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Evaluating the Fairness of the Proposed Carbon Tax in South Africa

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Declaration

I, Oro Ufuo Oro, declare that this research report is my unaided work. It is submitted to the School of Accountancy, University of the Witwatersrand, Johannesburg, in partial fulfillment of the requirements for the award of the M.Com degree in Accountancy. All sources that I have used or referred to have been indicated and acknowledged by means of complete references. It has not been submitted before for any other degree or examination at any other institution.

ORO UFUO ORO _____Date _____

Abstract

At the 2013 budget presentation, the South African government indicated its intention to introduce carbon tax starting 1 January, 2015 at the rate of R120 per ton of Co2 equivalent. Prior research confirmed that carbon taxes have the potential to increase price levels, make exports uncompetitive and reinforce income inequality. It was suspected that the proposed carbon tax in the face of other similar taxes in South Africa would result in similar outcome. Furthermore, the socio-economic circumstance of South Africa could make the tax unfair to taxpayers. The object of this research was to evaluate the fairness of the proposed carbon tax in South Africa using the tenets of tax fairness Proposed by Smith (1776). The research methodology adopted was content analysis and correspondence analysis to analyse survey responses. The results of the analysis confirmed that the proposed carbon tax would result in price increases, make exports uncompetitive and reinforce income inequality. It was concluded that the proposed carbon tax would be unfair to taxpayers if implemented as currently designed.

Key words

Adam Smith, Carbon Tax, Correspondence Analysis, Equity, Fairness, Tax Incidence

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CHAPTER ONE

1. Introduction

During the 2013 budget speech, the South African government announced its intention to implement carbon tax on 1 January, 2015. This proposed tax will have an impact on all residents of South Africa because it will affect the prices of electricity, transportation and building materials among others. The impact will not be shared proportionally by all South Africans. Even if the impact is shared proportionally, the burden of the impact may be heavier on some and lighter on others, bringing up issues of fairness. This research examines the fairness of the proposed carbon tax.

1.1. Purpose of the research

The purpose of this research is to examine the proposed carbon tax in South Africa and evaluate its features against the tenets of a fair tax system as proposed by Adam Smith (Smith, 1776). It should be noted that Smith's (1776) maxims for fair tax were developed to evaluate individual income tax; whereas the tenets of fairness apply to all types of taxes. Researchers have been evaluating fairness of different type of taxes; For example, Maroun (2007) examined the fairness regarding capital gains tax; Friedland (2010), corporate income tax and Gluckman (2012) turnover tax.

Taxation could have intentional and unintentional impacts on individuals, households and companies. Policy makers are not usually likely to envisage every possible circumstance of the taxpayers and how a given tax will affect them. Taxes are known to have imposed what is known as deadweight loss (DWL) on even unintentional targets (Knittel & Sandler, 2013). Besides the deadweight loss which has general impact on taxpayers, there are possibilities of shifting taxes from one taxpayer to another (Smith, 2004). Research has confirmed that tax shifting depends on the demand and supply elasticity of the base on which tax is imposed (Knittel & Sandler, 2013). This elasticity may not be the same in each case.

The variation in the tax impact provides grounds for examining the fairness of every tax. Such evaluation could be on account of welfare impact, convenience of payment or against some other unintentional consequences. This fairness evaluation forms the basis of this research.

In this research, the evaluation of the carbon tax will be considered in the context of the existence of other similar taxes in South Africa and the current socio-economic challenges facing the country.

1.2. The background to the research

The government of South Africa proposed a carbon tax at the rate of R120 per ton of carbon dioxide equivalent (R120/tCo2-eq) to be implemented from 1 January 2015 (National Treasury, 2013). This tax is part of the broader policy of government aimed at

mitigating the effects of climate change and facilitating the transition to a low carbon economy. This initiative follows the commitment made by the South African government at the 2009 Copenhagen Conference of Parties (COP17) to take appropriate actions to curb greenhouse gas (GHG) emissions by 34% by 2020 and 42% by 2025 (National Treasury, 2013).

The objectives of this tax, according to the Carbon Tax Policy Paper (National Treasury, 2013), are to mitigate the effects of climate change, facilitate the transition to a low carbon economy, enhance the development of cleaner technologies and ensure economically sustainable economic development for the country.

There are also other challenges facing South Africa that require policy initiatives. In the Budget Review (National treasury, 2013), the Minister of Finance highlighted the need for a rapid and inclusive economic development, reduction in income inequality and the creation of jobs. In the words of the Minister “these challenges find practical expression in the 2013 budget, and will continue to inform public policy” (National Treasury, 2013).

Every policy has its costs (Slemrod & Yitzhaki, 1996). Slemrod and Yitzhaki (1996) enumerated the cost of taxation to include the cost of compliance, collection, assessment, enforcement and deadweight losses. Every new tax therefore, requires an evaluation of its cost as compared with its benefits to the economy. This research is an effort in that direction. It is necessary to evaluate if the South African economy can still bear the burden of these existing policies in addition to the cost of the proposed carbon tax.

Prior to 2013, South Africa had in existence the following taxes in addition to income taxes and value-added tax: fuel and excise taxes, electricity levy, vehicle carbon dioxide emission tax, levy on plastic bags, environmental levy, general fuel levy, road accident fund levy, levy on light bulbs and excise duties on tobacco and alcohol (National Treasury, 2013). These taxes set pressure on general price levels and affected the general living standards of the residents of South Africa. In the 2013 Budget, the rates of most of these taxes were marked for upward review as has been the case for the past years (National Treasury, 2013). The collective impact of these taxes on the fairness of the South African tax system has not been evaluated. The addition of carbon tax with no prospect of pulling back any of the existing taxes would appear to be placing a heavy burden on the economy and residents of South Africa. It is therefore important to proactively evaluate the carbon tax for fairness in the context of these additional burdens.

This study is also motivated by the importance of the concept of fairness of a tax system. Tax experts (for example Martinez, 2004) remarked that a tax system must not only be simple, it must be fair. At a minimum, it must be perceived as fair by the taxpaying public in order to withstand the public's scrutiny (Martinez, 2004). The tax system, according to Martinez, exists to raise revenue and ensures stable economic growth. It also plays the role of functioning as a vehicle for social and economic policies. The tax system, therefore, is of utmost importance to the managers of the state. For taxation to be tolerated and allowed to play its role in the development of the economy, its fairness must be considered. In 2005, the Bush administration in the United States of

America (USA) commissioned the review and reform of the US tax system. The three principles that the reform considered included simplicity, fairness and economic growth (AICPA, 2005). Such objectives (including fairness) have been observed in recent times in the tax system's reforms around America and Europe. Surrey (1970), cited in Martinez (2002), remarks that the fairness of tax systems facilitates the acceptance of the tax by the taxpayers and the collection of revenue from such tax.

The consideration of the fairness of tax system is, therefore, indispensible, according to Surrey (1970), in enacting tax legislation. In South Africa, assessing the fairness of taxes appears to be of interest to researchers. In 2007 Maroun researched and reported on the evaluation of the fairness of capital gains tax (Maroun, 2007). This was followed by a similar research by Friedland in 2010 on the evaluation of the fairness of corporate income tax (Friedland, 2010) and another by Gluckman on the evaluation of the fairness of the Turnover Tax (Gluckman, 2012). The current research follows naturally from the three earlier researches.

1.3 Research question

The primary research question is: Will the proposed carbon tax be fair to South African taxpayers (and especially those who will ultimately bear the burden of the proposed carbon tax) when considered in the context of the existing other environmental taxes and current socio-economic challenges facing the country?

To answer this question, the study will examine six related sub-questions that will be derived from the characteristics of a fair tax system as proposed by Adam Smith in his

book ‘An Enquiry into the Nature and Causes of the Wealth of Nations’ (Smith, 1776).

The concept of a fair tax system will be explored, in more detail, later in this report.

1.4. The sub-questions

The sub-research questions are:

- Will the design and administration of the proposed carbon tax result in a proportional, progressive or regressive tax system? (equity)
- Will the proposed carbon tax amount to a fair ‘*quid pro quo’* in respect of the benefits from the abatement of GHG emissions for the ultimate taxpayers? (*quid pro quo*)
- Will the amount, timing and the manner of payment of the proposed carbon tax be clear and plain to the ultimate taxpayers? (certainty)
- Will the timing and the manner of levying the proposed carbon tax be convenient to the ultimate taxpayers? (convenience)
- Will the levying and administration of the proposed carbon tax be economical both to the taxpayers and the state? (economy)
- Will the proposed carbon tax affect the competitiveness of the economy and the income inequality in the system?(economy)

1.5 The significance of the study

Many South Africans have been disadvantaged by the oppressive regimes of the past. Income inequalities in the country are among the worst in the world (OECD, 2013). Seekings and Nattrass (2002) observed that the Gini coefficient in South Africa was high and stable for the greater part of the 1990s. Currently, the Gini coefficient remains high at 0.63 (StatisticsSA, 2012). This is reported to be the highest globally (OECD, 2013). Unemployment and poverty is also reported to be very high in South Africa (OECD, 2013). In response to these disturbing statistics, the South African government has initiated various measures to ameliorate the situation and has adopted specific policies aimed at addressing inclusive economic growth, unemployment, resource redistribution and poverty. Some of these policies have been operational for the past few years, such as broad-based black economic empowerment (BBBEE) and black business supplier development programmes (BBSDP). As a further step in reviewing tax policy, in July 2013, the Minister of Finance established a Tax Review Committee chaired by Judge Dennis Davis, with a mandate to evaluate how the tax system can be used to achieve inclusive economic growth, increased employment and a reduction in poverty (SARS, 2013).

It is then only proper to actively examine any new policy, such as the proposed carbon tax, to see if such policy will further worsen or improve the already burdened situation. This study is an effort in the direction of helping policy makers to evaluate whether or not the new carbon tax will be unfair or worsen the fairness of the tax system.

This study also attempts to broaden the debate on the principle of fairness in the realm of environmental taxation. Furthermore this study will help in the design or redesign of tax policies to ensure that they comply with the principle of fairness. Research (for example, Martinez, 2002) indicates that citizens do not like to pay taxes. And politicians often do not like to pass tax laws (Peters, 1991). Politicians will reluctantly pass tax laws only in certain circumstances where such taxes are clearly perceived to be fair on the majority (Martinez, 2002; Hagemann *et al*, 2013; Gills, 1989). This research will attempt to provide an informed analysis to help policy makers' support their decision as whether to approve or not approve the proposed carbon tax.

1.6 Delimitations and limitations

This section streamlines the scope of the research to ensure that it is manageable in terms of the context and data. This delimitation also limits the outcome of the research as discussed in the following paragraphs.

1.6.1 Delimitations

To keep focus on the research agenda, this study will not deal with the following aspects of carbon tax and fairness principles:

- The research will not go into a detailed empirical analysis of the economic impacts of the proposed carbon tax but will use the results of such analyses in prior research to support its conclusions.

- The research will not cover political or ethical areas of fairness in its discussions.
- The research will not discuss transparency and procedural fairness of the carbon tax.
- The research will not deal with the legal validity or the empirical measurement of fairness.
- The research adopts the concept of fairness as advanced by Adam Smith (1776) and as interpreted by other researchers.

1.6.2 Limitations of the research

- This research does not consider all areas of fairness of the proposed carbon tax. Inter-generational fairness, for instance, is not considered. Certain realities regarding those areas not covered in this research will not be uncovered and reported.
- The research examines only the fairness of carbon tax. Fairness is better appreciated when studying a tax system rather than a single tax in the system. This is because, in a basket of taxes, the unfairness of a tax could be reversed or neutralised by the fairness of another. In the aggregate, a tax could be unfair and the tax system as a whole remains fair (Duff, 2008). This research does not consider the fairness or otherwise of the whole tax system of South Africa.

1.6.3 Definition of terms

Unless otherwise mentioned, all technical terms have the same meaning as those contained in the Carbon Tax policy paper (National Treasury, 2013). Wherever it is necessary in the report, a description of terms or concepts will be provided before the terms or concepts are discussed. This study uses the concept of fairness proposed by Smith (1776) as a benchmark for fairness. The fairness principle is expatiated further in the literature review section of the report.

Having done the introduction in Chapter one, it will be necessary to review theories bearing on the issue to be investigated: carbon tax and tax fairness, to provide a theoretical basis for the investigation. The following section will review literature on carbon tax, the principle of tax fairness, the incidence of taxation and the general carbon tax administration. Chapter three will cover research methodology and data analysis, chapter four will cover the results of the data analysis and discussion thereon and chapter five will provide the conclusion of the research.

CHAPTER TWO

2. Literature review

This study reviews literature on the principle of fairness in taxation. It also covers prior research on tax fairness done in South Africa and many other countries where carbon tax is implemented to provide the theoretical basis for concepts such as tax fairness, carbon tax, tax incidence and general price increases resulting from the introduction of carbon taxes.

2.1 The concept of fairness in taxation

This section examines the concept of fairness in order to establish a framework and scope to be used in evaluating the fairness of the proposed carbon tax. The concept of fairness is considered as central to a good tax system. The understanding of its meaning is therefore important particularly in this research. The Oxford Dictionary (1995) defines fairness as a condition of treating people equally without favouritism. This definition highlights the concepts of equity and reasonableness. Fairness in the context of taxation would require the use of a known concept such as the one proposed by one of the foremost economists and social philosophers, Adam Smith (1776).

In his book, ‘The Wealth of Nations’ (Smith, 1776), Smith maintains that ‘the subjects of every state ought to contribute towards the support of the government, as nearly as

possible, in proportion to their respective abilities; that is, in proportion to the revenue which they respectively enjoy under the protection of the state'. Researchers generally understand Smith's criteria for a fair tax system to mean payment of tax in proportion to abilities (equity); payment of tax for services enjoyed from the state (quid pro quo); payment of tax in a manner that is convenient to the taxpayers; certainty of the amount and timing of tax to be paid; and the economy of the tax both to taxpayers and the state. These criteria will now be defined in a manner that will enable them to be used to evaluate the proposed carbon tax for equity and fairness.

2.2 Tax equity

In this section, the theoretical basis of equity in tax law will be examined as a parameter against which the proposed carbon tax can be evaluated. The fundamental principle of equity requires that similarly situated entities are taxed similarly and all dissimilarly situated are dissimilarly taxed (AICPA, 2005). Smith (1776) believed that equity is a crucial element of any tax system, since it ensures that individuals pay tax transparently and in accordance with their ability to pay. Tax policy commentators believe that equity in tax is a very complex concept that takes into account not only the individual income or wealth but also the relative tax burdens (Peters, 1991). These propositions will be examined further in this section.

In his Nicomachean Ethics, Aristotle equated equity with justice (AICPA, 2007). He posited that in a just society, equals are treated equally and un-equals unequally. It was Aristotle's idea that the differential treatment of the un-equals should not be arbitrary but

should be based on some relevant factors. The challenge in designing a just and equitable tax system is determining what factors should be considered or not considered in defining equals or un-equals for the allocation of economic rights and obligations. Researchers have used various principles including benefits to be drawn from the state, use of state services, ability to pay which is further reduced to income or wealth and sacrifices in measuring equals and un-equals for tax purpose (Friedland, 2010). The benefit principle is discussed in the next section

2.2.1 The benefit principle

This principle requires equality or inequality to be measured on the basis of benefits drawn from services provided by the state. The principle attempts to replicate a free market mechanism in which the amount one pays depends on the quantity and perhaps quality of what one consumes (Rothbard, 1970). This principle is highly favoured by capitalists as the most efficient way of allocating the tax burden (Slemrod, 1994).

The operations of this principle and how it can be used in this research will now be examined. According to researchers, the benefit principle exists over a spectrum. At one end it shows itself as a user-charged basis, where users pay for what they use or consume. Examples of this are toll roads and entrance fees to public theaters. In this regard, the benefit of government expenditure to the individual is the road used by the individual; the toll is the tax for the benefit. As can be seen from the context, at this extreme, the principle works only where a definite *quid pro quo* is identified and where a specific charge could be levied for its use (Maroun, 2007).

This principle is claimed to have the advantage of preventing the squandering of public resources and promoting efficiency in the use of tax revenue by government organizations (Margo Report, 1986). As one moves away from this extreme, the advantage of the benefit principle becomes less obvious but the principle may still be applicable. In some situations a *quid pro quo* may not be clearly identifiable but may be reasonably estimated. For instance, street cleaning expenditure can be funded by tax on the basis of the measure of road frontage of the property located on the road (Slemrod, 1994). In the same direction but at the extreme of the spectrum, the benefit principle breaks down. This happens where a reasonable basis for rationally allocating public expenditure cannot be found. For example, how can the benefits of defence expenditure be allocated to a given individual (Slemrod, 1994)? Even in the face of the uncertain operations of the principle at this extreme, some researchers have advanced various methods for allocating such expenditure. For instance, Musgrave (1989) advocates apportioning such expenditure on a per capita basis. It is argued that if such measure is adopted, then a poor man who is on social welfare grant, who has four children receives five times as much from government expenditure as a very rich single man and therefore needs to pay more tax than the rich man (Groves, 1974).

Some researchers advocate that income received by individuals should be used as a measure of benefit derived from public expenditure and should therefore be used as basis for tax allocation (Rothbard, 1970). This argument could be challenged on the following grounds: firstly, the differences in income earned by individuals may not necessarily be on account of the services of the state consumed but on account of the value of their skills to the society. Secondly, the income as benefit argument may also

imply that the rich enjoy more benefit from the state than the poor. This is hardly true. In South Africa there are free medical services, schools and social grants enjoyed by the poor and not necessarily by the rich. The benefit taxation using income as the tax base, therefore, is incompatible with equity (Friedland, 2010).

Researchers also identify individual consumption as another measure of benefit. This has been an argument for advocating value-added tax (VAT) (Margo Report, 1986). Taxes on consumption do have a philosophical foundation in equity. This is demonstrated in the words of Thomas Hobbes, a seventeenth century philosopher (cited in Friedland, 2010): who said –

> 'the equality of imposition consist rather in the quality of that which is consumed… for what reason is there, that he which labour much and sparing the fruits of his labour, consume little, shall be more charged, than he who lives idly, gets little, and spent all he gets'

In considering the use of the indirect tax such as VAT in South Africa, the Margo Report (1986) made clear the fact that the degree of indirect taxes, and by extension, the application of the benefit principle, depends upon the socio-economic condition of a given economy. The use of indirect taxes was aptly placed in context by the Katz Commission (1994) when it maintained that 'the more homogenous the distribution of wealth in the society the more it is acceptable and equitable to place much reliance on indirect taxes'. The Commission also opined that VAT is regressive in nature because it impacts more lightly on income as income increases (Katz Commission, 1994: 112).

There were researchers like Thomas Hobbes, who supported taxes on consumption of luxury goods (Groves, 1974). To solve the problem of tax regressiveness, many countries including South Africa have adopted VAT with multiple rates or exemptions. This has improved equity but in doing so has introduced other problems. The worst of this problem is management complexity and the cost of administering the tax. This problem was echoed by Katz Commission when it reported:

> 'The worst of all worlds is to end up with an eroded VAT base, complicated rates and exemptions, and a tax that is expensive to administer, all in the name of equity' (Katz Commission, 1994:116).

2.2.1.1 Disadvantages of the benefit principle

One serious shortcoming of the benefit principle is in its neglect of vertical equity. A simple understanding of vertical equity is as described in the theory of justice advanced by Aristotle: un-equals are taxed un-equally (AICPA, 2005). Vertical equity is concerned with the redistribution of income (Begg, Fisher, & Dornbusch, 2003) which is seen by many as a form of social justice. The simple fact that the benefit principle only taxes the *quid pro quo* of government expenditure means that it has nothing to do with income distribution; as such tax is independent of the individual income.

In the design of tax, if vertical equity is one of the objectives, then the benefit principle will be clearly inappropriate (Begg *et al.*, 2003). Vertical equity is certainly a contemporary policy objective in South Africa because of its widespread income

inequality and poverty; therefore, the benefit principle should not be adopted in its tax design (Katz Commission, 1994). It should be appreciated that the Katz Commission (1994) recommended the use of income tax progressivity to heal the problem of regressive VAT which it could not rule against (Katz Commission, 1994:119).

The benefit principle can be used to achieve vertical equity under one condition; that is, where income distribution is largely homogeneous. Wicksell (1970), quoted in Slemrod (1994) believed that tax equity could be achieved by first implementing policy that harmonizes income distribution and then applying benefit taxation.

The benefit principle is also difficult to implement in practice. Theoretically, it means that all income earned by a public officer should be exposed to tax, whereas, all income earned in a private company by a person doing similar work to the public employee would be tax exempt (Rothbard, 1970). Secondly, the recipients of social welfare grants will be required to pay tax simply because everything they have received is paid by government using tax revenue. This will defeat the purpose for which the grant was given (Begg *et al.,* 2003).

2.2.2 Ability-to-pay principle

The ability-to-pay principle means that tax must be paid according to the ability to bear the cost. This concept was identified as early as Smith (1776) when he advocated his maxim of fairness. He declared that 'the subject of every state ought to contribute… in proportion to their respective abilities'. This tax principle appears to be attractive to most

tax commentators for example Bird and Zolt (2003). In support of the ability-to-pay principle, the Margo Report (1986) recognized that ‘almost everyone subscribes to the ideal of taxation in accordance with the ability to pay’. The principle fosters the achievement of both the horizontal and vertical equity.

Despite its universal acceptability and application, the concept can be applied only if certain terms which are implicit in the principle are defined and accepted for policy formulation purposes (Groves, 1974). First among these is the term ‘ability’. How does one determine an individual’s ability to pay? Economists have identified various measures of the ability to pay. For example, the Margo Commission suggested income, expenditure and accumulated wealth as three possible measures (Margo Report, 1986).

These measures will be discussed in the following paragraphs.

2.2.2.1 Income principle

South Africa and many other countries consider annual income as reflecting the most appropriate indicator of an individual’s ability to pay. Income tax, therefore, is accepted as a tax that complies with the basic norms of tax equity (Margo Report, 1986). Other researchers see annual income as being measured over too short a period of time and being too subject to regular volatility, to be useful as a measure of an individual’s ability to pay (Bird & Zolt, 2003). They suggest instead the use of a lifetime income. This suggestion poses another problem of determining lifetime income or identifying a suitable proxy for it or recovering the related taxes on a short-term basis.

2.2.2.2 Expenditure principle

Other researchers turn to the concept of expenditure following Friedman's Permanent Income Hypothesis (Begg *et al.,* 2003). This hypothesis posits that one's expenditure reflects his or her long term or permanent income. Without considering the merit of this proposition, the proponents of this hypothesis believe that expenditure tax is more an equitable base for tax than income (Begg *et al.,* 2003).

2.2.2.3 Accumulated wealth

Accumulated wealth which includes increases in savings and purchases of securities, real estate and rights, can also be used as a measure of the ability to pay. The proponents of this view submit that wealth provides a good measure of the ability to pay because assets imply some degree of tax capacity even if they generate no tangible income (Britannica Online, 2007). Take for example two individuals who earn the same annual income: the one with a greater wealth will also have a greater ability to pay the given tax than the other (Rothbard, 1970). Having discussed the income, expenditure and accumulated wealth as proxy for ability to pay, another principle of equity will now be considered.

2.2.3 The sacrifice principle

The ability to pay discussed in the preceding paragraph is seen by some researchers as the ability to bear the tax burden rather than the ability to pay tax bills (Maroun, 2007).

According to Vivian (2006), the cannons of a fair tax system postulated by Smith (1776) can be properly appreciated only if the word 'ability' is understood with reference to the ability to bear the tax. Maroun (2007) quoted the same concept as was used by Montesquieu (1748) when the philosopher noted that –

> "To fix [the State's] revenue in a proper manner, regard should be had both to the necessities of the State and [the necessities] of the subject. Nothing requires more wisdom and prudence than the regulation of that portion of which the subject is deprived [due to tax] and that which he has suffered to retain."

This argument brings us to the concept of sacrifice which is the ability to bear the burden of tax contribution. The concept of equity discussed above could now be understood with reference to the ability to bear the tax burden. 'Equals' now mean people with equal ability to bear the tax burden while 'un-equal' refers to people with varying ability to bear the tax burden. The concept of sacrifice measures the ability to bear the burden of tax rather than the ability to pay the bills. This now brings the discussion to another concept requiring definition or explanation: the 'ability to bear' the tax burden. According to Maroun (2007), this ability can be understood from the comment made by Montesquieu (1748) quoted above. In the said quotation, Montesquieu noted that 'regard should be had for both the necessities of the state and those of the subjects'. The ability to bear the tax burden can be seen as the extent to which individuals are able to provide the basic necessities of food, shelter and raiment. Anything above the amount needed for meeting basic necessities could be subjected to tax. This position was confirmed by Vivian (2006) when he said '… before an amount is

subjected to tax, the cost of life's necessities should first be deducted from such amount'.

This concept of deducting the cost of life's necessities is rooted in history, according to Maroun (2007), who quoted Plato (347 BC) as saying that payment for common meals should be excluded from the tax calculation. Maroun (2007) also quoted Rousseau (1712) as saying that 'he who only has the bare necessity of life should pay no tax, tax on him who has surplus may, if need be, extended to everything beyond life's necessity'. Maroun (2007) describes as a material source of unfairness any tax system that violates the principle of making provision for life's necessity in its tax levy.

According to Vivian (2006), violation of such principle was seen at the root of the revolt in the American colony against the imperial Britain of 1765 to 1783. Elsewhere in France, the non-recognition of the cost of necessities of life by tax authority also led to a revolution that eventually led to the 'Declaration of the Rights of Man and of the Citizen' in 1789 (Vivian, 2006).

Generally, the concept of sacrifice is well supported as a measure of ability to pay tax. Mill (1848) introduced the concept as the key to equity when he stated '(e) quality of taxation therefore, as a maxim of politics, means equality of sacrifice'. The Margo Report (1986) and Slemrod (1994) acknowledged that the underlying idea is that tax is a sacrifice levied upon some kind of personal economic well-being.

In concluding this discussion, it is necessary to mention that even in the theory of sacrifice discussed above, income is still being acknowledged as the best basis for tax. The Margo Report (1986) observed that income as a tax base is widely used. The use of income as a tax base is also historical; Smith (1776) postulated that the contributions of individuals to the state should be made from revenue (income). Income presents, therefore, the best base for tax purpose.

2.2.4 Dimensions of tax equity

The AICPA (2007) proposed that equity and fairness are essential attributes of a good tax system and recommended that they be given due consideration in both the making and administration of tax laws. It recommended the following seven dimensions to be considered in determining tax equity and fairness. Three of these dimensions (Quid pro quo, horizontal and vertical equity, have been discussed in section 2.2 and 2.3 in this report. The other four are discussed below.

- First, the principles of equity and fairness, which require that taxpayers should be allowed a say in the tax system that affects them and should be treated with due respect and consideration by tax administrators.
- The second is time-related equity and fairness, which requires that taxes are not unduly distorted when income or wealth levels fluctuate over time
- The third is inter-group equity and fairness: no group of taxpayers should be favored to the detriment of another without a just cause.

- And the fourth is the compliance equity and fairness, which requires that all taxpayers should pay what they owe on a timely basis.

2.4 Tax quid pro quo

Citizens are required to pay tax in response to the services they enjoy from the state. Smith (1776) postulated '… in proportion to the revenue which they respectively enjoy under the protection of the state'. This implies that tax should be paid as a proportional exchange for some tangible goods or services offered by the state. The taxes levied on individuals need to be sufficient to cover the cost to the state of providing for them whether these are the costs, for example, of the judicial system, healthcare or national defence (Maroun, 2007). A similar idea was canvassed by Montesquieu (1748) when he stated that 'regard should be had for both the necessities of the state… those of the subjects'. Montesquieu's (1748) comment is old but is still valid. The picture presented here is that state services and provisions are made with the tax contributed by the residents of the country. Even if the state has to borrow to meet some shortfall, the debt will eventually be paid through tax proceeds.

The next enquiry is the issue of what comes first, the state provisions or the tax payment? Deciding on this matter will help in placing the issue of fairness in tax in a proper context. It appears to be common sense that tax payment should precede government's provision of services. Politicians canvass for the payment of taxes with promises that the proceeds will be used to provide goods and services to the taxpayers. In most cases when taxes are paid the services are not provided for reasons including

corruption, low skills in public organizations and mismanagement generally. South Africa is no stranger to such situations. The recent regular protests in South Africa over poor or no service delivery are a few examples. Magana (2012), reports that the protest wave in South Africa is generally recognised or attributed to failure in service delivery. The protests demonstrate the issue of unfairness when tax is paid and services are not or inadequately provided.

The next task is to create an understanding of the concept of *quid pro quo*. A clear *quid pro quo* exists as a spectrum. At one end is a situation which is akin to a free market condition where decisions are taken solely on the basis of price. The effects of these situations on tax fairness are simple. The Margo Report (1986) acknowledged that consumption tax is regressive and it works well where income distribution is homogeneous. Taxes based on consumption or benefit does not support vertical equity and have all the disadvantages discussed in Section 2.2.1.1 above.

2.4 Tax convenience

Smith (1776) postulates that, ‘every tax ought to be levied at the time or manner in which it is most likely to be convenient for the contributor to pay it’. In other words, payment of tax should be demanded when the taxpayer is most likely to have the wherewithal to pay. The same report also explained that taxes upon luxury consumable goods are all finally paid by the consumers and generally in a manner that is very convenient for them. Consumers pay the tax little by little, as they have occasion to buy

the goods. The report also explained that taxpayers are at liberty to either buy or not buy, as they please.

The objective of this section is to examine the proposed carbon tax to see if the payment of the tax can be said to be convenient to the ultimate taxpayers. As can be seen in Smith's (1776) posit above, it appears to be convenient for consumers to pay taxes levied on luxury goods. Regarding luxury goods, consumers have options to buy or not to buy, to buy now or to postpone buying. Such rights of decisions place the convenience of paying taxes on the goods in the hands of the consumers. The same cannot be said of the carbon products such as electricity or transportation services which are not luxuries but necessities. Some researchers, for example Poterba (1991), say the demand for goods such as electricity is inelastic because consumers hardly have the luxury of close substitutes and the privilege of postponing its consumption. In agreement with the postulate, the consumption of carbon products such as electricity can be done in bits and the tax upon it paid a little at a time as purchases are made. To that extent, the payment of the proposed carbon tax can be said to be convenient to the ultimate taxpayers.

Smith (1776) also implies that taxes should be paid using past income and not future or speculative income. This is drawn from the statement that 'payment of tax… when the payer is most likely to have the wherewithal to pay'. In the context of the proposed carbon tax, the tax is paid whenever the consumer purchases electricity even when it is bought on credit. To that extent, the payment of the tax is convenient to the taxpayer.

Making tax payments convenient also involves deciding who pays the tax. This could either be the manufacturers, wholesalers, retailers, consumers or employees (AICPA, 2005). In the case of the proposed carbon tax, the tax will be collected from the manufacturers or producers who emit carbon dioxide or other gases in their production processes. It is estimated that this tax will be shifted to consumers of their products most especially because the demand for such products are price inelastic (Entin, 2004). The payments of carbon tax will be made directly by the manufacturers and the consumers will pay the tax as they buy the carbon products. Paying the tax as consumption is made is adjudged to be convenient to consumers (Smith, 1776).

2.5 Tax certainty

Smith's second maxim of a fair tax requires that 'the tax which each individual is bound to pay ought to be certain and not arbitrary; the time of payment, the manner of payment, the quantity to be paid, ought all to be plain to the contributor, and every other person'. The same report believes that if this is not the case, the taxpayers will be under the power of the tax collector who has the power to aggravate the tax upon the taxpayer or extort some perquisite to himself. Smith (1776) agrees that uncertainty of taxation encourages corruption. In describing the importance of certainty in a tax system, he rates the problem of tax inequality as being of lesser evil than that of uncertainty.

The objective of this section is to analyze the proposed carbon tax to see if its payment can be said to be certain to the ultimate taxpayers. The section will start by trying to see if the timing of payment of carbon tax is certain. In Section 2.4 above, it was observed that tax on consumption is paid every time the taxed items are purchased. To such an

extent, the timing of the payment of the proposed carbon tax by the ultimate taxpayers is only as certain as the purchases of the carbon products. This cannot be said of the timing of payment of the tax by the legal taxpayers. The legal tax payers will pay the tax as provided in the tax legislation (National Treasury, 2013). Another enquiry is the manner of payment. This will be as certain as the timing of payment discussed above.

The next enquiry is the quantity of the tax to be paid. Smith (1776) said '… the quantity to be paid ought all to be plain to the contributors and to every other person'. This is understood to mean that the quantity which in the case of the carbon tax involves the quantity of carbon emitted times the rate of tax minus any offsets, must be known to the legal taxpayer, the revenue authority who will monitor the collection of the tax, and the treasury department for purpose of their budget. This is exactly where uncertainty could bring about corruption. The Carbon Tax Policy Paper (National Treasury, 2013: 12) reports that 'the carbon tax will be based on either appropriate emissions factors or a transparent and verified measuring and monitoring procedure'. This implies that the tax base will be measured, according to the paper, by the institutions, companies and installations that emit GHG in excess of 100 000 tons annually (National Treasury, 2013: 29). The Carbon Tax Policy paper reports that the Department of Environmental Affairs (DEA) will introduce mandatory reporting of GHG emissions (National Treasury, 2013).

The issue with this mandatory reporting requirement is in compliance. Compliance means being able to measure and report the actual quantity of GHG emissions per time

by the emitter who will also be the legal taxpayer. The measuring of carbon emissions will require special appliances, perhaps a special skill and integrity on the part of those responsible for reporting. All of these will impose extra costs on the business. Businesses, being guided by their overriding objective of maximizing profit may engage in some forms of cost minimization leading to reporting GHG emissions inaccurately. Collusion between companies and the government monitoring officials can also not be ruled out. Any alternative to correct this credibility problem may be costly, making the tax relatively less cost effective (Carbon Tax paper, 2013).

2.6 Economics of imposing carbon tax

Smith (1776) reports that ‘every tax ought to be so contrived, as both to take out and to keep out of the pockets of the people as little as possible, over and above what it brings into the public treasury of the state’. The same report analysed factors which increase the difference between what is collected as tax from the taxpayers and what enters the treasury of the state as revenue to include the following: the number of the tax officials and their pay, the tax impact on the economy which affect the fortunes of the taxpayer which also reduces the amount of future tax revenue, the effect of deterrents and enforcement against evasion and the inconvenience of frequent monitoring and audit of the disclosure made for the tax. These issues will be discussed in the following paragraphs.

2.6.1 Costs of carbon tax administration

The costs of tax administration would usually include the costs of identifying taxpayers, measuring the tax base, reporting, verification, calculating and imposing the tax, collection, enforcement and managing evasion among others. Smith (1776) postulates that these costs must be as low as possible otherwise it would amount to imposing additional tax on the taxpayers. The totality of these costs depend on the number of agents liable for tax payment, the measurability of the tax base, the heterogeneity across the industry, the technology used in the industry, the use of proxy or actual measure of the tax base, whether or not the carbon tax will be managed under existing tax administrative structure or a new structure and the number of emission sources (National Treasury, 2010).

In the case of the proposed carbon tax, its administrative cost flows directly from its design features and tax environment. In the proposed carbon tax, an upstream proxy carbon tax on fossil fuels is selected against other methods such as the tax applied directly to measured GHG emission and the tax levied on energy outputs (National Treasury, 2010). In South Africa, the emitters of the Co2 are few in number. They are also homogeneous for example, Coal Mines alone constitute 78% of all emitters while the rest amount to only 22% as shown in the table below. The administrative cost of the proposed carbon tax is expected to be low on the account of the small number of the taxpayers.

Table 1: Proposed number of carbon taxpayers.

Energy input	Producers	Number
Coal	Mines	67
Natural gas	Gas processors	13
Petroleum	Refineries	6

Source: Carbon tax policy paper (2010)

Besides the advantage of the small number of taxpayers, the carbon tax is planned to be administered by the existing tax administrative structure thereby reducing the cost of administration (National Treasury, 2010). The other costs of administration in measuring and reporting GHG emissions will be borne by the taxpayers (National Treasury, 2013). To this extent, the cost of administering the proposed tax which will be borne by the National Treasury will be low.

2.6.2 Tax impact on export competitiveness, employment and income inequality

Smith (1776) explained that a tax system that obstructs the industry of the people and discourages them from contributing to certain branches of business cannot be said to be economical and therefore fair. This is understood to be the tax impact on the competitiveness of the economy and export, employment and income inequality. The Carbon Tax Policy Paper (National Treasury, 2013) agrees that carbon tax implemented gradually complemented with revenue recycling can contribute to significant emission

reductions, with a largely neutral impact on economic growth, employment and income inequality. The Carbon Tax Policy Paper (2013) did not specify how the revenue should be recycled. Literature indicates that carbon tax revenue can be recycled by using it to fund other carbon mitigation programs as is the case in Quebec, Canada; it could be returned to taxpayers as is the case in United Kingdom, France and British Colombia; it could be used to fund the general government budget as is done in Sweden, Norway and Finland; and it could also be redirected to minimizing the tax impact on low-income households (Summer, Bird & Smith, 2009). Poterba (1991) recommended the revenue be used for a transfer program indexed for price changes but warned that such a measure may not be a complete solution because not all low-income households are transfer recipients. Bosquet (2000) recommended that the carbon tax revenue be used to reduce employers' social security contributions as this will encourage an increase in employment. Other researchers recommended the use of the revenue to reduce distortions due to other taxes in the system (Baranzini *et al.*, 2000).

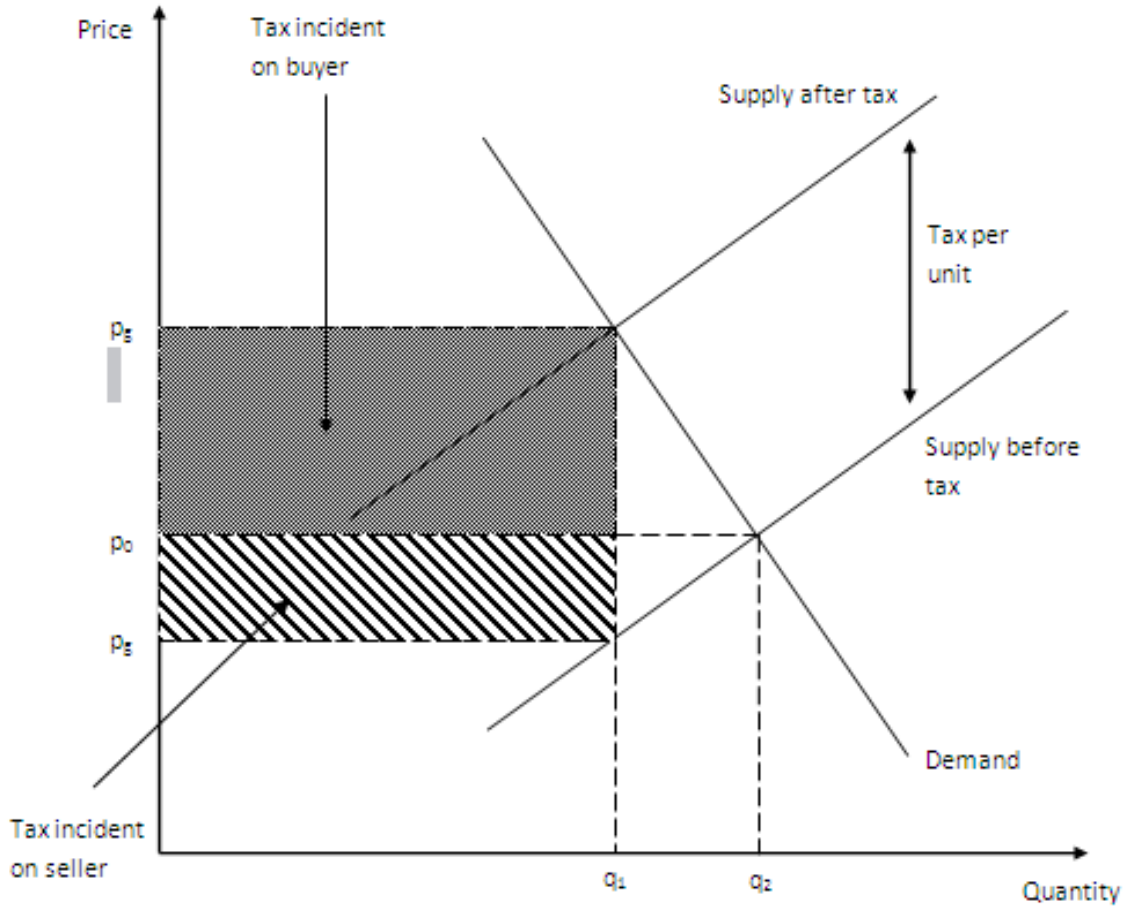
Goulder (1994) suggested that carbon tax could impact aggregate economic losses expressed in terms of gross national product (GNP) and aggregate consumption. The tax could also affect the ability of firms to compete in the international market due to increase in prices (Poterba, 1991). Metcalf (2009) recommended a border tax adjustment (BTA) to solve the problem of the impact on export competitiveness and carbon leakages. Alton *et al.* (2012) report that the implementation of carbon tax in South Africa will create a 1.2% loss in GDP and 0.6% losses in employment. This impact, according to Alton *et al.* (2012), will depend on the design of the carbon tax,

technology substitution possibilities, and the South African long-term investment plan in electricity.

Bosquet (2000) reviewed 139 simulations and 56 studies on the impact of carbon taxes and reported that 73% of the simulation predicts that carbon tax will help create jobs if revenue from the tax is used to reduce employers' social security contributions. The increased employment will result when the cut in the social security grant contribution is targeted at low-income workers (European Commission, 1994; Infras & Ecoplan, 1996). This may not be relevant to the current situation in South Africa but could be handy for future policy. Another condition stipulated by Bosquet (2000) is that the labour market must be flexible. These conditions are confirmed by a number of researchers (Standaert, 1992; Beaumaise & Brechet, 1993; Mors, 1995; Don, 1995 cited in Bosquet 2000). Bosquet (2000) also commented that a good number of studies reviewed opined that if wages are directly linked to price levels, carbon tax could translate into inflation, wiping out potential employment gains. The same author observed that the carbon tax cannot be fully passed on to consumers through prices. Other competitors are prepared to absorb some fractions of the tax which could be borne by capital and labour in the form of decrease in profits and wages respectively. Under such circumstances, a rigid labour market will result in job losses. A rigid labour market is evident in the South African labour market. Trade union activities evidenced by the recent industrial relation breakdowns indicate a rigid market. Bosquet (2000) also reported that 94% of all simulations reviewed predict rises in the consumer price index (CPI). According to him, this is due to the limited capacity of the economy to substitute carbon-intensive

processes and products. The substitution may not be possible in the short to medium term. In South Africa, the general increase in prices will decrease real income and worsen poverty and income distribution.

Figure1: Illustrating the incidence of taxation



Source: Smith (2004)

2.7 Tax incidence

This section reviews the literature on tax incidence. Tax incidence is relevance in this study because carbon tax is subject to tax shifting from the producers of carbon related goods to their consumers. Evaluating the impact of carbon tax will require the knowledge of the point of tax incidence. Tax incidence is discussed in the following paragraphs.

2.7.1 Defining tax incidence

Tax incidence is defined by Smith (Smith, 2004) as the place where the burdens of tax lie. He further divides the burden into legal and economic. He defines legal incidence as the entity legally responsible for paying the tax or from whose hands the tax is collected. He defines the economic or effective incidence as an entity that ultimately bears the burden of the tax or those whose living standard will change as a result of the tax.

Entin (2004) posits that all taxes legally incident on business will have their final incidence on either the customers, owners (shareholders) or employees through changes in price, profit or wages. Businesses can shift tax incidence that is upon them forward, backward or a combination of these. But how far this can be done depends on the price elasticity of demand and supply as illustrated in the Figure 1 below.

From Figure 1, the demand and supply before tax determines the price (Po); when tax is imposed, price level moves from Po to Pg and the supply line is shifted to supply after tax. With the demand curve remaining the same, quantity demanded becomes Q1 from Qo. The effect of the increase in tax splits into two: a part which can be shifted to the consumers (in check shade) and the part to be borne by the seller (in striped shade). This indicates that when demand for a product is not completely inelastic, tax imposed on such product cannot be completely shifted to the consumers. Part of the tax will be absorbed by the capital and labour in the company. The effect is the reduction in profit and/or wages if wage is flexible. If wage is not flexible, it will lead to loss of jobs.

2.7.2 The incidence of carbon tax

In 2013 the South African government announced the introduction of carbon tax at R120 per tCo2-eq and the tax is to be increased by 10% per annum until 2019 (Budget, 2013). This tax, according to the announcement, will cover scope 1 emissions which is the GHG emissions resulting from sources that are owned or controlled by the entity (National Treasury, 2013). The same policy paper also reports that in absolute terms, total GHG emissions per annum in 1994, 2000, and 2010 amounted to 380, 461, and 547 million tons respectively. Out of the figure reported, emissions from the energy sector due to electricity generation, petroleum refining and transportation accounted for 80% of total emissions in 2000. This is followed by agriculture and industrial sector with emissions of 8.4% and 7% respectively.

The demand for carbon related products are price inelastic (Madlener *et al.,* 2011); therefore tax charged on these products will be shifted to the consumers depending on their individual price elasticity of demand and supply (Entin, 2004). The more elastic the demand, the less the increases in price will be transferred to the purchaser, and the more of the increases in price will be borne by the seller of the good (Smith, 2004). The more elastic the supply, the more the increases in the price will be shifted to the purchaser and the less they will be borne by the seller of the good. From the above discussion, most of tax on carbon products including electricity and transportation may be transferred to the consumers of these items simply because the demand for these products is inelastic. Downes (2011) has indicated that any tax on Eskom's operations

will be passed on in its entirety to consumers through increases in price. Another company – Arcelor Mittal also reported that elasticity for factor substitution of carbon products used in their production process was close to zero at least in the short term (Vuuren, 2011). This implies that carbon tax levied on Arcelor Mittal will find its way onto the price of their products. This confirms that the ultimate incidence of the carbon tax will be the consumers of the carbon related products.

2.8 The significance of fairness in a tax system

Fairness in a tax system is significant for many reasons including being seen as an alignment with democratic principles, enabling the tax systems to be accepted thereby enhancing voluntary compliance with the policy, and ensuring the success of the tax in terms of revenue collection. The other significance is the reduction in political frictions and social unrests. These will be explained in the following paragraphs.

2.8.1 Fairness ensures democratic society

South Africa became a democracy in 1994 after many years of oppressive governance. A Bill of Rights was integrated with the South African Constitution (the Constitution) to ensure the reign of fairness, equity and respect for the rights of individuals (South African Constitution, 1996). It is only reasonable to ensure that every instrument designed for the administration of the state is fair and aligns with each other for the common goal of keeping away oppression. This is why tax policy or law is evaluated for fairness or otherwise.

2.8.2 Fairness enhances revenue collection

Tax experts believe that the success of a system depends on its fairness (Katz, 1995). Martinez (2002) opined that a tax system must not only be simple but must be fair. At a minimum, it must be seen as fair. A tax system that is seen to be fair attracts acceptance and voluntary compliance. This is confirmed by the outcome of a survey conducted by McGee and Goldman in many countries including South Africa (McGee & Goldman, 2012). Respondents cited tax inequity and unfairness as justification for tax evasion. Therefore a fair tax system enhances tax compliance and revenue collection.

2.8.3 Fairness reduces political frictions

Fairness in tax systems reduces political tension and social unrest. Montesquieu, cited in Adams (1999) was quoted as saying 'the excessive and inequitable taxes were extraordinary means of oppression'. This quote relates to eighteenth century France. In the same context, Adam (1999) quoted Louis XIV, the then Attorney General in France as saying 'the country has been ruined, the peasants reduced to sleeping on straw, their furniture sold to pay taxes…'. Following the situation referred to by the Attorney General, there was a revolution in France. In the same period of history tax-inspired revolutions were seen in the United Kingdom, United States of America, Russia, Spain and Switzerland (Vivian, 2006; Friedland, 2010). Unfair taxes can be politically destructive as it was the case in France and in British Empire and in the United States of America.

2.8.4 Fairness facilitates enactment of tax laws

Martinez (2002) observes that no one likes to pay tax and politicians also do not like to make tax laws. But politicians could reluctantly pass tax laws when such laws appear to be fair to the majority of the people and if such tax is for the social good of the people (Peters, 1991). The fairness of the proposed carbon tax would be one issue that must be considered beyond reasonable doubt before the law will be enacted by the Parliament.

2.8.5 Fairness of tax and tax reform

Tax fairness has been a driving force for tax reforms over the world. In South Africa the tax system was reviewed by the Frazsen Commission in 1968, the Margo Commission in 1986, and the Katz Commission in 1994 and in 2013 by the Davis Tax Review Committee. These tax reform commissions all have to do with fairness and equity of the South African tax or it structure. The Margo Report (1986) noted that a widespread belief that the system (tax) is inequitable undermined the ability of government to generate revenue due to taxpayers' resistance and increased evasion. The same report also said that maintaining an equitable tax policy is in governments' interests. The Margo Report (1986) also quoted a remark made in the USA's tax reform document to the effect that 'inequity of the tax system undermines taxpayers' morale - a valuable, yet fragile national asset and a prerequisite for a tax system based on voluntary compliance' (US Treasury,1984 cited in Margo Report, 1986). This sentiment was confirmed empirically in the USA, that many taxpayers fail to pay tax because they believed inequity exists in the nation's tax structure (US Treasury, 1948 cited in

Friedland, 2010). Similar empirical confirmation was conducted in South Africa and the same result was reported (McGee & Goldman, 2012).

The following remarks made in the Katz 3rd interim report (Katz, 1995) underscore the value of fairness of the tax system in a democratic society. According to Katz Commission (1996), the success of tax system depends to a large extend on its fairness. The Katz Commission (1994) also commented that in South Africa, the tax system is subject to the South African Constitution which insists on equality. The Katz Commission (1994) also remarked that the Constitution should effectively enforce all tax laws equally. It is not clear if this is achieved by the Constitution.

The value of fairness in the tax system is also demonstrated by the socio-political consequences of any intentional or unintentional negligence to observe due fairness in the tax system. The popular case of taxation in France where labourers were taxed up to 81% of their income, which eventually led to French Revolution (Groves, 1974) is an example. During the said revolution, as Adam (1995) reported, ‘angry overtaxed Frenchmen hauled every tax man they could find down to the guillotine’, and the monarch was subsequently overthrown. Tax inspired revolutions abound in history (Adam, 1999); all having their root in tax unfairness or inequity.

CHAPTER THREE

3.1 Research methodology

This research used a qualitative method in the form of a case study and content analysis. The research used a quantitative approach in the form of correspondence analysis to complement, compare and confirm the results obtained from the qualitative method. The combination of the two approaches was selected due to the peculiarities of the subject under investigation as documented in the Section 3.2 below (suitability of qualitative approach) and of the need to analyze the relationships among the conclusions of the post graduate students who participated in the survey using the correspondence analysis. Conclusions were used to evaluate the fairness of the proposed carbon tax.

3.1.1 Data collection and analysis

This section documented the methods used in collecting data including the sampling methods, instrument of analysis and the procedures. The next paragraph describes the qualitative approach; this is followed by the correspondence analysis.

3.1.1.1 Qualitative approach

This research used a case study approach and content analysis to study the design document of the proposed carbon tax for information regarding the tax design features, the concepts underlining the design and the goals achieved by the tax by 2025. The

Carbon Tax Policy Paper indicates that GHG emissions should be reduced by 42% by 2025 (National Treasury, 2013). The design documents were obtained from the National Treasury Department and the Department of Environment in Pretoria. The results of the empirical studies were conducted to inform the design of the tax in South Africa. Information in these documents in the form of empirical test results, analysis and arguments were extracted and compared with the design of the proposed carbon tax for deviations which could result in the unfairness or otherwise of the proposed tax.

3.1.1.2 Correspondence analysis

Correspondence analysis (CA), a form of quantitative technique, was used to analyse responses of the postgraduate students who participated in the survey. The analysis was to identify patterns or relationships amongst the responses.

The following section will describe correspondence analysis and its suitability for the analysis. Glynn (2012) describes correspondence analysis as a multivariate exploratory space reduction technique for analyzing categorical data. Correspondence analysis according to the above report reveals frequency-based association in *corpus* data. The technique, according to the report, also visualizes these associations to facilitate their identification and interpretation. The visualization of the relations takes the form of configuration biplots or maps, which depict degrees of correlation and variation through relative proximity of data points. Correspondence analysis takes the frequency of co-occurring features and converts them to distances, which are then plotted, revealing

how things are related by how close to or far from each other they are in a two- or three-dimensional visualization.

Bendixen (1996) concludes that correspondence analysis is a technique for representing contingency tables graphically in low-dimension space for easy interpretation of any dependency between rows and columns. According to Bendixen's (1996) report, it can be demonstrated that if there are n columns (or rows), then perfect representation can be achieved in n-1 dimensions. Correspondence analysis is able to graphically represent larger contingency tables (those with more rows and/or columns) in low dimensional space which facilitates visualization and interpretation. Correspondence analysis works with a cross-tabular categorical data in a contingency table. The contingency table for the carbon tax analysis is shown in Table 2 below.

Table 2: Sample of the survey document

Trait	Absence of fairness based on Smith's (1776) tenets of a fair tax system					Absence of fairness based on South African context (OECD 2013; Budget, 2013)	
Traits are extracted from the 'carbon tax policy paper 2013' Pages of the document are indicated	Tax paid but GHG reduction not achieved (a)	Tax burden may not be shared equitably (rich and the poor) (b)	Tax not economi-cal (c)	Tax not certain (d)	Tax not conve-nient (e)	Tax could make export uncompe-titive (f)	Tax rein-forces Wealth inequality (g)
1.Firms not correctly reporting green house gas emissions (pg 12)							
2.Carbon tax could be shifted to consumers (Entin, 2004)							
3.Exempting some sectors/firms weakens the reduction of GHGs (pg14)							
4.Carbon leakage could create unemployment (pg16)							
5.Low tax rate of R120 may not achieve target reduction in GHG (pg15)							
6.Carbon tax would be regressive (Poterba,1991)							
7.Revenue from the tax not used to reduce other taxes (pg16)							
8.Carbon tax in addition to other taxes may put extra							

burden on businesses (pg18)							
9.Supporting renewable energy producers may lead to budget deficit as reported in Australia (pg 17)							
10.Measuring and mandatory reporting may put extra cost on businesses (pg12)							

The rows of the table are made up of the criteria for the absence of fairness in line with Smith's (1776) tenets of fair tax. These criteria are extracted from the Smith (1776) report. There are also criteria relating to the South African context which are extracted from the Budget (2013). The columns contain the traits or features of the proposed carbon tax. These features are extracted the Carbon Tax Policy Paper (National Treasury, 2013). This information is obtained using the process of content analysis. The information on the columns is cross-matched against those of the rows. The frequencies of the corresponding information are then analyzed using Statistical Package for Social Science (SPSS) and reported in a correspondence map.

3.1.1.3 Advantages of correspondence analysis

Correspondence analysis has the following advantages (Phillips, 1995):

- It is an appropriate method for analysing - categorical data;
- It produces a visual representation of the relationships between the row and the column categories in the same space;

- The technique is versatile: it can be used with frequency data, with percentages, ratings and with heterogeneous datasets;
- Correspondence analysis can suggest unexpected dimensions and relationships; and
- It is always a useful preliminary to a more structured and traditional multivariate modeling of categorical data.

3.1.1.4 Data collection by survey

Contingency data table as shown above was designed and distributed to survey participants for completion. The population included students who have enrolled for the subjects- Taxation and Accounting for BCom Honours and Master Degrees (MCom Taxation and MCom Accountancy) for 2012 and 2013 of the University of Witwatersrand. The table with the instruction on how to complete the table was sent to the students electronically and was also distributed in the lecture rooms. The purpose and the value of the research explained to the students. The results of the survey were analysed in Chapter four. The students were selected because they have started analyzing issues in taxation in their masters' programme. They are therefore considered to be holders of credible opinion in tax matters. Most of the students (60%) are Chartered Accountants and are working in accounting firms in South Africa.

3.1.1.5 Suitability of qualitative approach

A qualitative approach is particularly suitable for this research for several reasons. Carbon tax in South Africa has never been studied for its fairness. Most of the variables

needed for the study including the principle of fairness, tax incidence, equity and income are difficult to define and measure. A qualitative approach is useful in handling shades of different opinions and arguments each of which having potentially equal validity (Creswell, 2007).

The study of fairness of carbon tax is a very complex situation. The concept of fairness and other concepts in the study have multi-dimensions and the research was not to determine any ultimate truth about the issues investigated but to reveal the nature of the different perspectives, settings and relationships. A qualitative approach was most suitable in this situation (Eisner, 1998).

The study of fairness of carbon tax involves human events, interpersonal relationships, social structure and creative products for example, laws. An objective approach as allowed through a quantitative approach may not be suitable in studying such issues (Creswell, 2009; Eisner, 1998).

A qualitative approach allowed the researcher to intimately be a part of the process by analysing; weighing, comparing various arguments and taking a position where necessary to be able to gather informed opinions to support arguments in the research.

Finally, the study was not an exercise to prescribe a scale to measure the fairness of carbon tax, but to highlight and evaluate the multiple realities surrounding the fairness and unfairness of the proposed carbon tax. A qualitative approach was the most suitable in this regard.

3.2 Validity and reliability of the research

This section considers the validity of the research, including the accuracy, meaningfulness and credibility thereof. The section documented the extent to which meaningful and defendable conclusions were drawn from the data analysed in the research. The validity was considered first in the form of internal validity which documented the controls adopted to ensure that the conclusions drawn were truly warranted. The next paragraph considers external validity, which documents the extent to which the results of the research can be generalized beyond the context of this research.

3.2.1 Internal and face validity

Sources of information for the research were carefully selected to enhance the internal validity of the research. Most information for the research came from the tested and examined previous researchers, from the University of the Witwatersrand, reputable industry journals and the renowned industry opinion leaders. These sources were complemented by government issued publications. Information with doubtful integrity was not adopted until they were confirmed by information from multiple sources. The practice of information triangulation was respected throughout the research and counter arguments were considered in every debate before a position was taken.

The use of survey and analysis of the results using correspondence analysis was done to further challenge the conclusions drawn using qualitative method. The results of the correspondence analysis were compared with the results obtained through qualitative method before conclusions were drawn. This will enhance the validity of the research.

Finally, the research report was reviewed by independently knowledgeable persons with a view to evaluating the clarity and the logic of the arguments presented in the report. This was done in an attempt to improve the face validity of the report.

3.2.2 External validity

Research replicated in many parts of the world on carbon tax design and implementations were studied; the results of this research were compared with those from other parts of the world to ensure that this research was externally valid. Their outcomes regarding the characteristic of carbon taxes were similar to most of the conclusions of this research. It should, however, be noted that case studies conducted using qualitative approach has limited external validity (Leedy & Ormrod, 2013).

3.2.3 Reliability of the research

The reliability of this research may be limited for certain reasons. A qualitative approach used in the research allows researcher the use of personal judgments which may be subjective and therefore would be different if similar research is conducted by another person. Secondly, the term ‘fairness’ was used as defined by Smith (1776) and adopted by Maroun (2011). Although the study is done in the same context, the outcome may not be the same. But if the contexts of our research are repeated, the reliability of the research may be proven.

CHAPTER FOUR

4. Data analysis and interpretation

A survey was conducted to gather information to confirm or refute the existence of unfairness in the proposed carbon tax. This section analyses the responses of the survey. This chapter also interpreted the results of the analysis leading to conclusions which are compared to the results of the literature review. Conclusions for the research were drawn after this process.

4.1 Analysis of the survey results

Sixty four (64) questionnaires were distributed to post-graduate students who participated in the survey. A response rate of 40.6% was recorded. 92% of the responses were legible and were accepted whereas the remaining 8% (2 surveys) was rejected as they were illegible and incomplete. Table 3 presents the frequency of the responses.

Table 3: Frequency of responses

Trait	Absence							
	Tax paid but GHG reduction not achieved	Tax burden may not be shared equitably	Tax not economical	Tax not certain	Tax not conve-nient	Tax could make export uncompetitive	Tax reinforces Wealth Inequality	Total number of responses
Firms not correctly reporting green house gas emission	8	9	3	1	0	4	2	27
carbon tax could be shifted to consumers	4	10	6	0	4	4	10	38
Exempting some sectors/firms weaken reduction of GHGs	9	7	4	0	2	2	3	27
Carbon leakage could create unemployment	2	7	5	4	0	3	5	26
Low tax rate of R120 may not achieve target reduction in GHG	15	2	6	2	1	2	2	30
Carbon tax would be regressive	3	5	7	2	0	3	4	24
Revenue from the tax not used to reduce other taxes	3	4	7	2	4	5	4	29
Carbon tax in addition to other taxes may put extra burden on businesses	0	3	11	2	8	10	3	37
Supporting renewable energy producers may lead to budget deficit	3	2	7	2	3	6	3	26
Measuring and mandatory reporting may put extra cost on business	3	0	12	1	7	6	2	31
Total number of responses	50	49	68	16	29	45	38	295

4.2 Significance dependencies

The first step in interpreting correspondence analysis is to establish whether there is a significant dependency between the rows and columns. To establish this significance, the 'Trace' as in Table 4 below is examined. The square root of the Trace may be interpreted as a correlation co-efficient between the rows and columns.

Table 4: Eigenvalue report

Dimension	Singular Value	Eigenvalue	Chi Square	Sig.	Proportion of Inertia		Confidence Singular Value	
					Accounted for	Cumulative	Standard Deviation	Correlation 2
1	.451	.204			.533	.533	.049	.180
2	.325	.105			.276	.809	.055	
3	.212	.045			.118	.926		
4	.139	.019			.050	.977		
5	.075	.006			.015	.992		
6	.056	.003			.008	1.000		
Total		.382	112.739	.000[a]	1.000	1.000		

a. 54 degrees of freedom

As a rule of thumb, any value of this correlation co-efficient in excess of 0.2 indicates significant dependency. The correlation coefficient of the study = √.382 = 0.618, thus indicating a very strong dependency between the traits and the absence of fairness.

4.3 Dimensionality of the solution

The second step in interpreting correspondence analysis is to determine the appropriate number of dimensions to be use in the solution (Bendixen, 1996). This is achieved by examining the Eigenvalue report in more detail. The ratio of the Eigenvalue of any axis to the trace represents the proportion of the total inertia (or chi-square value) explained by the axis as seen in the Table 5 below.

Table 5: Detailed report of the columns

		Score in Dimension			Contribution				
					Of Point to Inertia of Dimension			Of Dimension to Inertia of Point	
Absence	Mass	1	2	Inertia	1	2		1	2	Total
Tax paid but GHG reduction not achieved	.169	-1.057	.853	.126	.419	.380	.678	.318	.997
Tax burden may not be shared equitably	.166	-.603	-.796	.068	.134	.324	.403	.505	.907
Tax not economical	.231	.423	.209	.028	.092	.031	.670	.117	.787
Tax not certain	.054	.061	-.238	.032	.000	.009	.003	.031	.034
Tax not convenient	.098	1.072	.410	.068	.250	.051	.754	.079	.833
Tax could make export uncompetitive	.153	.550	.030	.028	.102	.000	.741	.002	.743
Tax reinforces Wealth Inequality	.129	-.085	-.718	.033	.002	.204	.013	.655	.668
Total	1.000			.382	1.000	1.000			

Symmetrical normalization

In Table 5 above, there are seven columns and ten rows, if the data were purely random with no significant dependencies, the average axis should account for 100/(7-1) =16.67% of the inertia. In terms of the rows, the average axis should account for 100/(10-1) = 11.11%. Thus any axis contributing more than the maximum of these two

percentages should be regarded as significant. As per Table 3, the first and second axes account for 67.8% and 31.8% of the inertia with a cumulative total of 99.7%. This indicates significant dependencies of the rows and columns and also that two-dimensional solution could be used.

Table 6: Detailed report of the rows

Trait	Mass	Score in Dimension		Inertia	Contribution				
					Of Point to Inertia of Dimension		Of Dimension to Inertia of Point		
		1	2		1	2	1	2	Total
Firms not correctly reporting green house gas emission	.092	-.864	-.144	.041	.151	.006	.744	.015	.759
carbon tax could be shifted to consumers	.129	-.121	-.706	.040	.004	.198	.021	.517	.538
Exempting some sectors/firms weaken reduction of GHGs	.092	-.743	.190	.031	.112	.010	.725	.034	.760
Carbon leakage could create unemployment	.088	-.234	-.861	.039	.011	.201	.056	.545	.601
Low tax rate of R120 may not achieve target reduction in GHG	.102	-.916	1.131	.085	.189	.400	.454	.499	.953
Carbon tax would be regressive	.081	-.165	-.413	.014	.005	.043	.073	.328	.401
Revenue from the tax not used to reduce other taxes	.098	.321	-.077	.005	.022	.002	.858	.035	.893
Carbon tax in addition to other taxes may put extra burden on businesses	.125	1.006	.071	.060	.281	.002	.946	.003	.950
Supporting renewable energy producers may lead to budget deficit	.088	.424	.143	.011	.035	.006	.645	.053	.698
Measuring and mandatory reporting may put extra cost on business	.105	.901	.640	.055	.189	.132	.703	.255	.958
Total	1.000			.382	1.000	1.000			

Trait Mass Score in Dimension Inertia Contribution.

In Table 6 above, there are seven columns and ten rows. Similar to table 3 above, if the data were purely random with no significant dependencies, the average axis should

account for 100/(7-1) = 16.67% of the inertia. In terms of the rows, the average axis should account for 100/ (10-1) = 11.11%. Thus any axis contributing more than the maximum of these two percentages should be regarded as significant. As per Table 4, the last axis and the axis before it accounts for 70.3% and 25.5% of the inertia with a cumulative total of 95%. This indicates significant dependencies of the rows and columns and also that two-dimensional solution could be used.

4.4 Interpretation of axes

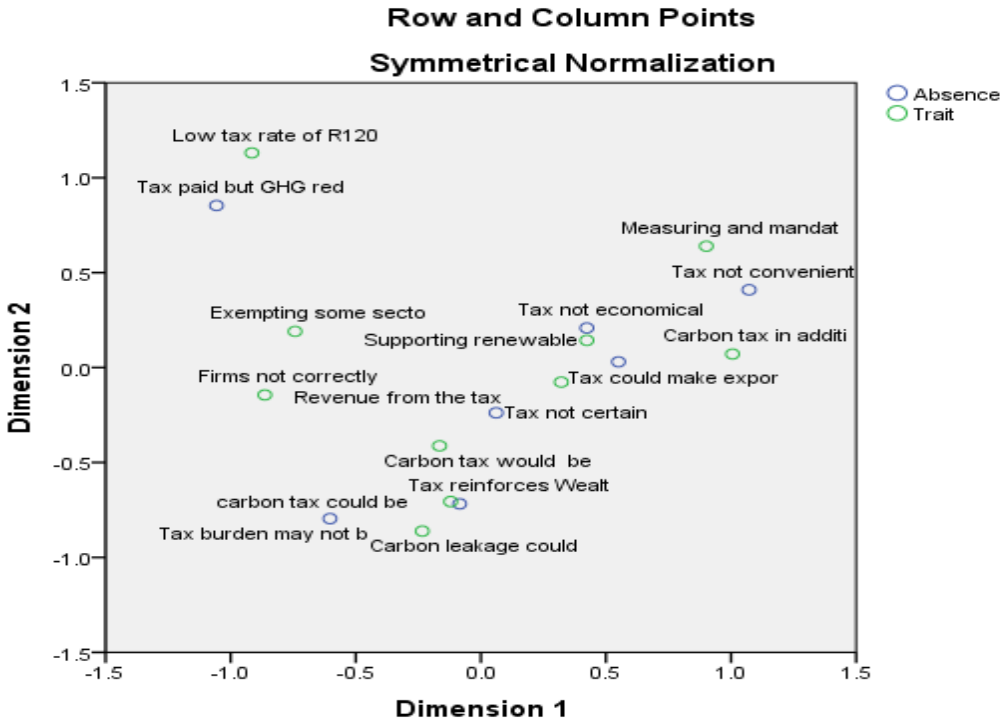
By examining the inertia and the signs attributable to the traits, the axis poles can be defined (Bendixen, 1996). This way, different traits can be used to characterise poles contained in the graphical analysis. The percentage of explained inertia for the first two dimensions, using the standard scaling, comes out at 80.9% of the inertia. By examining the plot details shown in Table 6 above, the following traits based on their inertias, define the respective axes:

Table 7: Interpretation of axis of the graphical presentation

Axis 1		Axis 2	
Positive x-axis No. Description	Negative x-axis No. description	Positive y-axis No. description	Negative y-axis No. description
7. Revenue from the tax not used to reduce other taxes 8. Carbon tax in addition to other taxes may put extra burden on businesses 9. Supporting renewable energy producers may lead to budget deficit 10. Measuring and mandatory reporting of GHG emissions may put extra cost on business	1. Firms not correctly reporting GHG emissions 2. Carbon tax could be shifted to consumers 3. Exempting some Sector/firms may weaken GHG reductions 4. Carbon leakage could create unemployment 5. Low tax rate of R120 not achieve target GHG reductions 6. Carbon tax would be regressive	3. Exempting sectors/firms from carbon tax may weaken GHG emissions reduction 5. Low tax rate of R120 may not achieve target GHG reductions 9. Supporting renewable energy producers may lead to budget deficit 10. Measuring and mandatory reporting of GHG emissions may put extra cost on businesses	1. Firms not correctly reporting GHG emissions 2. Carbon tax could be shifted to consumers 4. Carbon leakage could create unemployment 6. Carbon tax would be regressive

It is important to note that the sign of the inertia of any trait only determines its position relative to another trait. The sign of the inertia and the axis at which they fall merely highlights the traits the survey participants regarded as distinctly closely related (Maroun, 2007).

Figure 2: Asymmetric plots of rows and columns:



4.5 Interpreting patterns of associations

From Figure 2 above distinct associations between row and column items are apparent.

- Low tax rate of R120 (trait) is distinctly associated with tax paid but GHG emissions reduction not achieved (absence of fairness).
- Supporting renewable energy producers (trait) is also associated with tax not economical (absence of fairness).
- Carbon tax could be shifted (trait) is seen as being distinctly associated with tax reinforcing wealth inequality (absence of fairness).

- Carbon tax in addition to other taxes (trait) is associated with tax making export uncompetitive (absence of fairness)
- Measuring and mandatory reporting of GHG emissions (trait) is associated with tax not being convenient (absence of fairness)

4.6 Analysis of frequency tables

Phillips (1995) indicated that patterns of relationships could also be found in the profiles of the rows and columns. This section will discuss Table 1 in detail by examining the profiles of the relationships in Tables 8 to 17 below.

Table 8: Responses for firms not correctly reporting GHG emissions (Trait):

Absence of fairness	Frequency of response
Tax paid but GHG reduction not achieved	8
Tax burden may not be shared equitably	9
Tax not economical	6
Tax not certain	1
Tax not convenient	0
Tax could make export uncompetitive	4
Tax reinforces wealth inequality	2

In Table 8, nine respondents confirmed that if firms do not, for any reason, report GHG emissions correctly, it will result in inequitable sharing of the carbon tax burden. Eight of the respondents confirmed that incorrect reporting of GHG will result in the tax being paid but GHG reduction not being achieved.

Table 9: Responses for carbon tax being shifted to consumers (trait):

Absence of fairness	Frequency of response
Tax paid but GHG reduction not achieved	4
Tax burden may not be shared equitably	10
Tax not economical	6
Tax not certain	0
Tax not convenient	4
Tax could make exports uncompetitive	4
Tax reinforces wealth inequality	10

In Table 9 ten of the respondents believed that if carbon tax is shifted to consumers it will result in the tax burden not being equitably shared and will reinforce wealth inequality. None of the respondents indicated any relationship between tax shifting and tax certainty.

Table 10: Responses for exempting some sectors and firms from carbon tax (trait):

Absence of fairness	Frequency of response
Tax paid but GHG reduction not achieved	9
Tax burden may not be shared equitably	7
Tax not economical	4
Tax not certain	0
Tax not convenient	2
Tax could make exports uncompetitive	2
Tax reinforces wealth inequality	3

In Table 10 nine of the respondents believed that exempting some sectors or firms from payment of the carbon tax will result in paying tax but GHG reductions would not be achieved. Seven of the respondents agreed that the tax burden will not be shared equitably since some sectors or firms are exempted from the tax.

Table 11 Survey responses regarding carbon leakage and unemployment (trait):

Absence of fairness	Frequency of response
Tax paid but GHG reduction not achieved	2
Tax burden may not be shared equitably	7
Tax not economical	5

Tax not certain	4
Tax not convenient	0
Tax could make exports uncompetitive	3
Tax reinforces wealth inequality	5

In Table 11 seven of the respondents believed that carbon leakage will result in unfair distribution of the tax burden and five respondents indicated that the tax will not be economical and will reinforce wealth inequality. None of the respondents indicated any relationship between carbon leakage and tax being convenient to taxpayers.

Table 12: Responses regarding low tax rate of R120 and achieving target reduction in GHG (trait):

Absence of fairness	Frequency of response
Tax paid but GHG reduction not achieved	15
Tax burden may not be shared equitably	2
Tax not economical	6
Tax not certain	2
Tax not convenient	1
Tax could make exports uncompetitive	2
Tax reinforces wealth inequality	3

In Table 12 the majority of the respondents agreed that a low tax rate of R120 per ton of Co2-equivalent emitted will result in tax being paid but the GHG emissions reduction would not be achieved.

Table 13: Responses regarding carbon tax being regressive (Poterba, 1991) (trait):

Absence of fairness	Frequency of response
Tax paid but GHG reduction not achieved	3
Tax burden may not be shared equitably	5
Tax not economical	7
Tax not certain	2
Tax not convenient	0
Tax could make exports uncompetitive	3
Tax reinforces wealth inequality	4

In Table 13 seven of the respondents agreed that carbon tax being regressive will make the tax uneconomical while five respondents believed it will make the tax inequitable. None of the respondents indicated any relationship between the regressive nature of the tax and the tax not being convenient to the payers.

Table 14: Responses regarding revenue from carbon tax not being used to reduce other taxes (trait):

Absence of fairness	Frequency of response
Tax paid but GHG reduction not achieved	3
Tax burden may not be shared equitably	4
Tax not economical	7
Tax not certain	2
Tax not convenient	4
Tax could make exports uncompetitive	5
Tax reinforces wealth inequality	4

In Table 14 seven of the respondents confirmed that if revenue from the tax is not used to reduce other taxes, it will make the tax uneconomical. At the extreme of this were two of the respondents who indicated it will make the tax uncertain.

Table 15: Responses regarding carbon tax being levied in addition to other taxes (trait):

Absence of fairness	Frequency of response
Tax paid but GHG reduction not achieved	0
Tax burden may not be shared equitably	3
Tax not economical	11

Tax not certain	2
Tax not convenient	8
Tax could make exports uncompetitive	10
Tax reinforces wealth inequality	3

In Table 15 eleven of the respondents indicated that the addition of carbon tax to the existing taxes will make the tax system uneconomical while ten of the respondents agreed that it will make exports uncompetitive. At the other extreme, none of the respondents indicated that it will result in tax being paid but GHG reduction not being achieved.

Table 16: Responses regarding supporting renewable energy producers and budget deficit (trait):

Absence of fairness	Frequency of response
Tax paid but GHG reduction not achieved	3
Tax burden may not be shared equitably	2
Tax not economical	7
Tax not certain	2
Tax not convenient	3
Tax could make export uncompetitive	6
Tax reinforces wealth inequality	3

In Table 16 seven of respondents believed that supporting renewable energy producers as part of the GHG emissions abatement policy will lead to the tax system being uneconomical while six respondents confirmed that it will make exports uncompetitive.

Table 17: Responses regarding measuring and mandatory reporting of GHG emissions (trait):

Absence of fairness	Frequency of response
Tax paid but GHG reduction not achieved	3
Tax burden may not be shared equitably	0
Tax not economical	12
Tax not certain	1
Tax not convenient	7
Tax could make exports uncompetitive	6
Tax reinforces wealth inequality	2

The majority of the respondents agreed that the requirement for emitters of GHG to measure and report their emissions will make the tax uneconomical. At the other extreme, none of the respondents indicated any relationship between this policy and the tax burden being shared inequitably.

The findings of the research is summarised as follow: that the proposed carbon tax would not be equitable, economical, make export competitive and the planned

reduction in GHG emissions not achieved. All the findings except one align with the directions of the dominant arguments in the literature reviewed. Details of these are discussed in section 5.3 of chapter five of this report.

CHAPTER FIVE

5.1 Introduction

This chapter concludes on the research. It summarises the research's major findings and argues whether the findings of the research answered the research questions. In the following paragraph, the questions this research planned to answer are restated. These questions were discussed with a view to evaluating whether the questions have been answered. This was followed by the report of the research major findings, discussion of the findings and recommendations based on the research and for future research.

5.2 The research sub-questions

This research set for itself the task of answering six related sub-questions.

It was believed that when the questions are answered, the main research question would be answered.

The research sub-questions include:

- Will the design and administration of the proposed carbon tax result in a proportional, progressive or regressive tax system? (equity)
- Will the proposed carbon tax amount to a fair *quid pro quo* in respect of the benefits from the abatement of GHG emissions for the ultimate taxpayers? (*quid pro quo*)

- Will the amount, timing and the manner of payment of the proposed carbon tax be clear and plain to the ultimate taxpayers? (certainty)
- Will the timing and the manner of levying the proposed carbon tax most likely be convenient to the ultimate taxpayers? (convenience)
- Will the levying and administration of the proposed carbon tax be economical both to the taxpayers and the state? (economy)
- Will the proposed carbon tax affect the competitiveness of the economy and the income inequality in the system? (economy)

5.3 Summary of findings

This section documents what was done in the research and what the findings were. The study was introduced in chapter one, while the review of literature was done in chapter two. This was followed by the data collected and the method used to analyse the data in chapter three. Chapter four contains the results of the analysis and chapter five summarized the findings in the study. The summaries of findings are discussed under the following headings:

5.3.1 The question of tax equity

The result of the correspondence analysis in figure 2 confirmed that carbon tax would be inequitable. Figure 2 indicates carbon leakage being close to tax burden not being shared equitably. This indicates association between the two variables. The result of the

frequency table 3 analysed also confirmed that the burden of the carbon tax would not be shared equitably as a result of the shifting of carbon tax from the producers to the consumers. The results of the two analysis agree with the conclusions of various reports in the literature reviewed. The reports indicated that carbon tax is likely to be regressive (Poterba, 1991; Pearson & Smith, 1991; Smith, 1992; Inter-governmental Panel on Climate Change, 1996; Symons & Proops, 1998).

5.3.2 The issue of *quid pro quo* in respect of GHG emissions reduction

According to the result of the correspondence analysis as in figure 2, conducted in this research, the low tax rate of R120 (US$10) per ton of Co2 equivalent was closely associated with tax being paid but GHG emissions reduction targets not achieved. The result of the correspondence analysis indicated that the promised GHG emissions would not be achieved. This result was also confirmed by the analysis of the frequency table 3 above. These results were also collaborated by the literature reviewed. Baranzini (2000) indicated that the final impact of carbon tax was depended on tax base and the set tax rate. Pearson & Smith (1991) also reported that the tax rate to reduce GHG emissions will depend on the growth of the economy. The more rapid the growth of the economy, the higher should be the rate of the carbon tax needed to stabilize the emissions. This factor was not considered in the proposed carbon tax in South Africa.

5.3.3 The issue of tax certainty and convenience

Correspondence analysis (figure 2) did not indicate any clear result regarding tax certainty; but associated the cost of measuring and mandatory reporting of carbon

emission with the tax not being convenient to taxpayers. In the literature reviewed, Smith (1776) indicated that consumption tax (equivalent of carbon tax) would be convenient to taxpayers because the tax is paid in bits as consumption is made. To this extent, the proposed carbon tax does not appear to be unfair on the basis of certainty and convenience.

5.3.4 The issue of tax economy

The correspondence analysis (figure 2) indicated three major findings including the fact that the tax would reinforce wealth inequality, that the tax would be uneconomical to administer and that the tax would make export uncompetitive. The analysis of frequency table indicated that the carbon tax would be uneconomical to administer. Literature reviewed indicated that carbon tax would cause general increase in price level. The increase in price would cause export to be uncompetitive, tax to be regressive and wealth distribution to be more inequitable. The Carbon tax paper, (2010) from its analysis, indicated that the proposed carbon tax will be economical to administer contrary to the results of the analysis.

5.4 Discussion of the results

This section discussed the results of the analysis. It considered the argument around the results to establish their theoretical basis. The next section considered tax equity.

5.4.1 Tax equity

The result of the correspondence analysis indicated that the proposed carbon tax would be regressive due to suspicion that the tax may cause carbon leakages. Carbon leakages are situations where factories could be relocated from South Africa to another tax jurisdiction to avoid payment of the carbon tax. The connection between the suspected carbon leakages and carbon tax being regressive is also supported by the result of frequency table analysis. This connection appears to suggest that when there is carbon leakage it is only low income workers that would lose their jobs resulting in heavier burden of the tax on the poor. The higher income workers, for example factory managers, personnel managers and store managers could also lose their jobs.

Study indicates that the relocation of factories as a result of the introduction of carbon tax depends on the mobility of capital (Vermeend & Van Der Vaart, 1998). Factories being fixed capital may not be easily moved. The connection between the carbon tax being regressive and the carbon leakages is still to be confirmed.

The analysis of frequency table though confirmed that the proposed carbon tax may be regressive, it suggested different reasons from that of the correspondence analysis. The frequency table suggested that the proposed carbon tax would be regressive because the tax would be shifted by the manufacturers to the consumers and that GHG emissions would not be correctly reported by the GHG emitters. Studies, Poterba (1991), Pearson & Smith (1991), Symons and Proops (1998) agreed that carbon tax is regressive but suggested increase in price level to be the connection between the tax

and its regressiveness. The three sources agreed that carbon tax would be regressive but gave different reasons for it.

5.4.2 Quid pro quo

The correspondence analysis conducted in the research confirmed that the proposed tax may not achieve its emission reduction target by 2025. The analysis suggested the low tax rate of R120 (about US$10) per ton of Co2 equivalent as the reason why the emission reduction target would not be achieved. The frequency table analysis also confirmed the possibility of non-achievement of GHG emissions target by the introduction of the carbon tax. But frequency table analysis gave different reasons including the proposal to exempt some sectors and firms from paying the tax and firms not correctly measuring and reporting GHG emissions. These reasons are supported by Baranzini (2000) who indicated that the impact of carbon tax in reducing GHG emissions depends on the tax base and rate. This fact was also acknowledged by the proposed Carbon Tax Policy Paper (National Treasury, 2013) to the effect that carbon tax rate must be high enough to constrain GHG emitters and cause them to look for alternative source of energy.

In commenting on the rate of carbon tax, Pearson and Smith (1991) reported that the carbon tax rate required to abating GHG emissions depended on the growth rate of the economy. According to the authors, the more rapidly the economy grows, the higher should be the tax rate needed to stabilize the emissions abatement.

5.4.2.1 GHG emissions reduction and tax fairness

How is it unfair if the GHG abatement target is not achieved? National Treasury (2010) reported that South Africa and many other developing countries are especially vulnerable to the effects of climate change given their economic dependence on the primary sector (agriculture, fisheries, mining, to name a few). About 64 per cent of people in Southern Africa are employed in the primary sector. According to some estimates, a temperature increase of 3-4°C, could lead to a 15 per cent decline in African crop yields, with extremely negative consequences in sub-Saharan Africa, where only about 4 per cent of arable land is irrigated (National Treasury, 2010). Projections, according to the same report, suggest that a global temperature increase of 3°C would reduce crop yields, leading to food shortages for up to 550 million people, more than half of whom live in Africa. Warming is also expected to increase mosquito prevalence, with a concomitant rise in malaria. Extreme weather patterns are predicted to reduce growth rates in many developing countries (National Treasury, 2010). The weight of the impacts of the climate change would be more on the poor than the rich. The non-abatement, therefore, of GHG emissions to this extent would be unfair.

5.4.3 The issue of the carbon tax economy

The correspondence analysis conducted revealed that the proposed carbon tax would not be economical to administer because the tax policy proposed to support producers of renewable energy. The correspondence analysis also confirmed that the proposed carbon tax would reinforce wealth inequality due to the fact that the impact of the tax may be shifted to the consumers. The proposed carbon tax would also make export

uncompetitive because the tax will be levied in addition to the other similar taxes currently in operation in South Africa. Supporting renewable energy in Australia is reported have worsened the country's budget deficit without helping to reduce GHG emissions (Robson, 2013).

On the issue of tax shifting, Smith (2004) argued that not all the tax imposed that could be shifted to the consumers by the manufacturers. Some of the tax burden would be borne by the owners of capital and labour. It is therefore not certain if the anticipated shifting of the proposed tax could cause reinforcement of wealth inequality as indicated by the analysis. Further specific analysis would be required to confirm the connection.

5.5 The value of the study

This study provides information which could be used to review the proposed carbon tax design in the areas of the use of revenue from the tax, the tax rate, and planning to support the producers of renewable energy. The result of correspondence analysis (figure 2) indicates that supporting producers of renewable energy would cause the proposed tax uneconomical to administer. The study also provides information that could guide budget preparation in 2015 as price level is confirmed to change with the introduction of the carbon tax. The study could assist law makers in deliberating on the bill to pass to law the proposed carbon tax. The study could also guide tax review in the future. The study confirmed that it would be more beneficial to evaluate a tax system rather than a single tax because a tax could be unfair but the tax system remains fair.

And finally, the study tried to extend the boundary of knowledge in the areas of environmental taxation and tax fairness.

5.6 Recommendations based on the results of the study

It is recommended that the tax authority reconsiders how revenue from the carbon tax will be used to dampen the regressive effect of the tax and bring about the tax double dividend. Researches confirmed that double dividend in the form of increase employment and investment are possible depending on how the revenue from the tax is used (European Commission,1992; Goulder, 1995; Mor, 1995). Bosquet (2000) opined that for employment to be created through carbon tax policy labour market must be flexible and wages must not be rigid. The study suggested that carbon tax would make export uncompetitive. Bosquet (2000) recommended that firms should be compensated through Border Price Adjustment (BPA), tax refunds, exemption from the tax, and subsidies. This research recommended that the South Africa tax authority should consider these measures but should be careful not to allow these measures to detract from the achievement of GHG emissions reduction. They should also consider that they do not breach the international trade conventions by their actions to compensate firms. The study confirmed that the proposed carbon tax would reinforce inequality in wealth distribution. Bosquet (2000) believed that carbon tax could result in double dividend of creating employment and increasing investment. According to the same author, increase in employment and investment could dampen wealth inequality. It is therefore recommended that the revenue from carbon tax should be used with a view to creating the double dividend.

The study indicated that carbon tax could be regressive, makes export uncompetitive with wealth inequality being reinforced. One way in which these could happen is when the tax is shifted to consumers. Larson and Shar (1992) recommended price control and legal restriction of forward passing of the tax to consumers to control the practice of tax shifting. It is recommended that the South Africa's tax authority considers such policy to ensure that the carbon tax policy works.

5.7 Recommendations for further research

A more elaborate survey with larger sample size could have produced more definite results from the correspondence analysis. It is therefore recommended that a larger sample be used for similar analysis for the evaluation of the fairness of the proposed carbon tax. Other areas of fairness including intergenerational fairness should be used to evaluate the proposed carbon tax. A more elaborate study of the proposed carbon tax could also be done using econometric models such as computational general equilibrium model, input – output model and micro-simulation model to confirm the distributional effect, employment effect, Gross Domestic Product effect and income distribution effect of the carbon tax. And finally, Pearson and Smith (1991) reported that the rate of carbon tax to reduce emissions to a predetermined target would depend on the growth of the economy; the more rapid the growth of the economy, the higher the rate of tax needed to stabilise the emissions. This was not considered in the proposed carbon tax in South Africa. It is recommended that a study of connection between the economy growth rate and the rate of tax needed to stabilise GHG emissions should be conducted.

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