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Analysis of demographic, socio-economic and geographic factors affecting adoption and success of personal income tax e-filing in South Africa.

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ABSTRACT

E-filing of personal income tax returns is regarded as one of the South African Revenue Service (SARS)'s success stories based on its growth since its inception in 2006. Given the importance of tax revenue as a major source of revenue to government, this study explores the effects of personal income tax e-filing on tax compliance and tax revenues. The study was carried out with three objectives, namely; determining the relationship between personal e-filing growth and some demographic, socio-economic and geographic factors in South Africa; determining the relationship between personal income tax e-filing and personal income tax revenue; and determining the relationship between personal income tax e-filing and tax compliance. Descriptive statistics and the pooled ordinary least square were employed to analyse the data having found the absence of unit root at levels in the data. The study covered 6-year period prior to e-filing (2000-2005) and 10-year period of e-filing implementation from 2006 to 2015, with data collected from publicly available SARS database on registered taxpayers and revenues collected nationally and across South Africa's nine provinces and metropolitan areas. The results indicate that e-filing had a positive contribution to increase personal income tax revenue collection as well as tax compliance over the study period. The study concludes that the introduction of e-filing provided an opportunity for improved collection and compliance across the provinces of South Africa. We therefore recommend, among others, that investigations and investments in tax technology & e-filing in non-metropolitan areas be considered, and further research be done in identified areas of interest in South Africa and rest of the African continent.

KEY WORDS: e-filing growth, personal income tax, revenues, compliance, demographics, socio-economic factors.

GLOSSARY OF TERMS

Filing Rate	For CIT and PIT The extent to which returns expected from registered taxpayers are filed.
Personal Income Tax	A tax levied on the taxable income (gross income less exemptions and allowable deductions) of individuals and trusts, and is determined for a specific year of assessment. Taxable capital gains form part of taxable income.
Provisional Taxpayer	Any person who derives income other than remuneration, an allowance or advance as described in the Income Tax Act
Tax-to-GDP Ratio	Part of a country's output that is collected by the Government through taxes, and indicator to measure the tax effort of government. It is used internationally, by among others the IMF), the World Bank and the OECD in the comparative analysis of the tax systems and economic performance of different countries.
Tax Gap	The difference between total amounts of taxes owed to the government versus the amount actually paid.

Inflation

The rate at which the general level of prices for goods and services is rising that is measured as an annual percentage change, and consequently, the purchasing power of currency is falling.

LIST OF ACRONYMS AND ABBREVIATIONS

CGT	Capital Gains Tax
CPI	Consumer Price Index (Measure of Inflation)
CIT	Corporate Income Tax
DT	Dividends Tax
e-filing	Electronic filing of returns via the World Wide Web
GDP	Gross Domestic Product
HDI	Human Development Index
HMRC	Her Majesty Revenue and Customs
IRS	Internal Revenue Service
ICT	Information and Communication Technology
IMF	International Monetary Fund
IRS	Internal Revenue Service
KRA	Kenya Revenue Authority
NT	National Treasury
PAYE	Pay As You Earn
PIT	Personal Income Tax
UN	United Nations
UNDP	United Nation Development Programme
OECD	Organisation for Economic Cooperation and Development
SARB	South African Reserve Bank
SARS	South African Revenue Service
SITA	State Information Technology Agency
SSA	Statistics South Africa
STC	Secondary Tax on Companies
UIF	Unemployment Insurance Fund
VAT	Value Added Tax

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1. INTRODUCTION

According to the Organisation for Economic Development and Cooperation (2008) guidelines, a well-functioning state is important for responding to the interests of the poor in society. However, the key question is, by what means does the state respond to the interests of its citizens? The Organisation for Economic Development and Cooperation (2008) guidelines suggest that taxation, which is the revenue base or purse of the state provides the nexus which binds the state to its citizens. Consistent with the OECD (2008) guidelines, the World Bank (2015) report also shows that taxes provide a sustainable funding mechanism that is needed for social programmes and public investments which in turn are essential for promoting economic growth and development and for building a prosperous and an orderly society in any country. Owing to the pivotal role that taxes play in promoting the above, it can also be argued that the manner in which taxes are administered and collected has a role to play in the success of the government in delivering on its promises and in achieving economic success. Owing to the above, this implies that the success of government is also dependant on the administrative capacity of its tax authority, its innovativeness and swiftness in adopting and investment in technological developments or methods that promote effectiveness and efficiency in the manner in which taxes revenues. In addition, the success of any government in increasing or achieving the targeted tax revenue base hinges on devising and implementation of strategizes that are aimed at the use of a mechanism that allows taxpayers to easily file their tax returns with little difficulty and in the comfort of their own convenient place and time. The adoption of and implementation of conducive methods of filing tax returns which are complemented with taxpayers' education and adoption of methods that encourage the citizens both natural and artificial to be tax compliant provide an added dimension to increasing the tax revenue base in a country.

Based on the OECD (2008) guidelines, technological investment in tax administration is one of the answers to improve the tax system in a country. Although some countries have taken steps or initiatives to improve their tax systems, the challenge has always been that policy makers have always had difficulties in finding the right balance between raising revenue and ensuring that tax rates and the administrative burden of tax compliance do not deter participation in the system or does not discourage the business activities of individuals and corporate taxpayers. The World Bank (2015) report notes that there has been a focus on easing administrative tax burden to comply with tax obligations by introduction of technology in the system over the past decade. Although there is notable introduction of technology in the tax

system in some countries, largely in developed countries and to a lesser extent in developing and emerging markets, the rolling out of new information and communication technologies for filing tax payments and encouragement of its use by taxpayers or educating taxpayers and tax officials on its use have not been easy tasks for any government.

Furthermore, the automation of the tax system has been given different names in different countries. For example, the automation of tax system is interchangeably termed electronic taxation, electronic declaration, electronic tax filing, online taxation or e-tax lodgement (Wasao, 2014). Furthermore, researchers also define e-filing in a variety of ways. For example, Wasao (2014) defines electronic tax filing or e-filing as a process where tax documents or tax returns are submitted through the internet, usually without the need to submit any paper return, and the system encompasses the use of internet technology, the Worldwide Web and Software for a wide range of tax administration and compliance purposes. Fu et al (2006) define e-filing of personal Income Tax (eTax) as an application that automates tax related processes in an attempt to improve efficiency in assessing and collecting tax information. While Dowe (2008:6) define e-filing as a direct transmission of tax information using the internet, Fenwick and Browstone (2002: 182) simply define e-filing as the filing of information in electronic form, as opposed to paper form.

Despite the differences in the names given to the automation of the tax returns, the definition thereof and a notable limited use of an automated tax system in developing countries, an introduction of an electronic tax system confers benefits to both tax authorities and taxpayers. For tax authorities, electronic filing lightens workloads and reduces operational costs such as for processing, handling and storing tax returns. Furthermore, e-filing tax system allows administrative resources to be allocated to other tasks such as auditing or providing improved customer services. Similarly, e-filing tax system makes it easier and less costly for tax administrators and tax payers alike, which in turn has positive spill over benefits to the entire economic system.

Since governments of and by themselves, do not engage in business activities that generate money and wealth, they rely on private individuals (earnings) and private corporations (profits) as economic agents whose respective earnings and profits are the source of revenues that governments need. After receiving that tax revenues, the government then ploughs backs the tax revenue into society through investments in physical, human and social infrastructure and services, which benefits all members of society, not just those from whom tax had been collected (Glomm & Ravikumar, 1994). Therefore, tax administration plays a role not only in

shaping national economic development, but in developing an effective state (Bird, 2015). At the centre of tax administration, in addition to an appropriate legislative framework, is the fair, effective and efficient collection of tax revenues from personal and corporate taxpayers.

In order to ensure an effective and efficient tax system in any country, it is imperative to have measures in place that will enable the evaluation of the state of the tax system in place and the revenue collection mechanisms within it and its performance. This also requires an understanding of the tax systems that are being used elsewhere and making a comparison between the systems in the country and those being used elsewhere. This could be done as a way to examine what is working for the country and what is not in comparison to what is working or not working elsewhere. An examination of the above enables tax authorities in a country to improve on its current tax system. For example, many countries in the developed world have moved away from using the manual system to using a technologically enhanced electronic tax system as a move to remove the inefficiencies associated with the cumbersome manual system.

1.1 Limitations in past studies

Owing to the benefits associated with e-filing, some of the developing countries followed the evolution in the tax system in the developed countries in order to enhance their tax collection as well as a way of improving tax compliance amongst taxpayers. Despite, the adoption of e-filing in some of the developing and emerging countries, scholars have noted evidence of transformational effects of electronic government services in general, and of electronic tax services and functions in particular on performance. Relevant and probing studies have been done in an attempt to gauge the impact of e-filing. For example, Chatfield (2009) conducted a study in Japan in 2009 to examine if the Japanese National Tax Authority (NTA)'s e-tax initiatives had made any difference in tax administration and compliance. Chatfield (2009)'s research for the period five years after NTA's implementation of an e-tax initiative in 2004 observed that the e-tax system reduces the tax administration burden and increases compliance. However, Chatfield (2009) cautioned about the conclusions that could be drawn on the ability the e-tax system to enhance or encourage tax compliance from the Japanese context.

Another important limitation observed in prior literature is that e-filing in many Sub Saharan African countries remain largely underdeveloped and/or underutilised. Owing to the sparse research in this field in Sub Saharan region, Okello (2014) argues that e-filing remains an important aspect for developmental and research interest purposes. For example, an increase

in the tax revenue collection and compliance is deemed to improve the government's ability to deliver socio-economic benefits and services to its citizens as its expenditure hinges upon the tax revenue base. However, the argument is on whether the switch to e-filing actually increases the tax revenue collection and compliance, and if so, what factors are associated with the adoption and success of e-filing?. This is an area which needs investigation because the change in policy is always intended to improve the current situation or else it will be pointless to switch if the switch is not conferring better results than the status quo.

Following a few other developing countries that switched to e-filing, South Africa switched to e-filing for personal income taxpayers in 2006 (SARS, 2006). Since then there is no research that this current study could come across that attempted to evaluate whether the switching to e-filing in South Africa has actually improved the tax revenue collection in the country as whole, or a study that examined the association between tax revenue growth and personal taxpayers e-filing adoption based on demographic and socio-economic factors such as gender, age or income levels. Neither is there a study also that attempted to examine whether the switch has improved compliance based on those who have been assessed for tax compliance purposes based on the demographic and socio-economic factors mentioned above.

This study aims to conduct a quantitative examination of whether the implementation of e-filing increased personal income tax revenue collection and improved tax compliance, and whether the increase in personal income tax and compliance could be traced to demographic and socioeconomic factors.

1.2 Limitations of study

The following are limitations within which this study was conducted:

- E-filing is a relatively new phenomenon, so time series statistical studies that require data recorded over a long period face particular challenges. SARS and SAIRR data still remain authoritative and reliable.
- The tax gap is, by definition, only an estimation of the difference between the actual collected tax revenues and revenues one would expect given national economic reality.
- The study focus is on personal income tax (PIT), not other tax types like company income tax (CIT), value added tax (VAT) and customs.
- The primary source of data is that which is made publicly available by SARS, National Treasury, Statistics South Africa (SSA) and South African Reserve Bank (SARB) as part

of their annual reporting schedule, and is for the period between 2000 and 2014/15, and are compiled by the South African Institute of Race Relations (SAIRR).

- Availability and usability of comparable, relevant economic and public finances data over a long period are complicated by existence of separate (racial and Bantustan/homeland) political administrations in South Africa prior to 1994.
- For reasons of confidentiality, ethics and internal organisational and operational considerations within SARS, some detailed data which could enhance the study could not be made available.
- Comparable studies, particularly in the context of the developing world and Africa, are limited.

1.3 Motivation of the study

The South Africa Revenue Services (2015) report shows that the uptake of personal income tax e-filing in South Africa increased from 3% in 2006 to 99% in 2014. Furthermore, in April 2016 the South African Minister of Finance announced a historic more than R1 trillion rand revenue collection by SARS for the 2015-16 fiscal year, with Personal Income Tax (PIT) making a R389.3 billion contribution, which represented a 10% increase from the 2014-15 fiscal year (SARS, 2016a). This achievement was attributed to improvement in administrative and collection systems over years, which e-filing is part of (SARS, 2016a). The revenues collected during this period represented a ratio of 26.2% tax to GDP, which is the highest ratio since 2010 (SARS, 2016b). Tax to GDP ratio is an important economic indicator used internationally by institutions such as the International Monetary Fund (IMF), the World Bank and the Organisation for Economic Co-operation and Development (OECD) to analyse the tax systems and economic performance for comparative analysis between countries (National Treasury and South African Revenue Service, 2015). E-filing is thought to have contributed to the development of this ratio over the years. Owing to role that that the e-filing tax systems played as explained above, an investigation of factors that affect uptake and success of e-filing for personal income-taxpayers is opportune, warrants a study that examines how the swift to an automated tax system has had on tax revenue collection. The study could also be used as a basis to stimulate further research in e-government services in general and e-government tax services in particular in developing countries where research of this nature is sparse. The choice of South Africa as the location of the study is plausible in that the South African government implemented various initiatives over the years to improve tax compliance as a measure to

reduce the tax gap by improving tax payer experience with SARS. Furthermore, there is limited quantitative research on e-filing in both developed and developing countries that examines the determinants of e-filing, tax compliance and tax revenue growth separately or combined in one study. An examination of the determinants of e-filing, tax compliance and revenue growth is critical in future developments on tax policy for government and other stakeholders especially in developing countries when tax revenue is considered as the engine of government's welfare expenditure.

1.4 Contribution to knowledge

This study seeks to make a contribution to the general body of taxation knowledge, personal tax payer compliance, and utilisation of electronic technology in the South African context because of the significant role of and interaction between tax revenue collections, public sector technology utilisation, economic development and social stability and progress. It also adds to the body of knowledge of technology and innovation in the tax administration field. Furthermore, the study contributes to the small but growing literature concerning e-government programs, public sector utilisation and adoption of modern technology and its success, especially from a developing country perspective where research of this nature is sparse. It also adds to the limited amount of work conducted through surveys in other developing and comparable countries in Africa such as Kenya, India and Malaysia which implemented e-filing about the same time as South Africa. A review of literature on the impact of a switch from a manual tax system to an automated tax filling systems shows that most of the studies used the qualitative method to assess the impact of this switch. For example, there is a reasonable number of researchers who conducted qualitative research on the South African's demographic and ethnic groups' attitude and perception on tax evasion and related matters based on psychological and sociological theories (see for example, Oberholzer, 2007, Chait, 1993, Coetzee, 1993). Whilst these studies addressed a demographic variable (race/ethnicity), e-filing technology was not part of their scope. Furthermore, there is lack of studies that empirically tested how the uptake of the automated tax collection system has had on tax revenue growth, tax compliance and in closing the tax gap

Therefore, this study seeks to use the quantitative approach with the aim of providing tax authorities and policy makers with evidence of the potential contribution the electronic filing tax system has had on the reduction of tax gap through improved tax compliance by personal income taxpayers in South Africa. The use of a quantitative approach is also valuable in that it provides empirical evidence on whether the automated tax system has tax revenue collection

enhancing capabilities. Further, a quantitative approach is also likely to provide some insights into the determinants of e-filing after controlling for gender, income group and residential location of taxpayers. In addition, the shift in the assessment of the impact of a switch in tax administration using quantitative methods will also provide researchers with insights into how automation of the tax system impacts revenue growth, compliance as well as providing them with opportunities for future research in this field.

1.5 Problem statement

Economists, tax authorities, researchers and practitioners seem to agree that there is a significant tax gap problem in many jurisdictions, and particularly in developing countries. In South Africa it is estimated that between 15% and 30% of revenue is lost to the fiscus due to this phenomenon (Steyn, 2014). Non-compliance has negative influence on tax equity and tax efficiency. Matsuka (2006) notes that tax compliance analysis studies have tended to focus on direct anti-noncompliance measures like audits and penalties, hence, there is little or no research on measures not necessarily intended to primarily counter non-compliance, like e-filing. This study seeks to contribute to addressing of this void.

The South African Revenue Service (SARS) has implemented various initiatives over the years to improve tax compliance as a measure to reduce the tax gap by improving tax payer experience with SARS (South African Revenue Service, 2015). In 2006 electronic filing (e-filing) of returns for personal income taxpayers (PIT) was introduced, but no known studies on compliance and e-filing have been done, though SARS has records of e-filing uptake and personal income tax revenue collection for the period before and after e-filing introduction. E-filing is generally regarded as one of South Africa's premier e-governance initiatives. It is not known empirically whether e-filing has contributed to enhancing personal income tax compliance and increase of tax revenue. Whilst growth of personal income tax e-filing over the years since its inception has been noted and acknowledged, analysis of factors which could have contributed to this growth and their relationship with tax revenue growth has not been done. As a result, this study investigates demographic, socioeconomic and geographic factors' association with personal e-filing growth in South Africa.

1.6 Objectives of the study

This study aims to make a contribution to the body of knowledge concerning tax compliance, tax gap reduction and utilisation of electronic filing to improve tax revenue collection in South Africa as a developing country. As such, the main objectives are to understand the contribution and impact of electronic filing on income tax revenue collection, and specifically aim to:

- Determine the relationship between personal e-filing growth and some demographic, socio-economic and geographic factors in South Africa.
- Determine the relationship between personal income tax e-filing and personal income tax revenue.
- Determine the relationship between personal income tax e-filing and tax compliance.

1.7 Research questions

The study is designed to seek answers to the following questions:

- Is there a relationship between personal income tax e-filing and some socioeconomic (Income levels, Standard of living), demographic (Age, gender) and geographical (Metropolitan/Rural) factors?
- Is there a relationship between personal income tax e-filing and personal income tax revenue collection?
- Is there a relationship between personal income tax e-filing and personal income tax compliance?

1.8 Organisation of the study

This research is organised into seven main sections. Section 2 provides a background to the South African tax system. Sections 3 presents the principles for an effective tax system. Section 4 provides a review of related literature. Section 5 presents the methodology adopted for this current study. Thereafter, section 6 presents an analysis of results whilst section 7 provides a conclusion and recommendations for future research.

2. BACKGROUND TO THE SOUTH AFRICAN TAX SYSTEM

Tax policy, administration, design and implementation of effective tax system in developing countries deserve particularly utmost interest as governments seek macroeconomic stabilisation, and resources to finance basic public expenditure and promote socio-economic development (Arndt, Jones, Tarp, & Dunem, 2009). Similar to other low-middle income countries, South Africa's tax policy and administration are informed by its idiosyncrasies, history, technological, economical structure and social complexities such that the actual practised system may depart from or seem disconnected from that espoused in traditional taxation theories. (Arndt et al., 2009).

South Africa has a residence-based tax system, where residents, subject to certain exclusions, are taxed on their worldwide income irrespective of where such income was earned. Non-residents are taxed only on their income from a South African source and are subject to international treaties such as Double Taxations Agreements (DTAs). Foreign taxes are credited against South African tax payable on foreign income (National Treasury and South African Revenue Service, 2015). According to the National Treasury and South African Revenue Service, (2015) report, the South African Revenue Service Act (No. 34 of 1997) mandates SARS to:

- Collect all revenue due to the fiscus.
- Ensure maximum compliance with tax and customs legislation, and
- Provide a customs service that maximises revenue collections, protects South African borders and facilitate trade with the rest of the world.

Although SARS is an organ of state within the public administration, it is an institution outside the public service, and is responsible for the collection of tax and customs revenue for national government. Its mandate is derived from the SARS Act of 1997 and the 22 pieces of legislation which SARS administers (SARS, 2009).

In South Africa, the taxes levy was established in 1894 in terms of the Glen Grey Act (imposed by imperialist Cecil John Rhodes) and it was levied on all African men who did not enter the mines on a three-month contract. To augment the labour tax, poll and hut taxes were also imposed on the African rural population, thus increasing the incentive to earn cash on the mines (van der Berg & Bhorat, 1999).

The Income Tax Act 28 of 1914 was the first South African Income Tax Act to be implemented. The current Income Tax Act 58 of 1962 came into operation on 1 July 1962. Amendments were

introduced in the annual amendment acts: “pay-as-you-earn” in 1963; the “final deduction” system in 1983; the taxation of close corporations and fringe benefits in 1984 and the Standard Income Tax on Employees (SITE) in 1988 (Oberholzer, 2007). The current personal income tax rates vary progressively from 18% to 41% depending on income brackets, and company income tax rate is 28% (South African Revenue Service & National Treasury, 2015). The tax rates are announced annually by the Minister of Finance in the budget speech at the beginning of the financial year in parliament. Other various forms of taxes were introduced afterwards and each one of them is discussed separately below.

In addition to the income tax act, the estate Duty Act came into operation on 1 April 1955. The estate duty was initially set at 25% but it was later decreased to 20% with effect from 1 October 2001. The Master of the high court had the power to administer all estates except for African intestate estates, which had to be administered by a magistrate. However, this was successfully challenged by Judge Moseneke in 2001 as being unconstitutional. This challenge led to a subsequent change in legislation and the same measures for beneficiaries of an intestate estate now apply to all population groups in South Africa. (Oberholzer, 2007)

Thereafter, the General Sales Tax (GST) was introduced in 1978 at an initial rate of 4%, which was also subsequently increased to 13%. The GST was later replaced by the Value Added Tax (VAT) in September 1991. VAT was initially levied at 10% which was later increased to 14% on 7 April 1993 (Stack, Cronje, & Hamel, 2000). VAT is a regressive type of tax levied uniformly across all income groups, and it is taxed indirectly on the consumption of goods and services in the economy. However, there is a limited number of goods and services that are exempted from VAT (South African Revenue Service, 2016b).

There is also the Capital Gains Tax (CGT) which was introduced on 1 October 2001. In terms of the Eighth Schedule of the Income Tax Act of 1962, a capital gain arises when an asset is disposed of for more than its base cost. A portion of the gain is added to the taxpayer's taxable income and is subject to income tax (section 26A of the Income Tax Act). CGT applies to individuals, trusts and companies. Although the CGT applies to individuals, trusts and companies, some persons are fully or partially exempt from CGT (South African Revenue Service, 2016a). Some commentators who have been very critical of CGT questioned the value it adds to the country in improving or encouraging compliance and about what contribution it confers to the socio-economic development. For example, Marcus (2007) argues that introduction of CGT (viewed as a "wealth tax" by the South African government) may be considered to be a measure that runs contrary to the goal and principle of income equality, and

that international research indicates that it has adverse effects on poorer demographics as much as richer ones.

There is also the Dividends Tax, which is a tax on shareholders or any beneficial owners of dividends, when they receive dividend distributions from companies. The dividend tax was levied at 15%. However, DT was later replaced by the Secondary Tax on Companies (STC) effective from 1 April 2012. The STC was set at 10% instead of the 15% that was levied based on the DT (South African Revenue Service & National Treasury, 2015).

Lastly, there are Property Taxes and domestic taxes on goods and services. Property taxes comprise of Donations tax, Estate duty, Securities Transfer Tax (STT) and Transfer duties while domestic taxes on goods and services comprise of VAT, Specific excise duties, Ad valorem excise duties, Fuel levy, Universal Services Fund levy, and Turnover tax on micro businesses and various environmental taxes.

Below is a graph that shows the relative composition of the main sources of tax revenue in South Africa for periods 2010/11 - 2014/15, where PIT = Personal Income Tax, CIT = Company Income Tax and VAT = Value added Tax. As can be seen from the graph, PIT constitutes the highest (about 36%) of taxes collected. Therefore, the significance of PIT as a tax category over the period of study is evident.



Source:SARS(2016)

<http://www.sars.gov.za/AllDocs/Documents/Tax%20Stats/Tax%20stats%202015/Tax%20Stats%202015%20Highlights.pdf> .

The distribution in the picture has largely remained the same even for periods outside that specified above.

In order to facilitate an increase in tax revenue collection, there has been a couple of Tax Reform Measures that have been implemented in South Africa, with the aid of three commissions that were set up to consider and recommend tax revisions in the country. For instance, there has been the Margo commission of 1986, the Katz commission of 1995 and the most recent Davis Tax committee that was set up in 2015. However, this study will not provide detail of these reforms as they are not part of the focus for investigation, but instead, it provides an overview of e-filing and its intended purpose from the South African perspective, and this overview is discussed in the next section.

2.1 A brief overview of e-filing and its main purpose in the South Africa context

Personal E-filing in South Africa was introduced in 2006 as part of the initiative to improve customer experience with SARS, improve efficiency and increase taxpayer compliance (South African Revenue Service, 2015). The introduction of e-filing development was consistent with the e-government policy developed in 2001 and spearheaded by the State Information Technology Agency (SITA) as part of overall service delivery programme underpinned by *Bato Pele* (people first) values and principles (Naidoo, 2011). SARS's e-filing is hailed as one of the most successful and comprehensive e-government projects in South Africa and most of the developing world (Mpinganjira, 2011), although there are still many challenges that are associated with projects of this nature in developing countries (Mpinganjira, 2013). The primary objective of e-filing is to improve customer service experience, reduce tax gap, reduce costs for the taxpayer and authority, and increase tax compliance (South African Revenue Service, 2015). Besides SARS's best efforts to curb tax avoidance and evasion, these two problems still remain pervasive in the country (National Treasury & South African Revenue, 2014). Although the tax gap in South Africa has occasionally been attributed to ignorance, there is also evidence that shows that the tax gap is also generally attributed to aggressive tax planning by tax payers who seek to reduce tax liabilities and also to certain people who simply

do not want to pay tax- a finding which led Oberholzer, (2007) to argue that both tax evasion and avoidance are critical factors that reduce government tax receipts.

Regardless of problems discussed above coupled with the challenges in terms of inequalities, lack of relevant education and skills, variability in access to and adoption of technology among tax payers in developing countries, the benefits of e-filing to government including the South African government and society in general are numerous than otherwise. For instance, since e-filing is a process by which a tax payer fills in their tax documents and returns through internet with the help of computer software or by registering themselves to the income tax website (Kumar and Anees, 2014), some of the commonly discussed benefits of e-filing are:

- Convenience – Returns can be filed at any time, day or night.
- Fast refunds – It allows taxpayers receiving refunds to get them sooner.
- Taxpayers get instant acknowledgement of receipt.
- Value added services like tracking of refunds, email, SMS alerts regarding status of processing and refunds.
- Certainty of delivery and quick confirmation – provides immediate confirmation from tax administration that returns have been received,
- Taxpayers can correct their mistakes or make and save changes in system before the final submission of income tax return form.
- Eliminates or reduces error notices from tax administrations caused by data entry errors.
- Reduction in documents handling and storage space.
- Reduced operating costs for tax administration by reducing the cost of handling paper and eliminating unnecessary staff.
- Online help facilities and user-guides.
- System availability.

However, for any tax system to be effective and efficient, certain principles should be adhered to. The next section discusses some of the principles that should be followed if a country's tax system is to yield the desired outcomes.

2.2 Principles of an effective tax system

In designing tax policy to achieve government objectives, the public sector economics literature highlights the importance of the following principles as critical foundational elements of an effective tax regime, and e-filing or any technological intervention would be part of that system, hence the relevance of these principles for this study. Their restating and survey become necessary, (Gruber, 2012), (American Institute of Certified Public Accountants - Tax Division, 2001) and (Marcus, 2007):

2.2.1 Equity and fairness

The principle of equity is based on the premise that taxpayers should be taxed according to their ability to pay. Equitable taxes should be both horizontally equitable (i.e. taxpayers with the same means pay the same amount of tax) and vertically equitable (taxpayers in higher income brackets pay more than those in lower income brackets).

2.2.2 Certainty

Tax rules and legislation should be specific as to the determination of a taxpayer's liability for tax, as well as how and when the tax should be paid. This principle ensures timely and correct compliance with tax legislation and limits opportunities for taxpayers to manipulate tax laws to decrease or defer liabilities. A tax system can be characterised as certain where a taxpayer is able to accurately predict the timing and amount of their tax liability based on the nature of the transaction that they have undertaken. Tax legislation should therefore clearly categorise types of transactions, and should specify objective valuations for those transactions. Payment dates and methods should be clearly specified.

2.2.3 Convenience

The AICPA notes that a tax should be due at a time or in a manner that is most likely to be convenient for the taxpayer. The example given is that of an indirect sales tax such as VAT or general sales tax (GST), which is payable at the time that the good is purchased, or withholding taxes on investment or employment income (viz. the South African pay as-you-earn, or PAYE, employment tax system). The principle of convenience greatly increases the likelihood that taxes will be paid as it reduces the perception of tax payment as an administrative burden to the taxpayer.

2.2.4 Economy of payment and collection

An effective system of taxation should minimise the costs incurred by the parties involved. Taxpayers should incur low costs in order to comply with the tax, and government should incur low costs in collecting payments from those taxpayers. High collection and compliance costs reduce the overall effectiveness and efficiency of a tax system by increasing the complexity of the system for taxpayers, and reducing the overall revenue collected by government. The system must seek to maximise government revenues, with minimum distortion to the economy.

2.2.5 Simplicity

Tax law should be drafted and enacted as simply as possible, for both the taxpayers and the administering body. Authorities should continuously seek for opportunities that simplify the system. Mares (Marcus, 2007) stated that the lack of simplicity in a tax system negated many of the other principles described here, including the principles of convenience, certainty, and economy of collection.

2.2.6 Neutrality

The tax effect of a transaction or series of transactions should not unduly influence a taxpayer's intention to enter into those transactions. The concept of neutrality is equally applicable to the tax treatment of various types of transactions, for example the treatment of gains on the disposition of assets being classified as revenue (income) or capital in nature. Where items are treated differently for tax purposes, taxpayers will be incentivised to divert income streams into the category that is more favourable for tax purposes, thus distorting the economic reality or logic of transactions. The overall neutrality of a tax system can be adversely affected by a government's fiscal regulation strategies. In some cases, government may attempt to alter taxpayer behaviour by enhancing the positive or negative tax treatment of certain transactions. Whilst this is an acceptable approach, the balance between regulation and neutrality should be a priority.

2.2.7 Economic growth, efficiency and buoyancy

It is imperative that a country's fiscal policy and tax legislation be aligned with its overall economic strategies. Furthermore, the effect of tax policy on individual economic strategies also requires consideration; tax incentives which encourage foreign investment should not lead to bias against domestic firms, and tax provisions which encourage investment in capital assets should not lead to a decrease in labour utilisation. Emphasis should be placed on tax measures that affect taxpayer behaviour, domestic production, international competitiveness of exports

and overall economic growth. The system should raise sufficient revenues during all phases of the business cycle surviving knocks on the national economy and performing optimally even under difficult conditions. A stable, diversified tax base facilitate effective government budgeting process.

2.2.8 Transparency

The principle of transparency is linked to the goals of certainty, simplicity and neutrality. A transparent tax system allows taxpayers to know the amount and timing of their true tax liabilities. The concept of transparency also extends to government reporting in respect of public expenditure - taxpayers should know where tax revenues are being spent in order to encourage compliance and respect for the system.

2.3 Reduction or elimination of the tax gap

Mazur and Plumley (2007) of the United States Internal Revenue Service, define the tax gap as the difference between the amount of tax owed by taxpayers under the tax code and the amount that is actually paid to the federal treasury on time. The United Kingdom's Her Majesty Revenue and Customs (HMRC) define the tax gap as the difference between the tax that is paid and what the agency consider should be paid, and includes amount due in accordance with the spirit and the letter of the law, i.e. actual revenue collections versus the potential collections within the policy framework (International Monetary Fund, 2013). It is in the interest of, and within the mandate, vision and objectives of all tax administrations, including South African Revenue Service, to aim for reduction of the tax gap (International Monetary Fund, 2015). Tax gap problems are compounded by non-compliance with tax laws and/or underpayments. A tax system should therefore contain specific measures to minimise non-compliance and underpayments. Underpayments may occur unintentionally (due to complex legislation and a lack of understanding by taxpayers) or intentionally (via tax evasion, the understatement of income, overstatement of allowable deductions or omission of information). The aforementioned measures may be included in the taxing legislation (such as punitive sections for underpayments and anti-avoidance provisions, and incentives for proactive compliance), or ancillary thereto (such as government-provided taxpayer education and assistance facilities).

2.4 Tax compliance and tax administration

Havard Law School (2000) defines tax compliance as paying taxes on time and timely reporting of correct tax information, whilst Carroll (1987) asserts that tax compliance is the provision of tax information at the proper time and ensuring returns accurately report tax liability. Holtzman (2007) sees compliance as a reflection of the value and investment of the tax payer's own time and resources along with any out of pocket costs paid to outside tax-preparers and advisors.

The need to improve tax compliance through improvements in the effectiveness and efficiency of tax administration is of interest to tax practitioners, scholars, tax agencies and governments. Silvani (1992) makes a clear distinction between tax administration effectiveness and efficiency, and suggests administrative measures at various levels to improve overall tax compliance. Silvani (1992) further cautions and emphasises that whilst tax administration effectiveness is not the only determinant of voluntary compliance, it is likely to be a key factor in countries with suspected high non-compliance levels, and that an administration may be efficient with low tax collection costs but ineffective if it can't enforce compliance.

An effective tax administration must deal with the following shortfalls at all levels to improve overall compliance, and avoid shifting of noncompliance from one gap to another (Silvani, 1992):

- The gap between potential taxpayers and registered taxpayers.
- The difference between registered taxpayers and those who file returns.
- The difference between tax reported and declared by taxpayers and potential tax according to the law.
- The difference between what taxpayers report as owing or that authorities eventually assess, and the tax actually paid by taxpayers.

Development and implementation of adequate information and communication technology systems, of which e-filing is a part, to address the above shortfalls is critical.

Drawing on research done in Argentina and other developing countries of South America and Asia, Schlemenson (1992) argues that to achieve good tax compliance involves a variety of administrative factors like government & tax authority's image, its employees' credibility, and at the core of which are organisational culture, organisational structure and human resources. Simplicity and clarity are basic but key qualities, and these experiences are probably applicable to other developing country tax administration jurisdictions, including South Africa.

Several studies have found a relationship between audits conducted and compliance, even among taxpayers who end up not being necessarily audited, indicating critical role of audits as part of tax administration (Dublin & Wilde, 1988) and (Dubin, Graetz, & Wilde, 1990).

3. LITERATURE REVIEW

There is limited available academic literature that provides empirical evidence on the relationship between technology utilisation in personal tax filing and revenue collection in developing countries. According to Mansfield (1988) tax policy and administration in many countries tend to vary to a large degree, and the differences are more stark and evident in developing countries. At the core of public administration is the efficient and effective collection of dues from personal and corporate tax payers, but the problem is what drives tax revenue growth and compliance and whether automation is the answer to an effective and efficient tax system?

Developing countries in general have a narrow tax base, and evidence in prior studies show that personal income tax is a very difficult tax to collect (Mawia & Nzomoi, 2013). Failure to collect income tax effectively has serious economic consequences. Owing to the serious economic consequences that could be caused by a failure to raise adequate tax revenues, governments more often resort to embarking on major tax reforms to improve collections and compliance. Mawia and Nzomoi (2013) argued that the primary motivation for tax reform in developing countries is the desire to increasing tax revenues, maximise/optimize tax revenues from the reform process, and tax buoyancy being part of that system. In their study, Mawia and Nzomoi (2013) define a buoyant tax system as one in which revenues rise faster than GDP growth as income increases.

However, the IMF (International Monetary Fund, 2015) reported that a poor tax collection system results in a discrepancy between what is due to the state and what is actually collected, i.e. the tax gap. In the same report, the IMF (2015a) also noted that the effect of the tax gap is prevalent in both developed and developing countries.

In an endeavour to close the tax gap, improve capacity to provide government services, means of optimising government performance and increasing citizen satisfaction by utilising modern information and communication technologies have been identified by many governments around the world as part of their development agendas (Schuppan, 2009). The utilisation of information technologies in the filing systems of government agencies has become an integral part of those agencies' operating systems.

Ebrahim and Irani (2005) and Heeks (2006) define electronic government as not only the usage but also the adoption process of Information and Communications Technologies (ICTs) including internet-based technologies and network and communication infrastructure by

government agencies, with the aim of improving the informational and transactional exchanges between the government and stakeholders such as individuals, businesses and information technology suppliers. Moreover, technology also supports a variety of government needs ranging from government operations to improved interaction with stakeholders. Additionally, technology helps to reduce both regulatory burden and the cost of delivering governmental services (Garson, 2004; Brown, 2005). E-filing is developed and implemented within this broad strategic framework of delivering government services efficiently and cost-effectively.

However, various challenges have been noted in various qualitative studies. These challenges have been documented as impediments to the uptake of technological advancements in the tax system, especially in developing countries. For example, Van Rooyen and Van Jaarsveldt (2003) observed that there are certain challenges that governments would have to overcome for e-filing to succeed. In the context of South Africa, van Rooyen and van Jaarsveldt (2003) identified that the challenges that the South African government would have to address to make e-government endeavours a success would be poor political and management leadership, government bureaucracy, digital divide, resistance to change and lack of skills and knowledge by public servants and general public.

In an endeavour to manage the challenges, Rowley (2011)'s study places emphasises on the importance of comprehensive stakeholder assessment and management by government given that governments have a complex stakeholder set –up with multiple financial, political and social value dimensions. For example, South Africa, Malaysia, Kenya and India have diverse populations and profound politico-socio-economic challenges, and technological structures. As a result of this diversity, Rowley (2011) argued that a thorough analysis of stakeholder motives, needs and interests would maximise the possibility of achieving the desired value and impact.

Despite the challenges discussed above, the adoption of technological advancements in the tax system in many of the countries where it has or still happening have come as a result of global changes that filter into the global economics with the aim to improve efficiency and effectiveness in service delivery and also to remain competitive in the globalised world. For example, in India, as a result of being a member of the BRIC group of nations that included Brazil, Russia, China (Qobo & Soko, 2015) which are major emerging economies which had already adopted e-government as a tool for improving efficiency, had to automate its systems to remain competitive in the global economic village. In the same vein, evidence to the developments in South Africa show that the USA and UK which are major, economically and technologically advanced nations which are South Africa's key trading partners, have solid

experience in e-filing developed over decades (Verma, Dadhich, & Roy, 2015). The global developments among trading partners also add to a claim that developments in trading partners and other socio-economic changes and challenges the world over have had a role to play in the penetration of the e-government system in the global space.

At present, e-government services have become the norm and expectation in the modern, 21st century society. For example, the introduction of and improvements in technology in the tax administration system has been argued to improve compliance levels and to contribute towards reducing, though not eliminating the tax gap (International Monetary Fund, 2015). As such, the e-filing tax system is one of the e-government services that have been adopted by many developed and some developing countries over time. Malaysia, India and South Africa are some of the notable developing countries that adopted e-filing in the early 2000s (Azmi & Kamarulzaman, 2010).

Van Rooyen and Van Jaarsveldt (2003) wrote extensively about the implication of e-government as a package of public services; from health, transport, tax administration that a developing country such as South Africa can use to tackle developmental challenges. In their study, Van Rooyen and Van Jaarsveldt (2003) argued that the adoption of e-filing has been the trend of emerging economic superpowers over the centuries from Great Britain, Germany, Japan, United States of America to China and India today.

In search of evidence of customers experiences with e-government, Seng (2012) introduced the innovative design approach and concept of return on investment (ROI) vs return on relationship (ROR) to qualitatively measure customer satisfaction and experience with e-government services. The author argued that it is important to classify and categorise customers' experiences and satisfaction in order to be in a better position to respond appropriately and optimise positive impact, as in the case of earlier than expected receipt of tax refunds (Seng, 2012).

In a most recent study conducted in the United States of America, Apostolou *et al.*, (2016) examined the importance of trust and confidence that the e-user (taxpayer) has on the actual software behind the tax filing experience. They found that in the American context, users value and factor the extent to which the software can be trusted for reliability, security, confidentiality and fraud-proofness (Apostolou *et al.*, (2016), that is after considering quality of alternatives and cost-effectiveness of the software. After exploring theories associated with trust, commitment to and adoption of technologies from available alternatives, Apostolou *et al.*,

(2016) concluded that trust is critical, underlying the importance of well-considered choice of technology vendors by tax authorities.

Additionally, Shukla *et al.*,(2011) identified that political commitment, effective administrative leadership, effective handling of human resource issues, involvement of staff at design stage, innovative funding strategy and revenue model, appropriate administrative structure, common infrastructure and database creation, and training and motivation of personnel are some of the key factors necessary for successful e-government initiative.

There are studies that provide evidence that show that a switch from the manual tax system to an automated tax system (e-filing) improves tax revenues and compliance. For example, a study conducted in Tanzania by Chatama (2013) found that the Tanzanian Revenue Authority (TRA) statistics show that notwithstanding dynamics of trading and economic conditions, the introduction of e-filing and ICT led to improvements in performance by meeting or exceeding revenue targets and increasing revenue collection among large taxpayer segment from 2000/01 to 2008/9.

Furthermore, several studies conducted by various researchers in Kenya show that technological sophistication/savviness, ICT & electricity infrastructure development, income & education levels are the critical variables for e-filing adoption among taxpayers (see for example, Wasao, 2014 , Muturi, 2015, Muita, 2011). In India, the perceptions of risks involved and ease of use were found to be important among taxpayers (for example, Israel & Tiwari, 2011, Gupta, 2008). In Malaysia, several studies have shown that in addition to ease of use and economic factors, race and ethnicity were some of some of the critical variables to be considered (studies by Suki, 2010, Aziz, 2012b, Ramaya et al, 2008, Santhanamery & Ramayah, 2015).

In South Africa, Oberholzer (2005) conducted a study that sought to uncover and understand tax avoidance and attitudes towards tax and compliance from the point of view of perceptions of previously disadvantaged South Africans, i.e. black people being Africans, Coloureds and Indians. The findings from this study show that there is a pressing need for tax education among previously disadvantaged individuals in South Africa (Oberholzer, 2005).

As a follow up on Oberholzer (2005), Oberholzer's (2007) study explored several psychological and sociological theories to understand and uncover attitudes and perceptions of different South African race groups to taxation. This study surveyed several concepts and studies globally that looked at tax and associated demographics and sociological factors such

as gender, education, political system, perceived benefits, etc. and concluded that “there is no doubt that a large portion of the South African population harbour negative attitudes towards taxation due in part to the political injustice of the past” (Oberholzer, 2007, p. 32).

Still on South Africa, A study conducted by Coetzee (1993) requested a number of taxpayers to indicate their thoughts concerning the tax system in South Africa. Findings from this study show that the two main reasons why people dislike paying tax stem from, first, the fact that it is compulsory, and second, from the inability to immediately receive and appreciate the benefits of such tax.

On the other hand, Chait (1993) found that two-thirds of the respondents surveyed in his study did not regard taxes as an effective means of redistributing wealth and that most people are not willing to pay more taxes.

A study conducted by Yimaz & Coolidge, (2013) sampled small and medium sized businesses in South Africa, Nepal and Ukraine, and found that effects depend on the extent of e-filing implementation vs manual operation, business type and regional infrastructure development.

Malaysia is regarded as one of the early adopters of electronic government (1997) and e-filing of taxes (2006), after the United States of America (1993), then United Kingdom (1998), Canada (1999) and Singapore in 2000. The motivation behind the adoption of e-filing was based partly on the government’s vision and plan to be a fully economically developed nation by year 2020 (Aziz & Idris, 2012). Subsequently, massive investments were made in technology infrastructure and human resource developments, though Aziz and Idris (2012) note that returns on investments are low as the adoption of e-filing in particular has been low.

A study by Bee (2008) shows that taxpayers’ perceptions of risks, ease of use and trust have a strong influence on the adoption of e-filing in Malaysia.

Furthermore, a study by Islam, Yusuf, & Bhuiyan, (2015) shows that demographic factors such as, age and occupation, rather than race, gender and education have been found to be more significant with regards to adoption of and satisfaction with e-filing in Malaysia.

Another study conducted by (Santhanamery & Ramayah, 2015) on Malaysia examined the effect of individual demographic characteristics of age, gender, income, education and ethnicity, and the major personality traits of extraversion, conscientiousness, neuroticism, agreeableness and openness to experience and found that all these groups were eager to adopt and continue with e-filing.

Still in Malaysia, Chumsombat (2014) conducted a study based on small and medium enterprises and found that for small medium enterprises (SMEs), service quality and functionality of the system were more important in their assessment of e-filing experience.

However, recent studies indicate that tax compliance and reduction of the tax gap remain a serious challenge in Malaysia, as it is mainly in other developing countries. The problem is compounded by sophisticated tax avoidance schemes by high net worth individuals (HNWDs), and poor & inadequate strategies and systems of revenue collection (International Monetary Fund, 2015).

In Kenya, electronic filing was introduced in 2007, initially on a voluntary usage basis for all categories of income tax payers, through an online system called KRA Online. However, a new online system called iTax was introduced in 2013 and this system had improved qualities and features that made it simpler for taxpayers to e-file their tax returns and remit taxes as they fall due (Wasao, 2014).

After conducting a study to assess the usefulness of the Kenyan iTax system, Maisiba and Atambo (2016) found that although the Kenya Revenue Authority had an advanced, efficient and useful e-filing system with well trained and accessible staff, it was being inhibited by unreliable electricity supply and challenges of accessibility and internet connectivity for taxpayers.

On the other hand, Schuppan (2009) conducted a study based on several factors in Kenya and found that infrastructure, connectivity, socio-cultural (education, gender, ethnicity) were some of the challenges that Sub-Saharan Africa was facing. Furthermore, Schuppan (2009) observed that corruption was also amongst the other challenges that were inhibiting e-government development in Kenya..

In a separate study, Wafula *et al.*, (2015) found that most of the respondents in their study had an average knowledge of and positive experience of e-filing. In that study, Wafula et al (2015) examined demographics factors such as age, gender, education and income levels of their subjects, and found that all these factors were significant and important factors to be considered when examining the respondents' knowledge and experience with e-filing .

Furthermore, evidence in the study by Wasao (2014) show that e-filing has a positive relationship with tax compliance, as it encourages and incentivises taxpayers at most income levels to submit their returns.

In addition, Ali, Fjeldstad and Sjørusen (2014) found that taxpayers' attitude to complying with tax legislation is related to the perceived quality of public service that they get in Kenya, Tanzania, South Africa and Uganda. Given that taxes can be seen as forced buying and payment for services, these findings seemed to be consistent with expectations.

However, recent studies indicate that tax compliance and reduction of the tax gap remain a serious challenge in Kenya, as it is mainly in other developing countries (International Monetary Fund, 2015a). This challenge is compounded by sophisticated tax avoidance schemes, plus inadequate strategies and systems of revenue collection (International Monetary Fund, 2015).

In India, e-filing was first introduced in 2004 initially on a voluntary basis for all categories of taxpayers, but made mandatory for corporates in 2006 and in 2013 for individuals earning above 10 lakh Indian Rupees (Kumar & Anees, 2014).

In examining the effectiveness of e-filing in India, Israel and Tiwari (2011) found that the existence and acceptance of a sophisticated e-government system was hindered by the digital divide and issues of technology adoption as a result of security and privacy concerns and users' confidence in the system.

A study by Sekar's (2012) on e-filing adoption and satisfaction found that active users are generally happy and satisfied with the service, whereas there is a large number of potential users who need education about the use and benefits of using e-filing.

In a study conducted based on young Indian young professionals' attitude towards to e-filing, Ojha, Sahu and Gupta (2008) found that that the ease of use and perception of personal innovativeness were important factors in the use of e-filing services in India.

Although e-government has also been found to have a potential to reduce in the reduction of corruption in India (Sheela & Sairam, 2014), Shukla et al (2011) noted that there were several e-government challenges that were specific to the Indian perspective. Some of these challenges were; (i) the general lack of Integrated Services: In this vein, Shukla et al (2011) reported that most of the e-Governance Services being offered by state or central governments were not integrated. They attributed this challenge to a general lack of communication between different departments of the state. So the information that resides with one department has no or very little meaning to some other department of Government.

(ii) The study also noted that there also a lamentable lack of Key Persons such that e-Governance projects lack key skilled persons, not only from technological aspect, but from other aspects as well, such as process and change management.

(iii) It was also observed that the biggest challenge was that of huge population which though generally being an asset to the country, a huge population with language differences due to diversity can cause formidable difficulties. Language differences meant that the government had to roll out e government in the local languages of the diverse groups, which was clearly a big task to achieve.

4. RESEARCH METHODOLOGY

4.1 Introduction

This section presents the methodology adopted for the study. It also provides an explanation of data, their sources and validity as well as the constraints imposed by data availability, accessibility and relevance.

Rajasekar et al (2006) define research methodology as the procedures, schemes and algorithms by which researchers go about their work of describing, explaining and predicting phenomena and that the method of collecting or gathering information could be quantitative and/or qualitative in nature.

4.2 Research design

This study adopts a quantitative research approach through the use of secondary data. According to Babbie (2010), quantitative research methods emphasise objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing (i.e. secondary) statistical data using computational techniques. It focuses on gathering numerical data and generalizing it across groups of people or to explain a particular phenomenon. Secondary data represents information that has been generated by another person/party, and collected for a purpose other than for the current research project but have relevance and utility for the current research (Leedy & Ormrod, 2013).

Babbie (2010) emphasises that quantitative research deals in numbers, logic and an objective stance; with the goal being to determine the relationship between independent and dependent

variables within a population using descriptive research designs which can only establish associations between variables rather than causality, which is established by experimental research designs. “The overarching aim of a quantitative research study is to classify features, count them, and construct statistical models in an attempt to explain what is observed”, (Babbie, 2010, P. 7).

Pippin *et al* (2014)’s study show that there are studies that found that there is a relationship between the utilisation of digital technology, adoption of electronic programmes like e-filing and the various demographic and economic factors. For example, the various demographic factors used in prior studies (see for example, Pippin *et al* 2014) include; proportion of non-white, the Hispanic, the Black and the Asian population (with all variables measured as a proportion of the whole population), population 20 and younger, population 65 and older (both variables as a proportion of total population), Gender (women as a proportion of the population) and the economic variables used were income measure, unemployment rate-to assess the effect of income per capita, education, attitude to risk and perceived benefits, etc.

Another example of variables that were used in prior studies are presented in the Matsuka (2006)’s study. Matsuka (2006) had variables categorised into preparation mode (whether practitioners/consultants services were used), economic, demographic and tax policy dimensions.

In line with prior studies, this study follows the approach adopted by Pippin *et al* (2014) and Matsuka (2006) in the choice of various independent variables. Thus, in addition to using a mix of a selected demographic and economic factors used by Pippin *et al* (2014) and Matsuka (2006), variables such as metropolitan/residential area, type of the user of e-filing and income brackets are considered as additional important variables for analysis. Pippin (2014) sought to investigate and understand how different population groups and regions adopt e-filing in the American context, whilst we are interested in how the above mentioned economic-regional-demographic groups have adopted e-filing in the South African context. For instance, the publicly available SARS reports are silent on racial classification of taxpayers, and therefore unlike Pippin’s 2014 American study, race group is not considered here. In Malaysia, Santhanamery and Ramayah (2015) included education and ethnicity and utilised psychological theories to understand and explain e-filing uptake and growth. Education was also found to be a critical factor in Kenya in Wafula *et al* (2015) study on knowledge about

and adoption of e-filing. Ethnicity and education statistics are also not published in SARS and SAIRR reports accessible to the public, hence they have not been factored in this study.

To further account for, and to emphasise socio-economic variables (such as employment, education in studies referred to above) and dimensions in this study, we incorporated the macro-economic variables of GDP Per Capita, Inflation (CPI) and Human Development Index (HDI) as control variables. The World Bank, United Nations and other domestic and multinational agencies use CPI, GDP Per Capita as living standard measure and HDI as a composite, index measure of a nation's advancements in education and health provision (United Nations, 2016).

In Taiwan, Hung *et al* (2006) relied on theories of behaviour and relationships among various factors to explain e-filing adoption and acceptance. In the United States, Apostolou *et al* (2016) found that taxpayers value commitment and trust in the system, including the robustness of the software used in e-filing. In India, Singh *et al* (2015) and Mohanty (2015) concluded that perceptions of commitment to excellence in the system and community greater good were important factors. Wirtz and Kutz (2016) found that in the German local government context, users' and citizens' preferences were critical acceptance factors.

Based on the above discussion and a consideration of the data available for consideration, this study uses the following categories as choices from which the independent variables are going to be selected for analysis: Age, Gender, Income level and Geographic Residence. Geographic Residence refers to Provinces, and whether the area is Urban/Metropolitan or Non-Urban/Non-Metropolitan within a Province. The four distinct income groups and levels deemed significant by SARS in its operations and reporting, are:

R70 000 to R250 000 per annum, R250 001 to R550 000 per annum and R550 001 plus, per annum.

Following the findings by earlier researchers such as; Lukwata (2011), Chatama (2013), Verma (2015), Bird (2008), Pippin (2014), Wafula (2015), (S. Pippin, Tosun, & Reno, 2008), (Kumar v, Kumar U, 2011) which show that technology and electronic tax filing system improve tax compliance, which subsequently improves and increases tax revenues, the selected independent variables are tested against e-filing growth as a dependent variable. SARS has published e-

filing growth rate records over the years which show growth from 3% in 2006 to 99% in 2014/15 (National Treasury and South African Revenue Service, 2015).

4.3 Research method applied: Ordinary Least Squares and Panel Data Analysis

Ordinary least squares (OLS) regression is the most widely used type of regression for predicting the value of one dependent variable from the value of one independent variable. When two or more independent variables are involved it is called the multiple regression (Gerald Keller, 2012). We use multiple regression analysis as a technique to predict or explain the relationship between the dependent variable and independent variables. Whilst it is a widely used scientific technique, OLS regression analysis merely explains the relationship between variables and does not make a cause and effect determination (Leacock, Warrican, & Rose, 2015). OLS multiple regression assumes that independent variables are measured at the interval or ratio level, and when nominal level measurement variables are used, the dummy variables indicate the presence (with a 1) or absence (with a 0) of that quality (Keller, 2012). Here, Age (1 for above 45) and Gender (1 for Female) were used to avoid the problem of multicollinearity. Multicollinearity problems arise when one or two independent variables are highly correlated to one another and are basically measuring the same phenomenon with little variance in the dependent variable being explained by the other independent variable (Leacock et al., 2015). As such, this study uses a multiple regression model as an appropriate model for analysing the potential relationship between selected dependent variables and the various independent variables in the context of the transition from a manual tax system to a digital system. Given the paucity of data, Panel analysis is introduced which according to Baltagi (2008) help to overcome data limitation whilst reducing collinearity among explanatory variables hence improving estimates efficiency. A nine SA province linear panel analysis can be represented in the following general form:

$$Y_{it} = \alpha + \beta X_{it} + \mu_{it} \quad (1)$$

where Y represent the dependent variables, X , the independent variables, μ denotes the error terms with i and t representing provinces and time.

Unit root test as recommended by (Pesaran, 2004) and (Pesaran, 2007) were found to be relevant and useful. To achieve the set objectives, the following pooled OLS regression model from equation (1) was implemented in STATA 13 Software. Having tested for stationarity of

data using unit root test, all variables were found to be stationary at levels, and pooled OLS a sufficient method of analysis.

$$efilling_{it} = \alpha + \beta_i \sum IG_{it} + \beta_i GEO_{it} + \beta_i GEN_{it} + \beta_i \sum MAECON_{it} + \mu_{it} \quad (2)$$

$$PITREV_{it} = \alpha + efilling_{it} + \beta_i \sum MAECON_{it} + \mu_{it} \quad (3)$$

$$PITREG_{it} = \alpha + efilling_{it} + \beta_i \sum MAECON_{it} + \mu_{it} \quad (4)$$

Where *PITREV*, *PITREG*, *IG*, *GEO*, *GEN*, and *MAECON* signify PIT revenue, PIT registration, income group, geographical location, gender and macroeconomic variables respectively. All variables were seriously tested and considered for multicollinearity, hence the exclusion of Gender (Male & Female) and Income Group from equations 3 and 4 because they exhibited issues of collinearity during analysis. Also, GDP Per Capita and Human Development Index (HDI), despite showing high correlation, proved during the test and analysis that they have no collinearity issues, and did not negatively affect the integrity of the analysis, hence their continued use and inclusion. Serial correlation tests showed that collinearity assumptions and rules are not violated, and regression analysis could be implemented and the regression could be run.

E-Filing Growth: This shows the percentage growth of personal tax filings submitted electronically yearly nationally.

The chosen independent variables are as follows:

Gender: States whether the taxpayer is male or female. Literature review reveals that in most studies from diverse jurisdictions across the globe, taxpayers' gender is a significant demographic characteristic related to the adoption of technology in general and e-filing in particular, and virtually all tax authorities, financial agencies and institutions factor this in their analysis and reports (Hung et al (2006), Santhanamery (2015), Wafula (2015), Chumsombat (2014), Pippin (2014), Haryani (2015), Razak (2013), Ozkan (2011), Carter (2011), Fu (2004), Israel (2011). Whilst both genders' measurements were considered, only male taxpayers' data were used to avoid multicollinearity, and males' data displayed more significance than females.

Age: Generally, age has been found to be a critical demographic characteristic related to e-filing technology adoption, and is associated with taxpayers' working lives and earnings. Different age groups are provided in SARS reports where it's shown that certain age groups earn disproportionately higher and contribute more tax revenues (National Treasury and South African Revenue Service, 2015). For this study, two age groups: Less than 45 and Equal to & greater than 45 were considered, and measurements for the equal to & above 45 were used.

Income Group: Taxpayers' income level is an important socio-economic characteristic and has critical relevance on e-filing adoption numbers because of the relative contributions different income earners make to the tax revenue. SARS tax brackets and thresholds of taxable income change over time, and for this study appropriate adjustments were made and the following Income Levels analysed: Income Group 1= R0 to R70 000, Income Group 2 = R70 001 to R250 000, Income Group 3 = R250 001 to R500 000, Income Group 4 = R500 001 Plus.

Geographic Area: This refers to the province and municipal area declared by the individual taxpayer in the returns, and it's an important socio-economic variable. Not dramatically unlike Pippin's study (2014) which referred to states and counties in the U.S, here we refer to South Africa's nine provinces and municipal areas, whose urban or rural nature varies mainly based on existence and density of metropolitan municipalities. The provinces have metro municipalities as follows: Eastern Cape (Buffalo City, Nelson Mandela Bay), Free State (Mangaung), Gauteng (Ekurhuleni, Johannesburg, Tshwane). KwaZulu-Natal (eThekweni) and Western Cape (Cape Town). The remaining five provinces have no metropolitan municipalities, and were therefore regarded as 100% non-metro, and only Metro measurements were used in the study.

We developed the following research hypothesis (with corresponding Null, H₀, below).

H₁: Taxpayers' gender, age, income group and geographical area are associated with personal income tax e-filing growth rate.

H₀: Taxpayers' gender, age, income group and geographical area are not associated with personal tax e-filing growth rate.

4.4 Data Sources, Frequency and Collection

This study uses secondary data compiled by the South African Institute of Race Relations (SAIRR) and published in its annual South African Survey Reports (South African Institute of Race Relations, 2016). The SAIRR uses the South African Revenue Service (SARS), Statistics South Africa (Stats SA), South African Reserve Bank (SARB), South African National Treasury (NT), International Monetary Fund (IMF) and World Bank (WB) as primary sources of data, and publish annual reports. The **SARS** is the nation's tax collecting authority established in terms of the South African Revenue Service Act 34 of 1997 as an autonomous agency responsible for administering the South African tax system and customs service. It derives its mandate from Sections 4(2), 32 and 195 of the constitution (South African Revenue Service, 2015).

The **SAIRR** is one of the leading providers of economic, social, and political review data trends in South Africa, and has been publishing S.A. Survey & Public Finance Reports since 1946, that are used by local and multinational corporates, governments, institutions and researchers (SAIRR, 2016).

The **SARB** is an independent and impartial institution mandated and protected by sections 223, 224 and 225 of the constitution of the Republic of South Africa and the South African Reserve Bank Act of 1989 (SARB, 2016). **Stats SA** is also constitutionally mandated and protected by relevant sections of the constitution and acts of parliament (Statistics South Africa, 2016).

The **SARS and SAIRR** annual publications are regarded as very credible, reliable, scientific and of highest standards. The following information sets, among others, are available, and were extracted:

- GDP growth annually and over the period of study.
- Total tax revenue collected.
- Revenue collected as a percentage of GDP (Tax to GDP ratio).
- Tax types (Personal Income Tax (PIT), Corporate Income Tax (CIT), etc.) as percentage of total tax revenue.
- Tax types (PIT, CIT, etc.) as percentage of GDP.
- Amount and percentage of corporate/company income tax (CIT) collected.
- Amount and percentage of personal income tax (PIT) collected.
- Number of registered personal income taxpayers nationally and by provinces. In analysis, registered taxpayers are used as an indication of compliance.

- Tax payment channels (manually at branch, bank or e-filing) used.
- Number and percentage of e-filing personal income taxpayers.
- Age Groups of Personal Income Taxpayers. Those above 45 years old were used in the analysis.
- Gender of Personal Income Taxpayers. Males were used for analysis as they were proved to be more significant than females during test runs.
- Taxpayers income levels, grouped as follows: (1: R0 to R70 000, 2: R70 001 to R250 000, 3: R250 001 to R500 000 and 4: R500 001 plus). Adjustments made based on yearly SARS reports.
- Personal Taxpayers and Revenues by South Africa's nine provinces, to understand geographical implications.
- Macroeconomic indicators of Inflation (Consumer Price Index, CPI), Human Development Index (HDI), and GDP Per Capita sourced from the World Bank and United Nations were used as control variables. These indicators are not part of regular SARS reports, but were found to improve the comprehensiveness and integrity of the study and analysis.
- Taxpayers and revenues by municipalities within provinces. A distinction is made between metro and non-metro municipalities. The provinces have metro municipalities as follows: Eastern Cape (Buffalo City, Nelson Mandela Bay), Free State (Mangaung), Gauteng (Ekurhuleni, Johannesburg, Tshwane). KwaZulu-Natal (eThekweni) and Western Cape (Cape Town). The remaining four provinces (Limpopo, North West, Northern Cape and Mpumalanga) have no metropolitan municipalities, and are therefore regarded as 100% non-metro, hence the use of only Metro areas.

Analysis is done for the following periods:

- 2000 to 2005, i.e. Period before e-filing implementation
- 2006 to 2015, i.e. Ten-year period after e-filing implementation

International experience with e-filing by other countries is explored. India, Kenya, Malaysia were chosen for various reasons related to their relevance and comparability to the South African situation.

5. RESEARCH FINDINGS AND ANALYSIS OF RESULTS

5.1 Introduction

The overall aim of this study as stated in Chapter 1 is to determine socioeconomic, demographic and geographical factors that impact the growth of e-filing as well as establish whether any relationship exists between PIT revenue and e-filing on the one hand, and PIT compliance and e-filing on the other hand. This is addressed with three objectives stated in the following hypotheses.

1. Demographic, socioeconomic and geographical factors have no impact on e-filing growth.
2. There is no relationship between improvement in PIT revenue and e-filing, and;
3. There is no relationship between growth in PIT compliance and e-filing.

To test these hypotheses, we run 3 pooled OLS models, results displayed in Table 5.5 with the data collected from SARS for the periods 2006 to 2015. The descriptions of the data are attempted in the next subsection while the rest of the section deal with interpretation and discussion of results.

5.2 Data description

Presented in Table 5.1 is the summary statistics of the data under consideration showing the mean, standard deviation providing some idea of the nature of data and their normality.

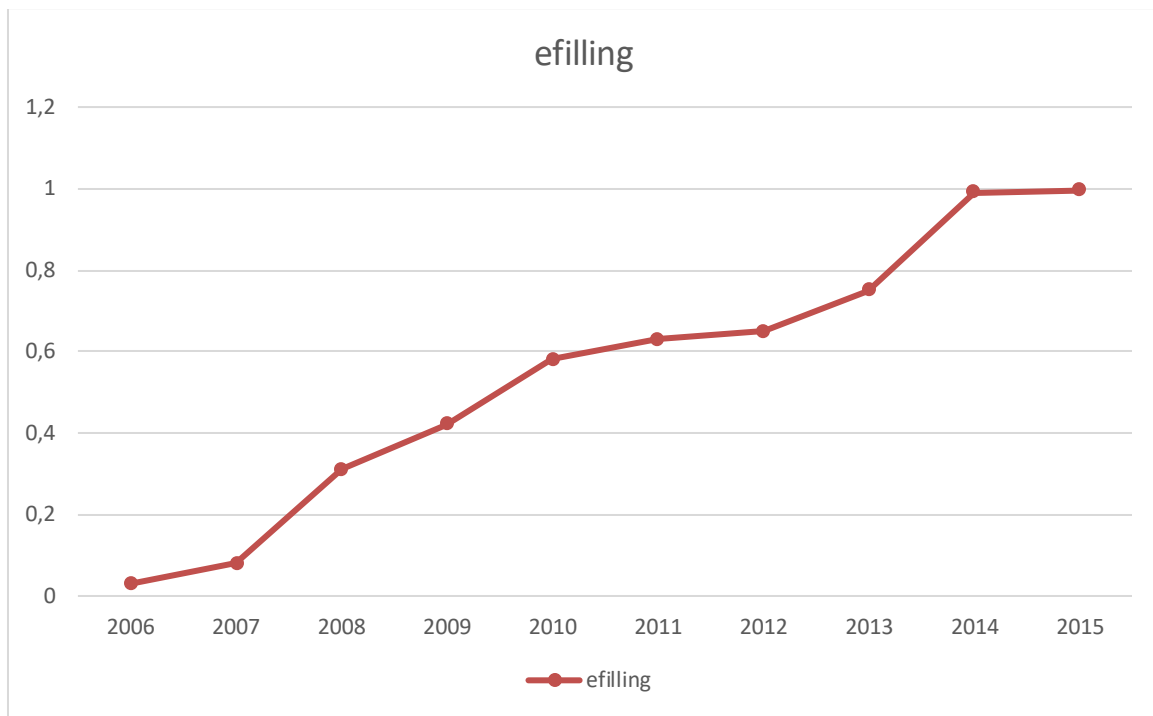
5.3 Summary Statistics

Table 5.1: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
Personal Income Tax Revenues	90	544250.7	502412	80789.27	2215805	1.806549	5.626227
Personal Income Tax Registrations	90	1092973	1252454	102954	6528608	2.5711	10.01558
E-filing	90	.5435	.3202654	.03	.995	-.1790084	1.965304
GDP Per Capita	90	56440.46	11030.03	38383.48	72619.66	-.066344	1.780514
Human Development Index (HDI)	90	.64585	.0165544	.619	.666	-.230625	1.588309
Consumer Price Index (CPI)	90	6.172674	2.04295	4.262343	11.53645	1.661353	5.029141
Males (Ma)	90	.3411111	.3343094	0	.89	.2421829	1.552173
Females (FI)	90	239470.3	221061.3	35547.28	974954.1	1.806549	5.626227
Age Above 45	90	.574	.0247141	.54	.61	-.0614372	1.563396
Income Group 1	89	.2162584	.0375716	.13	.274	-.6443267	3.422978
Income Group 2	89	.4373371	.174454	.24	.65	.1310627	1.179505
Income Group 3	89	.2767416	.1783425	.057	.47	-.0853886	1.149134
Income Group 4	89	.0698652	.0207645	.049	.118	.9943615	3.100849

Source: Author's Estimation

For all the variables under consideration, we noticed that the means fall mostly in the second quartile suggesting a relatively normally distributed data for the purpose of the regression analysis. This is supported by the results of the skewness and kurtosis. We however, found that for PITREV and PITREG, the means are closer to the maximum than the minimum with the standard deviations not significantly different from the mean, providing evidence to show a considerable increase in the variables during the study periods.



Source: SARS 2016

Figure 1: Efilling Growth

Figure 1 above shows the trend of e-filing with a steady increase from nearly zero at commencement in 2006 to almost 100% in 2015. We noticed a sharp increase between 2007 and 2010, slowed from 2010 to 2013 to rise sharply thereafter and flattened between 2014 and 2015. Furthermore, we compared five-year period (2001-2005) pre-e-filing and two five-year post-e-filing periods (2006/2010 and 2011/2015) using the absolute values in Figure 2 and the measures of central tendencies in figures 3 and 4, mean and median respectively.

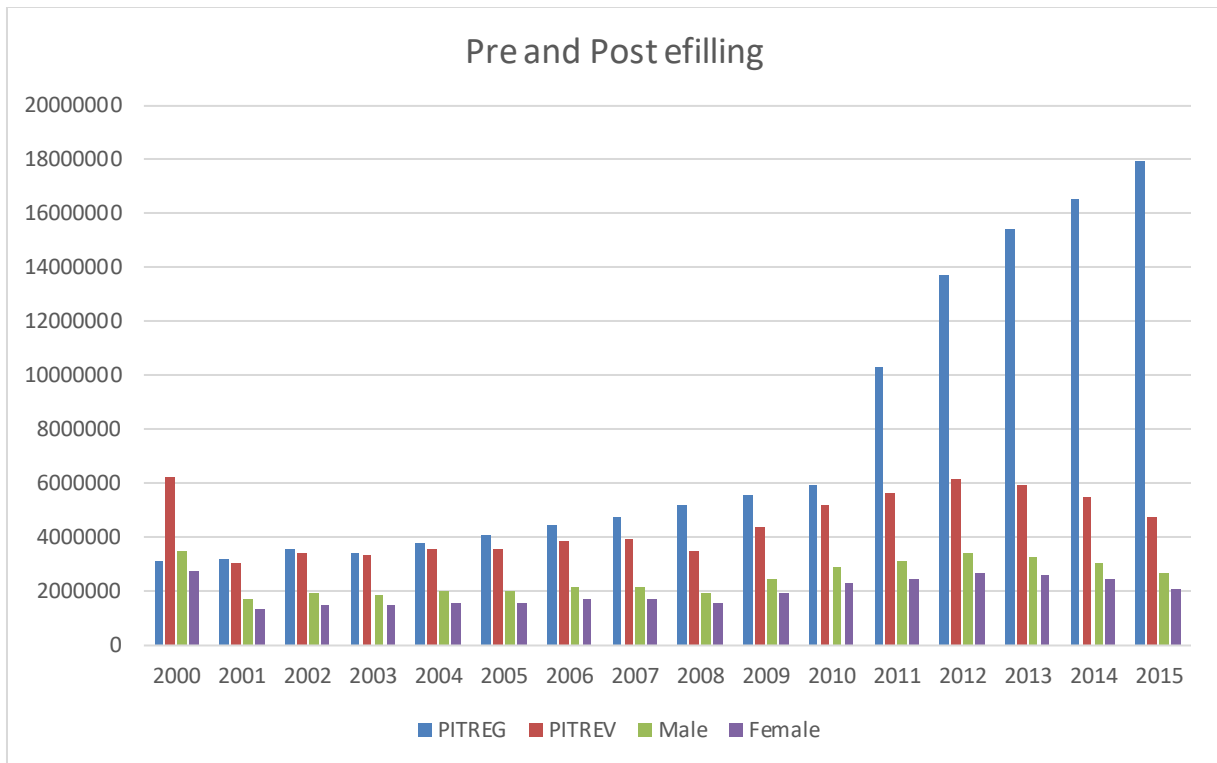


Figure 2: Pre- and Poste-filing Histogram. Source: SARS

For the absolute values in figure 2, we found some marginal differences between the PITREG values in 2001/2005 and 2006/2010 with the later period higher. But the difference becomes much more apparent comparing 2001/2005 to 2011/2015 as the latter period shows remarkably large increase in values. Whether these differences have largely been due to e-filing is another question entirely as the further investigation reveals that companies from 2010 made it mandatory for all employees to be registered for tax whether admissible or not. This no doubt may have impacted on the level of compliance translating to more registration. Again, the differences between the values of PITREV for 2001-05/2006-10 and 2001-05/2011-15 show increase in the post periods but with more increase in the latter. Although we noticed PITREV picked in 2012 and declined up till 2015. Gender compliance with PIT also follows the trend of PITREV with slight increase post implementation of e-filing, growing and then declining form 2012 up until 2015. This scenario is the case for both the male and female genders considered in this study (refer to fig 3 and 4 below).

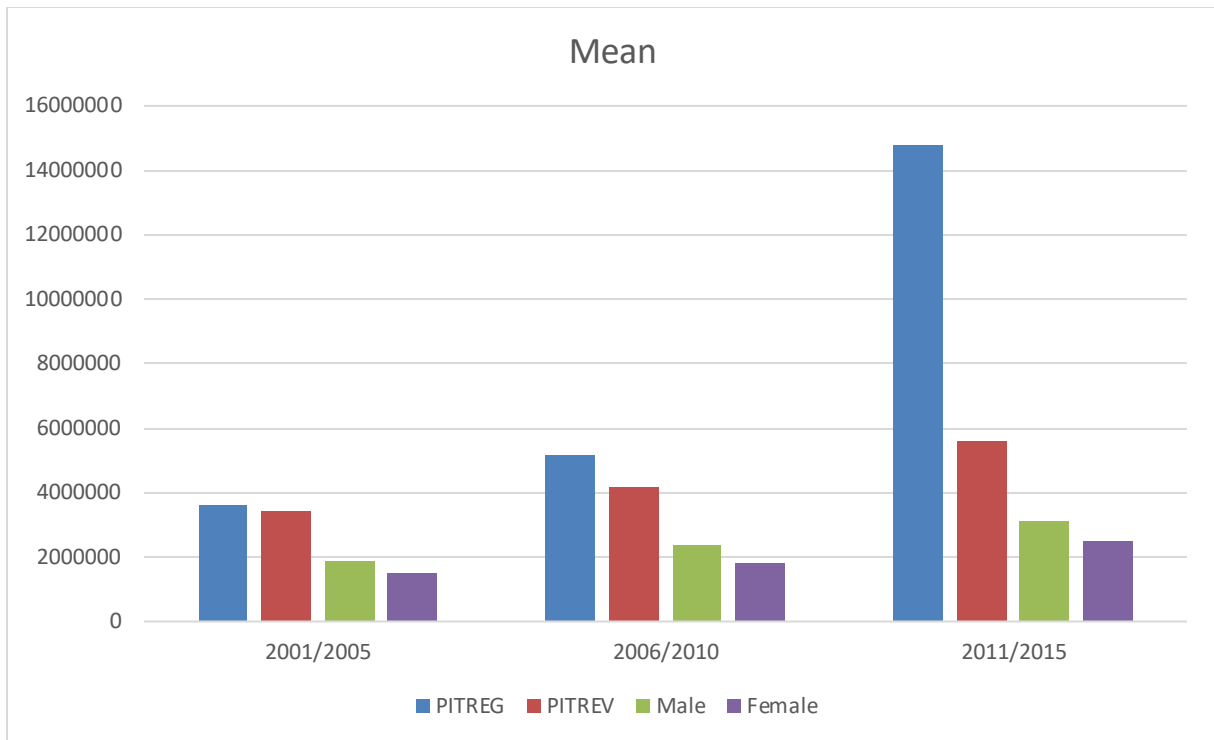


Figure 3: Pre- and Post-filing Mean . Source: SARS

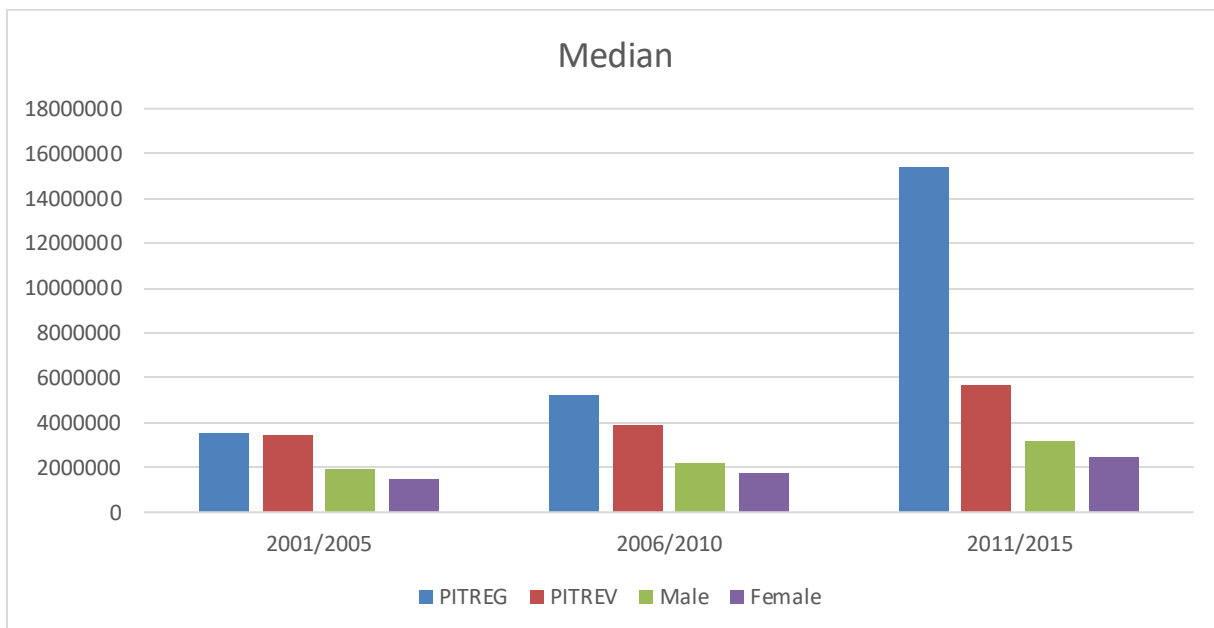


Figure 4: Pre- and Post-filing Median. Source: SARS

Therefore, measures of central tendencies in Figure 3 and 4 help to substantiate our findings on the absolute values as the trend are the same for both the mean and the median. The graphs

show more considerable impact on PITREG and then the others with better values post implementation of e-filing.

5.4 Analysis of Results

In this subsection, we attempt to test our research hypothesis using statistical analysis. The analysis of the data was done using Stata. To determine the nature of the regression we tested for unit root using Levin, Lin and Chu (LLC) statistics (Levin, Lin, & Chu, 2002) (as shown in appendix 1) and found stationary having differenced the data which does permit the use of OLS. The results of our estimation as presented in Table 5.5 and the correlation results for each of the models shown in Table 5.2 to 5.4 are discussed below.

5.5 Correlation Analysis

Given that three regression models are being implemented in this study to test hypotheses 1 – 3, we provide correlation analysis in Tables 5.2 – 5.4 for each of the regression models because of the different combinations of variables for each of the models. Table 5.2 presents the correlation matrix for the regression model 1. Model 1 tested the research hypothesis 2 that there is no significant relationship between e-filing and PIT compliance. The essence of the correlation analysis is to find out the degree of association among the variables necessary for the purpose of regression analysis. As a rule, there should be no correlation among the exogenous variables while the endogenous and the exogenous variables should be reasonably correlated. Correlation results lie between -1 and 1 with the extreme figures highly correlated and figures close to zero showing weak correlation, and 0 meaning no correlation.

Table 5.2: Model 1 Correlation Results

	PIT Registrations	E-Filing	Consumer Price Index (CPI)	Human Development Index (HDI)	GDP Per Capita
PIT Registrations	1.0000				
E-filing	-0.3791	1.0000			
Consumer Price Index (CPI)	0.1435	0.2395	1.0000		
Human Development Index (HDI)	0.2394	-0.1495	-0.2261	1.0000	
GDP Per Capita	0.1835	-0.1291	-0.2333	0.9897	1.0000

The signs interpretation is that a negative sign depicts an inverse association such that increase in a variable result in a decrease in the other variable. For positive sign, it is a direct relationship where the increase in one variable meaning an increase in the other. Note that the correlation of any variable with itself is 1 and does not count for the purpose of our analysis.

In Table 5.2 we found our variable of interest, e-filing to be weak and negative correlated to PITREG. This is against our expectation as we expect the growth in e-filing to translate to increase in compliance, however, the regression will help to establish this claim. Overall, we found a rather weak correlation among the variables except for GDPPC and HDI that have exhibited a very strong correlation. Also in Table 5.3 is the correlation matrix for model 2 which shows the degree of association among variables in testing our hypothesis 3.

Table 5.3: Model 2 Correlation Results

	PIT Revenues	E-filing	Consumer Price Index (CPI)	Human Development Index (HDI)	GDP Per Capita
PIT Revenues	1.0000				
E-filing	-0.3413	1.0000			
Consumer Price Index (CPI)	-0.5941	-0.3132	1.0000		
Human Development Index (HDI)	-0.3239	0.9538	-0.2261	1.0000	
GDP Per Capita	-0.3939	0.9790	-0.2333	0.9897	1.0000

The results in table 5.3 are similar to the ones shown in Table 5.2 with e-filing being negative and weakly correlated to PITREV. While this is contrary to our expectation, it is however consistent with the result of the first correlation analysis that found e-filing to be indirectly associated with PITREG. Finally, Table 5.4 presents the correlation for model 3 that looks at the association between variables that affect e-filing, which allows us to, test our hypothesis 1. Among the variables, metro area, MA, has the weakest and indirect association with e-filing at 0.02 followed by gender, FL at 0.12 and income group 1, IG1 at -0.16. The variables that show strong association with e-filing are human development index, HDI, at 0.95 and age group below 45, AB45, at 0.59, hence their exclusion from the final analysis. Going forward we look at various regression results on which our inference will be based, and their consistencies with the correlation results.

Table 5.4: Model 3 Correlation Results

	E-filing	Income Group 1	Income Group 2	Income Group 3	Income Group 4	Males (Ma)	Females (F)	Human Development Index (HDI)	Age Above 45
E-filing	1.0000								
Income Group 1	-0.1601	1.0000							
Income Group 2	0.3806	0.5925	1.0000						
Income Group 3	-0.3281	-0.6772	-0.9913	1.0000					
Income Group 4	0.2994	-0.5420	-0.0876	0.0993	1.0000				
Males (Ma)	-0.0208	0.0150	0.0011	-0.0025	-0.0169	1.0000			
Females (F)	0.1157	0.0435	0.1007	-0.0981	0.0060	0.8085	1.0000		
Human Development Index (HDI)	0.9535	-0.1473	0.4864	-0.4275	0.3414	-0.0160	0.1442	1.0000	
Age Above 45	0.5925	0.2556	0.6182	-0.6159	0.2275	0.0032	0.1755	0.7218	1.0000

5.6 Regression Analysis

The regression results are presented in Table 5.5. Model 3 addresses objective 1, model 2 for objective 2 and model 1 objective 3. Despite the few high degrees of correlation in a number of the independent variables, for instance GDPPC and HDI in Tables 5.2 and 5.3, we are able to implement our regression analysis as the result of serial correlation tests (shown in appendix 2) for the three models affirms the alternative hypothesis that collinearity assumption is not violated, which also explains why the regression could be run. The hypothesis tested in objective 1 is that there is no relationship between e-filing and socioeconomic, demography and geographical locations. For hindsight, we proxy income group, IG1 to IG4 and HDI for socioeconomic, male and female population group for gender, metro and non-metro areas for geographical location and above and below 45 for demography. To account for multicollinearity, one variable each of the gender, geographical location and demography has to be dropped and this we did based on the strength of correlation coefficient.

The result of model 3 provide evidence to show that all the proxies for social economic variables, IG1, IG2, IG3, IG4 and HDI are positive and strongly significant at 1% level of significance. Implying that income group is able to explain some of the growth in e-filing. This is consistent with our expectation as we expect the level of income to be related to level of education hence the attraction to the use of technology, and also consistent with previous studies by (Wafula et al., 2015), (Verma et al., 2015), (Lukwata, 2011) and (Bird & Zolt, 2008).

Table 5.5: OLS Models Results

VARIABLES	Obj3	Obj2	Obj1
	Model 1 pitreg	Model 2 pitrev	Model 3 efilling
ig1			64.21*** (13.47)
ig2			62.45*** (13.59)
ig3			62.91*** (13.60)
ig4			61.37*** (13.14)
ma			0.0118 (0.0359)
fl			-2.56e-08 (5.37e-08)
Hdi	25.54*** (7.066)	36.15*** (2.043)	25.41*** (0.925)
ab45			-2.494*** (0.489)
efilling	-0.703*** (0.186)	0.593*** (0.0816)	
cpi	0.0164*** (0.00602)	-0.0292*** (0.00162)	
gdppc	-1.998*** (0.610)	-4.447*** (0.272)	
Constant	5.563** (2.250)	24.96*** (1.804)	-14.41*** (0.484)
Observations	81	81	80
Prob. > F	0.0000	0.0000	0.0000
R-squared	0.350	0.934	0.959

Note: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Furthermore, we found age group below 45 AB45 to be strongly significant but negatively related to e-filing. Logically, one would expect the youthful population to be more technologically savvy and be readier to embrace such innovation. However, statistics show that this age group are not highly educated or skilled which again may account for this relationship. Evidence in a report by StatsSa (2015, p. 1) show that the challenges faced by the youth (ages 15 -34) in “finding employment is that as much as 55% of young people who are actively looking for jobs have education levels below matric while an additional 36.4% only have a matric qualification”. Furthermore, the report provides evidence that show that, “even among young people who are lucky to have a job, the level of education for many poses serious constraint to their position on the occupational ladder and also that of the relatively few employed young people, 21.1% have tertiary education. Therefore, there are large differences in the education profile by population group as well, for example, evidence in the StatsSa (2015, p. 1) show that for the period 2008-2015 “*there were only 13.1% of black Africa youth and 10.5% of coloured youth had skilled occupations while one in three Indian/Asian and 53.4% of white youth had such occupations*”. Therefore, this could be the reason why there is a negative correlation between this age group below 45 and e-filing. Finally, the results in model 3 show that both FL (Female) and MA (Metro Area) are not significant in explaining any relationship between gender and geographical location and e-filing. Therefore, it is appropriate to conclude that the socio-economic environment cum demography pose great implication for the success of e-filing.

For the second objective, represented by the results in model 2, our aim is to check if the growth in e-filing has got anything to do with the increase in the revenue from PIT over the period while we control for wellbeing and education, HDI, and macroeconomic variables, GDPPC and CPI. The results in Model 2 show that e-filing is statistically significant and positively related to PITREV at 1% significant level. Therefore, a 1% increase in e-filing will result in 0.59% increase in revenue. This is inconsistent with the correlation coefficient sign but align with our expectation as we expect increase in e-filing to result in increased revenue as it was the case after the e-filing period. We also found HDI to be strongly significant and positive to explain increase in PIT revenue at 1%. Although both CPI and GDP Per Capita are strongly significant at 1% significance level, they are negatively related to PITREV. This may be expected because in periods of high inflation, tax payers may find incentive to evade tax, while the impact of whether GDP Per Capita will increase tax will depend on which section

of the society is actually benefits from the high per capital income. We therefore conclude that e-filing contributes to increased revenue over the past periods in South Africa.

Finally, the results in Model 1, which answers question 3 on the compliance with PIT given e-filing, we found e-filing to be statistically significant but negatively related to PITREG. Although consistent with the correlation results, this finding is contrary to our expectations as we expect the growth in e-filing to result in more people complying with PIT registration as suggested by the data over the period. It is however not certain how much registration is associated with e-filing implementation as not all registered tax payer do so electronically. Besides, further investigation revealed that the significant increase in compliance from 2010 was due to policies by companies to register all employees for tax whether or not admissible to tax (SARS, 2011). Perhaps, this could be suggesting a forced compliance not necessarily compliance due to the convenience brought about by the e-filing process. Hence, we found no evidence to conclude that e-filing is responsible for the increased compliance during the periods under review besides being significantly related. We also found both macroeconomic variables highly significant at 1% significance level, with GDP Per Capita being negatively related to PITREG while CPI had a positive relationship with PITREG.

Overall, we are confident of the model fitness with F statistics probabilities highly significant and R-square that range from 0.350 (model 1), 0.93 (model 2) and 0.959 (model 3), hence showing that the greater level of variation in each of the regress in each model is explained by the regressors in the respective model.

6. INFERENCE AND POLICY IMPLICATIONS

The results of model 3 shows that it is socioeconomic variables that majorly explain the growth in e-filing, viz; wellbeing and education. While demography is significant, it is negative and require further investigation as to how this could be harnessed to improve the success of e-filing. Continuous education is required to sustain the positive impact of socio-economic variables with strengthened income and infrastructural development. As e-filing improves revenue as found in model 2, there will be need to strengthen the process and institutions that enhance HDI indicating better citizens' welfare. Inflation seemed to discourage PIT revenue increase, thus indicating a need for policy that prioritise sustainable price stability levels. Similarly, the results pose some implication for income distribution in the economy. Despite the expectation that as a high middle income country (as rated by the high GDP Per Capita), South Africa should be able to increase tax revenue, our study found an inverse relationship which led us to reasonably suspect that such income only reside in the hands of a relatively few members of the population. We found e-filing to be negatively related to PIT compliance, as previously expressed we are not pretty sure why this may be so for the study period. However, the possible explanation could be that it is because the government made it mandatory for companies to register all employees for tax, hence, making it an involuntary exercise. Furthermore, this also pauses a question regarding whether e-filing is that only factor that ensures compliance or whether there could be other factors in play that are also a function of compliance.. As a result of this finding further investigating should be conducted to examine or ascertain why this is the case, and this could also be an indication that there could be a need for policy reviews in this direction.

7. SUMMARY AND CONCLUSION

7.1 Introduction

This section presents a summary of this study and make suggestions for future research in this field.

7.2 Summary

This study set out to investigate the factors that are associated with the success of personal income tax e-filing in South Africa, looking at the pre-e-filing period (2000-2005) and post e-filing (2006-2015). Review of available literature pertaining to e-filing, e-government and tax administration technology in South Africa, Africa and rest of the world was conducted. The history and philosophy of the South African tax system were reviewed, together with development of e-filing/tax technology in India, Malaysia and Kenya. Taxpayers and revenue data were extracted from SARS and SAIRR annual publications available on-line, after the development of clear research objectives and questions. Panel data regression analyses were conducted using STATA 13 software. Pre and post e-filing implementation analysis was done. Discussion and conclusions were made based on regression outputs and results. Finally, recommendations for future research were made based on this study experience.

7.3 Conclusion

Overall, based on the evidence provided in analysis of results section, we conclude that, socioeconomic and demography majorly account for e-filing over the periods under study, that e-filing is related to both compliance and increase in PIT revenue and that macroeconomics variables of CPI and GDPPC are also related to PIT revenue and compliance.

8. RECOMMENDATIONS FOR FURTHER RESEARCH

The review of relevant literature during the course of this study and its contribution to the field revealed that there is general consensus among taxation academics, practitioners and authorities that there is a need for research in the following areas:

- Like similar studies in other parts of the world, South African researchers should broaden variables for consideration to include race and ethnicity in order for decision-makers to further appreciate the depth and the dynamics and respond appropriately.
- Comparison should be made of developments, progress and experience of e-filing and other tax related technologies among African countries for purpose of deepening and broadening knowledge and learning.
- Contrasts of e-filing and other tax technology developments' impact in the personal and corporate income tax environment, especially among the small medium and micro enterprises (SMMEs), which grow dramatically in South Africa and rest of the African continent.
- This study concerned itself only with personal income tax and it would be helpful to broaden it to include all other tax types like VAT, property tax, corporate tax, etc.
- E-filing is a relatively new phenomenon in South Africa and rest of the African continent, so empirical data are very limited. As its application expands over time and more data become available, more reliable and authoritative research should be done to interrogate and enrich earlier studies.
- Studies should be done that focus on a wider range of demographic groups like; young professionals, public servants, local/municipal government officials/politicians, postgraduate business-finance students, tax practitioners, etc.
- There is also a need for studies that focus exclusively on Provinces without metropolitan cities, i.e. Limpopo, North West, Northern Cape and Mpumalanga. This would help decision makers to better understand provincial economies from a tax technology admin perspective.

APPENDICES

1. Unit Root Test

LLC Unit Root Test Result

Variable	Statistics	P-value
Age Above 45	-2.3736	0.0088
Consumer Price Index (CPI)	-20.4164	0.0000
E-filing	-3.26623	0.0005
Income Group 1	-3.04175	0.0012
Income Group 2	-5.31904	0.0000
Income Group 3	-5.47555	0.0000
Income Group 4	-4.77385	0.0000
PIT Registrations	-3.26059	0.0006
PIT Revenues	-3.79301	0.0001
Human Development index (HDI)	-3.43933	0.0003
Females	-3.79299	0.0001
GDP Per Capita	-5.24642	0.0000

Source: Author's Estimation

2. Test of Serial Correlation

Models	Statistics	P-value
1	48.037	0.0001
2	4.664e+10	0.0000
3	94.229	0.0000

Source: Author's Estimation

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