The impact of carbon taxation on the triple bottom line of the South African motor vehicle manufacturing industry

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THESIS SUMMARY

Title: The impact of carbon taxation on the triple bottom line of the motor vehicle manufacturing industry

Key terms: Accounting, cap-and-trade, carbon dioxide, carbon taxation, climate change, corporate responsibility, corporate social investment, greenhouse gas, social cost of carbon, sustainable development, sustainable reporting, triple bottom line.

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Climate change has become an important concern for most governments in the current day. The impact of global warming on economic productivity, human welfare and environmental sustainability is becoming increasingly apparent to most people on the planet, resulting in a rapid evolution of policy instruments which are capable of addressing the issue of climate change. The ultimate aim of these policy instruments is to influence corporate activity to environmentally sustainable behaviour. The two most common policy instruments to effect change to most environmentally sustainable behaviour is carbon taxation and cap-and-trade schemes.

Linked to climate change and environmental sustainability is the concept of sustainable development which encompasses environmental sustainability, economic sustainability and social sustainability. These principles are formalized and made relevant for companies in the form of the triple bottom line. In South Africa, National Treasury implemented a carbon excise tax in 2010 for the motor vehicle manufacturing industry in response to the problem of global warming, and published a discussion document in support of their decision to implement carbon tax. The document highlighted reasons for the choice of carbon tax over other policy instruments such as cap-and-trade schemes and penalties. Even though the choice for carbon tax was assessed from an environmental perspective, the concept of sustainable development encompasses environmental, economic and social sustainability. The subject matter for the 1st article was to compare the two most widely used climate change instruments, known as cap-and-trade schemes and carbon tax, from the broader perspective of sustainable development. This included

an analysis of the effects of both instruments on both greenhouse gases as well as economic indicators such as gross domestic product (GDP) and fiscal revenue.

Linked to the implementation of any instrument designed to address carbon emissions is the concept of the social cost of carbon (SCC). The SCC is an estimate of the associated monetary cost of the damage cause by emitting one additional ton of carbon into the atmosphere. In a perfect world the SCC would be equal to, or lower than, the carbon tax price. National Treasury's carbon tax price has never been assessed from an economic perspective and in particular whether the price equates to the SCC from a feasibility viewpoint. The testing of the carbon tax price against the SCC from an economic perspective was the subject of the 2nd article, which then also evaluated the impact of carbon tax on motor vehicle manufacturer's production techniques and vehicle fuel efficiency.

Under the assumption that the carbon tax price approximates the SCC it is arguable that companies are effectively paying for the damage cost to the environment in the form of the carbon excise tax implemented. If the argument holds true, then the corporate social investment expenditure may well be adjusted since corporate responsibilities to the environment have been partially addressed by the payment of carbon tax. The impact of carbon tax on CSI expenditure by motor vehicle manufacturers in South Africa was the subject of the 3rd article in the thesis.

Furthermore, also linked to the implementation of carbon taxation for the motor vehicle industry is the financial and sustainability reporting of the motor vehicle manufacturers' tax in the sustainability report and financial statements. Since carbon tax was designed to promote behaviour toward a lower carbon footprint, evidence that such behaviour is being affected can be observed in a company's sustainability report, which specifies the company's planned path to carbon reduction in accordance with the disclosure standards set in the Global Reporting Initiative (GRI). In terms of financial accounting there is no specific International Financial Reporting Standard (IFRS) statement dealing with carbon tax, and the correct treatment thereof will have to be interpreted in accordance with existing accounting standards on revenue (IAS 18) and provisions (IAS 37). The subject matter of 4th article assessed motor vehicle manufacturers reporting compliance of carbon tax transactions in accordance with IFRS and the GRI.

In summary, the implementation of carbon tax in South Africa is seen as a significant move in the fight against climate change. If the instrument is to be considered effective it must prove to be sustainable from an environmental, economic and social perspective. The effectiveness of the instrument can only be measured if it was accurately reported in the financial statements and sustainability reports in accordance with IFRS and the GRI. Furthermore, the instrument should not be seen as an opportunity by motor vehicle manufacturers to forego corporate responsibility to environment and thus should not impact CSI expenditure which is a significant part of the welfare contribution by South African businesses to the people of South Africa.

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LIST OF ABBREVIATIONS

COP	Conference of Parties
CDP	Carbon Disclosure Project
CSI	Corporate Social Investment
CSR	Corporate Social Responsibility
EU ETS	European Union Environmental Trading Scheme
FASB	Financial Accounting Standards Board
GAAP	Generally Accepted Accounting Principles/Practices
GDP	Gross Domestic Product
GRI	Global Reporting Initiative
IAS	International Accounting Standards
IASB	International Accounting Standards Board
IFRS	International Financial Reporting Standards
ICAEW	Institute of Chartered Accountants of England and Wales
IASC	International Accounting Standards Committee
JSE	Johannesburg Stock Exchange
NAAMSA	National Association of Automobile Manufacturers of South Africa
SAICA	South African Institute of Chartered Accountants
SARS	South African Revenue Service

SCC	Social Cost of Carbon
SRI	Social Responsible Investment
TBL	Triple bottom line

REMARKS

The reader is reminded of the following:

- This thesis is presented in the article format in accordance with the policies of the North-West University's Faculty of Economic and Management Sciences' Work Well Research Unit and consists of ***four*** research articles.
- In the instance of an article format PhD thesis, the Faculty of Economic and Management Sciences' Regulation E.9.3 requires that the thesis consists of ***at least three (3) publishable articles***, but with the ***minimum requirement of proof that at least one (1) article has been submitted*** to a Department of Education approved peer-reviewed journal.
- Each of the individual articles comply with the writing style requirements (i.e. the specific abstract, spelling, grammar and referencing requirements) of the specific journal in which the applicable article was published, or to which the specific article was submitted.
- The author requirements and related documentation specific to each journal, are included as part of the annexure at the end of the thesis, together with copies of the articles as published or accepted (as the case may be).

CHAPTER 1

1. INTRODUCTION

1.1. Background

Climate change has been described as the biggest threat to nature and humanity in the 21st century (WWF, 2013). In South Africa, the level of carbon emissions per unit of economic output was nearly three times the average set by the Organisation for Economic Co-operation and Development (OECD) (Goldblatt & Davies, 2002). One of the methods to address global warming is carbon tax which has been defined as an instrument of environmental cost internalisation, and effectively amounts to an excise tax on the producers of raw fossil fuels based on the relative carbon content of those fuels (OECD, 1997). The objective of carbon tax is thus to control the problem of global warming caused by increasing concentrations of greenhouse gases which include carbon (Pearson & Smith, 1991). On the 1st of September 2010, a national carbon emissions tax on all passenger motor vehicles was implemented in South Africa. According to the National Association of Automobile Manufacturers of South Africa (NAAMSA) the tax added R75 for every gram of carbon dioxide per kilometre it emits over the 120g/km (Shirley, 2010).

Carbon tax has been closely linked to the concept of sustainable development which has been defined as that which implies meeting the needs of the present without compromising the ability of future generations to meet their own needs (UN, 1987). Since the objective of carbon tax is to protect the natural environment by attempting to control the problem of global warming, it may effectively be seen as an instrument to enhance or improve sustainable development.

Within the South African corporate responsibility context, companies have reacted more positively to the concept of *investment* as opposed to the concept of *responsibility*. The concept of *corporate social investment* (CSI) suggests that a *business-oriented* outcome is often preferred over doing something because it is *vaguely ethical* (Skinner & Mersham, 2008). The implementation of carbon tax may impact CSI spending by motor vehicle manufacturing companies depending on whether the motor vehicle manufacturing companies perceive carbon tax to adequately address the welfare effects of its implementation through an appropriate carbon tax price.

1.1.1. Carbon taxes and the Triple Bottom Line

Sustainable development may be further broken down into three aspects, the environmental, the social and the economic, which has come to be defined as the triple bottom line (Newport *et al*., 2003). The triple bottom line has generated a substitute to the idea of company success based on economic indicators alone and it has now been accepted that economic success is not the predominant indicator in evaluating a company's long term resolution (Granados & Gamez, 2010). Companies around the world have thus started to view success in terms of sustainable development and linked the concept of progress with the effect of a company's operations on quality of life (Hall & Matthews, 2008).

According to Pearce (quoted by Cronje & Chenga, 2009:416) the *economic* dimension of sustainability is important as critical issues, such as costs associated with environmental pollution, constraints on economic growth and the destruction of non-renewable resources, are addressed by this area of sustainable development. Carbon tax from an economic sustainability point of view may only be feasible as long as the incremental cost of reducing the emission is lower than the increase in the social cost of carbon (SCC) (IPCC, 2012).

With regard to the *social* dimension of sustainability, Maaga (quoted by Cronje & Chenga, 2009:416) suggests the social dimension of sustainable development encompasses the transformation, and perpetual improvement of the livelihoods of human beings in a specific social context. The responsibility of social sustainability can also be framed in terms of corporate social responsibility (CSR) or corporate citizenship. CSR effectively requires for a company to respond to employees, customers affected communities and the general public, on issues such as human rights and employee welfare (Hamman, 2003).

In terms of the *environmental* dimension of sustainability, clean air and water, reduced toxic emissions and reducing household waste as well as conserving natural resources are among the important environmental policy objectives that many OECD governments have been pursuing over the past thirty years. In South Africa the level of carbon emissions per unit of economic output was nearly three times the average set by

the OECD (Goldblatt & Davies, 2002). The endeavour to consider the environmental costs of economic growth has been pursued in a variety of ways in different countries, with policy instruments, emission prohibition, tradable permits, and taxes (O'Brien & Vourc'h, 2001). The environmental sustainability impact of carbon tax can be observed by determining the impact of the tax on motor vehicle manufacturer's production technologies and behaviours toward producing more fuel efficient vehicles.

It should be noted that even though carbon taxation was designed to promote environmental sustainable development, its implementation by Government may be inimical to economic and social sustainability. Justification for this statement can be found in the results of simulation models executed by the University of Saskatchewan which revealed that the introduction of carbon taxation had no significant effect on environmental sustainability but decreased economic sustainability (Belcher *et al*., 2003). As sustainable development is an integrated concept organised in three dimensions namely the economic, social and environmental (EEA GRANTS, 2006), a policy instrument which is effective in one dimension but detrimental to another may be considered an ineffective choice when considering sustainable development as a whole.

Indeed, one of the reasons many developing countries have not implemented carbon tax is because of it regressive economic effect (Timilsina, 2009). The welfare effect of carbon tax (in terms of social sustainable development) has also been examined, and higher carbon taxes have been seen to increase goods prices, reducing the real wage rate and thus the labour supply (Bye & Nyborg, 2003). An isolated simulation study on heat pumps even revealed that the effect of increasing carbon tax was to increase greenhouse gas emissions (Murr *et al*, 2003).

1.1.2. Cap-and-trade schemes

Another strategy that may be used by governments to lower carbon emissions is cap-and-trade schemes (Anon, 2012). In 1992 the United Nations Framework Convention on Climate Change (UNFCCC) was born with the goal of reducing the concentration of greenhouse gases in the atmosphere. South Africa became a signatory to the UNFCCC in August 1997 (UNFCCC, 2004).

In December 1997 a legally binding agreement known as the Kyoto Protocol was signed by a host of industrial countries (Kyoto, 2010). The protocol contains legally binding greenhouse gas (GHG) emission reduction targets for developed countries, referred to as the so called Annexure I Countries (Persson & Azar, 2003). The protocol also allows for countries who have exceeded their emission limit to remain in compliance by purchasing surplus permits from other industrialised countries (Persson & Azar, 2003). Kyoto protocol mechanisms are emissions trading known as "the carbon market" or "cap-and-trade schemes", the Clean Development Mechanism (CDM) and Joint Implementation (JI) (UNFCC, 2010). The Kyoto protocol mechanisms thus do not specifically include carbon tax as an instrument to create environmental sustainability.

1.1.3. The South African motor vehicle industry

The South Africa vehicle industry accounts for about 10% of South Africa's manufacturing exports, making it an important part of the South Africa economy (SAI, 2008). In 2008, the vehicle industry contributed approximately 7.5% to South Africa's gross domestic product (GDP) with the South African government identifying the industry as a key growth sector (SAI, 2008). In a global context, the South African vehicle industry produced approximately 472,000 vehicles in 2010 compared to global production of 77,609,901 vehicles in the same year (NAAMSA, 2011). In terms of the emissions level of the South African vehicle industry, a sector analysis of greenhouse gas emission in South Africa in 2009 revealed that the transport industry contributed approximately 10.5% to the total greenhouse gas emissions in South Africa (Department of National Treasury, 2010).

In February 2010, NAAMSA accepted that carbon tax will inflate vehicle prices by around 2% and that this would likely lower sales volumes and could negatively impact vehicle industry employment levels (Engineering News, 2010a). Due to the vehicle industry being an important part of the South African economy, it can be inferred that the impact of carbon tax on both the South African vehicle industry and economy would be significant.

1.2. Objective of the research

In the context of global warming, two typical approaches exist in the attempt to reduce greenhouse gas (GHG) emissions (Nordhaus, 2007). The first approach sets quantitative limits or targets for GHG emissions of different countries, with the countries then administering these limits in their own fashion, and a mechanism which will allow for the transfer of emission allowances in terms of the Kyoto Protocol. This is commonly referred to as *cap-and-trade* schemes. The second approach is to use harmonized prices or taxes as a method of coordinating policies among countries. An example of this approach is *carbon taxation*.

Although the objective of implementing carbon tax is to reduce greenhouse gases, which is encompassed in the field of environmental sustainability, the impact of this instrument on economic and social sustainable development of the South Africa vehicle industry also needs to be considered. The selection between cap-and-trade schemes and carbon tax thus becomes an important decision from the perspective of environmental sustainability. Furthermore the actual impact of carbon tax on motor vehicle manufacturers' decision to produce more fuel efficient vehicles also becomes critical from an environmental sustainability perspective.

The social cost of carbon (SCC) has been defined as the monetary damage done by emitting one more ton of carbon at some point in time. For illustrative purposes, using quantitative modelling a marginal cost of £100 per ton of carbon has been noted in the United Kingdom. The marginal cost of reducing a ton of carbon in terms of the Kyoto protocol has been determined at £45 per ton of carbon. The United Kingdom thus passes the cost versus benefit test in terms of carbon reduction (Pearce, 2003). In terms of economic theory, in conditions of a perfect market where all social costs have been considered, any efforts to cut back the emissions of greenhouse gases would be feasible as long as the incremental cost of reducing the emission is lower than the increase in SCC (IPCC, 2012). Applying this general economic principle to the economic sustainability of carbon tax, it may be argued that the SCC should be equal to, or lower than, revenues generated from carbon taxes in order for the instrument of carbon tax to be feasible.

CSI is a component of CSR and reflects a company's contribution to people, organisations or communities that are external to the company (CSI, 2006). An analysis of CSI expenditure by industry in South Africa revealed the manufacturing industry as being the fifth largest contributor to CSI expenditure in South Africa (CSI, 2006). From a social sustainability perspective the impact of carbon tax on CSI expenditure by the motor vehicle manufacturing industry in South Africa still has to be determined. A further contribution of the research is determining the impact of carbon tax on the financial and sustainability reporting to all stakeholders. A key question with regard to financial reporting will be whether the implementation of carbon tax has resulted in a consistent accounting treatment of carbon tax in accordance with IFRS?

For sustainability accounting there is a need for costs and benefits of environmental and social matters to be identified, for measurement and quantification of these where appropriate, for provision of qualitative data when intangible costs and benefits arise, for the use of commonly accepted physical and monetary performance indicators, and for recognition that many impacts of companies take a long time to eventuate (Aras & Crowther, 2009). In South Africa, the critical question is thus whether carbon taxation has been effectively incorporated in the sustainable reporting of motor vehicle manufacturers, ensuring compliance with the Global Reporting Initiative (GRI)?

The contribution to be made by this research study may therefore be summarised as follows:

- An evaluation of whether carbon excise tax is the correct (or best) policy instrument the address South African climate change concerns;
- An evaluation of the appropriateness of the carbon tax price given the SCC in South Africa;
- An evaluation of the impact of carbon tax on CSI activities and expenditure by South African motor vehicle manufacturers; and
- A determination of whether carbon tax has been adequately integrated into sustainable reporting of vehicle manufacturers in South Africa and whether it has been correctly accounted for in terms of IFRS.

1.3. Problem statement

Environmental sustainability has become an increasingly important issue in many countries. In particular, the rise in greenhouse gas emissions has forced many governments to respond by implementing environmental and fiscal instruments which are aimed at reducing the emissions of greenhouse gases. One such instrument is carbon taxation. Sustainable development however, encompasses environmental, social and economic sustainable development. The impact of the implementation of this instrument on *economic* and *social* sustainability may very well be adverse, in that case rendering it a poor policy instrument in the broader context of sustainable development. The primary research problem may thus be formulated as follows:

- What is the potential impact of carbon taxation on the triple bottom line of the South African motor vehicle industry?

The primary research problem may then be further examined by considering several detailed questions as follows:

- Is carbon tax the best policy instrument for addressing climate change and ensuring environmental sustainability in South Africa?
- From an economic sustainability perspective, is carbon tax an economically feasible instrument and does the carbon tax price accurately reflect the associated welfare cost of carbon emissions in South Africa?
- Has carbon tax impacted CSI spending and welfare activities by local motor vehicle manufacturers in South Africa from a social sustainability perspective?
- What has been the impact of the implementation of carbon taxation on sustainable and financial reporting compliance for motor vehicle manufacturers in South Africa?

These questions are considered in more detail in the various articles forming the primary chapters of the thesis.

1.4. Objectives

The primary objective of this study is to evaluate the potential impact of carbon tax (in the form of passenger motor vehicle carbon tax) on the triple bottom line of the South African motor vehicle industry.

This objective will be reached by:

- Analysis of the advantages and disadvantages of carbon tax and cap-and-trade schemes in the context of the triple bottom line.
- Brief consideration of the rationale behind the implementation of carbon tax on the vehicle industry in South Africa.
- An evaluation of the adequacy of carbon tax pricing in South Africa considering the SCC in South Africa.
- An evaluation of the impact of carbon tax taxation on the financial and sustainable reporting of motor vehicle manufacturers in South Africa.
- An evaluation of the impact of carbon tax on CSI spending by the South Africa motor vehicle manufacturers.

1.5. Research method

To achieve the above objectives, a theoretical study of recent literature as well as an empirical study is required.

1.5.1. Literature study

In line with the article format of this thesis, a theoretical study is to be conducted with four focus areas, integrated into the various articles.

- A first focus area will be on the distinguishing features of cap-and-trade schemes and carbon tax as well as the advantages and disadvantages of each instrument. The analysis of each instrument will also include an evaluation of the instruments from a triple bottom line perspective. This will include a review of scientific articles on the subject of carbon tax and cap-and-trade schemes. In addition an evaluation of the reasons provided by National Treasury for the implementation

of carbon tax as opposed to cap-and-trade schemes in South Africa will be considered.

- A second focus of the study will be on quantifying the SCC (quantified damage cost) of carbon emissions by passenger motor vehicles in South Africa. The carbon tax price will then be compared to the relative damage cost of carbon to determine its adequacy and overall impact on social sustainability. The literature review will involve the obtaining the details of emission levels of motor vehicles in South Africa after the implementation of carbon tax and comparing the damage cost of such emissions against the revenue collected from the implementation of the tax.
- A third focus of the study will focus on the impact of carbon tax on the CSI expenditures by the motor vehicle manufacturers in South Africa. CSI reports published by motor vehicle manufacturers detailing the level of CSI expenditure and activities by motor vehicle manufacturers in South Africa will be reviewed. The relevance and materiality of CSI expenditure on the South African economy will also be highlighted per a detailed review of applicable motor vehicle industry reports.
- The fourth area will focus on the compliance levels of motor vehicle manufacturers with sustainability reporting standards. In this regard the latest sustainable reports from major vehicle manufacturers will be examined as well as the published statistics and reports from the GRI. Overall levels of compliance by motor vehicle manufacturing companies with the GRI will be determined by noting the number of integrated reports submitted by motor vehicle manufacturers as well the levels of disclosures on such report.

1.5.2. Empirical study

In support of, and building on, the literary research as specified above, the empirical phase will focus on the South African motor vehicle manufacturing industry. The empirical study will use the questionnaires and interviews developed following the literature study. The empirical study will focus on three primary areas.

- The first focus area will determine the economic feasibility of carbon tax by considering the SCC. The empirical research in this regard will attempt to

determine awareness of the SCC concept among motor vehicle manufacturers and their view of the adequacy of the carbon tax price.

- A second focus area will be to determine the impact of carbon tax on CSI policy and expenditure by motor vehicle manufacturers in South Africa. The levels of CSI expenditure both before and after implementation of carbon tax will be examined, and respondents will be asked to confirm whether the implementation of carbon tax has affected CSI decision making processes.
- A third focus area of empirical research will be on the level of IFRS compliance by motor vehicle manufacturers with regard to carbon tax disclosures. The respondents will be asked to confirm that all IFRS disclosures relating to carbon tax been made and the skill level of personnel dealing with IFRS transactions. In addition, the respondents will be asked to provide feedback in the form of journal entries to confirm the correct accounting treatment of carbon tax in accordance with IFRS.

1.6. Definitions

In the context of this study, the following definitions and concepts are taken as correct or applicable.

Cap-and-trade schemes: Such schemes are Kyoto protocol mechanisms (UNFCC, 2010) which sets quantitative limits or targets for GHG emissions of different countries with countries then administering these limits in their own fashion, and a mechanism which will allow for the transfer of emissions allowances in terms of the Kyoto Protocol. This is commonly referred to as cap-and-trade schemes (Nordhaus, 2007). Cap-and-trade schemes thus set quantitative limits on carbon emissions by the distribution and administration of permits which can be traded by emitters.

Carbon tax: An instrument of environmental cost internalisation, which and effectively amounts to an excise tax on the producers of raw fossil fuels based on the relative carbon content of those fuels (OECD, 1997). Carbon tax has also been defined as a strategy to lower carbon emissions by effectively raising the price of fossil fuels based on their carbon content (Anon, 2012). Carbon tax is thus a climate change instrument

which raises the price of fuel inefficient products thus attempting to influence consumer behaviour toward fuel efficient choices.

Corporate Social Investment (CSI): A component of CSR and reflects a company's contribution to people, organisations or communities that are external to the company (CSI, 2006). CSI aims to uplift communities in such a way that the overall quality of life is improved (CSI, 2012). CSI can thus be regarded as a subcomponent of CSR which is focused on uplifting communities which are external to a company.

Corporate Social Responsibility (CSR): A concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis (Commission of European Communities, 2009). CSR refers to the organisation's total responsibility towards the business environment (CSI, 2012). In a broader context, CSR therefore refers to the obligation of a company to recognise its impact on an environmental and social level and engage in activities that will bring a positive impact to these spheres which could be communicated to stakeholders on a consistent and regular basis.

Global Reporting Initiative (GRI): The GRI is an organization that promotes sustainable development in the field of sustainability reporting is the (GRI, 2012). The GRI aims to develop a voluntary reporting framework that will elevate sustainability reporting practices to a level equivalent to that of financial reporting in rigour, comparability, auditability and general acceptance (Willis, 2003). The GRI is thus an organisation that produces the standard in terms of the minimum disclosure requirements that a sustainable report should contain.

Kyoto Protocol: A legally binding agreement stipulating greenhouse gas reduction targets signed by a host of industrial countries including developed countries referred to as *Annexure 1 Countries* (Kyoto, 2010; Persson & Azar, 2003). The protocol thus represents a legal obligation to its signatories to adhere to their environmental obligations of reducing greenhouse gas emissions.

Social Cost of Carbon (SCC): The SCC has been defined as the amount of damage caused by each additional ton of greenhouse gas emitted into the atmosphere (Hardisty,

2009; Pearce, 2003). The SCC thus represents the total quantified welfare cost of emitting an additional ton of greenhouse gas into the atmosphere.

Sustainable development: That which implies meeting the needs of the present which include the protection of the natural environment without compromising the ability of future generation to meet their own needs (UN, 1987; Mohammed, 2011). It is a concept that directs the efficient use of resources in such a way that the needs of both the present and future generations are met.

Sustainability: Refer sustainable development

Sustainable reporting: In broad terms it is generally used to describe a company's reporting on its economic, environmental and social performances which would be disclosed in a sustainability report (KPMG, 2008; GR, 2013). Sustainable reporting thus encapsulates the reporting of environmental as well as social costs and benefits to provide an accurate view of a company's levels of sustainability.

Triple-bottom-line (TBL): A substitute idea of company success not based on economic indicators alone but based on the three aspects of sustainable development, the environmental, the social and the economic (Granados & Gamez, 2010; Newport *et al*., 2003). The TBL is therefore a concept that has influenced companies to view their success not only in terms of profitability and economic growth but also the level of company impact on environment and people.

1.7. Overview

The study will follow the article format route and is divided into seven chapters (including four research articles) as follows:

Chapter 1 - Introduction

This chapter will address the following background to the study, the rationale of the study, the problem statement, research objectives, research methodology used in the study and the outline of the study.

Chapter 2 - Research design and methodology

The second chapter will elaborate on the research methodology and research design followed by providing details regarding case study research, the sampling technique utilised and data collection techniques.

Chapter 3 - Climate change: A comparison of market-based instruments from a South African perspective

The third chapter (research article 1) will focus on the distinguishing characteristics of carbon tax cap-and-trade schemes. A detailed review of published scientific economic journals and statistics will be conducted to determine the advantages and disadvantages of each instrument from a TBL perspective. In particular an assessment of the reasons provided for the implementation of carbon tax as oppose to cap-and-trade in South Africa by National Treasury will also be evaluated.

Chapter 4 - Carbon tax pricing and the social cost of carbon: The case in the South African motor vehicle manufacturing industry

A fourth chapter (research article 2) will focus on economic feasibility of a carbon tax in South Africa. This will be done by comparing the SCC against the actual carbon tax price to determine the accuracy of the carbon tax price. The adequacy and reasonability of carbon tax pricing in South Africa will be assessed via a literature study and empirically via interviews and a questionnaire with the motor vehicle manufacturers on their perceptions of the reasonability of the carbon tax price.

Chapter 5 - Carbon tax implications on corporate social investment in the South African motor vehicle manufacturing industry

The fifth chapter (research article 3) will focus on the impact of the implementation of carbon tax on CSI expenditure and activities by motor vehicle manufacturers in South Africa. Details of CSI expenditures and projects undertaken by motor vehicle manufacturers will be considered and CSI expenditure both before and after carbon tax implementation will be compared in order to gauge the potential impact of carbon tax on CSI policy and expenditure.

Chapter 6 - The impact of carbon tax on sustainable and integrated reporting.

The sixth chapter (research article 4) will focus on the impact of carbon tax on financial and sustainable reporting. Compliance with the GRI will be reviewed from a literature study perspective. Empirical research will be conducted on the adequacy of carbon disclosures on the financial statements as well as the level of IFRS compliance in respect of carbon tax transactions.

Chapter 7 - Conclusion and recommendations

This final chapter in the thesis will provide a summary of the study in the light of the objectives as set out. Conclusions, recommendations and areas for further studies will also briefly be discussed in this final chapter.

CHAPTER 2

2. RESEARCH DESIGN AND METHODOLOGY

2.1. Introduction

The objective of this chapter is to explain and provide supporting reasoning for the research philosophy, design and methodology employed in this research project, aimed at answering the research problems as expressed in chapter 1. The research was conducted primarily as a case study, with further supporting detail being provided later in the chapter. This chapter will also include detail on the population and the sample selection, as well as the data collection and analysis used in the study. Important terminologies and definitions are noted below:

- Research philosophy: According to Alolo (2007:3) a research philosophy is a belief about the way in which data about a phenomenon should be collected, analysed and interpreted. Two major research philosophies include i) epistemology, which enquires about the nature of knowledge and learning, and ii) ontology, which is the science or study of being (Bauer, Festner, Gruber, Harteis & Heid, 2004; Blaikie quoted by Flowers, 2009:1). In the context of this research project, the term *research philosophy* is taken as the overall view on the nature of the subject matter being investigated, in other words whether we are investigating the subject of existence or a theory of knowledge.
- Research design: Research design has been defined as the strategy, the plan and the structure of conducting a research project (Carriger, 2000). Research design has also been described as a function to ensure that the evidence obtained enables the researcher to answer the research problem as unambiguously as possible (NYU, 2013). The concept of *research desig*n in this study is therefore the overall plan used by the researcher to address the research problem identified in each of the research chapters.
- Research methodology: Rajasekar, Philminathan & Chinnathambi (2006:2) defines research methodology as the procedures by which researchers go about their work of describing and predicting phenomena, or a study of the methods by which knowledge is gained. The primary distinguishing factor between research design and research methodology is that whereas research *design* is focused on

the end product and what the outcome of the study will be, the research *methodology* is focused on the research tool, tasks and procedures to be employed in the study (Mouton, 2009:56). In terms of this study, *research methodology* means determining the actual nature and extent of procedures to be applied in order to obtain a research solution.

2.2. Research philosophy

In addressing the research problem, an effective research philosophy and approach is required. As mentioned, the two primary philosophy systems are ontological and epistemological philosophy. Firstly, according to Blaikie (quoted by Flowers 2009:1) ontological philosophy may be defined as *the science or study of being* and develops this description for the social sciences to encompass 'claims about what exists, what it looks like, what units make it up and how these units interact with each other'. Ontology may be further broken down into i) objectivism whose proponents believe there is one true and correct reality which we can come to know following the objective methods of science (Vrasidas, 2000) and ii) constructivism which is based on the idea that knowledge is constructed by the knower based on mental activity (USASK, 2013). Secondly, epistemological philosophy emphasizes beliefs which are fundamental assumptions about the nature of knowledge and learning (Bauer *et al.*, 2004). According to Alolo (2007) epistemological philosophy encompasses various philosophies of research including positivism and interpretivism. It is thus evident that while epistemological research is in respect of enquiries into subject matter or knowledge that is in existence, and attempts to explore certain beliefs and/or assumptions about such knowledge, ontological research is attempting to establish knowledge of the existence of an object, principle, behaviour, characteristic or relationship that may not be known. The enquiries into both types of research are thus distinct since the ontological is in essence enquiring as to whether an object or principle exists whereas epistemological is in essence enquiring as to the accuracy of our beliefs and assumptions about a known object or principle.

In terms of specific research philosophies, positivism seeks to explain and predict what happens in the social world by searching for regularities and causal relationships between its constituent elements and is based on traditional approaches which dominate

the natural sciences (Burell & Morgan, 1979). Alolo (2007) states that interpretivism on the other hand, holds that social science is fundamentally different to natural sciences and therefore approaches to the study of social phenomenon may typically not be the same as the natural sciences, with proponents of interpretivism arguing that attempts to understand social reality must be founded on people's experience of social reality.

Due to the fact that the study considers the potential impact of carbon tax on the South African motor vehicle manufacturing industry, based on certain beliefs of acceptable norms and values for the vehicle industry, the primary research philosophy system adopted could be considered as epistemological in nature. Within the epistemological assumption both the positivist and interpretivist positions are adopted as the research uses both the traditional approach which dominate natural sciences such as (basic) statistical analysis as well methods which are founded on peoples experience of social reality, such as is included in the form of structured questionnaires.

2.3. Research design

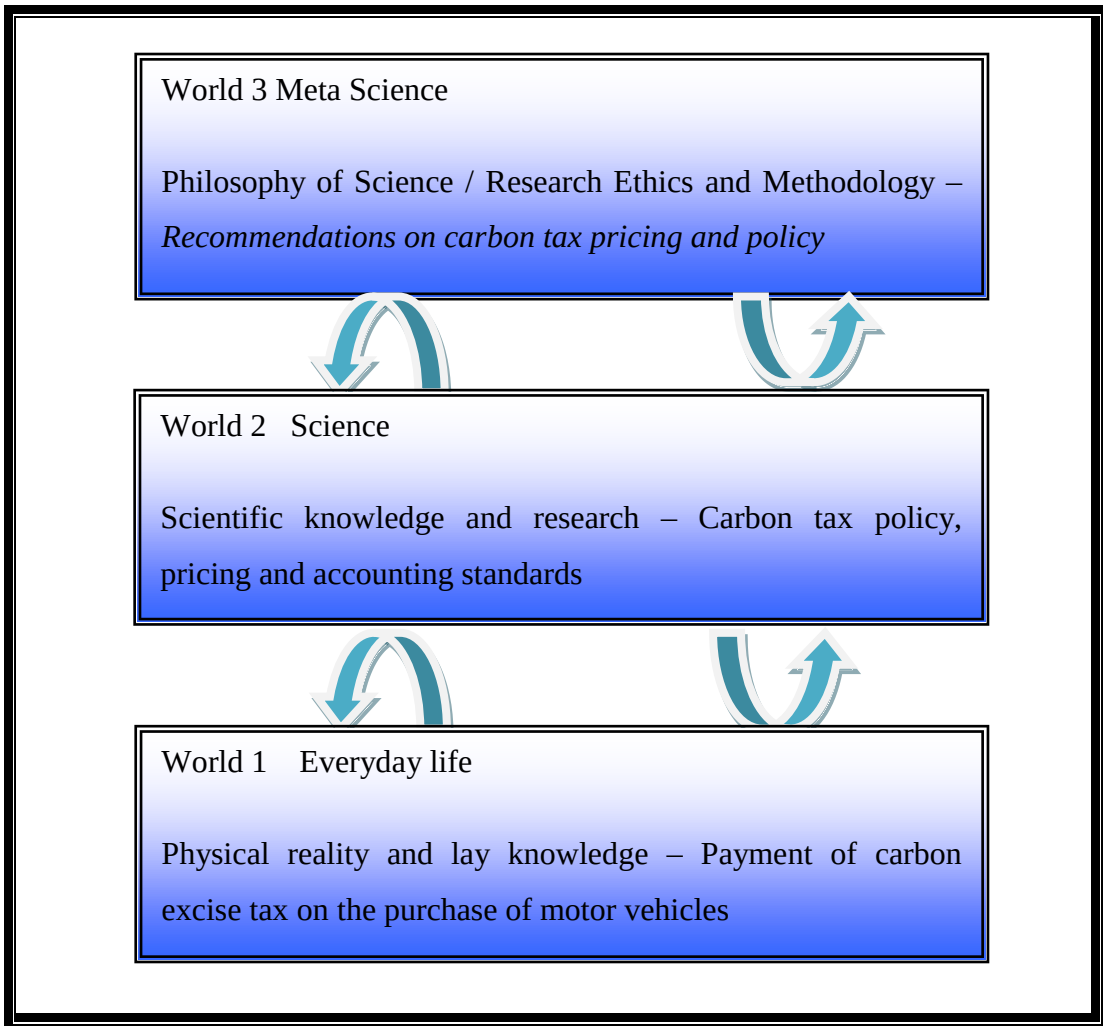
2.3.1. Research paradigm

Research design typically follows a characteristic cycle whereby initially an exploratory stance is adopted, where an understanding of a problem is developed and plans are made for some form of intervention strategy (USC, 2013). The research design of a project not only places value on areas of research, but equally on theoretical frameworks that are applicable to the project. In terms of the framework for research design, it has been suggested by Creswell (2003:3) that a general research framework should provide guidance about all facets of the study, from assessing the general philosophical ideas behind the inquiry to the detailed data collection and analysis procedures to be adopted. There are various theoretical frameworks that may be applied to a research project including the *Three Worlds Framework*, developed by Mouton (1996) which highlights the methodological differences between research approaches in the social sciences. These research approaches can be categorised as i) lay or ordinary knowledge; ii) scientific research and iii) reflections of research design and methodology. The aforementioned are all respectively categorised into different "world-paradigms" to highlight the distinguishing nature of each research approach.

2.3.2. The Three Worlds Framework

An important research framework in clarifying the object of the research is found in the *Three Worlds Framework* developed by Mouton and illustrated in Figure 2.1 below. The framework is based on a distinction between three levels or paradigms.

Figure 2.1: Three Worlds Framework



Source: (Adapted from Mouton, 2009:136)

Within the above framework, World 1 is seen as the world of everyday life and ordinary or practical knowledge. This can include practical accounting problems such as incorrectly applying the accounting standards to carbon tax transactions. It can also include not properly applying carbon tax legislation in determining the amount of carbon tax to be paid to tax authorities. Whereas World 1 is about everyday life, World

2 is concerned with more scientific research, and in particular making the lay knowledge in World 1 a subject of enquiry. World 2 will provide a body of existing knowledge in areas such as carbon tax policy and pricing. In the context of this study, World 2 activities could include determining whether the current carbon tax price is correct and whether it is in fact the best policy for South Africa. The scientific research in World 2 will be obtained in this study through review of academic articles, carbon tax legislation and policy as well as using questionnaires and interviews. Finally, World 3 refers to the reflection of the scientific research, research design and methodology and research ethics which are ordinarily applied in World 2. In the context of this study World 3 activities may include recommendations regarding carbon tax policy, pricing and accounting treatment based on scientific research obtained in the World 2 context.

2.3.3. Paradigm selection for the thesis

Considering the above, this thesis' research approach incorporates all three *World Levels* to some extent. The questionnaires used in the empirical study, are used primarily in the context of the 1st World paradigm in that the actual experiences and perceptions of the respondents are gauged. Since this study deals with carbon tax pricing, carbon tax policy and the proper accounting of carbon tax, it will entail investigations and enquiries into carbon tax policy, pricing and accounting standards resulting in greater scientific knowledge in these areas. The study therefore also falls within the theoretical 2nd World level of sustainability and social responsibility, and how the implementation of carbon taxes might impact on the 1st World paradigm. Finally in making the interpretations and recommendations based on the study, the 3rd World paradigm is also touched upon.

In addition, when considering the *Three Worlds Framework*, the research approach utilised in this study may fall into the following theoretical frameworks:

- Positivist framework: A philosophical approach which assumes that reality is objectively given and can be described by measurable properties which are independent of the observer (researcher) and his or her instruments (Myers, 1997). The positivist school of thought maintains that only by applying the methods of natural science to social science (including organizational research)

will it ever be able to match the achievements of natural science in explanation, prediction, and control (Lee, 1991).

- Interpretivist framework: In this approach researchers start out with the assumption that access to reality (given or socially constructed) is only through social constructions such as language, consciousness and shared meanings (Myers, 1997). Interpretative methods of research adopt the position that our knowledge of reality is a social construction by human actors (Walsham, 1995).
- Critical framework: This is a philosophical research approach that represents multiple types of research and has its source in the word "critical", which is used to identify approaches that challenge norms and aim to expose structures of power and domination (US, 2013). Critical social research attempts to reveal the socio-historical specificity of knowledge and to shed light on how specific knowledge reproduces structural relations of inequality and oppression (Muncie, 2013).

In terms of the theoretical framework therefore, the study will primarily fall into both the positivist and interpretivist frameworks as both quantitative methods in the form of numerical analysis and qualitative methods in the form of interviews which construct a social reality are used in the study. In addition, the research challenges the tax policy decisions taken by National Treasury which have been taken for granted as the norm thus qualifying it to fall within the purview of the critical framework.

2.4. Research methodology

2.4.1. Case study research

As mentioned earlier, this study follows a case study approach into the potential impact of carbon taxes on the South African motor vehicle manufacturing industry, and related corporate responsibility issues. A case study is a research strategy which focuses on the dynamics present within a single setting and typically combines data collection methods such as interviews, questionnaires and observation in producing quantitative or qualitative data (Eisenhardt, 1989). A case study has also been defined as a trans-paradigmatic and trans-disciplinary heuristic that involves the careful delineation of the phenomena for which evidence is being collected (Van Wynsberghe & Khan, 2007).

Case study research has both benefits and limitations with qualitative methodologists having identified case study methods as having comparative advantages in developing internally valid and context-sensitive measures of concepts (Bennett & Elman, 2006). In terms of limitations of case studies, the researcher may not be able to identify all reasonable rival hypotheses or give appropriate consideration to the role of external factors such as political factors in the situation of interest (Barkely, 2006).

Within a case study research approach there also exists distinguishing types of research. Quantitative research generally focuses on measuring social reality with quantitative questions directed to establish numerical conclusions (Holden & Lynch, 2013; Sukamolson, 2007). Quantitative researchers view the world as reality that can be objectively determined thus necessitating firm guidelines in the process of data collection and analysis (Holden & Lynch, 201; Sukamolson, 2007). On the other hand, qualitative research methods were developed in the social sciences to enable researchers to study social and cultural phenomena with examples hereof being action research, case study research and ethnography (Myers, 1997). Data sources for qualitative research will thus include observation, documents, texts, questionnaires as well the researchers' impressions (Myers, 1997). The research conducted in this study therefore used both quantitative and qualitative techniques.

2.4.2. Research reasoning

In terms of reasoning, there are typically two types of reasoning approaches used in scientific research, namely deductive and inductive reasoning. Firstly, the *deductive reasoning* involves the claim that the premise provides absolute grounds for accepting the conclusion or moving from the more general to the specific (Goel, Gold, Kapur & Houle., 1997; Burney, 2008). Secondly, the *inductive reasoning* involves the claim that premise provides only limited grounds for accepting the conclusion or moving from specific observations to broad generalisations (Goel *et al.*, 1997; Burney, 2008). In the context of this research project, a primarily inductive reasoning approach is followed in that the specific responses from respondents are used to interpret the situation for the broader case of the motor vehicle manufacturing industry.

2.4.3. Research sample selection

A target population may be defined as a group or individuals to which a specific questionnaire or survey is applicable (Kitchenam, 2002), in other words those groups or individuals who are in a position to respond and to whom the results of the survey apply to. The target population in this study has the following characteristics:

- Multinational motor vehicle manufacturers;
- within the boundaries of the Republic of South Africa; and
- subject to carbon excise tax on motor vehicles sold to the general public.

In consideration of the above criteria, the total number of motor vehicle manufacturers in South Africa is according to the National Association of Automobile Manufacturers of South Africa (NAAMSA, 2013) the following manufacturers:

- Volkswagen South Africa (Pty) Ltd;
- BMW SA (Pty) Ltd;
- Daimler Chrysler SA (Pty) Ltd;
- Toyota SA (Pty) Ltd;
- Nissan SA (Pty) Ltd;
- Renault SA (Pty) Ltd;
- GM SA (Pty) Ltd; and
- Ford SA (Pty) Ltd.

Since Nissan and Renault have entered in a global alliance via crossholdings in each other, for the purposes of this study they have been considered as one multinational motor vehicle manufacturer (Renault, 2013). Also note that all these companies are privately owned by their global holding companies. These companies therefore made up the target population for this study from which the sample was identified. Sampling may be defined as the selection of some part of an aggregate or totality on the basis of which a judgement or inference about the aggregate or totality is made, or the process of obtaining information about an entire population by examining only a part of it (Haque & Bharati, 2013). According to Marshall (1996:523) there are three key sampling strategies, based on the accessibility of the subjects that a researcher may

adopt. These include judgement sampling, theoretical sampling and convenience sampling. Furthermore non-probability sampling refers to those sampling methods that are not based on mechanical procedures involving, for example, lists of random numbers, but is rather based on some element of judgement or purposeful selection (Doherty, 1994).

In terms of this case study therefore, all companies who were listed as vehicle manufacturers in South Africa were approached for participation in the study. The intended sample thus represented the entire population of motor vehicle manufacturers in South Africa. In terms of responses received, three of the motor vehicle manufacturers declined their participation; this was due primarily to the sensitivity of information being released and the fact that they were privately-held companies. Four motor vehicle manufacturers initially agreed to respond to the questionnaire and one motor vehicle manufacturer did not indicate whether they were able to respond to the questionnaire. Unfortunately one of initially participating respondents withdrew their participation during the empirical phase. Excluding the non-responsive participant the study field therefore consisted of three respondents who were initially willing to participate in selected using convenience sampling. The final study field thus represent approximately 43% of the total population of motor vehicle manufacturers in South Africa. Since convenience sampling is based on the accessibility of subjects (Marshall, 1996) which would involve a purposeful selection it would fall into the realm of non-probability sampling. According to Middleburg (2011:135) non-probability sampling is appropriate for both quantitative and qualitative studies.

The motor vehicle industry is highly competitive and it is perceived that the information required for this study can be sensitive in nature and compromise an entity's competitive advantage. The final respondents in the study are thus not named in the study, with all information in the study being treated as strictly confidential.

2.4.4. Data collection

As stated above, the research methodology may be qualitative in nature in the form of case studies or focus groups or quantitative in nature such as mail or telephone survey or a combination of both qualitative and quantitative. Empirical data in this study was

obtained through structured questionnaires as well as follow up telephonic discussions and email correspondence explaining the questions to respondents. An exploratory survey questionnaire was prepared based on the underlying literature reviews and the knowledge obtained during such literature study. The total overarching questionnaire consisted of thirty six questions utilising an appropriate Likert-type response scales and served as a basis for comparison between the respondents (refer to **Annexure A: Compiled research questionnaire** on page **141** for the detailed questionnaire).

The researcher was available during the survey in order to provide guidance and clarification should the respondents have required clarification with regards to the questionnaire. The respondents were first contacted telephonically to explain the purpose of the questionnaire and determine if they were willing to consider the questionnaire for participation in the study. Questionnaires were then emailed to the respondents specifying an appropriate time period for responses. Follow up telephonic discussions were initiated by the researcher to track the progress of responses with respondents.

2.4.5. Data analysis

A preliminary review of data was conducted while the process of data collection was in process. Once the data collection was complete, an analysis of data was conducted which involved developing summaries, applying statistical techniques and investigating any relationships. Data obtained during the study included both qualitative and quantitative information. A graphical analysis of all the responses to the questions was first summarised and then a descriptive statistic summary of all questions is completed confirming statistical information such as minimum, maximum and mean results per question where a Likert type response scale was used. Response to Likert response scale questions were evaluated using the mean statistic for the question as well as considering the overall percentage response to questions.

In certain instances the accounting treatment of specific transactions was obtained and compared to the relevant accounting standard to determine the level of accounting compliance. The respondents' perception on issues such as carbon tax pricing and policy was also collated and considered in conjunction with numerical data to formulate

credible conclusions. Where multiple questions related to a specific subject such as carbon tax compliance these questions were grouped under a section and conclusions were formulated for the section as a whole.

2.5. Limitations and sources of error

In the context of study, the reader should take note that there is limited available literature on the motor vehicle industry in South Africa with regard to carbon excise tax awareness and practice. Much of the information gathered in the study is based on questionnaires completed by relevant people in the industry based on their personal understanding of concepts.

2.6. Summary

The objective of this chapter was to provide an understanding of the research design and methodology followed in the study. Whereas the research design represents the strategy and plan of conducting a research project, the research methodology refers to the actual procedures used by researchers to obtain knowledge. A case study research was conducted with the research type being both qualitative and quantitative.

Multiple cases with the characteristics of i) multinational motor vehicle manufacturers, ii) manufacturing motor vehicles within the boundaries of the Republic of South Africa and iii) are being subjected to carbon excise tax on motor vehicles sold to the general public. The sampling technique used is convenience sampling with the final sample size at three participants. The data collection technique utilised is a structured questionnaire.

The following four chapters (containing the four academic articles) form the bulk of study and each address a different research problem and objective(s) as set out earlier in chapter 1.

CHAPTER 3 (ARTICLE 1)

Title: Climate change: A comparison of market-based instruments from a South African perspective

The reader is requested to take note of the following:

The article has been ***published*** in the following IBSS indexed, internationally peer-reviewed academic journal as follows:

- Pillay, S. & Buys, P.W. 2013. Climate Change: A Comparison of Market-based Instruments from a South African perspective. *International Business and Economics Research Journal*, 12(4):457-468. (ISSN: 0892-7626)

The published article is included in **Annexure B: Article 1 as published** on page **147.** The article was written in line with the journal's submission guidelines, which are included in **Annexure E: Clute Institute's author guidelines** on page **186**.

The article was researched and written by the first author (S. Pillay) as the PhD candidate and primary author, while the second author (P.W. Buys) fulfilled a reviewer function thereto as the PhD project's promoter.

Abstract

This article aims to consider the relevancy of i) cap-and-trade schemes and ii) carbon tax schemes in a developing economy context. Even though both schemes have a common goal of reducing greenhouse gas emissions, they operate very differently, each with their own set of advantages and disadvantages. Sustainable development comprise various elements categorised in three primary dimensions – environmental, economic and social. The objective of reducing greenhouse gases via the implementation of carbon tax or cap-and-trade schemes primarily addresses the *environmental* dimension of sustainable development. Notwithstanding the aforementioned, the impact of both schemes on the economically sustainable development, including industry competitiveness and growth, still has to be determined.

In South Africa, the National Treasury made a decision to implement carbon tax as opposed to cap-and-trade schemes. In this article, the reasoning behind their decision in favour of carbon tax in the South African context is critically considered, firstly by evaluating the key characteristics between cap-and-trade and carbon tax schemes and secondly by considering the effectiveness hereof in the global context. It was found that the primary reason behind the favourable consideration of carbon tax was the fact the implementation thereof would be 'simpler' using the existing taxation systems, whereas cap-and-trade would require the implementation of sophisticated mechanisms that may not provide the optimum benefit in a developing economy context.

Keywords: Carbon taxation, cap-and-trade scheme, greenhouse gas, sustainable development, triple bottom line

JEL Classification: M14, M21, M40, Q56

3. CLIMATE CHANGE: A COMPARISON OF MARKET BASED INSTRUMENTS FROM A SOUTH AFRICAN PERSPECTIVE

3.1. Introduction

3.1.1. Background

The issue of global warming in recent years has been at the forefront of not only the scientific community, but also of various governmental institutions (Ren & Lin, 2001). Many scientists are of the opinion that higher concentrations of greenhouse gas emissions, such as carbon dioxide and methane, can negatively affect our climate (Sathiendrakumar, 2003) and that if the atmospheric concentrations of these greenhouse gases continue to rise, the global climate will become increasingly warmer (Yusuf *et al.*, 2012; Ren & Lin, 2001). Shepherd (2012:1) is in agreement herewith when saying that the climate change currently being experienced is due to an increase in greenhouse gas emissions that arise from human activities, such as the burning of fossil fuels, agriculture and deforestation. Spectral calculations also confirm that water vapour accounts for approximately 87% of the greenhouse effect and a doubling of the current level of carbon dioxide emissions would result in a rise in global temperatures of 0.51°C without water feedback (Ollila, 2012). In South Africa, the level of carbon emissions per unit of economic output was nearly three times the average set by the Organisation for Economic Co-operation and Development (OECD) (Goldblatt & Davies, 2002).

Governments considering strategies for lowering carbon emissions ordinarily have two basic approaches to consider, namely i) a cap-and-trade scheme that reduces emissions by limiting the quantity of carbon dioxide that can be emitted and then allocating emissions permits that are tradable, or ii) introducing a carbon tax scheme that effectively raises the price of fossil fuels based on their carbon content (Anon, 2012). The *cap-and-trade* approach has its foundation in the United Nations Framework Convention on Climate Change (UNFCCC) that was established with the goal of reducing the concentration of greenhouse gases in the atmosphere, to which South Africa became a signatory in August 1997 (UNFCCC, 2004). In a cap-and-trade

scheme, a governmental organisation typically issues *a license (or permit) to pollute* to major industries with the entity then being in position to trade these permits with another entity who might make 'equivalent' changes more cost effectively (Gilbertson & Reyes, 2009). This is the approach underlying most emission trading schemes with the underlying theory that the available supply of permits will be slowly reduced, so that the market retains its value while at the same time forcing a decrease in the overall level of greenhouse gas emissions (Gilbertson & Reyes 2009). On the other hand, *carbon tax* is in essence an excise tax on the producers of raw fossil fuels based on the relative carbon content of those fuels (OECD, 1997). The objective of carbon tax is therefore to control the problem of global warming caused by increasing concentrations of greenhouse gases, which then, *per se,* include carbon (Pearson & Smith, 1991). The impact of carbon tax is ordinarily determined by using the energy demand function that considers the price elasticity of energy (Yamaguchi, 2007). According to SBS (2012), carbon tax schemes have been implemented in many countries around the world, including Denmark, Finland, Ireland, the Netherlands, Norway, Slovenia, Sweden, Switzerland, the United Kingdom, Canada, India, Costa Rica and China.

3.1.2. Sustainable development

From the above it is evident that both cap-and-trade schemes and carbon tax schemes intended to effect reductions in greenhouse gas emissions in order to contribute to sustainable development. According to Mohammed (2011), sustainable development has been defined as that which is required to harmonise the fulfilment of human needs with the protection of the natural environment so that these needs can be met not only in the present, but also in the indefinite future. Sustainable development comprises various elements categorised into three primary dimensions, namely environmental, economic and social, which in essence is the so-called triple bottom line, which has been defined as the *balance* within the concept of sustainability (Cronje & Chenga, 2009; Anon, 2006; Newport *et al*., 2003):

- The *economic dimension* of sustainability is important as critical issues such as costs associated with environmental pollution, constraints on economic growth and the destruction of non-renewable resources are addressed by this area of sustainable development.

- With regard to *social sustainability*, it is suggested that the social dimension of sustainable development encompasses the transformation, and perpetual improvement of the livelihoods of human beings within a specific social context.
- In terms of *environmental sustainability,* clean air and water, reduced toxic emissions and reducing household waste as well as conserving natural resources are among the important environmental policy objectives that most OECD governments have been pursuing over the past thirty years.

3.2. The South African context

In terms of related carbon emission developments in South Africa, the National Treasury published a discussion document considering the economic merits for introducing a carbon tax in South Africa in December 2010 (National Treasury, 2010). This elicited 79 stakeholder responses, with a more detailed policy document containing the design of the carbon tax anticipated to be released in due course (WWF, 2012).

However, prior to this, on 1 September 2010, a carbon emission tax on the sale of new passenger motor vehicles in South Africa were implemented, which added a tax of R75 for every gram of carbon dioxide per kilometre it emits over the 120g/km (NAAMSA, 2011; Shirley, 2010). These vehicles are taxed on carbon dioxide emissions above 120g/km at a fixed rate of ZAR75 per g/km. Therefore, if a new passenger car emits 200g/km of carbon dioxide, it will be taxed on the 80g/km emitted above the 120g/km threshold. At the suggested flat rate of ZAR75 per g/km, such a vehicle will attract carbon tax of around ZAR 6 000 (Finnern, 2010). In terms of the industry's contribution to sustainable development in the region, it contributed approximately 7.5% to the country's GDP in 2008 (SAI, 2008a). Therefore, due to its importance to the South African economy, the impact hereof is expected to be significant. The National Association of Automobile Manufacturers of South Africa (NAAMSA) suggested that carbon tax will inflate vehicle prices by as much as 2%, which may lower sales volumes and could negatively impact vehicle industry employment levels (Anon, 2010).

3.3. Problem statement and objectives

Following from the above, the question may be asked as to the total impact of the implementation of carbon tax as an environmental policy, not only in the context of the South African vehicle industry, but also in the context of the broader economy. In light hereof, the primary research question under consideration could be formulated as follows:

- Is the carbon tax mechanism the most appropriate mechanism to reduce greenhouse gas emissions within the South African developing economy context, seen in the light of global experiences?

In consideration hereof, this paper aims to examine firstly the distinguishing natures of i) cap-and-trade schemes and ii) carbon tax schemes, and secondly to provide an evaluation of the decision made by the National Treasury to implement carbon tax in South Africa. The research is based on an analytical literature study research methodology and utilises a three-step approach in considering whether carbon tax is the most appropriate mechanism to reduce greenhouse gas emissions in South Africa. Firstly, the key distinguishing features between the carbon tax and cap-and-trade mechanisms are analysed, secondly, the effectiveness of these scheme are evaluated based on global experiences and thirdly an evaluation of the National Treasury's case for carbon tax is provided.

3.4. Key features of cap-and-trade and carbon tax schemes

3.4.1. Introduction

According to Goldblatt (2010a), the primary distinguishing features of cap-and-trade and carbon tax schemes are typically threefold, namely:

- In terms of carbon pricing, carbon tax offers some level of certainty as the price is fixed; whereas with a cap-and-trade approach, the carbon price is uncertain and is subject to market volatility.
- In terms of achieving quantitative limits of carbon emissions, the cap-and-trade approach appears to be able to accomplish this more effectively than carbon tax

as emissions are capped and therefore provide some level of certainty of the environmental outcome.

- In terms of administrative costs, the carbon tax approach may be seen as a more efficient option as its implementation can be executed within the infrastructure of the existing tax administration, whereas the cap-and-trade approach may require the creation of a new institution to implement a trading scheme.

The distinctive characteristics of these two approaches are discussed in more detail below.

3.4.2. Cap-and-trade schemes

The foundation of the cap-and-trade methodology originated with C Boyden Gray who talked about cleaning up the environment by letting people buy and sell *rights to pollute* (Smithsonian, 2009). This concept was initially termed *emissions trading*, but was subsequently changed to *cap-and-trade*. In a cap-and-trade scheme, quantitative limits are set on the time path for greenhouse gas emissions of different countries with these countries then administering these limits in their own fashion. These schemes typically allow for the transfer of emission allowances between the different countries under the Kyoto Protocol (Noordhaus, 2007). With regard to cap- and-trade schemes in South Africa, it should be noted that South Africa signed the protocol in 2002, and even though it has no commitment to cap emissions, it is involved in *Clean Development Mechanism* (CDM) projects (DEAT 2010). Some of the key (negative) characteristics of cap-and-trade schemes include the following:

- There may be initial over-allocation permits to governments or companies resulting in no required behavioural change by companies regarding carbon emissions (Gilbertson & Reyes, 2009).
- In some instances, producers may be able to transfer abatement costs to consumers and increase its prices without consideration of the true purposes of the scheme (Gilbertson & Reyes, 2009).
- There are major administrative complexities related to cap-and-trade schemes together with uncertainties with regard to the actual economic costs to business (National Treasury, 2010).

A further issue is the concept of carbon leakage, which is said to occur when there is an increase in greenhouse gas emissions in one country as a result of emission reductions in another country that has stricter climate change policies (CLC, 2010). The results of studies conducted on the effects of the Kyoto Protocol have shown carbon leakage to be in the range of 5 to 20% using static *Computable General Equilibrium* models, which differs from the opinion of researchers who say, in practice, carbon leakage is not substantial due to transport costs and local market conditions (Barker *et al.*, 2007). The principles of the cap-and-trade approach, however, have indicated some positive aspects, including the following:

- Trade schemes implemented in air pollution programmes in the United States reported a strong positive effect on reducing emissions (Tietenburg, 2003).
- The performance of cap-and-trade schemes in the field of improving environmental sustainability was assessed using a simulation model at the University of Saskatchewan, where it was revealed that it decreased carbon dioxide emissions and increased environmental and economic sustainability (Belcher *et al*., 2003).

3.4.3. Carbon tax

Carbon tax, which was first introduced in Europe in the early 1990s, has been widely advocated as a means for reducing such emissions to address anthropogenic climate change (Clarke, 2011). In principle, carbon taxes are levied at the same specific rate on all emissions, irrespective of their source. Since carbon emissions have a proportional relationship to fossil fuel usage, this could be charged directly on emissions of fossil fuels such as petrol, gas and coal (IMF, 2008). In addition to the advantages of price certainty and lower administrative costs, carbon tax offers the advantage of economy-wide application in terms of coverage in comparison to cap-and-trade schemes that ordinarily only cover high emitters in the initial phases (Goldblatt, 2010a). Another advantage is that pricing systems such as carbon tax are less susceptible to corruption than quantity type systems, with this being demonstrated frequently at international trade interventions when quotas are compared to tariffs (Noordhaus, 2007). A further significant advantage, according to Pope and Owen (2009), is the suggestion that it would provide a more stable revenue base over time. They propose (within the

Australian context) that it may generate around A$11.5 billion per annum, subject to various treasury assumptions (Pope & Owen, 2009).

In terms of disadvantages, carbon tax schemes do not ensure quantifiable emission reductions (National Treasury, 2010). This assumption is supported by the simulation model developed at the University of Saskatchewan, which revealed that carbon tax had no significant effect on carbon dioxide emissions or environmental sustainability, but may rather decrease economic sustainability (Belcher *et al*., 2003). Another possible significant disadvantage is the pricing of carbon. The social cost of carbon has been defined as the monetary damage done by emitting one more ton of carbon at some point in time. Using quantitative modelling, a marginal cost of £100 per ton of carbon has been noted in the United Kingdom (Pearce, 2003). Ideally, the carbon tax price should be priced to cover the marginal cost per ton of carbon, with the resultant question then being whether the carbon tax price accurately reflects the monetary damage caused by an additional ton of carbon?

3.5. Evaluation of the effectiveness of such schemes

3.5.1. Cap-and-trade schemes

In terms of cap-and-trade, the European Union Environmental Trading Scheme (EU ETS) is the world's largest emissions permit market to date and is organised into distinctive periods referred to as ‘phases’, with *Phase I* between 2005 and 2007 and *Phase II* between 2008 and 2012 (Hintermann, 2012). In terms of the effectiveness hereof in reducing greenhouse gas emissions, a sample study of 2101 European firms subject to the EU ETS revealed that it led to reductions in emissions in both phases (Abrell *et al.*, 2011).

In respect of Phase I, an analysis of carbon dioxide emissions by countries subject to the EU ETS (Table 3.1 below) found an overall net increase of 1.88% in GHG emissions, with 11 out of the 24 countries recording decreases in their carbon emissions.

Table 3.1: Phase I: Emissions of EU ETS countries (tons of carbon)

Country	2005	2006	2007	% change
Austria	33,372,826	32 382 804	31 751 165	-4.86
Belgium	55,363,223	54 775 314	52 795 318	-4.64
Cyprus	5,078,866	5 259 273	5 396 164	6.25
Czech Republic	82,454,618	83 624 953	87 834 758	6.52
Germany	474,990,760	478 016 581	487 004 055	2.53
Denmark	26,475,718	34 199 588	29 407 355	11.07
Estonia	12,621,817	12 109 278	15 329 931	21.46
Spain	183,626,981	179 711 225	186 495 894	1.56
Finland	33,099,625	44 621 411	42 541 327	28.53
France	131,263,787	126 979 048	126 634 806	-3.53
Greece	71,267,736	69 965 145	72 717 006	2.03
Hungary	26,161,627	25 845 891	26 835 478	2.58
Ireland	22,441,000	21 705 328	21 246 117	-5.32
Italy	225,989,357	227 439 408	226 368 773	0.17
Lithuania	6,603,869	6 516 911	5 998 744	-9.16
Luxembourg	2,603,349	2 712 972	2 567 231	-1.39
Latvia	2,854,481	2 940 680	2 849 203	-0.18
Netherlands	80,351,288	76 701 184	79 874 658	-0.59
Poland	203,149,562	209 616 285	209 601 993	3.18
Portugal	36,425,915	33 083 871	31 183 076	-14.39
Sweden	19,381,623	19 884 147	15 348 209	-20.81
Slovenia	8,720,548	8 842 181	9 048 633	3.76
Slovakia	25,231,767	25 543 239	24 516 830	-2.83
United Kingdom	242,513,099	251 159 840	256 581 160	5.8
Total	2,012,043,45	2 033 636 557	2 049 927 884	1.88

Source: Anon (2008b)

In respect of Phase II (table 3.2 below), all the countries reported reductions in carbon emissions, with an overall reduction of 7.2%

Table 3.2: Phase II: Emissions of EU ETS countries (tons of carbon)

Country	2008	2009	% change
Austria	68 232 000	62 313 000	-8.67
Belgium	104 865 000	103 593 000	-1.21
Cyprus	8 555 000	8 199 000	-4.16
Czech Republic	116 952 000	108 121 000	-7.55
Germany	786 652 000	734 599 000	-6.62
Denmark	46 850 000	45 698 000	-2.46
Estonia	18 383 000	15 951 000	-13.23
Spain	329 286 000	288 230 000	-12.47
Finland	56 083 000	53 568 000	-4.48
France	376 993 000	363 356 000	-3.62
Greece	97 817 000	94 917 000	-2.96
Hungary	54 653 000	48 676 000	-10.94
Ireland	43 406 000	41 642 000	-4.06
Italy	447 367 000	400 836 000	-10.4
Lithuania	15 130 000	12 838 000	-15.15
Luxembourg	10 660 000	10 143 000	-4.85
Latvia	7 591 000	6 652 000	-12.37
Netherlands	173 845 000	169 650 000	-2.41
Poland	316 059 000	298 905 000	-5.43
Portugal	58 357 000	57 400 000	-1.64
Sweden	49 105 000	43 744 000	-10.92
Slovenia	17 158 000	15 291 000	-10.88
Slovakia	37 557 000	33 890 000	-9.76
United Kingdom	522 247 000	474 579 000	-9.13
Total	3 763 803 000	3 492 791 000	-7.2

Source: UN (2011)

From a review of the above tables it is clear that the EU ETS was more effective in Phase II than in Phase I. It is, however, argued that Phase I not only established a

carbon price for material sectors of economic activity in Europe, but also established the necessary trading infrastructure (Convery *et al.*, 2008). Furthermore, during Phase I, the permits allocated were also found to be consistently higher than the actual verified emissions taking place in the EU ETS countries (Gilbertson & Reyes, 2009).

3.5.2. Carbon tax

Various studies around the world have been conducted using simulations to determine the estimated impact of carbon tax on greenhouse gas emissions, such as the following:

- In a study estimating the impact of carbon tax on greenhouse gas emissions in Nepal using an energy system model, it was confirmed that the introduction of carbon tax would result in an estimated reduction of 12% under certain conditions (Shakya *et al.*, 2012).
- A study estimating the effect of policy instruments such as carbon tax in Austria on the passenger motor vehicles confirmed that policy measures may demonstrate an effective reduction in GHG emissions (Kloess & Muller, 2011).
- In terms of the actual effectiveness of the tax in reducing greenhouse gases, studies conducted in Norway, one of the first countries to introduce carbon tax in 1991, revealed that carbon emissions increased by 19% from 1990 to 1999 as opposed to a GDP growth of 35% in the same period, which pointed to an overall reduction in average emission per unit GDP of 12% (Bruvoll & Larson, 2004).
- In Sweden, an ex-post evaluation of the implementation of carbon tax for the years 1992 to 1995 shows mixed results of the effect of the carbon tax on carbon emissions according to different industries affected by the tax, and also revealed that even though the services sector, household and transport sectors reported no change in emission levels, there was a positive effect on carbon emission levels (Bohlin, 1998).
- In both the Netherlands and Denmark, tax exemptions were provided for the manufacturing industry and related energy intensive industries, and this reduced the mitigating effects of carbon tax in these countries (Lin & Li, 2012).
- Carbon tax on passenger motor vehicles was introduced in Ireland in 2008, and a study estimating the effect of the tax on greenhouse gas emissions revealed that it

should result in a decline in greenhouse gas emissions of 0.2 milllion tons of carbon by 2015 (Hennessy & Toll, 2011).

- An analysis of the implementation of a potential carbon tax in Washington using a *Carbon Tax Analysis Model* revealed that a carbon tax at US$30 per metric ton of carbon dioxide lowers GHG emissions by 8.4% (Keibun, 2011).

3.5.3. Effects of cap-and-trade and carbon tax on industry

In terms of the economic effect of cap-and-trade schemes on profit, employment and value added, a firm-based study of the EU ETS revealed that in Phase I and the beginning of Phase II, the EU ETS did not materially affect profits, employment and value added (Abrell *et al.*, 2011). An interim analysis of Phase I of the EU ETS confirms that the first phase had little impact on industry competitiveness (Convery *et al.*, 2008). Table 3.3 below summarises the GDP per capita information (adjusted for current prices) for each EU ETS country in the period 2005 to 2009. With the exception of the United Kingdom, all countries reported a real increase in economic growth during the period, with the aggregate economic output growing in real terms by 21%. This mitigates any argument that cap-and-trade schemes will result in decreased profits and growth for companies and industries alike.

Table 3.3: EU ETS countries: GDP per capita (US dollars at current prices)

Country	2005	2006	2007	2008	2009	% change
Austria	37 048	39 278	45 133	49 650	45 614	23
Belgium	36 225	38 167	43 586	47 822	44 356	22
Cyprus	22 298	23 876	27 686	31 693	29 277	31
Czech Republic	12 726	14 463	17 499	21 723	18 789	48
Denmark	47 546	50 412	56 941	62 115	55 915	18
Estonia	10 330	12 506	16 375	17 773	14 337	39
Finland	37 302	39 460	46 523	51 153	45 062	21
France	34 002	35 669	40 586	44 245	40 773	20
Germany	33 514	35 169	40 281	43 937	40 029	19
Greece	21 468	23 357	27 088	30 216	28 411	32
Ireland	48 888	52 922	60 578	60 570	50 564	3
Italy	30 299	31 539	35 569	38 344	35 041	16
Latvia	6 913	8 658	12 557	14 729	11 433	65
Lithuania	7 641	8 900	11 636	14 153	11 075	45
Luxembourg	82 370	91 395	107 863	118 673	104 384	27
Netherlands	39 157	41 378	47 591	52 766	47 915	22
Poland	7 963	8 949	11 132	13 852	11 256	41
Portugal	18 132	19 008	21 846	23 689	21 976	21
Slovakia	8 844	10 290	13 803	17 348	16 026	81
Top of Form	17840	19406	23 507	27 058	24 235	36
Spain	26 044	28 052	32 327	35 306	32 080	23
Sweden	41 042	43 899	50 485	52 632	43 347	6
United Kingdom	37 881	40 381	46 191	43 022	35 220	-7
Total	676 410	728 315	850 336	927 859	819 775	21

Source: UN (2012)

The effect of carbon tax on certain industries has also been subject to empirical research.

- In a study of energy intensive industries, 21 OECD countries between 1992 and 2008 revealed that carbon tax had a positive influence on the international competitiveness of energy intensive industries in export countries (Zhao, 2011). An important point to note is that carbon tax has important implications in terms of global competitiveness of economies and even though global competitiveness may not be reduced over the long term by higher energy prices, the short-term effects of a carbon tax may be serious for certain industries (Zhang & Baranzini, 2004).
- In Sweden, the implementation of carbon tax has had no effect in terms of economic efficiencies in the transport, household and service sectors; however, carbon tax accounted for $1,6 billion of government revenue in 1995 (Bohlin, 1998).
- The implementation of excise tax on passenger motor vehicles (based on emission levels rather than engine size) in Ireland is expected to result in a decrease in fiscal revenue by up to half a billion euro in 2025 (Hennessy & Toll, 2011).

3.6. An evaluation of National Treasury's case for carbon tax

Considering the above, within the South African context, it was not disputed that cap-and-trade schemes could achieve the same objectives as carbon taxes. National Treasury (NT) did, however, argue that cap-and-trade schemes brought specific challenges to the South African context. These include the i) credibility of emission caps, the allocation of permits and the need for a competitive market to facilitate trading, ii) price uncertainty, iii) the need for new financial regulations and administrative capacity, iv) tax implications, as well as v) the non-transparency of distributional incidence (National Treasury, 2010).

- Firstly, with regard to the credibility of emission caps and the allocation of permits, the EU ETS permit allocations in first phase were greater than verified emissions, which were due to using emission projections before verifiable emissions data became available (Gilbertson & Reyes 2009). It was argued that if a cap-and-trade scheme is to work in South Africa, it will be critical for caps to be based on verified emissions data. The emissions data in Table 2, for the

second phase of the EU ETS, indeed confirms the effectiveness of credible caps in reducing carbon emissions.

- Secondly, with regard to price uncertainty, this is definitely a valid challenge as seen in EU ETS, where prices have moved significantly in response to new information regarding the allocation of allowances (Goldblatt, 2010b). The market structure in which permits are traded are equally important, as in South Africa there is a high concentration of emissions in the energy and fossils fuels sector that will create a challenge to the design of an emissions trading scheme in terms of addressing market power as well as ensuring trading liquidity (Goldblatt, 2010b).
- Thirdly, in terms of the administration of an emission trading scheme, most installations in EU ETS chose between a *method of calculation* or *continuous measurement*, with the former being the practical choice (Brohe, 2010). Each member state in the EU ETS is also required to keep a national registry to ensure accurate accounting of all allowances under the Kyoto Protocol (Brohe, 2010). It is clear that any emissions trading scheme in South Africa will require additional administrative resources for both the government and firms alike.
- Fourthly, the tax implications of cap-and-trade can be complicated, especially in the EU ETS, where there has been extensive grandfathering of emission rights (allocating them without charge) (IMF, 2008). Some experts argue that the grandfathered rights should be recorded as tax expenditure as a minimum, opening the issue up for public debate (IMF, 2008). This will present a valid challenge for South African Revenue Service (SARS) and NT if an emissions trading system were to be implemented in South Africa.
- Fifthly, in respect of the challenge of distributional incidence, a study examining the welfare effect of emissions trading under oligopolistic trading conditions found that refunding 10% of the emission trading proceeds resulted in optimal welfare improvements where such proceeds are reinvested in renewable energy sources (Traber & Kemfert, 2010). In South Africa, the structure of the energy sector market is oligopolistic (National Treasury, 2010), and provided the proceeds from emissions trading are invested in renewable energy, the challenge may be addressed effectively.

The effects of carbon tax on the competitiveness of industries are positive, and in addition, the carbon tax also increases fiscal revenue, although when replacing another tax, the results may be adverse to the fiscus. The effect of cap-and-trade schemes over the long term on industry is positive, with most EU ETS countries still experiencing positive GDP per capita growth at current prices over a five-year period of the EU ETS.

3.7. Conclusion

The objective of this article was to consider the effect of cap-and-trade and carbon tax schemes on sustainable development and to use this information in assessing the National Treasury's decision to implement carbon tax in South Africa. In determining the impact of cap-and-trade and carbon tax on sustainable development, the distinguishing features between both instruments were highlighted. The primary difference is that carbon tax is a pricing instrument offering certainty about price but uncertainty about the quantity of emission reductions, whereas a cap-and-trade scheme is a quantity instrument, offering certainty about the quantity of emissions reduced but uncertainty about the carbon price.

The studies evaluating the effect of carbon tax on greenhouse gas reduction confirm that the tax has the overall effect of reducing greenhouse gases. These results were obtained from both models predicting the impact of carbon tax on greenhouse gases as well as post-ex results of introducing a carbon tax. In respect of emissions trading, the first phase of the EU ETS showed no decrease in carbon emissions, which was primarily due to permit allocation being based on estimates of carbon emissions rather than verified emissions. However, the second phase of the EU ETS showed a material decline in carbon emissions with caps being based on verified emissions. On a whole, the impact of both market-based instruments on environmental and economically sustainable development is positive. The National Treasury's reasons for not implementing cap-and-trade schemes were explained on the basis of a list of factors that were considered challenging within a South African context. These challenges included the credibility of emission cap, the allocation of permits, the need for a competitive market to facilitate trading, price uncertainty, tax implications, the need for new financial regulations and administrative capacity as well as the non-transparency of distributional incidence.

The significant challenges from a South African context remain a competitive market for trading, price uncertainty, tax implications and administrative capacity. The welfare effect may be positive provided the South African government reinvests proceeds from emissions trading in renewable energy. The credibility of the emission cap and allocation of permits can be addressed by using verifiable emissions as a basis for determining the quantitative limits of carbon emissions and allocating permits based on verifiable emissions rather than grandfathering permits. The decision by the Treasury on a whole is considered rational and acceptable from an economic and environmental perspective.

3.8. Limitations and future research

A key limitation of the study is that it does not produce any new empirical insights nor does it necessarily validate any existing empirical insights. Notwithstanding this limitation, the article contribution can be seen in it contrasting evaluation of cap-and-trade schemes as opposed to carbon tax schemes, especially in the context of a developing economy such as South Africa. Although the study has led to theoretical insights regarding the relationship of carbon tax and cap-and-trade schemes on greenhouse gas emissions and economic growth, an empirical study will be necessary to validate the theoretical conclusions arrived at in the study. As far as future research opportunities regarding the impact of carbon tax and cap-and-trade schemes on economic and environmental sustainability, the following may be considered. The third phase of the EU ETS started in 2012 and should end in 2020. The level of allocated permits in the third phase is expected to be even smaller than in the second phase. The impact of a shortfall in permit allocations on carbon leakage, which occurs when there is an increase in carbon dioxide in one country as a result of an emissions reduction by a second country with a strict climate policy could be significant. The ability of multi-national companies operating in countries with stringent climate change policies to shift production processes to other countries with less stringent climate change policies and thereby nullify any emission reductions should be considered in determining the true effectiveness of the EU ETS in the third phase.

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CHAPTER 4 (ARTICLE 2)

Title: Carbon tax pricing and the social cost of carbon: The case in the South African motor vehicle manufacturing industry

The reader is requested to take note of the following:

The article has been ***published*** in the following IBSS indexed, internationally peer reviewed academic journal as follows:

- Pillay, S. & Buys, P.W. 2013. Carbon Tax Pricing And The Social Cost Of Carbon: The Case In The South African Motor Vehicle Manufacturing Industry. *Journal of Applied Business Research*, 29(6):1751-1762. (ISSN: 0892-7626)

The published article is included in **Annexure C: Article 2 as published** on page **160**. The article was written in line with the journal's submission guidelines, which are included in **Annexure E: Clute Institute's author guidelines** on page **186**.

The article was researched and written by the first author (S Pillay) as the PhD candidate and primary author, while the second author (P.W. Buys) fulfilled a reviewer function thereto as the PhD project's promoter.

Abstract

Since the implementation of carbon tax on motor vehicles in South Africa during 2010, the pricing of the tax has never been challenged or assessed. The purpose of this study is to gauge the reasonability of the carbon tax price in South Africa as applicable to the motor vehicle manufacturing industry. A detailed review is performed to determine the adequacy of the carbon tax price by comparing the social cost of carbon from motor vehicle emissions against the revenue raised from carbon tax levied on motor vehicles in the same period. Empirical research includes an exploratory questionnaire into the adequacy of the carbon tax price in South Africa with input data from multinational motor vehicle manufacturers operating in South Africa. The findings from the literature review confirm that although the respondents do not consider the level of carbon tax price as adequate to be relevant for the social cost of carbon, the revenue raised from this tax exceeds the social cost of carbon leading to the conclusion that the tax is adequately priced.

Keywords: Carbon dioxide, carbon tax, cap-and-trade scheme, climate change, social cost of carbon

JEL Classification: M14, M21, M40, Q56

4. CARBON TAX PRICING AND THE SOCIAL COST OF CARBON: THE CASE IN THE SOUTH AFRICAN MOTOR VEHICLE MANUFACTURING INDUSTRY

4.1. Introduction

4.1.1. Background

According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), the average global temperature had increased by 0.741°C during the period 1906 to 2005, resulting in rising sea levels due to melting snow and ice (Li *et al.*, 2012). It is expected that greenhouse gas emissions will continue to increase over the next 30 years, resulting in even further rising sea levels and additional negative impacts on coastal ecosystems, among other (Hardisty, 2009). Governments therefore have to consider strategies and alternatives to reduce greenhouse gas emissions, such as CO_2, if they wish avoid or even just to mitigate the negative impacts of climate change. Two 'mainstream' instruments available to governments to lower greenhouses gas emissions include i) *cap-and-trade schemes,* which limits the quantity of allowable emissions with a final carbon price being established through trade allowances, and ii) *carbon taxes,* which seeks to reduce emissions through the pricing of emissions (National Treasury, 2010).

Cap-and-trade schemes originated from the Kyoto Protocol, which is a legally binding agreement signed by a host of industrial countries in December 1997 to reduce greenhouse gas emissions (Wittneben & Kyar, 2009; Kyoto, 2010; UNFCC, 2010). These schemes are regulatory measures designed to achieve environmental objectives at the lowest social cost by making pollution credits available to those who are best equipped to make the desired changes (Harwatt, 2008). Carbon tax, on the other hand, is a market-based instrument that creates a cost to emissions by directly taxing the carbon content of fuels (Hasset *et al.*, 2007). The purpose of a carbon tax is to internalise externalities related to anthropogenic climate change (Metcalf, 2009). A recent study concluded that South Africa is a major exporter of carbon; at least 129 per cent more carbon is associated with a dollar earned with exports than a dollar spent on

imports, with such figures having serious policy-related implications in a future where international climate-change trade limitations will become stricter and binding (Brent *et al.*, 2009).

Within the South African context, the National Treasury (2010) published a discussion document considering the economic merits for introducing a carbon tax in South Africa in December 2010, which highlighted their reasons for leaning towards carbon taxes as a method of limiting the social cost of carbon (or SCC). The discussion document evaluated the case for carbon tax against cap-and-trade schemes and concluded that carbon tax was the best policy instrument for South Africa, as it was administratively easy to manage and minimised opportunities for abuse due its simple structure. Estimates of the social cost of carbon were also briefly reviewed in the discussion paper as a guideline in determining the South African carbon tax price, which was suggested to be R75 per ton of CO_2 with an increase to approximately R200 per ton CO_2 (National Treasury, 2010). The actual carbon tax price implemented on 1 September 2010 on the sale of new passenger motor vehicles in South Africa was R75 for every gram of carbon dioxide per kilometre it emits over the 120g/km (NAAMSA, 2011; Shirley, 2010). It should be noted that, since the introduction of carbon tax in South Africa, the ability of a carbon tax policy to actually reduce CO_2 emissions has been questioned, but not assessed (Nel & Nienaber, 2012).

The SCC has been defined as the amount of damage caused by each additional ton of greenhouse gas emitted into the atmosphere (Hardisty, 2009; Pearce, 2003). Hardisty (2009:209) further states that the damage cost specifically relates to the probable impacts to the global economy caused by increases in global temperatures, rising sea levels, weather-related events, declining agricultural production and loss of biodiversity, among others. In terms of economic theory, in conditions of a perfect market where all social costs have been considered, any efforts to cut back the emissions of greenhouse gases would be feasible as long as the incremental cost of reducing the emission is lower than the increase in SCC (IPCC, 2012). Applying this general economic principle to the carbon tax scenario, we therefore argue that the SCC should be equal to, or lower than, revenues generated from carbon taxes in order for the instrument of carbon tax to be feasible.

4.1.2. Problem statement, objectives and research method

Following from the above, the potential knowledge gap this paper explores is found in its attempt to determine the adequacy of carbon tax revenues generated in compensation for the damages caused by related carbon emissions. It is acknowledged that this in itself is not a simplistic task and that there are multiple variables at play in such an endeavour. Notwithstanding, the key objective of this paper is to examine the SCC from a South African motor vehicle industry perspective, to which two supporting research questions have been formulated as follows:

- What is the (perceived) level of understanding by the South African motor vehicle manufacturers of the SCC, the implications of carbon taxes on their operations and the adequacy of such taxes?
- Is the South African carbon tax price pertinent to the motor vehicle industry adequately priced to compensate for the monetary damage caused by emitting one additional ton of carbon dioxide into the atmosphere?

The study comprises an exploratory study and analysis with both literature and empirical components. With regard to the *first* question as set out above, an exploratory study into the motor vehicle manufacturers' perceptions and understanding of the SCC and of the adequacy of the carbon tax pricing, as well as the impact of carbon tax on their business operations was conducted by way of a questionnaire developed based on an underlying literature study, utilising an appropriate four-point Likert-type response scale. The overall targeted population was the eight multinational vehicle manufacturers producing/assembling motor vehicles in South Africa. It should be noted that Renault and Nissan entered into a global alliance agreement, which effectively results in them becoming 'one manufacturer' in the South African context (Anon, 2013). Since there is such a limited number of manufactures available, all the companies were initially approached, with three of them offering their willingness to participate in the study. The researcher was available during the survey to provide guidance and clarification, should the respondents have had questions regarding the survey.

With regard to the *second* question as set out above, a detailed review quantifying the SCC of motor vehicles manufactured in South Africa has been identified in order to

determine the adequacy of carbon tax pricing in South Africa. The total level of carbon emissions attributable to motor vehicles manufactured in South Africa in 2011 was identified and the total damage due to CO_2 emissions emitted from these vehicles was established using cost of carbon estimates from previous research projects. It should be noted that as carbon emissions tax on all passenger motor vehicles in South Africa was implemented on 1 September 2010 (NAAMSA, 2011), the first complete year in which carbon tax was fully operational was the year 2011. Since carbon tax is levied only on *newly manufactured* vehicles, the related tax revenues generated in 2011 had to be matched to motor vehicles that were manufactured in the same period. This is the reason for using carbon emissions attributable to motor vehicles manufactured in 2011 exclusively.

The revenue received by the South African Revenue Service (SARS) in respect of carbon tax on motor vehicles was obtained and compared to the cost of CO_2 emissions by motor vehicles manufactured in 2011 to determine whether the carbon tax price adequately covered the total damage costs associated with carbon emissions from motor vehicles manufactured in 2011.

4.2. Motor vehicle manufacturers and SCC

In achieving the first objective, an exploratory questionnaire was distributed to the motor vehicle manufacturers in South Africa. Table 4.1 below presents a brief analysis of the descriptive statistics associated with the responses received from the respondents in respect of each question.

Table 4.1: Descriptive statistics of responses

Question no	Min Statistic	Max Statistic	Mean Statistic	Std Dev Statistic
1	1	3	1.67	1.12
2	4	4	4.00	0.00
3	4	4	4.00	0.00
4	4	4	4.00	0.00
5	1	4	2.00	1.73
6	1	4	2.00	1.73
7	1	4	2.33	1.53
8	3	4	3.67	0.58
9	1	4	2.33	1.53
10	1	4	2.33	1.53

The questionnaire was divided into two main sections, as indicated by the responses below:

4.2.1. Section I: Carbon tax compliance

The first part of the questionnaire focused on whether the respondents think there is a need for carbon tax and their overall compliance with carbon tax legislation. Question 1 asked whether there is a need for carbon tax in South Africa, question 2 enquired as to whether the respondents were aware of all carbon tax legislation and regulations, question 3 attempted to confirm whether there existed adequate internal controls over the carbon tax, and question 4 asked whether the respondents comply with all carbon tax legislation and regulations.

- *Question 1 (score:1.67):* The majority of the respondents do not consider there to be a need for a carbon excise tax on motor vehicles in South Africa.
- *Question 2 (score: 4):* All of the respondents confirmed that they aware of the carbon tax legislation and regulations applicable to the motor vehicle industry in South Africa.

- *Question 3 (score: 4):* All of the respondents were of the opinion that there exists adequate internal controls over the recognition, measurement, recording and payment of carbon tax applicable to motor vehicles.
- *Question 4 (score: 4):* All of the respondents in the study also confirmed that they comply with all carbon tax legislation and regulations applicable to motor vehicles.

It would therefore seem that although the motor vehicle manufactures do not particularly agree with the need of carbon tax in their institutions, they do comply with the applicable regulations.

4.2.2. Section 2: Carbon tax pricing and impact on manufacturing

The second part of the questionnaire focused on the pricing of carbon tax as well as the impact of the tax on production techniques and fuel efficiency of motor vehicles manufactured. Question 5 enquired about the impact of carbon tax on production techniques and technologies toward producing more fuel efficient vehicles, while question 6 focused on whether carbon tax has resulted in an improvement in the fuel efficiency of motor vehicles manufactured. Question 7 attempted to determine the impact of carbon tax on corporate social investment (CSI), question 8 enquired as to the awareness of the concept of the SCC among the respondents, question 9 enquired as to the adequacy of the current carbon tax price, while question 10 focused on whether carbon tax is the best policy decision from a climate change perspective.

- *Question 5 and Question 6 (score: 2):* No specific conclusions could be reached regarding the impact of carbon tax on production techniques, technology and the production of more fuel efficient vehicles within the South African context. The average answer obtained for both questions was mid-way in between the two extremes.
- *Question 7 (score: 2.33):* No specific conclusion could be made on whether the implementation of carbon tax has affected the respondents' CSI policy and/or behaviours. The average answer obtained for this question lies approximately mid-way in between the two extremes.

- *Question 8 (score: 3.67):* With regard to the awareness, the majority of the respondents are aware of the concept of the social cost of carbon.
- *Question 9 and Question 10 (score: 2.33):* There was no clear indication of whether the respondents consider the carbon tax price to adequately compensate for the damage caused by carbon emissions from motor vehicles or whether carbon tax is the best policy measure in addressing South Africa's climate change concerns.

A possible explanation for the inconclusive answer in question 5 is that the respondents' production techniques and technologies might vary with respect to the level of automated capacity versus labour intensity. A possible reason for the inconclusive answer to question 6 is that carbon emission reduction strategies differ among respondents with some respondents taking a more aggressive short-term approach as opposed to a more long-term gradual approach to carbon emission reductions. The variability in respondents' answers in respect of question 7 could lie in the impact of other factors such as company economic performance and market conditions on the internal CSI policies. On a factual basis, however, 66.67% of respondents do not agree (subject to exceptions) that the implementation of carbon tax has affected their CSI policy and/or behaviour. The average answer obtained for both questions was mid-way in between the two extremes. On a factual basis, 66.67% of respondents do not agree subject to exceptions that the carbon tax price adequately compensates for the damage caused by carbon emissions from motor vehicles, with a similar 66.67% that do not agree that carbon tax is the best policy measure in addressing South Africa's climate change concerns.

4.3. The adequacy of carbon tax pricing

In addressing the second objective regarding the adequacy of related tax revenues generated, the concept of quantifying the costs associated with carbon emissions using quantification models with the results of prior published research studies in determining an appropriate starting point. South African carbon tax cost was explored, which was followed by an evaluation of the adequacy of the carbon tax price by comparing the total estimated cost of damage caused by carbon emissions associated with

manufactured vehicles to the revenue raised from levying the relevant carbon tax in the same period.

4.3.1. Quantification of the monetary damage of carbon

Attributing a monetary cost to the damage caused by carbon emissions is important as it allows for a proper benefit analysis of the feasibility of a particular abatement instrument. Opponents of the quantification of damage caused by carbon emissions, however, argue that the true SCC cannot be determined as the effect on future generations is not yet fully known (Pearce, 2003). In determining the potential impact of carbon emissions, USG (2012) states that both scientists and economists face difficult challenges as there are always uncertainties and a lack of information about the future emissions of greenhouse gases as well as the effect of past and future emissions on the current climate system. Notwithstanding, several studies have attempted to quantify the SCC, or have attempted to evaluate the adequacy of carbon tax-related revenues to compensate for such SCC.

Within the South African context, the following provides an indicative estimate of the potential damage costs associated with carbon-related climate change (Midgley *et al.*, 2007):

- Flood damage costs in the Western Cape Province due to extreme rainfall events in the period from 2003 to 2007 have been estimated at around R1 billion.
- Coastal storm damage along the Durban coast in KwaZulu-Natal due to extreme weather events in 2007 have been estimated at around R100 million.
- Forestry losses during the 1991/1992 drought have been estimated at around R450 million.
- Drought impacts on agriculture 1983/84 have been estimated at be around R2.2 billion, and in 1991/92 to be around R3.5 billion.

In challenging the adequacy of carbon tax pricing, it is important to consider the distributional effects of a carbon tax. For illustrative purposes, various studies have been conducted in attempting to quantify the monetary impact of carbon tax on human society and welfare such as the following:

- In a study attempting to determine the effect of carbon tax on welfare in Italy, it was noted that the introduction of the tax had the effect of increasing welfare losses in households, with welfare losses increasing from €225,000,000 in 1995 to €938,820,000 in 2000 (Tiezzi, 2005).
- The quantitative welfare impact of carbon tax was also evaluated in a case study conducted in the United States on a 30 bus network, where it was noted that a uniform carbon tax would result in economic welfare losses of $2,700,000 (He *et al.*, 2012).
- In China, the impacts of various carbon tax schemes on household disposable income, household welfare, and economic growth were compared using a general equilibrium model indicating that a carbon tax will not only widen the urban-rural gap, but also result in welfare damage by reducing household savings by approximately ¥20,000,000,000 (Liang & Wei, 2012).

The studies above confirm instances where carbon tax was not the optimal policy choice in terms of welfare and distributional effects as the net impact of the implementation of carbon tax resulted in welfare losses. In such situations, one may conclude that the benefits of implementing a carbon tax will not exceed the SCC. Theoretically therefore, if the price of the carbon tax does not match the SCC in South Africa, one may expect similar welfare losses to those noted above.

4.3.2. Quantification models for determining the SCC

The SCC is often determined by economists using Integrated Assessment Models (IAMs), because they attempt to include knowledge from various fields of study (such as engineering, technology, behaviour and climate science) for the purpose of determining whether climate change policies are economically efficient (WRI, 2012). In South Africa, recent studies have incorporated the use of computer generated equilibrium (CGEs) models to determine the economy-wide impacts of a carbon tax, and while these are precise and functional, the static nature of CGE models often make them unsuitable for modelling the impacts of long-term problems such as climate change with significant uncertainty (National Treasury, 2010). In consideration of carbon prices, Table 4.2 below summarises the estimated carbon prices across different years by different research projects.

Table 4.2: Summary of carbon price estimates

No	Study	CO_2 price per ton (SA Rand)
1	Devarajan (2009)	96.25
2	Winkler/Marquaard (2009)	200.00
3	Long-term mitigation (2008)	100.00
4	Metcalf (2008)	123.45*
5	Nordhaus (2008)	699.55*
6	Stern Review (2007)	210.90*
7	Fankhauser (1994)	140.18*
8	Nordhaus (1991)	22.08*

(* Foreign currencies are converted to South African Rand at the relevant exchange rate.) Sources: National Treasury (2010); OANDA (2012); Devarajan *et al.* (2009)

An analysis of the estimates above reveals a range of so-called carbon prices over different periods. In terms of the sample of studies reflected in the above table, it should be noted that only three studies, i.e. the *Long-term mitigation, Winkler/Marquaard* and *Devarajan* studies, were specific to the South Africa context, with the *Long-term mitigation* and the *Devarajan* studies using CGE models to determine the estimate of the carbon price. It is submitted that the three South African studies should be used as a basis of determining the appropriate estimated South African carbon tax price as they are more specific to the South African context. The mean average of the three studies therefore confirms an average carbon tax price of R132.08 per ton of carbon.

4.3.3. The adequacy of carbon tax pricing in South Africa

The adequacy of carbon tax pricing has been assessed by comparing the benefits of introducing a carbon tax (as evidenced by tax revenue generated) per tax statistics published by the Department of National Treasury and comparing this revenue against the cost of carbon (as calculated above) in respect of emissions by newly manufactured motor vehicles in 2011 (being the latest complete data available at the stage of the research). The actual cost of carbon was then computed by multiplying South African

carbon tax emissions from motor vehicle emissions against the carbon tax price. South African carbon emissions from motor vehicles have been estimated using reports from the United Nations, Statistics South Africa and the World Bank. The following steps were employed to test the adequacy of the carbon tax price on motor vehicles in South Africa:

4.3.3.1. Step 1: The total level of carbon emissions in South Africa

The historical carbon emission levels in South Africa are available up to 2010 using data published by the United Nations (UN, 2012). Growth rates have been determined over the most recent prior five-year period, and the average growth rate of 3.2% has then been used to estimate the carbon emissions for South Africa in 2011 (refer figure 4.1 below).

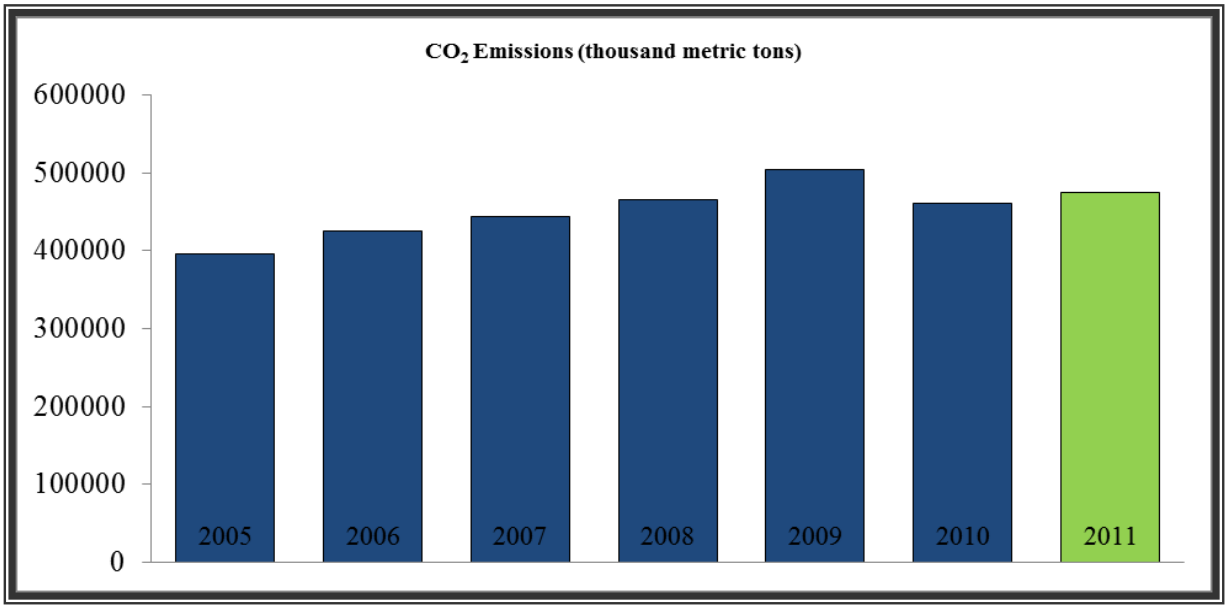

Figure 4.1: Carbon emissions in South Africa

Source: (adapted and forecasted from UN, 2012)

As illustrated above, extrapolating the historical carbon emission trends in South Africa brings the total estimated CO_2 emissions for 2011 at 475,004,400 metric tons (across all industries).

4.3.3.2. Step 2: The total level of carbon emissions attributable to the motor vehicle industry

Since carbon tax is levied only on *newly manufactured* vehicles, the related tax revenues generated had to be matched to these vehicles. 2011's total carbon emission estimate therefore had to be adjusted to reflect the motor vehicles manufactured in 2011. The total carbon emissions (expressed in tons) from motor vehicles manufactured were derived indirectly as there was no direct literature source for this statistic. *Firstly*, the total carbon emissions in 2011 attributable to the motor vehicle industry were obtained from the Devarajan study (as above), which estimated the total carbon emissions attributable to the motor vehicle industry at around 10% of the country's total CO_2 emissions (Devarajan *et al.*, 2009). Under the assumption that the percentage is stable on a year-to-year basis, the estimated figure comes to 47,500,440 tons of carbon emitted by the motor vehicle industry in 2011. This estimate, however, includes emissions from 2011 and prior years' vehicles.

According to the World Bank (2012) and Statistics South Africa (2005-2011), there were 5,926,372 vehicles in South Africa in 2011; while, according NAAMSA (2012), there were 532,545 vehicles manufactured and sold in the same year. The ratio manufactured motor vehicles to the total motor vehicles is therefore 8.9% (or 532,545 vehicles/5,926,372 vehicles). Following hereon, the estimate of total carbon emissions in respect of the 2011 motor vehicles manufactured amounts to 4,227,539 tons (or 8.9% of 47,500,440 tons).

4.3.3.3. Step 3: Evaluate the adequacy of carbon tax revenues

In order to evaluate the adequacy of revenues generated, the total carbon emissions attributable to motor vehicles manufactured in 2011 (4,227,539 tons as calculated in step 2 above) are firstly multiplied by the carbon tax cost (R132.08 per ton as determined earlier) to arrive at a calculated SCC of motor vehicles manufactured in 2011. This results in an estimated social cost of carbon from 2011 motor vehicles manufactured of R558,373,372 (R132.08*4,227,539 tons of carbon). Secondly, according to National Treasury and South African Revenue Service (2012), the related carbon tax revenue received by the SARS amounted to R626,000,000 in 2011 and

R1,617,000,000 in 2012, respectively. As carbon tax was implemented on 1 September 2010, it is submitted that a reasonable figure of tax revenue for 2011 would be R208,667,000 (being an average estimate for January and February 2011) plus R1,347,500,000 (being an average estimate for March to December 2011), which brings the total calculated revenue for 2011 to R1,556,167,000. On a high and estimated level, the carbon tax revenues therefore exceed the estimate of the social cost of carbon in respect of motor vehicles manufactured in 2011 quite substantially. It would therefore seem that the carbon excise tax price in South Africa more than adequately covers the SCC and passes the cost-benefit reasonability test in terms of policy-making.

4.4. Discussion and conclusion

In addressing the key objective as set out earlier, this article explored the social cost of carbon and carbon taxes within the context of the South Africa motor vehicle manufacturing industry, and then specifically the industry's awareness thereof together with the adequacy of the tax revenue generated per the objective of the tax policies.

In respect of the *first* objective as specified, in terms of overall carbon tax compliance, though the majority of respondents considered that there is no need for a carbon tax in South Africa. It was further noted in terms of carbon tax policies that the majority of the respondents do not agree that carbon tax is the best policy measure in addressing South Africa's climate change concerns. Notwithstanding, all the respondents confirmed that they were aware of carbon excise tax legislation and regulations. The respondents also confirmed that they maintained adequate internal controls over carbon taxes collected. It was further noted that all the respondents are in compliance with all carbon tax legislation and regulations. Furthermore, in terms of the carbon tax impact on manufacturing, no conclusions could be drawn on the impact of the tax on production techniques and the fuel efficiency of motor vehicles manufactured. This could be due to the variation on production techniques and technology applied by different motor vehicle manufacturers in South Africa. With regard to their CSI policies, the majority of the respondents did not think that carbon tax would impact on its CSI expenditure. In terms of awareness of the concept of the social cost of carbon, the majority of the respondents confirmed that they are aware of the concept.

In respect of the *second* objective as specified, it would seem that the majority of respondents do not think (subject to exceptions) that the current carbon tax price adequately compensates for the damage caused by carbon emissions from motor vehicles. However, when considering the estimated level of carbon emissions of the relevant vehicles manufactured, and considering the revenues generated by the carbon on such vehicles, it would seem that the tax price is adequately levelled to compensate for the SCC related to the applicable vehicles. Notwithstanding the adequacy of the tax revenue generated, it remains a point of contention whether these revenues generated for the government coffers will in effect be used for related SCC issues, or whether it will just disappear into the *general government revenues*.

Looking at the results of the study as whole, one may conclude that South African motor vehicle manufacturers comply with carbon tax regulations and laws; however, the impact of carbon tax on production techniques and fuel efficiency on vehicles is still not truly established. Another important finding is that local motor vehicle manufacturers do not consider carbon tax to be the best climate change policy instrument for South Africa. This could be due to a number of reasons including the belief that the price of the tax has not adequately considered the price elasticity of demand relating to motor vehicles manufactured in South Africa or the perception that the SCC is actually greater than the carbon tax price.

4.4.1. Limitations and future research

With regard to the exploratory nature of this study, certain assumptions have been made and applied in determining the adequacy of the pricing of carbon tax constitute limitations. These assumptions included using an average growth rate in determining the carbon emissions for 2010 and 2011, as well as that the motor vehicle industries' proportionate share of carbon emissions in 2011 was similar to that of 2009. These assumptions may result in distortions in the final quantitative analysis of the reasonability of the carbon tax price.

Furthermore, even though the sample size may be considered small, the fact is that there are only limited motor vehicle manufacturers in South Africa, of which a substantial portion did participate in the study. Notwithstanding, the reader must take cognisance of

this fact and be careful to generalise any findings to the motor vehicle industry *per se*, but such findings should be read and understood within the context of this study. A further limitation is that carbon tax might also be more or less relevant to a motor vehicle manufacturer depending on the existing level of fuel efficiency of vehicles manufactured. The depth and accuracy of answers provided in the questionnaire could therefore hinge on the existing level of fuel efficiency of motor vehicles manufactured.

A very topical future research opportunity lies in the fact that a national carbon tax is to be implemented by the National Treasury in South Africa as from 2015. Contributing studies into the pricing of such taxes will be of significant importance as the tax will be applicable to almost all companies operating in South Africa.

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4.6. Article annexure: Questionnaire

Company name: _____
Interviewee: _____
Date of interview: _____

Please allocate marks to each question as follows:
1. Do not agree
2. Do not agree subject to exceptions
3. Agree subject to exceptions
4. Strongly agree

SECTION I: General				
1. There is a definite need for a carbon excise tax on motor vehicles in South Africa.	1	2	3	4
2. I am aware of all carbon excise tax legislation and regulations applicable to the motor vehicle industry in South Africa.	1	2	3	4
3. There are adequate internal controls over the recognition, measurement, recording and payment of carbon excise tax applicable to motor vehicles.	1	2	3	4
4. My company complies with all carbon excise tax legislation and regulations applicable to motor vehicles.	1	2	3	4
SECTION II: Carbon tax impact and the social cost of carbon				
5. The implementation of carbon excise tax changed the production techniques and technologies toward producing more fuel efficient vehicles.	1	2	3	4
6. The implementation of carbon excise tax has resulted in an improvement in the fuel efficiency of motor vehicles manufactured.	1	2	3	4
7. The implementation of carbon tax has affected our company's corporate social investment policy and/or behaviours.	1	2	3	4
8. I am aware of the concept of the social cost of carbon.	1	2	3	4
9. The carbon tax price and revenue generated from its implementation adequately compensates for the damage caused by carbon emissions from motor vehicles.	1	2	3	4
10. Carbon tax is the best policy measure in addressing South Africa's climate change concerns.	1	2	3	4

CHAPTER 5 (ARTICLE 3)

Title: Carbon tax implications on corporate social investment in the South African motor vehicle manufacturing industry

The reader is requested to take note of the following:

The article has been ***accepted*** for publication in the following IBSS indexed, peer-reviewed academic journal as follows:

- Pillay, S. & Buys, P.W. Carbon Tax Implications On Corporate Social Investment In The South African Motor Vehicle Manufacturing Industry. *International Business and Economics Research Journal*, 12(12): (in press). (ISSN: 0892-7626)

The article submission and confirmation of acceptance is included in **Annexure D: Article 3 as accepted** on page **173**. The article was written in line with the journal's submission guidelines, which are included in **Annexure E: Clute Institute's author guidelines** on page **186**.

The article was researched and written by the first author (S Pillay) as the PhD candidate and primary author, while the second author (P.W. Buys) fulfilled a reviewer function thereto as the PhD project's promoter.

Abstract

Carbon excise tax was implemented on all passenger motor vehicles as from 1 September 2010 in South Africa. Since its implementation, the impact of carbon tax on the corporate social investment (CSI) initiatives and expenditure of South African motor vehicle manufacturers has not been assessed. Given that the carbon tax price should ideally compensate for the damage caused by carbon emissions on the environment and people, the key knowledge gap this article aims to consider is whether the implementation of such a carbon tax is likely to affect the CSI decision-making process in respect of motor vehicle manufacturers in South Africa.

The research methodology applied in this study is both in the form of a literature review as well as empirical research. A literature review was performed on the history, emergence and significance of CSI expenditure within the South African context. The empirical research includes an exploratory case study into the impact of the tax in the decision-making processes with regard to CSI expenditure as well as the impact of carbon tax on CSI spending by motor vehicle manufacturers in South Africa. It was found that although the advent of carbon tax in the industry would place added pressure on the financial performance of the companies, it is unlikely that it would adversely affect the industry's commitment to the CSI initiatives.

Keywords: Carbon taxation, climate change, corporate social investment, corporate responsibility

JEL classification: M14, M21, M40, Q56

5. CARBON TAX IMPLICATIONS ON CORPORATE SOCIAL INVESTMENT IN SOUTH AFRICA

5.1. Introduction

5.1.1. Background

According to Hahn (2008:2), the European Commission defines *corporate responsibility* as a concept whereby companies integrate social and environmental concerns into their business operations. As such, it is closely related to the concept of sustainable development (Mirflazi, 2008), which puts the social, economic and environmental aspects of a company at the centre of its focus (Hahn, 2008). In support hereof, integrated reporting has been defined as a written communication about how a company's strategy, governance, performance and prospects can contribute to the creation of value over the short, medium and long terms (IIRC, 2013). Integrated reporting has also been referred to as the integration of corporate responsibility reporting into existing financial reporting models to allow the users of such information to reflect on the social, environmental and economic impacts of the organisation (IRC, 2013; KPMG, 2011:2), thereby allowing for greater transparency and governance, while promoting sustainable value creation (Buys, Van Rooyen & Bosman, 2009).

A key factor in an organisation's ability to sustain value is found in the concept of sustainable development, which can be defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs (Strange & Bayley, 2008:27; Newport *et al*., 2003). Brent *et al* (2009) however, states that there is evidence that liberalized trade and increased incentives for exports from developing countries (such as South Africa) lead to greater exploitation of natural resources. The value of sustainable development lies in ensuring the wellbeing of humanity by promoting social and economic development, together with environmental conservation and protection (HREA, 2013). The core of sustainable development therefore requires the consideration of its *three pillars*, namely the society, the economy and the environment (Strange & Bayley, 2008:27; Newport *et al*., 2003), also referred to as the triple bottom line (TBL). The concept of sustainable development therefore

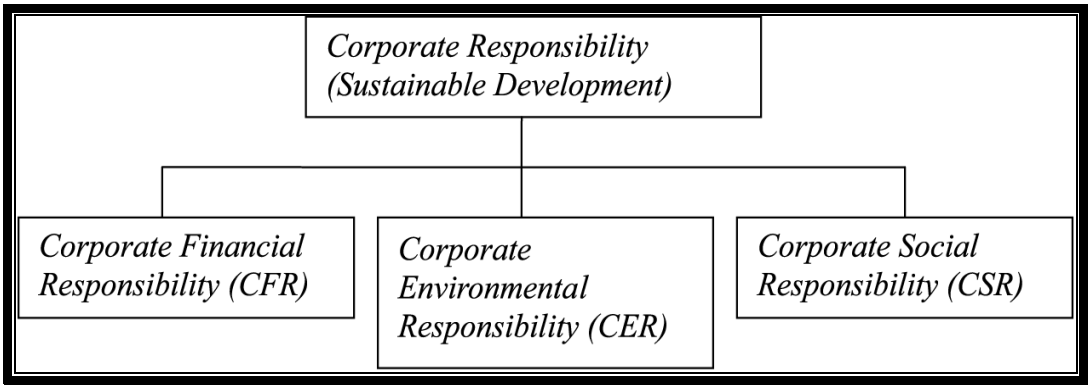
provides a guiding framework for global development, which then in turn provides guidelines for good corporate responsibility.

5.1.2. The concept of corporate responsibility

The broader concept of corporate responsibility is concerned with treating all the stakeholders of the company in an ethical and responsible manner, where the terms 'ethical' and 'responsible' translate into treating stakeholders in a manner that is deemed to be acceptable in civilised societies (Scott, 2007:32). It is important to note that the concept includes environmental considerations not only required by law and regulations, but also going beyond mere compliance to such laws and regulations, such as the private provision of public goods and the voluntarily internalisation of externalities (Lyon &Maxwell, 2008). Often, the outcomes of research into corporate responsibility-related topics have confirmed positive relationships between financial performance and social responsibility, with the implication that management should take such responsibility implications into account in their business decision-making (Chen, 2011; Margolis & Walsh, 2003).

A company's overall corporate responsibility strategy may be further broken down into three key components or building blocks, namely i) corporate financial responsibility, ii) corporate environmental responsibility and iii) corporate social responsibility (Harvard, 2013; Mirflazi, 2008) (refer to Figure 5.1 below).

Figure 5.1: The building blocks of corporate responsibility



Source: Adapted from Mirflazi (2008)

Although very much inter-related, Harvard (2013) and Mirflazi (2008) do identify distinct focus differences between the *corporate financial responsibility*, which deals with the efficient management of capital and the effective utilisation of corporate assets, *corporate environmental responsibility*, which attempts to reduce the adverse effects of environmental problems, and *corporate social responsibility*, which deals, *inter alia*, with how a company manages its relationships in key spheres of influence such as the workplace, marketplace, community and public policy realms.

5.1.3. The concept of corporate social investment

Within the South African corporate responsibility (or sustainable development as per Mirflazi (2008)) context, companies have reacted more positively to the concept of *investment* as opposed to the concept of *responsibility*, which could have been perceived as linking them to discriminatory practices of the past. The concept of *corporate social investment* (CSI) therefore suggests that a *business-oriented* outcome is often preferred over doing something because it is *vaguely ethical* (Skinner & Mersham, 2008). CSI, as such, encompasses company projects that are external to the ordinary business activities and do not specifically have a profit motif. Rather, such projects would utilise company resources to the benefit and upliftment of various communities within the broader society (CSI, 2012). Whereas the terms *corporate social investment* and *corporate social responsibility* (or CSR) were previously often interpreted interchangeably, they should in effect be defined separately with the latter referring to the organisation's total responsibility towards the business environment, and the former being considered as a sub-component thereof, aiming to *uplift* communities in such a way that the overall quality of life is improved (CSI, 2012).

According to Brent *et al* (2009) South Africa's climate change strategy sets out to reduce the rate of increase in greenhouse gas emissions by 2020, and then to stabilize such emissions for ten years, after which it would aim to reduce the emissions in absolute terms. As part of the South African government's effort to *manage* greenhouse gas emissions, a carbon excise tax was introduced on all new passenger motor vehicles manufactured as from 1 September 2010 (Shirley, 2010; NAAMSA, 2011). The purpose of a carbon tax is to internalise externalities related with anthropogenic climate change (Nel & Du Plooy, 2013; Metcalf, 2009). Carbon tax is a market-based

instrument that creates a cost to emissions directly by taxing the carbon content of fuels (Hasset *et al*, 2007). The social cost of carbon (SCC) has been defined as the amount of damage caused by each additional tonne of greenhouse gas emitted into the atmosphere (Hardisty, 2009). Any carbon tax should in terms of cost-benefit analysis therefore be equal to the marginal damage caused by greenhouse gas emissions at the point where marginal damage equals marginal cost (Pearce, 2003). However, there are other aspects that must also be considered, other than the direct social cost of carbon. Indirectly, many companies do re-invest much of their resources and profits into social upliftment initiatives. By placing additional pressure on such companies' financial performances, their ability (and perhaps even willingness) to contribute to CSI initiatives may be adversely affected.

5.2. Research objectives and methodology

Following from the above, and given the potential impact of carbon taxes on private companies' CSI initiatives, this paper aims to explore the potential impact of carbon tax implementation on such initiatives and expenditure for motor vehicle manufacturing companies in South Africa. The primary research question under consideration could therefore be formulated as follows:

- Is the implementation of carbon tax likely to adversely affect the CSI initiatives and expenditure of the motor vehicle manufacturers in South Africa?

In addressing the above question, two basic high-level objectives are set. Firstly, the development and impact of CSI within the South African context has to be considered, and secondly, the commitment of the motor vehicle manufacturers to their CSI initiatives and expenditure, in light of the additional carbon tax burden facing them, should also be considered. This research project is also conducted as a case study. According to Van Wynsberghe and Khan (2007), case study research has been defined as a trans-paradigmatic and trans-disciplinary heuristic that involves the careful explanation of the occurrences for which substantiation is being collected (Van Wynsberghe & Khan, 2007). Such research promises benefits in terms of developing internally valid and context-sensitive measures of concepts (Bennett & Elman, 2006).

With regard to the literature research, a review of the emergence of CSI in South Africa is conducted, followed by a consideration of the welfare effect of such social investment within the context of corporate responsibility and sustainable development. The economic significance of the South African motor vehicle industry and its contribution to CSI is also considered. The empirical research component focused on the potential impact of carbon tax on the CSI policies and strategies, of the South African motor vehicle manufacturers. The sample characteristics of the respondents include multinational motor vehicle manufacturers, within the boundaries of South Africa that are subject to carbon excise tax on motor vehicles sold to the general public. The overall targeted population was the eight multinational vehicle manufacturers producing/assembling motor vehicles in South Africa. It should be noted that Renault and Nissan entered into a global alliance agreement, which effectively results in them becoming 'one manufacturer' in the South African context (Anon, 2013). Since there is such a limited number of manufactures available, all the companies were initially approached, with three of them offering their willingness to participate in the study.

The research questionnaire was developed based on the underlying literature study and consisted of ten questions, utilising an appropriate four-point Likert-type response scale as well as a quantification of actual CSI initiatives and expenditure for the years 2009 to 2012. The period 2009 to 2012 allowed for the evaluation of the *before* and *after* impact of carbon tax (being implemented as from 2010) on CSI initiatives and expenditure as well as to provide corroborative evidence to answers in response to questions included in the questionnaire. The researcher was available during the survey to provide guidance and clarification in case the respondents had questions regarding the questionnaire.

In order to meet its objectives, the questionnaire had three objectives, namely i) to determine the current perception of the meaning and value of CSI by the respondents ii) to determine the respondents' perceptions of the welfare effect of carbon tax, and iii) to evaluate the impact of carbon tax on the company CSI initiatives and expenditure.

5.3. Corporate social investment relevance in South Africa

5.3.1. Introduction

The sections that follow examine the impact of carbon tax on CSI under the assumption that the carbon tax price correctly reflects the monetary damage caused by carbon emissions. The impact of carbon tax on CSI is analysed by firstly considering the emergence of CSI in South Africa, and then evaluating the contribution of the South African motor vehicle manufacturers to CSI initiatives within South Africa.

5.3.2. CSR and CSI emergence in South Africa

Even though CSR principles may be traced to the 1800s, with Adam Smith's book entitled *The Wealth of Nations*, first published in 1776, the emergence of globalisation in the 1980s and 1990s resulted in greater environmental awareness and the development of responsible business practices (SSA, 2012). Companies within South Africa may also benefit in terms of financial performance and competitiveness by implementing well-designed CSR strategies, as a recent study of emerging markets (which included South Africa) confirmed that proactive CSR strategies combined with generating quantitative extra financial information to shareholders and regulators is an emerging driver of global competitiveness in respect of industrial organisations (Segot, 2011). The background to the emergence of CSI in South Africa lies in performance-based CSR measures, which have been adopted in many developing countries with specific accountability ratings having been applied at various times (Ndlovu, 2011).

Following the implementation of the Black Economic Empowerment Act of 2003 in South Africa, there has been increased pressure on companies to play a greater role in generating development goals (Ndlovu, 2011). The guidelines of the Black Economic Empowerment Act formalise CSR programmes and allow its results to be more easily communicated (CSR, 2012). The South African government's commitment to encourage corporate responsibility is also evidenced by the *Codes of Good Practice*, which were finalised on 9 February 2007, and aim to ensure consistency in the implementation of socially responsible behaviour in the area of empowerment of historically disadvantaged population groups (Arya & Bassi, 2011). The overall concept

of corporate responsibility is also further encouraged in South Africa by the following (CSR, 2012):

- The South African Constitution (drafted in 1994) and reforms of the existing legislature have allowed for social and environmental topics to be focused on by companies.
- The scarcity of skilled employees in certain areas of expertise in South Africa has resulted in the creation of specialised training programmes that various companies may sponsor.
- The HIV problem in South Africa has allowed for greater involvement of South African companies in the field of healthcare.

It should be noted, however, that CSI is specific to South Africa and that it is (arguably) driven primarily by legislation and industry charters (Hinson & Ndlovu, 2011). However, Hinson and Ndlovu (2011) also note that it promises to present a new way of addressing developmental problems in South Africa. Following the emergence of CSI in South Africa in 2004, the Johannesburg Stock Exchange (JSE) launched the first Socially Responsible Investment (or SRI) index, which contains a listing of companies on the FTSE/JSE All Share Index that have met certain criteria in respect of socially responsible performances (JSE, 2012). The popularity of the SRI index among companies can be measured in terms of compliance to the relevant guidelines and frameworks, such as the JSE's integrated reporting requirement or the Global Reporting Initiative (GRI) framework, for example. According to SSA (2011), the annual 2011 SRI index review (which reviewed 109 JSE-listed companies), found that approximately two thirds of the JSE-listed companies assessed by a JSE-appointed *global investment research provider*, had fulfilled the requirement to become a constituent of the JSE's SRI index as at December 2011.

With regard to *social sustainability*, Cronje and Chenga (2009:416) suggest the social dimension of sustainable development encompasses the transformation, and perpetual improvement of the livelihoods of people within a specific social context. According to Haman (2003), such responsibility of social sustainability can also be framed in terms of social investment as it effectively requires a company to respond to communities and the general public on issues such as human rights and employee welfare.

5.3.3. The South African motor vehicle manufacturer's role in CSI

The national contribution of South African companies to CSI initiatives is significant; with Thwaits (2012) indicating that up to R6.2 billion was spent in the areas of education, healthcare and community development for the 2010-2011 financial year. In an analysis of social investment expenditure by industry, CSI (2006) found that the manufacturing industry is currently the fifth largest contributor to the total CSI expenditure in South Africa.

Within the context of the South African manufacturing industry, the motor vehicle sector contributes approximately 7.5% to the country's total GDP, and accounts for approximately 10% of the country's total manufacturing exports (SAI, 2008). Considering these numbers, it is little wonder that the government considers the motor vehicle industry as a key sector targeted for growing the country's economy. Within this context, the South African motor vehicle manufacturers have then also contributed in a significant manner to CSI initiatives. In terms of monetary investments, Volkswagen SA, for example, invested in excess of ZAR400,000,000 (U$48,000,000) (VWSA, 2012; OANDA, 2013), and Mercedes Benz SA invested in excess of ZAR270,000,000 (U$33,000,000) in CSI projects (MBSA, 2012; OANDA, 2013). Furthermore, according to Mossman (2010), the types of CSI projects typically receiving funding from the motor vehicle manufacturing industry include social upliftment initiatives focusing on:

- Education-related funding such as:
    - The Nelson Mandela Ndonga School and Clinic Project;
    - the Technology Laboratory on the Mamelodi campus of Vista University;
    - the BMW Mathematics Science and Technology Centres for Excellence;
    - the Mercedes-Benz Coastal Education &Visitors' Centre;
    - the Schools Start-up Programme for primary education in partnership with the Eastern Cape Department of Education; and
    - the Volkswagen Community Trust Socio-economic factors focusing specifically on education, youth development and job creation.
- Healthcare funding for multiple HIV/AIDS and child healthcare centres such as:
    - the Soshanguve Health and Wellness Centre;

    - the BMW Love Life Youth Center against HIV/AIDS;
    - the Siyakhana SME HIV & Aids;
    - the Hillcrest Aids Centre;
    - the St Bernard's Hospice;
    - the Mamelodi Hospice;
    - the Trucking Against Aids Wellness Centre; and
    - the Baby Therapy Centre.
- Environmental-related funding for initiatives such as:
    - The Schools Environmental Education Development (or SEED) project focusing on increasing environmental awareness among children;
    - the Peace Parks Foundation; and
    - the World Wide Fund (WWF) bursary awarded to women from a rural community to study towards a qualification in natural resource management.

Considering the above historical examples, it is clear that the motor vehicle manufacturers in South Africa have not been lax in their social investment initiatives in various South African communities. The question, however is, whether the advent of the additional burden of carbon taxes on their products may reduce their level of commitment to future social investment initiatives.

5.4. The effect of carbon tax on CSI initiatives

The sections that follow consider the potential impact of carbon tax on the CSI initiatives and expenditure of the South African motor vehicle manufacturers. In order to address the research question and objectives as set out above, a questionnaire was submitted to the South African motor vehicle manufacturers. Table 5.1 below represents an analysis of descriptive statistics associated with the responses received from the respondents.

Table 5.1: Analysis of descriptive statistics

Question no	Min statistic	Max statistic	Med statistic	Std dev statistic
1	3	4	3.67	0.58
2	3	4	3.67	0.58
3	4	4	4	0
4	4	4	4	0
5	4	4	4	0
6	4	4	4	0
7	2	3	1.67	1.53
8	4	1	2.33	1.53
9	4	1	2.33	1.53

5.4.1. Section 1: CSI perception and carbon tax compliance

The first part of the questionnaire focused on the respondents' understanding of the concept of CSI as well their overall level of compliance with carbon tax legislation. Question 1 enquired whether social investment is considered as a necessary cost of doing business, while question 2 asked whether social investment gives a company a distinctive position in the market. Question 3 asked the respondents to confirm the definition of CSI as taking proper account of the broader interests of society when making business decisions. Question 4 posed an alternative definition of CSI, which is to sacrifice profits in order to do the right thing. Question 5 determined whether the respondents comply with all relevant carbon tax legislation and regulations.

- *Question 1 (score: 3.67):* The majority of the respondents strongly agree without exception that CSI is a necessary cost of doing business within the South African business context.
- *Question 2 (score: 3.67)*: The majority of the respondents strongly agree without exception that CSI gives a company a distinctive position in the market.

- *Question 3 (score:4)*: All of the respondents in the study confirmed the definition of CSI as taking proper account of the broader interests of society when making business decisions.
- *Question 4 (score: 4)*: All of the respondents in the study confirmed an alternative definition of CSI as sacrificing profits in order to *do the right thing*.
- *Question 5 (score: 4)*: All the respondents confirmed that they are in compliance with all carbon tax legislation and regulations.

5.4.2. Section 2: Carbon tax pricing

The second part of the questionnaire focused on carbon tax pricing and its relationship to their CSI initiatives and expenditure. Question 6 asked about the impact of carbon tax pricing on their CSI decision, while question 7 enquired as to the respondents' opinion on whether carbon excise tax for motor vehicles is adequately priced and accurately reflects the associated damage cost from motor vehicle carbon emissions.

- *Question 6 (score: 4)*: All of the respondents confirmed without exception that carbon tax pricing has no impact on their CSI initiatives and expenditure.
- *Question 7 (score: 1.67)*: No specific conclusion could be made on whether carbon tax is being adequately priced and whether the carbon tax price accurately reflects the associated damage cost from motor vehicle carbon emissions, thereby indicating that there is some uncertainty among vehicle manufacturers as to whether carbon tax is adequately priced and accurately reflects the damage costs from motor vehicle carbon emissions.

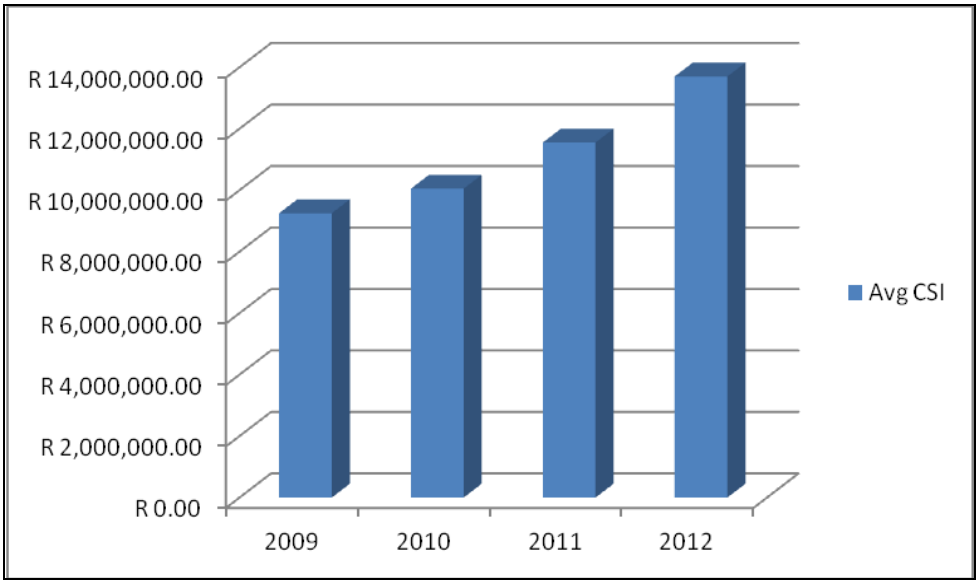
5.4.3. Section 3: Impact of carbon tax on CSI policy and expenditure

This section of the questionnaire focused on the impact of carbon tax on social investment and in particular whether the CSI budgets of the motor vehicle manufacturers were lowered since the inception of carbon tax. Question 8 asked whether the implementation of carbon tax affected their social investment policies and strategies. Question 9 is framed under the assumption that carbon tax is adequately priced and asked the respondents to confirm whether their obligations to society and the environment under CSI are effectively reduced as result of the implementation of

carbon tax. Question 10 required the respondents to quantify the CSI expenditure for the years 2009 to 2012 to determine the pattern of CSI expenditure both before and after the implementation of carbon tax.

- *Questions 8 and 9 (score: 2.33 each)*: No specific conclusion could be made on whether the implementation of carbon tax has affected the CSI policy and strategy of the respondents. The average answer obtained for the question was mid-way in between the two extremes. On a factual basis, however, 66.67% of the respondents do not agree, subject to exception, that carbon tax has affected the corporate social investment policy and strategy of the company.
- *Question 10:* Quantifications of actual corporate social investment expenditure from the 2009 to 2012 were requested from the respondents. The actual average corporate social investment expenditures as received from the respondents are presented in Figure 5.2 below:

Figure 5.2: Average CSI as reported by the respondents



The horizontal axis represents the year in review and the vertical axis represents the CSI expenditure. When considering the trend in the average CSI expenditure as reported by the respondent (as illustrated in Figure 5.2 above), it would seem as if the implementation of carbon tax did not adversely affect the bigger picture in terms CSI expenditure. It should, however, be noted that the above is a presentation of the average

CSI expenditure, and that individual respondents may have different experiences than the above.

5.5. Discussion and conclusion

The key aim of this paper was to consider the potential impact of carbon tax implementation on the social investment strategies and expenditure of motor vehicle manufacturing companies in South Africa. In answering the question of whether the implementation of carbon tax is likely to adversely affect the corporate social investment initiatives of the motor vehicle manufacturers in South Africa, two objectives were set. Firstly, it was indicated that the concept of corporate social investment shifts the focus from a *responsibility* perspective, to a more constructive *investment* perspective. To that effect, the motor vehicle manufacturing industry became a major contributor to such social upliftment initiatives.

In gauging whether the advent of a carbon tax had an effect on the revenue source for this industry, there may be a valid concern that the industry might limit (or plan to limit) their contribution to corporate social investment initiatives within the South African context, which has to be highlighted, and secondly, the commitment of the motor vehicle manufacturers to their corporate social investment strategies, in light of the additional carbon tax burden facing them, should be determined. To that effect, the respondents have indicated that they strongly agree without exception that corporate social investment is a necessary cost of doing business and that CSI gives a company a distinctive position in the market. All of the respondents in the study confirmed the definition of CSI as taking proper account of the broader interests of society when making business decisions as well as the practice of sacrificing profits in order to do the right thing. In addition, all of the respondents confirmed that they comply with all carbon tax legislation and regulations. In terms of the carbon tax pricing, all of the respondents confirmed without exception that carbon tax pricing has no impact on the CSI decision. No conclusion could be made on whether carbon tax was adequately priced and whether the carbon tax price accurately reflects the associated damage cost from motor vehicle carbon emissions. The responses indicated that there is uncertainty among motor vehicle manufacturers as to whether carbon tax is adequately priced and accurately reflects the damage costs from motor vehicle carbon emissions. Finally, no

conclusion could be made on whether the implementation of carbon tax has affected CSI policy and strategy of the company. However, 66.67% of the respondents did not agree, subject to exception, that carbon tax has affected the corporate social investment policy and strategy of the company. No conclusions could be made on whether corporate obligations to environment and society under CSI would be reduced due to the implementation of carbon tax under the assumption that carbon tax is adequately priced.

Approximately 66.67% of the respondents do not agree, subject to exception, that corporate obligations to environment and society under CSI are reduced as a result of the implementation of carbon tax. A quantitative analysis of CSI expenditure incurred by two respondents confirms that CSI policy is non-responsive to the implementation of carbon tax and has not resulted in any decrease in CSI expenditure by motor vehicle manufacturers in South Africa

5.6. Research limitations, contribution and future research

Notwithstanding the fact that the sample size of the motor vehicle manufacturers could be seen as a limitation within the context of the case study, it does provide some important contributions in that it highlights that the industry is a major contributor to various CSI initiatives, and that the advent of carbon tax does not seem to diminish its commitment to CSI initiatives. The possibility that the respondents are not representative of all multinational motor vehicle manufacturers in South Africa could not be ruled out and the study should be read within this context. A further limitation is that CSI expenditure may well be driven by other factors, such as economic environment, company financial performance, and changes in company advertising policy, which is not necessarily within the scope of the study. It has been noted that CSI is specific to South Africa, and that it promises to present a new way of addressing developmental problems in South Africa. Within this context, if CSI is successful in changing the way companies conduct their business, further research will have to be conducted on whether this will be sufficient to attract further foreign direct investment.

As far as future research opportunities regarding the impact of carbon tax on corporate social investment are concerned, the following may be considered. The National

Treasury is expected to implement a national carbon tax in South Africa in 2015, which will affect most companies in South Africa. Company perception regarding the carbon tax price will become an even more important issue as it might well affect the financial bottom line of many companies. An empirical study carried out on the largest carbon emitters in the South Africa could reveal an impact of the new carbon tax on corporate social investment policy and expenditure.

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5.8. Article annexure: Questionnaire

Company name: _____
Interviewee: _____
Date of interview: _____

Please allocate marks to each question as follows:
1. Do not agree
2. Do not agree subject to exceptions
3. Agree subject to exceptions
4. Strongly agree

General				
1. CSI is a necessary cost of doing business	1	2	3	4
2. CSI gives a company a distinctive position in the market	1	2	3	4
3. CSI may be defined as taking proper account of the broader interests of society when making business decisions	1	2	3	4
4. CSI may be defined as sacrificing some profits in order to do the right thing.	1	2	3	4
5. Our company complies with all carbon excise tax legislation and regulations applicable to motor vehicles	1	2	3	4
Carbon tax pricing				
6. Carbon tax pricing has nothing to do with the CSI decision making.	1	2	3	4
7. The carbon excise tax for motor vehicles is adequately priced and accurately reflects the associated damage cost from motor vehicle carbon emissions.	1	2	3	4
Carbon tax and corporate social investment				
8. The implementation of carbon tax has affected corporate social investment policy and strategy of the company	1	2	3	4
9. Since carbon tax is adequately priced for monetary damage caused by carbon emissions, corporate obligations to society and environment in terms of CSI is effectively reduced	1	2	3	4
10. Kindly provide the CSI spend for the 2009 to 2012 years in millions of rand per the appropriate columns below	2009 Rm	2010 Rm	2011 Rm	2012 Rm

CHAPTER 6 (ARTICLE 4)

Title: The impact of carbon tax on financial and sustainability reporting in South Africa: The case of motor vehicle manufacturers

The reader is requested to take note of the following:

The article has been ***submitted*** for peer-review in the following IBSS indexed, internationally peer-reviewed academic journal as follows:

- Pillay, S. & Buys, P.W. The impact of carbon tax on financial and sustainability reporting in South Africa: The case of motor vehicle manufacturers. *Managing Global Transitions*, (submitted). (ISSN: 1854-6935)

The article as submitted is included in **Annexure F: Submission notification for article** 4 on page **189**. The article was written in line with the journal's submission guidelines, which are included in **Annexure G: Managing Global Transitions' author guidelines** on page **191**

The article was researched and written by the first author (S Pillay) as the PhD candidate and primary author, while the second author (P.W. Buys) fulfilled a reviewer function thereto as the PhD project's promoter.

Abstract

Sustainability reporting in South Africa has emerged strongly in the last decade with evidence suggesting that corporate social responsibility assurance prevalence is growing among the top 100 publicly-listed companies. Multinational motor vehicle manufacturers will have to comply with all sustainable reporting requirements that incorporate South African motor vehicle subsidiary company results. Carbon excise tax was implemented on all passenger motor vehicle on 1 September 2010 in South Africa. From an accounting perspective, the adequacy of carbon tax recognition and disclosures has not been assessed in South Africa. This paper examines the adequacy of carbon tax accounting disclosures by local motor vehicle manufacturers that are subject to such a tax as well as the compliance level of the related multinational motor vehicle holding companies in terms of sustainable reporting.

Keywords: Accounting, carbon taxation, climate change, corporate social responsibility, sustainable development, sustainability reporting

JEL classification: M14, M21, M40, Q56

6. THE IMPACT OF CARBON TAX ON FINANCIAL AND SUSTAINABILITY REPORTING IN SOUTH AFRICA: THE CASE OF MOTOR VEHICLE MANUFACTURERS

6.1. Introduction

The concept of sustainable development has been defined as that which is required to harmonise the fulfilment of human needs with the protection of the natural environment, so that these needs can be met not only in the present, but in the indefinite future (Mohammed, 2011). Furthermore, sustainable development also comprise various elements categorised in three primary dimensions, i.e. the environmental, economic and social dimensions (EEA GRANTS, 2006). These three dimensions constitute the so-called triple bottom line (TBL), which has been defined as the balance of sustainability for three different performance aspects, namely the environmental, economic and social performance aspects (Newport *et al*., 2003). The TBL concept brought into being the notion that organisations were starting to think about issues related to *sustainable development*, and needed to move away from a single financial bottom line as the key corporate objective, to a recognition that organisations also have social and environmental bottom lines (Gray & Milne, 2002). A sustainability report therefore is a holistic organisational report that provides information about the relevant economic, environmental, social (including governance) performances (GR, 2013). One organisation that promotes sustainable development in the area of sustainability reporting is the Global Reporting Initiative (GRI), which provides a sustainability reporting framework that can be applied practically to issues of sustainable development (GRI, 2012). Closely linked to sustainability reporting is also the Carbon Disclosure Project (CDP), which is an international non-profit organisation providing the only international system for companies to measure and disclose important environmental data and, according to the CDP (2013), holds the largest collection of climate change as well as water and forest risk information from a global perspective.

In terms of accounting for sustainable development, there is a need for the costs and benefits of environmental and social matters to be identified, as well as for the measurement and quantification of these costs and benefits where appropriate (Aras &

Crowther, 2009). In terms of sustainable development and TBL reporting, external corporate social responsibility (CSR) assurance provides stakeholders with assurances that the applicable CSR disclosures may be relied upon. Furthermore, in South Africa, there is also strong evidence that such CSR assurance prevalence is growing among the top 100 publicly-listed companies (Ackers, 2009). Internationally, the reporting of corporate responsibility (CR) activities is also growing rapidly with a KPMG international survey indicating that approximately 95% of the 250 largest companies in the world reported on its CR activities in 2011, which represent a substantial improvement on the approximately 81% of such companies in 2008 (SAICA, 2013a). In South Africa, the provision of integrated reports (in essence combining the sustainability report and financial statements) has become a listing requirement of the Johannesburg Securities Exchange Ltd (JSE) for financial years starting on or after 1 March 2010 (SAICA, 2013a).

Linked to sustainability reporting specifically in South Africa is the Social Responsible Index (SRI), which was launched by the JSE as the first *socially responsible investment* index containing a listing of companies on the FTSE/JSE All Share Index that have met certain criteria in respect of TBL performances (JSE, 2012). According to the annual 2011 SRI index review, approximately two thirds of the JSE-listed companies had fulfilled the requirement to become a constituent of the JSE's SRI index as at December 2011 (SSA, 2011).

6.2. Financial accounting and reporting of carbon tax

Supportive to the concept of sustainability are the various instruments designed to enhance sustainable development, such as carbon tax, which is a market-based instrument that creates a direct cost to emissions by taxing the carbon content of fuels (Hasset *et al*, 2007). The purpose of carbon tax is to internalise externalities related to anthropogenic climate change (Metcalf, 2009) as well as assisting in controlling the problem of global warming caused by increasing concentrations of greenhouse gases (Pearson & Smith, 1991). According to Clarke (2011), carbon tax, which was first introduced in Europe in the early 1990s, has been widely advocated as a means of reducing such emissions to address anthropogenic climate change.

Financial reporting is typically conducted in accordance with International Financial Reporting Standards (IFRS) as promulgated by the International Accounting Standards Board (IASB) (IFRS, 2013). It should be noted that from 1973 until 2000, a series of accounting standards, known as the International Accounting Standards (IAS), was released by the International Accounting Standards Committee (IASC), a body that was replaced by the International Accounting Standards Board (IASB) in 2001 (ICAEW, 2013). From a South African perspective, as from 2005, the JSE requires all South African listed companies to comply with IFRS (Kinsey, 2006). The historical 'South African Generally Accepted Accounting Practices' (SA GAAP) have therefore also been completely harmonised with the IFRS. Following the *letter of the law* however, South African unlisted companies are not compelled to produce financial statements in accordance with IFRS, but should still comply with either i) SA GAAP or ii) if they meet the Small or Medium Entity (SME) criteria, with the IFRS for SMEs (SAICA, 2013b).

Per a comparison report of the full IFRS standards and the IFRS for SMEs, it was noted that the recognition and measurement requirements in respect of account balances that relate to carbon tax such as revenue, inventory, as well as liabilities were not different under either IFRS or IFRS for SMEs (PWC, 2013). Since SA GAAP is fully harmonised with full IFRS (SAICA, 2013b), and since there is no difference in carbon tax reporting requirements between IFRS for SMEs and full IFRS (PWC, 2013), it essentially means that whether an unlisted/private entity prepares financial statements in accordance with i) SA GAAP or ii) IFRS for SMEs, such financial statements would still have to be indirectly in compliance with full IFRS in respect of any relevant carbon tax transactions and disclosures.

6.3. Problem statement, objectives and research method

The implementation of carbon excise tax in South Africa triggered the interpretation and application of IFRS in the financial statements of South African motor vehicle manufacturers. The implementation of carbon tax may therefore also affect the carbon emission reduction strategy of motor vehicle manufacturers as disclosed in their sustainability reports. The primary research question under consideration could therefore be formulated in two parts as follows:

- P_1: Has the carbon tax been correctly accounted for and disclosed in the financial statements of South African motor vehicle manufacturers in accordance with IFRS?
- $P_{2:}$ Have the necessary carbon emission disclosures been made in the sustainability reports of these motor vehicle manufacturers?

This study comprised both literature and empirical sections. With regard to the literature section, a detailed review will be conducted in two stages. In the first stage, the history and evolution of sustainable reporting are considered to set the background for the study; while in the second stage, the level of sustainable reporting in South Africa is considered with a specific focus on the motor vehicle manufacturing industry. The level of GRI compliance is also considered among South African companies and then especially in the motor vehicle manufacturing industry.

An empirical research study will also be performed to explore the accounting treatment of carbon tax by motor vehicle manufacturers in South Africa. The overall targeted population was the eight multinational vehicle manufacturers producing/assembling motor vehicles in South Africa. It should be noted that Renault and Nissan entered into a global alliance agreement, which effectively results in them becoming 'one manufacturer' in the South African context (Anon, 2013). The exploratory research questionnaire was developed based on the underlying literature study (as mentioned above) and consisted of 11 questions, utilising an appropriate Likert-type response scales in certain questions, or a description and explanation of the accounting treatment of carbon tax in the applicable report statements. The researcher was available during the survey to provide guidance and clarification should the respondents have experienced uncertainties with regard to the questionnaire. The structured questionnaire had three objectives, namely i) to determine the issues or complexities around the issue of carbon tax reporting ii) to gauge the actual accounting treatment of carbon tax in terms of IAS 18 (Revenue) and IAS 37 (Provisions and Liabilities), and iii) to understand the rationale behind the current accounting treatment of carbon tax as per the industry.

In order to reach the objectives of this article, the remainder hereof is set out as follows; firstly, some consideration is given to the growth of sustainability reporting, from the

initial developments thereof, evolving into the South African context hereof per industry grouping and then also for the motor vehicle manufacturing industry specifically; secondly, the accounting treatment of carbon taxes within the context of IFRS is considered; thirdly, the applicable responses received from the respondents in terms of their disclosures and treatment are analyzed and lastly, providing some closing discussion and conclusions.

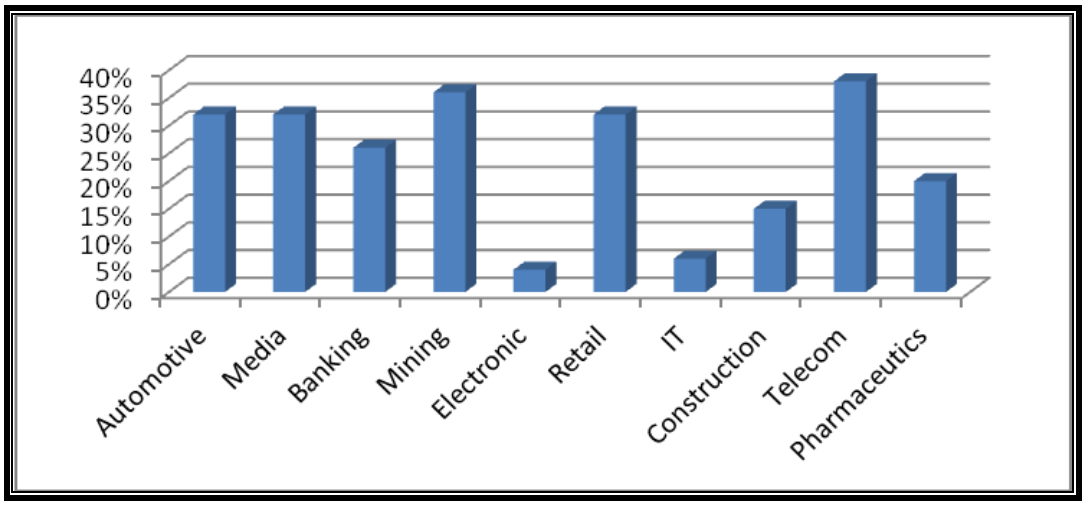
6.4. The growth of sustainable reporting

According to Gray and Milne (2002:3), the emergence of the TBL was a good idea as it allowed for full accountability, and that an organisation needed to deliver a full set of *social and environmental* statements alongside its regular financial statements. In addition, the advent of sustainable development resulted in increasing stakeholder interests in corporate responsibility, with many companies having converted their corporate environmental reports (CERs) into *full-blown* corporate sustainability reports (CSRs), and by integrating accounting aspects on environmental, social and economic issues into their TBL reporting (Hedberg & Von Malmborg, 2003).

In terms of the motivation for sustainable reporting, a study conducted in Ireland revealed that many senior executives are of the opinion that the prime motive for embarking on a sustainable reporting initiative was to improve or enhance its own corporate legitimacy (Adams & McNicholas, 2007). In support hereof, Bebbington *et al.* (2009:615) state that the primary reasons for companies initiating sustainability reporting are typically a mix of legitimacy and accountability motivations, in which the company will embark on such reporting initiatives when various factors intersect. Sustainability reports have been evolving over time and an increase in efforts to advance the specific business case for sustainability, including attempts to provide measurable economic outcomes from various sustainable activities and initiatives, was noted (Bowers, 2010). The impact of mandatory sustainability reporting has, according to Iannou and Serafeim (2011), also been examined on management practices, with a conclusion that mandatory sustainability reporting had a role in the increase in the social responsibility of business leaders, the prioritisation of sustainable development initiatives, and an increase in the implementation of ethical practices by firms.

In terms of sustainability reporting in South Africa, a detailed research study comprising 392 GRI reports submitted by South African companies found South African sustainability reporting to be the fifth highest in the world based on the number of GRI reports submitted (CSAP, 2013). Figure 6.1 below provides a summary indication of sustainability reporting by industry in South Africa in 2011. Industry compliance denoted by percentages on the vertical axis reflects the number of company GRI reports submitted in an industry relative to the total number of company GRI reports that should have been submitted in the industry.

Figure 6.1: Sustainability reporting by industry: 2011



Source: Adapted from CSAP, 2013

As per Figure 6.1 above, the leading industries in sustainability reporting are mining (approximately 36%) and telecommunications (approximately 38%), while the IT (approximately 6%) and electronic (approximately 4%) industries represent the poorest compliance levels in South Africa. In terms of sustainability reporting of motor vehicle manufacturers in South Africa, it should be noted that there are eight multinational motor vehicle companies in South Africa (SANEA, 2010). The levels of sustainability reporting compliance of these companies are summarised in Table 6.1 below.

Table 6.1: Sustainability reporting compliance by motor vehicle manufacturers

No	Name	Sustainable report submitted	Last year submitted	GRI report format	GRI checked	Carbon disclosures included
1	Toyota	Yes	2012	Non-GRI	No	Yes
2	VW	Yes	2011	G3	Yes	Yes
3	Nissan	Yes	2012	GRI Referenced	No	Yes
4	BMW	Yes	2010	G3	Yes	Yes
5	Daimler	Yes	2011	G3.1	Yes	Yes
6	General Motors	Yes	2011	G3.1	No	No
7	Renault	Yes	2010	G3	No	No
8	Ford	Yes	2011	G3	No	Yes

Source: Toyota Motor Corporation, 2012; VW AG, 2012; Nissan Motor Corporation, 2012; BMW, 2012, Daimler 2012, General Motors, 2012, Renault, 2012, Ford Motor Company, 2012

The results of the table above indicate that even though all the manufacturers produced sustainability reports, only three (38%) of the manufacturers' reports were verified by the GRI. Given that the objective of carbon tax is to address the problem of global warming (Pearson & Smith, 1991), one would expect to note behavioural changes, such as carbon reduction strategies, in place by multinational motor vehicle manufacturers if such a tax is to be considered effective. The companies' sustainability reports were therefore inspected for disclosures regarding actions and processes in place to reduce their carbon footprint. In terms of carbon disclosures only Renault and General Motors have not included carbon disclosures relating to actions in place to reduce carbon emissions. Per inspection of the 2011 report for Renault, it was noted that Renault and Nissan entered into a global alliance agreement, which effectively results in them becoming 'one manufacturer' within the South African context (Anon, 2013). Since Renault's compliance is being considered under Nissan's sustainability report, this

leaves only General Motors. General Motors, however, has confirmed in their sustainability report that these disclosures have been made separately in their CDP report. It should be noted that of the manufacturers operating in South Africa, only Toyota has submitted a sustainability report in a non-GRI format.

6.5. Accounting for carbon tax

An excise tax is a particular type of tax that is ordinarily levied on certain services and products (FASB, 2013). As carbon tax is levied on the purchase price of a motor vehicle (Shirley, 2010), it should therefore be regarded as an excise tax for the purposes of financial accounting. As stated earlier, financial accounting and reporting are governed by IFRS, which is a group of accounting standards prepared by the IASB. The two specific IFRS standards that may be applicable to *excise* taxes are i) IAS 18: Revenue and ii) IAS 37 Provisions, Contingent Liabilities and Contingent Assets. It should be noted that IAS 12: Income Taxes, deals specifically with the accounting treatment of *income tax* and does not consider excise taxes (Deloitte, 2013).

Under IFRS, taxes other than income taxes are accounted for under IAS 37 (Ernst & Young, 2012) and, in terms of this standard, a provision for such tax should be recognised when (IFRS, 2013a):

- An entity has a present obligation (legal or constructive) as a result of a past event;
- it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation; and
- a reliable estimate can be made of the amount of the obligation.

A key consideration in terms of IAS 37 would therefore be whether motor vehicle manufacturers have correctly raised an accounting liability for the carbon excise tax in their financial statements. Since the excise tax can be passed on to a customer in a revenue transaction, it may be argued, however, that the transaction should be recognised in accordance with IAS 18: Revenue, at the fair value of the consideration received or receivable (Ernst &Young, 2012). In terms of IAS 18, revenue from the sale

of goods shall be recognised when all the following conditions have been satisfied (EU, 2013c):

- The entity has transferred to the buyer the significant risks and rewards of ownership of the goods;
- The entity retains neither continuing managerial involvement to the degree usually associated with ownership nor effective control over the goods sold;
- The amount of revenue can be measured reliably;
- It is probable that the economic benefits associated with the transaction will flow to the entity; and
- The costs incurred or to be incurred in respect of the transaction can be measured reliably.

When interpreting the provisions of IAS 18, one may conclude that as the carbon tax is recovered from a customer in a *revenue generating transaction*, it must be included in revenue.

An alternative view, however, is expressed in a technical publication by Ernst & Young (2012), which argues that the revenue treatment is based on whether the applicable company subject to carbon tax is acting as a *principal* or as an *agent* in the transaction with the excise tax being excluded from revenue if the local vehicle manufacturer is acting as agent. A key question in IAS 18 is therefore whether motor vehicle manufacturers consider themselves as an agent or as a principal and choose to recognise carbon tax in revenue for accounting purposes accordingly.

6.6. Empirical results

In terms of whether the respondents are in compliance with accepted accounting practices and standards, the sections that follow consider the responses received in terms of their compliance to IFRS.

6.6.1. IFRS compliance

Questions 1 and 2 of the questionnaire focused on the overall IFRS compliance of motor vehicle manufacturers in South Africa. Question 1 asked the respondents to rate

their compliance with IFRS on a scale of 1 to 7 and question 2 asked the respondents on what date did they convert financial preparation adoption to the IFRS format.

- *Question 1:* All the respondents confirmed that they are fully compliant with IFRS and indicated an average score of 7 on this question.
- *Question 2:* The majority of the respondents confirmed that they implemented IFRS when it was introduced, which was 2004.

6.6.2. Carbon tax compliance and process

Questions 3 and 4 focused on the overall carbon tax compliance and processes in place in levying carbon tax on motor vehicles manufactured in South Africa. Question 3 asked the respondents whether they levy carbon tax on all newly manufactured motor vehicles in compliance with carbon tax legislation and question 4 required the respondents to explain the process of determining the carbon tax to be levied on motor vehicles.

- *Question 3:* All the respondents confirmed that they levy carbon tax on all newly manufactured vehicles in accordance with carbon tax legislation.
- *Question 4:* Processes in levying carbon tax varied between respondents, with some respondents confirming that carbon tax is levied at the point of entry into South Africa for imports and other respondents confirming that carbon tax is paid in accordance with the Customs and Excise Act, 1964. The respondents further confirmed that carbon tax is included in the selling price to dealers, excluding dealers in BLNS countries (Botswana, Lesotho, Namibia and Swaziland) and that separate emission limits exist for passenger motor vehicles and double cabs. A rand value is associated with every gram of carbon emission exceeding the prescribed limits.

6.6.3. IFRS compliance of carbon tax transactions

Questions 5 to 8 focused on the overall IFRS treatment and compliance of carbon tax transactions. Question 5 asked respondents to confirm whether all sales transactions are subject to carbon tax, while question 6 asked whether accounting personnel understand IFRS requirements relating to carbon tax. Question 7 asked whether IFRS is applied

consistently to all sales transactions that are subject to carbon tax. Question 8 asked whether carbon tax has been adequately disclosed in terms of IFRS.

- *Question 5:* The majority of the respondents confirmed that sales transactions are subject to carbon tax.
- *Question 6:* All of the respondents confirmed that accounting personnel understand IFRS requirements relating to carbon tax.
- *Question 7:* All of the respondents confirmed that carbon tax is applied consistently to all sales transactions.
- *Question 8:* The majority of the respondents confirmed that carbon tax is adequately disclosed in terms of IFRS. The remaining respondent confirmed that there is no separate IFRS disclosure requirement for carbon tax, thereby also indicating automatic compliance with IFRS.

It was noted per a review of IAS 18 (Revenue recognition); IAS 37 (Provisions Contingencies and Liabilities) and IAS 2 (Inventories) that there are no specific disclosure requirements relating to excise tax or carbon excise tax in particular (EU 2013a; EU 2013b; EU 2013c).

6.6.4. Accounting treatment of carbon tax

Questions 9, 10 and 11 of the questionnaire dealt with the specific accounting treatment adopted by motor vehicle manufacturers in respect of carbon tax. Question 9 asked the respondents to describe the economic substance of carbon tax transactions that form the basis of accounting treatment, while question 10 asked to provide the journal entries (including narrations) for the recording of carbon excise taxes. Question 11 asked the respondents whether they believe that the accounting treatment applied to carbon tax is correct in terms of IFRS.

- *Question 9:* The majority of the respondents confirm that the economic substance of the transaction is similar to a custom or excise tax.
- *Question 10:* An analysis of journal entries provided by the respondents confirmed that all the respondents have raised a liability for carbon excise tax. All the respondents have also excluded carbon tax from revenue indicating the

view that motor vehicle manufacturers act as *an agent* rather than *principal* on collecting carbon tax. The view is supported by the fact local vehicle manufacturers are required to pay over the carbon tax to SARS evidenced by SARS revenue collection from carbon tax (Department of National Treasury & South African Revenue Service, 2012). The accounting treatment to therefore exclude carbon tax from revenue is viewed as technically correct in terms of IFRS.

- *Question 11:* All of the respondents are of the opinion that the accounting treatment applied to carbon tax is correct in terms of IFRS.

6.7. Discussion and conclusions

This paper had two important aims in mind. The first dealt with the compliance level of sustainability reports produced by multinational motor vehicle manufacturers, while the second dealt with the accounting treatment of carbon tax. In terms of sustainability reporting, the results revealed that all the multinational motor vehicle companies produce sustainability reports. All the multinational motor vehicle manufacturers also disclosed actions to reduce the carbon footprint, with the exception of General Motors, which disclosed this information under its CDP report.

The accounting treatment of carbon tax was subject to empirical study and the first enquiry was to determine the level of IFRS compliance among motor vehicle manufacturers. All the respondents considered themselves to be compliant with the majority confirming implementation of IFRS in 2004, which was when IFRS was first introduced. All the respondents also confirmed that they levy carbon tax on all newly manufactured vehicles in accordance with carbon tax legislation and described processes in place to ensure compliance with carbon tax legislation. Furthermore, all of the respondents confirmed that their accounting personnel understood the applicable IFRS requirements relating to carbon tax and that carbon tax is applied consistently to all sales transactions. The majority of respondents also confirmed that sales transactions are subject to carbon tax and adequately disclosed in terms of IFRS.

The actual accounting treatment of carbon tax was examined via a review of journal entries passed by the motor vehicle manufacturers to record carbon tax. All the

respondents correctly raised a liability for the carbon excise tax in terms of IAS 37, and also excluded carbon tax from revenue in terms of IAS 18 under the view that motor vehicle manufacturers act as agent and not principal in collecting carbon tax. The correctness of the accounting treatment applied is reinforced by the motor vehicle manufacturers' opinion that their accounting treatment of carbon tax is correct in terms of IFRS.

6.8. Limitations and future research

Notwithstanding the fact that there are few motor vehicles manufactures in South Africa, the sample size of the motor vehicle manufacturers that participated in the study could be seen as a limitation. The possibility that the respondents are not representative of all multinational motor vehicle manufacturers in South Africa could not be ruled out. As most of the motor vehicle manufacturers in South Africa operate as private companies, there was no pressure on these companies to produce sustainability reports in comparison to listed companies.

Future research opportunities could include identifying countries where motor vehicle excise tax has been levied and examining the compliance of corporate entities situated in such countries with IFRS.

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6.10. Article annexure: Questionnaire

Company name: _____
Interviewee: _____
Date of interview: _____

1) Please indicate your compliance with IFRS based on a scale of 1 to 7, where 1 = non-compliance and 7 = fully compliant.						
1	2	3	4	5	6	7

2) Are your company IFRS compliant?	Y
	N
If yes, please indicate since when.	
3) Do you levy carbon tax on all newly manufactures motor vehicles in compliance with carbon tax legislation	Y
	N
4) If yes, briefly describe the process in which carbon tax is levied?	

For the questions 5-7 below, please indicate the frequency of each, based on the following scale:

1	2	3	4	5
Always	Most of the time	Sometimes	Rarely	Never

5) Sales transactions are subject to carbon tax	
6) Accounting personnel understand IFRS requirements relating to carbon tax	
7) IFRS is applied consistently to all sales transactions which are subject to carbon tax	
8) Carbon tax has been adequately disclosed in terms of IFRS	Y
	N

9) Describe the economic substance of carbon tax transactions which determine your accounting treatment of carbon tax transactions?		
10) Provide the journal entries (including narrations) for the recording of carbon excise taxes?	Debit	Credit
Narration:	Acc Name:	Acc Name:
Narration:	Acc Name:	Acc Name:
Narration:	Acc Name:	Acc Name:

Narration:	Acc Name:	Acc Name:
Narration:	Acc Name:	Acc Name:

11.Do you believe that the accounting treatment applied to carbon tax is correct in terms of IFRS?	Y
	N

CHAPTER 7

7. SUMMARY AND CONCLUSIONS

7.1. Introduction

The purpose of this chapter is to draw conclusions from the four research articles that formed the basis of this study. Conclusions are drawn in accordance with the research objectives. The objectives comprised the following key research questions:

- Is carbon tax the best policy instrument for addressing climate change and ensuring environmental sustainability in South Africa?
- From an economic sustainability perspective, is carbon tax an economically feasible instrument and does the carbon tax price accurately reflect the associated welfare cost of carbon emissions in South Africa?
- Has carbon tax impacted CSI spending and welfare activities by local motor vehicle manufacturers in South Africa from a social sustainability perspective?
- What has been the impact of the implementation of carbon taxation on sustainable and financial reporting compliance for motor vehicle manufacturers in South Africa?

These objectives were derived from the main problem statement (chapter 1, page 9) where the question was asked as to what the potential impact of the implementation of carbon tax on the triple bottom line of the motor vehicle manufacturing industry was. As a result the study considered the adequacy of carbon tax in the South African context as an instrument in mitigating the impact of climate change as well as the impact of the carbon tax on CSI expenditure and sustainability/financial reporting.

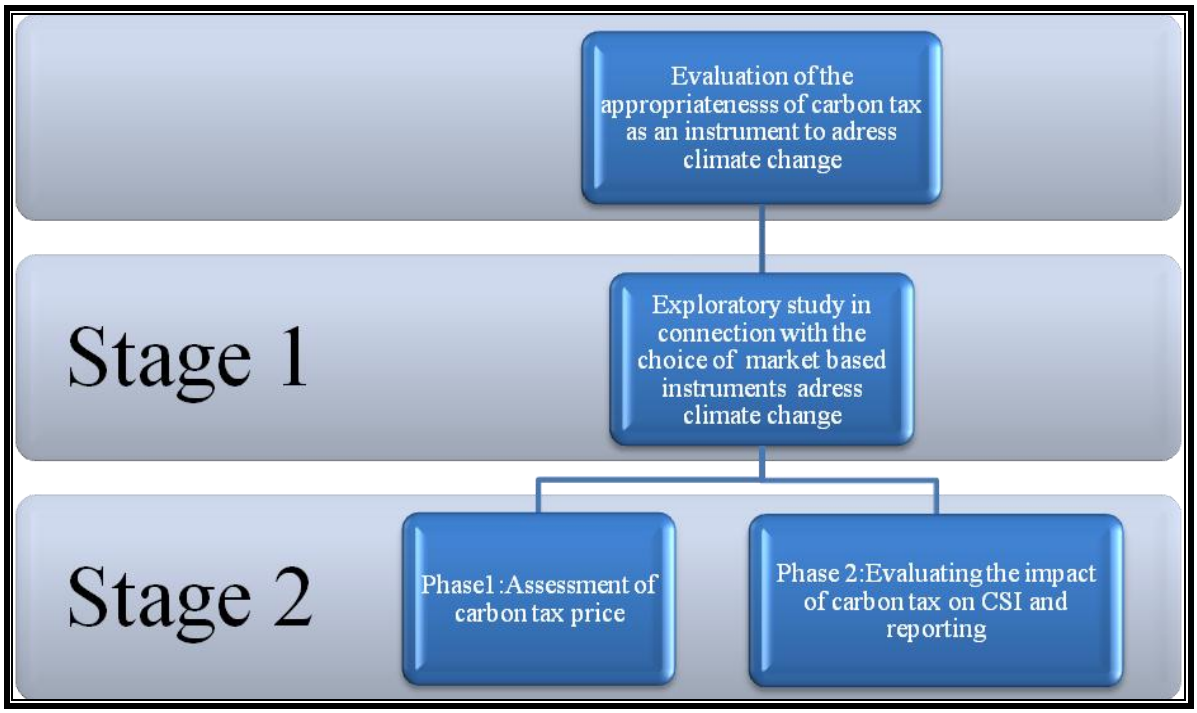
In South Africa, the level of carbon emissions per unit of economic output was nearly three times the average set by the Organisation for Economic Co-operation and Development (OECD) (Goldblatt & Davies, 2002). Global warming may be addressed in a number of ways including carbon tax which effectively amounts to an excise tax on the producers of raw fossil fuels based on the relative carbon content of those fuels (OECD, 1997).

One of the methods to address global warming is carbon taxation, which has been defined as an instrument of environmental cost internalisation that effectively amounts to an excise tax on the producers of raw fossil fuels based on the relative carbon content of those fuels (OECD, 1997). The objective of carbon tax is thus to control the problem of global warming caused by increasing concentrations of greenhouse gases, which include carbon (Pearson & Smith, 1991). The decision by National Treasury to implement a carbon tax on the 1 September 2010 for motor vehicles at a rate of R75 for every gram of carbon dioxide per kilometre it emits over the 120g/km (Shirley, 2010) can therefore be considered a significant landmark in addressing the problem of climate change in South Africa.

In terms of research method, this study followed a case study approach into the potential impact of carbon taxes on the South African motor vehicle manufacturing industry and related corporate responsibility issues. Within the case study approach the type of research adopted was both qualitative and quantitative in nature with the research sample being selected from the total population of multinational motor vehicle manufacturers operating in South Africa. Research questionnaires, using Likert type response scales were issued to a sample of motor vehicle manufacturers and responses were analysed and compared in determining research solutions to the research questions noted at the beginning of this chapter.

At the time of the study, the carbon tax as applicable to the motor vehicle manufacturing industry as per this study had been newly implemented and very few studies were conducted in assessing the tax against other market based instruments. Furthermore the pricing of the carbon tax had not been tested against the social cost of carbon (SCC) to determine whether this pricing was acceptable and reasonable in achieving its primary objective. The impact of carbon tax on motor vehicle manufacturers in South Africa is also relatively unknown and the study considered the impact of the tax on the CSI policy of the motor vehicle manufacturers as well as the financial reporting of the tax by motor vehicle manufacturers. The overall study was conducted in two broad stages (see Figure 7.1 below).

Figure 7.1: Research summary



Firstly an exploratory study regarding the appropriateness of carbon tax as an instrument to address climate change was conducted in Chapter 3 (article 1 on page 30). The second stage consisted of a further two phases. The first of which considered the economic feasibility of a carbon tax via testing of the carbon tax price in Chapter 4 (article 2 on page 54), and the second which considered the impact of carbon tax on CSI and sustainability and financial reporting in both Chapter 5 (article 3 on page 75) and Chapter 6 (article 4 on page 97). Some limitations of this study are also discussed later on together with further potential research opportunities that emanate from the study, being presented.

7.2. Summary and discussion

The primary objective of this study as set out above has been addressed separately and integrally in four research articles, as discussed here below.

7.2.1. Climate change: A comparison of market based instruments

The first objective regarding the implementation of carbon tax was whether carbon tax was the best policy instrument for addressing climate change and ensuring environmental sustainability in South Africa with the question being asked as to whether National Treasury made the optimum decision by implementing carbon tax as opposed to a cap-and-trade scheme in South Africa.

It was found that governments considering strategies for lowering carbon emissions ordinarily have two basic approaches to consider, namely i) a cap-and-trade scheme that reduces emissions by limiting the quantity of carbon dioxide that can be emitted and then allocating emissions permits that are tradable, or ii) introducing a carbon tax scheme that effectively raises the price of fossil fuels based on their carbon content. In terms of the effectiveness of the instruments to lower greenhouse gases both carbon tax and cap-and-trade schemes have been shown to lower emissions. Both instruments have also been shown to increase economic sustainability. It was found that National Treasury's reasons not to implement cap-and-trade schemes in South Africa were primarily due to i) credibility issues of emission caps, the allocation of permits and the need for a competitive market to facilitate trading, ii) inappropriate permit prices given South Africa's oligopolistic market structure price uncertainty, iii) the need for new financial regulations and administrative capacity, iv) tax implications, as well as v) the non-transparency of distributional incidence.

The emissions reduction seen in the second phase of the European Union Emission Trading Schemes (EU ETS) confirms that emission caps can be credible as a carbon emissions management option. Price uncertainty is a challenge in South Africa as there is a high concentration of emissions in the energy sector creating a significant design challenge to a South African emissions trading scheme. There will also be a greater need for additional related administrative capacities if South Africa was to implement an emissions trading scheme. The tax implications of emission trading schemes can also be complex and require additional resources both in terms of drafting tax legislation by National Treasury as well as monitoring tax compliance by SARS (South African Revenue Service). The challenge of distributional incidence may be overcome by the

South African government, provided the proceeds of emissions trading are invested in renewable energy.

The final conclusion to be made is that there are a significantly greater number of challenges facing the implementation of cap-and-trade schemes than for a carbon tax system. Given the challenges of administrative capacity, price uncertainty and complex tax implications, National Treasury's decision is seen as a prudent and acceptable option in terms of carbon emissions management from an economic and environmental perspective.

7.2.2. Carbon tax pricing and the SCC

The second objective regarding the implementation of carbon tax was to gauge the reasonability of the carbon tax price in South Africa as applicable to the motor vehicle manufacturing industry. The key question under consideration revolved around the appropriateness of the carbon tax price given the SCC in the South African context. In addressing this objective, we therefore asked the following primary and supportive secondary questions:

- What is the perception of motor vehicle manufacturers regarding the adequacy of the carbon tax price and their awareness of the concept of the SCC?
- Does the carbon tax price accurately reflects the monetary damage cost of carbon emissions reflected in the SCC?

The SCC was defined as the amount of damage caused by each additional ton of greenhouse gas emitted into the atmosphere. In terms of economic theory, the study concluded that in conditions of a perfect market where all social costs have been considered, any efforts to cut back the emissions of greenhouse gases may be considered feasible as long as the incremental cost of reducing the emission is lower than the increase in SCC. Applying this general economic principle to the carbon tax scenario, it is arguable that the SCC should be equal to, or lower than, revenues generated from carbon taxes in order for the instrument of carbon tax to be feasible.

The *first* question as specified above was addressed through an empirical research questionnaire and the study confirmed that the majority of the respondents were aware

of the concept of the SCC, but did not agree, subject to exception, that the carbon tax price adequately compensates for the damage caused by carbon emissions from motor vehicles. Another important conclusion regarding the carbon tax impact on manufacturing was that no specific conclusions could be drawn on the impact of the tax on production techniques and the fuel efficiency of motor vehicles manufactured.

The *second* question as specified above was addressed through a literature study which compared the damage cost of carbon emissions attributable to motor vehicles manufactured in 2011 to the actual revenue received from carbon tax by SARS in the same period. The carbon cost per kilogram was obtained by a review of academic studies conducted on the cost of carbon in South Africa. The study resulted in an estimated SCC from 2011 motor vehicles manufactured in excess of R558 million and the related carbon tax revenue received by the SARS amounted to an approximate figure of R1,556 million. On an estimated level the carbon tax revenue was therefore found to be exceeding the estimate of the SCC in respect of motor vehicles manufactured in 2011 quite substantially. The carbon tax was thus considered as adequately priced when comparing the carbon tax revenue to the SCC in South Africa.

The final conclusion to be made in the context of this article is that even though carbon tax can be considered as adequately priced when comparing the SCC to carbon tax revenues received by SARS, the South African motor vehicle manufacturers' perception is that the tax is not adequately priced. This could be due to a number of reasons such as the view that carbon tax has not adequately considered the price elasticity of demand relating to motor vehicles manufactured in South Africa or the perception that the SCC is actually greater than the carbon tax price.

7.2.3. Carbon tax implication on CSI

The third objective regarding the implementation of carbon tax was to determine the impact of carbon tax on CSI initiatives and expenditure for motor vehicle manufacturing companies in South Africa. We therefore asked the following question:

- Is the implementation of carbon tax likely to adversely affect the CSI initiatives and expenditure of the motor vehicle manufacturers in South Africa?

In addressing this question two basic high-level objectives were set. Firstly, the development and impact of CSI within the South African context had to be considered, and secondly, the commitment of the motor vehicle manufacturers to their CSI initiatives and expenditure, in light of the additional carbon tax burden facing them, was also to be considered.

The study found that CSI can typically be defined as a sub component of CSR aiming to *uplift* communities in such a way that the overall quality of life is improved whereas CSR is seen as the organisation's total responsibility towards the business environment. With the implementation of carbon tax placing additional pressures on a company's financial performance, their ability (and perhaps even willingness) to contribute to CSI initiatives may be adversely affected. In respect of the two objectives as set out above, the developments of CSI within South Africa was examined through a literature study, while the commitment of the motor vehicle manufacturers to their CSI initiatives and expenditure, was examined through an empirical study. The literature study confirmed that CSI growth has been strong in South Africa with the national contribution of South African companies to CSI initiatives with that up to R6.2 billion being spent in the areas of education, healthcare and community development for the 2010-2011 financial year. Monetary investments by motor vehicle manufacturers were also significant with Volkswagen SA, investing in excess of R400,000,000 and Mercedes Benz SA investing in excess of R270,000,000 in CSI projects. The empirical research questionnaire required respondents to confirm whether the implementation of carbon tax reduced corporate obligations to environment and society. In addition the actual CSI expenditure incurred by motor vehicle manufacturers was disclosed for periods both before and after implementation of carbon tax. The results of the empirical study confirmed that the respondents did not agree, subject to exception, that corporate obligations to environment and society under CSI are reduced as a result of the implementation of carbon tax. A quantitative analysis of the average CSI expenditure as reported during the empirical study indicates that CSI policy may be considered as non-responsive to the implementation of carbon tax and has not resulted in any decrease in CSI expenditure. The final conclusion reached by this study is therefore that the implementation of carbon tax is unlikely to adversely affect the industry's commitment to the CSI initiatives.

7.2.4. Impact of carbon tax on financial and sustainable reporting

The fourth and final issue regarding the implementation of carbon tax was to determine the impact of carbon tax on the sustainability and financial reporting of the motor vehicle manufacturing companies in South Africa. We therefore asked the following primary and supporting secondary questions:

- Has the carbon tax been correctly accounted for and disclosed in the financial statements of South African motor vehicle manufacturers in accordance with IFRS? and
- Has the necessary carbon emission disclosures been made in the sustainable reports of motor vehicle manufacturers in terms of the GRI?

In terms of the financial accounting for carbon tax the recognition, measurement and disclosure of the tax is prepared in accordance with the International Financial Reporting Standards (IFRS) which is a group of accounting standards prepared by the International Accounting Standards Board (IASB) that has effectively become the international standard for the preparation of public company financial statements (IFRS, 2013). In South Africa since the carbon excise tax can be passed on to a customer in a revenue transaction the transaction must be recognised in accordance with International Accounting Standard (IAS) 18: Revenue, at the fair value of the consideration received or receivable (Ernst & Young, 2012). A key accounting consideration in terms of IAS 18 is whether the local vehicle manufacturer is acting as principal or agent in transaction, with the excise tax being excluded from revenue if the local vehicle manufacturer is acting as agent (Ernst & Young, 2012).

The first question was addressed by an empirical study utilizing a questionnaire that required the respondents to disclose the accounting treatment via journal entries of carbon tax transactions. As the respondents were acting as agents in the transaction all the respondents correctly excluded the carbon tax out of revenue in terms of IAS 18 (Accounting Standard on Revenue) and correctly recognised a liability to SARS in terms of IAS 37 (Accounting Standard on Provisions Contingencies and Liabilities). The accounting treatment of carbon tax was thus in compliance with IFRS.

The second question dealt with sustainability reporting compliance and was addressed in the form of a literature study. It should be noted that it is a JSE listing requirement for financial years starting on or after 1 March 2010 to include integrated reports with the result that 97 of the top 100 listed companies report on CR activities (SAICA, 2013). Unlisted companies are thus not compelled to produce integrated reports which included sustainability reports.

As the local motor vehicle manufacturers are unlisted, privately held companies, the sustainability compliance of the multinational holding company was examined, such compliance was measured against the GRI requirements, which is an organization that promotes sustainable development in the field of sustainability reporting and provides all companies with a sustainability reporting framework to be applied practically to issues of sustainable development (GRI, 2012). The study confirmed that the overall compliance level of multinational motor vehicle manufacturers operating in South Africa is 100% as all manufacturers submitted sustainability reports. Even though one manufacturer did not disclose actions in place to reduce carbon emissions, they did confirm such information was included in the carbon disclosure report. The necessary carbon disclosures have been made in the sustainability reports of the multinational motor vehicle manufacturers.

7.3. Contribution and concluding reflection

The contribution of this study arises in the field of climate change policy and in particular an assessment of the carbon excise tax instrument. Scientific evidence overwhelmingly confirms that if greenhouse gas emissions continue to rise as they have risen in the past, the global climate will become increasingly warmer. In addressing the concerns, many governments and policy makers around the world have engaged in constructive debate in choosing policy measures that best address the climate change problems. The contribution of this study is therefore found in the fact that it is the first independent (academic) evaluation of National Treasury's decision to embark on the carbon tax route as a way to address climate change (and perhaps as an additional source of revenue for the government coffers), together with evaluation of the adequacy of the tax prices, the potential impacts thereof on CSI initiatives and the sustainability reporting.

Climate change policy is thus of critical importance should humanity wish to effectively address the problem of global warming. In this regard the decision of the South African government to address the problem of climate change and introduce a carbon excise tax in South Africa can been seen as a significant move in their attempt to reduce the carbon footprint. The decision to levy an excise tax on all motor vehicles manufactured within the Republic of South Africa based on the inherent fuel efficiency of the vehicle being manufactured was intended to reduce the South African carbon footprint by encouraging manufacturers to produce more environmentally friendly vehicles and engage in production techniques that are more environmentally friendly.

The decision of the South African government (i.e. National Treasury) is also in harmony with the principle of sustainable development, and from a company perspective, the TBL concept. However history has taught us that all policy decisions should be carefully analysed and assessed before implementation. A prime example of this is the EU –ETS where there was large allocation of permits in the first phase of the scheme which resulted in no reduction of carbon emissions in the first phase of the scheme.

The international debate over whether to use carbon tax and cap-and-trade schemes has been a long standing debate ever since climate change became a priority in many countries. In this light the decision by National Treasury to choose a carbon tax as opposed to cap-and-trade scheme, begs the question as to whether all the advantages and disadvantages have been adequately considered in making the final choice. In support of National Treasury's choice for a carbon tax, a brief explanation was provided in the National Treasury discussion paper for the choice of carbon tax over market based instruments such as cap-and-trade schemes. A comparison of the most suitable market based instrument by National Treasury however, was never critically assessed in terms of sustainable development which encompasses social, environmental and economic aspects as per the TBL concept. A more complete assessment of the full implications of implementing an instrument from a sustainability perspective was completed in article one of the study which confirms National Treasury's view to be both reasonable and prudent.

A further concern that arises when an instrument such as carbon tax is implemented is the economic feasibility of the instrument. In short if an instrument is not economically feasible, it loses credibility as an effective policy choice. The SCC has never been subject to scrutiny in a South African context; however the implementation of carbon tax made it necessary to determine a reasonable SCC in order to gauge the reasonability of the carbon tax price. A detailed feasibility study of the carbon tax price was completed on an economic basis and it confirmed that the price set by Treasury was found to be indeed at a reasonable level.

A critical part of the welfare and social sustainability of South Africa lies in CSI initiatives. The fact that total CSI expenditure amounted to approximately R6,2 billion in the 2010/2011 financial year (Thwaits, 2012) confirms the materiality and significance of CSI in South Africa. The study also reported that the manufacturing industry is currently the fifth largest contributor to the total CSI expenditure in South Africa. Under the assumption that carbon tax may correctly reflect the damage cost of carbon emissions, many may argue that the settlement of the tax may constitute part settlement of a corporate responsibility to environment and people. This assertion has been tested for the first time in this study where CSI expenditure of motor vehicle manufacturers has been reviewed both before and after the implementation of carbon tax to determine the corporate perception of CSI and the SCC. The study confirms that the perception of motor vehicle manufacturers is that the settlement of carbon tax does not mitigate in any way their corporate responsibilities as reflected in their CSI expenditure.

Since the implementation of carbon tax, the reporting of the tax either from a financial accounting perspective or sustainability reporting perspective has never been considered. The long term viability of an instrument can only be reasonably assessed if it has been accurately reported on by the motor vehicle manufacturers who are subject to the tax. Furthermore as there is no specific standard in financial accounting dealing with carbon excise tax, accountants are left to interpret IFRS for a sound treatment of carbon tax. The correct treatment of carbon tax from an accounting perspective has never been prescribed, however there are professional views on excise taxes. These views are based on the accounting fundamental principal of substance over form, and are expected to be applied consistently by all companies who encounter excise taxes.

Based on these views the study confirmed that accounting treatment of carbon tax to be accurate and conceptually sound as per the respondents in this study.

Equally important in the reporting of carbon tax is the sustainability reporting of companies' carbon footprint path to reducing emissions. If carbon tax was truly effective this would result in a behavioural adjustment by companies to actively pursue a path of carbon reduction, which would be disclosed in the sustainability report of the company. The reporting and compliance level testing of multinational motor vehicles provides an indication of the behavioural effectiveness of the tax. With the exception of one multinational company which stated that it disclosed its carbon reduction strategy in its carbon disclosure report all the multinational motor vehicle manufacturers included carbon reduction strategies in their sustainability reports.

In closing, in broad terms the introduction of carbon tax has been viewed as a positive move by the South African government to address the problem of climate change. As the South African economy and technology advance, further challenges will have to be met and further policy decisions regarding climate change strategies will have to be made. The decision by National Treasury to implement a carbon excise tax is therefore seen as a credible decision in light of this study, and brings hope to environmentalists and citizens alike that in the future the appropriate steps will be taken to address the global problem of climate change.

7.4. Limitations of the study

Perhaps a first limitation of this study to be cognisant of in respect of the empirical research undertaken in the study was the sample size of the motor vehicle manufacturers. Even though the sample size may be considered small, the fact remains that there are only a limited number motor vehicle manufacturers in South Africa, of which around 40% did participate in the study. Notwithstanding, the reader must take cognisance of this fact and be careful not to generalise any specific findings to the overall motor vehicle industry *per se*, but such findings should be read and understood within the context of the study.

A further limitation in respect of the carbon tax price is that carbon tax might also be more or less relevant to a specific motor vehicle manufacturer depending on the existing level of fuel efficiency of the vehicles manufactured. The depth and accuracy of answers provided by respondents in respect of the SCC could therefore hinge on the existing level of fuel efficiency. In respect of CSI expenditure, such initiatives may perhaps also be driven by other (complimentary) factors, such as the overall economic environment, the specific company's financial performance, and even changes in a company's advertising policy, which are not necessarily within the scope of this study.

With regard to sustainability reporting, a further limitation to consider is that since the sustainability reports of multinational holding companies were used, they may not be indicative of the culture of sustainable reporting by the specific motor vehicle manufacturers (or divisions) operating in South Africa.

7.5. Future research

As far as future research opportunities are concerned, the following may serve as a guide in formulating such research problems:

- With regard to the debate over carbon tax and cap-and-trade schemes, the third phase of the EU ETS started in 2012 and should end in 2020 with the level of allocated permits in the third phase expected to be even smaller than in the second phase. The ability of multi-national companies operating in countries with stringent climate change policies to shift production processes to other countries with less stringent climate change policies (and thereby nullify any emission reductions) should be considered in determining the true effectiveness of the EU ETS in the third phase.
- With regard to the carbon tax pricing and CSI, a very topical future research opportunity lies in the fact that a national carbon tax is to be implemented by the National Treasury in South Africa as from 2015. Contributing studies into the pricing of such taxes will be of significant importance as the tax will be applicable to almost all companies operating in South Africa. An empirical study carried out on the largest carbon emitters in South Africa could reveal an impact of the new carbon tax on CSI activities and expenditure.

- With regard to the financial reporting of carbon tax future research opportunities could include identifying countries where motor vehicle excise tax has been levied and examining the compliance of corporate entities situated in such countries with IAS 18 (Accounting standard on Revenue) and IAS 37 (Accounting standard on Provisions and Contingent liabilities).

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ANNEXURES

8. ANNEXURE A: COMPILED RESEARCH QUESTIONNAIRE

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May 2013

QUESTIONNAIRE FOR EMPIRICAL RESEARCH

To whom it may concern:

The implementation of carbon tax in South Africa in 2010 has been received with mixed perception from motor vehicle manufacturers and consumers alike. To date the actual impact of such tax on the passenger motor vehicle industry has not been measured against its intended outcomes. A key impact of the research is to consider the impact of carbon tax on the motor vehicle manufacturing industry. This includes considering the reasonability of the pricing of carbon given the social cost of carbon as well as the impact of carbon tax on sustainability reporting and corporate social investment spending. As part of the study, I would require an interview with a representative from each entity in order to obtain the required information.

The questionnaire is divided into four sections:

Section 1:	General information
Section 2:	Carbon tax pricing
Section 3:	Corporate Social Investment
Section 4:	Sustainability Reporting

All information provided by you will be treated as confidential and aggregated. It will therefore not be possible to identify individual companies in the report.

Your cooperation is highly appreciated.

Kind regards

Surendran Pillay

Will you be interested in receiving feedback on the results and recommendations arising from this research?

Yes	
No	

Company name: _____
Interviewee: _____
Date of interview: _____

Section 1: General

1) What type of business form is your entity?	
Co-operative	
Private company	
Non-listed public company	
Listed public company	
Other (specify) _____	

2) What is the date of your financial year-end?

_____

3) Name your external auditors.	
PricewaterhouseCoopers	
Deloitte	
KPMG	
Ernst & Young	
Other (specify) _____	

4) Please indicate your compliance with carbon tax legislation based on a scale of 1 to 7, where 1 = non-compliance and 7 = fully compliant.

1	2	3	4	5	6	7

5) Kindly indicate whether your company has a corporate social investment policy and budget	Y
	N

Section 2: Carbon tax pricing

Please allocate marks to each question as follows:
1. Do not agree
2. Do not agree subject to exceptions
3. Agree subject to exceptions
4. Strongly agree

General				
1) There is a definite need for a carbon excise tax on motor vehicles in South Africa.	1	2	3	4
2) I am aware of all carbon excise tax legislation and regulations applicable to the motor vehicle industry in South Africa.	1	2	3	4
3) There exist adequate internal controls over the recognition, measurement, recording and payment of carbon excise tax applicable to motor vehicles.	1	2	3	4
4) My company complies with all carbon excise tax legislation and regulations applicable to motor vehicles.	1	2	3	4
Carbon tax impact and the social cost of carbon				
5) The implementation of carbon excise tax changed the production techniques and technologies toward producing more fuel efficient vehicles	1	2	3	4
6) The implementation of carbon excise tax has resulted in an improvement in the fuel efficiency of motor vehicles manufactured.	1	2	3	4
7) The implementation of carbon tax has affected our company's corporate social investment policy and/or behaviours.	1	2	3	4
8) I am aware of the concept of the social cost of carbon.	1	2	3	4
9) The carbon tax price and revenue generated from its implementation adequately compensates for the damage caused by carbon emissions from motor vehicles?	1	2	3	4
10) Carbon tax is the best policy measure in addressing South Africa's climate change concerns?	1	2	3	4

Section 3: Corporate Social Investment Expenditure ("CSI")

Please allocate marks to each question as follows:
1. Do not agree
2. Do not agree subject to exceptions
3. Agree subject to exceptions
4. Strongly agree

General				
1) CSI is a necessary cost of doing business	1	2	3	4
2) CSI gives a company a distinctive position in the market	1	2	3	4
3) CSI may be defined as taking proper account of the broader interests of society when making business decisions	1	2	3	4
4) CSI may be defined as sacrificing some profits in order to do the right thing.	1	2	3	4
5) Our company complies with all carbon excise tax legislation and regulations applicable to motor vehicles	1	2	3	4
Carbon tax pricing				
6) Carbon tax pricing has nothing to do with the CSI decision making.	1	2	3	4
7) The carbon excise tax for motor vehicles is adequately priced and accurately reflects the associated damage cost from motor vehicle carbon emissions.	1	2	3	4
Carbon tax and corporate social investment				
8) The implementation of carbon tax has affected corporate social investment policy and strategy of the company	1	2	3	4
9) Since carbon tax is adequately priced for monetary damage caused by carbon emissions, corporate obligations to society and environment in terms of CSI is effectively reduced	1	2	3	4
10) Kindly provide the CSI spend for the 2009 to 2012 years in millions of rand per the appropriate columns below	2009 Rm	2010 Rm	2011 Rm	2012 Rm

Section 4: Sustainability Reporting

1) Please indicate your compliance with IFRS based on a scale of 1 to 7, where 1 = non-compliance and 7 = fully compliant.						
1	2	3	4	5	6	7

4) Are your company IFRS compliant?	Y
	N
If yes, please indicate since when.	
2) Do you levy carbon tax on all newly manufactures motor vehicles in compliance with carbon tax legislation	Y
	N
4) If yes, briefly describe the process in which carbon tax is levied?	

For the questions 5-7 below, please indicate the frequency of each, based on the following scale:

1	2	3	4	5
Always	Most of the time	Sometimes	Rarely	Never

5) Sales transactions are subject to carbon tax	
6) Accounting personnel understand IFRS requirements relating to carbon tax	
7) IFRS is applied consistently to all sales transactions which are subject to	

carbon tax	
8) Carbon tax has been adequately disclosed in terms of IFRS	Y
	N

9) Describe the economic substance of carbon tax transactions which determine your accounting treatment of carbon tax transactions?

10) Provide the journal entries (including narrations) for the recording of carbon excise taxes?	Debit	Credit
Narration:	Acc Name:	Acc Name:
Narration:	Acc Name:	Acc Name:
Narration:	Acc Name:	Acc Name:
Narration:	Acc Name:	Acc Name:
Narration:	Acc Name:	Acc Name:

11.Do you believe that the accounting treatment applied to carbon tax is correct in terms of IFRS?	Y
	N

9. ANNEXURE B: ARTICLE 1 AS PUBLISHED

Page B 1

10. ANNEXURE C: ARTICLE 2 AS PUBLISHED

Page C 1

11. ANNEXURE D: ARTICLE 3 AS ACCEPTED (PROOF COPY)

Page D 1

Page D 3

12. ANNEXURE E: CLUTE INSTITUTE'S AUTHOR GUIDELINES

Clute 1

Clute 2

13. ANNEXURE F: SUBMISSION NOTIFICATION FOR ARTICLE 4

Page F 1

14. ANNEXURE G: MANAGING GLOBAL TRANSITIONS' AUTHOR GUIDELINES

Climate Change: A Comparison Of Market-Based Instruments From A South African Perspective

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ABSTRACT

This article aims to consider the relevancy of (i) cap-and-trade schemes and (ii) carbon tax schemes in a developing economy context. Even though both schemes have a common goal of reducing greenhouse gas emissions, they operate very differently, each with their own set of advantages and disadvantages. Sustainable developments comprise various elements categorised in three primary dimensions – environmental, economic and social. The objective of reducing greenhouse gases via the implementation of carbon tax or cap-and-trade schemes primarily addresses the environmental dimension of sustainable development. Notwithstanding the aforementioned, the impact of both schemes on the economically sustainable development, including industry competitiveness and growth, still has to be determined. In South Africa, the National Treasury made a decision to implement carbon tax as opposed to cap-and-trade schemes. In this article, the reasoning behind their decision in favour of carbon tax in the South African context is critically considered, firstly by evaluating the key characteristics between cap-and-trade and carbon tax schemes and secondly by considering the effectiveness hereof in the global context. It was found primary reason behind the favourable consideration of carbon tax was the fact the implementation thereof would be 'simpler' using the existing taxation systems, whereas cap-and-trade would require the implementation of sophisticated mechanisms that may not provide the optimum benefit in a developing economy context.

Keywords: Climate Change; Carbon Taxation; Cap-And-Trade Scheme; Greenhouse Gas Emissions; Sustainable Development

INTRODUCTION

Background

The issue of global warming in recent years has been at the forefront of not only the scientific community, but also of various governmental institutions (Ren & Lin, 2001). Many scientists are of the opinion that higher concentrations of greenhouse gas emissions, such as carbon dioxide and methane, can negatively affect our climate (Sathiendrakumar, 2003) and that if the atmospheric concentrations of these greenhouse gases continue to rise, the global climate will become increasingly warmer (Yusuf *et al.*, 2012; Ren & Lin, 2001). Shepherd (2012:1) is in agreement herewith when saying that the climate change currently being experienced is due to an increase in greenhouse gas emissions that arise from human activities, such as the burning of fossil fuels, agriculture and deforestation. Spectral calculations also confirm that water vapour accounts for approximately 87% of the greenhouse effect and a doubling of the current level of carbon dioxide emissions would result in a rise in global temperatures of 0.51°C without water feedback (Ollila, 2012). In South Africa, the level of carbon emissions per unit of economic output was nearly three times the average set by the Organisation for Economic Co-operation and Development (OECD) (Goldblatt & Davies, 2002).

Governments considering strategies for lowering carbon emissions ordinarily have two basic approaches to consider, namely i) a cap-and-trade scheme that reduces emissions by limiting the quantity of carbon dioxide that can be emitted and then allocating emissions permits that are tradable, or ii) introducing a carbon tax scheme that effectively raises the price of fossil fuels based on their carbon content (Anon, 2012). The *cap-and-trade* approach has its foundation in the United Nations Framework Convention on Climate Change (UNFCCC) that was established with the goal of reducing the concentration of greenhouse gases in the atmosphere, to which South Africa became a signatory in August 1997 (UNFCCC, 2004). In a cap-and-trade scheme, a governmental organisation typically issues *a license (or permit) to pollute* to major industries with the entity then being in position to trade these permits with another entity who might make 'equivalent' changes more cost effectively (Gilbertson & Reyes, 2009). This is the approach underlying most emission trading schemes with the underlying theory that the available supply of permits will be slowly reduced, so that the market retains its value while at the same time forcing a decrease in the overall level of greenhouse gas emissions (Gilbertson & Reyes 2009). On the other hand, *carbon tax* is in essence an excise tax on the producers of raw fossil fuels based on the relative carbon content of those fuels (OECD, 1997). The objective of carbon tax is therefore to control the problem of global warming caused by increasing concentrations of greenhouse gases, which then, *per se*, include carbon (Pearson & Smith, 1991). The impact of carbon tax is ordinarily determined by using the energy demand function that considers the price elasticity of energy (Yamaguchi, 2007). According to SBS (2012), carbon tax schemes have been implemented in many countries around the world, including Denmark, Finland, Ireland, the Netherlands, Norway, Slovenia, Sweden, Switzerland, the United Kingdom, Canada, India, Costa Rica and China.

Sustainable development

From the above it is evident that both cap-and-trade schemes and carbon tax schemes intended to effect reductions in greenhouse gas emissions in order to contribute to sustainable development. According to Mohammed (2011), sustainable development has been defined as that which is required to harmonise the fulfilment of human needs with the protection of the natural environment so that these needs can be met not only in the present, but also in the indefinite future. Sustainable development comprises various elements categorised into three primary dimensions, namely environmental, economic and social, which in essence is the so-called triple bottom line, which has been defined as the *balance* within the concept of sustainability (Cronje & Chenga, 2009; Anon, 2006; Newport *et al*., 2003):

- The *economic dimension* of sustainability is important as critical issues such as costs associated with environmental pollution, constraints on economic growth and the destruction of non-renewable resources are addressed by this area of sustainable development.
- With regard to *social sustainability*, it is suggested that the social dimension of sustainable development encompasses the transformation, and perpetual improvement of the livelihoods of human beings within a specific social context.
- In terms of *environmental sustainability*, clean air and water, reduced toxic emissions and reducing household waste as well as conserving natural resources are among the important environmental policy objectives that most OECD governments have been pursuing over the past thirty years.

The South African context

In terms of related carbon emission developments in South Africa, the National Treasury published a discussion document considering the economic merits for introducing a carbon tax in South Africa in December 2010 (National Treasury, 2010). This elicited 79 stakeholder responses, with a more detailed policy document containing the design of the carbon tax anticipated to be released in due course (WWF, 2012).

However, prior to this, on 1 September 2010, a carbon emission tax on the sale of new passenger motor vehicles in South Africa was implemented, which added a tax of R75 for every gram of carbon dioxide per kilometre it emits over the 120g/km (NAAMSA, 2011; Shirley, 2010). These vehicles are taxed on carbon dioxide emissions above 120g/km at a fixed rate of ZAR75 per g/km. Therefore, if a new passenger car emits 200g/km of carbon dioxide, it will be taxed on the 80g/km emitted above the 120g/km threshold. At the suggested flat rate of ZAR75 per g/km, such a vehicle will attract carbon tax of around ZAR 6 000 (Finnern, 2010). In terms of the

industry's contribution to sustainable development in the region, it contributed approximately 7.5% to the country's GDP in 2008 (SAI, 2008a). Therefore, due to its importance to the South African economy, the impact of hereof is expected to be significant. The National Association of Automobile Manufacturers of South Africa (NAAMSA) suggested that carbon tax will inflate vehicle prices by as much as 2%, which may lower sales volumes and could negatively impact vehicle industry employment levels (Anon, 2010).

PROBLEM STATEMENT AND OBJECTIVES

Following from the above, the question may be asked as to the total impact of the implementation of carbon tax as an environmental policy, not only in the context of the South African vehicle industry, but also in the context of the broader economy. In light hereof, the primary research question under consideration could be formulated as follows:

- Is the carbon tax mechanism the most appropriate mechanism to reduce greenhouse gas emissions within the South African developing economy context, seen in the light of global experiences?

In consideration hereof, this paper aims to examine firstly the distinguishing natures of i) cap-and-trade schemes and ii) carbon tax schemes, and secondly to provide an evaluation of the decision made by the National Treasury to implement carbon tax in South Africa. The research is based on an analytical literature study research methodology and utilises a three-step approach in considering whether carbon tax is the most appropriate mechanism to reduce greenhouse gas emissions in South Africa. Firstly, the key distinguishing features between the carbon tax and cap-and-trade mechanisms are analysed, secondly, the effectiveness of these scheme are evaluated based on global experiences and thirdly an evaluation of the National Treasury's case for carbon tax is provided.

KEY FEATURES OF CAP-AND-TRADE AND CARBON TAX SCHEMES

Introduction

According to Goldblatt (2010a), the primary distinguishing features of cap-and-trade and carbon tax schemes are typically threefold, namely:

- In terms of carbon pricing, carbon tax offers some level of certainty as the price is fixed; whereas with a cap-and-trade approach, the carbon price is uncertain and is subject to market volatility.
- In terms of achieving quantitative limits of carbon emissions, the cap-and-trade approach appears to be able to accomplish this more effectively than carbon tax as emissions are capped and therefore provide some level of certainty of the environmental outcome.
- In terms of administrative costs, the carbon tax approach may be seen as a more efficient option as its implementation can be executed within the infrastructure of the existing tax administration, whereas the cap-and-trade approach may require the creation of a new institution to implement a trading scheme.

The distinctive characteristics of these two approaches are discussed in more detail below.

Cap-and-trade schemes

The foundation of the cap-and-trade methodology originated with C Boyden Gray who talked about cleaning up the environment by letting people buy and sell *rights to pollute* (Smithsonian, 2009). This concept was initially termed *emissions trading,* but was subsequently changed to *cap and trade*. In a cap-and-trade scheme, quantitative limits are set on the time path for greenhouse gas emissions of different countries with these countries then administering these limits in their own fashion. These schemes typically allow for the transfer of emission allowances between the different countries under the Kyoto Protocol (Noordhaus, 2007). With regard to cap- and-trade schemes in South Africa, it should be noted that South Africa signed the protocol in 2002, and even though it has no commitment to cap emissions, it is involved in *Clean Development Mechanism* (CDM) projects (DEAT 2010). Some of the key (negative) characteristics of cap-and-trade schemes include the following:

- There may be initial over-allocation permits to governments or companies resulting in no required behavioural change by companies regarding carbon emissions (Gilbertson & Reyes, 2009).
- In some instances, producers may be able to transfer abatement costs to consumers and increase its prices without consideration of the true purposes of the scheme (Gilbertson & Reyes, 2009).
- There are major administrative complexities related to cap-and-trade schemes together with uncertainties with regard to the actual economic costs to business (National Treasury, 2010).

A further issue is the concept of carbon leakage, which is said to occur when there is an increase in greenhouse gas emissions in one country as a result of emission reductions in another country that has stricter climate change policies (CLC, 2010). The results of studies conducted on the effects of the Kyoto Protocol have shown carbon leakage to be in the range of 5 to 20% using static *Computable General Equilibrium* models, which differs from the opinion of researchers who say, in practice, carbon leakage is not substantial due to transport costs and local market conditions (Barker *et al.*, 2007). The principles of the cap-and-trade approach, however, have indicated some positive aspects, including the following:

- Trade schemes implemented in air pollution programmes in the United States reported a strong positive effect on reducing emissions (Tietenburg, 2003).
- The performance of cap-and-trade schemes in the field of improving environmental sustainability was assessed using a simulation model at the University of Saskatchewan, where it was revealed that it decreased carbon dioxide emissions and increased environmental and economic sustainability (Belcher *et al*., 2003).

Carbon tax

Carbon tax, which was first introduced in Europe in the early 1990s, has been widely advocated as a means for reducing such emissions to address anthropogenic climate change (Clarke, 2011). In principle, carbon taxes are levied at the same specific rate on all emissions, irrespective of their source. Since carbon emissions have a proportional relationship to fossil fuel usage, this could be charged directly on emissions of fossil fuels such petrol, gas and coal (IMF, 2008). In addition to the advantages of price certainty and lower administrative costs, carbon tax offers the advantage of economy-wide application in terms of coverage in comparison to cap-and-trade schemes that ordinarily only cover high emitters in the initial phases (Goldblatt, 2010a). Another advantage is that pricing systems such as carbon tax are less susceptible to corruption than quantity type systems, with this being demonstrated frequently at international trade interventions when quotas are compared to tariffs (Noordhaus, 2007). A further significant advantage, according to Pope and Owen (2009), is the suggestion that it would provide a more stable revenue base over time. They propose (within the Australian context) that it may generate around A$11.5 billion per annum, subject to various treasury assumptions (Pope & Owen, 2009).

In terms of disadvantages, carbon tax schemes do not ensure quantifiable, emission reductions (National Treasury, 2010). This assumption is supported by the simulation model developed at the University of Saskatchewan, which revealed that carbon tax had no significant effect on carbon dioxide emissions or environmental sustainability, but may rather decrease economic sustainability (Belcher *et al*., 2003). Another possible significant disadvantage is the pricing of carbon. The social cost of carbon has been defined as the monetary damage done by emitting one more ton of carbon at some point in time. Using quantitative modelling, a marginal cost of £100 per ton of carbon has been noted in the United Kingdom (Pearce, 2003). Ideally, the carbon tax price should be priced to cover the marginal cost per ton of carbon, with the resultant question then being whether the carbon tax price accurately reflects the monetary damage caused by an additional ton of carbon?

EVALUATION OF THE EFFECTIVENESS OF SUCH SCHEMES

Cap-and-trade schemes

In terms of cap and trade, the European Union Environmental Trading Scheme (EU ETS) is the world's largest emissions permit market to date and is organised into distinctive periods referred to as ‘phases’, with *Phase I* between 2005 and 2007 and *Phase II* between 2008 and 2012 (Hintermann, 2012). In terms of the effectiveness

hereof in reducing greenhouse gas emissions, a sample study of 2101 European firms subject to the EU ETS revealed that it led to reductions in emissions in both phases (Abrell *et al.*, 2011).

In respect of Phase I, an analysis of carbon dioxide emissions by countries subject to the EU ETS (Table 1 below) found an overall net increase of 1.88% in GHG emissions, with 11 out of the 24 countries recording decreases in their carbon emissions.

Table 1: Phase I: Emissions of EU ETS countries (tons of carbon)

Country	2005	2006	2007	% change
Austria	33,372,826	32 382 804	31 751 165	-4.86
Belgium	55,363,223	54 775 314	52 795 318	-4.64
Cyprus	5,078,866	5 259 273	5 396 164	6.25
Czech Republic	82,454,618	83 624 953	87 834 758	6.52
Germany	474,990,760	478 016 581	487 004 055	2.53
Denmark	26,475,718	34 199 588	29 407 355	11.07
Estonia	12,621,817	12 109 278	15 329 931	21.46
Spain	183,626,981	179 711 225	186 495 894	1.56
Finland	33,099,625	44 621 411	42 541 327	28.53
France	131,263,787	126 979 048	126 634 806	-3.53
Greece	71,267,736	69 965 145	72 717 006	2.03
Hungary	26,161,627	25 845 891	26 835 478	2.58
Ireland	22,441,000	21 705 328	21 246 117	-5.32
Italy	225,989,357	227 439 408	226 368 773	0.17
Lithuania	6,603,869	6 516 911	5 998 744	-9.16
Luxembourg	2,603,349	2 712 972	2 567 231	-1.39
Latvia	2,854,481	2 940 680	2 849 203	-0.18
Netherlands	80,351,288	76 701 184	79 874 658	-0.59
Poland	203,149,562	209 616 285	209 601 993	3.18
Portugal	36,425,915	33 083 871	31 183 076	-14.39
Sweden	19,381,623	19 884 147	15 348 209	-20.81
Slovenia	8,720,548	8 842 181	9 048 633	3.76
Slovakia	25,231,767	25 543 239	24 516 830	-2.83
United Kingdom	242,513,099	251 159 840	256 581 160	5.80
Total	2,012,043,453	2 033 636 557	2 049 927 884	1.88

Source: Anon (2008b)

In respect of Phase II (Table 2 below), all the countries reported reductions in carbon emissions, with an overall reduction of 7.2%

From a review of the above tables it is clear that the EU ETS was more effective in Phase II than in Phase I. It is, however, argued that Phase I not only established a carbon price for material sectors of economic activity in Europe, but also established the necessary trading infrastructure (Convery *et al.*, 2008). Furthermore, during Phase I, the permits allocated were also found to be consistently higher than the actual verified emissions taking place in the EU ETS countries (Gilbertson & Reyes, 2009).

Table 2: Phase II: Emissions of EU ETS countries (tons of carbon)

Country	2008	2009	% change
Austria	68 232 000	62 313 000	-8.67
Belgium	104 865 000	103 593 000	-1.21
Cyprus	8 555 000	8 199 000	-4.16
Czech Republic	116 952 000	108 121 000	-7.55
Germany	786 652 000	734 599 000	-6.62
Denmark	46 850 000	45 698 000	-2.46
Estonia	18 383 000	15 951 000	-13.23
Spain	329 286 000	288 230 000	-12.47
Finland	56 083 000	53 568 000	-4.48
France	376 993 000	363 356 000	-3.62
Greece	97 817 000	94 917 000	-2.96
Hungary	54 653 000	48 676 000	-10.94
Ireland	43 406 000	41 642 000	-4.06
Italy	447 367 000	400 836 000	-10.40
Lithuania	15 130 000	12 838 000	-15.15
Luxembourg	10 660 000	10 143 000	-4.85
Latvia	7 591 000	6 652 000	-12.37
Netherlands	173 845 000	169 650 000	-2.41
Poland	316 059 000	298 905 000	-5.43
Portugal	58 357 000	57 400 000	-1.64
Sweden	49 105 000	43 744 000	-10.92
Slovenia	17 158 000	15 291 000	-10.88
Slovakia	37 557 000	33 890 000	-9.76
United Kingdom	522 247 000	474 579 000	-9.13
Total	3 763 803 000	3 492 791 000	-7.20

Source: UN (2011)

Carbon tax

Various studies around the world have been conducted using simulations to determine the estimated impact of carbon tax on greenhouse gas emissions, such as the following:

- In a study estimating the impact of carbon tax on greenhouse gas emissions in Nepal using an energy system model, it was confirmed that the introduction of carbon tax would result in an estimated reduction of 12% under certain conditions (Shakya *et al.*, 2012).
- A study estimating the effect of policy instruments such as carbon tax in Austria on the passenger motor vehicles confirmed that policy measures may demonstrate an effective reduction in GHG emissions (Kloess & Muller, 2011).
- In terms of the actual effectiveness of the tax in reducing greenhouse gases, studies conducted in Norway, one of the first countries to introduce carbon tax in 1991, revealed that carbon emissions increased by 19% from 1990 to 1999 as opposed to a GDP growth of 35% in the same period, which pointed to an overall reduction in average emission per unit GDP of 12% (Bruvoll & Larson, 2004).
- In Sweden, an ex-post evaluation of the implementation of carbon tax for the years 1992 to 1995 shows mixed results of the effect of the carbon tax on carbon emissions according to different industries affected by the tax, and also revealed that even though the services sector, household and transport sectors reported no change in emission levels, there was a positive effect on carbon emission levels (Bohlin, 1998).
- In both the Netherlands and Denmark, tax exemptions were provided for the manufacturing industry and related energy intensive industries, and this reduced the mitigating effects of carbon tax in these countries (Lin & Li, 2012).
- Carbon tax on passenger motor vehicles was introduced in Ireland in 2008, and a study estimating the effect of the tax on greenhouse gas emissions revealed that it should result in a decline in greenhouse gas emissions of 0.2milllions tons of carbon by 2015 (Hennessy & Toll, 2011).

- An analysis of the implementation of a potential carbon tax in Washington using a Carbon Tax Analysis Model revealed that a carbon tax at US$30 per metric ton of carbon dioxide lowers GHG emissions by 8.4% (Keibun, 2011).

Effects of cap-and-trade and carbon tax on industry

In terms of the economic effect of cap-and-trade schemes on profit, employment and value added, a firm-based study of the EU ETS revealed that in Phase I and the beginning of Phase II, the EU ETS did not materially affect profits, employment and value added (Abrell *et al.*, 2011). An interim analysis of Phase I of the EU ETS confirms that the first phase had little impact on industry competitiveness (Convery *et al.*, 2008). Table 3 below summarises the GDP per capita information (adjusted for current prices) for each EU ETS country in the period 2005 to 2009. With the exception of the United Kingdom, all countries reported a real increase in economic growth during the period, with the aggregate economic output growing in real terms by 21%. This mitigates any argument that cap-and-trade schemes will result in decreased profits and growth for companies and industries alike.

Table 3: EU ETS countries: GDP per capita (US dollars at current prices)

Country	2005	2006	2007	2008	2009	% change
Austria	37 048	39 278	45 133	49 650	45 614	23
Belgium	36 225	38 167	43 586	47 822	44 356	22
Cyprus	22 298	23 876	27 686	31 693	29 277	31
Czech Republic	12 726	14 463	17 499	21 723	18 789	48
Denmark	47 546	50 412	56 941	62 115	55 915	18
Estonia	10 330	12 506	16 375	17 773	14 337	39
Finland	37 302	39 460	46 523	51 153	45 062	21
France	34 002	35 669	40 586	44 245	40 773	20
Germany	33 514	35 169	40 281	43 937	40 029	19
Greece	21 468	23 357	27 088	30 216	28 411	32
Hungary	10 937	11 181	13 553	15 390	12 660	16
Ireland	48 888	52 922	60 578	60 570	50 564	3
Italy	30 299	31 539	35 569	38 344	35 041	16
Latvia	6 913	8 658	12 557	14 729	11 433	65
Lithuania	7 641	8 900	11 636	14 153	11 075	45
Luxembourg	82 370	91 395	107 863	118 673	104 384	27
Netherlands	39 157	41 378	47 591	52 766	47 915	22
Poland	7 963	8 949	11 132	13 852	11 256	41
Portugal	18 132	19 008	21 846	23 689	21 976	21
Slovakia	8 844	10 290	13 803	17 348	16 026	81
Slovenia	17 840	19 406	23 507	27 058	24 235	36
Spain	26 044	28 052	32 327	35 306	32 080	23
Sweden	41 042	43 899	50 485	52 632	43 347	6
United Kingdom	37 881	40 381	46 191	43 022	35 220	-7
Total	676 410	728 315	850 336	927 859	819 775	21

Source: UN (2012)

The effect of carbon tax on certain industries has also been subject to empirical research.

- In a study of energy intensive industries, 21 OECD countries between 1992 and 2008 revealed that carbon tax had a positive influence on the international competitiveness of energy intensive industries in export countries (Zhao, 2011). An important point to note is that carbon tax has important implications in terms of global competitiveness of economies and even though global competitiveness may not be reduced over the long term by higher energy prices, the short-term effects of a carbon tax may be serious for certain industries (Zhang & Baranzini, 2004).
- In Sweden, the implementation of carbon tax has had no effect in terms of economic efficiencies in the transport, household and service sectors; however, carbon tax accounted for $1,6 billion of government revenue in 1995 (Bohlin, 1998).

- The implementation of excise tax on passenger motor vehicles (based on emission levels rather than engine size) in Ireland is expected to result in a decrease in fiscal revenue by up to half a billion euro in 2025 (Hennessy & Toll, 2011).

AN EVALUATION OF NATIONAL TREASURY'S CASE FOR CARBON TAX

Considering the above, within the South African context, it was not disputed that cap-and-trade schemes could achieve the same objectives as carbon taxes. National Treasury did, however, argue that cap-and-trade schemes brought specific challenges to the South African context. These include the i) credibility of emission caps, the allocation of permits and the need for a competitive market to facilitate trading, ii) price uncertainty, iii) the need for new financial regulations and administrative capacity, iv) tax implications, as well as v) the non-transparency of distributional incidence (National Treasury, 2010).

- Firstly, with regard to the credibility of emission caps and the allocation of permits, the EU ETS permit allocations in first phase were greater than verified emissions, which were due to using emission projections before verifiable emissions data became available (Gilbertson & Reyes 2009). It was argued that if a cap-and-trade scheme is to work in South Africa, it will be critical for caps to be based on verified emissions data. The emissions data in Table 2, for the second phase of the EU ETS, indeed confirms the effectiveness of credible caps in reducing carbon emissions.
- Secondly, with regard to price uncertainty, this is definitely a valid challenge as seen in EU ETS, where prices have moved significantly in response to new information regarding the allocation of allowances (Goldblatt, 2010b). The market structure in which permits are traded are equally important, as in South Africa there is a high concentration of emissions in the energy and fossils fuels sector that will create a challenge to the design of an emissions trading scheme in terms of addressing market power as well as ensuring trading liquidity (Goldblatt, 2010b).
- Thirdly, in terms of the administration of an emission trading scheme, most installations in EU ETS chose between a *method of calculation* or *continuous measurement*, with the former being the practical choice (Brohe, 2010). Each member state in the EU ETS is also required to keep a national registry to ensure accurate accounting of all allowances under the Kyoto Protocol (Brohe, 2010). It is clear that any emissions trading scheme in South Africa will require additional administrative resources for both the government and firms alike.
- Fourthly, the tax implications of cap-and-trade can be complicated, especially in the EU ETS, where there has been extensive grandfathering of emission rights (allocating them without charge) (IMF, 2008). Some experts argue that the grandfathered rights should be recorded as tax expenditure as a minimum, opening the issue up for public debate (IMF, 2008). This will present a valid challenge for South African Revenue Service (SARS) and NT if an emissions trading system were to be implemented in South Africa.
- Fifthly, in respect of the challenge of distributional incidence, a study examining the welfare effect of emissions trading under oligopolistic trading conditions found that refunding 10% of the emission trading proceeds resulted in optimal welfare improvements where such proceeds are reinvested in renewable energy sources (Traber & Kemfert, 2010). In South Africa, the structure of the energy sector market is oligopolistic (National Treasury, 2010), and provided the proceeds from emissions trading are invested in renewable energy, the challenge may be addressed effectively.

The effects of carbon tax on the competitiveness of industries are positive, and in addition, the carbon tax also increases fiscal revenue, although when replacing another tax, the results may be adverse to the fiscus. The effect of cap-and-trade schemes over the long term on industry is positive, with most EU ETS countries still experiencing positive GDP per capita growth at current prices over a five-year period of the EU ETS.

CONCLUSION

The objective of this article was to consider the effect of cap-and-trade and carbon tax schemes on sustainable development and to use this information in assessing the National Treasury's decision to implement carbon tax in South Africa. In determining the impact of cap-and-trade and carbon tax on sustainable development, the distinguishing features between both instruments were highlighted. The primary difference is that carbon tax is a

pricing instrument offering certainty about price but uncertainty about the quantity of emission reductions, whereas a cap-and-trade scheme is a quantity instrument, offering certainty about the quantity of emission reduced but uncertainty about the carbon price.

The studies evaluating the effect of carbon tax on greenhouse gas reduction confirm that the tax has the overall effect of reducing greenhouse gases. These results were obtained from both models predicting the impact of carbon tax on greenhouse gases as well as post-ex results of introducing a carbon tax. In respect of emissions trading, the first phase of the EU ETS showed no decrease in carbon emissions, which was primarily due to permit allocation being based on estimates of carbon emissions rather than verified emissions. However, the second phase of the EU ETS showed a material decline in carbon emissions with caps being based on verified emissions. On a whole, the impact of both market-based instruments on environmental and economically sustainable development is positive. The National Treasury's reasons for not implementing cap-and-trade schemes were explained on the basis of a list of factors that were considered challenging within a South African context. These challenges included the credibility of emission cap, the allocation of permits, the need for a competitive market to facilitate trading, price uncertainty, tax implications, the need for new financial regulations and administrative capacity as well as the non-transparency of distributional incidence.

The significant challenges from a South African context remain a competitive market for trading, price uncertainty, tax implications and administrative capacity. The welfare effect may be positive provided the South African government reinvests proceeds from emissions trading in renewable energy. The credibility of the emission cap and allocation of permits can be addressed by using verifiable emissions as a basis for determining the quantitative limits of carbon emissions and allocating permits based on verifiable emissions rather than grandfathering permits. The decision by the Treasury on a whole is considered rational and acceptable from an economic and environmental perspective.

LIMITATIONS AND FUTURE RESEARCH

A key limitation of the study is that it does not produce any new empirical insights nor does it necessarily validate any existing empirical insights. Notwithstanding this limitation, the article contribution can be seen in it contrasting evaluation of cap-and-trade schemes as opposed to carbon tax schemes, especially in the context of a developing economy such as South Africa. Although the study has led to theoretical insights regarding the relationship of carbon tax and cap-and-trade schemes on greenhouse gas emissions and economic growth, an empirical study will be necessary to validate the theoretical conclusions arrived at in the study. As far as future research opportunities regarding the impact of carbon tax and cap-and-trade schemes on economic and environmental sustainability, the following may be considered. The third phase of the EU ETS started in 2012 and should end in 2020. The level of allocated permits in the third phase is expected to be even smaller than in the second phase. The impact of a shortfall in permit allocations on carbon leakage, which occurs when there is an increase in carbon dioxide in one country as a result of an emissions reduction by a second country with a strict climate policy could be significant. The ability of multi-national companies operating in countries with stringent climate change policies to shift production processes to other countries with less stringent climate change policies and thereby nullify any emission reductions should be considered in determining the true effectiveness of the EU ETS in the third phase.

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Carbon Tax Pricing And The Social Cost Of Carbon: The Case In The South African Motor Vehicle Manufacturing Industry

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ABSTRACT

Since the implementation of carbon tax on motor vehicles in South Africa during 2010, the pricing of the tax has never been challenged or assessed. The purpose of this study is to gauge the reasonability of the carbon tax price in South Africa as applicable to the motor vehicle manufacturing industry. A detailed review is performed to determine the adequacy of the carbon tax price by comparing the social cost of carbon from motor vehicle emissions against the revenue raised from carbon tax levied on motor vehicles in the same period. Empirical research includes an exploratory questionnaire into the adequacy of the carbon tax price in South Africa with input data from multinational motor vehicle manufacturers operating in South Africa. The findings from the literature review confirm that although the respondents do not consider the level of carbon tax price as adequate to be relevant for the social cost of carbon, the revenue raised from this tax exceeds the social cost of carbon leading to the conclusion that the tax is adequately priced.

Keywords: Carbon Dioxide; Carbon Tax; Cap and Trade Scheme; Climate Change; Social Cost of Carbon

INTRODUCTION

Background

According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), the average global temperature had increased by 0.741°C during the period 1906 to 2005, resulting in rising sea levels due to melting snow and ice (Li *et al.*, 2012). It is expected that greenhouse gas emissions will continue to increase over the next 30 years, resulting in even further rising sea levels and additional negative impacts on coastal ecosystems, among other (Hardisty, 2009). Governments therefore have to consider strategies and alternatives to reduce greenhouse gas emissions, such as CO_2, if they wish avoid or even just to mitigate the negative impacts of climate change. Two 'mainstream' instruments available to governments to lower greenhouses gas emissions include i) *cap and trade schemes,* which limits the quantity of allowable emissions with a final carbon price being established through trade allowances, and ii) *carbon taxes,* which seeks to reduce emissions through the pricing of emissions (National Treasury, 2010).

Cap and trade schemes originated from the Kyoto Protocol, which is a legally binding agreement signed by a host of industrial countries in December 1997 to reduce greenhouse gas emissions (Wittneben & Kyar, 2009; Kyoto, 2010; UNFCC, 2010). These schemes are regulatory measures designed to achieve environmental objectives at the lowest social cost by making pollution credits available to those who are best equipped to make the desired changes (Harwatt, 2008). Carbon tax, on the other hand, is a market-based instrument that creates a cost to emissions by directly taxing the carbon content of fuels (Hasset *et al.*, 2007). The purpose of a carbon tax is to internalise externalities related to anthropogenic climate change (Metcalf, 2009). A recent study concluded that South Africa is a major exporter of carbon; at least 129 per cent more carbon is associated with a dollar earned with exports than a dollar spent on imports with such figures having serious policy-related implications in a future where international climate-change trade limitations will become stricter and binding (Brent *et al.*, 2009).

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Within the South African context, the National Treasury (2010) published a discussion document considering the economic merits for introducing a carbon tax in South Africa in December 2010, which highlighted their reasons for leaning towards carbon taxes as a method of limiting the social cost of carbon (or SCC). The discussion document evaluated the case for carbon tax against cap and trade schemes and concluded that carbon tax was the best policy instrument for South Africa as it was administratively easy to manage and minimised opportunities for abuse due its simple structure. Estimates of the social cost of carbon were also briefly reviewed in the discussion paper as a guideline in determining the South African carbon tax price, which was suggested to be R75 per ton of CO_2 with an increase to approximately R200 per ton CO_2 (National Treasury, 2010). The actual carbon tax price implemented on 1 September 2010 on the sale of new passenger motor vehicles in South Africa was R75 for every gram of carbon dioxide per kilometre it emits over the 120g/km (NAAMSA, 2011; Shirley, 2010). It should be noted that, since the introduction of carbon tax in South Africa, the ability of a carbon tax policy to actually reduce CO_2 emissions has been questioned, but not assessed (Nel & Nienaber, 2012).

The SCC has been defined as the amount of damage caused by each additional ton of greenhouse gas emitted into the atmosphere (Hardisty, 2009; Pearce, 2003). Hardisty (2009: 209) further states that the damage cost specifically relates to the probable impacts to the global economy caused by increases in global temperatures, rising sea levels, weather-related events, declining agricultural production and loss of biodiversity, among others. In terms of economic theory, in conditions of a perfect market where all social costs have been considered, any efforts to cut back the emissions of greenhouse gases would be feasible as long as the incremental cost of reducing the emission is lower than the increase in SCC (IPCC, 2012). Applying this general economic principle to the carbon tax scenario, we therefore argue that the SCC should be equal to, or lower than, revenues generated from carbon taxes in order for the instrument of carbon tax to be feasible.

Problem Statement, Objectives and Research Method

Following from the above, the potential knowledge gap this paper explores is found in its attempt to determine the adequacy of carbon tax revenues generated in compensation for the damages caused by related carbon emissions. It is acknowledged that this in itself is not a simplistic task and that there are multiple variables at play in such an endeavour. Notwithstanding, the key objective of this paper is to examine the SCC from a South African motor vehicle industry perspective, to which two supporting research questions have been formulated as follows:

P_1: What is the (perceived) level of understanding by the South African motor vehicle manufacturers of the SCC, the implications of carbon taxes on their operations and the adequacy of such taxes?

P_2: Is the South African carbon tax price pertinent to the motor vehicle industry adequately priced to compensate for the monetary damage caused by emitting one additional ton of carbon dioxide into the atmosphere?

The study comprises an exploratory study and analysis with both literature and empirical components. With regard to the *first* question as set out above, an exploratory study into the motor vehicle manufacturers' perceptions and understanding of the SCC and of the adequacy of the carbon tax pricing, as well as the impact of carbon tax on their business operations was conducted by way of a questionnaire developed based on an underlying literature study, utilising an appropriate four-point Likert-type response scale. The overall targeted population was the eight multinational vehicle manufacturers producing/assembling motor vehicles in South Africa. It should be noted that Renault and Nissan entered into a global alliance agreement, which effectively results in them becoming 'one manufacturer' in the South African context (Anon, 2013). Since there is such a limited number of manufactures available, all the companies were initially approached, with three of them offering their willingness to participate in the study. The researcher was available during the survey to provide guidance and clarification, should the respondents have had questions regarding the survey.

With regard to the *second* question as set out above, a detailed review quantifying the SCC of motor vehicles manufactured in South Africa has been identified in order to determine the adequacy of carbon tax pricing in South Africa. The total level of carbon emissions attributable to motor vehicles manufactured in South Africa in 2011 was identified and the total damage due to CO_2 emissions emitted from these vehicles was established using cost of carbon estimates from previous research projects. It should be noted that as carbon emissions tax on all passenger motor vehicles in South Africa was implemented on 1 September 2010 (NAAMSA, 2011), the first

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complete year in which carbon tax was fully operational was the 2011. Since carbon tax is levied only on *newly manufactured* vehicles, the related tax revenues generated in 2011 had to be matched to motor vehicles that were manufactured in the same period. This is the reason for using carbon emissions attributable to motor vehicles manufactured in 2011 exclusively.

The revenue received by the South African Revenue Service (SARS) in respect of carbon tax on motor vehicles was obtained and compared to the cost of CO_2 emissions by motor vehicles manufactured in 2011 to determine whether the carbon tax price adequately covered the total damage costs associated with carbon emissions from motor vehicles manufactured in 2011.

MOTOR VEHICLE MANUFACTURERS AND SCC

In achieving the first objective, an exploratory questionnaire was distributed to the motor vehicle manufacturers in South Africa. Table 1 below presents a brief analysis of the descriptive statistics associated with the responses received from the respondents in respect of each question.

Table 1: Descriptive Statistics of Responses

Question no	Min Statistic	Max Statistic	Mean Statistic	Std Dev Statistic
1	1	3	1.67	1.12
2	4	4	4.00	0.00
3	4	4	4.00	0.00
4	4	4	4.00	0.00
5	1	4	2.00	1.73
6	1	4	2.00	1.73
7	1	4	2.33	1.53
8	3	4	3.67	0.58
9	1	4	2.33	1.53
10	1	4	2.33	1.53

The questionnaire was divided into two main sections, as indicated by the responses below:

Section I: Carbon Tax Compliance

The first part of the questionnaire focused on whether the respondents think there is a need for carbon tax and their overall compliance with carbon tax legislation. Question 1 asked whether there is a need for carbon tax in South Africa, question 2 enquired as to whether the respondents were aware of all carbon tax legislation and regulations, question 3 attempted to confirm whether there existed adequate internal controls over the carbon tax, and question 4 asked whether the respondents comply with all carbon tax legislation and regulations.

- *Question 1 (score: 1.67):* The majority of the respondents do not consider there to be a need for a carbon excise tax on motor vehicles in South Africa.
- *Question 2 (score: 4):* All of the respondents confirmed that they aware of the carbon tax legislation and regulations applicable to the motor vehicle industry in South Africa.
- *Question 3 (score: 4):* All of the respondents were of the opinion that there exists adequate internal controls over the recognition, measurement, recording and payment of carbon tax applicable to motor vehicles.
- *Question 4 (score: 4):* All of the respondents in the study also confirmed that they comply with all carbon tax legislation and regulations applicable to motor vehicles.

It would therefore seem that although the motor vehicle manufactures do not particularly agree with the need of carbon tax in their institutions, they do comply with the applicable regulations.

Section 2: Carbon Tax Pricing and Impact on Manufacturing

The second part of the questionnaire focused on the pricing of carbon tax as well as the impact of the tax on production techniques and fuel efficiency of motor vehicles manufactured. Question 5 enquired about the impact of carbon tax on production techniques and technologies toward producing more fuel efficient vehicles, while question

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6 focused on whether carbon tax has resulted in an improvement in the fuel efficiency of motor vehicles manufactured. Question 7 attempted to determine the impact of carbon tax on corporate social investment (CSI), question 8 enquired as to the awareness of the concept of the SCC among the respondents, question 9 enquired as to the adequacy of the current carbon tax price, while question 10 focused on whether carbon tax is the best policy decision from a climate change perspective.

- *Question 5 and Question 6 (score: 2):* No specific conclusions could be reached regarding the impact of carbon tax on production techniques, technology and the production of more fuel efficient vehicles within the South African context. The average answer obtained for both questions was mid-way in between the two extremes.
- *Question 7 (score: 2.33):* No specific conclusion could be made on whether the implementation of carbon tax has affected the respondents' CSI policy and/or behaviours. The average answer obtained for this question lies approximately mid-way in between the two extremes.
- *Question 8 (score: 3.67):* With regard to the awareness, the majority of the respondents are aware of the concept of the social cost of carbon.
- *Question 9 and Question 10 (score: 2.33):* There was no clear indication of whether the respondents consider the carbon tax price to adequately compensate for the damage caused by carbon emissions from motor vehicles or whether carbon tax is the best policy measure in addressing South Africa's climate change concerns.

A possible explanation for the inconclusive answer in question 5 is that the respondents' production techniques and technologies might vary with respect to the level of automated capacity versus labour intensity. A possible reason for the inconclusive answer to question 6 is that carbon emission reduction strategies differ among respondents with some respondents taking a more aggressive short-term approach as opposed to a more long-term gradual approach to carbon emission reductions. The variability in respondents' answers in respect of question 7 could lie in the impact of other factors such as company economic performance and market conditions on the internal CSI policies. On a factual basis, however, 66.67% of respondents do not agree (subject to exceptions) that the implementation of carbon tax has affected their CSI policy and/or behaviour. The average answer obtained for both questions was mid-way in between the two extremes. On a factual basis, 66.67% of respondents do not agree subject to exceptions that the carbon tax price adequately compensates for the damage caused by carbon emissions from motor vehicles, with a similar 66.67% that do not agree that carbon tax is the best policy measure in addressing South Africa's climate change concerns.

THE ADEQUACY OF CARBON TAX PRICING

In addressing the second objective pertaining to the adequacy of carbon tax revenues generated, the concept of quantifying damage costs associated with carbon emissions using quantification models together with the results of prior published research studies in determining an appropriate South African carbon tax cost was explored, which was followed by an evaluation of the adequacy of the carbon tax price by comparing the total estimated cost of damage caused by carbon emissions associated with manufactured vehicles to the revenue raised from levying the relevant carbon tax in the same period.

Quantification of the Monetary Damage of Carbon

Attributing a monetary cost to the damage caused by carbon emissions is important as it allows for a proper benefit analysis of the feasibility of a particular abatement instrument. Opponents of the quantification of damage caused by carbon emissions, however, argue that the true SCC cannot be determined as the effect on future generations is not yet fully known (Pearce, 2003). In determining the potential impact of carbon emissions, USG (2012) states that both scientists and economists face difficult challenges as there are always uncertainties and a lack of information about the future emissions of greenhouse gases as well as the effect of past and future emissions on the current climate system. Notwithstanding, several studies have attempted to quantify the SCC, or have attempted to evaluate the adequacy of carbon tax-related revenues to compensate for such SCC.

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Within the South African context, the following provides an indicative estimate of the potential damage costs associated with carbon-related climate change (Midgley *et al.*, 2007):

- Flood damage costs in the Western Cape Province due to extreme rainfall events in the period from 2003 to 2007 have been estimated at around R1 billion.
- Coastal storm damage along the Durban coast in KwaZulu-Natal due to extreme weather events in 2007 have been estimated at around R100 million.
- Forestry losses during the 1991/1992 drought have been estimated at around R450 million.
- Drought impacts on agriculture 1983/84 have been estimated at be around R2.2 billion, and in 1991/92 to be around R3.5 billion.

In challenging the adequacy of carbon tax pricing, it is important to consider the distributional effects of a carbon tax. For illustrative purposes, various studies have been conducted in attempting to quantify the monetary impact of carbon tax on human society and welfare such as the following:

- In a study attempting to determine the effect of carbon tax on welfare in Italy, it was noted that the introduction of the tax had the effect of increasing welfare losses in households, with welfare losses increasing from €225,000,000 in 1995 to €938,820,000 in 2000 (Tiezzi, 2005).
- The quantitative welfare impact of carbon tax was also evaluated in a case study conducted in the United States on a 30 bus network, where it was noted that a uniform carbon tax would result in economic welfare losses of $2,700,000 (He *et al.*, 2012).
- In China, the impacts of various carbon tax schemes on household disposable income, household welfare, and economic growth were compared using a general equilibrium model indicating that a carbon tax will not only widen the urban-rural gap, but also result in welfare damage by reducing household savings by approximately ¥20,000,000,000 (Liang & Wei, 2012).

The studies above confirm instances where carbon tax was not the optimal policy choice in terms of welfare and distributional effects as the net impact of the implementation of carbon tax resulted in welfare losses. In such situations, one may conclude that the benefits of implementing a carbon tax will not exceed the SCC. Theoretically therefore, if the price of the carbon tax does not match the SCC in South Africa, one may expect similar welfare losses to those noted above.

Quantification Models for Determining the SCC

The SCC is often determined by economists using Integrated Assessment Models (IAMs), because they attempt to include knowledge from various fields of study (such as engineering, technology, behaviour and climate science) for the purpose of determining whether climate change policies are economically efficient (WRI, 2012). In South Africa, recent studies have incorporated the use of computer generated equilibrium (CGEs) models to determine the economy-wide impacts of a carbon tax, and while these are precise and functional, the static nature of CGE models often make them unsuitable for modelling the impacts of long-term problems such as climate change with significant uncertainty (National Treasury, 2010). In consideration of carbon prices, Table 2 below summarises the estimated carbon prices across different years by different research projects.

Table 2: Summary of Carbon Prices Estimates

No	Study	CO_2 price per ton (SA Rand)
1	Devarajan (2009)	96.25
2	Winkler/Marquaard (2009)	200.00
3	Long-term mitigation (2008)	100.00
4	Metcalf (2008)	123.45*
5	Nordhaus (2008)	699.55*
6	Stern Review (2007)	210.90*
7	Fankhauser (1994)	140.18*
8	Nordhaus (1991)	22.08*

(* Foreign currencies are converted to South African Rand at the relevant exchange rate.) Sources: National Treasury (2010); OANDA (2012); Devarajan *et al.* (2009)

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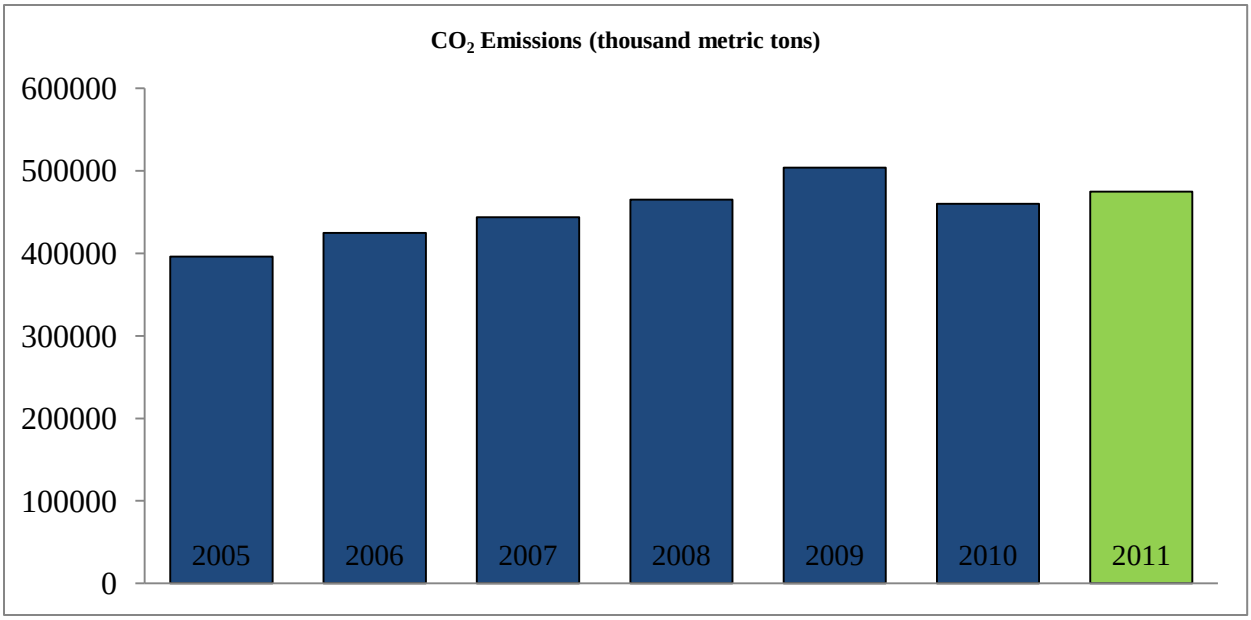
An analysis of the estimates above reveals a range of so-called carbon prices over different periods. In terms of the sample of studies reflected in the above table, it should be noted that only three studies, i.e. the *Long-term mitigation*, *Winkler/Marquaard* and *Devarajan* studies, were specific to the South Africa context, with the *Long-term mitigation* and the *Devarajan* studies using CGE models to determine the estimate of the carbon price. It is submitted that the three South African studies should be used as a basis of determining the appropriate estimated South African carbon tax price as they are more specific to the South African context. The mean average of the three studies therefore confirms an average carbon tax price of R132.08 per ton of carbon.

The Adequacy of Carbon Tax Pricing in South Africa

The adequacy of carbon tax pricing has been assessed by comparing the benefits of introducing a carbon tax (as evidenced by tax revenue generated) per tax statistics published by the Department of National Treasury and comparing this revenue against the cost of carbon (as calculated above) in respect of emissions by newly manufactured motor vehicles in 2011 (being the latest complete data available at the stage of the research). The actual cost of carbon was then computed by multiplying South African carbon tax emissions from motor vehicle emissions against the carbon tax price. South African carbon emissions from motor vehicles have been estimated using reports from the United Nations, Statistics South Africa and the World Bank. The following steps were employed to test the adequacy of the carbon tax price on motor vehicles in South Africa:

Step 1: The total level of carbon emissions in South Africa

The historical carbon emission levels in South Africa are available up to 2010 using data published by the United Nations (UN, 2012). Growth rates have been determined over the most recent prior five-year period, and the average growth rate of 3.2% has then been used to estimate the carbon emissions for South Africa in 2011 (refer graph 1 below).



Graph 1: Carbon Emissions in South Africa
Source: (adapted and forecasted from UN, 2012)

As illustrated above, extrapolating the historical carbon emission trends in South Africa brings the total estimated CO_2 emissions for 2011 at 475,004,400 metric tons (across all industries).

Step 2: The total level of carbon emissions attributable to the motor vehicle industry

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Since carbon tax is levied only on *newly manufactured* vehicles, the related tax revenues generated had to be matched to these vehicles. 2011's total carbon emission estimate therefore had to be adjusted to reflect the motor vehicles manufactured in 2011. The total carbon emissions (expressed in tons) from motor vehicles manufactured were derived indirectly as there was no direct literature source for this statistic. *Firstly*, the total carbon emissions in 2011 attributable to the motor vehicle industry were obtained from the Devarajan study (as above), which estimated the total carbon emissions attributable to the motor vehicle industry at around 10% of the country's total CO_2 emissions (Devarajan *et al.*, 2009). Under the assumption that the percentage is stable on a year-to-year basis, the estimated figure comes to 47,500,440 tons of carbon emitted by the motor vehicle industry in 2011. This estimate, however, includes emissions from 2011 and prior years' vehicles.

According to the World Bank (2012) and Statistics South Africa (2005-2011), there were 5,926,372 vehicles in South Africa in 2011; while, according NAAMSA (2012), there were 532,545 vehicles manufactured and sold in the same year. The ratio manufactured motor vehicles to the total motor vehicles is therefore 8.9% (or 532,545 vehicles/5,926,372 vehicles). Following hereon, the estimate of total carbon emissions in respect of the 2011 motor vehicles amounts to 4,227,539 tons (or 8.9% of 47,500,440 tons).

Step 3: Evaluate the adequacy of carbon tax revenues

In order to evaluate the adequacy of revenues generated, the total carbon emissions attributable to motor vehicles manufactured in 2011 (4,227,539 tons as calculated in step 2 above) are firstly multiplied by the carbon tax cost (R132.08 per ton as determined earlier) to arrive at a calculated SCC of motor vehicles manufactured in 2011. This results in an estimated social cost of carbon from 2011 motor vehicles manufactured of R558,373,372 (R132.08*4,227,539 tons of carbon). Secondly, according to National Treasury and South African Revenue Service (2012), the related carbon tax revenue received by the SARS amounted to R626,000,000 in 2011 and R1,617,000,000 in 2012, respectively. As carbon tax was implemented on 1 September 2010, it is submitted that a reasonable figure of revenue for 2011 would be R208,667,000 (being an average estimate for January and February 2011) plus R1,347,500,000 (being an average estimate for March to December 2011), which brings the total calculated revenue for 2011 to R1,556,167,000. On a high and estimated level, the carbon tax revenues therefore exceed the estimate of the social cost of carbon in respect of motor vehicles manufactured in 2011 quite substantially. It would therefore seem that the carbon excise tax price in South Africa more than adequately covers the SCC and passes the cost-benefit reasonability test in terms of policy-making.

DISCUSSION AND CONCLUSION

In addressing the key objective as set out earlier, this article explored the social cost of carbon and carbon taxes within the context of the South Africa motor vehicle manufacturing industry, and then specifically the industry's awareness thereof together with the adequacy of the tax revenue generated per the objective of the tax policies.

In respect of the *first* objective as specified, in terms of overall carbon tax compliance, though the majority of respondents considered that there is no need for a carbon tax in South Africa. It was further noted in terms of carbon tax policies that the majority of the respondents do not agree that carbon tax is the best policy measure in addressing South Africa's climate change concerns. Notwithstanding, all the respondents confirmed that they were aware of carbon excise tax legislation and regulations. The respondents also confirmed that they maintained adequate internal controls over carbon taxes collected. It was further noted that all the respondents are in compliance with all carbon tax legislation and regulations. Furthermore, in terms of the carbon tax impact on manufacturing, no conclusions could be drawn on the impact of the tax on production techniques and the fuel efficiency of motor vehicles manufactured. This could be due to the variation on production techniques and technology applied by different motor vehicle manufacturers in South Africa. With regard to their CSI policies, the majority of the respondents did not think that carbon tax would impact on its CSI expenditure. In terms of awareness of the concept of the social cost of carbon, the majority of the respondents confirmed that they are aware of the concept.

In respect of the *second* objective as specified, it would seem that the majority of respondents do not think (subject to exceptions) that the current carbon tax price adequately compensates for the damage caused by carbon

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emissions from motor vehicles. However, when considering the estimated level of carbon emissions of the relevant vehicles manufactured, and considering the revenues generated by the carbon on such vehicles, it would seem that the tax price is adequately levelled to compensate for the SCC related to the applicable vehicles. Notwithstanding the adequacy of the tax revenue generated, it remains a point of contention whether these revenues generated for the government coffers will in effect be used for related SCC issues, or whether it will just disappear into the *general government revenues*.

Looking at the results of the study as whole, one may conclude that South African motor vehicle manufacturers comply with carbon tax regulations and laws; however, the impact of carbon tax on production techniques and fuel efficiency on vehicles is still not truly established. Another important finding is that local motor vehicle manufacturers do not consider carbon tax to be the best climate change policy instrument for South Africa. This could be due to a number of reasons including the belief that the price of the tax has not adequately considered the price elasticity of demand relating to motor vehicles manufactured in South Africa or the perception that the SCC is actually greater than the carbon tax price.

Limitations and Future Research

With regard to the exploratory nature of this study, certain assumptions have been made and applied in determining the adequacy of the pricing of carbon tax constitute limitations. These assumptions included using an average growth rate in determining the carbon emissions for 2010 and 2011, as well as that the motor vehicle industries' proportionate share of carbon emissions in 2011 was similar to that of 2009. These assumptions may result in distortions in the final quantitative analysis of the reasonability of the carbon tax price.

Furthermore, even though the sample size may be considered small, the fact is that there are only limited motor vehicle manufacturers in South Africa, of which a substantial portion did participate in the study. Notwithstanding, the reader must take cognisance of this fact and be careful to generalise any findings to the motor vehicle industry *per se*, but such findings should be read and understood within the context of this study. A further limitation is that carbon tax might also be more or less relevant to a motor vehicle manufacturer depending on the existing level of fuel efficiency of vehicles manufactured. The depth and accuracy of answers provided in the questionnaire could therefore hinge on the existing level of fuel efficiency of motor vehicles manufactured.

A very topical future research opportunity lies in the fact that a national carbon tax is to be implemented by the National Treasury in South Africa as from 2015. Contributing studies into the pricing of such taxes will be of significant importance as the tax will be applicable to almost all companies operating in South Africa.

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ANNEXURE A

Company name: _____
Interviewee: _____
Date of interview: _____

Please allocate marks to each question as follows:

1. Do not agree
2. Do not agree subject to exceptions
3. Agree subject to exceptions
4. Strongly agree

SECTION I: General				
There is a definite need for a carbon excise tax on motor vehicles in South Africa.	1	2	3	4
I am aware of all carbon excise tax legislation and regulations applicable to the motor vehicle industry in South Africa.	1	2	3	4
There are adequate internal controls over the recognition, measurement, recording and payment of carbon excise tax applicable to motor vehicles.	1	2	3	4
My company complies with all carbon excise tax legislation and regulations applicable to motor vehicles.	1	2	3	4
SECTION II: Carbon tax impact and the social cost of carbon				
The implementation of carbon excise tax changed the production techniques and technologies toward producing more fuel efficient vehicles.	1	2	3	4
The implementation of carbon excise tax has resulted in an improvement in the fuel efficiency of motor vehicles manufactured.	1	2	3	4
The implementation of carbon tax has affected our company's corporate social investment policy and/or behaviours.	1	2	3	4
I am aware of the concept of the social cost of carbon.	1	2	3	4
The carbon tax price and revenue generated from its implementation adequately compensates for the damage caused by carbon emissions from motor vehicles.	1	2	3	4
Carbon tax is the best policy measure in addressing South Africa's climate change concerns.	1	2	3	4

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Carbon tax implications on corporate social investment in the South African motor vehicle manufacturing industry

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ABSTRACT

Carbon excise tax was implemented on all passenger motor vehicle as from 1 September 2010 in South Africa. Since its implementation, the impact of carbon tax on the corporate social investment (CSI) initiatives and expenditure of South African motor vehicle manufacturers has not been assessed. Given that the carbon tax price should ideally compensate for the damage caused by carbon emissions on the environment and people, the key knowledge gap this article aims to consider is whether the implementation of such a carbon tax is likely to affect the CSI decision-making process in respect of motor vehicle manufacturers in South Africa.

The research methodology applied in this study is both in the form of a literature review as well as empirical research. A literature review was performed on the history, emergence and significance of CSI expenditure within the South African context. The empirical research includes an exploratory case study into the impact of the tax in the decision-making processes with regard to CSI expenditure as well as the impact of carbon tax on CSI spending by motor vehicle manufacturers in South Africa. It was found that although the advent of carbon tax in the industry would place added pressure on the financial performance of the companies, it is unlikely that it would adversely affect the industry's commitment to the CSI initiatives.

Keywords: carbon taxation, climate change, corporate social investment, corporate responsibility

INTRODUCTION

Background

According to Hahn (2008:2), the European Commission defines *corporate responsibility* as a concept whereby companies integrate social and environmental concerns into their business operations. As such, it is closely related to the concept of sustainable development (Mirflazi, 2008), which puts the social, economic and environmental aspects of a company at the centre of its focus (Hahn, 2008). In support hereof, integrated reporting has been defined as a written communication about how a company's strategy, governance, performance and prospects can contribute to the creation of value over the short, medium and long terms (IIRC, 2013). Integrated reporting has also been referred to as the integration of corporate responsibility reporting into existing financial reporting models to allow the users of such information to reflect on the social, environmental and economic impacts of the organisation (IRC, 2013; KPMG, 2011:2), thereby allowing for greater transparency and governance, while promoting sustainable value creation (Buys, Van Rooyen & Bosman, 2009).

A key factor in an organisation's ability to sustain value is found in the concept of sustainable development, which can be defined as meeting the needs of the present without compromising the ability of future generations to meet their own needs (Strange & Bayley, 2008:27; Newport *et al*., 2003). Brent *et al* (2009) however, states that there is evidence that liberalized trade and increased incentives for exports from

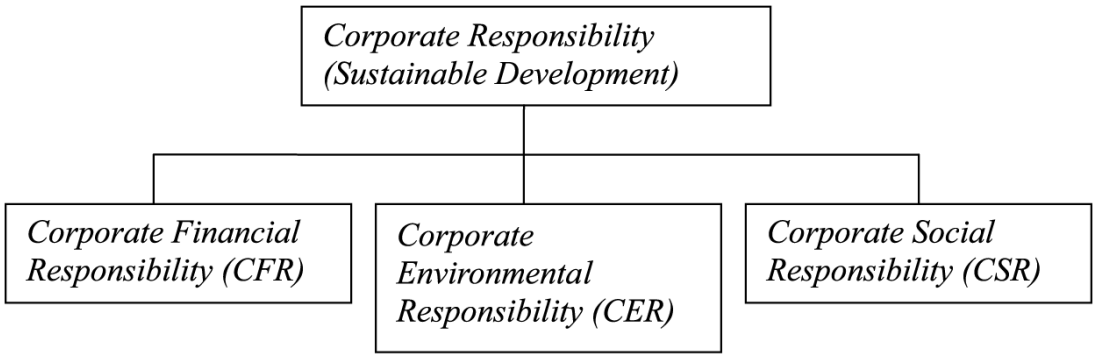
developing countries (such as South Africa) lead to greater exploitation of natural resources. The value of sustainable development lies in ensuring the wellbeing of humanity by promoting social and economic development, together with environmental conservation and protection (HREA, 2013). The core of sustainable development therefore requires the consideration of its *three pillars*, namely the society, the economy and the environment (Strange & Bayley, 2008:27; Newport *et al*., 2003), also referred to as the triple bottom line (TBL). The concept of sustainable development therefore provides a guiding framework for global development, which then in turn provides guidelines for good corporate responsibility.

The concept of corporate responsibility

The broader concept of corporate responsibility is concerned with treating all the stakeholders of the company in an ethical and responsible manner, where the terms 'ethical' and 'responsible' translate into treating stakeholders in a manner that is deemed to be acceptable in civilised societies (Scott, 2007:32). It is important to note that the concept includes environmental considerations not only required by law and regulations, but also going beyond mere compliance to such laws and regulations, such as the private provision of public goods and the voluntarily internalization internalisation of externalities (Lyon & Maxwell, 2008). Often, the outcomes of research into corporate responsibility-related topics have confirmed positive relationships between financial performance and social responsibility, with the implication that management should take such responsibility implications into account in their business decision-making (Chen, 2011; Margolis & Walsh, 2003).

A company's overall corporate responsibility strategy may be further broken down into three key components or building blocks, namely i) corporate financial responsibility, ii) corporate environmental responsibility and iii) corporate social responsibility (Harvard, 2013; Mirflazi, 2008) (refer to Figure 1 below).

Figure 1: The building blocks of corporate responsibility



Source: Adapted from Mirflazi (2008)

Although very much inter-related, Harvard (2013) and Mirflazi (2008) do identify distinct focus differences between the *corporate financial responsibility*, which deals with the efficient management of capital and the effective utilisation of corporate assets, *corporate environmental responsibility*, which attempts to reduce the adverse effects of environmental problems, and *corporate social responsibility*, which deals, *inter alia*, with how a company manages its relationships in key spheres of influence such as the workplace, marketplace, community and public policy realms.

The concept of corporate social investment

Within the South African corporate responsibility (or sustainable development as per Mirflazi (2008)) context, companies have reacted more positively to the concept of *investment* as opposed to the concept of *responsibility*, which could have been perceived as linking them to discriminatory practices of the past. The concept of *corporate social investment* (CSI) therefore suggests that a *business-oriented* outcome is often

preferred over doing something because it is *vaguely ethical* (Skinner & Mersham, 2008). CSI, as such, encompasses company projects that are external to the ordinary business activities and do not specifically have a profit motif. Rather, such projects would utilise company resources to the benefit and upliftment of various communities within the broader society (CSI, 2012). Whereas the terms *corporate social investment* and *corporate social responsibility* (or CSR) were previously often interpreted interchangeably, they should in effect be defined separately with the latter referring to the organisation's total responsibility towards the business environment, and the former being considered as a sub-component thereof, aiming to *uplift* communities in such a way that the overall quality of life is improved (CSI, 2012).

According to Brent *et al* (2009) South Africa's climate change strategy sets out to reduce the rate of increase in greenhouse gas emissions by 2020, and then to stabilize such emissions for ten years, after which it would aim to reduce the emissions in absolute terms. As part of the South African government's effort to *manage* greenhouse gas emissions, a carbon excise tax was introduced on all new passenger motor vehicles manufactured as from 1 September 2010 (Shirley, 2010; NAAMSA, 2011). The purpose of a carbon tax is to internalise externalities related with anthropogenic climate change (Nel & Du Plooy, 2013; Metcalf, 2009). Carbon tax is a market-based instrument that creates a cost to emissions directly by taxing the carbon content of fuels (Hasset *et al*, 2007). The social cost of carbon (SCC) has been defined as the amount of damage caused by each additional tonne of greenhouse gas emitted into the atmosphere (Hardisty, 2009). Any carbon tax should in terms of cost-benefit analysis therefore be equal to the marginal damage caused by greenhouse gas emissions at the point where marginal damage equals marginal cost (Pearce, 2003). However, there are other aspects that must also be considered, other than the direct social cost of carbon. Indirectly, many companies do re-invest much of their resources and profits into social upliftment initiatives. By placing additional pressure on such companies' financial performances, their ability (and perhaps even willingness) to contribute to CSI initiatives may be adversely affected.

RESEARCH OBJECTIVES AND METHODOLOGY

Following from the above, and given the potential impact of carbon taxes on private companies' CSI initiatives, this paper aims to explore the potential impact of carbon tax implementation on such initiatives and expenditure for motor vehicle manufacturing companies in South Africa. The primary research question under consideration could therefore be formulated as follows:

- Is the implementation of carbon tax likely to adversely affect the CSI initiatives and expenditure of the motor vehicle manufacturers in South Africa?

In addressing the above question, two basic high-level objectives are set. Firstly, the development and impact of CSI within the South African context has to be considered, and secondly, the commitment of the motor vehicle manufacturers to their CSI initiatives and expenditure, in light of the additional carbon tax burden facing them, should also be considered. This research project is also conducted as a case study. According to Van Wynsberghe and Khan (2007), case study research has been defined as a trans-paradigmatic and trans-disciplinary heuristic that involves the careful explanation of the occurrences for which substantiation is being collected (Van Wynsberghe & Khan, 2007). Such research promises benefits in terms of developing internally valid and context-sensitive measures of concepts (Bennett & Elman, 2006).

With regard to the literature research, a review of the emergence of CSI in South Africa is conducted, followed by a consideration of the welfare effect of such social investment within the context of corporate responsibility and sustainable development. The economic significance of the South African motor vehicle industry and its contribution to CSI is also considered. The empirical research component focused on the potential impact of carbon tax on the CSI policies and strategies, of the South African motor vehicle manufacturers. The sample characteristics of the respondents include multinational motor vehicle manufacturers, within the boundaries of South Africa that are subject to carbon excise tax on motor vehicles sold to the general public. There are a total of eight companies meeting these requirements, of which four were willing to participate in the study. The research questionnaire was developed based on the underlying literature study and consisted of ten questions, utilising an appropriate four-point Likert-type response scale as well as a quantification of actual CSI initiatives and expenditure for the years 2009 to 2012. The period 2009 to 2012 allowed for the evaluation of the *before* and *after* impact of carbon tax (being implemented as from 2010) on CSI initiatives and expenditure as well as to provide corroborative evidence to answers in response to questions included in the questionnaire. The researcher was available during the survey to provide guidance and clarification in case the respondents had questions regarding the questionnaire.

In order to meet its objectives, the questionnaire had three objectives, namely i) to determine the current perception of the meaning and value of CSI by the respondents ii) to determine the respondents' perceptions of the welfare effect of carbon tax, and iii) to evaluate the impact of carbon tax on the company CSI initiatives and expenditure.

CORPORATE SOCIAL INVESTMENT RELEVANCE IN SOUTH AFRICA

Introduction

The sections that follow examine the impact of carbon tax on CSI under the assumption that the carbon tax price correctly reflects the monetary damage caused by carbon emissions. The impact of carbon tax on CSI is analysed by firstly considering the emergence of CSI in South Africa, and then evaluating the contribution of the South African motor vehicle manufacturers to CSI initiatives within South Africa.

CSR and CSI emergence in South Africa

Even though CSR principles may be traced to the 1800s, with Adam Smith's book entitled *The Wealth of Nations*, first published in 1776, the emergence of globalisation in the 1980s and 1990s resulted in greater environmental awareness and the development of responsible business practices (SSA, 2012). Companies within South Africa may also benefit in terms of financial performance and competitiveness by implementing well-designed CSR strategies, as a recent study of emerging markets (which included South Africa) confirmed that proactive CSR strategies combined with generating quantitative extra financial information to shareholders and regulators is an emerging driver of global competitiveness in respect of industrial organisations (Segot, 2011). The background to the emergence of CSI in South Africa lies in performance-based CSR measures, which have been adopted in many developing countries with specific accountability ratings having been applied at various times (Ndlovu, 2011).

Following the implementation of the Black Economic Empowerment Act of 2003 in South Africa, there has been increased pressure on companies to play a greater role in generating development goals (Ndlovu, 2011). The guidelines of the Black Economic Empowerment Act formalise CSR programmes and allow its results to be more easily communicated (CSR, 2012). The South African government's commitment to encourage corporate responsibility is also evidenced by the *Codes of Good Practice*, which were finalised on 9 February 2007, and aim to ensure consistency in the implementation of socially responsible behaviour in the area of empowerment of historically disadvantaged population groups (Arya & Bassi, 2011). The overall concept of corporate responsibility is also further encouraged in South Africa by the following (CSR, 2012):

- The South African Constitution (drafted in 1994) and reforms of the existing legislature have allowed for social and environmental topics to be focused on by companies.
- The scarcity of skilled employees in certain areas of expertise in South Africa has resulted in the creation of specialised training programmes that various companies may sponsor.
- The HIV problem in South Africa has allowed for greater involvement of South African companies in the field of healthcare.

It should be noted, however, that CSI is specific to South Africa and that it is (arguably) driven primarily by legislation and industry charters (Hinson & Ndlovu, 2011). However, Hinson and Ndlovu (2011) also note that it promises to present a new way of addressing developmental problems in South Africa. Following the emergence of CSI in South Africa in 2004, the Johannesburg Stock Exchange (JSE) launched the first Socially Responsible Investment (or SRI) index, which contains a listing of companies on the FTSE/JSE All Share Index that have met certain criteria in respect of socially responsible performances (JSE, 2012). The popularity of the SRI index among companies can be measured in terms of compliance to the relevant guidelines and frameworks, such as the JSE's integrated reporting requirement or the Global Reporting Initiative (GRI) framework, for example. According to SSA (2011), the annual 2011 SRI index review (which reviewed 109 JSE-listed companies), found that approximately two thirds of the JSE-listed companies assessed by a JSE-appointed *global investment research provider*, had fulfilled the requirement to become a constituent of the JSE's SRI index as at December 2011.

With regard to *social sustainability*, Cronje and Chenga (2009:416) suggest the social dimension of sustainable development encompasses the transformation, and perpetual improvement of the livelihoods of

people with in a specific social context. According to Haman (2003), such responsibility of social sustainability can also be framed in terms of social investment as it effectively requires a company to respond to communities and the general public on issues such as human rights and employee welfare.

The South African motor vehicle manufacturer's role in CSI

The national contribution of South African companies to CSI initiatives is significant, with Thwaits (2012) indicating that up to R6.2 billion was spent in the areas of education, healthcare and community development for the 2010-2011 financial year. In an analysis of social investment expenditure by industry, CSI (2006) found that the manufacturing industry is currently the fifth largest contributor to the total CSI expenditure in South Africa.

Within the context of the South African manufacturing industry, the motor vehicle sector contributes approximately 7.5% to the country's total GDP, and accounts for approximately 10% of the country's total manufacturing exports (SAI, 2008). Considering these numbers, it is little wonder that the government considers the motor vehicle industry as a key sector targeted for growing the country's economy. Within this context, the South African motor vehicle manufacturers have then also contributed in a significant manner to CSI initiatives. In terms of monetary investments, Volkswagen SA, for example, invested in excess of ZAR400,000,000 (U$48,000,000) (VWSA, 2012; OANDA, 2013), and Mercedes Benz SA invested in excess of ZAR270,000,000 (U$33,000,000) in CSI projects (MBSA, 2012; OANDA, 2013). Furthermore, according to Mossman (2010), the types of CSI projects typically receiving funding from the motor vehicle manufacturing industry include social upliftment initiatives focusing on:

- Education-related funding such as:
  - The Nelson Mandela Ndonga School and Clinic Project;
  - the Technology Laboratory on the Mamelodi campus of Vista University;
  - the BMW Mathematics Science and Technology Centres for Excellence;
  - the Mercedes-Benz Coastal Education &Visitors' Centre;
  - the Schools Start-up Programme for primary education in partnership with the Eastern Cape Department of Education; and
  - the Volkswagen Community Trust Socio-economic factors focusing specifically on education, youth development and job creation.

- Healthcare funding for multiple HIV/AIDS and child healthcare centres such as:
  - the Soshanguve Health and Wellness Centre;
  - the BMW LoveLife Youth Center against HIV/AIDS;
  - the Siyakhana SME HIV & Aids;
  - the Hillcrest Aids Centre;
  - the St Bernard's Hospice;
  - the Mamelodi Hospice;
  - the Trucking Against Aids Wellness Centre; and
  - the Baby Therapy Centre.

- Environmental-related funding for initiatives such as:
  - The Schools Environmental Education Development (or SEED) project focusing on increasing environmental awareness among children;
  - the Peace Parks Foundation; and
  - the World Wide Fund (WWF) bursary awarded to women from a rural community to study towards a qualification in natural resource management.

Considering the above historical examples, it is clear that the motor vehicle manufacturers in South Africa have not been lax in their social investment initiatives in various South African communities. The question, however is, whether the advent of the additional burden of carbon taxes on their products may reduce their level of commitment to future social investment initiatives.

THE EFFECT OF CARBON TAX ON CSI INITIATIVES

The sections that follow consider the potential impact of carbon tax on the CSI initiatives and expenditure of the South African motor vehicle manufacturers. In order to address the research question and objectives as set out above, a questionnaire was submitted to the South African motor vehicle manufacturers. Table 1 below represents an analysis of descriptive statistics associated with the responses received from the respondents.

Table 1: Analysis of descriptive statistics

Question no	Min statistic	Max statistic	Med statistic	Std dev statistic
1	3	4	3.67	0.58
2	3	4	3.67	0.58
3	4	4	4	0
4	4	4	4	0
5	4	4	4	0
6	4	4	4	0
7	2	3	1.67	1.53
8	4	1	2.33	1.53
9	4	1	2.33	1.53

Section 1: CSI perception and carbon tax compliance

The first part of the questionnaire focused on the respondents' understanding of the concept of CSI as well their overall level of compliance with carbon tax legislation. Question 1 enquired whether social investment is considered as a necessary cost of doing business, while question 2 asked whether social investment gives a company a distinctive position in the market. Question 3 asked the respondents to confirm the definition of CSI as taking proper account of the broader interests of society when making business decisions. Question 4 posed an alternative definition of CSI, which is to sacrifice profits in order to do the right thing. Question 5 determined whether the respondents comply with all relevant carbon tax legislation and regulations.

- *Question 1 (score: 3.67):* The majority of the respondents strongly agree without exception that CSI is a necessary cost of doing business within the South African business context.
- *Question 2 (score: 3.67)*: The majority of the respondents strongly agree without exception that CSI gives a company a distinctive position in the market.
- *Question 3 (score:4)*: All of the respondents in the study confirmed the definition of CSI as taking proper account of the broader interests of society when making business decisions.
- *Question 4 (score: 4)*: All of the respondents in the study confirmed an alternative definition of CSI as sacrificing profits in order to *do the right thing*.
- *Question 5 (score: 4)*: All the respondents confirmed that they are in compliance with all carbon tax legislation and regulations.

Section 2: Carbon tax pricing

The second part of the questionnaire focused on carbon tax pricing and its relationship to their CSI initiatives and expenditure. Question 6 asked about the impact of carbon tax pricing on their CSI decision, while question 7 enquired as to the respondents' opinion on whether carbon excise tax for motor vehicles is adequately priced and accurately reflects the associated damage cost from motor vehicle carbon emissions.

- *Question 6 (score: 4)*: All of the respondents confirmed without exception that carbon tax pricing has no impact on their CSI initiatives and expenditure.

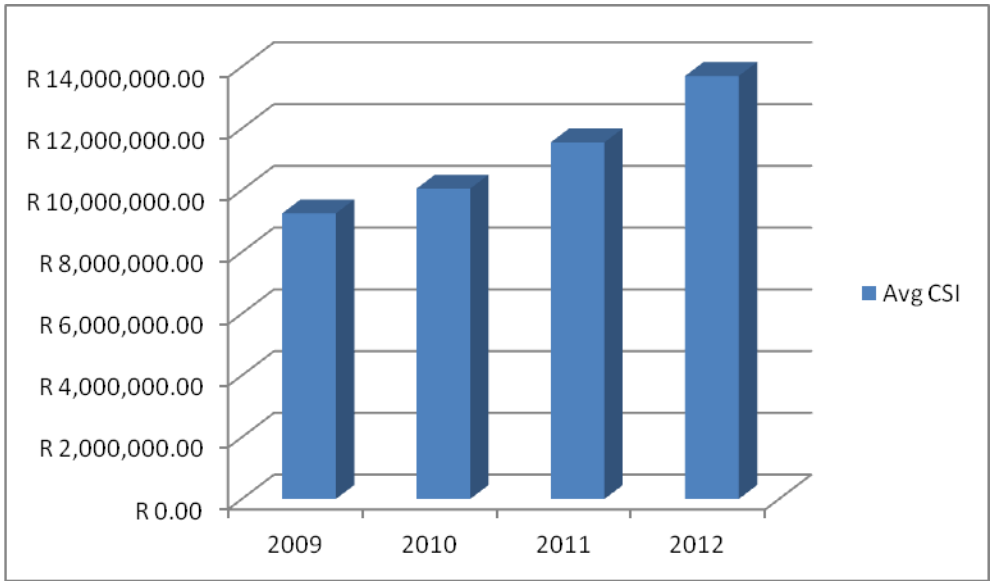
- *Question 7 (score: 1.67)*: No specific conclusion could be made on whether carbon tax is being adequately priced and whether the carbon tax price accurately reflects the associated damage cost from motor vehicle carbon emissions, thereby indicating that there is some uncertainty among vehicle manufacturers as to whether carbon tax is adequately priced and accurately reflects the damage costs from motor vehicle carbon emissions.

Section 3: Impact of carbon tax on CSI policy and expenditure

This section of the questionnaire focused on the impact of carbon tax on social investment and in particular whether the CSI budgets of the motor vehicle manufacturers were lowered since the inception of carbon tax. Question 8 asked whether the implementation of carbon tax affected their social investment policies and strategies. Question 9 is framed under the assumption that carbon tax is adequately priced and asked the respondents to confirm whether their obligations to society and the environment under CSI are effectively reduced as result of the implementation of carbon tax. Question 10 required the respondent to quantify the CSI expenditure for the years 2009 to 2012 to determine the pattern of CSI expenditure both before and after the implementation of carbon tax.

- *Questions 8 and 9 (score: 2.33 each)*: No specific conclusion could be made on whether the implementation of carbon tax has affected the CSI policy and strategy of the respondents. The average answer obtained for the question was mid-way in between the two extremes. On a factual basis, however, 66.67% of the respondents do not agree, subject to exception, that carbon tax has affected the corporate social investment policy and strategy of the company.
- *Question 10:* Quantifications of actual corporate social investment expenditure from the 2009 to 2012 were requested from the respondents. The actual average corporate social investment expenditures as received from the respondents are presented in Figure 2 below:

Figure 2: Average CSI by as reported by the respondents



The horizontal axis represents the year in review and the vertical axis represents the CSI expenditure. When considering the trend in the average CSI expenditure as reported by the respondent (as illustrated in Figure 2 above), it would seem as if the implementation of carbon tax did not adversely affect the bigger picture in terms CSI expenditure. It should, however, be noted that the above is a presentation of the average CSI expenditure, and that individual respondents may have different experiences than the above.

DISCUSSION AND CONCLUSION

The key aim of this paper was to consider the potential impact of carbon tax implementation on the social investment strategies and expenditure of motor vehicle manufacturing companies in South Africa. In

answering the question of whether the implementation of carbon tax is likely to adversely affect the corporate social investment initiatives of the motor vehicle manufacturers in South Africa, two objectives were set. Firstly, it was indicated that the concept of corporate social investment shifts the focus from a *responsibility* perspective, to a more constructive *investment* perspective. To that effect, the motor vehicle manufacturing industry became a major contributor to such social upliftment initiatives.

In gauging whether the advent of a carbon tax had an effect on the revenue source for this industry, there may be a valid concern that the industry might limit (or plan to limit) their contribution to corporate social investment initiatives within the South African context, which has to be highlighted, and secondly, the commitment of the motor vehicle manufacturers to their corporate social investment strategies, in light of the additional carbon tax burden facing them, should be determined. To that effect, the respondents have indicated that they strongly agree without exception that corporate social investment is a necessary cost of doing business and that CSI gives a company a distinctive position in the market. All of the respondents in the study confirmed the definition of CSI as taking proper account of the broader interests of society when making business decisions as well as the practice of sacrificing profits in order to do the right thing. In addition, all of the respondents confirmed that they comply with all carbon tax legislation and regulations. In terms of the carbon tax pricing, all of the respondents confirmed without exception that carbon tax pricing has no impact on the CSI decision. No conclusion could be made on whether carbon tax was adequately priced and whether the carbon tax price accurately reflects the associated damage cost from motor vehicle carbon emissions. The responses indicated that there is uncertainty among motor vehicle manufacturers as to whether carbon tax is adequately priced and accurately reflects the damage costs from motor vehicle carbon emissions. Finally, no conclusion could be made on whether the implementation of carbon tax has affected CSI policy and strategy of the company. However, 66.67% of the respondents did not agree, subject to exception, that carbon tax has affected the corporate social investment policy and strategy of the company. No conclusions could be made on whether corporate obligations to environment and society under CSI would be reduced due to the implementation of carbon tax under the assumption that carbon tax is adequately priced.

Approximately 66.67% of the respondents do not agree, subject to exception, that corporate obligations to environment and society under CSI are reduced as a result of the implementation of carbon tax. A quantitative analysis of CSI expenditure incurred by two respondents confirms that CSI policy is non-responsive to the implementation of carbon tax and has not resulted in any decrease in CSI expenditure by motor vehicle manufacturers in South Africa

Research limitations, contribution and future research

Notwithstanding the fact that the sample size of the motor vehicle manufacturers could be seen as a limitation within the context of the case study, it does provide some important contributions in that it highlights that the industry is a major contributor to various CSI initiatives, and that the advent of carbon tax does not seem to diminish its commitment to CSI initiatives. The possibility that the respondents are not representative of all multinational motor vehicle manufacturers in South Africa could not be ruled out and the study should be read within this context. A further limitation is that CSI expenditure may well be driven by other factors, such as economic environment, company financial performance, and changes in company advertising policy, which is not necessarily within the scope of the study. It has been noted that CSI is specific to South Africa, and that it promises to present a new way of addressing developmental problems in South Africa. Within this context, if CSI is successful in changing the way companies conduct their business, further research will have to be conducted on whether this will be sufficient to attract further foreign direct investment.

As far as future research opportunities regarding the impact of carbon tax on corporate social investment are concerned, the following may be considered. The National Treasury is expected to implement a national carbon tax in South Africa in 2015, which will affect most companies in South Africa. Company perception regarding the carbon tax price will become an even more important issue as it might well affect the financial bottom line of many companies. An empirical study carried out on the largest carbon emitters in the South Africa could reveal an impact of the new carbon tax on corporate social investment policy and expenditure.

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ANNEXURE A

Please allocate marks to each question as follows:

1. Do not agree
2. Do not agree subject to exceptions
3. Agree subject to exceptions
4. Strongly agree

General				
1) CSI is a necessary cost of doing business	1	2	3	4
2) CSI gives a company a distinctive position in the market	1	2	3	4
3) CSI may be defined as taking proper account of the broader interests of society when making business decisions	1	2	3	4
4) CSI may be defined as sacrificing some profits in order to do the right thing.	1	2	3	4
5) Our company complies with all carbon excise tax legislation and regulations applicable to motor vehicles	1	2	3	4
Carbon tax pricing				
6) Carbon tax pricing has nothing to do with the CSI decision making.	1	2	3	4
7) The carbon excise tax for motor vehicles is adequately priced and accurately reflects the associated damage cost from motor vehicle carbon emissions.	1	2	3	4
Carbon tax and corporate social investment				
8) The implementation of carbon tax has affected corporate social investment policy and strategy of the company	1	2	3	4
9) Since carbon tax is adequately priced for monetary damage caused by carbon emissions, corporate obligations to society and environment in terms of CSI is effectively reduced	1	2	3	4
10) Kindly provide the CSI spend for the 2009 to 2012 years in millions of rand per the appropriate columns below	2009 Rm	2010 Rm	2011 Rm	2012 Rm

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Abstract
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Body of paper
Tables, figures, etc. placed where they belong
Conclusion
Acknowledgments (if applicable)
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