



Analysing the determinants of concentration in the South African manufacturing industry



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List of abbreviations

<i>AC</i>	Attributed carriers
<i>CDR</i>	Cost disadvantage ratio
<i>CPD</i>	Product-differentiation dummy
<i>CR</i>	Concentration ratio
<i>CR5</i>	Concentration ratio at five firm level
<i>CR10</i>	Concentration ratio at 10 firm level
<i>CR20</i>	Concentration ratio at 20 firm level
<i>EFTA</i>	European Free Trade Association
<i>EU</i>	European Union
<i>EXP</i>	Exponential Index
<i>FDI</i>	Foreign direct investment
<i>GATT</i>	General Agreement on Tariffs and Trade
<i>GC</i>	Gini coefficient
<i>HHI</i>	Herfindahl-Hirschman Index
<i>HOR</i>	Horwath Index
<i>IMP</i>	Import-intensity
<i>K/S</i>	Capital intensity
<i>LM</i>	Lagrange Multiplier
<i>LRAC</i>	Long-run average cost curve
<i>LSS</i>	Large sample surveys
<i>MES</i>	Minimum efficient scale
<i>MKT</i>	Minimum efficient size firm variable
<i>OLS</i>	Ordinary least square
<i>R&D</i>	Research & development
<i>ROS</i>	Rosenbluth Index
<i>SADC</i>	Southern African Development Community
<i>SCP</i>	Structure-conduct-performance
<i>SIC</i>	Standard Industrial Classification
<i>SONA</i>	State of the Nation Address
<i>StatsSA</i>	Statistics South Africa
<i>USA</i>	United States of America

Preface

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Abstract

Seller concentration in the South African economy regularly appears in the news. In recent years, the impact of industry concentration in South Africa has not been given the necessary attention it deserves. The purpose of this dissertation is to emphasise the important influence that the degree of seller, or industry concentration, has on the South African economy by focusing on the potential determinants of seller concentration.

The South African manufacturing sector indicates evidence of highly concentrated industries, controlled by a few dominant firms, and is therefore the focal point of this study. In order to completely understand the extent of industry concentration in the South African manufacturing sector, it is necessary to investigate industry concentration level and trends, to estimate the possible determinants of industry concentration, and to provide policy implications.

The literature on industry concentration, and other similar international studies conducted on this topic, serves as point of reference by providing guidance on how the study should be carried out on a South African front. The correct methodology used in this study to identify the determinants of seller concentration in South Africa is obtained from examining international studies on industry concentration from New Zealand, Australia, France and the United States of America. The industry data available for this study were derived from Statistics South Africa (StatsSA) reports from 2008 and 2011.

In order to measure the degree of industry concentration, a specific concentration measure must be used. Numerous measures of industry concentration were examined in this dissertation, but special attention was given to the concentration ratio (CR) and the Herfindahl-Hirschman Index (HHI). The construct of the South African manufacturing industry data used in this study made the use of the widely accepted measure of industry concentration, namely the *concentration ratio (CR)*, possible.

The empirical analysis focused on the relationship between the dependent variable, the concentration ratio (CR), and various independent variables. The independent variables estimated are in accordance with the literature reviewed on the determinants

of industry concentration, along with the international studies conducted on this topic. Therefore, a combination of the literature on the determinants of industry concentration and the various international studies examined was used to identify which independent variables should be estimated. However, the availability and construct of the South African manufacturing data also played a role in determining which independent variables could be estimated.

The literature on industry concentration and the multiple studies examined suggested that the independent variables, or potential determinants of industry concentration, that should be estimated in this study are advertising, export intensity, import penetration, value added per worker and economies of scale. Throughout the literature review process, it became evident that advertising and industry concentration are closely related; therefore, an entire chapter was dedicated to analysing the relationship between industry concentration and advertising.

The empirical analyses were conducted by estimating five different models for 2008, 2011, and 2008 to 2011 respectively. The 2008 to 2011 analysis allowed for trends in industry concentration to be observed. The results from the empirical analyses indicate that all of the independent variables estimated in this study are determinants of industry concentration in the South African manufacturing sector. However, in 2008, import penetration did not have a significant influence on industry concentration, but in 2011, it did. In the 2008 to 2011 analysis, value added per worker and advertising had a positive significant influence on industry concentration, which suggested that there is a trend between advertising intensity and industry concentration.

Keywords: Manufacturing; industry concentration; seller concentration; determinants; monopoly, free market

Opsomming

Verkoperskonsentrasie in die Suid-Afrikaanse ekonomie verskyn dikwels in die nuus. Gedurende die afgelope paar jare ontvang die impak van industriekonsentrasie in Suid-Afrika nie die aandag wat dit verdien nie. Die doelstelling van hierdie verhandeling is om te benadruk watter belangrike invloed die graad van verkoper, of industriekonsentrasie, op die Suid-Afrikaanse ekonomie het. Om hierin te slaag, word gefokus op die potensiele bepalers van verkoperskonsentrasie.

Die Suid-Afrikaanse vervaardigingsektor toon bewyse dat hoogs gekonsentreerde industrieë deur 'n paar dominante firmas beheer word. Daarom is dit die fokuspunt van hierdie studie. Dit is nodig om industriekonsentrasievlakke en -neigings te ondersoek; moontlike industriebepalers te skat; en beleidsimplikasies te verskaf, sodat mens volledig kan verstaan wat die graad van industriekonsentrasievlakke in die Suid-Afrikaanse ekonomie is.

Die literatuur oor industriekonsentrasie, asook ander soortgelyke internasionale studies wat oor hierdie onderwerp gedoen is, dien as 'n verwysingspunt deurdat dit riglyne verskaf oor die wyse waarop sodanige studie binne die Suid-Afrikaanse konteks uitgevoer behoort te word. Die korrekte metodologie wat in hierdie studie gebruik word om bepalers van industriekonsentrasie in Suid-Afrika te identifiseer, is verkry deur die ondersoek van studies op industriekonsentrasie van Nieu-Seeland, Australië, Frankryk en die Verenigde State van Amerika. Die industriedata wat beskikbaar was vir hierdie studie is afgelei uit Statistiek Suid-Afrika (StatsSA) se verslae van 2008 en 2011

'n Spesifieke konsentrasie-afmeting moet aangewend word om die graad van industriekonsentrasie te meet. Verskeie maatstawwe van industriekonsentrasie is in hierdie studie ondersoek; maar die konsentrasieverhouding (ratio) (CR) en die Herfindahl-Hirschman Index (HHI) het spesiale aandag geniet. Die konstruk van die Suid-Afrikaanse vervaardigingsindustrie-data wat gebruik is in hierdie studie het die gebruik van die wydaanvaarde konsentrasieverhouding (ratio) (CR) moontlik gemaak.

Die empiriese ontleding het gefokus op die afhanklike veranderlike, die konsentrasieverhouding (ratio) (CR), en verskeie onafhanklike veranderlikes. Die

geskatte onafhanklike veranderlikes is in ooreenstemming met die geëvalueerde literatuur oor die bepalers van industriekonsentrasie; in samehang met internasionale studies wat oor hierdie onderwerp onderneem is. Dus is 'n kombinasie van letterkunde oor die bepalers van industriekonsentrasie asook verskeie internasionale studies gebruik om te identifiseer watter onafhanklike veranderlikes geskat moet word. Die samestelling en die beskikbaarheid van Suid-Afrikaanse vervaardigingsdata het egter ook 'n rol gespeel om te bepaal welke onafhanklike veranderlikes geskat kan word.

Die literatuur oor industriekonsentrasie asook die verskeie ander studies wat onderneem is, dui daarop dat die onafhanklike veranderlikes, of potensiële bepalers van industriekonsentrasie, wat geskat behoort te word in hierdie studie, bemarking, uitvoerintensiteit, invoerpenetrasie, waardetoevoeging per werknemer en skaalbesparings is. Dit het duidelik tydens die literatuurhersienings geblyk dat bemarking en industriekonsentrasie nouliks met mekaar verband hou. Daarom is 'n hele hoofstuk daaraan gewy om die verhouding tussen industriekonsentrasie en bemarking te ontleed.

Die empiriese ontledings is onderneem deur onderskeidelik vyf verskillende modelle vir 2008 tot 2011, en 2008 tot 2011 te skat. Die 2008 tot 2011-ontleding het dit moontlik gemaak om neigings in industriekonsentrasie waar te neem. Die resultate van die empiriese ontledings dui daarop dat al die industrieveranderlikes wat in hierdie studie geskat is, bepalers is van industriekonsentrasie in die Suid-Afrikaanse vervaardigingsektor. Invoerpenetrasie in 2008 het egter nie 'n beduidende invloed op industriekonsentrasie gehad nie, maar in 2011 het dit wel. In die 2008 tot 2011-ontleding het waardetoevoeging per werker sowel as bemarking 'n beduidende positiewe invloed op industriekonsentrasie gehad, wat daarop dui dat daar 'n neiging is tussenin bemarkingintensiteit en industriekonsentrasie.

Sleutelwoorde: vervaardiging; industriekonsentrasie; verkoperskonsentrasie; Bepalers; Monopolie; Vryemark

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

In President Zuma's 2017 State of the Nation Address (SONA), he emphasises that high economic concentration levels deserve to be given more attention in South Africa. Compared to other countries, South African is notorious for having a highly concentrated economy. An IMF country report from 2014 indicates that high levels of concentration in the South African financial sector could weaken the asset quality of financial institutions. The report also states that the high levels of concentration in the financial sector mainly benefits major firms, enabling them to gain higher returns compared to their smaller counterparts (IMF, 2014:10-53).

Certain sectors of the South African economy are more concentrated than others. The manufacturing sector in South Africa is also considered to be one of the highly concentrated sectors in the South African economy. Compared to other manufacturing sectors in developing countries, the manufacturing sector in South Africa is altogether very well developed, which is an indication of its importance to the economy as a whole.

The significance of industry, or seller concentration, is important for a number of reasons. According to Tibor (1955:101), industrial concentration concerns the public as a whole, as it holds various political and economic consequences. The degree of concentration in an industry has very important repercussions for the price setting and competition in general of an economy.

Measuring concentration in an industry can be useful to compare different industries or markets, to regulate competition and to assist policymakers. This allows for consumer rights to be protected and to improve their overall well-being.

In contrast to South Africa, the determinants of seller concentration have been studied in depth in other countries. Extensive research has been conducted on what the possible determinants of seller concentration can be. The relatively late development of this sub-field of industrial economics can help explain why little attention has been given to it. In order to comprehend why industry concentration should be examined, it is necessary to investigate the formation of industry concentration as a field of study.

This chapter is structured as follows: In the following section, the history of industrial concentration is examined. In the next section, industrial concentration from a South African perspective is investigated, followed by the structure of chapters in this dissertation.

1.2 THE HISTORY OF DETERMING INDUSTRY CONCENTRATION

The origin of seller concentration can be traced back as early as 1931. It was during this period that data became available that allowed for the study of industry concentration. For the first time, the “Statistics of Income” presented data that classified industries in an orderly fashion, and also paid special attention to industry size. The article, *The Large Corporation in American Economic Life*, published in the *American Economic Review*, by Gardiner C. Means is regarded as the inauguration of the study of industry concentration (Adelman, 1951:285).

Following in the footsteps of Gardiner C. Means, economist Edward S. Mason expanded the field of industry concentration by focusing on the effect of industry concentration on policy formulation. Mason (1939:61) came to the conclusion that price policies are influenced by the number of buyers and sellers in an industry. The research conducted by Mason (1939:63) discovered that there are specific factors that determine the degree of industry concentration. The argument can be made that Mason (1939) laid the foundation to identify determinants of industry concentration.

The work of economists Gardiner C. Means and Edwards S. Mason made it possible for economist Joe S. Bain to devise hypotheses that could contribute to the development of studying industry concentration as a whole. Bain (1951) realised the importance of examining industry concentration, and analysed the effect of highly concentrated industries on firm profitability. Bain (1951:298) was also the first economist to shed light on what is conveyed by the term “degree of industry concentration”. In addition to devising hypotheses and defining industry concentration,

Bain (1951:311) also identified the main factors and determinants that lead to industry concentration. The determinants of industry concentration identified by Bain (1951:311) are still relevant for modern studies of industry concentration.

Since economists such as Bain identified the likely determinants of industry concentration, the number of studies focusing on the determinants of industry concentration has increased substantially. Internationally, studies have been conducted with the aim to establish the main determinants of industry concentration in various countries.

The methodology used to determine the factors of industry concentration vary from country to country. The reason for the difference in the methodology used to carry out the empirical analyses can be accredited to the variation of industry data available. Bain (1951:323) stressed that industry data can be a major hurdle when conducting an industry concentration analysis. Obtaining the appropriate industry data is vital to ensure a successful empirical analysis.

The literature review section of this dissertation focuses on factors that are generally considered to be the main determinants of industry concentration. Studies that are similar to that of Bain (1951), but carried out in other countries, are examined in detail. Studies from New Zealand, Australia, France and the United States of America (US) are mentioned. These specific international studies served as a framework to apply a similar analysis within a South African context. Analysing international studies on the same topic makes it possible to avoid the general mistakes in the methodology and empirical analysis.

Internationally, studies aimed at identifying the determinants of industry concentration all have shed light on the significance of advertising. Therefore, a whole section in the literature review is devoted to the examination of the effect of advertising on industry concentration in this dissertation.

1.3 INDUSTRIAL CONCENTRATION IN SOUTH AFRICA

Industry concentration determinants in South Africa have not yet been given the necessary attention it deserves. The determinants of seller concentration in the South African manufacturing industry have yet to be determined (Fedderke & Simabegavi, 2008:181). Studies such as these aim to contribute to the South African economy by

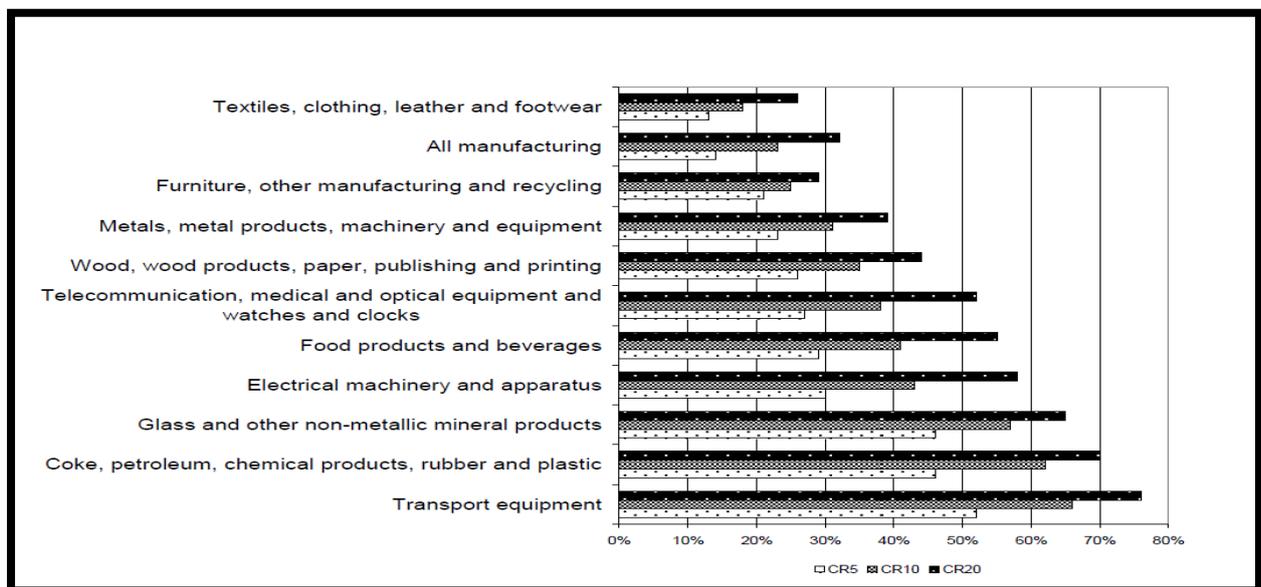
filling the information void with the research required to make informed decisions regarding industries and the manufacturing sector as a whole.

Government institutions, such as The Competition Commission of South Africa, can benefit substantially from research in this field. Competition among industries in South Africa can be better regulated to ensure that all parties involved are treated fairly and help create a South African economy that is inclusive.

Data on the South African manufacturing industry indicate that industries are greatly concentrated. Figures 1.1 and 1.2 indicate the highly concentrated nature of the South African manufacturing industry. The concentration ratio (CR) at five-firm level is dominant in both 2008 and 2011. This means that five firms, or fewer, dictate the behaviour of each industry in the South African manufacturing sector.

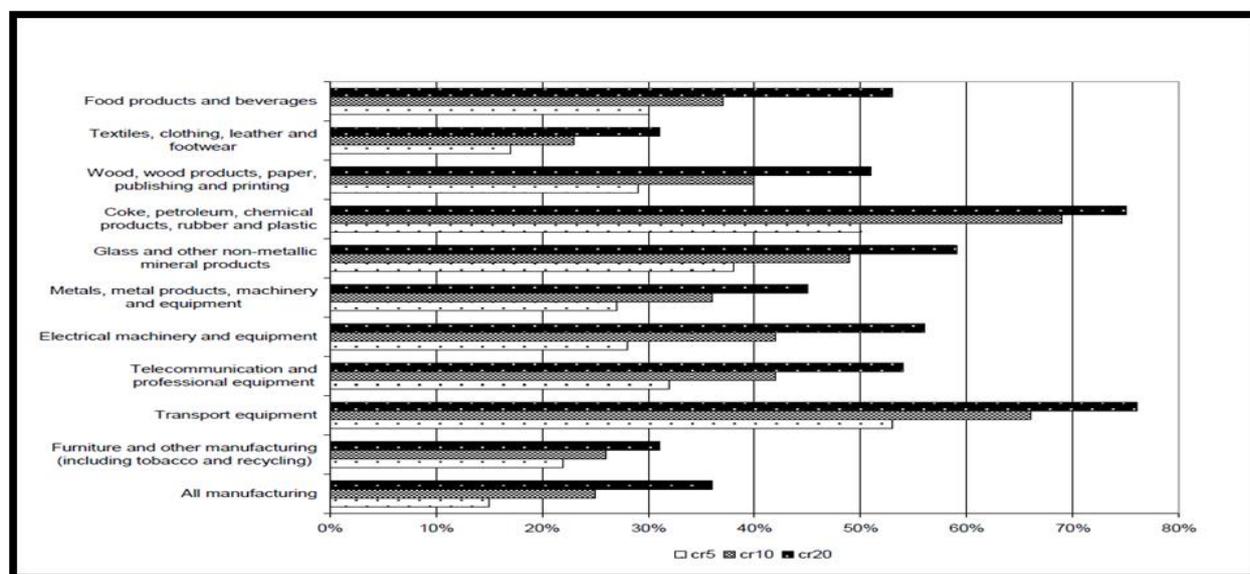
In contrast to the CR5, the CR10 and CR20 indicate that the dominant 10 or 20 firms in an industry do not affect the industry as significantly as the dominant five (StatsSA, 2010 & 2013). The concentration ratio is a popular method of measuring industry concentration, and is explained in detail in Chapter 2.

Figure 1.1: Concentration ratios (CR) in 2008



Source: StatsSA, 2010

Figure 1.2: Concentration ratios (CR) in 2011



Source: StatsSA, 2013

Table 1.1 compares the concentration ratios for the different manufacturing industries between 2008 and 2011. Contrary to the conventional wisdom that concentration ratios in South Africa are rising, it seems as if concentration (according to CR5 and CR10) levels actually decreased from 2008 to 2011. The only exceptions are glass and other non-metallic mineral products, as well as electrical machinery and apparatus.

Table 1.1: Comparing concentration ratios per industry

Manufacturing divisions	2011			2008		
	CR5	CR10	CR20	CR5	CR10	CR20
30: Food products and beverages	29	41	55	30	43	54
31: Textiles, clothing, leather and footwear	13	18	26	17	23	31
32: Wood, wood products, paper, publishing and printing	26	35	44	30	41	52
33: Coke, petroleum, chemical products, rubber and plastic	47	62	70	50	69	76
34: Glass and other non-metallic mineral products	46	57	65	38	50	60

Table 1.1: Comparing concentration ratios per industry (continued)

Manufacturing divisions	2011			2008		
	CR5	CR10	CR20	CR5	CR10	CR20
35: Metals, metal products, machinery and equipment	23	31	39	27	36	46
36: Electrical machinery and apparatus	30	43	58	29	43	56
37: Telecommunication, medical and optical equipment and watches and clocks	27	38	52	33	42	55
38: Transport equipment	52	66	76	53	66	76
39: Furniture, other manufacturing and recycling	21	25	29	21	25	29

Source: StatsSA, 2010 & 2013

1.4 PROBLEM STATEMENT AND RESEARCH OBJECTIVE

Considering the unexpected decline in concentration levels observed from Table 1.1, as well as the lack of previous research in this regard, the research question to be probed is: “What are the main determinants of seller concentration in the South African manufacturing sector.”

The general objective of this study is the empirical estimation of variables that determine seller concentration in the South African manufacturing industry. In addition to the general objective, there are also three specific objectives for this study: Firstly, to investigate recent levels and trends in industry concentration in South Africa; secondly, to estimate the determinants of seller concentration in South Africa; and finally, to propose some policy implications based on the identified determinants of industry concentration.

The methodology used in order to achieve the desired objectives is designed from the examination of literature on industry concentration, and of similar previous studies conducted.

1.5 STRUCTURE OF CHAPTERS

The chapters included in this dissertation are structured as follows:

Chapter 2 examines how industrial concentration is measured. The different measures, or indices, used to measure industrial concentration are analysed and explained. This chapter also provides the rationale for using a specific measure of industrial concentration in South Africa.

Chapter 3 provides a detailed analysis of industry concentration in South Africa. Industrial concentration in South Africa is analysed by focusing on specific factors influenced by industry concentration. These factors include market power, productivity, investment and employment. Different measures that were used to analyse industry concentration in South Africa are also examined.

Chapter 4 investigates literature on the determinants of industry concentration. The determinants of industry concentration analysed in this chapter include: economies of scale, barriers to entry, sunk cost expenditure, regulation, industry lifecycle, distinctive capabilities, core competences, export intensity, and profitability. The determinants examined in this chapter indicate what the possible determinants of industry concentration in the South African manufacturing sector are.

Chapter 5 focuses on various international studies conducted on industrial concentration that are similar to this study. Studies conducted in New Zealand, Australia, France and the United States of America are examined. The studies examined in this chapter can be linked with the determinants investigated in Chapter 4, and provide a good indication of how to analyse industry concentration in South Africa.

Chapter 6 is dedicated to the impact of advertising on industry concentration. The literature reviewed in Chapter 4, along with the studies examined in Chapter 5, indicated that advertising plays a major role in determining the degree of industry concentration.

Chapter 7 explains the methodology necessary to identify the determinants of industry concentration in the South African manufacturing sector. The model selection process is explained, along with the description of the data used, and the different econometric tests. An explanation of the dependent variable, and various independent variables used in the empirical analysis, is also provided in this chapter.

Chapter 8 deals with the empirical analysis of this dissertation. In this chapter, the different models selected for the empirical analysis are explained, the *a priori* specifications are provided and the empirical results are provided. In order to fully understand the empirical test results, an interpretation of the models specified is provided, as well as an explanation of the behaviour of the independent variables.

Chapter 9 provides an overall summary, conclusion, and recommendations for future studies. This chapter also includes a section with an introduction and summary of each chapter included in this dissertation.

1.6 SUMMARY AND CONCLUSION

It is evident that high degrees of industry concentration exist in the South African manufacturing sector. An analysis of the determinants of industry concentration in South Africa will allow for an opportunity to mitigate this problem. By analysing the determinants of industry concentration in South Africa, policy makers will be able to formulate the correct and necessary policies that will address the issue of high levels of industrial concentration in South Africa's manufacturing sector. The following chapter will focus on the determinants of industry concentration, and will explain the different measures of industry concentration.

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CHAPTER 2

MEASURING INDUSTRY CONCENTRATION

2.1 INTRODUCTION

This chapter examines different methods of measuring industry concentration. The objective of this chapter is to analyse the different measures used to determine the degree of industry concentration, and to identify a measure that can be used in the empirical analysis of this study in order to assist with the identification of the determinants of industry concentration in the South African manufacturing sector. The measures of concentration that are examined can be divided between discrete and cumulative measures of concentration.

This chapter also provides background on choosing the most appropriate measure of industry concentration, and examines the desired properties as stipulated by Hall and Tideman (1967:163-164) to measure industry concentration.

This chapter is structured as follows: Section 2.2 provides a definition of industry concentration and background information on measures of industry concentration. Sections 2.3 and 2.4 distinguish between discrete and cumulative measures of industry concentration.

2.2 BACKGROUND

Seller concentration can be defined as the selling of a certain product, or collection of products, by the size of the distribution of firms. Seller concentration is considered to be important because of the influence it has on market power and business behaviour in general (Curry & George, 1983:203). The prices paid by consumers, and profits earned by firms are also influenced.

An alternative definition of industry concentration can be the high percentage of market share a relatively small number of firms in an industry has in terms of assets, sales

and employment. The small number of firms provides the majority of the product in an industry.

There are several ways to measure the degree of concentration, or in this case seller concentration of an industry. Economists have debated over the method to use when determining seller concentration. There is not yet consensus as to which measure of concentration is the most effective (Northcott, 2004:30). Normally, the type of concentration measure used in empirical analysis depends on the structure and availability of data.

There is still no ideal measure of concentration and the measure of concentration that should be used depends on various variables and factors. According to Hall and Tideman (1967:162), cross-sectional questions are answered by means of measures of concentration. These questions that are answered are related to the variation in concentration amid certain industries at a specific time period.

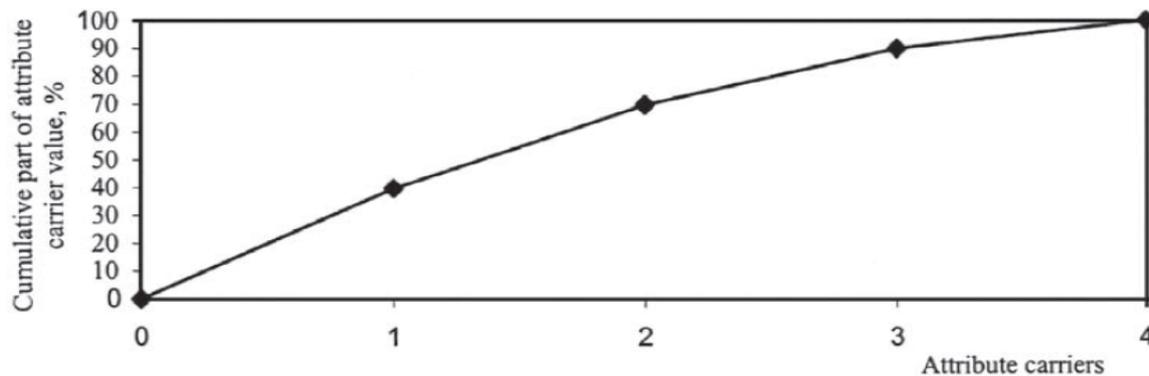
Two schools of thought exist when measuring the level of seller concentration in an industry. The first measure is a cumulative measure of concentration, which deals with the significance of the large firms in an industry or the economy, and the second is a discrete measure of concentration that takes the number and size of firms into account.

Cumulative measures of concentration can be useful in determining what the importance of larger firms in an industry is, although it might not reveal the accurate level of concentration in an industry. This simplistic approach to determine seller concentration in an industry can be practical when establishing which large firms have the ability to influence economic and political decisions.

According to Ginevičius and Čirba (2007:4), the vast majority of concentration measures available indicate that an ideal measure has not yet been identified. Ginevičius and Čirba (2009:192) argue that all concentration measures can be explained by the use of the concentration curve. The concentration curve involves market players being plotted on the abscissa of the coordinate system in a descending order of their respective size and additive values.

In other words, the market players, or criterion bearers, are plotted based on the cumulative value of the sum of respective criterion bearers. Figure 2.1 indicates four market players, where each has 10%, 20%, 30% and 40% market share, respectively.

Figure 2.1: Concentration curve



Source: Ginevičius & Čirba, 2007

The measuring units on the concentration curve are either discrete or cumulative. The values of discrete concentration measures are calculated directly or indirectly as measures of concentration. Cumulative concentration measures take various market players, attributed carriers (AC), into account. The AC is determined by various methods. The following section provides examples of discrete and cumulative concentration measures. Therefore, concentration measures are distinguished between discrete and cumulative concentration measures.

2.3 DISCRETE MEASURE OF CONCENTRATION

This section only examines one discrete measure of concentration, namely the concentration ratio. Literature on other discrete measures of concentration mainly focuses on the concentration ratio, due to its simplicity and convenience of use.

2.3.1 Concentration ratio (CR)

Concentration ratio as a measure of concentration is the most widely used concentration index and is considered to be a positive measure of concentration. The simplicity of this measure makes it easy to use. The concentration ratio can be defined

as a ratio that combines the market share of a specific number of firms (x), or market players, with regard to a specific market.

The ratio is constructed as follows:

$$CR_x = \sum_{i=1}^n S_i^2$$

The x on the concentration ratio represents the attributed carriers. The numbers 3, 4 and 5 (which represent the number of firms) are normally represented by x, thereby making x relatively arbitrary. The concentration ratio is often considered to leave out information, because the index is only one point on the cumulative concentration curve (Curry & George, 1983:207). The concentration ratio (CR) represents only one point on the concentration curve, thereby making it a one-dimensional measure of concentration that has a range of 0 to 1. An alternative form of the CR_x is CR%, which indicates the aggregate market share of the top percentage sellers in a market (Hall & Tideman, 1967:165).

The simplistic nature of the concentration ratio means that it is very easy to interpret and analyse. The following example indicates the simplicity of the concentration ratio used: CR₄=0.5 indicates that the largest four firms in an industry control 50% of the sum attributed carriers, which refers to market share. The reliability and accuracy of the concentration ratio are determined by x. Therefore, a positive characteristic of the concentration ratio is that not a significant amount of statistical data is required to determine the level of concentration. The fact that only information on market players, or firms, is required makes the concentration ratio easy to use and to interpret.

2.4 CUMULATIVE MEASURES OF CONCENTRATION

This section examines a few of the most popular cumulative measures of concentration. Since there are various cumulative concentration measures available, only the ones that are considered to be the most accurate are explained. Cumulative measures of concentration are useful in determining the importance of larger firms in an industry, although it might not reveal the accurate level of concentration in an industry since different weights are subjectively allocated to different market players (attributed carriers).

2.4.1 Herfindahl-Hirschman Index (HHI)

The Herfindahl-Hirschman Index (HHI) is also one of the most popular measures of concentration. The HHI satisfies all the necessary properties required to measure concentration, as proposed by Hall and Tideman (1967:163-164). These properties include the following:

- i. The concentration index that will be used must be a one-dimensional measure, which means that it should be distinct and not be open to several interpretations.
- ii. The concentration in an industry should be unrelated to the size of the industry as a whole when measuring concentration.
- iii. The 'principle of transfer' should be applied. This means that if a firm increases its share at the expense of a smaller firm, concentration should increase.
- iv. If all the firms in an industry are split into equal parts, the concentration index should be decreased. This property holds if there are any changes in the industry over time, and this property is a prerequisite for the cardinal properties of the measure.
- v. Should the industry accommodate a specific number of firms of an equal size, the concentration should be a decreasing function of that same amount. In other words, if there are many firms in an industry, it indicates less concentration, and if there are few firms in an industry, it indicates higher concentration. This is an important property because it is the only particular guide obtained exactly from economic theory.
- vi. A range of zero to one should be used when measuring concentration. This specific property simplifies the concentration measure, and makes transformation of a measure possible.

According to Hall and Tideman (1967:165), the fact that the HHI satisfies their properties, as stated above, makes it an ideal choice of concentration measure. The HHI is calculated by weighing each firm in an industry by its relative market share.

Hannah and Kay (1977) also identified criteria to evaluate measures of concentration. Industrial textbooks and economists have stated the importance of these criteria when evaluating measures of concentration (Latreille & Mackley, 2011:120):

- i. Concentration curve criterion: An industry is considered to be more concentrated if its concentration curve is located above the concentration curve of another industry.
- ii. Sales transfer principle: Should a customer switch from a small firm to a larger firm, concentration will increase.
- iii. The entry condition: Concentration in an industry should decline if there are any new firms entering an industry that are smaller than the average firm in an industry.
- iv. The merger condition: The merger of firms in an industry results in higher concentration.
- v. Should customers choose to switch brands, it will usually lead to a decrease in concentration.
- vi. Gibrat's Law: Concentration can also be attributed to the random growth factors of a firm.
- vii. Small-scale entry occurs when new firms to an industry have no significant effect on concentration.

The choice of concentration measure depends greatly on the type of data that is available. Hannah and Kay recommend that a self-evident approach to concentration needs to be used to obtain accurate results.

The HHI is constructed as follows:

$$HHI = \sum_{i=1}^N S_i^2$$

The total number of sellers in the industry is indicated by N, and S_i refers to the market share. The HHI indicates an index of 0 under perfect competition, compared to an index of 1 under a monopoly. The higher the HHI is, the more concentrated an industry is. The HHI recognises the significant contribution that larger firms in an industry

contribute to the degree of concentration, but also integrates the importance of smaller firms in an industry when calculating concentrations (Fedderke & Simbanegavi, 2008:138). The following section investigates international studies conducted on industry concentration.

The HHI is calculated by squaring the sum of the attributed carriers. A problem with using the HHI as a measure of concentration arises in the calculation of its attributed carriers. This is because the attributed carriers are squared in the calculation of the HHI, which causes large attributer carriers to have a much more significant impact compared to smaller ones. Ginevičius and Čirba (2007:5) point out that, for this reason, the HHI poorly reflects the degree of market concentration. Therefore, more accurate measures of industry concentration should be used.

2.4.2 Horwath Index (HOR)

The HOR is estimated by assigning a larger weight to each one of the market players (firms) compared to the HHI. The attributed carrier (market player) with the largest weight is considered to be the essential part of the HOR, as its full share of the absolute sum of attributed carriers is used to calculate the measure. In other words, the aggregate value of the weight of the market players is used in this concentration measure.

According to Ginevičius and Čirba (2007:6), the HOR cannot be regarded as a fitting measure of concentration, as its division between cumulative and discrete parts is not well grounded. Another reason for their scepticism stems from the fact that it is not entirely known why only the largest part of the attributed carrier is used, and how values are assigned to larger and smaller attributed carriers.

2.4.3 Exponential Index (EXP)

The EXP is identical to the HHI, except for the determination of the attributed carriers. In order to determine the EXP, the value distribution of attributed carriers must be available.

The values produced by the EXP are usually significantly smaller compared to the values produced by the HHI. Therefore, results generated by the EXP are usually too low to reflect the degree of concentration accurately.

2.4.4 Rosenbluth Index (ROS)

The ROS is calculated by taking into account the number of attributed carriers. Accordingly, the number of attributed carriers involved has a significant influence on this concentration measure. A high number of attributed carriers results in a larger weight being ascribed to small carriers. This results in the market players (firms) being ranked in descending order, in terms of their market share.

The weight assigned to each market player increases as their ranking decreases, and consequently smaller firms make a larger contribution to this index. If the value produced by the ROS declines as the number of market players increases, it demonstrates that concentration declines.

2.4.5 Gini coefficient (GC)

The GC is considered to be a relative measure of concentration. A relative measure of concentration specifies the inequality between firm sizes, and does not focus on the number of market players like other measures of concentration do. The GC produces a value between 0 and 1. A value closer to 0 indicates an equal market share, and a value closer to 1 indicates unequal market share. Since the GC is, in essence, a measure of equality, it is easy to interpret and understand.

2.5 SUMMARY AND CONCLUSION

The concentration ratio and Herfindahl-Hirschman Index are the two most common measures of industry concentration. The choice of concentration measure is often limited to structure and availability of industry data. Both of these measures of concentration are considered to be accurate, and yield reliable results. However, the structure of manufacturing industry data in South Africa only allows for use of the concentration ratio. The concentration ratio is therefore used in the empirical analyses of the study, instead of the Herfindahl-Hirschman Index. The purpose of using the concentration ratio in this study is to identify the variables that have a significant influence on it. Therefore, the degree of industry concentration in the South African manufacturing sector is captured by the concentration ratio. The concentration ratio is therefore used as the dependent variable in the empirical analyses, and the overall aim of this study is identifying what the determinants are that have a significant influence on it. The determinants influencing the concentration ratio are identified in

Chapters 4, 5 and 6. The following chapter will focus on industry concentration from a South African perspective.

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CHAPTER 3

INDUSTRY CONCENTRATION IN SOUTH AFRICA

3.1 INTRODUCTION

This chapter focuses on certain aspects that are affected as a result of high levels of industry concentration. The influence of industry concentration on market power, productivity, investment and employment in South Africa will be examined. In section 3.2, the relationship between industry concentration and market power will be examined in detail by placing an emphasis on the effect that mark-ups have, not only on industry concentration, but also import penetration and pricing behaviour. Section 3.2 also sheds lights on what types of industry concentration measures are appropriate to measure industry concentration.

Section 3.3 examines the relationship between industry concentration and productivity, as well the general implications of its effect on the economy. In section 3.4, the effect of industry concentration on investment levels is briefly examined. Section 3.5 investigates the relationship between industry concentration and employment levels in South Africa, since unemployment is major socio-economic problem in South Africa.

In addition to the examination of the effect of industry concentration on employment, the relationship between industry concentration and competition will also be briefly examined. Section 3.6 focuses on analyses conducted on industry concentration with the use of the Gini coefficient and the Rosenbluth Index, as well as suggestions to policymakers regarding industry concentration in South Africa.

Table 1.1 serves as a good indication of the high levels of industry concentration in South Africa. This chapter will help explain the current state of industrial concentration in South Africa and the literature reviewed in this chapter will help explain why it is necessary to analyse industry concentration in South Africa.

Table 3.1: Comparing concentration ratios per industry

Manufacturing divisions	2011			2008		
	CR5	CR10	CR20	CR5	CR10	CR20
30: Food products and beverages	29	41	55	30	43	54
31: Textiles, clothing, leather and footwear	13	18	26	17	23	31
32: Wood, wood products, paper, publishing and printing	26	35	44	30	41	52
33: Coke, petroleum, chemical products, rubber and plastic	47	62	70	50	69	76
34: Glass and other non-metallic mineral products	46	57	65	38	50	60
35: Metals, metal products, machinery and equipment	23	31	39	27	36	46
36: Electrical machinery and apparatus	30	43	58	29	43	56
37: Telecommunication, medical and optical equipment and watches and clocks	27	38	52	33	42	55
38: Transport equipment	52	66	76	53	66	76
39: Furniture, other manufacturing and recycling	21	25	29	21	25	29

Source: StatsSA, 2010 & 2013

3.2 CONCENTRATION AND MARKET POWER

High levels of industry concentration cause mark-ups to increase, signifying that dominant firms tend to have more market power. However, an increase in competitiveness between industries raises mark-ups, where an increase in competitiveness within industries lowers mark-ups.

Mark-ups and industry concentration are related in the sense that the degree of market concentration influences the pricing power in an industry. The complications of the

contestability of markets (costs associated with entry or exit), such as barriers to entry, might lead to unclear effects on industry concentration on mark-ups, and should further be explained to give some clarity.

Empirical evidence from Fedderke *et al.* (2007:54) indicates that the severely concentrated nature of the South African manufacturing sector has a fundamental impact on pricing behaviour. High concentration levels in the manufacturing sector influence market power to a great extent. This means that producers in the manufacturing sector are given a great deal of power in terms of pricing behaviour, which ultimately causes them to increase the level of mark-ups over marginal cost.

Fedderke *et al.* (2007:60) also made the assumption that the high levels of industry concentration in South Africa get established in horizontal as well as vertical integration. In conclusion, Fedderke *et al.* (2007:31) found that the anti-competitive pricing strategies adopted in South Africa do not enhance the international competitiveness of the South African manufacturing industry significantly. Their study also concludes that the average mark-up in South African industries is considerably higher than those of the USA industries. Therefore, industry concentration and its determinants need to be addressed to ensure the overall development of the South African manufacturing sector.

It is important to analyse the effects of mark-ups when considering the effect of industry concentration on a number of factors. Mark-ups are useful when analysing an industry, as they refer directly to the power a firm has in terms of increasing prices above the marginal costs (Fedderke & Simabegavi, 2008:173). The fact that the South African mark-ups are much higher than many other manufacturing industries worldwide, justifies a cause to investigate. An increase in industry concentration levels may also lead to an increase in mark-ups.

Compared to other manufacturing sectors in developing countries, the manufacturing sector in South Africa is altogether very well developed, which is an indication of its importance to the economy as a whole (Fedderke & Simabegavi, 2008:142). It is important to analyse the effects of industry concentration as it is an important factor to consider for policymakers to ensure it leads to favourable economic conditions. The effects of industry concentration should also be examined for a number of other reasons, rather than just for policy implications. These reasons include productivity,

employment, consumer welfare and investment (Fedderke & Simabegavi, 2008:160). Industry concentration and market power go together, and generally the one tends to represent the other.

An analysis of the South African manufacturing sector by Fedderke and Simbanegavi (2008:134) found that it was heavily concentrated until 1996, but started to decrease thereafter. It is necessary to examine the manufacturing industry and its level of concentration, as well as the causes of concentration and the possible policy implications. The existing literature can be helpful in determining what the determinants of seller concentration in the South African manufacturing sector may be.

There are various indices that can be used to determine industry concentration, mainly depending on the availability of data (*see Chapter 2*). The two main measures of concentration that were used in studies on the concentration levels of the South African manufacturing sector are the Gini coefficient and the Rosenbluth Index. These indices of concentration indicated that the South African manufacturing industry is heavily concentrated; however, the reliability and accuracy of these indices are questionable. The true market power of different industries is not always correctly reflected by these indices. The lack of available data forced the use of these indices, and it therefore lacks accuracy and reliability (Fedderke & Simabegavi, 2008:135). The results yielded from the Gini coefficient shed light on the output inequality of industries, and do not directly deal with industry concentration.

The soundness of empirical studies done on the concentration of the South African manufacturing industry in the previous findings is questionable due to the concentration measures that were used. The lack of more reliable and accurate concentration measures, such as the concentration ratio (CR) and the Herfindahl-Hirschman Index (HHI), adds to the distrust in the accuracy of the previous findings (Fedderke & Simabegavi, 2008:147). The absence of the use of these two trustworthy concentration measures can be attributed to the type of data that did not allow for those two specific concentration measures to be calculated. International literature on manufacturing sectors welcomes the use of the concentration ratio and the Herfindahl-Hirschman Index (HHI), but avoids other measures of concentration.

Industry concentration can represent market power, but this does not necessarily mean that firms are exercising their market power. There are important factors to take into account when dealing with industrial concentration or market power. Some of these factors need to be included when examining industry concentration or market power on price controls and entry barriers. Fedderke and Simbanegavi (2008:160) came to a conclusion that the empirical evidence presented does not irrefutably prove that the South African manufacturing sector is highly concentrated, and for this reason there still remains extensive research to be conducted on industry concentration.

3.3 INDUSTRY CONCENTRATION AND PRODUCTIVITY

The link between concentration and productivity should be carefully examined. It is imperative to understand whether high concentration levels lead to an increase in the productivity of the economy, or have the opposite effect. Policies should be toward the effect that concentration has on productivity. These policies should assist or discourage concentration, depending on its effect on economic growth. International literature on the relationship between concentration and productivity has diverse conclusions. A study conducted by Greer and Rhoades (1976:1042) on the relationship between concentration and productivity in the USA manufacturing sector found that industry concentration has a slight positive effect on the level of productivity. Another study by Pletzman (1977:46) on the same topic also found that industry concentration improves productivity through economies of scale, which lowers the cost of production and ultimately increases efficiency.

Contrarily, the findings of Greer and Rhoades (1976:1042) and Sveikauskas and Sveikauskas (1982:773-774) showed no effect between industry concentration and productivity. However, they did come to the conclusion that research and development (R&D) have a positive effect on productivity, which causes it to increase. Larger firms and more concentrated industries conduct more R&D.

The relationship between concentration and productivity was also tested by Ward (1987:217), concentrating on a specific industry. His findings are in line with the findings of Sveikauskas and Sveikauskas (1982:773-774), who found no proof of a positive relationship between productivity and concentration. On the South African front, Fedderke and Szalontai (2009:249) found the relationship between productivity and concentration to be negative. The main findings of their study are that increased

industry concentration has a harmful effect on output, labour productivity and unit labour costs.

The findings that Fedderke and Szalontai (2009:249) made in their study can prove helpful to policymakers. Policymakers should examine industry concentration in South Africa closely, seeing that its effect tends to affect productivity in a negative manner. Policies should be geared at promoting import penetration and boost entry by new firms, which implies that entry barriers should be reduced. This will allow the market to be more contestable and fair.

3.4 INDUSTRY CONCENTRATION AND INVESTMENT

There have been conflicting empirical results regarding the relationship between industry concentration and investment. Fedderke and Naumann (2011:2930) stated that insignificant economic growth can be linked to inadequate investment levels. According to Fedderke and Naumann (2011:2934), found that high levels of industry concentration are positively correlated with investment in terms of investment in machinery and equipment, and stressed that further research on industry concentration in South Africa is required. However, Fedderke and Szalontai (2009:249) concluded that there is no decisive evidence that indicates that the level of concentration has an effect on investment.

3.5 INDUSTRY CONCENTRATION AND EMPLOYMENT

Empirical evidence by Fedderke and Szalontai (2009:249) shows that a negative relationship between industry concentration and employment levels exists. Further research by Fedderke and Naumann (2011:2929) on industry performance revealed that high levels of industry concentration have a negative effect on employment levels, indicating that there is a positive relationship between low levels of employment and highly concentrated industries. High unemployment levels are detrimental to the South African economy. Policymakers should take note of the significant relationship between industry concentration and unemployment and formulate policies to combat this.

There is no direct positive relationship between industry concentration and competition (Fedderke & Simabegavi, 2008:179). Market leaders are forced to become more

innovative and increase investment to avoid the threat of new entrants (Fedderke & Simabegavi, 2008:179).

The effect of trade liberalisation policies on the level of industry concentration has largely been ineffective and limited. Trade liberalisation programmes have been effective in decreasing tariff protection, but could have taken place at a more rapid pace (Harmse & Rangasamy, 2003:721). Trade liberalisation has taken place at a pace similar to that of lower-middle income countries (Fedderke & Simabegavi, 2008:183).

A solution for the high mark-ups in the South African manufacturing sector can be trade liberalisation policies. Import penetration, along with export penetration, lowers average mark-ups. Policymakers should make use of trade liberalisation policies to ensure that mark-ups are reduced. Low mark-ups will ultimately improve the productivity of the manufacturing sector (Fedderke & Simabegavi, 2008:177). These types of policies should also focus on lowering entry barriers and examining merger activity.

The study conducted by Ratnayake (1999) in New Zealand can be used as an example. Ratnayake (1999) found that economies of scale had a significant influence on industry concentration, which could explain New Zealand's policies geared toward merger activity. According to Fedderke and Simabegavi (2008:181), the determinants identified by Ratnayake (1999) have not yet been investigated in South Africa. The following section discusses research on the Rosenbluth Index and Gini coefficient applied to South Africa.

3.6 THE ROSENBLUTH INDEX AND GINI COEFFICIENT

The manufacturing industry of South Africa has been criticised for being too concentrated. Multiple research studies discussed above have proved that the South African manufacturing industry has remarkably high levels of concentration. The fact that industry concentration in South Africa is considered to be very high compared to the rest of the world indicates that more research should be done in this field. High levels of industry concentration are positively correlated with low levels of employment (Fedderke & Simabegavi, 2008:169).

On the other hand, investment tends to increase when the market share of incumbent firms in an industry increases and raises the level of industry concentration. Conversely, investment will decrease as a result of the decrease in the competition of incumbent firms in an industry. An explanation for this can be the fact that in South Africa increased investment goes hand in hand with an increase in the market share of a firm, as it is viewed as a desired managerial goal (Fedderke & Szalontai, 2009:249).

The results generated from both the absolute, as well as the relative measures of concentration indicated that concentration levels are still rising in South Africa. The Gini coefficient specifically indicated that concentration levels were on the rise for the period from 1972 to 1996. On the other hand, the Rosenbluth Index indicated a more widespread rise in concentration levels in specific sectors (Fedderke & Szalontai, 2009).

The Rosenbluth Index is especially sensitive to the number of small firms in an industry, which can lead to an inaccurate reflection of concentration in an industry. Results from the Gini coefficient are in line with results from previous studies, which also indicate that industry concentration in South Africa is still on the rise. The underlining conclusion drawn from the study is the fact that high levels of concentration increase domestic pricing power, raise profits by increasing the price of mark-up over the marginal cost, and diminish productivity.

Fedderke and Szalontai (2009) highlight three findings when it comes to employment in the manufacturing sector and concentration with the use of the Rosenbluth Index and Gini Coefficient. Firstly, high levels of concentration have a negative effect on employment in the manufacturing sector, even when concentration is defined in terms of market share or the number of incumbent firms in an industry. Secondly, the two measures of concentration that were used can be estimated in different ways and will still yield the same results. Finally, different variables were used in the regressions to ensure that spurious regressions were not as a result of correlations between variables.

In a developing country such as South Africa, policymakers need to consider industry concentration, as unemployment levels remain very high. Firms that dominate the South African manufacturing sector demotivate other firms to gain market share and

cause monopolistic behaviour; this, in turn, also causes dominant firms not to pursue higher levels of capital stock. However, the evidence from the study conducted by Fedderke & Szalontai (2009:249) provided conflicting results, as they it also suggests that higher market shares are closely associated with higher investment rates. Investment rates are also raised substantially because of the high levels of inequality of market shares in the South African manufacturing sector (Fedderke & Szalontai, 2009:249). The rate of investment can be viewed as an entry barrier for potential new entrants in an industry who intend to enlarge their market share.

Further investigation into this field needs to be conducted to determine exactly what the main causes of industry concentration are, which hinder the creation of employment. The studies mentioned in this chapter indicate that the highly concentrated nature of the South African manufacturing industry causes negative consequences for employment and productivity levels. The following section will explain the methodology of the empirical analysis.

3.7 SUMMARY AND CONCLUSION

In this chapter, numerous factors affected by industry concentration in South Africa are discussed. It is important to analyse these factors, since they ultimately affect the economy as a whole. Firstly, industry concentration influences the market power of firms. Firms in a concentrated industry have significantly more control over pricing power and import penetration than firms that are not situated in a concentrated industry.

Measures used to analyse industry concentration in South Africa in the past are unreliable. Therefore, a suitable measure of concentration should be used in order to attain reliable results that can be used by policymakers to formulate effective policies. This measure has been identified as the concentration ratio in Chapter 2. Since unemployment is a major socio-economic issue in South Africa, analysing industry concentration can assist in the development of policies geared toward creating jobs in the manufacturing sector of South Africa.

As a result of the high levels of industry concentration in South Africa, monopolistic behaviour in industries often transpires. By analysing industry concentration, this type of behaviour can be avoided, which could lead to favourable economic conditions. The overall purpose of this chapter is to shed light on the significant influence of industrial

concentration on the South African employment, investment and productivity. The following chapter will focus on the existing literature of the determinants of industry concentration.

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CHAPTER 4

LITERATURE ON THE DETERMINANTS OF INDUSTRIAL CONCENTRATION

4.1 INTRODUCTION

This chapter focuses on the existing literature on industry concentration with regard to the relationship between industry concentration and various possible determinants. In this chapter, the determinants of industry concentration will be analysed. These specific determinants will form part of the foundation of this study, and will later be applied to industry concentration in South Africa.

A clear association between the structure-conduct-performance (SCP) paradigm and industry concentration can be made. The SCP paradigm focuses on the specific behaviour of a firm in an industry, by examining the degree of competitiveness, in terms of price setting. The SCP paradigm determines whether or not a firm colludes with others in an industry, or is able to set their own prices. Therefore, it is important to keep the SCP paradigm in mind when examining industry concentration. Industry concentration refers to the degree to which a small number of firms control and influence the sales in a specific industry. Industry concentration has adverse effects on the competition and structure of an industry. Market share and price discrimination are also affected by high levels of industry concentration.

This chapter is structured as follows: Section 4.1 to 4.7 will focus on the seven determinants of industry concentration identified by Lipczynski, Wilson and Goddard (2005:215), as well as the significance of export intensity with regard to industry concentration in section 4.8. Section 4.9 will aim to explain the relationship between profitability and industry concentration.

The purpose of this chapter is to discuss the determinants of industrial concentration that have already been identified, and to inform on what type of independent variables

should be estimated to identify the determinants of industry concentration in the South African manufacturing sector.

4.2 THE MAIN DETERMINANTS OF SELLER CONCENTRATION

Lipczynski, Wilson and Goddard (2005:215) identified seven main determinants of seller concentration in an industry. These seven determinants of seller concentration should be examined thoroughly in order to determine the impact of each of these determinants on the degree of seller concentration in an industry. These seven determinants of seller concentration are economies of scale, barriers to entry, sunk cost expenditures, regulation, the industry lifecycle, distinctive capabilities and core competences.

In addition to the seven determinants of industry concentration identified by Lipczynski, Wilson and Goddard (2005), export intensity will also be examined, and is discussed with the rest of the determinants of industry concentration below, as the rest of the study will focus on these determinants.

4.2.1 Economies of scale

The structure of an industry, or the behaviour of firms, is determined by its cost structure. Economies of scale are achieved if a firm operates at a larger scale as a result of savings on the long-run average costs curve (LRAC). A firm's minimum efficient scale (MES) of production is reached at the specific level of output where the LRAC is at its minimum (Pindyck & Rubinfeld, 2009).

The total output produced by each occupying firm at its MES, along with the total demand for the industry's product, at the specific price level where it is still possible to generate a normal profit, has important implications for the firms in an industry. These implications entail profitability and accommodation of firms.

The degree of seller concentration in an industry is affected by economies of scale, as it basically determines the number of firms an industry can accommodate. An example can be made that if total demand in an industry is 2 000 times larger than the MES of the industry, the industry can accommodate 2 000 firms, which will indicate an industrial structure of perfect competition in this case. The industry structure tends to be monopolistic in nature when the MES is equal to the total demand for a product.

4.2.2 Barriers to entry

Entry and exit barriers are regarded as an important driving force for the procedure to reach equilibrium. Numerous studies have been conducted on the effects of entry and exit barriers (Caves & Porter, 1977:241-262). Empirical evidence on this topic indicates that fast-growing or high-profit industries tend to have a high level of entrants. This is in contrast with slow-growing or low-profit industries, which have a high level of exiting firms (Lipczynski *et al.*, 2005:216).

The assumption can be made that concentration, in general, or seller concentration, will be reduced if the average size of new entrants in an industry is smaller than the average size of the current firms occupying the industry, *ceteris paribus* (Pindyck & Rubinfeld, 2009). Despite this assumption, concentration increases if the average size of entering firms is larger than the incumbent firms.

The assumption can therefore be made that if entry takes place on a larger scale, it will ultimately increase the level of concentration in general, or the degree of seller concentration. The overall level of concentration in an industry is positively correlated to entry and exit barriers. According to Bain (1968:299), seller concentration is determined by the nature of the entry barrier, among other things.

4.2.3 Sunk cost expenditure

Sutton (1991, 1998) identified two types of industries in accordance with the characteristic of their type of sunk costs. The first school of thought, or first type of industry, is the exogenous sunk cost industry. This is when a firm that is entering an industry has fixed sunk cost expenditure. The sunk cost expenditure that the firm experienced when entering includes advertising or the construction of a plant. The sunk cost is exogenous of nature because the entering firm has no control in selecting the level of sunk cost expenditure.

The second type of costs experienced in the industry is the endogenous sunk costs. In this case, when a firm enters an industry, it has full control over choosing the level of sunk cost expenditure and can choose its level of sunk cost expenditure based on its market share, or increase it in order to be more competitive with other firms in the same industry. The sunk cost expenditure can also include advertising or research and development. According to the hypotheses by Sutton (1991, 1998), it is expected

that the average level of concentration is much higher in the second type of industry identified as it is an endogenous sunk expenditure industry cost. This is mainly because dominant firms can then dictate the initial level of expenditure needed to enter the industry by increasing the amount of sunk cost expenditure needed to get access to the industry.

4.2.4 Regulation

The levels of concentration in an industry are likely influenced by government policy to a loose degree. Competition policies are generally directed at correcting market failures, increasing the level of competition and giving consumers a wider range of product or service choice. Regulations are usually expected to decrease the level of concentration by preventing mergers and suppressing restrictive practices. However, policies can sometime lead to an increase in the level of concentration (Pindyck & Rubinfeld, 2009). Policies that limit the number of firms in an industry are inclined to increase concentration (Lipczynski *et al.*, 2005:216).

4.2.5 The industry lifecycle

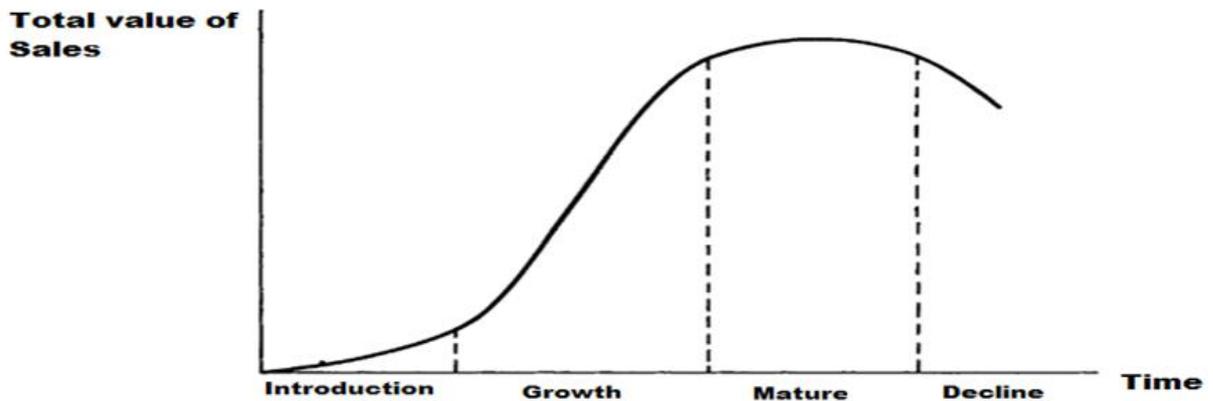
Seller concentration is influenced by the stage in which an industry is in its lifecycle. There are four stages in an industry lifecycle, i.e. the introduction stage, growth stage, maturity stage and decline stage, as illustrated by Figure 4.1.

The degree of seller concentration differs at each stage. Throughout the introduction stage, firms are still concerned with the completion of the development of their products through investment in advertising, research and development. In the introduction stage, consumers have not yet familiarised themselves with the industry's products and are still uncertain about the usefulness of their products. Seller concentration is very low in the introduction stage.

The industry's technological specification becomes established during the growth stage. Throughout the growth stage, producers who have become successful start saving costs through economies of scale (Lipczynski *et al.*, 2005:216). The consumer demand is stimulated by the fall in prices, and the markets expand. The stimulation of consumer demand might attract new entrants to the industry with minor variations in their products. The expansion of consumer demand makes it possible for incumbent

firms to absorb the entry of new firms, thereby allowing seller concentration to remain reasonably low.

Figure 4.1: Industry life cycle



Source: Compiled by author

The industry's technological specification becomes established during the growth stage. Throughout the growth stage, producers who have become successful start saving costs through economies of scale (Lipczynski *et al.*, 2005:216). The consumer demand is stimulated by the fall in prices, and the markets expand. The stimulation of consumer demand might attract new entrants to the industry with minor variations in their products. The expansion of consumer demand makes it possible for incumbent firms to absorb the entry of new firms, thereby allowing seller concentration to remain reasonably low.

During the maturity stage of the industry lifecycle, sales and profit levels begin to fall as the consumer's demand for the industry's product proceeds toward a level of saturation. The product variations initially introduced at the growth stage become exhausted, along with the window of opportunity for additional growth. The incumbent firms in the industry become defensive, since they are threatened by newcomers. Additional expenditure is spent on advertising in order to create product awareness under potential consumers. In order for incumbent firms to achieve economies of scale at this stage, it often results in mergers or acquisitions. At this stage seller concentration is very high (Lipczynski *et al.*, 2005:216).

During the final stage, the decline stage, profits and sales decrease to very low levels. Incumbent firms that wish to strengthen their market share, or raise their profitability levels, usually turn to collusions. This is viewed as a defence mechanism. Incumbent firms accept collusion in order to eliminate their competitors and strengthen their total market share. Some firms opt to withdraw from industry completely at this stage. The reason why some firms decide to withdraw is because of their profitability levels in the industry, and they also seek out new opportunities in different markets. Incumbent firms that are unable to, or unwilling to adapt to the changes in the industry at the declining stage, usually file for bankruptcy. The surviving firms of an industry at the declining stage are normally left with a high market share, which creates a high level of seller concentration.

Stigler (1951:190) indicated the relationship between the industry lifecycle and vertical integration, and found that producers attempt to supply their personal sale services and to secure input supplies themselves via forward and backward integration. The reason why producers resort to these measures is because of the condition of the market. The market has not yet reached a level of sufficient volume to support professional suppliers of certain raw materials and the necessary distribution channels needed in the production process by firms. During the introduction stage, concentration levels are very high in terms of the raw material suppliers and the available distribution channels. Concentration will start to decline as the market expands over time. During the maturity and decline stages, incumbent firms will utilise vertical integration as a defence mechanism against other firms (Lipczynski *et al.*, 2005:216).

4.2.6 Distinctive capabilities

The distinctive capabilities of a firm are closely associated with its performance. Architecture, innovation and reputation form part of a firm's distinctive capabilities. Architecture sheds light on a firm's association with its supplier, internal organisation, and knowledge of the industry.

Innovation refers to the intellectual properties of a firm that can be used as assets in order to improve its own performance in an industry. Reputation is closely related to the quality that a firm offers. Firms with a well-respected brand name and an excellent image have an advantage over other firms. Distinctive capabilities influence seller

concentration in the sense that if firms develop their distinctive capabilities it will ensure a leading market share (Lipczynski *et al.*, 2005).

4.2.7 Core competences

The core competences refer to the overall performance of a firm. Core competences are concerned with the knowledge a firm has, which can be used to give them the competitive edge in an industry. Knowledge can be used to adapt to rapid technological changes and the effective use of specialised resources (Lipczynski *et al.*, 2005). Firms that are successful in utilising the knowledge and information it has to gain a competitive advantage will usually be more successful than other firms in the industry.

4.2.8 Export intensity

The effect of export intensity should be taken into account when analysing industry concentration. Firms rely on exports to expand their business operation as a whole, and are an integral part of a nation's economic growth and prosperity (Forte & Reis, 2016:267).

Moghaddam, Hamid and Aliakbar (2012:5150) argue that investigating the influence of export intensity is imperative for government to formulate policies and foster economic growth. Export intensity is regarded as an entry barrier, and therefore the relationship between export intensity and industry concentration should be examined.

The relationship between industry concentration and export intensity is regarded as complex. The complexity is due to the contradicting empirical results of studies conducted on the topic. A highly concentrated industry can create a restricted domestic market, which takes away the incentive for dominant firms in an industry to explore export opportunities.

Smaller firms are also reluctant to explore export markets, as the risks associated with it are greater than doing business in a domestic market. Large dominant firms have the ability to absorb the risks associated with exploring export markets. Highly concentrated industries are therefore often oligopolistic of nature (Zhao & Zou, 2002:56).

Fu, Wu and Tang (2010) found that there is no significant evidence that industry concentration and export intensity influence each other. The results obtained in their study were inconclusive, and they advised that further research needs to be conducted on this topic. Clougherty and Zhang (2009:463) argue that high levels of industry concentration take away the incentive to diversify products, expand export opportunities and gain market share.

Geroski (1982:324) found in his study that a positive relationship between industry concentration and export intensity exists. High levels of industry concentration cause dominant firms to export more.

According to Zhao and Zou (2002:65), industry concentration has a significant effect on export intensity. Their empirical analysis indicated that a negative relationship between industry concentration and export intensity exists. Industry concentration ultimately reduced the aspiration to export, as dominant firms are occupied with expanding business operations in domestic markets.

The findings of Forte and Reis (2016:277) also indicate that a negative relationship between industry concentration and export intensity exists. Their empirical analysis suggests that highly concentrated industries tend to have lower levels of export intensity. They argue that low levels of industry concentration could indicate higher competition in an industry, which causes firms to look for new opportunities by examining export markets. The following section discusses and explains the concentration measures.

4.2.9 Profitability and industry concentration

Brozen (1970:280) argues that there have been sufficient empirical studies conducted to conclude that high levels of concentration are associated with substantial capital return rates, especially in industries where the dominant four firms are responsible for at least 60% of the total sales. Turner (1969:1215) claims that highly concentrated industries will benefit most from return rates.

The findings by Bain (1951:323) contradict this statement, however. Bain found no evidence to support the assumption that highly concentrated industries yield higher returns. According to Bain (1951:323), the size of the firm does not have an effect on

the profit rates. These findings are also supported by Stigler (1964:57), who found that profitability is not correlated with concentration.

Bain (1951:323) makes the assumption that barriers to entry are most likely correlated with return rates. Mann (1969:848) supported the assumption by Bain (1951:323) and found that industries with high barriers to entry are positively associated with high return rates. The empirical evidence on the subject of the relationship between industry concentration and return rates is inconclusive. All these studies on the relationship between industry concentration and profitability were conducted on manufacturing industries.

Brozen (1971:241) also challenges the assumption by Bain (1951:323) that barriers to entry are associated with profitability. A brief observation of the barriers to entry of an industry does not give any reason to assume that they are correlated with return rates or profitability. Brozen (1971:242) makes the definitive statement that there is no evidence that industry concentration affects profitability or return rates.

Wenders (1971:256) took an alternative approach to examining the relationship between profitability, or return rates, and industry concentration. Wenders examined the relationship between industry growth and profitability. The findings of his study concluded that concentrated industries grew at a rate of approximately 14% per year, compared to the 11.1% of non-concentrated industries.

Wenders argued that growth rates for concentrated industries can be linked with higher profits. Fast-growing firms have the capability to effectively allocate their resources, thereby making it difficult for slow growing firms to capitalise on the available resources.

The industrial rate of return can also be attributed to a structural disequilibrium. Changes in the demand of an industry influence the growth of an industry and therefore have an effect on the profitability and return rates.

However, Wenders (1971:256) states that demand changes cannot be responsible for the growth rate of an industry, as there is no theoretical and empirical evidence to support this notion. The conclusion can be drawn that the allocation of resources is essential in the structure of an industry, which affects the level of concentration.

4.3 SUMMARY AND CONCLUSION

In this chapter, the main determinants of industry concentration are analysed. The seven main determinants of industry concentration, as identified by Lipczynski *et al.* (2005:215), were examined. In addition to the examination of the seven determinants of industry concentration, the influence of industry concentration on export intensity and profitability was also examined.

The seven main determinants of industry concentration discussed in this chapter will serve as a premise for this study. Special attention will be given to three of the seven determinants of industry concentration, as identified by Lipczynski *et al.* (2005), namely: Economies of scale, barriers to entry and sunk cost expenditure. The motivation behind this can be attributed to the amount of literature that exists on the relationship between these specific determinants and industry concentration. In Chapters 5 and 6, these three determinants will be examined further.

Analysing these determinants of industry concentration allows for a better understanding of how to analyse the degree of industry concentration. The determinants discussed in this chapter will serve as a point of departure for the rest of the study.

The determinants of industry concentration explained in this chapter will be combined with the determinants identified in the international studies examined in Chapter 5, and are ultimately applied in the empirical tests of this study when estimating the independent variables to identify the determinants of industry concentration in South Africa. The relationship between industry concentration and profitability is unclear, and should be analysed in future studies. The following chapter will focus on the similar international studies conducted on industry concentration.

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CHAPTER 5

PREVIOUS INTERNATIONAL STUDIES CONDUCTED ON SELLER CONCENTRATION

5.1 INTRODUCTION

This chapter examines various international studies conducted on industry concentration. It is important to take note of these studies in order to understand what can be expected in South Africa in terms of analysing seller concentration.

The studies examined in this chapter can be used as a point of reference for the empirical analysis of this study. The international studies reviewed in this chapter will specifically assist in the choice of methodology for the empirical analysis, as well as the estimation of the independent variables.

A vital part of an industry concentration analysis is estimating the correct independent variables; therefore, the independent variables used in these international studies will clarify which independent variables should be estimated.

In this chapter, the previous studies carried out on this topic in New Zealand (sections 5.2 & 5.3), Australia (section 5.4), France (section 5.5) and the United States of America (section 5.6) will be examined to identify the determinants of industrial concentration, and how it can be applied to the South African manufacturing sector.

The determinants of industry concentration examined in Chapter 4 are applicable to this chapter. A combination of the determinants of industry concentration identified in Chapter 4, and the independent variables used in the international studies examined in this chapter will help shape the foundation of the methodology in terms of estimating the correct independent variables. Throughout this chapter, the following recurring independent variables will be analysed: market/industry size, industry growth rate, economies of scale and export intensity and import penetration.

5.2 SELLER CONCENTRATION IN NEW ZEALAND 1

A study conducted by Pickford (1983:381) on the manufacturing industry in New Zealand found that the main determinants of seller concentration are the size of the market, growth of the market, economies of scale, multi-plant ownership, merger activity and product differentiation.

The possible determinants of seller concentration as identified by Pickford (1983:381) can be useful in identifying the determinants of seller concentration in South Africa. The following section focuses on these determinants, as they are included as variables in the empirical study.

5.2.1 Size of the market

There exists a negative relationship between absolute concentration and the size of the market. Value-added (\$'000's) is used to reflect the size of the market in this case, instead of sales. Value-added is regarded as a more accurate measurement of market size, as it ignores the inaccuracy of firm sizes caused by the extent to which a firm is vertically integrated (Pickford, 1983:376).

5.2.2 Growth of the market

Entry and exit barriers are associated with market growth. Thus, the growth rate of a market could be a possible barrier to entry, or exit, in an industry. Past empirical evidence suggests that the entry barriers associated with fast-growing markets are less likely to prevent entry than slow-growing markets. Market growth as a determinant of seller concentration in New Zealand is in line with the determinants identified by Lipczynski, Wilson and Goddard (2005:215).

5.2.3 Economies of scale

The point at which a firm's long-run average cost curve (LRAC) reaches its minimum value is known as the firm's minimum efficient scale (MES) of production (see Chapter 2, section 2.1). A firm that operates below its MES runs the risk of exit from an industry because of the volume and cost of production.

This article highlights that one of the main determinants of seller concentration is economies of scale. The empirical evidence indicates that there is a strong positive relationship between scale economies and the size of the market, and that it is

significant determinant of industry concentration relative to market size (Pickford, 1983:377).

5.2.4 Multi-plant ownership

Multi-plant ownership is considered to be a variable that determines increased concentration on operations by a firm, with respect to the size of the firm. A firm that operates multiple plants at MES will find that the level of industry concentration is affected.

Concentration levels can be at a lower or higher level, depending on how many firms own such plants (Pickford, 1983:377-380). Multi-plant ownership is an important variable to consider when determining industry concentration.

Industry data does not always indicate whether a single firm has more than one manufacturing plant in an industry, which usually leads to inaccurate test results from the available data, if that is not known or taken note of.

5.2.5 Merger activity

According to Pickford (1983:377), vertical and horizontal merger activity will likely cause industry concentration to increase. Merger activity will instantly reduce the number of incumbent firms in an industry, which will lead to a higher level of industry concentration.

5.2.6 Product differentiation

Previous empirical studies suggest that product differentiation should be regarded as a significant barrier to entry. A positive relationship between industry concentration and product differentiation can be expected.

In this specific study (Pickford, 1983:378), the advertising-sales ratio was used as a proxy for the product differentiation variable. The same can be done when identifying the determinants of seller concentration within a South African context.

The findings of this study are that economies of scale and advertising are significant barriers to entry and are considered to be the main determinants of seller concentration in New Zealand. The following section discusses another concentration study conducted in New Zealand.

5.3 SELLER CONCENTRATION IN NEW ZEALAND 2

Ratnayake (1999) emphasises the determinants of industry concentration in New Zealand, and explains why there has been a declining trend from 1976 to 1991 in industry concentration levels. This particular study can be closely associated with a study conducted by Pickford (1983), which also deals with the determinants of industry concentration in New Zealand.

Ratnayake (1999) focused on competitiveness, while Pickford (1983) focused on the determinants of seller concentration. The findings can be compared to determine what raises industry concentration in New Zealand.

5.3.1 Effect of changes in trade policies

Trade policy changes in New Zealand have led to changes in the country's industry and trade landscape. The Commerce Act of 1975 is considered to be the main trade-related policy, which has led to comprehensive changes in New Zealand's concentration levels. The Commerce Act of 1975 replaced a number of other trade policies, and was also modified in 1986 with the purpose to create more competition within the country's markets.

The Labour Government of New Zealand also made trade policy changes that led to a large reduction in tariffs and other quantitative restrictions with respect to imports. The aims of these policy changes were mainly to promote competition and reduce industry concentration (Ratnayake, 1999:1042).

Ratnayake (1999) investigated the effects of the policy changes, along with other factors that are deemed to be determinants of industry concentration. The significant determinants of industry concentration identified in this case can be compared to the determinants identified in a number of other studies with regard to this topic (Pickford, 1983; Hamm & Mueller, 1974).

Similar to other studies conducted on the topic of the determinants of industry concentration, special attention was given to various entry barriers and the significance of larger firms in an industry. The determinants and variables that Ratnayake (1999) considered to be significant are as discussed in the following sections.

5.3.2 Dependent variable

The widely used concentration ratio (CR) was also used by Ratnayake (1999). The concentration ratio is effective and makes international comparisons simple. In this case, the concentration ratio was used on a four-firm level, meaning that concentration was measured by examining the four largest firms in an industry.

The four-firm concentration ratios indicate that the most highly concentrated industries have substantial entry barriers and only a few dominant firms. Some of the notable entry barriers include capital requirements and product brand names. The four-firm concentration ratios also indicate that industries with a low level of concentration consist of many smaller firms (Ratnayake, 1999:1043).

5.3.3 Factors influencing industry concentration

There are a number of factors that could help explain why industry concentration levels are high in some countries. Ratnayake (1999) identified four factors that need to be taken into account. Firstly, protectionism of industries can contribute to the increase of industry concentration.

The protection of domestic markets means that there is no room for international competition to take place. This allows domestic markets to dictate their specific industry without being threatened by international firms. Secondly, merger activity can also be a factor that causes an increase in industry concentration.

The significance of merger activity as a determinant of concentration has already been explained. The third factor to take into account is the size of the domestic market in question, as well as the size a firm needs to be in order to obtain advantages from economies of scale.

The final factor that can result in raising the concentration levels is the lack of antitrust legislation. These four broad factors can be used as an approximate framework to help identify potential causes of concentration in any country and also serve as a point of reference.

5.3.4 Group of independent variables used

Industry concentration in New Zealand has undergone major changes in the past 30 years. Empirical evidence indicates which variables had a significant influence in

changing the industry concentration over the years. The variables that were considered to be determinants of industry concentration were classified into three main groups by Ratnayake (1999). These groups consisted of technical causes and market influencing variables, international influencing variables and government and policy-related variables.

5.3.5 Technical causes and market influencing variables

The first group of variables, technical causes and market influencing variables, is viewed as entry barriers. These barriers are regarded to be a major influence on market power. These entry barriers include advertising expenditure, cost barriers and economies of scale. In addition to these barriers, the size of the industry and merger activity is also included. The size of the industry is represented by domestic sales. Merger activity refers to the consolidation of firms.

5.3.6 Export intensity and import penetration variables

The second group of variables consists of export intensity and import penetration. Export intensity is the calculated ratio between value of exports and total output. Import penetration is the calculated ratio between the value of imports and domestic sales. Export intensity and import penetration can have adverse effects on foreign direct investment (FDI).

Foreign firms can increase competition by dissolving local oligopolies in a domestic market, which will, in turn, create room for a larger number of firms in an industry. On the other hand, foreign firms can contribute to merger activity, which will ultimately lead to an increase in domestic bankruptcies, and in this way also increase the level of seller concentration.

5.3.7 Government interventions

The final group of variables deals with the effect of government intervention. Government policies essentially increase or decrease industry concentration through a number of ways. Government can increase competition, which will usually decrease industry concentration by enforcing antitrust laws. Conversely, government can increase industry concentration by administering import restrictions, increasing tariffs and promoting franchising. It is especially important to analyse the effects of trade on

industry concentration, given the trade policy changes in recent years. Trade policies usually take time to come fully into effect.

5.3.8 Behaviour of independent variables

It was expected that advertising expenditure would have a significant effect on industrial concentration (Lipczynski *et al.*, 2005:216), but the advertising expenditure variable could not be used in this case. The reason for this is that advertising expenditure and industry size are strongly correlated, which causes multicollinearity in the regression results.

The rest of the variables in the first group all generated results that were expected of them (Ratnayake, 1999). Economies of scale generated significant results. The structure of New Zealand's market only allows large firms to benefit from economies of scale. Capital intensity has a positive relationship with industry concentration. Test results showed that capital intensity is an important entry barrier in the local market. The industry size variable reacted as was expected. The larger the size of an industry, the less concentrated the industry usually is. This is because an industry that is large has more space to occupy a greater number of firms than a smaller industry, which means that the industry is less concentrated.

Import penetration did not have a significant effect on industry concentration, except for the time period when the New Zealand government introduced trade liberalisation policies. During the time period (post-1986) when policies were introduced, import penetration lowered concentration levels. However, in many cases, the dominant firm in an industry is the main importer and can still enforce monopolistic behaviour. The trade liberalisation policies that were introduced take time to come into full effect.

Regarding foreign ownership, test results indicated that high concentration levels are strongly correlated with the foreign ownership variable in New Zealand. Bankruptcies and mergers occur usually where there is a great deal of foreign ownership. Merger activity as an independent variable did not produce significant results, and could not be considered to be a determinant of industry concentration in this case. On the other hand, merger activity should always be interpreted carefully. The available data does not always include the merger of private firms, but mainly focuses on the merger of public companies.

A conclusion can be drawn from the research results that industries in New Zealand are still much more concentrated than most other countries. Industrial concentration has been declining since the introduction of trade liberalisation policies that were introduced in the late 1980s by the New Zealand government.

High levels of industry concentration can be attributed to the exploitation of economies of scale by larger firms. Small firms cannot gain benefits from economies of scale. In this particular case, merger activity can actually improve market conditions when small firms decide to merge. This will allow them to benefit from economies of scale. Ratnayake (1999) concluded that the newly introduced policies have had a significant effect in lowering concentration levels and that foreign ownership will probably lead to higher concentration levels. The following section investigates empirical studies on industry concentration in Australia.

5.4 SELLER CONCENTRATION IN AUSTRALIA

The South African manufacturing sector can easily be compared to the Australian manufacturing sector, as both the South African and Australian manufacturing sectors exhibit high degrees of industry concentration (Bhattacharya & Bloch, 2000:1182).

The South African manufacturing sector is similar to its Australian counterpart in the sense that there are a few, approximately five, firms in an industry that dominate the majority of the market share. An examination of concentration in the Australian manufacturing sector may shed some light on what the possible determinants of seller concentration in South Africa are.

An analysis of the Australian manufacturing sector conducted by Bhattacharya and Bloch (2000:1182) indicates that the industry lifecycle, size of the industry, trade policies and economic growth all play a role in determining the level of concentration in an industry.

An analysis of the Australian manufacturing sector was conducted by constructing a steady-state model of concentration. The construction of the steady-state model makes comparisons between similar studies possible. The specification of the model included a number of variables that are expected to be significant determinants of industry concentration. This section discusses determinants of concentration found by the research of Bhattacharya and Bloch (2000). The independent variables that were

used in this study will first be explained, followed by the behaviour of them in the empirical analysis.

5.4.1 Economies of scale

The first important variable comprised economies of scale and market size. Both of these variables are important to consider when examining industrial concentration. Economies of scale usually benefit larger dominant firms in an industry, and market size determines the number of firms an industry can accommodate. The minimum efficient size firm variable (MKT) captures the effect of economies of scale and market size (Bhattacharya & Bloch, 2000:1185).

5.4.2 Capital intensity and cost disadvantage ratio

The second and third variables are capital intensity (K/S) and the cost disadvantage ratio (CDR), respectively. K/S was calculated by taking the average of investments and dividing it with sales for the period 1977 to 1985. CDR was determined by taking the average value added per worker between large and small firms (Bhattacharya & Bloch, 2000:1197).

Both of these variables are used as proxies for the cost disadvantage experienced by smaller firms (Bhattacharya & Bloch, 2000:1185). Smaller firms have a cost disadvantage in terms of the small scale of its operations.

5.4.3 Product-differentiation dummy

The fourth variable is a product-differentiation dummy (CPD). The reason for the inclusion of this dummy variable is the fact that product differentiation may contribute to the drawback that smaller firms experience. The CPD variable was constructed by differentiating between producer and consumer goods. This is because of the costs involved in developing new products and the marketing of new brands. The CPD variable aims to capture the concentration in consumer product industries.

5.4.4 Import intensity

The final variable included in this model was import intensity (IMP). IMP was calculated by subtracting exports from imports and dividing it with sales (Bhattacharya & Bloch, 2000:1197). Import competition influences smaller firms to exit from an industry, or to merge with a larger firm as a result of its inefficiency.

5.4.5 Behaviour of independent variables

The only variables that were significant were MKT and CDR. In conclusion to this model, it can be stated that MKT and CDR have a significant relationship with industry concentration.

Bhattacharya and Bloch (2000:1192) also tested the hypothesis devised by Sutton (1991) of endogenous and exogenous sunk cost expenditure (see Chapter 4, section 4.2.3). This hypothesis is tested by using an advertising-sales expenditure ratio as a variable.

The empirical evidence of this study determined that the hypothesis of Sutton is correct, and that concentration levels are higher in industries with endogenous sunk cost expenditure. In this particular case, endogenous sunk cost expenditure refers to large advertising industries. The following section considers empirical studies on industry concentration in France.

5.5 SELLER CONCENTRATION IN FRANCE

An analysis of the determinants of concentration of the French manufacturing sector was conducted by Jenny and Weber (1978). They analysed the French manufacturing sector to identify significant determinants of industry concentration. Their study can also be used to identify possible significant determinants of seller concentration in the South African manufacturing sector.

Aside from their primary findings, Jenny and Weber (1978:193) also indicated that highly concentrated industries cause market power to be reflected inaccurately. The inaccuracy usually occurs when firms pay their workers higher wages than their opportunity cost, which leads to a misallocation of resources.

In the past, the French government has argued that large firms are better for the economy in the sense that they are more robust against foreign competition. This argument by the French government has failed to take into account the effect of industry concentration on smaller, more vulnerable firms. It was stated that if the high levels of concentration in France are not addressed, the misallocation of resources will continue.

Likewise to the South African manufacturing sector, concentration in the French manufacturing sector is also measured via concentration ratios (CR). The implication of their use of the concentration ratio (CR) means that their findings may be applicable to the South African manufacturing sector.

The concentration ratio (CR) is used as the dependant variable in the empirical tests. The following section will consider possible determinants of industry concentration found by Jenny and Weber (1978), as well as the interaction of the independent variables in the empirical analysis.

5.5.1 Initial concentration

The initial level of concentration in an industry primarily affects the profits earned by incumbent firms. The dominant incumbent firms in an industry will lose a part of their market share if they maximise their profits in the short run. Conversely, if dominant firms follow a limit price model, concentration will stay constant (Jenny & Weber, 1978:197).

5.5.2 Barriers to entry

In general terms, concentration will remain high if entry barriers make it difficult for new firms to enter an industry. Entry barrier variables include economies of scale, product differentiation and absolute capital cost requirements.

5.5.3 Growth rate of the industry

The growth rate of an industry has important implications for the number of firms an industry can accommodate. Two contradicting arguments exist in this regard.

The first argument, associated with the growth rate variable, is that the increase in market size, as a result of the industry growth, will surpass the increase in size of minimum optimal plant, which will make the reduction of concentration more practical (Ross & Scherer, 1990:89). The lack of data in this case makes it difficult to compute the optimal plant size, and therefore a negative relationship between industry concentration and industry growth is expected.

An alternative argument by Stigler (1964) places emphasis on the presence of cartels. According to Stigler (1964:44-61), the existence of cartels may influence the gathering

of information, generally through mergers, which will lead to an increase in industry concentration.

5.5.4 Firm entry

According to Jenny and Weber (1978:198), *ceteris paribus*, concentration should decrease if the number of entrants in an industry increases (and *vice versa*). The problem with the specification of this variable is that the number of incumbent firms in an industry reflects the effect of other factors that have already been included in a regression or that have not been specified. An inconclusive result is usually expected from this variable.

5.5.5 Behaviour of independent variables

The results from the regression model indicated that most of the independent variables, which are possible determinants of industry concentration, reacted as expected. Barriers to entry indicated a positive relationship with the dependent variable concentration ratio (CR) variable.

The economies of scale and absolute capital cost requirement variables both demonstrated a significant positive relationship with the concentration ratio variable. This indicates that both of these barriers to entry can be considered to be determinants of industry concentration. The only barrier to entry variable that did not react as expected was the product differentiation variable.

A possible explanation for this can be that the variable was measured adequately. Firm entry and the growth rate did not produce significant results. The insignificant results from firm entry can be attributed to a lack of information on firm attributes and data restraints (Jenny & Weber, 1978:206).

The empirical test result analysis shows that industries with low entry barriers, and that were not highly concentrated to begin with, are prone to deconcentration. Dominant firms in industries will continue to increase their market power through mergers. The physical size of the country should also be considered to be a determinant of high concentration levels.

The significance of the absolute cost capital variables gives reason to believe that the improvement of the capital market will lead to better distribution of resources, which,

in turn, will decrease concentration. In the following section, industry concentration in the United States of America is studied.

5.6 SELLER CONCENTRATION IN THE UNITED STATES OF AMERICA

Hamm and Mueller (1974:514) analysed trends in market concentration and identified certain independent variables that could be potential determinants of industry concentration in the United States of America (USA). In order to test the significance of these variables, a cross-sectional analysis was conducted, using the concentration ratio (CR) as the dependent variable.

The independent variables they identified as possible determinants of industry concentration are in line with other studies on this topic. The five variables identified by Hamm and Mueller (1974:514) are the industry growth rate, industry size, initial level of concentration, net entry, and product differentiation. In the following section, the significance of each variable will be examined.

5.6.1 Industry growth rate

Hamm and Mueller (1974:514) found that when demand in an industry grows rapidly, entry barriers will be reduced.

5.6.2 Industry size

Other things being equal, industry concentration is expected to be low in larger industries. Entry barriers are also usually lower in large industries.

5.6.3 Initial level of concentration

A literature study conducted on the initial level of concentration by Bain (1956:4) found that industries with a high level of initial concentration undergo a later decrease of concentration. In this case, the initial level of concentration is captured by the concentration ratio (CR). Hamm and Mueller (1974:515) found a negative relationship between the initial level of concentration and industry concentration.

5.6.4 Net entry

The interpretation and understanding of a net entry variable is important in order to analyse its effects. Net entry refers to the number of firms entering a certain industry. The argument can be made that the net entry of firms decreases the level of

concentration, but does not lower the market share of dominant incumbent firms. Therefore, Hamm and Mueller (1974:515) argue that it will ultimately not decrease the level of concentration in an industry.

5.6.5 Product differentiation

Product differentiation can be regarded as a significant entry barrier, according to previous empirical studies (Marcus, 1969; Pickford, 1983; Bhattacharya & Bloch, 2000). Product differentiation allows firms, mainly larger firms, to have the competitive advantage in an industry.

Product differentiation can be as a result of economies of scale experienced by the dominant firms. Hamm and Mueller (1974:515) made the assumption that concentration levels will rise in industries with differentiated products, instead of normal producer goods.

In their study, the product differentiation variable is tested using three dummy variables, since it is was not possible to make an accurate definition of the continuous variable. The three dummy variables that were included distinguish between product differentiation on a low, moderate and high level. A significant relationship between the moderate and high product differentiation dummy variables was found.

5.6.6 Behaviour of independent variables

All of the above-mentioned variables reacted as was expected, except for industry size and the low product differentiation variable (Hamm & Mueller, 1974:515). Industry growth and initial level of concentration indicated a negative relationship with the dependant concentration ratio variable. The results from the net entry variable cannot be interpreted accurately.

The reason for this is the fact that the industries in this study were observed over a long period of time, which allows other economic factors to influence and obscure the accuracy of this variable. The moderate and high product differentiation variables indicated a significant relationship with industry concentration.

In general, the conclusion can be drawn that a number of other economic factors, which were not accounted for in this study, affect the level of concentration. The underlining conclusion of this study can be attributed to the significance of product

differentiation. This study indicates the importance of estimating a product differentiation variable when analysing the degree of industry concentration.

5.7 SUMMARY AND CONCLUSION

In this chapter, different international studies conducted on industry concentration were reviewed. These previous international studies conducted on industry concentration provide a good indication of which variables should be estimated for the empirical analysis of this study, and can be linked with the literature in Chapter 4.

The independent variables identified in this chapter that will be used in the empirical analysis include market and industry size, industry growth rate, export intensity, import penetration and economies of scale. However, the structure and availability industry data is also a factor to take into consideration with the estimation of the variables for the empirical analysis. The significance of advertising as a likely determinant of industry concentration was evident in studies carried out in New Zealand and Australia, and should be examined in further detail. The following chapter will focus on the relationship between advertising and industry concentration.

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CHAPTER 6

ADVERTISING AND INDUSTRY CONCENTRATION

6.1 INTRODUCTION

This chapter aims to provide an in-depth analysis of the relationship between advertising and industry concentration, by focusing on specific aspects regarding advertising. The literature and international studies conducted on industry concentration suggest that advertising plays a significant role in determining the degree of industry concentration and therefore an entire chapter is dedicated to analysing the relationship between industry concentration and advertising.

The extensive literature that exists on the relationship between industry concentration and advertising will be analysed throughout this chapter by examining previous studies conducted on the subject. It is important to take into consideration the findings of these studies in order to avoid downplaying the significant effect of advertising when analysing industry concentration. The studies examined in this chapter will also provide insight into what the appropriate manner is to estimate the advertising independent variable for the empirical analysis.

This chapter is structured as follows: Section 6.2 provides an overview of single equation models with regard to analysing the relationship between industry concentration and advertising. In section 6.2.1, the relationship between industry concentration and advertising is examined in terms of the estimation of an advertising-sales ratio. Section 6.2.2 examines the significant effect of product differentiation on advertising when analysing industry concentration. In section 6.2.3, the effect of advertising on industry concentration is investigated by distinguishing between the types of goods in an industry. Section 6.2.4 deals with a study conducted to identify multiple determinants of industry concentration, including advertising intensity. In section 6.2.5, a study is examined that analyses the relationship between industry concentration and advertising through the use of an alternative model. Section 6.2.6

briefly examines the influence of advertising on the stability of markets. Section 6.2.7 discusses a study conducted on the optimal level of advertising expenditure within an industry. In section 6.3, a study is examined that uses a simultaneous equation in order to identify possible determinants of industry concentration, including advertising.

6.2 SINGLE EQUATION MODELS

The relationship between advertising and industry concentration has been examined by a number of empirical studies, using single equation models. The single equations models that were used assume that the relationship between advertising and industry concentration is linear, and that it can be shown by using a number of explanatory and/or independent variables (Leahy, 1997:36). The majority of studies examined in this chapter made use of single equation models, except where noted.

6.2.1 Advertising expenditure and sales

A study by Mann, Henning and Meehan (1967) was designed to determine the relationship between advertising and industry concentration. The tests that were conducted in this study were quite simplistic, and made use of the concentration ratio, at four-firm level, as the dependant variable, and advertising as the independent variable. The advertising variable was estimated by dividing advertising expenditure and sales.

Mann *et al.* (1967:38-39) came to the conclusion that there is a positive relationship between industry concentration and advertising; however, the findings and accuracy of this study were later challenged by Ekelund and Maurice (1969).

Ekelund and Maurice (1969:76) used the same data in their study as Mann *et al.* (1967:35). However, they argue that the large set of data caused biased results, and that the relationship between advertising and concentration is not accurately portrayed. Concentration ratio was used as the dependant variable, along with an advertising-sales ratio and an error term as the independent variables.

The estimation of the variables used by Ekelund *et al.* (1969) measures the change in both the dependent and independent variables. Their findings are inconclusive, and suggest that there is no correlation between advertising and industry concentration. The main problem with these test results can be attributed to the large set of data that was used.

6.2.2 Advertising intensity

Tesler (1969:85) argued that the relationship between industry concentration and advertising is non-existent. However, in his study, he made the finding that there is a positive relationship between industry concentration and product differentiation.

The independent variables in this model included an advertising intensity variable and an error term. The dependent variable is the concentration ratio, at a four-firm level. The findings of his study contradicted those of Mann *et al.* (1967). The advertising intensity variable was statistically insignificant, and indicated that there is no relationship between industry concentration and advertising (Leahy, 1997:36).

It was found that concentration ratios are better explained by the promotional intensity as a whole, which includes product differentiation, and that advertising intensity can be attributed to the type of industry or product (Tesler, 1969:94). The findings of Tesler (1969) also suggested that the degree of advertising intensity depends on the competitiveness of the industry, firm entry, and new brands. This implies that industries with a high degree of advertising intensity are highly competitive, but usually have low concentration ratios.

According to Bain (1956:114), product differentiation has major advantages for larger dominant firms. Bain focused on product differentiation created through advertising. Empirical studies have proven that investment in product differentiation yields large gains for firms (Hamm & Mueller, 1974). Advertising serves as an incentive for firms to invest, as it allows for product differentiation that might give them the competitive edge.

According to Porter (1976:406), different types of advertising media have different effects on concentration. The type of advertising chosen by firms depends on the objectives firms aim to achieve, for example competitive market structures that are associated with advertising with high volumes of information. Television advertising was regarded as the most effective way for large firms to differentiate their products. The advertising intensity variable consists of total advertising, television advertising and other types of advertising, such as magazines and newspapers.

A different approach in determining the relationship between industry concentration and advertising was followed by Marcus (1969). Previous studies on this subject, such

as that of Telser (1969) and Mann *et al.* (1967), made use of continuous advertising variables.

However, in this case, Marcus (1969:119) used product differentiation as a proxy for the level of advertising. Marcus (1969:121) observed a positive relationship between advertising and industry concentration, and states that an increase in advertising will cause an increase in industry concentration.

Asch (1979:288) found no significant evidence that a positive relationship between advertising intensity and industry concentration exists either. In order to calculate advertising intensity, he used a percentage of the value of shipments in an industry, which was used to obtain inputs via the advertising sector. The advertising intensity variable was used as the independent variable.

A possible explanation for the insignificant relationship between advertising intensity and industry concentration can be attributed to inaccurate measurements in the data, other factors that influence concentration levels and the time period that was also examined.

6.2.3 Differentiation between types of goods

A unique approach to analyse the effects of advertising on industry concentration was used by Nelson (1975). He analysed the relationship between industry concentration and advertising by distinguishing between two different types of goods, namely search goods and experience goods.

Nelson (1975:214) argues that monopoly power, which affects industry concentration, is affected by the type of goods in an industry. He also states that no theoretical evidence exists that can explain why advertising has an effect on concentration levels.

Despite the lack of theoretical evidence, it was found that a significant relationship between concentration and advertising for search goods exists. However, the findings of this study indicate that concentration influences advertising, and not the other way around. Nelson (1975) compared the findings of his empirical study to that of Telser (1969).

6.2.4 Concentration levels and advertising intensity

An empirical study by Mueller and Rogers (1980:89) examined the relationship between advertising and concentration.

Mueller and Rogers (1980:89) estimated a model to analyse the relationship between industry concentration and advertising, as well as a number of other variables. The dependent variable in the model they estimated is the change in the concentration ratio. The independent variables include initial concentration level, industry growth rate, industry size, and advertising intensity. A brief explanation of these variables is provided in the following sub-sections.

6.2.4.1 Initial concentration level

The initial concentration level variable is measured by the concentration ratio at the beginning of each measured year (Mueller & Rogers, 1980:89). An explanation for the negative relationship can be ascribed to economics literature on this topic that argues that the initial level of concentration will decrease over time as more firms enter the industry.

6.2.4.2 Industry growth rate and size

Both new entrants and incumbent firms are affected by the industry growth rate (Mueller & Rogers, 1980:90). The larger the industry becomes, the lower concentration levels become over time. Industry concentration declines when firms enter an industry.

6.2.4.3 Behaviour of independent variables

The estimated model indicated that all of the above-mentioned variables were significant in the test results, except for the industry growth rate variable. The industry size variable was significant and negative. The initial concentration level variable was highly significant in the test results, and had a negative effect on industry concentration. This indicates that deconcentration will become evident in highly concentrated industries as time progresses.

The result of the advertising intensity variable was overall positive and significant. Television advertising was the most significant variable of the three advertising variables (Mueller & Rogers, 1980:92-93).

The main finding of their study can be contributed to the important role television advertising played during the time of this study. Mueller and Rogers (1980:95) found that advertising can increase the level of concentration in an industry, even if the initial level of concentration is already high. The following section will investigate other alternative models to study industry concentration.

6.2.5 Bias in the models

The estimation of the models that analyse the relationship between industry concentration and advertising is all relatively similar in the above-mentioned studies. However, Levy (1985:58) specified a different type of model with the aim to eliminate the biased caused by the dependent variable in other models. A dynamic model is specified, which made it possible for the partial adjustment of concentration deviations from the long-run equilibrium value.

This model is designed to pay special attention to concentration in the long run. The results indicated that advertising did not play a significant role in determining industry concentration. However, minimum efficient plant size, which represented economies of scale, was significant in the test results and indicated a positive relationship with industry concentration (Levy, 1985:66).

6.2.6 The effect on market stability

In contrast to the above-mentioned studies, Eckard (1987:539) concentrated on determining the effect of advertising on the share of market instability. Although an unorthodox approach in determining the relationship between advertising and industry concentration was followed, the results still prove useful. It found no evidence to support the notion that advertising influences market power, which also indicated that there was no correlation between industry concentration and advertising.

6.2.7 Optimal advertising expenditure

Uri (1987:434) analysed the relationship between advertising and industry concentration. The underlining conclusion that was drawn was that advertising and industry concentration are correlated. The test results in the study conducted were statistically significant. The study found advertising expenditure, relative to sales, started to increase as the level of industry concentration increases. The advertising expenditure increases until an optimal level is reached. After the maximum advertising

expenditure is reached, it declines, even though concentration levels are still rising. Uri (1987:434) points out that any previous study that did not come to the same conclusion can be attributed to the misspecification of the empirical models.

6.3 SIMULTANEOUS EQUATION MODELS

The approach using simultaneous equation models is often favoured, for the reason that it can address the problem of causality between variables. However, simultaneous equation models can be biased due to the interaction between the independent variable and the error term. This section will focus on studies conducted using simultaneous model equations.

Greer (1971:19) identified a number of problems with the theoretical framework regarding the relationship between industry concentration and advertising. The first problem identified is the classification and characteristics of the products in the industries; secondly, the accuracy of using a linear hypothesis when analysing the correlation between industry concentration and advertising. The most accurate and reliable estimation of a model concerning advertising and industry concentration has yet been determined. Finally, the problem of causality between the variables still produces inaccurate results at times.

According to Greer (1971:22), advertising can be considered to be a cause of concentration, as well as a consequence of concentration. Large incumbent firms can use the majority of their market share to take advantage of advertising economies of scale. The concurrent behaviour between advertising and concentration can result in industrial concentration as a whole.

Industrial concentration was also found to positively influence advertising, by influencing the level of advertising expenditure needed by firms to stay competitive in a concentrated industry.

Mann *et al.* (1967:34) state that high levels of advertising expenditure can be attributed to a high degree of seller concentration. High levels of industry concentration can also be as result of substantial advertising campaigns by large incumbent firms in order to regain their market share lost to new entrants.

These extensive advertising campaigns will often lead to a new and higher plateau of industry concentration. The advertising-concentration relationship can furthermore be

influenced by exogenous and endogenous factors, such as industry growth and random changes in consumer preferences or tastes. These types of endogenous and exogenous factors will generate more entrants in an industry, which, in turn, will stabilise the advertising-concentration relationship (Greer, 1971:23).

Greer (1971:19) analysed the advertising-concentration relationship with both single and simultaneous equation models. In the single equation model estimated, the dependent variable consisted of advertising as a percentage of sales. The independent variables consisted of the concentration ratio at four-firm level, individual sales growth of a certain industry, as well as the square of the concentration ratio.

A unique factor of the empirical test is the fact that Greer (1971:24) distinguished between the different types of products by placing them into three separate classes in the estimation of the model. The three classes included standard products (relatively cheap products that can be compared easily), expensive products (mostly luxury goods), and unique goods. The test result of the single equation model indicated that there was a robust relationship between concentration and advertising for standard products and expensive products. However, the approach used by Greer will not be followed in the empirical analysis of this study.

In order to test the simultaneous equation model, Greer (1971:26) estimated the following equations:

$$A = a_1 + a_2C + a_3C^2 + a_4G$$

$$C = b_1 + b_2X + b_3M + b_4\log K + b_5A + b_6XA + b_7G$$

$$G = c_1 + c_2P + c_3E + c_4A$$

where:

A = Percentage sales represented by advertising.

C = Concentration ratio (CR) at four-firm level.

G = Real short-run growth

X = Dummy variable (added for the sake of the non-monotonic relationship between advertising and industry concentration)

M = Economies of scale

K = Prerequisite capital to create economies of scale

P = Ratio of relative price changes

E = Expandable income elasticity of demand

The results of the simultaneous equation models produced more or less the same results as the single equation models. Both of these models indicated a strong relationship between industry concentration and advertising. The inclusion of other variables in the simultaneous equation model did not obscure the findings of the single equation model.

The test results in this study were unanimous in concluding that there is no significant relationship between industry concentration and advertising with regard to unique goods (Greer, 1971:32).

Strickland (1976:1109) found that the results of both the single equation model and simultaneous model were consistent with one another. Strickland (1976:1119) came to the conclusion that industry concentration and advertising have significant effects on each other. The direction of causality between industry concentration and advertising is not clear, which produces conflicting results.

6.4 SUMMARY AND CONCLUSION

The purpose of this chapter was to highlight the significant effect of advertising on determining industry concentration. Numerous studies analysing the relationship between advertising and industry concentration have provided conflicting results. It is necessary to analyse the effect of advertising on industry concentration in South Africa in order to draw an objective conclusion.

The use of an advertising-sales ratio independent variable has provided mixed results; however, it can still be viewed as an effective manner of estimating an advertising independent variable. Estimating an advertising-sales ratio is a simplistic, yet effective approach towards capturing the effect of advertising. The empirical evidence in section 4 indicates the influence of advertising on product differentiation. The empirical evidence suggests that advertising influences industry concentration through product

differentiation, and that product differentiation leads to higher levels of industry concentration.

This chapter confirms the importance of analysing the effect of advertising on industry concentration, and should therefore be taken into consideration when identifying the determinants of industry concentration in South Africa. The use of simultaneous equations to identify the relationship between advertising and industry concentration has yielded insignificant results, and therefore only single equation models will be used in the empirical analysis of this study. The following chapter will investigate the methodology required to conduct an industry concentration analysis in South Africa that will provide the determinants of industry concentration in the South African manufacturing sector.

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CHAPTER 7

METHODOLOGY

7.1 INTRODUCTION

This dissertation investigates what the determinants of industrial concentration are. The literature examined in Chapters 2, 4, 5 and 6 informed on how to identify the determinants of industry concentration, and what variables should be estimated to achieve this. This chapter informs on the process required to identify the determinants of industry concentration in the South African manufacturing sector.

The main objective of this chapter is to describe the methodology that will be used to carry out the empirical analysis of this study. The previous studies conducted to identify the determinants of industry, or seller, concentration serve as a good point of reference to identify which variables should be estimated when analysing the determinants of seller concentration in South Africa.

Section 7.2 of this chapter provides a brief explanation of the type model used in the empirical analysis. Section 7.3 explains the structure of the data, origin of data, and problems associated with the data. Section 7.4 describes the required econometric tests that need to be conducted when analysing industry concentration, as well as the necessity of these specific tests.

Sections 7.5 and 7.6 provide a thorough explanation of the dependent and independent variables that will be used in the empirical analysis of this study. The variables that will be estimated and included in the empirical test for this study are variables that were proven to be significant, effective, and accurate determinants of industry concentration in earlier studies. The variables for this study are specified similar to the variables in the international studies discussed in the literature review in Chapter 5. Overall, the literature review discussed in this dissertation is used to inform the specifications of the variables.

7.2 MODEL SELECTION

The empirical tests of this study are conducted with the use of multiple linear regression models. The estimation is carried out by using the ordinary least square (OLS) method. This particular method of estimating a regression model is considered to be the most popular estimation technique in econometrics (Schmidheiny, 2013:1).

A multiple regression model aims to explain the relationship with dependent and independent variables. The set of independent variables that will be used to carry out the analysis has carefully been selected through the literature review process of the previous chapters. Past empirical studies on industry concentration have served as a point of reference to select the dependent and independent variables.

7.3 DESCRIPTION OF DATA

The dependent and independent variables will also be defined by the availability, or limitations, of industry data in South Africa. The data used in this study was gathered from Statistics South Africa (StatsSA). The data used to estimate the variables for the empirical analysis was derived from two separate StatsSA reports. These reports are the Manufacturing Industry Financial reports from 2008 and 2011, respectively. The Manufacturing Industry Financial reports are released every three years and contain industry-specific financial details.

The financial reports consist of 10 different divisions and sub-divisions that will allow the investigation of the manufacturing industry as a whole, as well as specific industries. The 2014 report was released, but due to alterations in the data it could not be used in this study.

The 2008 and 2011 manufacturing financial reports are presented at a four-digit Standard Industrial Classification (SIC) level. Data reflected in the two reports was gathered by means of large sample surveys (LSS) conducted by StatsSA. The surveys conducted to obtain the data for both reports are generated from a sample of roughly 10 000 enterprises with a frame sample of roughly 52 000 enterprises. Responses were collected at a rate of 81%.

Only the 2008 and 2011 manufacturing industry financial reports are used for the purpose of this study. The reason why only two of the aforementioned reports are applicable to this study can be attributed to the changes in the description of

manufacturing divisions. The 2005 and 2014 manufacturing financial reports exclude, and include, specific sub-divisions that will eventually distort the results of the empirical tests.

However, the division classifications for the 2008 and 2011 manufacturing financial reports are the same. Therefore, results of the empirical analysis will be more accurate and reliable by using only the 2008 and 2011 manufacturing financial reports.

The structure of the data allows for a cross-section analysis. In economics, a cross-section analysis is regularly used and is often associated with micro-economics. Data used in a cross-sectional analysis is captured at a specific point in time (Asteriou & Hall, 2011:15). Results of a cross-sectional analysis are often used to devise hypotheses in order to assess economic policies. Therefore, the type of data used for this study can be applied by policies makers in South Africa to improve the efficiency of the manufacturing sector.

The data for the 2008 manufacturing financial report was captured from July 2007 to June 2008. The data for the 2011 manufacturing financial report was captured from July 2010 to June 2011. The inclusion of the 2014 manufacturing financial report would have been ideal. This would allow estimation of panel data regression, but due to changes in data, the 2014 rapport cannot be used in this study. Appendix A provides a list of industries included in the South African manufacturing sector.

7.4 ECONOMETRIC TESTS

The variables that will be used in the empirical part of this study may cause certain problems. Past studies have served as a guide to which problems may arise when conducting an analysis of industry concentration. Economists who have conducted studies on industry concentration have come across three main problems that distort empirical test results.

The three main problems that emerge during the empirical tests are usually misspecification of variables, heteroskedasticity and multicollinearity. It is necessary to anticipate these specific problems that occur during econometric tests of industry concentration. The following section will focus on the econometric tests needed to be conducted to test for the three problems associated with an industry concentration analysis.

7.4.1 Misspecification

A common mistake that is often made in econometrics is the misspecification of an equation. Testing for the misspecification of an econometric model is an important step to evaluate an equation (Godfrey, 1991:1). Omitting more than one influential explanatory variable is regarded as one of the most frequent misspecification errors. Another common misspecification error is to assume that the relationship between the dependent variable and independent variables is linear (Asteriou & Hall, 2011:173).

There are a number of procedures that can be used to test for the misspecification of an equation (Godfrey, 1991:1). For the purpose of this study, the Ramsey RESET procedure will be followed to test for the misspecification of the equation. Ramsey's RESET test is considered to be one of the most widely used procedures to test for misspecification (Asteriou & Hall, 2011:187). The null hypothesis of the Ramsey RESET test is that the equation has been specified correctly.

The simplistic nature of the general Ramsey RESET test makes it a reliable and effective method of testing for misspecification in linear regression models. The Ramsey RESET test is convenient to use, as it does not require complicated algebraic calculations. This procedure should be used as a simple examination of the suitability of the equation (Simon, 2000:364).

Failing to test for the misspecification of an equation can also lead to other serious problems. In many cases, the irrelevant omitted variable that causes the misspecification of the equation can also lead to multicollinearity. Therefore, it is necessary to test for model misspecification before any other econometric tests can be conducted.

On the other hand, the exclusion of a relevant variable can also lead to model misspecification. The absence of a relevant variable in the equation will cause the OLS estimator properties to be violated.

However effective and simple the Ramsey RESET test is, there is still some criticism against it. One of the major weaknesses of the Ramsey RESET test is the fact that it does not provide the correct form of specification once the equation has been misspecified (Asteriou & Hall, 2011:188). Therefore, the null hypothesis gets rejected if the equation has been misspecified.

7.4.2 Heteroskedasticity

Heteroskedasticity refers to the unequal spread in the variance (Asteriou & Hall, 2011:110). Conversely, an equal spread in the variance is known as homoskedasticity. Heteroskedasticity causes estimates of parameters to be ineffective. On average, heteroskedasticity often occurs in a cross-sectional analysis, such as in the current particular study of industry concentration (White, 1980:817). Adeboye and Agunbiade (2012:27) also came to the conclusion that heteroskedasticity frequently arises in cross-sectional data.

Testing for heteroskedasticity will resolve a number of problems, which could potentially affect the accuracy of the specified equations. The distributions of the variances are affected, which causes the estimators of the equation to be inefficient. The accuracy of the t-statistic, as well as the F-statistic is affected by heteroskedasticity. The values of the t-statistic and F-statistic are depicted with higher values than what they actually are. This, in turn, could lead to the wrongful rejection of the null hypothesis.

There are a number of methods that can be used to detect heteroskedasticity. According to Asteriou and Hall (2011:116), there are generally two ways to detect heteroskedasticity. The first is an informal method that includes the inspection of graphs, and the latter includes more formal econometric tests for heteroskedasticity.

The formal tests for heteroskedasticity include a number of Lagrange Multiplier (LM) tests. For the purpose of this study, White's test for heteroskedasticity will be used. White's test for heteroskedasticity is also considered to be an 'LM test', but has certain advantageous characteristics. Normal LM tests for heteroskedasticity require preceding knowledge of the causes of heteroskedasticity that are captured by the auxiliary regressions. Conversely, White's test for heteroskedasticity does not require any prior knowledge of heteroskedasticity in the auxiliary regressions (Asteriou & Hall, 2011:129).

Once the presence of heteroskedasticity has been identified via White's test, a transformation of the equation takes place. Every one of the observations is divided by the square root of the variance of the error term (Kennedy, 1998:121).

7.4.3 Multicollinearity

Multicollinearity can be defined as the intercorrelation between explanatory variables (Maddala, 2001:268). Multicollinearity can cause a number of problems for the estimation and interpretation of the regression analysis. When multicollinearity occurs, the highly correlated explanatory variables obscure the distinct effects of each explanatory variable. Multicollinearity has been a major problem in previous studies dealing with industry concentration. In order for the empirical analysis of this study to be accurate and efficient, the problem of multicollinearity needs to be dealt with.

Maddala (2001:268) argues that in many instances the tests that are designed to rectify the problem of multicollinearity further complicate the existing problem of multicollinearity in a regression. Therefore, caution should be exercised when conducting tests regarding multicollinearity.

The problem of multicollinearity arises when a linear relationship exists in the data used for the empirical analysis. According to Kennedy (1998:184), multicollinearity can emerge for a number of reasons. Firstly, multicollinearity can be attributed to a regular time trend in the explanatory variables. Secondly, the lagged value of explanatory variables could lead to multicollinearity. Thirdly, multicollinearity can also exist when data is collected from a limited base. Therefore, the correct estimation of the explanatory variables should be a priority.

Perfect multicollinearity causes the denominators of the coefficients in the equation to be zero. Perfect multicollinearity rarely arises, and makes it impossible to estimate an econometric equation (Wang, 1996:23). Contrarily, imperfect multicollinearity occurs on a regular basis. Therefore, testing for imperfect multicollinearity will be prioritised.

Imperfect multicollinearity occurs when the correlation between the explanatory variables in the equation correlates, but is not perfectly correlated (Asteriou & Hall, 2011:98). One of the major consequences of imperfect multicollinearity is that it affects the precision of the estimated equations.

There are two simplistic approaches to detect multicollinearity. The first approach is to examine the R-square (R^2) for the estimated regression and the explanatory variables. The rule of thumb is that if the R-squared of the estimated regression is higher than any of the omitted explanatory variables, then there is no need to be concerned about

multicollinearity. The second approach involves the inspection of the *t*-statistics. Should the *t*-statistics all have a value greater than 2, multicollinearity does not exist (Kennedy, 1998:187).

Kennedy (1998:188) argues that should the above-mentioned approaches detect multicollinearity in the estimated regression, the easiest way to rectify the problem is by dropping explanatory variables from the estimated regression.

In addition to the two above-mentioned measures of multicollinearity, a correlation matrix will also be used to test the presence of multicollinearity. The following section provides a detailed description of the dependent and independent variables.

7.5 DEPENDENT VARIABLE

Choosing the correct dependent variable for empirical tests affects the accuracy and soundness of the results. Previous literature on the topic of analysing industry concentration levels suggests that there are mainly two measures of concentration, dependent variables, which need to be considered. These two measures of concentration are the concentration ratio (CR), and the Herfindahl-Hirschman Index (HHI).

These two specific measures of concentration have been widely used in empirical studies that were conducted on the topic of industry concentration. Both of the above-mentioned measures of industry concentration are regarded to be accurate and reliable.

However, in this study, the concentration ratio is used to measure industry concentration. The reason for its popularity can be attributed to two reasons. Firstly, its simplicity allows for straightforward tests that are usually accurate. Secondly, the available industry data only enables the use of the concentration ratio (CR). Using the concentration ratio (CR) will make international comparisons possible. In addition to the international comparisons, different types of industries can also conveniently be compared with each other.

The available manufacturing data in South Africa provides the concentration ratio (CR) at five-, 10-, and 20-firm levels. The aim of this study is to identify the main determinants of industry, or seller, concentration. Therefore, the main objective of the empirical study is determining which of the independent variables that were identified

in the literature review will have a significant impact on industry concentration in South Africa.

The regressions are estimated to determine the relationship between the concentration ratio at five-firm (CR5) level and a number of explanatory variables. The following section will focus on which explanatory variables will be omitted, and how they will be specified.

7.6 INDEPENDENT VARIABLE

The accuracy and reliability of the empirical tests will be contingent on the relationship between the dependent and independent variables. Therefore, all of the independent variables in this study will be estimated as a ratio, as the dependent variables (CR5) are presented as a percentage. The independent variables that were used in the current research are explained in the following sub-sections. The abbreviations used in the analysis are provided between brackets.

7.6.1 Advertising-income ratio

Extensive literature on the relationship between advertising and industry concentration has been conducted. The studies of Mann *et al.* (1967) and Pickford (1983) found advertising to be a significant variable, and that it has a positive relationship with industry concentration. The importance of estimating the advertising variable in analysing the level of seller concentration in an industry has been underlined thoroughly in existing literature.

In order to estimate the advertising variable accurately, the approach that was used to estimate this variable in previous studies should be taken in consideration. The available data for manufacturing industries in South Africa allows for this variable to be estimated in a similar fashion to the earlier studies.

The available data of the manufacturing industries in South Africa makes it possible to estimate the advertising variable in two different ways. Both ways of estimating the advertising variable were significant in previous empirical studies that were conducted on this topic.

The advertising variable can be estimated using the total expenditure of advertising (R millions) in an industry. An alternative way of estimating this variable can be done by

means of an advertising-to-sales ratio. The advertising-to-sales ratio is estimated by dividing the total advertising expenditure in an industry by the total sales. These two approaches used to estimate the advertising variable as an independent variable have been widely used in empirical studies and are considered to be accurate estimations.

However, for the purpose of this study, only an advertising-income ratio will be used in the estimation of the empirical models. A significant positive relationship between the advertising-income ratio and the concentration ratio is expected.

7.6.2 Export intensity

The effect of export opportunities needs to be taken into account when identifying the determinants of industry concentration. The intensity of exports can have adverse effects on any given industry.

An increase in the intensity of exports can result in deconcentration, as more firms enter the market. The deconcentration as a result of exports can be attributed to the increase in the potential market size. An increase in the market size of an industry usually means that there is more room for firm entry.

However, the lack of an export market can also lead to an increase in industry concentration. The height of the entry barriers in an industry can limit the potential of export opportunities. Some industries have extensive barriers to entry compared to others, which, in turn, causes the domestic markets to be concentrated and over-saturated.

The procedure to estimate an export intensity variable is straightforward due to the availability of data. In order to estimate this variable, the same approach that was used by Ratnayake (1999:1056) will be adopted in the upcoming empirical tests. Export intensity will be computed as a ratio between the value of exports (R million) and the value of sales (R million). A significant negative, or positive, relationship between export intensity and industry concentration is expected.

7.6.3 Import penetration

The effect of imports also needs to be taken into consideration when conducting an analysis of industry concentration. The import penetration variable will capture the overall results of imports on industry concentration. Empirical studies suggest that the

effect of import penetration on industry concentration will be similar to that of export intensity.

One of the main reasons for the estimation of this variable can be assigned to the pressure that imports place on smaller firms to merge. Small firms are often forced into a merger due to their inability to survive the loss in market share due to import penetration. Import penetration poses a greater threat to smaller firms than larger firms.

However, the argument can also be made that import penetration resolves industry concentration. According to Pugel (1980:119), import penetration can reduce industry concentration by serving as a proxy for antitrust laws.

The method used to estimate this variable will be similar to the method in a previous empirical study by Ratnayake (1999). The import penetration variable in the same type of study conducted by Ratnayake (1999:1056) yielded significant results. This variable will therefore be estimated the same way in this study.

Import penetration will be computed as a ratio between the value of exports (R million) and the value of sales (R million). A significant negative relationship between import penetration and industry concentration is expected.

7.6.4 Economies of scale

Existing literature on industry concentration stipulates the importance on economies of scale as a main determinant of industry concentration. The importance of economies of scale as an independent, and likely main, determinant of industry concentration cannot be over stated. Empirical studies have concluded that economies of scale usually have a significant effect on industry concentration, and therefore should be estimated accurately to capture its complete effect.

As emphasised by Lipczynski, Wilson and Goddard (2005:215), economies of scale affect the number of firms an industry can accommodate and what the general market structure of an industry is. The estimation of economies of scale should help explain why the markets of certain industries are structured the way they are, as well as give an explanation for the number of incumbent firms in any given industry. Larger firms are usually benefitting primarily from economies of scale by saving costs on production

and expanding their business activities. Therefore, economies of scale should generate significant results in highly concentrated industries.

There are several ways of estimating economies of scale. However, the available data in South Africa limits the specification of the variable to a specific manner. Therefore, four proxy variables will be estimated for economies of scale. These four proxy variables are capital expenditure per worker, carry assets per worker, productive assets per worker, and total sales per worker. The following section will explain how the four economies of scale proxy variables are devised.

7.6.4.1 Capital expenditure per worker

The importance of capital good for firms with regard to industry concentration needs to be investigated. The estimation of a variable that captures the intensity of capital in industries will indicate whether or not it is a significant determinant of industry concentration.

Firms with access to more capital have a considerable advantage over others. Access to capital gives firms the opportunity to differentiate their products, and invest in technology. The assumption can be made that larger firms usually have more access to capital than their smaller counterparts. Capital intensity is regarded as an entry barrier, seeing how it affects the access a firm has to resources.

The estimation of capital intensity will follow the same procedure as presented by Ratnayake (1999:1056). The procedure used to estimate this variable involves using the fixed capital (R million) and the number of employees in an industry. The amount of fixed capital will be divided by the number of employees in an industry in order to generate a capital expenditure per worker variable. This approach to the estimation of the variable has proven to yield significant empirical results.

A significant positive relationship between industry concentration and capital expenditure per worker is expected.

7.6.4.2 Asset expenditure per worker

In order to estimate proxy variables for economies of scale, asset expenditure should also be taken into account. The available data allows for the estimation of two asset expenditure variables, which will both serve as proxy variables for economies of scale.

7.6.4.3 Carry assets per worker

The first asset expenditure proxy variable is the total carrying value (R million) per worker. This explanatory variable is the summation of a number of assets per worker. These assets include land, construction, buildings, plant machinery and equipment, vehicles, computers, software and computer and other IT equipment, goodwill, patents and copyright, and other assets.

7.6.4.4 Productive assets per worker

The second asset expenditure proxy variable is productive assets (R million) per worker. This variable consists of the summation of only certain assets. These assets include land, construction, buildings, plant machinery and equipment, vehicles and computers, software and other IT equipment. A positive relationship between both productive assets per worker and carry assets per worker and industry concentration is expected.

7.6.4.5 Total sales of manufactured goods per worker

The inclusion of an independent variable that represents the total value of sales of an industry is useful when examining the level of concentration. The total value of sales of any given industry can help shed some light on the overall effectiveness and market share that an industry can have.

This independent variable will be estimated by dividing the total sales (R millions) of manufactured goods by the total number of workers. A total sales (R millions) per worker independent variable will be estimated. The inclusion of this independent variable will indicate whether the total sales of manufactured goods play a significant role in determining industry concentration. A significant positive relationship is expected between industry concentration and total sales of manufactured goods per worker.

7.6.5 Value added per worker

Existing literature on industry concentration suggests that the value added per worker can be used as proxy variable for industry growth rate and market size. Therefore, the value added per worker independent variable captures the effect of industry growth and market size on industry concentration.

7.6.5.1 Industry growth rate/market size

The rate at which an industry grows affects the number of firms any given industry can occupy. Some industries tend to grow more rapidly than others, and therefore the general effect of industry growth on industry concentration should be examined. As noted in literature on industry concentration, the industry growth rate has important implications for the entry barrier in an industry. The effect that industry growth has on entry barriers, in turn, affects the overall firm entry, or exit, of an industry.

Empirical evidence suggests that industries with a rapid growth rate (%) tend to be more concentrated than others. Therefore, it can be expected that the faster growing industries in South Africa will be more concentrated compared to those that are not. Industry growth rate as an independent variable is expected to be highly correlated with industry concentration.

The number of firms an industry can accommodate can be attributed to the market size (industry size). The level of industry concentration cannot be evaluated without including an independent variable that represents the size of the market. The underlining hypothesis regarding market size is that the larger the market is, the more firms it can accommodate. However, this hypothesis needs to be tested within a South African context.

The significance, or insignificance, of larger firms can also be analysed when determining the effect of market size on industry concentration. Market size is expected to be correlated with another independent variable, i.e. economies of scale. The reason why market size and economies of scale are expected to be correlated can be ascribed to the benefit that larger firms obtain through economies of scale.

The available industry data in South Africa allows for a straightforward estimation of the value added per worker variable, which is in line with the previous empirical studies that utilised this specific variable.

A value added (R million) of manufactured goods per worker will be used as an estimate of the industry growth rate and market size as an independent variable. A significant positive relationship is expected between value added per worker and industry concentration.

7.6.6 Product differentiation

An analysis of industry concentration determinants cannot be completed without estimating a product differentiation variable. Empirical studies suggest that product differentiation is as a result of economies of scale (Hamm & Mueller, 1974:515). A correlation between product differentiation and economies of scale is expected, as it can be expected that mainly the larger firms benefit from product differentiation.

Product differentiation enables firms to gain market share more rapidly than others; and by doing so, they establish their authority in an industry. The inclusion of product differentiation in the empirical test will also point out whether it contributes to industry concentration in only certain industries of specific types of products, or apply to all industries. A designated product differentiation variable was not specified in this study; however, an advertising-income ratio and economies of scale are also used as proxy variables for product differentiation. The interaction between both of these variables on the concentration ratio should explain the significant influence of product differentiation on industry concentration.

7.7 SUMMARY AND CONCLUSION

The overall objective of this study is to identify the determinants of industry concentration in the South African manufacturing sector. In order to obtain accurate results, the literature reviewed in Chapters 2, 4, 5 and 6 provided insightful information on how to analyse industry concentration, and how to identify the determinants of industry concentration.

Chapter 7 outlines the appropriate methodology necessary to conduct an industry concentration analysis. The dependent and independent variables will be estimated by using data from the 2008 and 2011 Manufacturing Industry Financial reports. The dependent and independent variables identified in this chapter will be used in a cross-sectional analysis in order to establish the determinants of industry concentration in South Africa. The variables were tested for misspecification, heteroskedasticity and multicollinearity, for the sake of accurate results. The following chapter describes the empirical analysis of this study.

CHAPTER 8

EMPIRICAL ANALYSIS

8.1 INTRODUCTION

The aim of this study is to identify the main determinants of industry concentration in the South African manufacturing sector (see Chapter 1, section 1.5). The objective of this chapter is to explain and interpret the results of the econometric models used in the empirical analysis of this study. The variables described in Chapter 7 will be estimated in regression models for 2008, 2011 and 2008 to 2011. This will allow for the observation of the independent variables, indicating the determinants of industry concentration. The behaviour of each independent variable estimated for the empirical analysis is also interpreted and discussed.

Section 8.2 explains how the models are selected for the empirical analysis. In section 8.3, the pre-test assumptions are displayed. The results of the empirical tests are reported in section 8.4, followed by model and independent variable interpretations in section 8.5. However, the various independent variables analysed in the study are discussed in depth in section 8.6. The following section sheds light on the process followed in order to select how the models for this study should be estimated.

8.2 MODEL SELECTION

The different independent variables mentioned in the previous chapter will be grouped together in five regression models to establish the significant determinants of industry concentration. The five regression models will be estimated with the 2008 and 2011 manufacturing industry financial data, respectively. The dependent variable, concentration ratio at five firm level (CR5), included in the five regression models will remain the same. The reason for this is the fact that the concentration ratio at five-firm level captures the high degree of industry concentration compared to the concentration ratio at ten- or 20-firm level.

The independent variables included in each of the five regression models remain roughly the same, except for the addition of the four economies of scale proxy variables and the value-added variable included separately in each model. Therefore, each regression model will include the standard advertising-income ratio, export intensity and import penetration independent variables.

Due to the problem of multicollinearity, the four different economies of scale proxy variables are included in separate regression models. An additional five regression models will also be estimated that contain the same variables, but capture the changes from 2008 to 2011. The following section provides insight into what the expected signs of the estimated variables could be in consideration of the literature and international studies discussed in Chapters 4 and 5.

8.3 A *PRIORI* SPECIFICATIONS

Table 8.1 indicates how the independent variables are expected to react in the empirical analysis. The independent variables are expected to react in the following way in light of previous studies conducted on industry concentration. A positive coefficient indicates a positive effect on the dependent variable (CR5). A significant positive effect on the dependent variable indicates that the independent variable can be interpreted as a determinant of industry concentration.

The expected coefficient signs stipulated in Table 8.1 are in line with the literature examined in Chapters 4, 5 and 6. A combination of the determinants of industry concentration examined by Lipczynski, Wilson and Goddard (2005) and the various international studies conducted on industry concentration that were analysed served as a guide as to what the expected coefficient signs of the independent variables could be.

In the studies analysed, where the same type of independent variables yielded conflicting results, the expected coefficient sign for this study is based on the number of times the respective independent variable generated the same results. In other words, the expected coefficient signs are emanated from the aggregate number of times the respective independent variables produced either a positive or negative coefficient.

Table 8.1: A priori specifications

Independent variables	Expected coefficient sign
Advertising-income ratio	+
Export intensity	-/+
Import penetration	-
Value-added per worker	+
Economies of scale proxy variables	
<i>Capital expenditure per worker</i>	+
<i>Carry assets per worker</i>	+
<i>Productive assets per worker</i>	+
<i>Total sales per worker</i>	+

Source: Compiled by author

The tables in the following section indicate the results of the regression models estimated for 2008 (Table 8.2), 2011 (Table 8.3), and 2008 to 2011 (Table 8.4).

8.4 EMPIRICAL RESULTS

The following tables indicate the relationship between the independent variables and the dependent variables by indicating the coefficient and the level of significance of the independent variables. The regression analyses include five models for 2008, 2011, and 2008 to 2011.

The dependent variable for every model specified is the concentration ratio at five-firm level. Therefore, models 1 to 5 contain the following standard independent variables: advertising-income ratio, export intensity, and import penetration. A different proxy variable for economies of scale for models 1 to 4 is included. Alternatively, model 5 includes a value-added per worker variable as opposed to an economies of scale proxy variable.

Table 8.2: Results of OLS regression analyses for 2008

Dependent variable CR5					
Independent variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>
Advertising-income ratio	** 3.835552	* 2.570367	** 3.451197	** 4.363581	** 4.031177
Export intensity	** 0.392239	** 0.391522	** 0.402805	** 0.437647	*** 0.472468
Import penetration	* 0.259542	* 0.230237	* 0.231112	* 0.260799	* 0.249565
Value-added per worker					*** 0.291534
Economies of scale proxy variables					
Capital expenditure per worker	*** 1.499084				
Carry assets per worker		*** 25.59197			
Productive assets per worker			*** 28.21551		
Total sales per worker				*** 4.315459	
R ²	0.264132	0.295778	0.297131	0.256325	0.277044
F-statistic	6.550646	7.665126	7.715017	6.290287	6.993570

Source: Compiled by author

Notes: Regressions estimated with White heteroskedasticity-consistent standard errors & covariance.

Included observations: 78

- * Statistically significant at 10%
- ** Statistically significant at 5%
- *** Statistically significant at 1%

Table 8.3: Results of OLS regression analyses for 2011

Dependent variable CR5					
Independent variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>
Advertising-income ratio	** 2.485600	** 2.164825	*** 3.183568	*** 3.468448	** 2.248313
Export intensity	** 0.332784	* 0.255602	* 0.240496	** 0.307553	** 0.316794
Import penetration	*** 0.435491	*** 0.456542	*** 0.468800	*** 0.410032	** 0.331243
Value-added per worker					*** 0.243562
Economies of scale proxy variables					
Capital expenditure per worker	*** 0.612634				
Carry assets per worker		*** 18.15693			
Productive assets per worker			*** 37.90444		
Total sales per worker				*** 4.130964	
R ²	<i>0.220517</i>	<i>0.310933</i>	<i>0.277439</i>	<i>0.253228</i>	<i>0.279385</i>
F-statistic	<i>5.304419</i>	<i>8.460718</i>	<i>7.199361</i>	<i>6.358079</i>	<i>7.269444</i>

Source: Compiled by author

Notes: Regressions estimated with White heteroskedasticity-consistent standard errors & covariance.

Included observations: 78

- * Statistically significant at 10%
- ** Statistically significant at 5%
- *** Statistically significant at 1%

Table 8.4: Results of OLS regression analyses for 2011 to 2008

Dependent variable CR5					
Independent variables	<i>Model 1</i>	<i>Model 2</i>	<i>Model 3</i>	<i>Model 4</i>	<i>Model 5</i>
Advertising-income ratio	** 2.085879	* 1.503231	** 2.246542	* 1.480855	** 2.492115
Export intensity	* 0.171036	* 0.065051	* 0.113371	* 0.018823	* 0.150537
Import penetration	* 0.140435	* 0.151339	* 0.148215	* 0.142220	* 0.147726
Value-added per worker					** 0.157892
Economies of scale proxy variables					
Capital expenditure per worker	* - 0.101370				
Carry assets per worker		** 9.024007			
Productive assets per worker			* 8.559757		
Total sales per worker				*** 8.722300	
R ²	<i>0.047313</i>	<i>0.100598</i>	<i>0.058706</i>	<i>0.176978</i>	<i>0.083461</i>
F-statistic	<i>0.906349</i>	<i>2.041263</i>	<i>1.138197</i>	<i>3.924367</i>	<i>1.661861</i>

Source: Compiled by author

Notes: Regressions estimated with White heteroskedasticity-consistent standard errors & covariance

Included observations: 78

* Statistically significant at 10%

** Statistically significant at 5%

*** Statistically significant at 1%

8.5 INTERPRETATIONS OF MODELS' RESULTS

This section will focus on the interpretation of the five separate models estimated for 2008, 2011 and 2008 to 2011. Each model will be interpreted by focusing on the sign and the significance of the estimated independent variables, in order to determine its relationship with the dependent variable. Special attention will be given to the independent variables that are statistically significant at the 5% or 1% level. Variables statistically significant at a 10% level will not be interpreted.

8.5.1 Model results for 2008

Overall, the five models estimated for 2008 indicated that there is a significant positive relationship between the estimated independent variables and dependent variable. In models 1, 3, 4 and 5, advertising-income ratio indicated a significant positive relationship with CR5. In each model estimated, export intensity was highly statistically significant. Import penetration reacted oppositely in each model to what was expected and did not produce any significant results. The results of model 5 indicated that value added per worker was positive and highly statistically significant at 1%.

Therefore, value added per worker reacted in line with the *a priori* specifications. With regard to the economies of scale proxy variables, all four of the economies of scale proxy variables yielded positive significant results. The economies of scale proxy variables confirmed the *a priori* specifications. The economies of scale variables were all statistically significant at 1%.

8.5.2 Model results for 2011

In general, the regression results for 2011 are similar to 2008. The advertising-income variable once again indicated a strong positive significant relationship with the dependent variable. In 2011, export intensity also reacted similar to the models specified for 2008 by producing a positive significant relationship at the 5% level, in models 1, 4 and 5.

The relationship between the dependent variable, value added per worker, as well as the economies of scale proxies reacted the same in 2011 as in 2008. Both value added per worker and economies of scale produced statistically positive significant results at 1%. The behaviour of the economies of scale proxy variables was in accordance with the *a priori* specifications. However, in contrast to 2008, import penetration showed

highly statistically significant results in 2011. In 2011, import penetration indicated a positive relationship with the dependent variable.

8.5.3 Model results for 2011 to 2008

In general, the regression analyses for the years 2008 to 2011 led to mixed results. In models 1, 3 and 5, advertising-income ratio displayed a positive statistical significant relationship with the dependent variable. In model 5, the relationship between value added per worker and the dependent variable was positive and significant. Varied results for the economies of scale variables were observed.

The only economies of scale proxy variables that produced statistically significant results were carry assets per worker and total sales per worker. Both variables indicated a positive correlation with the dependent variable.

8.6 BEHAVIOUR OF INDEPENDENT VARIABLES

The results produced in the regression analyses for 2008 and 2011 are in accordance with existing literature on industry concentration. The following section will focus on the effect of each individual independent variable on industry concentration.

8.6.1 Advertising

As highlighted in Chapter 2, advertising can be viewed as sunk cost expenditure. Lipczynski, Wilson and Goddard (2005:216) consider sunk cost expenditure to one of the main determinants of industry concentration. Advertising is classified as either an endogenous or exogenous sunk cost expenditure.

Endogenous sunk cost expenditure implies that a firm has control over the amount spent on the sunk cost, which in this case is advertising. Sutton (1991, 1998) hypothesised that endogenous sunk cost industries are associated with higher industry concentration. The regression results from 2008 and 2011 prove that the hypothesis devised by Sutton can be accepted. Exogenous sunk cost expenditure suggests that there is an initial expenditure required in order to penetrate the industry.

In order to test the hypothesis devised by Sutton, a closer examination of the manufacturing industry data is required. Table 8.5 illustrates the advertising-income

ratio and concentration ratio of specific industries by comparing the concentration ratio at five-firm level with the advertising-income ratio.

Table 8.5: Comparison of advertising-income ratio and concentration ratio

Manufacturing industry	Advertising-income ratio (%)		Concentration ratio (CR5) (%)	
	2008	2011	2008	2011
Production, processing and preserving of meat and meat products	0.36	1.07	29	30
Manufacture of other food products	2.75	3.52	48	57
Manufacture of fertilisers, nitrogen compounds, plastics and synthetic rubber	4.51	0.11	87	75
Manufacture of soap and detergents, perfumes and toilet preparations	8.15	5.02	60	47

Source: Compiled by author

Table 8.5 shows that a positive relationship between the advertising-income ratio and concentration ratio exists. An increase in the advertising-income ratio leads to an increase in the concentration ratio and *vice versa*.

Advertising expenditure as a whole increased from 2008 to 2011. The significant effect of advertising on industry concentration can be observed in Table 9.5. Advertising was one of the few independent variables that produced statistically significant results in the regression analyses for the years 2008 to 2011. The regression analyses for 2008, 2011, and 2008 to 2011 indicate that advertising is a robust variable. It can be calculated that the concentration ratio (CR5) is affected by advertising.

The impact of advertising on industry concentration can be attributed to the endogenous sunk cost expenditure of firms with the majority of market share. Firms in highly concentrated industries tend to invest in advertising in order to retain and gain market share. This creates entry barriers for firms trying to enter an industry. In return, the entry to an industry is blockaded, which prevents deconcentration from transpiring.

Therefore, the assumption can be made that higher advertising expenditure leads to higher industry concentration levels. Although industry concentration is significantly influenced by advertising, other possible determinants should also be taken into account.

8.6.2 Export intensity

The results of the 2008 regression analysis indicate that export intensity had a positive significant influence on industry concentration. The results of the 2011 regression analysis indicate that export intensity continued to have a significant influence on industry concentration, although models 2 and 3 were not significant. The 2008 to 2011 regression analyses did not yield any significant results regarding the relationship between industry concentration and export intensity.

The significant positive results from 2008 and 2011 provide evidence that export intensity can be regarded as a determinant of industry concentration. The positive relationship between export intensity and industry concentration indicates that export intensity causes industries to be more concentrated.

The empirical findings regarding export intensity are supported by Geroski (1982), but are in contrast with Zhao and Zou (2002) and Forte and Reis (2016). The positive relationship between export intensity and industry concentration is indicated in Table 8.6 by comparing the export intensity of a few specific industries with their corresponding concentration ratio at five-firm level. In these specific industries, it is clear that an increase in export intensity from 2008 to 2011 led to an increase in the concentration ratio.

The empirical test results observed in this study on the determinants of industry concentration clearly indicate that export intensity should be regarded as a determinant of industry concentration.

Table 8.6: Comparison of export intensity and concentration ration

Manufacturing industry	Export intensity (%)	Concentration ratio (CR5) (%)
	2011 to 2008	2011 to 2008
Manufacture of basic chemicals, except fertilisers and nitrogen compounds	29	14
Manufacture of machinery for food, beverage and tobacco processing	14	16
Manufacture of watches and clocks, optical instruments and photographic equipment	25	12
Manufacture of other transport equipment	22	26

Source: Compiled by author

8.6.3 Import penetration

In the regression analyses for 2008, and 2008 to 2011, results for import penetration were insignificant. However, the regression analysis for 2011 indicated a positive significant relationship between industry concentration and import penetration. Similar to export intensity, a negative relationship with industry concentration was expected.

The empirical evidence suggests that import penetration led to an increase in industry concentration from 2008 to 2011. The fact that the regression analysis for 2011 was significant, compared to 2008, can be assigned to a number of factors:

Firstly, since 1994, the South African trading landscape has shifted significantly. Imports, as well as exports, have been remarkably influenced by trade liberalisation. The newly elected government promoted trade liberalisation by joining the General Agreement on Tariffs and Trade (GATT). In order to foster growth in the manufacturing sector, government also made the decision to join free trade agreements with the

Southern African Development Community (SADC), the European Union (EU) and the European Free Trade Association (EFTA).

This phase led to a rapid rise in imports and exports. Import consumption by manufactures led to a total increase from 14% to 26% between 1993 and 2010. The late 1990s and the early 2000s had a significant effect on import penetration. Major countries, such as China, played a major role in increasing imports. From 2001 to 2011, manufactured imported goods from China have increased from \$1.1 billion to \$14.2 billion. In 2010, China was responsible for 18.5% of imports, exceeding the United States of America (USA), Japan and Germany.

Since the 1990s, China has been the leading importer of labour-intensive goods. However, by 2010, the machinery and technology sectors were also dominated by China. This could help explain why the empirical results for import penetration were only significant for the 2011 regression analyses. In the early 2000s, South African trade policy was substantially affected by two underlining factors: Trade liberalisation and the rise of China's involvement in South African trade.

In the manufacturing sector, the top 5% (CR5) firms are responsible for producing more than 90% of total export value. In comparison to other countries, South Africa's export sector is considered to be one of the most concentrated among developing countries. In 2005, the top 1% of manufacturing exporters was responsible for producing 65% of total export value. This should indicate that there is a strong correlation between industry concentration and export intensity. According to a 2014 World Bank report, South Africa's firm entry into export markets is much lower compared to other developing countries (World Bank, 2014).

The regression analysis for 2008 to 2011 did not present any significant results. This could partly be due to rapid increases in industry concentration prior to 2011.

8.6.4 Value added per worker

Value added per worker yielded positive significant results in each regression analysis. The empirical results support the *a priori* specification of a positive significant relationship between industry concentration and value added per worker.

Therefore, the significance of value added per worker implies that industry growth rate and market size are determinants of industry concentration. Since value added per

worker is a proxy variable for industry growth rate and market size, it is necessary to analyse what the possible impact of each can be.

In terms of industry growth rate, the positive significant relationship with the dependent variable indicated that firms entering and occupying an industry contributed to an increase in industry concentration. In section 5.5.3, Stigler (1964:44-61) makes the assumption that a positive relationship between industry concentration and industry growth rate can be evidence of cartelised industries. The presence of cartels can restrict economic growth and discourage new firms to enter an industry. This, in turn, restricts job creation in the manufacturing sector.

The positive effect of industry growth rate on industry concentration also indicates a barrier to entry. Therefore, faster growing industries are more difficult to infiltrate than slower growing industries. This barrier to entry is closely related to profitability. Industries with a higher growth rate tend to be more profitable than others. This means that highly concentrate industries have an unfair advantage over non-concentrated industries.

In addition to industry growth, value added per worker was also measured to determine the influence of market size on industry concentration. In theory, larger industries are less concentrated than their smaller counterparts, as they can accommodate more firms. The positive relationship in the empirical analysis suggests that the industries with a larger market size are indeed less concentrated than smaller ones.

8.6.5 Economies of scale

In the empirical analyses for 2008 and 2011, economies of scale as a whole indicate a highly significant relationship with industry concentration. The regression analyses for 2008 to 2011 did not yield significant results for all of the proxy variables specified. Carry asset per worker and total sales per worker were the only two economies of scale proxy variables that indicate a significant influence on industry concentration.

The robustness of economies of scale proxy variables implies that economies of scale are a significant determinant of industry concentration. All of the economies of scale proxy variables reacted in accordance with the *a priori* specifications.

Economies of scale also dictate the number of firms an industry can accommodate. Small firms operating at lower levels of production and profit can easily be forced out of an industry by large firms benefitting from economies of scale.

Through economies of scale, large dominant firms are also able to differentiate their products. This added advantage allows for few firms to exist in an industry, causing industry concentration levels to rise.

8.7 SUMMARY AND CONCLUSION

The overall objective of this study is to identify the determinants of industry concentration in the South African manufacturing sector. This chapter provides the findings of the empirical test results of this study, and indicates which independent variables significantly influenced the degree of industry concentration in the South African manufacturing sector. In this chapter, the three models specified for the empirical analysis are explained and interpreted.

The conclusion can be drawn that the determinants of industry concentration identified in this study significantly influence the levels of industry concentration in the South African manufacturing sector. The behaviour of the majority of independent variables is in accordance with the previous studies conducted on industry concentration that are discussed throughout this study.

The overall empirical test results indicate the statistically significant relationship between industry concentration and advertising, export intensity, import penetration, value added per worker, and economies of scale. The model results for 2008 indicate that there is a positive significant relationship between industry concentration and the following independent variables: advertising-income ratio, export intensity, value-added per worker, and all of the economies of scale proxy variables.

The model results obtained for 2011 are similar to the results for the 2008 analyses; however, import penetration also indicated a significant positive relationship with industry concentration. The results for the 2008 to 2011 analyses only indicated a positive significant influence of a few independent variables. These variables included value added per worker, carry assets per worker, and the advertising-income ratio.

The significant influence of advertising on industry concentration is justified in the model results for 2008 to 2011. This indicates that a trend has manifested within the

manufacturing sector of South Africa in terms of advertising intensity. The results indicate that firms in the manufacturing sector that tend to advertise more leads to higher levels of concentration in their respective industries. The following chapter will provide a summary and conclusion of each chapter of the study.

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CHAPTER 9

SUMMARY, CONCLUSION AND RECOMMENDATIONS

9.1 INTRODUCTION

The objective of this chapter is to provide a thorough explanation and synopsis of the study on the determinants of seller, or industry, concentration of the South African manufacturing sector. The motivation for this study stems from the lack of research on industrial concentration, and the determinants thereof. Therefore, an empirical study was conducted in order to identify the main determinants of industry concentration of the South African manufacturing sector. The overall conclusion, policy recommendations, trends and recent levels of industry concentration in the South African manufacturing sector, and areas identified for future research, are also discussed in this chapter.

9.2 MOTIVATION AND OBJECTIVE OF STUDY

A thorough analysis of the determinants of industry concentration has not yet been conducted in South Africa. Table 1.1 indicates the high degree of industry concentration in the South African manufacturing sector. However, there has been a slight decline in the degree of concentration from 2008 to 2011, yet industries are still mainly controlled by the five dominant firms in each industry as indicated by the concentration ratio. The concentration ratio is a measure of industry concentration used to determine the degree of concentration. CR5 refers to five dominant firms in the industry (Chapter 2 provides a detailed explanation on concentration measures).

The various implications of high levels of industry concentration also cause concern to identify the actual determinants of industry concentration. High levels of industry concentration can cause unequal market power and unwanted monopolistic behaviour. Therefore, firms in highly concentrated industries have the ability to dictate firm entry by establishing sunk cost expenditure and creating barriers to entry. In order

to mitigate the high levels of concentration in an industry, it is necessary to analyse what the factors are that determine the high degree of industry concentration.

The South African manufacturing sector was chosen for the purpose of this study since it exhibits a high degree of industry concentration. Table 1.1 provides a summary of the different levels of industry concentration in the South African manufacturing sector divisions, indicating that the five largest firms in each respective industry control their market share to a great extent.

Table 9.1: Comparing concentration ratios per industry

Manufacturing divisions	2011			2008		
	CR5	CR10	CR20	CR5	CR10	CR20
30: Food products and beverages	29	41	55	30	43	54
31: Textiles, clothing, leather and footwear	13	18	26	17	23	31
32: Wood, wood products, paper, publishing and printing	26	35	44	30	41	52
33: Coke, petroleum, chemical products, rubber and plastic	47	62	70	50	69	76
34: Glass and other non-metallic mineral products	46	57	65	38	50	60
35: Metals, metal products, machinery and equipment	23	31	39	27	36	46
36: Electrical machinery and apparatus	30	43	58	29	43	56
37: Telecommunication, medical and optical equipment and watches and clocks	27	38	52	33	42	55
38: Transport equipment	52	66	76	53	66	76
39: Furniture, other manufacturing and recycling	21	25	29	21	25	29

Source: StatsSA, 2010 & 2013

In general, industrial concentration affects productivity, consumer welfare, investment and employment. Identifying the determinants of seller concentration in the South African manufacturing sector makes it possible for policymakers and government institutions to formulate policies that focus on industrial concentration, which could lead to better economic conditions in the manufacturing sector.

Since high levels of industrial concentration mainly benefit large firms in an industry, identifying what determines the high levels of industrial concentration will shed light on how the necessary steps can be taken to also benefit small firms. Allowing more firms to enter a specific industry will, in turn, create jobs and decrease high unemployment levels. The following section provides a summary of each chapter in this study.

9.3 SUMMARY AND CONCLUSION OF EACH CHAPTER

9.3.1 Chapter 1: Introduction

This chapter motivates why it is important to measure and analyse industry concentration, and the necessity to study the determinants of industry concentration in the South African manufacturing sector. The analysis of industrial concentration from a historical perspective is also looked at. An overview of industrial concentration in South Africa is provided, along with a brief description of the manufacturing data used in the empirical analyses.

The research question for this study can be defined as: “What are the main determinants of seller concentration in the South Africa manufacturing sector?” Firstly, investigating recent levels and trends in industry concentration in South Africa; secondly, estimating the determinants of seller, or industry, concentration in South Africa; and finally, to provide policy recommendations that are based on the determinants of industry concentration that were identified.

Final conclusion

The lack of research on concentration in general in South Africa has caused the field to be overlooked by economists and policymakers. The objective and implications of studying the determinants of industry concentration in South Africa explained, and the motives of the study are examined.

9.3.2 Chapter 2: Measuring industry concentration

This chapter is devoted to the explanation of different measures used to calculate industry concentration. The objective of this chapter is to identify a measure of industry concentration that is compatible to help identify the determinants of industry concentration in the South African manufacturing sector. The indices used to measure industry concentration are either cumulative or discrete.

Various cumulative measures used to calculate the degree of industry concentration are explained, along with one discrete measure of industry concentration. The measures of concentration examined in this chapter include concentration ratio, Herfindahl-Hirschman Index, Horwath Index, exponential index, Rosenbluth Index and the Gini coefficient. However, only one of the various cumulative measures mentioned is examined in depth, namely the Herfindahl-Hirschman Index (HHI), along with the only discrete measure, i.e. the concentration ratio (CR).

Final conclusion

The main finding of this chapter is the measure of industry concentration that will be used for the empirical analysis of this study. The structure of the manufacturing data in South Africa allows for the use of the discrete measure of concentration analysed, namely the concentration ratio. The concentration ratio is used to represent the degree of industry concentration in the empirical analyses, and serves as a dependent variable.

Therefore, in order to identify the determinants of industry concentration, independent variables are estimated in the empirical analyses, and the variables with a significant influence on the concentration ratio (dependent variables) are regarded as determinants of industry concentration. The independent variables are selected by examining literature on industry concentration and similar previous studies conducted.

9.3.3 Chapter 3: Industry concentration in South Africa

In this chapter, the industry concentration from a South African perspective is examined. Different aspects affected by industry concentration are examined. These aspects include market power, productivity, investment and employment.

In addition to the analysis of these aspects, empirical evidence on industry concentration in South Africa obtained with the use of the Gini coefficient and Rosenbluth Index concentration measures are also examined.

Final conclusion

A conclusion is drawn that high levels of industry concentration do not lead to favourable economic conditions. However, previous studies conducted on industry concentration in South Africa are not reliable due to the measures of concentration that were used. It was also concluded that high levels of industry concentration often lead to monopolistic behaviour among firms, and should therefore be properly analysed to identify the determinants of industry concentration, which, in turn, can inform policymakers to make legislative decisions regarding industry concentration in the South African manufacturing sector.

The fact that industry concentration affects the level of employment in an industry provides further motivation to examine its determinants. The high unemployment rate in South Africa is a major socio-economic problem. Therefore, it is necessary to mitigate high levels of industry concentration by formulating policies geared at creating an inclusive economy that can create more jobs.

9.3.4 Chapter 4: Literature on the determinants of industry concentration

The main focus of this chapter is to explain the possible determinants of industry concentration, which have already been identified in existing literature on the subject. The determinants of industry concentration discussed in this chapter are perceived as the main determinants of industry concentration. These specific determinants of industry concentration are discussed in depth and include economies of scale, barriers to entry, sunk cost expenditure, regulation, industry lifecycle, core competences, and export intensity. The determinants of industry concentration discussed are recurrent in Chapter 5 that focuses on studies conducted on industry concentration in different countries.

Final conclusion

The basis of this study is based on the main determinants of industry concentration identified in this chapter, as it provides an understanding of which variables should be considered for inclusion in the empirical analysis. The determinants of industry

concentration examined in this chapter are used to decide which variables to include in the empirical analyses, along with determinants identified in empirical studies examined in Chapters 5 and 6.

Therefore, a combination of the literature examined in this chapter and the empirical studies examined in Chapters 5 and 6 is used to estimate the independent variables for the empirical analysis. The independent variables that are estimated are considered to be possible determinants of industry concentration, and the empirical analysis will allow an observation of which of the independent variables significantly influence industry concentration.

9.3.5 Chapter 5: Previous international studies conducted on seller concentration

This chapter examines different international studies conducted on industry concentration. Empirical studies on industry concentration are from New Zealand, Australia, France and the United States of America. The objective of this chapter is to analyse various studies that have already been conducted on industry concentration in order to assist in choosing the most appropriate methodology for the empirical analysis, as well as identifying significant determinants of industry concentration.

The variables that were used in studies examined in this chapter to determine industry concentration are also approximately the same as the ones examined in Chapter 4. However, the international studies examined in this chapter also contain additional variables that are considered for the empirical analyses of this study.

Final conclusion

The studies examined in this chapter from each country contain important information on how to analyse industry concentration and what the possible determinants of industry concentration are. The studies from New Zealand indicate that economies of scale, advertising, market/industry size, merger activity, export penetration, import and capital intensity, and legislation affect industry concentration. The concentration ratio was also effectively used to measure industry concentration in a study conducted in New Zealand.

The studies conducted in New Zealand indicate that economies of scale, capital intensity and advertising are significant determinants of industry concentration. The

analyses in New Zealand also concluded that factors such as merger activity, import penetration, export intensity and legislation affect industry concentration.

The Australian study indicated a significant relationship between industry concentration and economies of scale and a cost disadvantage ratio (CDR), which was captured by taking the average value added per worker into account. It also indicated the significant impact of endogenous sunk cost expenditure.

The study in France emphasised that high levels of industry concentration distort market power reflection. The significant determinants identified in this study include barriers to entry such as economies of scale and absolute capital cost requirements. The study also mentioned the significant influence of merger activity on industry concentration. The study analysing industry concentration in the United States of America indicated that significant determinants of industry concentration are industry growth rate, initial level of concentration and product differentiation.

9.3.6 Chapter 6: Advertising and industry concentration

Literature on industry concentration indicates that advertising has a significant influence on determining the degree of concentration. The literature and studies examined on industry concentration indicate that it can be regarded as a barrier to entry and sunk cost expenditure. Therefore, an entire chapter is devoted to thoroughly analysing the relationship between industry concentration and advertising.

This chapter examines various aspects regarding industry concentration and advertising, including the models used to analyse the relationship between industry concentration, estimation of an advertising variable, the impact of advertising on product differentiation and markets, and the optimal level of advertising expenditure.

Final conclusion

The main finding of this chapter indicates that advertising has a significant impact on industry concentration, and its effect on industry concentration should be captured in the estimation of the empirical analyses. The studies examined show that single mode equations, along with an advertising-sales ratio is an effective method to capture the influence of advertising on the industry concentration. However, the estimation of the advertising variable is limited to the availability and structure of the South African manufacturing data.

9.3.7 Chapter 7: Methodology

This chapter outlines the methodology required for the empirical analyses. The contents of this chapter contain a description of the model selection, data, type of econometric tests, as well as dependent and independent variables included in the econometric models. The methodology for the empirical analyses was based on the literature and studies examined in previous chapters of this study.

Final conclusion

In order to quantify the effect of the independent variables on the dependent variable, the ordinary least square (OLS) method was chosen to estimate the models for the empirical analyses. The data available for the empirical tests comprises two Statistics South Africa (StatsSA) reports from 2008 and 2011, respectively. This data allows for cross-sectional analyses, and makes it possible to compare the degree of industry concentration in 2008 with 2011. In addition to the estimation of models, three econometric tests were also conducted on each of the models estimated. The literature and studies conducted on industry concentration indicated that it is necessary to test for model misspecification, heteroskedasticity and multicollinearity.

The dependent variable used in the models estimated is the concentration ratio (CR). The dependent variable reflects the degree of industry concentration; that is to say, the current degree of industry concentration in each respective year analysed (2008 or 2011). The independent variables were chosen based on the literature examined, along with empirical studies analysed on industry concentration. The purpose of the independent variables is to reflect the impact they have on the dependent variable, meaning to what extent did they determine the degree of industry concentration. The independent variables included in the models estimated consisted of an advertising-income ratio, export intensity, import penetration, value-added per worker, and economies of scale. The economies of scale variable comprises proxy variables that include capital expenditure per worker, carry assets per worker, productive assets per worker and total sales per worker.

9.3.8 Chapter 8: Empirical analysis

The empirical analyses of the study are presented and interpreted in this chapter. The methodology outlined in Chapter 7 is applied in this chapter. The empirical analyses

are carried out by estimating five models for 2008, 2011, and 2008 to 2011. The objective of all of the models estimated is determining the relationship between the independent variables and the dependent variable. The concentration ratio (CR) at five-firm level was used as the dependent variable in all of the models estimated.

Final conclusion

The results from the models estimated for 2008 were overall significant. The following independent variables indicated a significant positive relationship with the dependent variable: advertising-income ratio, export intensity, value-added per worker, and all of the economies of scale proxy variables. The only independent variable that did not yield significant test results was import penetration.

The results for 2011 are comparable with 2008, with the exception of import penetration. In contrast with the model results from 2008, the 2011 models indicate that import penetration had a positive significant impact on the dependent variable. However, the model results varied for the 2008 to 2011 analysis, compared to 2011 and 2008. In the 2008 to 2011 analysis, the advertising-income ratio yielded over all significant positive results, along with value added per worker. With regard to economies of scale, only carry assets per worker and total sales per worker indicated significant results for the 2008 to 2011 analysis.

The comprehensive conclusion drawn from the empirical analyses reveals that all of the independent variables included in the empirical analyses are determinants of industry concentration. Nonetheless, the independent variables reacted relatively the same in all of the models for 2008 and 2011, with the exception of import penetration.

9.4 FINDINGS AND RECOMMENDATIONS OF STUDY

The overall conclusion drawn from analysing the determinants of industry concentration in the South African manufacturing sector is that all of the possible determinants examined in this study indicated positive significant results in the empirical analysis. This produces evidence that advertising, export intensity, import penetration, value added per worker (industry growth rate), and economies of scale cause the increase of industry concentration in the South African manufacturing sector.

The high levels of industrial concentration should be mitigated in order for economic growth to prosper and unemployment levels to decrease. The barriers to entry created by leading firms in an industry need to be taken down for new and small firms. The barriers to entry include advertising, export intensity and import penetration.

However, it is a difficult task to lower the barriers to entry in an industry. This is because small and new firms, also known as infant industries, frequently require external assistance in the form of protection from the dominant firms. Public agencies such as the Competition Commission of South Africa and the Competition Tribunal play a crucial role in assuring that industrial concentration is attended to.

The 2014 World Bank country report stipulates that in order to combat the rising industry concentration levels in South Africa, domestic markets should be opened to local entry and foreign entry. Policies promoting domestic competition will allow for the stimulation of investment and force firms to innovate. Through competition, firms will gain the necessary productivity and experience to enter global markets.

Economies of scale cause industry concentration to rise as a result of the advantage it imposes on large dominant firms. Smaller firms cannot produce at the same level of output as larger firms, which cause them to become obsolete. Large firms exploit their advantage of production by utilising economies of scale. In order to resolve this problem, policies should be put in place to assist smaller, vulnerable firms with production. Small firms operating in a highly concentrated industry can also resort to merger activity in order to remain competitive.

High unemployment levels in South Africa remains one of the most significant problems facing the country, and formulating policies that mitigate high levels of industry concentration can lead to growth in employment and the development of small, medium, and micro-enterprises (SMMEs). Without the continuous development of SMMEs in South Africa, industries will only become more concentrated, which will lead to an abundance of job opportunities gone to waste.

9.5 AREAS IDENTIFIED FOR FUTURE RESEARCH

The literature and empirical evidence of this study indicate that advertising has a significant impact on the level of industry concentration. However, more research should be conducted on the different types of advertising, as well as the direction of

causality between industry concentration and advertising. The impact of product differentiation on advertising and industry concentration should also be further studied.

Another area of research related to industry concentration is the impact of merger activity. The extent to which merger activity influences market power and industry concentration should be examined in order to inform policymakers to formulate the most effective competition policies. The relationship between industry concentration and profitability is also another area that requires further research. It has yet been established whether the degree of industry concentration influences the profitability of firms.

9.6 FINAL CONCLUSION

The general objective of this study was to identify the main determinants of industry concentration in the South African manufacturing sector. Through an extensive literature review process that consisted of reviewing literature on the determinants of industry concentration, as well as examining similar studies conducted in other countries, a few possible determinants of industry concentration were identified and estimated as independent variables with the use of Statistics South Africa (StatsSA) data for 2008 and 2011.

The empirical analysis comprised analysing the relationship between the concentration ratio (dependent variable), and the independent variables chosen from the literature review. Overall, all of the independent variables indicated a positive significant relationship with the dependent variable, and can be regarded as determinants of industry concentration in the South African manufacturing sector. These variables included advertising, export intensity, import penetration, value added per worker and economies of scale.

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BIBLIOGRAPHY

- Adeboye, N.O. & Agunbiade, D.A. 2012. Estimation of heteroscedasticity effects in a classical linear regression model of a cross-sectional data. *Progress in Applied Mathematics*, 4(2):27.
- Adelman, M.A. 1951. The measurement of industrial concentration. *The Review of Economics and Statistics*, 33(4):269-285.
- Asch, P. 1979. The role of advertising in changing concentration, 1963-1971. *Southern Economic Journal*, 46(1):288-295.
- Asteriou, D., & Hall, S.G., eds. 2011. Applied Econometrics. 2nd ed. Hampshire: Palgrave Macmillan.
- Bain, J.S. 1951. Relation of profit rate to industry concentration: American manufacturing, 1936-1940. *The Quarterly Journal of Economics*, 65(3):298-323.
- Bain, J.S. 1956. Barriers to New Competition. 1st ed. London: Geoffrey Cumberlege.
- Bain, J.S. 1968. Industrial organization. John Wiley & Sons.
- Bhattacharya, M. & Bloch, H. 2000. The dynamics of industrial concentration in Australia manufacturing. *International Journal of Industrial Organization*, 18(8):1182-1192.
- Brozen, Y. 1970. The antitrust task force deconcentration recommendation. *The Journal of Law & Economics*, 13(2):280-284.
- Brozen, Y. 1971. Concentration and structural and market disequilibria. *Antitrust Bulletin*, 16(2):241-242.
- Caves, R.E. & Porter, M.E. 1977. From entry barriers: Conjectural decisions and contrived deterrence to new competition*. *The Quarterly Journal of Economics*, 91(2):241-262.

- Clougherty, J.A. & Zhang, A. 2009. Domestic rivalry and export performance: Theory and evidence from international airline markets. *Canadian Journal of Economics*, 42(2), 463.
- Curry, B. & George, K.D. 1983. Industrial concentration: A survey. *The Journal of Industrial Economics*, 31(3):203-207.
- Department of Agriculture (ASGI-SA)
- Eckard, E.W. 1987. Advertising, competition, and market share instability. *The Journal of Business*, 60(4):539-552.
- Ekelund, R.B. & Maurice, C. 1969. An empirical investigation of advertising and concentration: Comment. *The Journal of Industrial Economics*, 18(1):76-80.
- Fedderke, J., Kularatne, C. & Mariotti, M. 2007. Mark-up pricing in South African industry. *Journal of African Economies*, 16(1):28-60.
- Fedderke, J. & Naumann, D. 2011. An analysis of industry concentration in South African manufacturing, 1972-2001. *Applied Economics*, 43(22):2930.
- Fedderke, J. & Simbanegavi, W. 2008. South African manufacturing industry structure and its implications for competition policy. *Journal of Development Perspectives*. 4(1):134-189.
- Fedderke, J. & Szalontain, G. 2009. Industry concentration in South African manufacturing industry: Trends and consequences, 1972-96. *Economic Modelling*, 26(2):242-249.
- Fedderke, J. & Vaze, P. 2001. The nature of South Africa's trade patterns by economic sector, and the extent of trade liberalization during the course of the 1990's, *South African Journal of Economics*, 69(3):471.
- Forte, R. & Reis, J. 2016. The impact of industry characteristics on firms' export intensity. *International Studies Area Review*, 19(3):267-277.
- Ginevičius, R. & Čirba, S. 2007. Determining market concentration. *Journal of Business Economics and Management*, 8(1):3-10.
- Ginevičius, R. & Čirba, S. 2009. Additive measurement of market concentration. *Journal of Business Economics and Management*, 10(3):191-198.

- Geroski, P.A. 1982. Interpreting a correlation between market structures and performance. *The Journal of Industrial Economics*, 30(3):324.
- Godfrey, L.G. 1991. Misspecification tests in econometrics: The Lagrange Multiplier Principle and Other Approaches. 1st ed. Cambridge: Cambridge University Press.
- Greer, D.F. 1971. Advertising and market concentration. *Southern Economic Journal*, 38(1):19-32.
- Greer, D.F. & Rhoades, S.A. 1976. Concentration and productivity changes in the long and short run. *Southern Economic Journal*, 43(2):1042.
- Hall, M. & Tideman, N. 1967. Measures of concentration. *Journal of the American Statistical Association*, 67(317):162-165.
- Hamm, L.G. & Mueller, W.F. 1974. Trends in industrial market concentration, 1947 to 1970. *The Review of Economics and Statistics*, 56(4):514-515.
- Hannah, L. & Kay, J.A. 1977. 1st ed. London, United Kingdom: The Macmillan Press Ltd.
- Harmse, C. & Rangasamy, L. 2003. The extent of trade liberalisation in the 1990s: Revisited. *South African Journal of Economics*, 71(4):721.
- IMF (International Monetary Fund). 2014. IMF Country Report No. 14/338. <https://www.imf.org/external/pubs/ft/scr/2014/cr14338.pdf> Date of access: 30 Oct. 2017.
- Jenny, F. & Weber, A.P. 1978. The determinants of concentration trends in the French manufacturing sector. *The Journal of Industrial Economics*, 26(3):193-197.
- Kennedy, P. 1998. A guide to econometrics. 4th ed. Malden, Massachusetts: Blackwell Publishers Inc.
- Latreille, P.L. & Mackley, J. 2011. Using Excel to illustrate Hannah & Kay's concentration axioms. *International Review of Economics Education*, 10(1):117-120.
- Leahy, A.S. 1997. Advertising and concentration: A survey of the empirical evidence. *Quarterly Journal of Business and Economics*, 36(1):36.
- Levy, D. 1985. Specifying the dynamics of industry concentration. *The Journal of Industrial Economics*, 34(1):58-66.

- Lypczynski, J., Wilson, J.O.S. & Goddard, J.A., eds. 2005. *Industrial organization: Competition, Strategy, Policy*. Pearson Education.
- Maddala, K. 2001. *Introduction to econometrics*. 3rd ed. Chichester, West Sussex: John Wiley & Sons Ltd.
- Mann, H.M., Henning, J.A. & Meehan, J.W. 1967. Advertising and concentration: An empirical investigation. *The Journal of Industrial Economics*, 16(1):34-39.
- Mann, H.M. 1969. Note on barriers to entry and long run profitability. *Antitrust Bulletin*, 14(4):848.
- Marcus, M. 1969. Advertising and changes in concentration. *Southern Economic Journal*, 36(2):121.
- Mason, E.S. 1939. Price and production policies of larger-scale enterprise. *The American Economic Review*, 29(1):61-63.
- Moghaddam, F.M., Hamid, A.B.B.A. & Aliakbar, E. 2012. Management influence on the export performance of firms: A review of the empirical literature 1989-2009. *African Journal of Business Management*, 6(15):5150.
- Mueller, W.F. & Rogers, R.T. 1980. The role of advertising in changing concentration of manufacturing industries. *The Review of Economics and Statistics*, 62(1):89-95.
- Nelson, P. 1975. The economic consequences of advertising. *The Journal of Business*, 48(2):214-236.
- Northcott, CA. 2004. Competition in banking: A review of the literature. *Bank of Canada Working Paper*, 30.
- Pickford, M. 1983. The determinants of seller concentration in New Zealand manufacturing industry*. *Australian Economic Papers*, 22(41):376-381.
- Pindyck, R.S. & Rubinfeld, D.L. 2009. *Microeconomics*. 8th ed. University of California: Berkley.
- Pletzman, S. 1977. The gains and losses from industrial concentration. *National Bureau of Economic Research Cambridge, WORKING PAPER*.
- Porter, M.E. 1976. Interbrand choice, media mix and market performance. *The American Economic Review*, 66(2):406.

- Pugel, T.A. 1980. Foreign trade and US market performance. *The Journal of Industrial Economics*, 29(2):119.
- Ratnayake, R. 1999. Industry concentration and competition: New Zealand experience. *International Journal of Industrial Organization*, 17(7):1049-1055.
- Ross, D. & Scherer, F.M. 1990. Industrial market structure and economic performance. *University of Illinois at Urbana-Champaign's Academy for entrepreneurial leadership historical research reference in entrepreneurship*, 89.
- Schmidheiny, K. 2013. The Multiple Linear Regression Model.
- Simon, P. 2000. On the use of the RESET test in microeconomic models. *Applied Economics Letters*, 7(6):364.
- StatsSA (Statistics South Africa). 2010. Manufacturing industry: Financial, 2008 Report No. 30-02-03 (2008). <http://www.statssa.gov.za/publications/Report-30-02-03/Report-30-02-032008.pdf> Date of Access: 20 Feb. 2016.
- StatsSA (Statistics South Africa). 2013. Manufacturing industry: Financial, 2011 Report No. 30-02-03 (2011). <http://www.statssa.gov.za/publications/Report-30-02-03/Report-30-02-032011.pdf> Date of Access: 20 Feb. 2016.
- Stigler, G.J. 1951. The division of labor is limited by the extent of the market. *Journal of Political Economy*, 59(3):190.
- Stigler, G.J. 1964. A theory of oligopoly. *Journal of Political Economy*, 72(1):44-61.
- Strickland, A.D. & Weiss, L.W. 1976. Advertising, concentration, and price-cost margins. *Journal of Political Economy*, 84(5):1109-1119.
- Sutton, J. 1991. Sunk costs and market structure: Price competition, advertising, and the evolution of concentration. London: MIT press.
- Sutton, J. 1998. Technology and market structure: Theory and evidence. London: MIT press.
- Sveikauskas, C.D. & Sveikauskas, L. 1982. Industry characteristics and productivity growth. *Southern Economic Journal*, 48(3):773-774.
- Tesler, L.G. 1969. Another look at advertising and concentration. *The Journal of Industrial Economics*, 18(1):85-94.

- Tibor, S. 1955. Economic theory and the measurement of concentration. *Princeton University Press*, 101.
- Turner, D.F. 1969. The scope of antitrust and other economic regulatory policies. *Harvard Law Review*, 82(6):1215.
- Uri, N.D. 1987. A re-examination of the advertising and industrial concentration relationship. *Applied Economics*, 19(4):434.
- Wang, G.C.S. 1996. How to handle multicollinearity in regression modelling. *Journal of Business Forecasting Methods and Systems*, 15(1):23.
- Ward, C.E. 1987. Productivity-concentration relationship in the US meatpacking industry. *Journal of Agriculture and Applied Economics*, 19(2):217.
- Wenders, J.T. 1971. Profits and antitrust policy: The question of disequilibrium economics. *Antitrust Bulletin*, 16(2):256.
- White, H. 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48(4):817.
- Zhao, H. & Zou, S. 2002. The impact of industry concentration and firm location of export propensity and intensity: An empirical analysis of Chinese manufacturing firms. *Journal of International Marketing*, 10(1):56-65.

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Appendix A

List of type of manufacturing industries in South Africa:

Division 30: Food products and beverages

Production, processing and preserving of meat and meat products

Processing and preserving of fish and fish products

Processing and preserving of fruit and vegetables

Manufacture of vegetable and animal oils and fats

Manufacture of dairy products

Manufacture of grain mill products

Manufacture of prepared animal feeds

Manufacture of bakery products, sugar, cocoa, chocolate and sugar confectionery

Manufacture of other food products

Manufacture of alcoholic and non-alcoholic beverages

Division 31: Textiles, clothing, leather and footwear

Preparation and spinning of textile fibres and weaving and finishing of textiles

Manufacture of made-up textile articles, except apparel

Manufacture of carpets, rugs and mats

Manufacture of cordage, rope, twine and netting

Manufacture of other textiles

Manufacture of knitted and crocheted fabrics and articles

Manufacture of wearing apparel, except fur apparel

Dressing and dyeing of fur, articles of fur and tanning and dressing of leather

Manufacture of luggage, handbags and the like, saddlery and harness

Manufacture of footwear

Division 32: Wood, wood products, paper, publishing and printing

Sawmilling and planing of wood

Manufacture of veneer sheets, plywood and other boards and carpentry and joinery

Manufacture of wooden containers

Manufacture of other products of wood, articles of cork, straw and plaiting materials

Manufacture of pulp, paper and paperboard and articles of paper and paperboard

Publishing of books, brochures, musical books and other publications

Publishing of newspapers, periodicals, recorded media and other publishing

Printing

Service activities related to printing

Reproduction of recorded media

Division 33: Coke, petroleum, chemical products, rubber and plastic

Manufacture of coke oven products

Manufacture of petrol, fuel oils and other petroleum/synthesised products

Manufacture of basic chemicals, except fertilisers and nitrogen compounds

Manufacture of fertilisers, nitrogen compounds, plastics and synthetic rubber

Manufacture of pesticides and other agro-chemical products

Manufacture of paints, varnishes and similar coatings, printing ink and mastics

Manufacture of pharmaceuticals, medicinal chemicals and botanical products

Manufacture of soap and detergents, perfumes and toilet preparations

Manufacture of other chemical products

Manufacture of rubber tyres and tubes and other rubber products; retreading of tyres

Manufacture of plastic products

Division 34: Glass and other non-metallic mineral products

Manufacture of glass and glass products and non-structural non-refractory ceramic ware

Manufacture of refractory ceramic products

Manufacture of structural non-refractory clay and ceramic products

Manufacture of cement, lime and plaster and articles of concrete, cement and plaster

Cutting and shaping of stone and manufacture of other non-metallic mineral products

Division 35: Metals, metal products, machinery and equipment

Manufacture of basic iron and steel and of primary iron and steel products

Manufacture of basic precious and non-ferrous metals

Casting of iron and steel

Casting of non-ferrous metals

Manufacture of structural metal products

Manufacture of tanks, reservoirs and similar containers of metal

Manufacture of steam generators, except central heating water boilers

Forging, pressing, stamping and roll-forming of metal; powder metallurgy

Treatment and coating of metals; general mechanical engineering

Manufacture of cutlery, hand tools and general hardware

Manufacture of other fabricated metal products

Manufacture of pumps, compressors, taps and valves

Manufacture of bearings, gears, gearing and driving elements

Manufacture of agricultural and forestry machinery

Manufacture of machine tools

Manufacture of machinery for mining, quarrying and construction

Manufacture of machinery for food, beverage and tobacco processing

Manufacture of weapons and ammunition and other special purpose machinery

Division 36: Electrical machinery and apparatus

Manufacture of electric motors, generators and transformers

Manufacture of electricity distribution and control apparatus

Manufacture of insulated wire and cable

Manufacture of accumulators, primary cells and batteries and lighting equipment

Manufacture of other electrical equipment

Division 37: Telecommunication, medical and optical equipment and watches and clocks

Manufacture of electronic valves and tubes and other electronic components

Manufacture of television and radio transmitters and receivers, sound or video recording and line telephony apparatus

Manufacture of medical and surgical equipment and orthopaedic appliances

Manufacture of instruments and appliances for measuring, testing and navigating

Manufacture of industrial process control equipment

Manufacture of watches and clocks, optical instruments and photographic equipment

Division 38: Transport equipment

Manufacture of motor vehicles

Manufacture of bodies (coachwork) for motor vehicles, trailers and semi-trailers

Manufacture of parts for motor vehicles, ships and boats and their engines

Manufacture of railway and tramway locomotives and rolling stock

Manufacture of aircraft

Manufacture of other transport equipment

Division 39: Furniture, other manufacturing and recycling

Manufacture of furniture

Manufacture of jewellery and related articles

Other manufacturing, including manufacturing of tobacco and tobacco products

Recycling of waste and scrap