Firm Dynamics, Growth and Survival in South Africa

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Abstract:
A major concern as an economy develops is the evolution of in its industrial structure, with a mixture of firms of different sizes important for innovation and sustainable growth. There is however, little research on the evolution of the company sector within developing and emerging economies. This paper uses data on a panel of companies listed in the Johannesburg Stock Exchange (JSE) in South Africa with a special focus on those involved in manufacturing sector during the period 2000-2010 from the DataStream service to analyses the changing size distribution, concentration rates and reasons for non-survival. Using the law of proportionate effects framework (following Dunne and Hughes (1994) and others) it evaluates of the relative growth rates of large and small companies in general and at sectoral level. Overall, the results suggest that smaller firms are growing faster than larger ones, and more interestingly it is the very smallest of the small and medium firms that are growing fastest. The policy implications for job creation interventions are not straightforward considering the differences in absolute numbers of the employment generated by small and large firms. It is recommended that more efforts should be directed towards improving the general business environment, while paying attention to the low survival of smaller firms.

Keywords: Economic growth; manufacturing; firm size distribution; Gibrat's law; employment

JEL classifications: L25; C2; O55

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Preliminary draft. Comments welcome. Please do not quote

1. Introduction

One of the major economic challenges facing the post-apartheid government in South Africa is the persistently high unemployment rate, inequality and relatively low economic growth. The severity of these challenges is apparent when South African macroeconomic performance is compared against other emerging market economies. During the period 2002-2011, South African GDP grew by an average of 3.6 per cent and only experienced a recession of 1.5 per cent in 2009, largely due to the second round effects of the global financial crisis. This was similar to Brazil, which grew by average 3.7 per cent during the period, but considerably less than China and India, which registered average growth of 10.3 per cent and 7.7 per cent respectively. A similar pattern is observed in the growth of GDP per capita. Over the same period unemployment in South Africa averaged 24.4%, much higher than the single digit rates observed in Brazil, China and India[1]. Persistent high unemployment is seen as one of the major failures of the incumbent ANC government. Over the years the Government adopted a number of policy initiatives aimed at addressing these challenges. The policies range from the Reconstruction and Development Policy (RDP), Growth Employment and Redistribution (GEAR) in the late 1990s to the more recent ones the New Growth Path (NGP), National Industrial Policy Framework (NIPF) and National Development Plan (NDP). The NDP which is intended as the policy framework to achieve average economic growth target of 5 per cent per annum, which is just 1.5 per cent from the current average and it is not clear how this will substantially affect employment.

In order to fully understand the dynamics of the South African economy, it is important to appreciate that its economic structure is closer to that of developed than developing countries (Fedderke: 2013). About 67 per cent of total output is contributed by the service sector, with finance, real estate and business services subsector representing the bulk of the services sector. The secondary sector is the second largest sector in the economy accounting for 19 per cent of GDP in 2010, while the manufacturing sub-sector accounted for 12.9 per cent of GDP in 2010 and has been on a downward trend since the 1970s. The primary sector is the smallest of the three and accounted for 10.6 per cent of GDP in 2010, with the mining and quarrying sub-sector dominant, accounting for 7.5 per cent of GDP. Mining is the traditional bedrock of the South African economy and continues to play the pivotal role in the economy.

The performance of manufacturing has been the subject of discussion in both policymaking and academic circles (Bell: 1995). The sector is relatively diversified covering automotive, textiles and clothing, carbon and stainless steel and chemicals, with 94 products accounting for 75 per cent of exports in 2007. This is very high by African standards, with most developing countries merchandise exports dominated by a few products, mainly primary commodities. The leading industry, automotive, has largely benefited from incentives provided by the government, as has the textile and clothing sector because of its high

[1] These concerns are discussed in the recent International Monetary Fund (IMF) assessment which concludes that South African economic growth underperforms relative to its peer emerging economies.

employment generation capacity. Despite the implementation of a series of trade liberalisation reforms that marked the post-apartheid period, the sector has declined from a share of GDP of 19.3 per cent in 1994 to 11.3 per cent in 2012. It has resulted in the net loss in employment generated by the sector, with the main loss of employment in the low and medium skill industries (Dunne and Edwards, 2007). Employment in the manufacturing sub-sector fell by 5.4 per cent in 2000-10 and was particularly bad in the period 2005-10.

In contrast, as well as being the largest employer in 2010 the tertiary sector was the only one that experienced employment growth 2000-10. It grew by 16 per cent over the decade, while the primary and secondary sectors fell by 42 per cent and 11 per cent respectively. There is an issue in interpreting the sectoral employment changes. It is not completely clear the degree to which the changes are structural or simply represent displacement. The change in employment in services is in 'other services' and when this has been looked at in more detail the big change is in labour brokers, but we do not know who which sectors the labour brokers are providing labour to (Tregenna, 2010).

While it is clearly important to analyse the development of the economy at a sectoral level to identify the areas of growth and decline and of potential growth in employment, it still does not tell us about the dynamics within the sectors. The sectors are made up of companies of different sizes and a changing distribution of firms over time can have important implications for an economy. A tendency towards increased (or decreased) concentration within an industry can have implications for competitiveness, innovation, employment and trade in an industry and in the economy as a whole. Studies have looked at competition and different aspects of the industrial structure in South Africa including Fedderke (2013), Fosu (2013), Fedderke and Naumann (2011), Fedderke and Szalontai (2009), and Aghion et al (2008)[2]. None of these considered the relationship between firm growth and size, despite the emphasis given to this in the general industrial economics literature.

This paper focuses upon this issue and considers the changing distribution of companies in South Africa over the period 2000-2010, using data collected from Datastream and other sources of companies listed on the JSE. It follows the work of Dunne and Hughes (1994) and others in using the law of proportionate effects (LPE) framework and considers the implications for South Africa. The next section presents the relevant theoretical background and related empirical research on firm growth and survival in emerging and developing countries. Section three then discusses the data used and the method of collection, the distribution of firms and their growth and survival over time, with section four analysing the relationship between size and growth to see if there is any systematic pattern, using the law of proportionate effects (Gibrat's law) approach followed by an analysis of the relationship between firm growth and employment creation in section five. Section six presents some conclusions and policy implications.

[2] Gilbert et al(no date) presented at ERSA workshop on Quantitative Techniques for Competition Analysis in March 2013

2. Analyses of Firm Growth and Size

There is an extensive literature on the theory of firm growth and market structure that has been reviewed in a number of articles, including Hart (2000), Sutton (1997) and Trau (1996). This presents the neoclassical theory of the firm as providing the basic starting point towards understanding the theory of firm growth, with assumptions that firms are profit maximising and there exists some equilibrium size of the firm. Firms can grow up to this size and beyond which there is no incentive for further growth or shrinkage, determined by the U-shaped average cost curve. This would imply that faster growing smaller firms are firms moving towards the minimum efficient level. This has been seen as unsatisfactory as there is no evidence indicating the convergence towards the equilibrium size and neoclassical theory has been extended to allow for imperfect competition and economies of scale. Despite these development Hart (2000) argues that there have been a number of institutional factors advanced, since the 1960s, to explain the observed faster growth of small firms that render the neoclassical view inadequate. This includes the evidence that average cost curves are more likely to be L shaped particularly for larger firms and the potential for managerial theories of the firm to successfully explain performance. The dissatisfaction about the neoclassical approach led to more institutional approaches, but also the stochastic approach which argues that the determinants of firm growth rates are complex and determined by a range of factors and behaviour that make treating growth as a random shock on initial firm size. While the approach has been criticised as atheoretical, it has been widely used in empirical work analysing the growth of companies and the changing size distribution of firms. It uses the framework of testing Gibrat's law, the law of proportionate effects (LPE), on company data that is outlined below and adopted in this study (Dunne and Hughes, 1994 and 1993; Sutton, 1997; Caves, 1998)[3].

While initial studies supported the LPE, recent studies have continually rejected it (Hart, 2000). The evidence from emerging and developing market, however, has been scanty, partly because of the unavailability of firm level data. Earlier studies had mainly used the limited survey data, but availability of stock exchange data has provided a more reliable and comprehensive source. In the case of South Africa the only available study in McPherson (1996), who tested of the law of proportionate effects in four developing countries including South Africa, using survey data from two townships in South Africa and comparing the results to those from other Southern African countries Lesotho, Swaziland Botswana and Zimbabwe. The evidence from the two other BRICS countries include Zhang et al (2009), Shanmugan and Bhadura (2002). Zhang et al (2009) used the data on listed Chinese firms and found that support for LPE was conditional on industry. The studies testing the law in emerging and developing countries are summarised in Table A1 in the appendix.

[3] It was used in the 1970s to analyse the reasons for an observed inexorable rise in concentration of manufacturing industry, which led to concern that this would continue and lead to increasing monopoly power (Hannah and Kay, 1977).

3. Firm Growth and Survival in South Africa

Information on South African companies listed on the Johannesburg Stock Exchange (JSE) is available from Datastream and data was collected for the period 2000-2010. While focusing on listed companies may be open to criticism for over representing the large firms, the range of firms covered is relatively large and there is no other comprehensive dataset of firms across the size groups available in South Africa and as Jenson (2004) argues the JSE listed companies to a large extent represent the characteristics of the corporate sector of the South African economy. The data comprises income statements, profit and loss accounts and the balance sheet for each of the companies during the period and additional non-financial data were obtained from various sources including the Profiles Stock Exchange Handbooks, Macgregor Handbooks and online database, Financial Times top companies online and Who Owns Whom online database. Information on mergers and acquisitions was sourced from the website of the Competition Commission of South Africa and Bloomberg database. Firm age is measured as the year 2005 minus the year in which the firm was founded. The full descriptions of the variables collected are provided in the appendix. To consider the development of the size distribution of firms, data is taken from the first year, 2000, of the period the middle year, 2005, and the final year, 2010.

The empirical literature has utilised a number of measures of firm size including net sales/revenue, total assets and employment. Smyth et al (1975) and Shalit and Sankar (1977) investigate the interchangibility of the alternative measures and argue that the choice of the suitable one depends on the question being investigated, but is often the result of data availability. In this study net sales and employment measures are used. Net sales is used as the main measure mainly because it has the least missing values and so provides the largest sample, though in fact the different measures were found to be highly correlated. Employment is used to tease out the relationship between firm growth and job creation in order to inform the resulting policy recommendations.

Considering the evolution of the number of companies listed in the JSE during the period 1995-2010 in Table 1, the larger number of firms in the earlier period reflects some changes in the JSE over the period. This includes allowing of offshore listing. As Burke (2005) explains, the population of the JSE went from 669 in 1998 to 396 in 2004, while at the same time the capitalisation of the JSE almost doubled. The reason for this seems to have been a tranche of unsuited companies listing on the JSE because of a listing boom, with a lot of fund money going into small capitalisations companies for expected large returns, encouraging listings and driving up prices, until the bottom fell out of the market. To prevent such excesses the JSE tightened up listing requirements. And this is apparent in Table 1 for non-financial companies, particularly for 1997-8. While this change will not affect the analysis of surviving firms, it does impact upon the results in the analysis of non-survivors, which

focuses on the reasons why companies did not survive both overall and broken down by size group[4].

Table 1: Number of Non-Financial Companies in the JSE in the Period 1995-2010

Year	Number of Non-Financial Companies
1995	158
1996	166
1997	186
1998	413
1999	442
2000	401
2001	350
2002	320
2003	308
2004	307
2005	307
2006	312
2007	325
2008	320
2009	314
2010	304

Moving to analyse the changing size distribution of these firms over the period 2000-10 a useful procedure is to construct a transition matrix over a number of years. Starting with the distribution in 2000 and considering how firms moved (or didn't) across size groups or out of the sample by 2005 and then repeating this for 2005-10, gave the results in Table 2. Out of the 400 companies that were alive in 2005, 288 (72 per cent) survived to 2010. As expected, the highest survival rate is observed in higher size groups with survival rate of over 90 per cent compared to 54.7 per cent in the lowest size group. Of the surviving companies 121 (42 per cent) remained in their size groups and a sizable number of the companies moved up to the next size group, with fewer moving beyond three groups. A smaller number of companies moved to lower size groups. The notable downward movement was the two companies that declined from the size groups' R3-4billion and R4-5billion respectively to the lowest size group of less than R0.1 billion. The pattern is similar for the period 2000-2005 as presented in panel 2 of Table 5. There were 518 companies alive in 2000 and 294 (56.8 per cent) survived the five years and 139 (47.2 per cent) remained in their size groups. Interestingly, the ratio of firm remaining in their size groups during the five years is comparable with 45.6 per cent found in Dunne and Hughes (1994) in the case of UK firms. Bigsten and Gebreeyesus (2007) reported 75 per cent in the case of Ethiopia for the five year period.

[4] It may also affect the results of sample selection models used later, as the full number of firms will be included in the survival equation. This is discussed later.

Table 2: Transition matrices by Sales

Panel 1: 2005-2010												
Companies alive in 2005 by Sales Size		Survivors		Sales2010(billions)								
				<0.1b	0.1-0.5b	0.5-1b	1-2b	2-3b	3-4b	4-5b	5-10b	>10b
Rbn	Number	Number	%	Number								
<0.1b	128	70	54.7	39	24	4	2	1	0	0	0	0
0.1-0.5b	101	72	71.3	5	25	24	16	0	1	0	1	0
0.5-1b	33	27	81.8	0	1	5	13	3	3	1	1	0
1-2b	24	18	75.0	0	0	2	4	6	5	1	0	0
2-3b	16	13	81.3	0	0	0	0	1	5	2	4	1
3-4b	17	15	88.2	1	0	0	0	1	1	4	5	3
4-5b	16	12	75.0	1	0	0	0	0	0	0	8	3
5-10b	24	23	95.8	0	0	0	0	0	0	1	8	14
>10b	41	38	92.7	0	0	0	0	0	0	0	0	38
Total	400	288	72.0	46	50	35	35	12	15	9	27	59
Panel 1: 2000-2005												
Companies alive in 2000 by Sales Size		Survivors		Sales2005(billions)								
				0.1b	0.1-0.5b	0.5-1b	1-2b	2-3b	3-4b	4-5b	5-10b	>10b
Rbn	Number	Number	%	Number								
<0.1b	182	96	52.7	67	24	2	2	0	1	0	0	0
0.1-0.5b	146	71	48.6	12	38	18	3	0	0	0	0	0
0.5-1b	44	23	52.3	0	5	4	9	4	1	0	0	0
1-2b	47	30	63.8	0	0	2	5	8	6	6	3	0
2-3b	22	14	63.6	0	0	0	1	0	3	6	4	0
3-4b	13	8	61.5	0	0	0	0	0	0	0	7	1
4-5b	10	8	80.0	0	0	0	0	1	1	0	4	2
5-10b	26	19	73.1	1	0	0	0	1	0	3	3	11
>10b	28	25	89.3	0	2	0	0	0	0	0	1	22
Total	518	294	56.8	80	69	26	20	14	12	15	22	36

Another important concern is exactly why the companies did not survive. The implications for the economy are rather different when companies are going bankrupt, than if they are being taken over while growing. The earlier period has a larger number of firms, but also a considerable larger number and proportion of firms failing. The categories for firm deaths are identified are takeover, liquidation, delisting and other. The study departs from Dunne and Hughes (1994) and includes delisting category in order to investigate the effects of the listing boom identified in the period 1997-98. Takeover is a general term referring to the transfer of control of a firm from one group of shareholders to another and can take different forms including mergers and acquisition (M&A). A merger being the consolidation of two companies in which one survives and the merged one goes out of existence. In essence the acquiring firm assumes the assets and liabilities of the merged company, though sometimes

the target company becomes the subsidiary of the parent company and does not disappear from the sample[5]. Changes in scheme of arrangement, offer to minorities and offer to shareholders are all considered as takeovers, which may be by other listed companies or by non-listed ones. Liquidations include no dividend liquidation, voluntary winding up and disposal, while Delisting include voluntarily delists suspension and failure to comply with listing requirements. Others include unbundling of assets and companies that based on the available data we cannot confidently classify. As those categorised as failing to comply with listing requirements or suspended could be companies in transitory states, that were in the process of being taken over or liquidated, more information was collected to verify the final classification.

As Table 3 shows, the death rate between 2005 and 2010 was lowest in the upper most size groups and highest in the lowest size groups. Takeover was the main cause of death (13.5 per cent) and varied across the size classes, with the highest proportions in the R1-2billion and R4-5billion groups, at 25 per cent each. The figures for 2000-2005 were somewhat different in scale, but had a similar pattern. The death rate was considerably higher, 42 per cent compared to 22 per cent and the main cause of death was again found to be takeover. To investigate the listing issue, a delisting category was added to the usual categories, which reduced the number in the 'other' category, but did not alter the takeover and liquidation categories much. This suggests there was no tranche of firms listing and then delisting, but it is likely that a number of the newly listed firms were liquidated or taken over.

[5] A consolidation is when the two or more companies form an entirely new entity, so in our panel we will see a birth. It may be an issue whether you treat the new company as a birth or just a combination of the two in dealing with historical data.

Table 3: Sales Size Distribution by Type of death

Panel 1: 2005-2010												
Companies alive in 2005 by Sales Size		Non-Survivors		Type of Death								
				Takeover		Liquidated		Delisting		Other(1)		Missing(2)
Rbn	Number	Number	%	Number	%	Number	%	Number	%	Number	%	Number
<0.1b	128	35	27.3	14	10.9	2	1.6	10	7.8	2	1.6	7
0.1-0.5b	101	29	28.7	18	17.8	5	5.0	1	1.0	0	0.0	5
0.5-1b	33	6	18.2	6	18.2	0	0.0	0	0.0	0	0.0	0
1-2b	24	6	25.0	6	25.0	0	0.0	0	0.0	0	0.0	0
2-3b	16	3	18.8	2	12.5	0	0.0	0	0.0	0	0.0	1
3-4b	17	2	11.8	1	5.9	0	0.0	1	5.9	0	0.0	0
4-5b	16	4	25.0	4	25.0	0	0.0	0	0.0	0	0.0	0
5-10b	24	1	4.2	1	4.2	0	0.0	0	0.0	0	0.0	0
>10b	41	3	7.3	2	4.9	1	2.4	0	0.0	0	0.0	0
Total	400	89	22.3	54	13.5	8	2.0	12.0	3.0	2	0.5	13
Panel 1: 2000-2005												
Companies alive in 2000 by Sales Size		Non-Survivors		Type of Death								
				Takeover		Liquidated		Delisting		Other(1)		Missing(2)
Rbn	Number	Number	%	Number	%	Number	%	Number	%	Number	%	Number
< 0.1b	182	86	47.3	39	21.4	21	11.5	20	11.0	6	3.3	0
0.1-0.5b	146	75	51.4	51	34.9	16	11.0	4	2.7	4	2.7	0
0.5-1b	44	21	47.7	13	29.5	6	13.6	1	2.3	1	2.3	0
1-2b	47	17	36.2	13	27.7	2	4.3	1	2.1	0	0.0	1
2-3b	22	8	36.4	7	31.8	1	4.5	0	0.0	0	0.0	0
3-4b	13	5	38.5	3	23.1	1	7.7	1	7.7	0	0.0	0
4-5b	10	2	20.0	2	20.0	0	0.0	0	0.0	0	0.0	0
5-10b	26	7	26.9	5	19.2	1	3.8	0	0.0	1	3.8	0
>10b	28	3	10.7	3	10.7	0	0.0	0	0.0	0	0.0	0
Total	518	224	43.2	136	26.3	48	9.3	27	5.2	12	2.3	1
1) Includes unbundling of assets and unclassified 2)Includes missing and zero values in the second period												

4. Firm Size and Growth in South Africa

Assuming that the factors that influence firm growth are complex and there is no obvious systematic pattern across different sizes of firms implies that the probability distribution of growth rates is the same for all sizes. Thus growth could be treated as random shocks

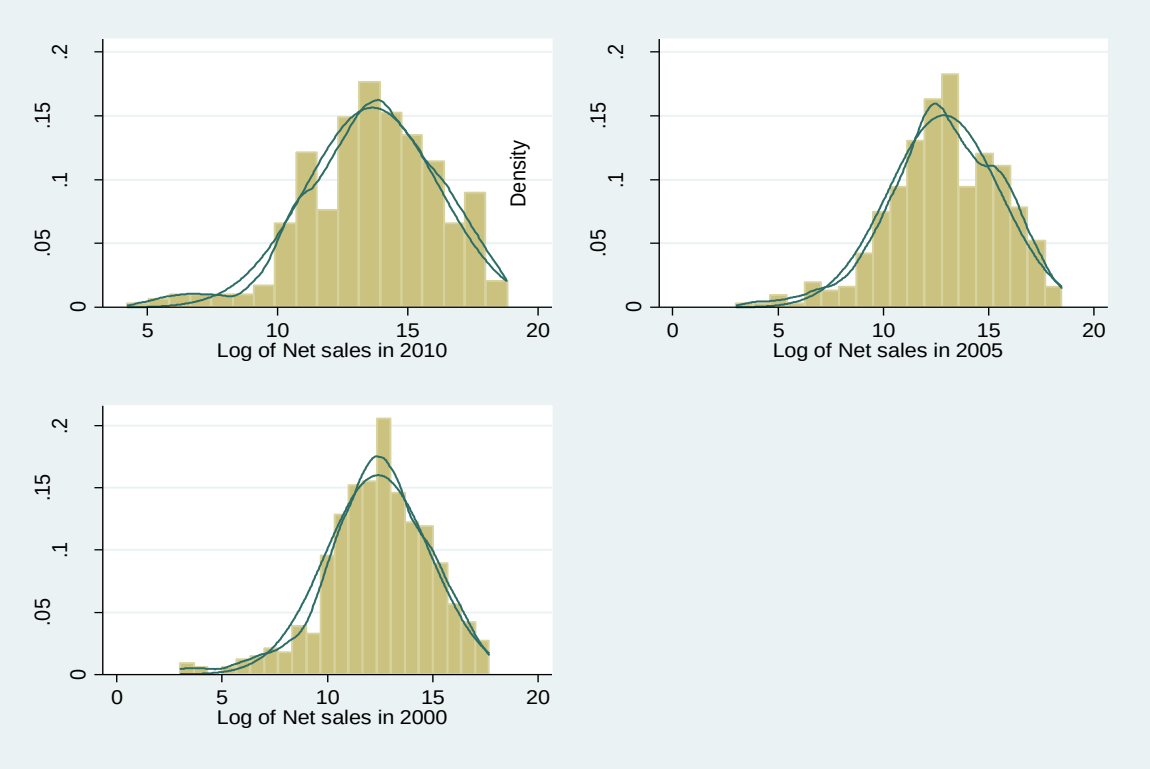
distributed across the size distribution and is the hypothesis representing the law of proportionate effects (LPE). One means of checking whether this holds follows Dunne and Hughes (1994) in looking at the distribution mean growth rates, which should be the same across size classes if the LPE holds there should not be differences in the mean growth rates across the size classes. Table 4 presents the net growth of net sales and standard errors are tabulated across all the size classes. It is clear for both periods that the growth rates are not distributed equally, giving evidence against the LPE, and it is the slowest size classes that show the highest growth rates. There are also interesting differences across the two periods, with the middle size classes registering the highest mean growth for 2000-5 while companies with sales greater than R10 billion were the slowest growing.

Table 4: Mean growth of Net sales

	2005-2010					2000-2005				
Rbn	N	Mean	Std. Err.	[95% Conf.	Interval]	N	Mean	Std. Err.	[95% Conf.	Interval]
< 0.1b	70	1.52	0.23	1.07	1.98	82	0.58	0.23	0.13	1.04
0.1-0.5b	72	0.82	0.10	0.63	1.02	70	0.17	0.14	-0.10	0.44
0.5-1b	27	0.81	0.12	0.56	1.06	23	0.43	0.14	0.13	0.73
1-2b	18	0.47	0.12	0.22	0.73	30	0.61	0.10	0.39	0.82
2-3b	13	0.58	0.10	0.36	0.81	14	0.54	0.08	0.36	0.72
3-4b	15	0.26	0.33	-0.45	0.97	8	0.81	0.14	0.47	1.14
4-5b	12	0.32	0.40	-0.57	1.21	8	0.42	0.26	-0.20	1.03
5-10b	23	0.46	0.10	0.26	0.67	19	0.11	0.29	-0.50	0.73
>10b	38	0.55	0.05	0.44	0.66	25	0.05	0.30	-0.58	0.67

The LPE implies that the log of sales can be tested for normality and following Bigsten and Gebreeysus (2007), figure 1 presents histograms for the log of sales overlaid by the kernel density functions and the normal distribution for the years 2000, 2005 and 2010. The distributions are relatively close to normal and skewness and kurtosis tests and the Shapiro-Francia test for normality reject the null, suggesting that the LPE is likely to be rejected.

Figure 1: Sales Distributions



A more formal method of testing the law of proportionate effect is using regression analysis. Gibrat's law states that the probability distribution of growth rates was the same for all sizes of firms.

$$\frac{S_{it}}{S_{it-1}} = \varepsilon_{it}$$

This can be tested by writing it as:

$$logS_{it} = \alpha + \beta \log S_{it-1} + \varepsilon_{it}$$

and testing if $\beta = 1$. Using this method and estimating the coefficient allows an interpretation of the process involved if the hypothesis is rejected as, if $\beta < 1$ smaller firms are growing faster than the larger firms and if $\beta > 1$ the larger firms are growing faster than the smaller firms.

Estimating the log linear equation above gave the results in Table 5, which confirm the results of the more informal tests above. For 2005-10 the beta coefficient is 0.805 and significantly less than one. For the earlier period the estimated coefficient was larger at 0.906, but still significantly less than one. The observed difference in the magnitude of the beta coefficient is indicative of some process at play between the two periods. It is important to

note that the listing boom noted earlier will not explain these differences as it is only companies that survive over the five year period that make up the sample. However, the result provides evidence that over both periods smaller firms were growing relatively faster than larger firms.

In general our results are in line with earlier studies in finding beta less than unity. Dunne and Hughes (1994) in the UK for the period 1980-85 and 1975-1980 found the consistent beta coefficient of 0.93, while for China, Zhang et al (2009) found the beta coefficient of 0.66 for the six year period 1997-2003. It is worth noting that Zhang et al (2009) beta coefficient tended to increase when the period was shortened to year on year.

Table 5: OLS Estimates

Panel 1	*Continuing Companies,2005-2010*							
	N	ls2005		Constant		R-squared	Wald(beta=1)	
ALL	288	0.805***	(0.0242)	3.418***	(0.325)	0.795	65.44	0
SMALL	70	0.468***	(0.109)	6.646***	(1.066)	0.214	23.95	0
MEDIUM	157	0.832***	(0.0594)	2.927***	(0.802)	0.559	7.99	0.0053
LARGE	61	0.958***	(0.0670)	1.217	(1.108)	0.776	0.4	0.5311
PRIMARY SECTOR	46	0.958***	(0.0547)	1.264	(0.780)	0.875	0.58	0.4494
SECONDARY SECTOR	107	0.809***	(0.0381)	3.350***	(0.510)	0.811	25	0
SERVICES SECTOR	135	0.759***	(0.0372)	4.012***	(0.492)	0.758	41.98	0
MANUFACTURING SECTOR	94	0.811***	(0.0336)	3.276***	(0.460)	0.864	31.6	0
Panel 2	*Continuing Companies,2000-2005*							
	N	ls2000		Constant		R-squared	Wald(beta=1)	
ALL	279	0.906***	(0.0321)	1.583***	(0.417)	0.742	8.55	0.0037
SMALL	82	0.582***	(0.119)	4.600***	(1.160)	0.231	12.41	0.0007
MEDIUM	153	1.153***	(0.0630)	-1.672*	(0.846)	0.689	5.89	0.0164
LARGE	44	1.121***	(0.376)	-1.893	(6.127)	0.175	0.1	0.7495
PRIMARY SECTOR	40	0.740***	(0.0607)	4.176***	(0.813)	0.796	18.36	0.0001
SECONDARY SECTOR	94	1.045***	(0.0608)	-0.390	(0.804)	0.762	0.54	0.4643
SERVICES SECTOR	145	0.902***	(0.0450)	1.627***	(0.574)	0.738	4.72	0.0315
MANUFACTURING SECTOR	83	0.923***	(0.0572)	1.324*	(0.757)	0.763	1.83	0.1802
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1								

It is important to consider whether or not these aggregate results are a reasonable representation of the overall picture, or can be explained by the behaviour of particular difference sectors or size groups. Disaggregation also allows a closer analysis of sectors of

particular interest, such as manufacturing. Three size classes were defined to distinguish small, medium and large companies. In doing this the official South African definition of small company is not followed, for obvious reason that the sample is drawn from the stock exchange listed companies and is biased towards relatively large enterprises. A small company is defined as the one with net sales of less than R0.1 billion. These companies also have an average of less than 500 employees, which is in line with the European Union (EU) definition. Medium companies are the ones with net sales of R0.1-5billion, while large is above R5billion. The results are shown in rows 2 - 4 of each panel in Table 5 and show variation across the size classes. Interestingly the results for 2005-10 show the small and medium sized firms to reject the LPE restriction, but the large firms not to, a feature shared with the 2000-5 period, but with generally lower coefficients. This implies that in addition to the evidence that small firms tend to grow faster it is also the case that within the small firm group, it is the smaller firms that tend to grow faster, a similar result to Dunne and Hughes (1994).

Below the size results are the results for the three economic sectors – primary, secondary and services. It was also decided to isolate the manufacturing sector, defined as all industries that are in the international standard industrial classification (ISIC) 15- 37. The results do show variation across the sectors with the primary sector coefficient for 2005-10 not being significantly less than one, as shown by the Wald test is reported in the last column. This means that the LPE is not rejected. For the other sectors and manufacturing the coefficient is significantly different from zero, suggesting that smaller firms grew faster than the larger ones. Interestingly the results for 2000-5 were different with the secondary sector and manufacturing not rejecting the LPE, but the others doing so. It does seem that there is some process of change at work over this time period, moving away from a tendency towards concentration in manufacturing and the secondary sector as a whole, but with the primary sector developing a tendency to concentration in the later period. Certainly the change in results for the primary industry across the periods is striking.

These are intriguing results, but there are a number of specification issues that need to be dealt with. Firstly, it may be that slow growing small firms, for example, are not growing slowly because they are small per se, but because they are old. If the age of the firm is important this could lead to heteroscedasticity (Dunne and Hughes, 1994). Adding age to the regression did not affect the results. It was insignificant in all equations except the full sample for 2000-5 and in that equation did not change the rejection of the unitary restriction[6].

[6] These results are available from the authors on request

Table 6: OLS Growth Persistence results

Dep:growths20102005	N	growths20052000		Constant		R-squared
ALL	213	-0.410***	(0.0565)	0.937***	(0.0785)	0.200
SMALL	57	-0.526***	(0.103)	1.472***	(0.214)	0.322
MEDIUM	117	-0.425***	(0.0677)	0.852***	(0.0693)	0.255
LARGE	39	0.242*	(0.123)	0.313**	(0.128)	0.094
PRIMARY SECTOR	34	-0.185	(0.206)	0.785***	(0.228)	0.024
SECONDARY SECTOR	77	-0.491***	(0.0859)	0.844***	(0.115)	0.304
SERVICES SECTOR	102	-0.392***	(0.0813)	1.016***	(0.122)	0.188
MANUFACTURING SECTOR	68	-0.618***	(0.0916)	0.860***	(0.104)	0.408
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

Second, there is the possibility of the existence of persistence, or serial correlation, which could invalidate the test. To check this the current period is explained by growth in the previous period, firm growth in the five year period 2005-2010 was regressed on growth in previous five year period and the results are presented in Table 6. Of the 518 companies alive in 2000 about 217 companies survived through the two periods. For the aggregate, first period growth is statistically significant but the R-squared is only 0.2. The coefficient is also statistically significant for the small, medium and large companies. In the economic sectors the coefficient is significant in both secondary sector, services and manufacturing, but not in the primary sector. There is evidence of persistence, but this is for companies that survived over the whole period 2000-10, so may not have a particularly large impact on the results of the growth equations. It certainly suggests that the parameter estimates are consistent rather than unbiased, with any bias likely to increase the value of the parameter estimates. This implies that there is a stronger case for any rejection of the LPE restriction that beta is equal to one.

Third, an important concern in the literature is that of sample selection bias, as the OLS regressions above only include companies that have survived over the estimation period. If the non-surviving companies share certain characteristics, such as they are slow growing, then this can obviously bias the estimation results. For example, it is possible that most of the companies that 'died' were of a particular type, small and slow growing, as opposed to big and slow growing. This would mean that the coefficient estimates would be biased. One means of dealing with this is to use the Heckman sample selection model, which starts with a survival equation that estimates the probability of survival based on opening size and then uses that probability, suitably transformed, in the growth equation specification to deal with the bias. This model can be estimated using the standard Heckman two stage procedure or simultaneously, using a maximum likelihood procedure. The maximum likelihood procedure does have some advantages and is chosen here and the results are presented in appendix Table A3 (Dunne and Hughes, 1994).

Table 7 presents a summary of the two sets of results and comparison of the maximum likelihood and OLS estimations, where missing values imply non convergence of the procedure. The maximum likelihood estimation results for 2005-10 show that the coefficients are similar but lower than the OLS ones, for the total sample, except for the primary sector which remained the same. The null hypothesis of beta coefficient being equal to unity is being rejected in all equations except for the primary sector and it was not possible to get a maximum likelihood estimate for the large firms. Lower coefficients with a similar pattern of rejections of the null was also evident for the earlier 2000-05 period, particularly for the aggregate and services sector equations. No ML results could be obtained for the primary and manufacturing sectors.

A further concern is the possibility that the age of the company may be important. This would mean for example that some slow growing firms might be like that not because they were small, but because they were old and so different from the young small firms. To deal with this potential omitted variable bias all of the results were re- estimated introducing age as an independent variable. For both periods the age variable was insignificant had little effect on the results.

Table 7: Summary Maximum Likelihood and OLS Equations

	MAXIMUM LIKELIHOOD		OLS	
	ls2005	ls2000	ls2005	ls2000
ALL	0.726*	0.780*	0.805*	0.906*
SMALL	0.458*	0.568*	0.468*	0.582*
MEDIUM	0.769*	1.151*	0.832*	1.153*
LARGE	……..	1.156	0.958	1.121
PRIMARY SECTOR	0.958	……	0.958	0.740*
SECONDARY SECTOR	0.764*	0.925	0.809*	1.045
SERVICES SECTOR	0.691*	0.782*	0.759*	0.902*
MANUFACTURING SECTOR	0.753*	…….	0.811*	0.923

* reject the null that the coefficient in 1
….no convergence

5. Firm Growth and Employment

So far the focus has been on the changing size distribution of firms with respect to sales measure, however what is more relevant in the African context is the changing distribution of firms in terms of employment. The finding that the smaller firms tend to grow faster is useful, given the emphasis that is often put on the role of small firms in job creation. Also as Dunne and Hughes (1993) discuss, small firms may grow quickly, but they may not be particularly good at creating sustainable employment, given the variance of their growth rates and high rates of failure. The loss of employment from the closure of one plant in a major company is also going to require a lot of growth from a lot of small firms. It is, therefore, of considerable interest to look at the dynamics of firm growth in terms of employment.

Unfortunately, as mentioned the reporting of employment in the dataset is much worse than for sales and moving to employment, reducing the number of companies by 50 per cent. Recognising the limitations that come with a reduced coverage and the likelihood that the missing data is not randomly distributed, it seems worthwhile to analyse the data that is available.

Table 8 below presents the distribution of employment across size class and shows that the companies that employed less than 500 employees had the highest mean growth of employment in both periods and the largest size class the slowest. In fact for 2000-2005, the mean employment growth in the more than 10000 size class and the 1000-5000 size class declined. This decline in employment is in line with an observed decline in employment during the period in both primary and secondary sectors in South Africa and the Table locates the loss of employment in the very largest size categories. The results are consistent with the sales data in suggesting that the law of proportionate effects will be rejected for the companies in South Africa in both periods.

Table 8: Employment Changes by Size

	2005-2010 (Thousands)							2000-2005(Thousands)						
Size Class	Growth in total employment 2005-2010		Total Employment in 2005		Employment in Surviving firms 2005-10			Growth in total employment 2000-2005		Total Employment in 2000		Employment in Surviving firms 2000-5		
	N	Mean	N	Mean	2005	2010	Change	N	Mean	N	Mean	2000	2005	Change
<500	36	0.70	80	0.2	12	14	2	29	0.68	63	0.15	10	12	2
500-1000	17	-0.11	23	0.7	17	19	2	19	0.14	35	0.70	24	17	-8
1000-5000	46	0.26	64	2.5	162	165	3	48	-0.03	79	2.25	178	162	-16
5000-10000	16	0.17	23	6.8	157	141	-16	21	0.09	34	7.27	247	157	-90
>10000	41	0.07	44	33.2	1460	1475	15	34	-0.16	41	35.57	1459	1460	-1

*growth is calculated as the difference of the logarithms

Moving on to testing the LPE, the estimation results in Table 9 show the LPE to be rejected for all companies over the period 2005-10, but not rejected for the other size categories and all sectors, except for the constructed manufacturing sector (and the primary sector at 6%). These results are different to those for sales and it is important to remember the reduced sample, but they seem to imply that the smaller firms grow faster when looking at all companies and that this is driven by companies in manufacturing. This implies that employment growth was random across the size distribution for employment for many sectors, meaning that there is underlying trend towards concentration in the shares of employment in large companies.

The results for 2000-5 were very different, though this might have been expected given the differences in growth observed in Table 8. The LPE was rejected for all companies, small companies and all sectors except manufacturing. In this case the smaller firms grow faster and within small firm category it is the smaller firms that grew fastest. These results are closer to those found for sales.

Table 9: OLS Estimations for Number of employees

Panel 1:2005-2010	*Continuing Companies,2005-2010*							
	N	le2005		Constant		R-squared	Wald(beta=1)	
ALL	156	0.902***	(0.0312)	1.016***	(0.248)	0.845	9.96	0.0019
SMALL	36	0.879***	(0.202)	1.272	(0.977)	0.358	0.36	0.5513
MEDIUM	79	1.112***	(0.0837)	-0.704	(0.650)	0.696	1.76	0.185
LARGE	41	0.908***	(0.0786)	1.012	(0.803)	0.774	1.38	0.2476
PRIMARY SECTOR	29	0.813***	(0.0957)	1.799**	(0.794)	0.728	3.81	0.0613
SECONDARY SECTOR	62	0.937***	(0.0468)	0.655*	(0.378)	0.870	1.82	0.182
SERVICES SECTOR	65	0.966***	(0.0300)	0.576**	(0.231)	0.943	1.29	0.2601
MANUFACTURING SECTOR	52	0.775***	(0.0715)	1.966***	(0.583)	0.701	9.86	0.0028
Panel 2:2000-2005	*Continuing Companies,2000-2005*							
	N	le2000		Constant		R-squared	Wald(beta=1)	
ALL	151	0.842***	(0.0286)	1.321***	(0.227)	0.853	30.95	0
SMALL	29	0.464***	(0.136)	3.029***	(0.621)	0.302	15.61	0.0005
MEDIUM	88	0.983***	(0.0710)	0.168	(0.552)	0.690	0.06	0.8078
LARGE	34	1.068***	(0.192)	-0.850	(1.968)	0.492	0.12	0.7263
PRIMARY SECTOR	22	0.776***	(0.0758)	1.862**	(0.666)	0.840	8.71	0.0079
SECONDARY SECTOR	61	0.842***	(0.0538)	1.283***	(0.434)	0.806	8.64	0.0047
SERVICES SECTOR	68	0.879***	(0.0390)	1.101***	(0.293)	0.885	9.65	0.0028
MANUFACTURING SECTOR	52	0.933***	(0.0418)	0.571*	(0.336)	0.909	2.55	0.1168
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1								

Considering the robustness of the results, Table 10 below presents a comparison of the sample selection model maximum likelihood estimates and the OLS results. For all companies, the results for both periods are a bit lower than the OLS and so provide a more significant rejection of the null. Across all the other categories the test results are consistent and the coefficients of similar magnitude. This implies that the OLS results are robust to sample selection.

Table 10: Summary Maximum Likelihood and OLS Equations - Employment

	ML		OLS	
	le2005	le2000	le2005	le2000
ALL	0.897*	0.783*	0.902*	0.842*
SMALL	0.761	0.556*	0.879	0.464*
MEDIUM	1.119	0.986	1.112	0.983
LARGE	0.892	1.043	0.908	1.068
PRIMARY SECTOR	0.692*	0.657*	0.813*	0.776*
SECONDARY SECTOR	0.94	0.759*	0.937	0.842*
SERVICES SECTOR	0.963	0.848*	0.966	0.879*
MANUFACTURING SECTOR	0.783*	0.953	0.775*	0.933
* reject the null that the coefficient is 1				

6. Conclusions and Policy Implications

Analysing the changing size distribution of firms in terms of sales has produced some interesting results that have policy implications. Using sales, takeover was found to be the main cause of death for 2005-10 and varied across the size classes, with the highest proportions in the R1-2billion and R4-5billion groups. Just under half of all non survivors in the smallest size category were taken over. The figures for 2000-2005 were somewhat different in scale, but had a similar pattern. This suggests that a major cause of no survival among small firms is takeover. The policy issue is then whether the firms are taken over to improve efficiency or to reduce potential competition and this is something in need of further research. When testing the LPE, smaller firms were found to growing relatively faster than larger firms and in the small category it was the very smallest that were growing fastest. There was some variation across sectors, with LPE not rejected for the primary sector. The LPE was also rejected for manufacturing sector in the period 2005-10 and this was consistent when employment was used. There was also some variation in the results for the earlier period, 2000-5.

This heterogeneity indicates the presence of some process of change at work over this time period and makes it difficult to draw general conclusions, but it is clear that in general smaller firms are growing faster than larger ones and that takeover are a major explanation of the exit of firms. Non survival is most prevalent in smaller firms. Both of these conclusions are encouraging, and initial policy implications can be drawn. Consistent with the experience in other countries smaller firms tend to be influential in employment creation but what is clear is that in aggregate the larger firms create more jobs and continue to do so over long period. Thus while policies that encourage and support smaller firms need to be introduced, as they are a basis for entrepreneurship and innovation, this should not be to the detriment of large companies. In other words rather broad based improvement of the business and investment climate are needed, particularly in the manufacturing sector. Policy needs to be focused on productivity enhancing interventions, so that the local companies can regain

competitiveness in the low skill and medium skill industries. This includes training on basic skills. Future research needs to look at other aspects of firm growth to strengthen this recommendation.

What the results also mean is that industrial policies aimed towards small firms are unlikely to provide a means of reducing unemployment significantly. The results for employment size distribution, while limited in relevance by lack of data, do illustrate the issues. In 2005, the mean employment for companies employing less than 500 people was 151 compared with 33178 people in companies employing more than 10000 and total employment by companies employing less than 500 class was 12083, which was less than one per cent of the total employment generated by firms in the more than 10000 class. Despite their slow growth the large firms have a bigger impact on employment generation. This coupled with the high death rate among small firms casts doubt on whether jobs created by small firms will last. This conclusion is supported by Kerr et al (2013) who, using labour force survey data for South Africa, found that small firms cannot be net job creators in South Africa. Also, Page and Soderbom (2012) argue that in order to create 'good' jobs a broad based policy aimed at improving the business environment in general instead of tying the intervention to firm size.

This is not to say that small firms are not important. The nature of the data used here, focussing upon listed companies, will tend to miss the smallest companies and bias the results towards larger companies. There is also no consideration being given to the informal sector. Nevertheless, the results do question the emphasis on small firms that is often found in policy. While they are an important part of a healthy economy providing innovation, competition a healthy industrial structure, they are unlikely to be important for net job creation in the future. Thus the state needs to focus on policies that are broad based, in the sense that it should not be size specific, but it does need to be aware of the dangers of concentration. As the main cause of death is takeover, the Competition Commission, which is already legally charged with approval of any mergers and acquisition in South Africa, has an important role to play in maintaining competition in markets.

It would appear that despite the high growth rates of smaller firms the focus of job creation and maintenance will be need to be in the larger size classes and any job creation schemes will also need to consider the likely impact on competitiveness, entry barriers and concentration.

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Appendix

Table A1: Recent Evidence from Selected Emerging and Developing Countries

Study	**Period** **N** **Country**	**Size Measure**	**Sample** **Estimation Method**	**Results**
Zhang et al(2009)	Period:1997-2003 N=570 Country: China	Total assets	**Sample:** Chinese listed companies **Method:** Quantile Regression	Mixed results
Shanmugan and Bhaduri (2002)	Period:1989-1993 N=1568 Country: India	Sales	**Sample:** CMIE Database **Method:** OLS and Fixed Effects	Rejects the law
Chen and Lu(2003)	Period:1988-1999 N= 258 firms Country: Taiwan	Fixed assets	**Sample:** Publicly traded Companies **Method:** Panel unit roots	Mixed results
McPherson(1996)	Period: N=244 Country: South Africa	Number of workers	**Sample:** Survey of micro and small enterprises in two townships. **Method:** OLS	Rejects the law
	Period: N=277 Country: Swaziland	Number of workers	**Sample:** Survey of micro and small enterprises **Method:** OLS	Rejects the law
	Period: N=599 Country: Lesotho	Number of workers	**Sample:** Survey of micro and small enterprises **Method:** OLS	Rejects the law
	Period: N=206 Country: Botswana	Number of workers	**Sample:** Survey of micro and small enterprises **Method:** OLS	Rejects the law
	Period: N=345 Country: Zimbabwe	Number of workers	**Sample:** Survey of micro and small enterprises **Method:** OLS	Rejects the law
Bigsten and Gebreeyesus(2007)	Period:1996-2003 N=5542 Country: Ethiopia	Number of workers	**Sample:** Annual Census of manufacturing establishments **Method:** OLS and Panel based methods	Rejects the law
Sleuwaegen and Goedhuys(2002)	Period: 1989-1994 N=185 Country: Cote d'ivoire	Number of workers and sales	**Sample:** Survey of manufacturing firms Method: two stage least squares	Rejects the law
Gunning and Mangistae (2001)	Period:1983-1993 N=220 Country: Ethiopia	Number of workers	**Sample:** Ethiopian Industrial Enterprise Survey **Method:** Least squares	Rejects the law
Alvarez and Vergara(2006)	Period:1979-1999 N=11644 Country: Chile	Number of workers	**Sample:**Annual Industrial Enterprise Survey **Method:** Least squares and MLE heckman	Rejects the law
Teal(1998)	Period:1992-1999 N=263 Country: Ghana	Number of workers and sales	**Sample:**Enterprise Survey and sales tax data **Method:** Least squares	Rejects the law
Page and Soderbom(2012)	Period:2001-2008 N=263 Country: Ethiopia	Number of employees	**Sample:** Large and medium Enterprise Survey **Method:** Least squares	Rejects the law

Table A2: Variables Description

Variable	**Description**	**Source**
$ls2000_{it}$	Log of net sales in 2000	Datastream
$s2000\_num_{it}$	Net sales in 2000	Datastream
$ls2005_{it}$	Log of net sales in 2005	Datastream
$s2005\_num_{it}$	Net sales in 2000	Datastream
$ls2010_{it}$	Log of net sales in 2010	Datastream
$s2010\_num_{it}$	Net sales in 2000	Datastream
$la2005_{it}$	Log of total assets in 2005	Datastream
$la2010_{it}$	Log of total assets in 2010	Datastream
$la2000_{it}$	Log of total assets in 2000	Datastream
$le2005_{it}$	Log of number of employees in 2005	Datastream
$e2005_{it}$	Number of employees in 2005	Datastream
$le2010_{it}$	Log of number of employees in 2010	Datastream
$e2010_{it}$	Number of employees in 2010	Datastream
$le2010_{it}$	Log of number of employees in 2000	Datastream
$e2010_{it}$	Number of employees in 2000	Datastream
$lage\_2005_{it}$	Log of age in 2005	Handbooks
$growths20052000_{it}$	Log difference of sales in 2005 and 2000.	
$growths20102005_{it}$	Log difference of sales in 2010 and 2005	
$growth\_employ20052000_{it}$	Log difference of number of employees in 2005 and 2000	
$growth\_employ20102005_{it}$	Log difference of number of employees in 2010 and 2005	
$survivor2005_{it}$	Dummy variable =1 if company survived the period 2000-2005 and 0 otherwise	
$survivor2010_{it}$	Dummy variable =1 if company survived the period 2005-2010 and 0 otherwise	

Table A3: Heckman Maximum Likelihood Estimations - Sales

Panel 1: 2005-2010								
	ALL	SMALL	MEDIUM	LARGE	PRIMARY	SECONDARY	SERVICES	MANUFACTURING
ls2005	0.726***	0.458***	0.769***		0.958***	0.764***	0.691***	0.753***
	(0.0289)	(0.129)	(0.0667)		(0.0611)	(0.0426)	(0.0441)	(0.0402)
Constant	4.872***	7.811***	4.114***		1.267	4.180***	5.529***	4.256***
	(0.398)	(1.276)	(0.902)		(0.908)	(0.581)	(0.593)	(0.565)
survival2010								
ls2005	-0.761***	-0.360	0.649		-0.135	-1.320***	-0.693***	-1.695***
	(0.132)	(0.355)	(1.706)		(0.542)	(0.359)	(0.177)	(0.339)
ls2005sq	0.0326***	0.0179	-0.0202		0.0171	0.0572***	0.0286***	0.0725***
	(0.00564)	(0.0207)	(0.0630)		(0.0236)	(0.0160)	(0.00729)	(0.0153)
Constant	4.838***	2.164	-4.398		-0.242	8.188***	4.436***	10.37***
	(0.786)	(1.513)	(11.49)		(3.054)	(2.049)	(1.085)	(1.955)
athrho	-1.339***	-1.582***	-1.353***		-0.00196	-1.061***	-1.651***	-1.398**
	(0.186)	(0.418)	(0.191)		(0.328)	(0.320)	(0.250)	(0.576)
lnsigma	0.270***	0.775***	0.0110		-0.0954	0.0882	0.408***	-0.0623
	(0.0545)	(0.122)	(0.0695)		(0.104)	(0.0854)	(0.0764)	(0.0972)
Wald(Beta=1)	89.88	17.71	11.96		0.47	30.77	49.15	37.63
	0	0	0		0.4924	0	0	0
N	377	105	207		57	128	192	111
Panel 2: 2000-2005								
	ALL	SMALL	MEDIUM	LARGE	PRIMARY	SECONDARY	SERVICES	MANUFACTURING
ls2000	0.780***	0.569***	1.152***	1.156***		0.925***	0.782***	
	(0.0395)	(0.123)	(0.0769)	(0.371)		(0.0747)	(0.0570)	
Constant	4.374***	4.449***	-1.647	-2.596		2.306**	4.456***	
	(0.521)	(1.215)	(1.235)	(6.070)		(0.981)	(0.743)	
survival2005								
ls2000	-0.605***	0.222	-4.616**	44.32**		-0.687***	-0.851***	
	(0.100)	(0.404)	(1.975)	(19.80)		(0.219)	(0.178)	
ls2000sq	0.0261***	-0.0172	0.179**	-1.343**		0.0288***	0.0353***	
	(0.00423)	(0.0242)	(0.0738)	(0.601)		(0.00962)	(0.00724)	
Constant	3.430***	-0.441	29.68**	-364.2**		4.123***	4.967***	
	(0.614)	(1.633)	(13.16)	(163.0)		(1.296)	(1.101)	
athrho	-1.973***	0.191	-0.0133	0.310		-3.093***	-2.009***	
	(0.146)	(0.487)	(0.494)	(0.344)		(0.565)	(0.220)	
lnsigma	0.647***	0.653***	-0.125**	0.341***		0.608***	0.695***	
	(0.0522)	(0.0978)	(0.0573)	(0.114)		(0.0839)	(0.0743)	
Wald(Beta=1)	31.03	12.35	3.89	0.18		0.99	14.66	
	0	0.0004	0.0485	0.6739		0.3186	0.0001	
N	495	160	281	54		161	270	
Standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1						

Table A4: Heckman Maximum Likelihood Estimations - Employment

Panel 1:2005 - 2010	ALL	SMALL	MEDIUM	LARGE	PRIMARY	SECONDARY	SERVICES	MANUFACTURING
le2005	0.897***	0.761***	1.119***	0.892***	0.692***	0.940***	0.963***	0.783***
	(0.0368)	(0.270)	(0.0882)	(0.0799)	(0.132)	(0.0527)	(0.0367)	(0.0841)
Constant	1.049***	1.984	-0.887	1.185	2.960**	0.625	0.622*	1.885***
	(0.326)	(1.627)	(0.701)	(0.819)	(1.195)	(0.461)	(0.378)	(0.727)
le2005	0.241	1.169	-4.226	-392.6	-2.732	0.296	0.400	0.171
	(0.273)	(1.162)	(3.669)	(302.9)	(2.233)	(0.559)	(0.364)	(0.690)
le2005sq	-0.00130	-0.104	0.269	20.20	0.244	-0.000316	-0.0179	0.00937
	(0.0202)	(0.132)	(0.236)	(15.55)	(0.185)	(0.0417)	(0.0272)	(0.0522)
Constant	-0.912	-2.886	17.26	1,908	7.434	-1.145	-1.347	-0.765
	(0.880)	(2.449)	(14.13)	(1,475)	(6.231)	(1.832)	(1.155)	(2.192)
athrho	0.0277	-0.102	0.646	-0.435	-0.174	0.0465	-0.0927	0.0695
	(0.213)	(0.591)	(0.464)	(0.605)	(0.416)	(0.414)	(0.611)	(0.342)
lnsigma	-0.200***	0.338***	-0.433***	-1.103***	0.381***	-0.451***	-0.748***	-0.00390
	(0.0572)	(0.128)	(0.122)	(0.114)	(0.140)	(0.0901)	(0.0923)	(0.0994)
Wald(Beta=1)	7.8	0.78	1.82	1.83	5.45	1.31	1.04	6.64
	0.005	0.3768	0.177	0.1761	0.0195	0.2522	0.3077	0.01
N	201	58	99	44	31	75	95	61
Panel 2:2000 - 2005	ALL	SMALL	MEDIUM	LARGE	PRIMARY	SECONDARY	SERVICES	MANUFACTURING
le2000	0.783***	0.556***	0.986***	1.043***	0.657***	0.759***	0.848***	0.953***
	(0.0348)	(0.155)	(0.0802)	(0.193)	(0.0758)	(0.0625)	(0.0465)	(0.0595)
Constant	2.126***	3.284***	0.113	-0.502	3.186***	2.322***	1.658***	0.332
	(0.305)	(0.718)	(0.830)	(1.978)	(0.639)	(0.529)	(0.423)	(0.613)
le2000	-0.964***	-1.439	0.394	3.340***	-1.048***	-0.758**	-1.045**	-0.590
	(0.218)	(0.892)	(2.901)	(0.471)	(0.180)	(0.315)	(0.464)	(0.465)
le2000sq	0.0793***	0.148	-0.0172	-0.175***	0.0768***	0.0650***	0.0839**	0.0588*
	(0.0161)	(0.106)	(0.188)	(0.0212)	(0.0117)	(0.0235)	(0.0333)	(0.0344)
Constant	2.876***	3.300*	-1.678	-14.87***	3.541***	2.166**	3.157**	1.274
	(0.737)	(1.791)	(11.04)	(3.119)	(0.863)	(1.104)	(1.523)	(1.585)
athrho	-1.035***	-1.011*	0.0818	-15.13	-16.21	-1.124***	-0.937*	0.281
	(0.241)	(0.575)	(0.941)	(229.7)	(321.8)	(0.303)	(0.480)	(0.614)
lnsigma	-0.140	0.150	-0.554***	-0.272**	0.000894	-0.112	-0.232	-0.667***
	(0.0860)	(0.240)	(0.0869)	(0.121)	(0.152)	(0.122)	(0.163)	(0.132)
Wald(Beta=1)	38.83	8.28	0.03	0.05	20.5	14.9	10.72	0.62
	0	0.004	0.8617	0.8222	0	0.0001	0.0011	0.4328
N	234	56	141	37	29	96	109	86
Standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1							