MARKUPS AND CONCENTRATION IN SOUTH AFRICAN MANUFACTURING SECTORS: AN ANALYSIS WITH ADMINISTRATIVE DATA

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Abstract

This paper uses newly available firm-level tax data to evaluate the market structure in South African manufacturing sectors in the period 2010-2012. To describe the market structure, we compute markups for South African manufacturing firms and concentration indexes for 4-digit manufacturing sectors. We find both significant markups and significant concentration across most sectors. We compare computed markups and concentration with early estimates in South Africa and with other international benchmark countries. We then examine the market structure based on the concentration, firms size and entry and exit dynamics to rule out some potential explanations for relatively high markups. We find that the relationships are not monotonic and point to the importance of specific barriers to entry in explaining the relationship between these three characteristics.

JEL Classification: L11, L13, L60

Keywords: Firms microdata, markup pricing, concentration, manufacturing, South Africa

1. INTRODUCTION

In a model of creative destruction, a la Aghion and Howitt (1992), economic growth is linked to productivity improvements generated by the entry of firms looking to exploit profit opportunities of new technologies and by the competitive response of incumbent firms (Luttmer, 2007). It follows that the analysis of market structure, competitive pressures and entry-exit dynamics of firms are fundamental blocks in the analysis of a country's growth process.

This is urgent in the case of South Africa, a country in need of a significant acceleration of its growth trajectory. Until now analysis of market structure in South Africa has been mainly based on aggregate or sectoral data. This has given a static picture of a low competitive environment with significant monopoly rents represented by high markups over marginal cost (Aghion *et al.*, 2008) and large market concentration (Fedderke and Naumann, 2011). These results have been discussed by a subsequent literature that tested the results using different datasets (Du Plessis *et al.*, 2015) or different methodologies and theoretical frameworks (Zalk, 2014). Nevertheless, high markups and high concentration rates represent our baseline understanding of the South African market structure and they underpin the majority of current academic and policy debates (Purfield et al., 2016).

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One limitation of the existing literature is the scarce amount of available firm-level data. This has significantly constrained the ability of researchers to understand the process of firm creation and destruction and its linkage to market structure, productivity and economic growth.

In this paper, we make use of newly available tax administrative data at the firm-level collected by the South African Revenue Service (SARS). A significant advantage of this database is that, given the negligible size of the South African informal sector, the tax administration data represents a very high degree of coverage of South African firms. The newly acquired access to tax administrative data therefore gives us an opportunity to start answering some of these questions using a large population of firms for which we know all the information collected by the tax administration.

The contribution of this paper is threefold:

• We calculate and analyse the level of markups in the South African manufacturing sectors for the period 2010–2012 using administrative tax data of around 60,000 South African firms. The results are compared to previous estimates from aggregate and industry-level data and with comparable international research.
• We use the same data to calculate the concentration levels in 4-digit manufacturing sectors in South Africa.
• We explore the dynamics of entry and exit of firms and market structure and infer some potential explanations for the relatively high markups and concentration, particularly the influence of barriers to entry. We show the importance of micro analysis in the design of policy intervention for industrial development.

The paper is organised as follows. In the next section, we briefly describe the data pointing out the possibilities and the limitations that attach to these data for the purpose of analysing firm behaviour. In Section 3 we review the mark-up debate in South Africa and provide new calculations of markups using tax administration data. In Section 4 we conduct the same exercise in the analysis of market concentration. These two sections confirm the view of generally high markups and low competitive pressure, but also show a considerable degree of heterogeneity. In Section 5 we link markups and concentration to the exit and entry dynamics of firms. We show that markups are not correlated with industry concentration, but are significantly linked to proxies of barriers to entry, either natural or institutional. Section 6 concludes and indicates the avenue of research that the availability of tax administrative data opens to understand firm behaviour and the dynamics of growth in South Africa.

2. DATA

The primary data for the calculations in this paper are obtained from information collected by the SARS to calculate the annual corporate income tax liability of firms for the years 2009–2013. These data have been made available thanks to a joint project by UNU-WIDER and the National Treasury of South Africa.[1] The dataset includes

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[1] We had access to the data from January 2015 to January 2016. At that time the data included only a part of the 2014 tax year collection, with mainly big firms still having to file for the 2013–2014 tax year. The data are described at length in Pieterse *et al.* (2016).

Table 1. Number of firms per year

	2009	2010	2011	2012	2013
Food and food products	622	2,144	2,084	2,221	2,145
Beverages	246	831	858	996	1,163
Tobacco	16	68	78	87	79
Textiles	448	1,640	1,603	1,593	1,512
Clothing, except footwear	358	1,223	1,258	1,505	1,717
Leather and products from leather	119	372	356	370	323
Footwear	76	322	329	380	363
Wood and wood and cork products	186	666	620	630	684
Furniture	386	1,351	1,292	1,267	1,245
Paper and paper products	260	962	961	958	895
Printing, publishing and allied industries	495	1,977	1,880	1,774	1,645
Coal and refined petroleum	123	507	524	525	546
Basic chemicals	278	1,118	1,093	1,004	863
Other chemicals	322	1,222	1,183	1,009	817
Rubber products	107	419	382	353	323
Plastic products	289	1,087	1,044	976	972
Glass and glass products	195	673	599	576	520
Other non-metals	392	1,208	1,212	1,368	1,209
Basic iron and steel industries	345	1,277	1,183	1,187	1,234
Non-ferrous metal basic industries	109	389	380	348	299
Metal products, except machinery and equipment	1,112	4,429	4,140	3,603	2,821
Machinery, except electrical	752	3,150	3,100	2,691	2,104
Electrical machinery apparatus	1,321	5,084	4,821	4,188	3,183
Television, radio and communication equipment	460	2,263	2,108	1,606	813
Professional and scientific equipment	204	800	838	788	655
Motor vehicles, parts and accessories	1,686	5,887	5,639	5,589	5,621
Transport equipment	189	686	663	651	517
Other manufacturing industries	584	2,183	2,101	2,053	1,802

Source: Authors' calculations.
3-Digit sectors used as in Fedderke and Hill (2011).

information on about 900,000 unique firms with new firms entering the dataset at different times and some firms leaving the dataset or going dormant.

While the dataset includes all firms registered for corporate income tax purposes, in this paper we focus only on firms involved in manufacturing activities. We also use data for only the period 2010–2012 for two reasons: first the total number of firms in the dataset jumps between 2009 and 2010, showing a dramatic increase. In 2009 there were about 172,000 active firms in the dataset, *i.e.* firms who submitted some tax information and reported as not dormant. The number of active firms jumps to 658,000 in 2010, 623,000 in 2011 and 525,000 in 2012. This suggests that the data for 2009 is incomplete. We therefore exclude 2009 from our analysis.

Secondly the number of firms in 2013 falls dramatically when compared to the number of firms in 2012. The total number of active firms in the data in 2013 falls to about 385,000. This is a drop of over 25% and suggests that the data might again be incomplete, perhaps because tax filings might not have been completed at the time of data capture.

Table 1 shows the number of firms with suitable data for each year of observation and for each manufacturing sector in the dataset.

We classify firms into the standard 3-digit manufacturing sectors as used in Fedderke and Hill (2011). This results in 29 manufacturing sectors reported. While the number of employees is typically used to classify firms for size purposes, unfortunately administrative tax data does not include information about the total number of employees in the firms. We therefore use the size of the total reported assets of the firms as an alternative classification for size. The average number of firms in each industrial and size category for the years 2010 through 2012 are reported in Table 2.

Table 2. Average number of firms per year by asset class

	All	No Assets	0-R1m	R1m-R10m	R10m-R100m	R100m+
Food and food products	2,150	882	835	284	117	32
Beverages	895	302	355	123	77	38
Tobacco	78	29	25	10	9	5
Textiles	1,612	640	613	235	102	22
Clothing, except footwear	1,329	420	749	115	41	4
Leather and products from leather	366	148	147	51	15	5
Footwear	344	126	135	59	20	4
Wood and wood and cork products	639	278	202	124	29	6
Furniture	1,303	548	528	189	36	2
Paper and paper products	960	410	329	144	52	26
Printing, publishing and allied industries	1,877	832	750	224	56	15
Coal and refined petroleum	519	220	117	130	39	13
Basic chemicals	1,071	483	287	194	73	34
Other chemicals	1,138	514	354	174	66	31
Rubber products	385	183	81	88	27	6
Plastic products	1,036	485	199	219	108	25
Glass and glass products	616	271	204	108	30	3
Other non-metals	1,263	491	497	191	69	15
Basic iron and steel industries	1,216	519	339	219	110	29
Non-ferrous metal basic industries	372	158	113	65	25	12
Metal products, except machinery and equipment	4,057	2,013	1,030	771	219	24
Machinery, except electrical	2,980	1,376	838	551	178	38
Electrical machinery apparatus	4,698	2,240	1,364	801	243	50
Television, radio and communication equipment	1,992	1,034	603	258	80	17
Professional and scientific equipment	809	337	279	131	53	9
Motor vehicles, parts and accessories	5,705	2,539	1,783	1,001	295	87
Transport equipment	667	265	303	79	14	6
Other manufacturing industries	2,112	888	859	280	76	10

Source: Authors' calculations.
3-Digit sectors used as in Fedderke and Hill (2011).

The data collected by the SARS include balance sheet and income statement information. The details of the data change with the dimension of the firms. Firms are classified as:

- Micro Business – a company with a gross income not exceeding R1 million and total assets (current and non-current) not exceeding R5 million. These firms have to report a very simplified balance sheet and income statement, indicating basic assets and liabilities composition and aggregate revenues, cost of sales, total costs to calculate taxable profits.
- Small Business – a company with a gross income not exceeding R14 million and total assets not exceeding R10 million. The reporting requirements are more detailed both for the balance sheet and the income statement, allowing a closer matching of reported assets with capital in the production function.
- Medium to Large Business – a company with gross income exceeding R14 million and/or total assets exceeding R10 million. For these companies, the reporting is very detailed, with a complete balance sheet and income statement.

In all cases, the matching of the data with a theoretical production function is not straightforward: on the labour side, we do not have details on the amount of labour used but only the overall cost of labour, while, on the capital side only for the large firms would be possible to match with a limited approximation the information collected with a theoretical definition of productive capital. In order to maximise the sample of firms analysed, in what follows we look for methods of analysis that relying on the portion of the data that are less in need of subjective definitions.

3. MARKUPS IN SOUTH AFRICAN MANUFACTURING INDUSTRY

The nature of competition in any given industry has many characteristics of which only a few can be easily quantified. One of such characteristics is the pricing behaviour of firms. Specifically, the markup of price over marginal cost serves as an indicator of the relative level of competitiveness of industry via firm pricing power.

The first task in this paper is to provide new measures of markups in South African manufacturing sectors for the period 2010–2012. As mentioned in the introduction, previous studies focussed on South Africa have found markups to be relatively high. Aghion *et al.* (2008) and Fedderke *et al.* (2007) provide the baseline calculation of markups in South Africa which have been a point of reference for several following studies. Both studies use aggregate industry data and firm-level data only from publicly listed companies and find consistently that markups in South Africa are significantly higher than corresponding industries in other countries. This result has been questioned by Du Plessis *et al.* (2015) using only listed companies information, and by Zalk (2014) mainly from a methodological point of view.

All these studies face the limitation of using either aggregate data or data for a very specific sub-set of firms, generally firms listed in the Johannesburg Stock Exchange.

The availability of comprehensive firm-level data in the present study allows us calculate markups directly from firm income statements for the full set of firms in South Africa that are subject to filing tax returns. We calculate markups for the period 2010–2012 and we aggregate these markups at industry level to compare our results with earlier estimates of markups across industry.

3.1 Methodology

In this paper we just apply a straightforward definition of markup, developed by Tamminen (2013), which is based on the production function framework in Hall (1988), but which is easily tractable and applicable to the particular data available. In the data, we have information on firm revenues, costs and profits and we therefore derive a markup definition starting from a basic firm profit definition. In particular the markups are derived using the firms profit function and the equation that links price with variable costs. The firm profit is equal to the difference between total revenues and total costs *i.e*:

$$\pi_i = TR_i - TC_i = p_i q_i - c_i q_i - FC_i \tag{1}$$

where p_i is the unitary price, c_i indicates variable unitary cost c_i, q_i is the quantity produced and FC_i is the fixed cost. The markup for firm i is defined as:

$$p_{ij} = (1 + \mu_i) c_i \tag{2}$$

where μ_i represents the markup of firm i over marginal cost, p represents the price of the output and c represents the marginal costs. Equation (2) can be re-written as:

$$\mu_i = \frac{(p_i - c_i)}{c_i} \tag{3}$$

Equation (3) can then be transformed by multiplying by total quantity sold

Table 3. Average markups

	2010	**2011**	**2012**
Food and food products	1.64	1.36	19.83
Beverages	2.25	0.82	2.28
Tobacco	3.94	36.55	0.75
Textiles	1.59	0.71	1.33
Clothing, except footwear	1.08	0.78	0.70
Leather and products from leather	0.72	0.57	0.52
Footwear	0.74	0.45	0.49
Wood and wood and cork products	1.01	2.15	0.80
Furniture	1.48	0.72	0.60
Paper and paper products	0.73	3.16	0.66
Printing, publishing and allied industries	1.93	1.26	5.65
Coal and refined petroleum	0.43	0.36	0.37
Basic chemicals	31.16	1.15	1.23
Other chemicals	2.58	0.80	1.08
Rubber products	0.81	0.60	0.80
Plastic products	0.81	0.44	5.58
Glass and glass products	0.88	0.64	0.88
Other non-metals	1.02	3.48	1.50
Basic iron and steel industries	0.93	0.53	0.72
Non-ferrous metal basic industries	1.46	0.53	0.48
Metal products, except machinery and equipment	1.19	2.14	1.32
Machinery, except electrical	3.87	3.21	2.24
Electrical machinery apparatus	2.24	3.18	1.78
Television, radio and communication equipment	3.49	1.39	3.97
Professional and scientific equipment	1.73	1.02	1.26
Motor vehicles, parts and accessories	0.84	1.12	0.98
Transport equipment	5.96	3.78	1.92
Other manufacturing industries	1.14	1.27	0.98

Source: Authors' calculations.
3-Digit sectors used as in Fedderke and Hill (2011).

$$\mu_i = \frac{(p_i - c_i)q_i}{c_i q_i} = \frac{(TR_i - VC_i)}{VC_i} \tag{4}$$

where TR_i represents total sales for firm i, and VC_i represents the variable costs for firm i. The markups for each firm can then be easily calculated from the information in the tax data. From equation (4) markups are calculated from total revenue from sales and variable costs. Variable costs include all labour costs and costs of sales, which are all part of the information collected by the tax authority.

One side-effect of this methodology is that calculated markups will depend on the economy-wide conditions in that year. For instance, it has been shown that, due to stickiness in wages, markups would be countercyclical to the business cycle. We therefore expect the calculated markups the vary year on year.

3.2 Results

The average markups for each industrial category are reported in Table 3. The markups appear to be very large.

One possible reason for this may be due to the large number of small firms in the dataset that do not have significant labour costs. *E.g.* a sole proprietorship with no employees would have no reported labour costs and thus would generate a relatively high markup. To work around this problem we report, in Table 4, markups weighted by the total assets of the firm for each year. Since we expect to observe volatility in the computed markups we also report the three-year averages. We note immediately that the

Table 4. Average markups weighted by total assets

	2010	2011	2012	3-Year Average
Food and food products	0.37	0.25	1.54	0.72
Beverages	0.32	0.39	4.65	1.79
Tobacco	0.27	0.24	1.22	0.58
Textiles	0.17	0.40	0.49	0.35
Clothing, except footwear	0.28	0.27	0.21	0.26
Leather and products from leather	0.12	0.26	0.22	0.20
Footwear	10.55	0.41	0.28	3.75
Wood and wood and cork products	0.64	0.71	0.32	0.56
Furniture	0.36	0.33	0.30	0.33
Paper and paper products	1.83	0.52	0.45	0.93
Printing, publishing and allied industries	1.04	0.58	1.08	0.90
Coal and refined petroleum	0.54	0.59	0.67	0.60
Basic chemicals	2.37	0.24	0.31	0.97
Other chemicals	0.33	0.32	0.32	0.32
Rubber products	0.17	0.13	0.01	0.10
Plastic products	0.31	0.18	1.10	0.53
Glass and glass products	0.41	0.78	0.48	0.56
Other non-metals	0.09	0.51	0.38	0.33
Basic iron and steel industries	0.40	0.26	0.49	0.38
Non-ferrous metal basic industries	0.11	0.10	0.13	0.11
Metal products, except machinery and equipment	0.48	1.33	0.47	0.75
Machinery, except electrical	0.91	0.33	0.33	0.52
Electrical machinery apparatus	0.13	0.48	0.43	0.35
Television, radio and communication equipment	0.26	0.22	0.45	0.31
Professional and scientific equipment	0.46	0.40	0.39	0.42
Motor vehicles, parts and accessories	0.23	0.15	1.88	0.75
Transport equipment	0.59	0.60	0.19	0.46
Other manufacturing industries	0.42	0.94	0.65	0.67

Source: Authors' calculations.
3-Digit sectors used as in Fedderke and Hill (2011).

magnitude of reported markups under the asset weighting approach of Table 3, immediately generates estimated magnitudes that are considerably more plausible than the unweighted estimates of Table 3. Some sectors show consistently low markups across all years, such as the rubber products sector, and the non-ferrous metals sector. Equally, however, a number of sectors show consistently high markups, such as the coal and refined petroleum sector and the printing, publishing and allied industries sector. In general, there is a lot variation in average markups across years and sectors.

We also report the unweighted markups for each sector grouped into size based on total assets. In Table 5 we report three-year-average markups for each sector categorised by the size of the firm. Firms are grouped into five different categories; firms with no reported assets, firms with assets between 0 and R1 million, firms with assets between R1 million and R10 million, firms with assets between R10 million and R100 million and firms with assets above R100 million. Across most sectors, average markups appear to reduce as firm size increases. The exceptions to this pattern are the beverages sector, paper and paper products, coal and refined petroleum and basic chemicals sectors.

The consistent cross-sector pattern is that average markups are inversely correlated to the size of firms. This is evident in Fig. 1 which shows the estimated density function for three years average markups for firms of different asset class. The figure shows the heterogeneity of markups and the relationship between markups and dimension of the firm, where smaller firms have higher and more dispersed markups.

3.3 Comparison to Previous Studies
Although this is the first study to use comprehensive disaggregated firm-level data, to compute markups in South Africa, we think it would be useful to compare our

Table 5. Average markups by asset group (in millions of Rands)

	0	R1m	R10m	R100m	R100m+
Food and food products	1.10	1.48	23.90	0.41	0.21
Beverages	1.32	1.97	0.49	0.57	4.30
Tobacco	31.40	5.15	0.69	0.12	0.24
Textiles	0.95	1.60	0.47	0.34	0.13
Clothing, except footwear	1.05	0.79	0.36	0.18	0.20
Leather and products from leather	0.51	0.77	0.70	0.28	0.10
Footwear	0.38	0.59	0.60	4.01	0.29
Wood and wood and cork products	0.85	1.12	2.25	0.20	0.31
Furniture	1.15	0.70	0.45	0.31	0.23
Paper and paper products	0.51	2.65	2.12	0.18	1.43
Printing, publishing and allied industries	1.70	4.96	1.14	0.49	0.66
Coal and refined petroleum	0.32	0.33	0.32	0.22	0.64
Basic chemicals	13.77	1.76	0.96	0.35	6.70
Other chemicals	1.37	1.28	1.37	0.33	0.37
Rubber products	0.61	1.49	0.47	0.61	0.11
Plastic products	0.61	0.72	4.94	0.31	0.27
Glass and glass products	0.83	0.97	0.76	0.28	0.23
Other non-metals	3.71	1.67	0.53	0.32	0.20
Basic iron and steel industries	0.53	1.64	0.45	0.78	0.22
Non-ferrous metal basic industries	0.75	1.54	0.36	0.10	0.15
Metal products, except machinery and equipment	1.04	1.32	2.53	0.47	0.11
Machinery, except electrical	5.07	4.77	1.09	0.74	0.71
Electrical machinery apparatus	1.36	4.14	1.00	0.45	0.47
Television, radio and communication equipment	2.14	3.99	1.70	0.31	0.15
Professional and scientific equipment	0.83	3.96	0.72	0.49	0.33
Motor vehicles, parts and accessories	0.71	1.46	0.87	0.41	0.21
Transport equipment	4.01	3.22	1.42	0.71	−0.01
Other manufacturing industries	1.20	1.29	0.70	0.68	0.64

Source: Authors' calculations.
3-Digit sectors used as in Fedderke and Hill (2011).

calculations with other studies have estimated markups using more aggregated data. Fedderke and Hill (2011) *e.g.* use data from the Trade and Industrial Policy Strategies database to estimate markups across manufacturing sectors, but do so strictly at the sectoral level. We compare our computations of markups with their estimates in Table 6. The computed three-year-average markup appears to be different in most sectors to prior
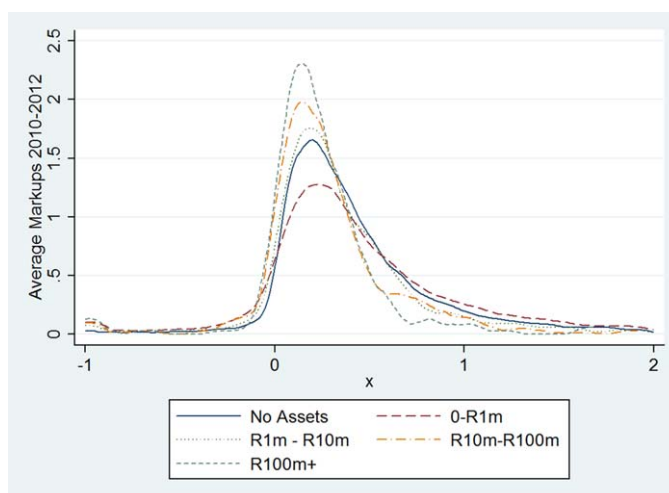

Figure 1. Markup distribution by firm size [Colour figure can be viewed at wileyonlinelibrary.com]

Table 6. Historical markups vs. average markups

	1985–1994	1991–2000	1995–2004	2010–2012	$\frac{2010-2012}{1985-1995}$ ratio
Food and food products	0.73	1.28	1.85	0.72	0.99
Beverages	2.11	2.09	3.56	1.79	0.85
Tobacco	−2.06	−0.45	−76.29	0.58	−0.28
Textiles	0.66	1.23	1.31	0.35	0.53
Clothing, except footwear	0.36	−1.06	−0.50	0.26	0.72
Leather and products from leather	0.30	0.60	−0.54	0.20	0.67
Footwear	0.17	−0.04	0.13	3.75	22.06
Wood and wood and cork products	1.07	0.64	0.39	0.56	0.52
Furniture	0.20	0.03	0.12	0.33	1.65
Paper and paper products	4.45	2.30	2.14	0.93	0.21
Printing, publishing and allied industries	0.60	−0.30	−0.48	0.90	1.5
Coal and refined petroleum	1.99	−14.32	−17.75	0.60	0.30
Basic chemicals	0.89	2.27	1.38	0.97	1.09
Other chemicals	0.91	1.60	1.47	0.32	0.35
Rubber products	0.40	0.44	−2073.24	0.10	0.25
Plastic products	2.30	0.59	−0.60	0.53	0.23
Glass and glass products	0.66	0.69	−2.51	0.56	0.85
Other non-metals	−0.73	1.98	3.56	0.33	−0.45
Basic iron and steel industries	0.36	−0.26	2.18	0.38	1.06
Non-ferrous metal basic industries	1.47	−5.19	−7.48	0.11	0.07
Metal products, except machinery and equipment	0.33	0.41	1.54	0.75	2.27
Machinery, except electrical	0.53	0.01	0.23	0.52	0.98
Electrical machinery apparatus	0.29	0.29	0.36	0.35	1.21
Television, radio and communication equipment	−0.94	−2.37	−4.36	0.31	−0.33
Professional and scientific equipment	0.85	1.60	2.33	0.42	0.49
Motor vehicles, parts and accessories	0.30	−1.95	−0.80	0.75	2.5
Transport equipment	0.46	−2.43	−3.00	0.46	1
Other manufacturing industries	3.30	5.07	4.44	0.67	0.20

Source: Authors' calculations.
3-Digit sectors used as in Fedderke and Hill (2011).
1985 to 2004 data taken from Fedderke and Hill (2011).

estimates. Fedderke and Hill (2011) find average markups across all sectors ranging from a high of 0.79 for the years 1970–1980 to a low of 0.5 for the years 1974–1984. This is consistent with our three-year average markup of 0.71. However, on average the sectoral markups we have computed for 2010–2012 appear in most cases to be lower than the earlier sectoral estimates, suggesting that the liberalising economic policies of South Africa may have put downward pressure on markups over time. A relative ranking of sectors is shown in Fig. 2.

4. MEASURING COMPETITIVENESS OF SOUTH AFRICAN MANUFACTURING SECTORS

In this section, we move our attention to the calculation of market concentration in the South African manufacturing sectors. Market concentration and competition is an important topic in economics. It is often seen as one of the better ways to measure the extent of oligopoly in industry. Although concentration is not the only index of oligopoly or market power, changes in concentration are important because it measures, to some extent, a change in the structure of industry. Due to unavailability of adequate data, studies on market concentration in South Africa have been few and far between. Du Plessis (1978), Fourie and Smit (1989), Leach (1992) and Fedderke and Szalontai (2009) are the only major studies with estimates on market concentration in South Africa. Prior estimates of market concentration in South Africa had been computed using data from the census of manufacturing compiled by Statistics South Africa (StatsSA) or by using
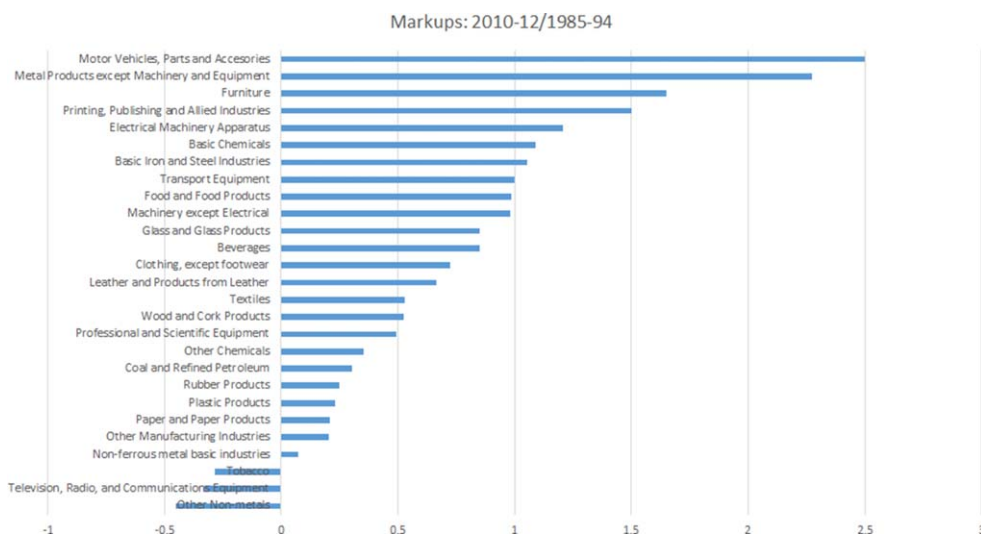
Figure 2. Sectoral markups comparison: 2010–2012 vs. Fedderke and Hill (2011) [Colour figure can be viewed at wileyonlinelibrary.com]

the 2001 Large Sample Survey of the Manufacturing Industry published by StatsSA (Fedderke and Naumann, 2011)

In general, previous estimates suggest a relatively high level of concentration in South Africa. Du Plessis (1978) for instance finds exceptionally high levels of concentration with 9 of 30 industry main groups categorised as highly concentrated in 1972. Fourie and Smit (1989) find that concentration was indeed high and rising. They show an increase in relative concentration between 1972 and 1982 and that the majority of industries showed a persistent increase in concentration. Fedderke and Szalontai (2009) extend the work of Fourie and Smit (1989) to 1996 and show that concentration was indeed still high and rising across a wide range of industries. Fedderke and Naumann (2011), using the Large Sample Survey dataset, find significantly lower levels of concentration across most industries in 2001.

The availability of firm-level administrative data allows us to extend prior research by computing an array of measures of market concentration. We calculate 5%, top four firms and top eight firms concentration ratios as well as the Herfindahl-Hirschman Index (HHI) for the top 50 firms and all firms in each category. We compute these for all years between 2010 and 2012. We find significantly higher levels of market concentration across almost all sectors when compared with earlier studies.

4.1 Concentration Ratios
The concentration ratios and HHI are calculated using the market share of firms in each industrial category. Market share is defined as the fraction of sales of firm i to total sales in category j in each year. The primary data for market share for firms is obtained from the income statement data submitted by firms to the SARS.

Concentration ratios are calculated as the cumulative percentage market share of the top n firms by sales in category j. To allow for comparison with earlier measures of industry concentration in South Africa, and with international standard measures of

Table 7. Concentration ratio of top 5% of firms by market share

	1976	1985	1996	2001	2010	2011	2012
Food and food products	65.29	70.12	75.16	65.93	75.63	73.51	79.72
Beverages	55.64	62.68	74.26	76.27	92.46	91.57	93.14
Textiles	52.29	55.92	48.11	36.00	60.77	60.26	62.79
Clothing, except footwear	46.75	50.58	58.68	34.18	68.47	68.22	73.89
Leather and products from leather	37.17	50.25	67.86	27.69	75.34	78.00	78.17
Footwear	36.73	46.08	56.42	39.99	54.56	55.48	54.10
Wood and wood and cork products	51.35	63.34	61.10	38.45	63.08	70.35	65.32
Furniture	53.39	52.12	58.38	56.68	62.28	63.98	64.69
Paper and paper products	53.36	75.43	62.05	78.13	85.55	85.22	85.17
Printing, publishing and allied industries	60.99	62.45	69.25	48.90	71.28	70.45	73.46
Basic chemicals	69.55	62.88	70.79	68.55	75.66	78.80	86.04
Other chemicals	71.32	47.99	63.43		82.76	83.08	78.15
Rubber products	55.97	66.16	80.85	40.33	77.44	75.70	72.46
Plastic products	36.55	46.63	56.67	30.22	79.39	81.25	61.48
Glass and glass products	53.46	85.40	87.31	69.74	61.99	77.32	76.79
Other non-metals	69.60	75.83	74.96	60.07	71.52	73.11	70.44
Basic iron and steel industries	73.48	76.93	69.89	76.00	83.26	83.67	82.49
Non-ferrous metal basic industries	47.60	63.07	64.66	70.60	88.45	89.23	87.55
Metal products, except machinery and equipment	58.48	65.47	67.34	47.49	60.52	58.46	60.13
Machinery, except electrical	56.14	60.24	61.79	38.41	69.86	75.01	82.47
Electrical machinery apparatus	60.77	66.58	58.26	51.60	78.76	77.84	75.36
Motor vehicles, parts and accessories	79.42	83.90	85.19	78.87	84.01	84.97	87.19
Transport equipment	68.01	73.37	75.27	58.99	70.60	76.29	75.97
Other manufacturing industries	53.15	59.90	83.38	50.66	61.88	76.60	79.44

Source: Authors' calculations.
3-Digit Industrial Classification as in Fedderke and Szalontai (2009) used.
1976–1996 data taken from Fedderke and Szalontai (2009). 2001 data taken from Fedderke and Naumann (2011).

concentration, we compute concentration ratios based on market share of the top 5% of firms, the top four firms and the top eight firms based on each 3-digit Standard Industrial Classification (SIC) category as in Fedderke and Naumann (2011).

Table 7 reports the concentration ratios for the top 5% of firms in each 3-digit SIC category as in Fedderke and Szalontai (2009) and Fedderke and Naumann (2011). Concentration ratios for 1976, 1985 and 1996 are taken from Fedderke and Szalontai (2009). These concentration ratios were calculated using aggregate industry from the census of manufacturing. Concentration ratios for 2001 are taken from Fedderke and Naumann (2011) and were calculated using the large sample survey of South African manufacturing.

On average concentration appears to be higher across most industrial categories compared to concentration before 2001. In 1976, 5 out of 24 sectors had concentration levels with market share of the top 5% of firms falling below 50%. In 1985 only three industrial categories had concentration below the 50% mark. In 1996 only one category had concentration levels below 50%. Continuing the trend, none of the manufacturing sectors between 2010 and 2012 had concentration levels below the 50% mark. This suggests that concentration levels have risen on average across South African manufacturing. Exceptions can be made for a few categories where concentration can be said to have been stable since the 1990s. The food and food products industry for instance shows concentration steadily averaging about 75% from the 1990s through 2012. The footwear industry also shows concentration levels stable at about 55% through the same period. Other non-metals and motor vehicle, parts and accessories sectors also appear stable from the 1990s through to the contemporary era. Two sectors that have shown a relative decline in concentration though from relatively high levels of concentration, are the
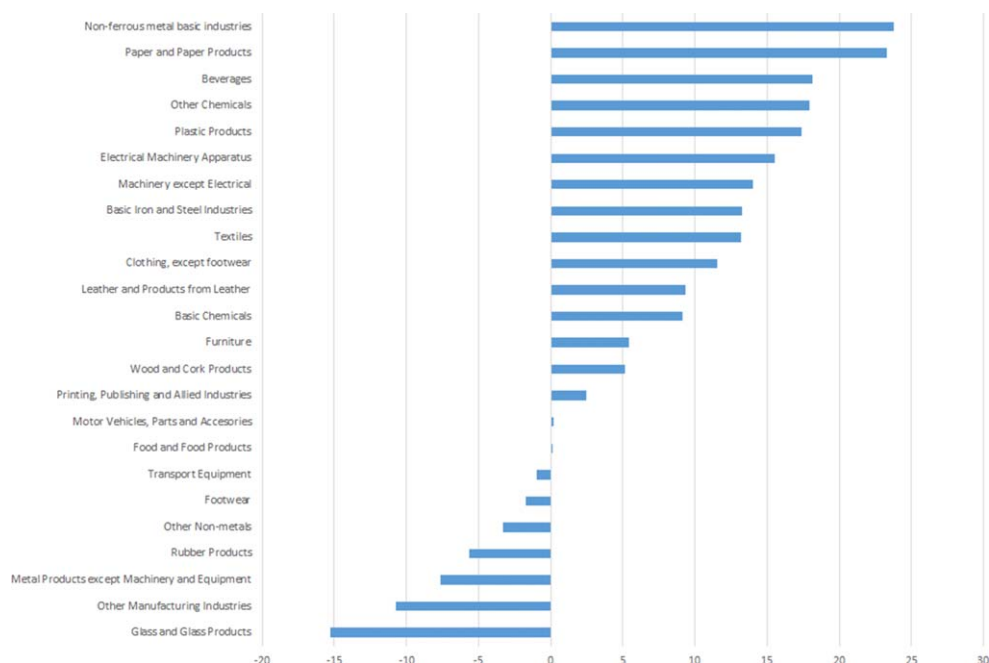
Figure 3. Concentration ratio-comparison [Colour figure can be viewed at wileyonlineli-brary.com]

rubber products and metals products categories where concentration appears to have fallen since the 1990s.

The changes in relative concentration can be more clearly seen in Fig. 3. Figure 3 shows the percentage point increase in concentration across all sectors between 1996 and the average of 2010 through 2012. As shown, the majority of sectors show an increase in the levels of concentration. Considering that concentration was already thought to be high and rising between the 1970s and 1990s (Fedderke and Szalontai, 2009), the new data suggests that the increase in concentration has continued until the current period.

The measures of concentration ratios in 2001 computed by Fedderke and Naumann (2011) using the large sample survey of South African manufacturing appear to be very different to the concentration measures recorded for other time periods. This suggests that the aberration is due to the data collection methodology, which was less universal in coverage than the manufacturing census or the tax record data. As shown in Table 7, the concentration ratios in 2001 appears to markedly lower in most sectors.

Tables 8 reports the concentration ratios for the top four firms in each category. Concentration ratios are computed for all the years from 2010 through 2012.

Again, the heterogeneity of concentration across sectors is notable. The beverages, tobacco and leather products industries for instance show high degrees of concentration with the top four firms accounting for over 40% of sales in all years. Conversely, Textiles, Metal products, and Electrical machinery and apparatus, show concentration ratios below 20% in most years.

The standard classification combines a lot of industries together. Not all industries in each category produce the same type of products. In essence, the industry-level

Table 8. Concentration ratio of top 4 by market share

	2010	2011	2012
Food and food products	30.01	30.53	38.42
Beverages	58.22	58.13	54.17
Tobacco	90.12	65.04	80.85
Textiles	20.86	19.16	18.05
Clothing, except footwear	28.96	27.08	27.87
Leather and products from leather	42.75	46.18	41.45
Footwear	33.89	33.80	28.53
Wood and wood and cork products	31.78	39.52	36.01
Furniture	35.94	38.96	36.93
Paper and paper products	59.89	56.41	56.85
Printing, publishing and allied industries	22.07	22.98	29.13
Coal and refined petroleum	81.68	82.22	86.15
Basic chemicals	28.77	29.34	55.22
Other chemicals	41.11	42.58	34.08
Rubber products	53.39	52.45	52.20
Plastic products	58.18	59.16	23.64
Glass and glass products	41.17	64.11	61.16
Other non-metals	34.01	34.22	38.27
Basic iron and steel industries	54.68	54.15	53.33
Non-ferrous metal basic industries	62.64	60.64	64.52
Metal products, except machinery and equipment	15.74	11.96	12.89
Machinery, except electrical	18.57	23.22	42.54
Electrical machinery apparatus	19.97	18.88	19.07
Television, radio and communications equipment	23.20	25.36	37.22
Professional and scientific equipment	16.26	16.65	14.54
Motor vehicles, parts and accessories	29.03	28.21	27.25
Transport equipment	31.90	38.49	40.93
Other manufacturing industries	15.83	45.47	50.30

Source: Authors' calculations.
Seventh Edition Standard Industrial Classification Used.

concentration ratio might disguise higher levels of concentration if firms in the categories produce different types of products. The SARS data provides the finer 4-digit industrial classification which allows us to measure concentration at a much finer level. Although there are too many categories to list individually, Fig. 4 shows a distribution of concentration ratios for the top eight firms for 2010 through 2012. As shown in the
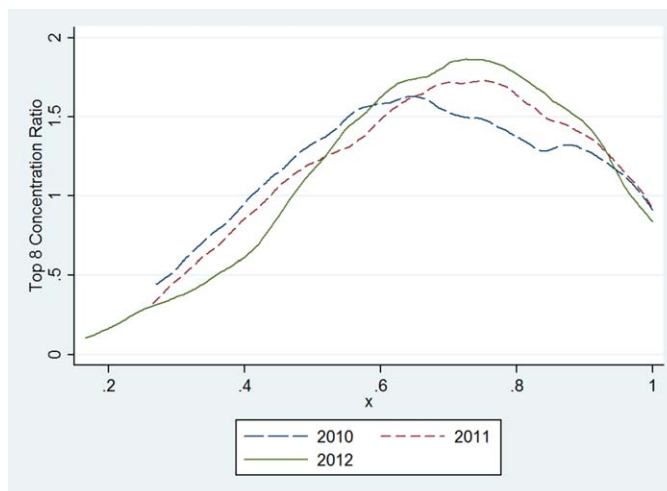

Figure 4. Concentration index 2010–2012 [Colour figure can be viewed at wileyonlinelibrary.com]

Table 9. HHI of top 50 firms by market share

	2010	**2011**	**2012**
Food and food products	388	400	643
Beverages	1,345	1,551	1,248
Tobacco	4,984	1,393	3,647
Textiles	209	167	147
Clothing, except footwear	310	276	272
Leather and products from leather	639	736	620
Footwear	380	392	334
Wood and cork products	382	568	550
Furniture	706	792	632
Paper and paper products	1,199	1,141	1,149
Printing, publishing and allied industries	206	218	331
Coal and refined petroleum	2,038	2,122	1,935
Basic chemicals	319	334	1,860
Other chemicals	708	765	435
Rubber products	830	823	767
Plastic products	2,467	2,460	201
Glass and glass products	1,269	1,943	1,739
Other non-metals	481	495	545
Basic iron and steel industries	1,360	1,254	1,031
Non-ferrous metal basic industries	1,317	1,170	1,286
Metal products, except machinery and equipment	88	62	73
Machinery, except electrical	156	225	828
Electrical machinery apparatus	169	157	144
Television, radio and communications equipment	225	247	397
Professional and scientific equipment	149	146	130
Motor vehicles, parts and accessories	290	295	294
Transport equipment	416	505	703
Other manufacturing industries	120	1,615	2,070

Source: Authors' calculations.
Seventh Edition Standard Industrial Classification Used.

distributions, most categories have concentration ratios above 50 with averages between 60% and 80%. The distribution highlights high levels of concentration across most sectors.

4.2 Herfindahl-Hirschman Index

In international literature, concentration measures such as the HHI have become the most widely used. The HHI is defined as:

$$HHI = \sum_{i=1}^{N} M_i^2 \tag{5}$$

where M_i is the market share of firm i, and N denotes the number of firms in the industry. The HHI has the advantage of taking into account the total number of firms in the industry in calculating concentration.

Table 9 reports the HHI for the top 50 firms in each SIC. The data suggest differences in concentration across different categories similar to the concentration ratios. Some sectors have low levels of concentration such as the clothing and footwear sector, and the machinery and related items sector.

5. MARKUPS, CONCENTRATION AND ENTRY-EXIT OF FIRMS

The previous descriptive analysis shows a static picture of South African market structure. While we can with a certain confidence suggest that the manufacturing sectors in

Table 10. Distribution of sectors

	Markups		
	Low	**Medium**	**High**
Low concentration	Clothing except footwear Basic chemicals	Food and food products Textiles Wood and wood products Furniture Machinery Electrical machinery Television, radios. . . Professional and scienc. . . Other manufacturing	Footwear Printing, publishing. . . Metal products Motor vehicles
Medium concentration	Leather and leather. . . Rubber products	Other chemicals Plastic products Glass and glass products Other non-metals Basic iron and steel Transport equipment	Paper and paper. . .
High concentration	Non-ferrous metals	Tobacco Coal and petroleum prod. . .	Beverage

Source: Authors' calculations.
Note: 3-Digit sectors used as in Fedderke and Hill (2011).
Note: Low markups defined as markups less than 0.3, medium between 0.3 and 0.7, high above 0.7. Low concentration defined as 8-firm concentration ration below 0.5, medium between 0.5 and 0.7 and high above 0.7.

South Africa are characterised by relatively high markups and low competitive pressure, we cannot yet make any causal statement. Although there are limitations to the data which do not allow at this stage a fully structural identification of economic relationships, in this section we examine the nature of the correlation between markups and concentration and the relationships between market structure and the entry and exit of firms, two of the basic mechanism at the centre of much economic growth thinking. The analysis of these correlations and their heterogeneity helps also to highlight the importance of barriers to entry in understanding the nature of high markups and concentration in South Africa.

5.1 Markups and Concentration
The first correlation we look at is the direct relation between markups and concentration. Table 10 classifies the different sectors according to their degree of concentration and markups.

   In the table, we compare average markups weighted by total assets in each sector to the level of market concentration in that sector. Market concentration here is defined as the combined market share of the eight largest firms by sales. Again, there is much variation across sectors with no clear patterns. The beverages sector for instance is highly concentrated with markups of the largest firms by assets very high. Conversely, the non-ferrous basic metals sector is also very highly concentrated but the markups of the largest firms are relatively low.

   It is apparent that there is no clear pattern of relationship between markups and market concentration. It is unlikely that the high markups are completely explained by high levels of concentration.

5.2 Market Structure and Entry and Exit of Firms
Another possible explanation of high markups is absence of entry. The data allow us to calculate the firm entry and exit rates for the years 2011 and 2012. Tables 11 and 12

Table 11. Average Entry rates by asset group − 2011 and 2012

	No Assets	0-R1m	R1m-R10m	R10m-R100m	R100m+	All
Food and food products	1.89	8.58	0.28	0.02	0	10.78
Beverages	1.14	7.21	0.69	0.11	0.15	9.31
Tobacco	1.28	5.50	1.79	0.57	0	9.15
Textiles	1.41	5.44	0.38	0.03	0	7.26
Clothing, except footwear	1.97	11.81	0.45	0.03	0	14.27
Leather and products from leather	1.52	7.57	0.69	0	0	9.78
Footwear	1.35	7.52	0.26	0	0	9.13
Wood and wood and cork products	1.12	5.27	0.40	0	0	6.79
Furniture	1.63	4.34	0.35	0.12	0	6.44
Paper and paper products	2.08	5.42	0.42	0	0.05	7.97
Printing, publishing and allied industries	1.61	4.93	0.13	0.05	0	6.73
Coal and refined petroleum	1.81	3.91	0.38	0	0	6.10
Basic chemicals	1.16	3.63	0.29	0	0.05	5.13
Other chemicals	1.83	4.44	0.18	0.08	0	6.54
Rubber products	1.06	3.12	0.82	0	0	4.99
Plastic products	1.03	2.11	0.70	0.20	0.05	4.10
Glass and glass products	0.25	3.85	0.34	0.17	0	4.60
Other non-metals	1.73	6.61	0.42	0.08	0	8.85
Basic iron and steel industries	1.48	3.97	0.38	0.25	0.04	6.12
Non-ferrous metal basic industries	1.47	3.83	0.67	0	0	5.97
Metal products, except machinery and equipment	1.45	2.41	0.23	0.04	0	4.14
Machinery, except electrical	1.72	3.06	0.31	0	0.02	5.10
Electrical machinery apparatus	1.98	2.65	0.27	0.03	0.01	4.94
Television, radio and communication equipment	1.99	2.56	0.20	0	0	4.76
Professional and scientific equipment	2.05	5.85	0.30	0	0.06	8.26
Motor vehicles, parts and accessories	1.52	3.46	0.36	0.06	0	5.40
Transport equipment	1.43	8.00	0.30	0.07	0	9.81
Other manufacturing industries	1.39	6.10	0.12	0.05	0.02	7.68

Source: Authors' calculations.
3-Digit sectors used as in Fedderke and Hill (2011).

Table 12. Average exit rates by asset group − 2010 and 2011

	No Assets	0-R1m	R1m-R10m	R10m-R100m	R100m+	All
Food and food products	15.80	12.65	10.16	7.00	3.33	13.60
Beverages	12.60	10.63	9.01	1.56	4.29	10.49
Tobacco	7.68	17.38	44.44	5.00	0	12.76
Textiles	16.2	14.64	8.19	7.22	0	14.01
Clothing, except footwear	23.39	15.03	12.72	3.85	33.33	17.60
Leather and products from leather	17.38	15.79	7.88	2.94	0	14.84
Footwear	11.90	13.26	10.51	2.78	0	11.34
Wood and wood and cork products	17.17	14.95	11.46	3.125	0	14.84
Furniture	17.29	15.28	10.48	9.92	0	15.57
Paper and paper products	17.33	12.37	11.61	7.12	0	13.70
Printing, publishing and allied industries	16.46	15.19	11.60	2.88	0	14.61
Coal and refined petroleum	10.04	11.02	7.74	3.49	7.89	9.35
Basic chemicals	11.21	14.30	6.80	5.04	2.77	11.01
Other chemicals	18.25	16.18	10.48	4.88	7.14	15.61
Rubber products	10.94	17.26	5.09	10.12	45.00	11.75
Plastic products	12.46	14.38	9.13	5.81	2.17	11.58
Glass and glass products	17.47	13.98	7.31	3.57	0	14.46
Other non-metals	16.88	11.94	13.16	18.34	2.5	13.49
Basic iron and steel industries	14.51	16.92	11.66	12.52	3.33	13.87
Non-ferrous metal basic industries	12.99	21.18	6.63	15.26	0	15.00
Metal products, except machinery and equi...	12.47	15.91	8.47	15.64	20.67	12.11
Machinery, except electrical	13.82	15.68	6.73	3.72	6.10	12.69
Electrical machinery apparatus	13.87	16.51	8.34	5.24	7.14	13.19
Television, radio and communication equipment	14.88	15.58	7.50	2.88	0	13.95
Professional and scientific equipment	14.74	15.03	4.49	1.75	5.56	12.30
Motor vehicles, parts and accessories	12.80	13.87	8.31	7.09	9.24	12.27
Transport equipment	18.78	13.82	12.33	22.55	0	15.46
Other manufacturing industries	16.44	13.29	8.90	13.61	5.00	13.85

Source: Authors' calculations.
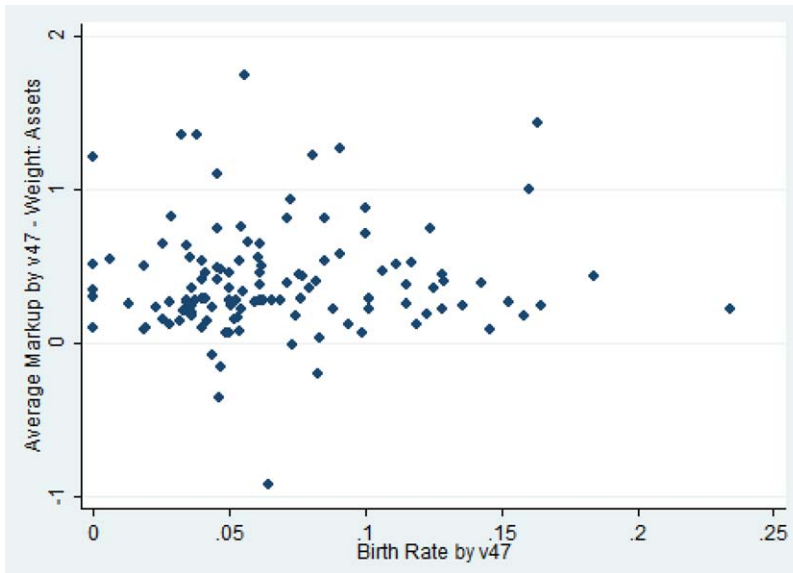3-Digit sectors used as in Fedderke and Hill (2011).

Figure 5. Entry rate vs. average markups by 4-digit classification 2012 [Colour figure can be viewed at wileyonlinelibrary.com]

show the calculated entry and exit rates by manufacturing sectors and by asset class of the entrants.

The first observation is that there is a significant entry and exit dynamics of small firms, with exit dominating the flow. The entry rate of new firms appears to be between 5% and 10% per year, against an exit rate in the period well above 10%. We note also that while the fact that the exit rate exceeds the entry rate of firms is consistent with the rising average concentration of sectors, we cannot separate the effect of the global financial crisis which affected South Africa significantly in the period considered.

Conversely, we can see a large variability in the flows of entry and exit and no obvious correlation with markups. Fig. 5 plots the entry rate of firms against the average markups for each 4-digit category.

5.3 Barriers to Entry?

While this paper is mainly descriptive, the previous observations show us that the relation between size of the firm, concentration, markups and entry and exit is at least not linear. Given the high levels of concentration witnessed in most manufacturing sectors, the obvious question is how firms are able to maintain such dominant positions.

The data suggests that barriers to entry might play some role in explaining the market structure in South Africa. Fig. 6 shows a scatter plot of entry rates against concentration in each 4-digit category. The variation of entry across sectors appears to increase as concentration increases. The observation is more apparent in Fig. 7 which plots the growth rate of firms against concentration for each 4-digit category. Growth rate is here defined as the rate of entry of new firms minus the rate of exit of existing firms (and note that this is less than zero for most observations). In some relatively highly concentrated sectors
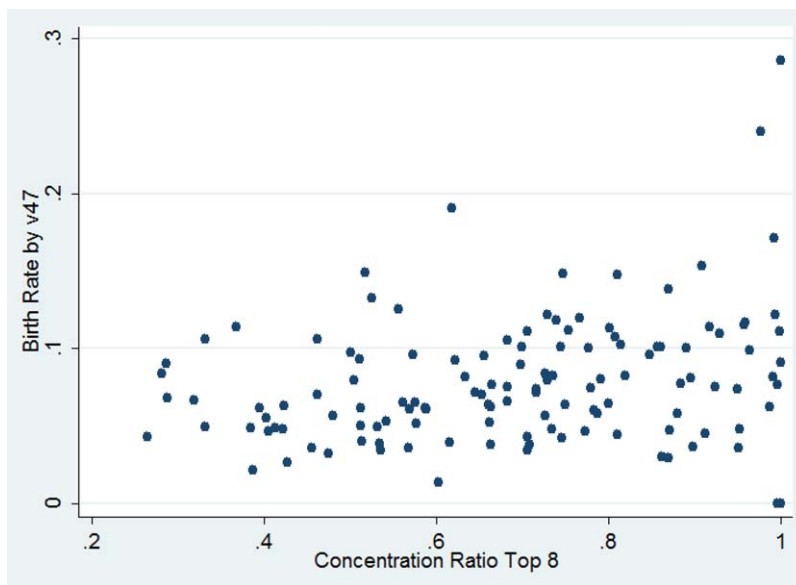
Figure 6. Entry rate vs. concentration by 4-digit classification 2011 (source: Authors' calculations) [Colour figure can be viewed at wileyonlinelibrary.com]

there is a high amount of entry and exit, while in other concentrated sectors, entry and exit is relatively low.

In terms of the dynamics of markups and concentration, this implies that firms are able to protect their positions in different ways. We hypothesise that in sectors where
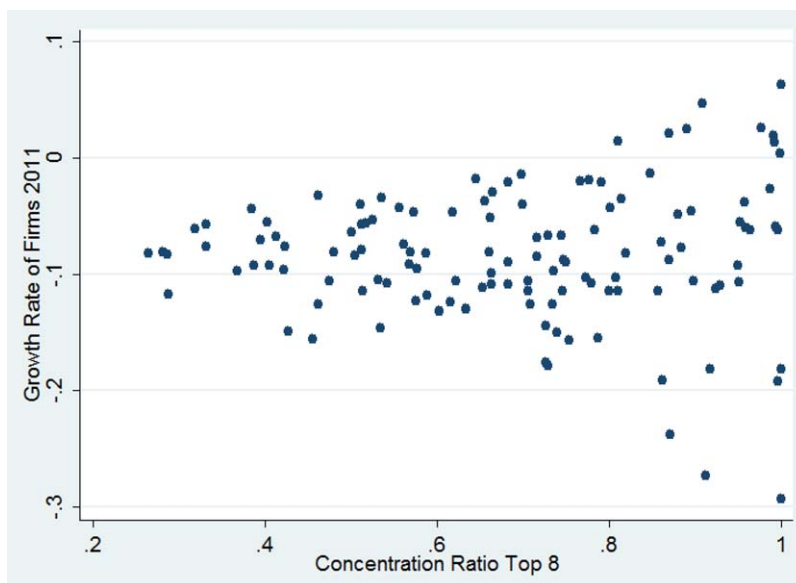

Figure 7. Growth rate vs. concentration by 4-digit classification 2011 (source: Authors' calculations) [Colour figure can be viewed at wileyonlinelibrary.com]

Table 13. Average markups on concentration and average assets

Concentration	0.00	(0.17)
Average assets	−9.99**	(4.61)
Average assets × concentration	10.66**	(4.81)
Obs	125	
R^2	0.05	

Note: ** indicates significance at the 5%, levels. t-statistics in parenthesis

there are high barriers to entry, firms can maintain higher markups and still face low competitive pressure due to the barriers. However, in sectors with low barriers to entry, firms protect their positions by keeping markups very low. This dynamic, however, will only be present in sectors with relatively higher levels of concentration.

To test this hypothesis, we run a simple regression linking markups to concentration and barriers to entry, with average asset size of existing firms as a proxy for fixed-cost barriers of entry. We thus run a regression of the form:

$$M_i = \beta_0 + \beta_1 C_i + \beta_2 A_i + \beta_3 A_i C_i + \epsilon_i \tag{6}$$

where M_i denotes the average markups of existing firms in 4-digit sector i, C_i is the concentration ratio in sector i and A_i is the average size of assets in sector i. We include an interaction between average assets and concentration to capture the impact of highly concentrated and high barriers to entry sectors on markups.

Table 14. Barriers to entry – by SIC category

	2011				2012			
Category	Interaction	S.E	N	R^2	Interaction	S.E	N	R^2
Food and food products	0.13	0.01	892		0.01***	0.00	1,226	
Beverage	0.00	0.00	416		0.00	0.00	579	
Tobacco	−0.01	0.26	32		−0.00	0.01	51	
Textiles	0.19**	0.08	791		0.11***	0.03	1,015	
Clothing, except footwear	0.67***	0.21	569		0.26**	0.10	892	
Footwear	0.40	0.48	139		0.50*	0.28	204	
Leather and leather pro...	0.00	0.12	149		0.09	0.14	232	
Wood and cork products	−0.01	0.03	306		0.02	0.03	392	
Furniture	0.15	0.10	648		0.01	0.03	862	
Paper and paper products	0.00	0.00	392		0.00	0.00	553	
Printing, publishing...	1.08***	0.37	790		0.30***	0.05	1,062	
Basic chemicals	0.04*	0.02	486		0.00	0.00	645	
Other chemicals	0.05**	0.02	554		0.01**	0.005	644	
Rubber products	0.06	0.12	186		0.11**	0.04	239	
Plastic products	0.00	0.00	526		0.06**	0.03	680	
Coal and refined petroleum	−0.00	0.00	258		−0.00	0.00	341	
Glass and glass products	0.11	0.10	283		0.01	0.01	379	
Other non-metals	0.01	0.01	531		0.02*	0.01	684	
Basic iron and steel	0.00	0.00	598		0.00	0.00	814	
Non-ferrous metals...	0.01	0.02	177		0.00	0.00	239	
Metal products except.	0.21***	0.07	2,097		0.05***	0.02	2,444	
Machinery except electrical	0.05**	0.02	1,391		0.01*	0.00	1,712	
Electrical machinery...	0.03***	0.01	2,365		0.02***	0.01	2,770	
Television, radio...	0.05***	0.02	911		0.04**	0.02	993	
Motor vehicles, parts...	0.01*	0.005	2,862		0.01**	0.006	3,811	
Transport equipment	0.05	0.04	231		0.03	0.02	297	
Professional and scientific.	0.09	0.08	346		0.30	0.22	485	
Other manufacturing industries	0.09***	0.02	914		0.05***	0.02	1,179	

Source: Authors' calculation.
Note: ***, ** and * indicate significance at the 1%, 5%, and 10% levels.

The results, reported in Table 13, confirm the following. First, that there is no direct correlation between markups and concentration. Second, that smaller firms tend to have higher markups than large firms. Third, that sectors with high barriers to entry (high asset requirements) and high concentration tend to have higher markups.

As mentioned earlier, the heterogeneity across sectors implies that the hypothesis about barriers to entry although proving to be the case on average, might not be true for every sector. To examine the sector specific barriers to entry hypotheses, we estimate equation (6) above for each SIC category independently. In this case we use the market share of each firm as a measure of sectoral dominance. The interaction between size of assets and market share serves as the indicator of highly concentrated and high barriers. The results are reported in Table 14. As expected the barriers to entry and markups hypothesis applies to some sectors but not to all sectors. Sectors that do report the inter-action between barriers to entry and concentration predominate in the chemicals (basic chemicals, other chemicals, rubber, plastics), metals (metal products, other non-metal industries), machineries and motor vehicles (machineries, electrical machineries, televi-sion, radio etc., motor vehicles), clothing and textiles (textiles, clothing, footwear) food and food products and the printing and publishing industries. This again highlights the heterogeneity in market structure and dynamics across different sectors in South African manufacturing.

6. CONCLUSIONS

In this paper, we use firm-level tax data to compute markups for manufacturing firms in South Africa. We find much variation in markups across different sectors and across time. The computed markups appear to be significantly different from earlier estimates of markups using aggregate industry data.

We also extend earlier research on levels of market concentration in South Africa. We use firm-level data to show that concentration levels are higher across majority of indus-tries than was the case in earlier studies.

We do not find in the data a clear monotonic relationship between markups and con-centration, suggesting that more research is needed to unpack the large heterogeneity observed in the administrative data used. Nevertheless, it is clear that the interaction of markups and concertation is dependent on the level of barriers to entry in the sector.

The use of administrative data is clearly an important development in our effort to understand the role of the firm in the process of economic growth in South Africa. It gives a new powerful instrument to understand on the determinants of markups, the rela-tionship between markups and firm productivity, the impacts of openness to trade on markups and productivity and the impacts of sectoral regulation on markups and productivity.

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