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WIDER Working Paper 2020/49

Depreciation allowances in South Africa

Estian Calitz,[1] Eva Muwanga-Zake,[2] Alexius Sithole,[3] and Wynnona Steyn[4]

April 2020

United Nations University World Institute for Development Economics Research
wider.unu.edu

Abstract: Nowadays, tax depreciation allowances are used less as instruments of macroeconomic stabilization and more as long-term measures to stimulate investment. This paper tabulates the types of accelerated depreciation allowances in South Africa and calculates the magnitude of these benefits in addition to standard across-the-board accounting depreciation by companies. Using anonymized tax assessment data from the South African Revenue Service, the analysis generates the aggregate and sectoral composition of tax depreciation and tax investment allowances for 2014–17. An estimate is offered of the cost to the treasury of these tax expenditures, and of the reduction in the statutory corporate income tax rate should depreciation allowances be terminated.

Key words: tax depreciation allowances, tax investment allowances, tax expenditures, corporate income tax

JEL classification: H25, H32

Acknowledgements: The authors acknowledge with appreciation the support received from UNU-WIDER for the research conducted for this paper. They also thank Krige Siebrits of Stellenbosch University for his literature review and Alex O'Riordan of Stellenbosch University for his data analysis, as well as Nombulelo Ngcamu of the South African Revenue Service and Khanyisa Phika, formerly of the South African Revenue Service, for their contributions to earlier versions of the paper.

[1] Stellenbosch University, Stellenbosch, South Africa, corresponding author: calitz@sun.ac.za; [2] South African Revenue Service (SARS), Pretoria, South Africa; [3] SARS, Pretoria, South Africa; [4] SARS, Pretoria, South Africa

This study has been prepared within the UNU-WIDER project Southern Africa—Towards Inclusive Economic Development (SA-TIED).

Information and requests: publications@wider.unu.edu

ISSN 1798-7237 ISBN 978-92-9256-806-1

https://doi.org/10.35188/UNU-WIDER/2020/806-1

Typescript prepared by Merl Storr.

Katajanokanlaituri 6 B, 00160 Helsinki, Finland

1 Introduction

South African policy makers have long acknowledged the importance of higher levels of investment and accelerated rates of economic growth. The country's latest development framework, the National Development Plan, reiterates the salience of these imperatives by including 'faster economic growth, higher investment and greater labour absorption' in a list of six interlinked policy priorities for the period until 2030 (National Planning Commission 2012: 26). One of the targets of the plan is to raise total gross fixed capital formation to 30 per cent of gross domestic product (GDP) in 2030, of which one third should take the form of public-sector fixed investment (National Planning Commission 2012: 64). Corporate income tax (CIT) incentives count among the policy measures used by governments to boost investment and economic growth. This paper investigates the nature and value to companies of tax benefits from depreciation allowances in South Africa.

The paper provides three sets of perspectives on tax depreciation allowances in South Africa. Section 2 reviews theoretical and empirical writings on tax depreciation allowances and tax incentives in general. This section includes a review of existing studies on the nature and effectiveness of depreciation allowances and other tax incentives in South Africa. Section 3 contains an inventory of the types of tax depreciation allowances available in South Africa. Section 4 provides empirical perspectives on such allowances, first outlining the nature of the data set, and then providing estimates (derived from comparisons with firms' actual accounting depreciation) of the benefits of standard and accelerated tax depreciation allowances. This section also contains a brief word on the feasibility of panel data analysis. Section 5 concludes the paper by summarizing the main findings and presenting proposals.

2 Literature review

2.1 Conceptual, theoretical, and empirical issues

Tax incentives are provisions in tax codes that grant relatively favourable tax treatment to some sectors, industries, or activities (Klemm and Van Parys 2012: 393–94). As pointed out by Klemm (2010: 316) and Zee et al. (2002: 1498), this definition implies that across-the-board tax provisions—such as general reductions in statutory CIT rates and generous depreciation allowance schemes—are not tax incentives. Nonetheless, firms derive tax benefits from general tax rules that allow them to fully depreciate assets before their economic lifespans end. Tax holidays, preferential tax rates, investment allowances, investment tax credits, and accelerated depreciation allowances that satisfy the selectivity criterion are common examples of CIT-related incentives to stimulate investment (cf. Klemm 2010: 317).[1] Such concessions can raise rates of return on investment projects by reducing effective CIT rates, *ceteris paribus*. Hence, many empirical studies calculate the

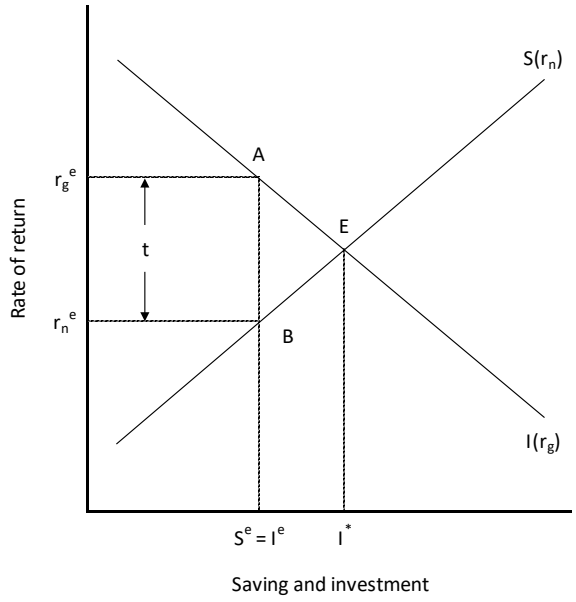
[1] Other tax incentives include import tariff and value-added tax exemptions for exporting firms (Zee et al. 2002: 1505–7). Firms located in export-processing and special economic zones are often exempt from other taxes as well.

effects of tax incentives on the marginal effective tax rates (METRs) of investment projects.[2] Zee et al. (2002: 1502–3) explain the calculation and interpretation of METRs[3] as follows:

> The effective tax burden on an investment project is […] the difference between its real pre-tax rate of return (p) and the real post-tax rate of return (s) to the investor of that project. For a marginal project (i.e., a project whose p is just enough to cover its cost of financing […]), this difference would represent the marginal effective tax burden, from which the METR could be computed as $(p - s) / p$. Hence, the greater an incentive's ability to lower the METR, the more effective it is for stimulating investment.

Figure 1, which is based on Chua's (1995: 162–64) modification of a conceptual framework suggested by Boadway (1987), illustrates the concept of METRs. The figure shows the market for a class of capital goods in which $I(r_g)$ depicts investment as a downward-sloping function of the pre-tax real rate of return r_g, while $S(r_n)$ depicts saving as a positive function of the after-tax real rate of return r_n. Given that a profit-maximizing firm would invest until the rate of return on investment just equalled the cost of borrowing, the equilibrium in a market without taxes would be at E, where saving and investment would both equal I^* and where r_g equals r_n.

Figure 1: METRs and capital market equilibrium



Source: Chua (1995: 162). Reproduced with permission.

The introduction of taxes may disturb this equilibrium in ways that give rise to allocative inefficiency. For example, if aspects of the corporate tax system raise the required pre-tax rate of return to r_g^e, the level of investment by firms at A (i.e. I^e) will be lower than the equilibrium level in the absence of taxes (I^*), *ceteris paribus*. A depreciation allowance system that does not align with economic depreciation is one of the factors that may cause such outcomes. In the same way,

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[2] King and Fullerton (1984) and Boadway (1987) suggested well-known approaches for studying METRs. Feldstein et al. (1983) was an influential early empirical study.

[3] Sørensen (2008) provides a more detailed overview of the estimation of METRs based on the King-Fullerton methodology.

aspects of the personal income tax system may reduce the after-tax return on saving to r_n^e, which will result in a level of savings below the equilibrium in the absence of taxes (I^*), *ceteris paribus*, namely at B (i.e. S^e).[4] Jointly, these aspects of the corporate and personal income tax systems create a wedge—depicted in Figure 1 by the distance t—between the pre-tax rate of return on investment r_g^e and the after-tax rate of return on saving r_n^e. The triangle ABE depicts the efficiency cost of the influence of these tax-related factors on investment. The METR is obtained by expressing the tax wedge t as a proportion of the pre-tax rate of return on investment r_g^e.

The ultimate aim of attempts to affect investment via tax incentives has changed over time. During the heyday of Keynesian fiscal activism (roughly speaking, the third quarter of the 20th century), many governments used tax incentives to influence private-sector investment for macroeconomic stabilization purposes (see e.g., Gramlich 1971: 516; Tobin 2001: 2). While this motive may not have disappeared entirely,[5] governments now mainly use tax concessions for investment promotion per se. The aims of such efforts are to attract domestic or foreign direct investment, and sometimes also to create employment, promote particular sectors and activities, and develop specific regions (Zee et al. 2002: 1499). As pointed out by Erdogan and Atakli (2012: 1185), some governments also use tax incentives to protect the balance of payments, defence and other strategic industries, and young industries.

CIT incentives are common in high-income and developing countries (see e.g., James 2013: 4).[6] Figure 2, which shows the prevalence of six types of tax incentives in samples of countries from each of the World Bank's four categories, confirms this. The figure also points to similarities and differences in the types of incentives favoured by the various country groups (see also Morisset and Pirnia 2000). Whereas special economic zones, free zones, export-processing zones, and free ports are relatively popular in developing and high-income countries, tax holidays are markedly more common among the three groups of developing countries than among high-income ones. By contrast, high-income countries rely more heavily on tax incentives intended to stimulate research and development than do developing countries.

The popularity of tax incentives belies the scope for achieving at least some of their aims more effectively by other means. Governments often introduce tax incentives to overcome three sets of hurdles to investment: tax-related constraints (e.g., relatively high CIT rates), non-tax-related economic constraints (e.g., inadequate communications systems and labour market rigidities), and non-economic constraints (e.g., corruption and regulatory uncertainty) (Zee et al. 2002: 1499–1500). Tax incentives can seldom compensate for poor investment climates; in fact, empirical studies suggest that their effectiveness is severely blunted when other barriers to investment exist. James (2009: 7), for example, simulated the effects of reductions in METRs from 40 per cent to 20 per cent in countries in the top and bottom halves of the World Bank's 'Doing Business' rankings for 2008. He found that the reduction in the tax burden increased foreign direct investment by eight per cent of GDP in the group of countries with better investment climates, compared with only one per cent of GDP in the group with poorer climates. Such findings imply that measures to overcome actual barriers to investment are likely to be more effective than compensatory tax incentives would be. Similarly, targeted government spending programmes are

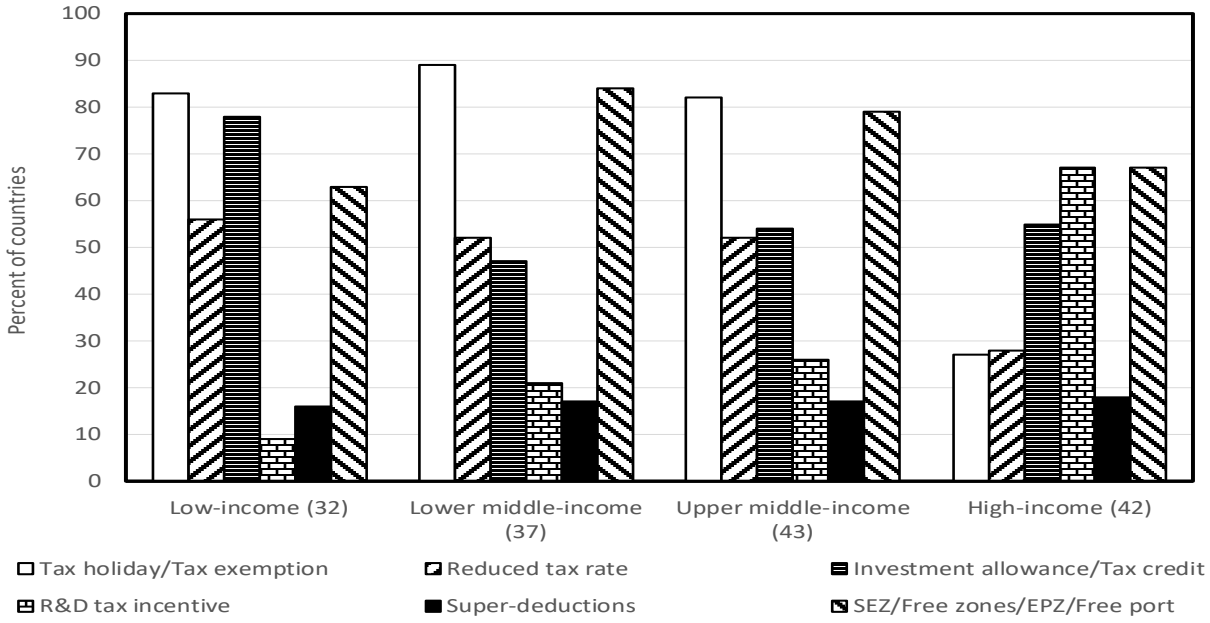
[4] A discussion of the tax-related determinants of saving falls outside the scope of this paper. However, such aspects of personal income tax systems also affect METRs and, by implication, investment decisions.

[5] The results of Petkova and Weichenrieder (2018) for a sample of 47 countries are consistent with the use of depreciation allowances for macroeconomic stabilization purposes from 1983 to 2016.

[6] A 'partial race to the bottom' (Ali Abbas et al. 2012: 3) in statutory and effective CIT rates caused by intensifying international competition has contributed to the popularity of tax concessions in developing countries.

likely to be more effective measures than tax incentives would be for pursuing redistributive and other social policy aims (Zee et al. 2002: 1500).

Figure 2: Tax incentives in countries grouped by income levels



Source: authors' calculations based on data from James (2013).

Reviews of studies of the effectiveness of tax incentives for investment have yielded mixed evidence (see e.g., Boadway and Shah 1995; Chen et al. 2018; Klemm and Van Parys 2012; Thomas 2007; Tuomi 2012; Zee et al. 2002). CIT incentives seldom pass muster when subjected to cost-benefit analysis, however, even when justified by sound economic considerations such as positive spillover effects. The questionable cost-effectiveness of tax incentives partly reflects identification problems such as the difficulty of isolating their effects from those of other determinants of investment (Klemm 2010: 334). Yet it is well established that such concessions are often redundant in the sense that firms receive them for investment projects they would have undertaken even in their absence (Zee et al. 2002: 1501). Furthermore, Zee et al. (2002: 1501–2) point out that tax incentives tend to be costly. Apart from direct administrative costs and foregone tax revenue, such incentives often distort the allocation of investment resources, and contribute to corruption and rent-seeking activities.

2.2 The nature and role of depreciation allowances

The cost of capital is one of the most important determinants of firms' capital investment decisions. Also defined as the cost of holding a unit of capital during a unit of time, the cost of capital represents the opportunity cost of the funds used in a business, that is, the minimum rate of return that the business must earn to make a capital investment worthwhile. The two core components of the cost of capital are capital consumption costs and finance costs. Capital consumption costs arise because wear and tear and obsolescence reduce the value of most capital assets used in firms. Accounting and corporate tax systems grant deductions from firms' revenues to allocate the costs of capital assets over periods of time. The best-known methods for determining the values of such depreciation allowances are the straight-line method (which

apportions the historical cost of an asset in equal amounts) and the declining balance method (which applies a fixed rate to the decreasing book value of an asset).[7]

The influence of depreciation allowances on investment decisions is affected strongly by the degree of alignment between the period during which an asset generates revenues (that is, the economic lifespan of that asset) and that during which the tax system allows a firm to depreciate its value to zero. If the deductions allowed by the tax rules are smaller than the economic depreciation, the tax system makes investments costlier and may contribute to inefficiency in the allocation of resources. Being less than warranted from an allocative efficiency point of view, such depreciation allowances amount to 'unwarranted' tax revenue. By contrast, if the tax rules allow firms to deduct depreciation faster than the economic depreciation of any particular asset, this constitutes a tax benefit and a loss to the treasury. The benefits of accelerated depreciation allowances could be universal or limited to particular sectors or activities. As was pointed out earlier, only the second of these two types of depreciation allowance systems constitutes a tax incentive.

Accelerated depreciation allowances have long featured in discussions and policy initiatives to stimulate investment,[8] and they remain prominent in writings on investment incentives (see e.g., Klemm 2010; Tuomi 2012). Goode (1955: 194–201) identified three channels by means of which systems of accelerated depreciation allowances may stimulate investment. The first is that earlier receipt of the tax benefits yields a time discount gain: the present value of a given amount of tax saving is higher under an accelerated depreciation allowance system than under one providing normal deductions.[9] Second, an accelerated depreciation allowance system makes investments feasible even when firm owners aim to protect themselves against longer-term risk and uncertainty by expecting assets to pay for themselves within periods markedly shorter than their normal economic lives. Third, such systems improve the cash flows of firms, which allows them to finance larger portions of their capital expenditures from internal funds and to raise outside capital more easily. The extent of the effects of such incentives on investment is likely to depend on a range of factors. Apart from risk, uncertainty, and the time discount assessments of investors, such factors include general business conditions, company tax rates, and firms' ability to absorb depreciation allowances (which is a function of their profitability and scope for offsetting accounting losses against future profits, *inter alia*) (cf. Goode 1955: 201–3).

From an economic point of view, accelerated depreciation allowances count among the more attractive tax incentives. For one thing, such allowances are less costly in terms of revenue foregone than are tax holidays (Morisset and Pirnia 2000: 14). Zee et al. (2002: 1504–5) pointed out that accelerated depreciation allowances are effective instruments for promoting particular types of investments that have transparent and relatively controllable revenue costs.[10] Furthermore, faster deduction of investment costs moves the CIT in the direction of a consumption tax, thus mitigating the investment-distorting character it shares with all income-based taxes (Zee et al. 2002: 1505).

There are two potential objections to accelerated depreciation allowances as tools to promote business investment. The first consists of arguments against all investment incentives: as was

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[7] Chua (1995: 137) lists several other methods.

[8] Dobrovolsky (1951: 906), for example, referred to the advocacy of accelerated depreciation allowances in the United States during the Great Depression in the 1930s.

[9] Goode (1955: 195) pointed out that this gain increases the rate of return on an investment, *ceteris paribus*, and that it is not dissimilar to a reduction in the cost of a capital asset.

[10] Revenue cost refers to the forfeited revenue due to the tax allowance. In the literature, this is also called tax expenditure.

pointed out earlier, such incentives have an uneven record, and may well be inferior to low corporate tax rates and general investor-friendly regulatory environments (Klemm 2010: 316, 317).[11] While not universally accepted, this argument questions the logic of relying on special incentives, which may have costs of their own, to counteract the investment-suppressing effects of poor regulatory environments and other distortive policies. The second objection does not flow from antagonism to investment incentives per se, but from the belief that other mechanisms are more efficacious instruments for stimulating investment than accelerated depreciation allowances are. For example, an argument of this nature might emphasize the administrative simplicity of tax holidays and their neutrality with regard to the relative factor intensities of investment projects (cf. Zee et al. 2002: 1503). To be sure, such arguments can be countered by highlighting the disadvantages of alternatives to depreciation allowances.[12]

All attempts to calculate METRs are data-intensive processes; furthermore, it is very difficult to isolate the effects of accelerated depreciation allowances on investment from those of other elements of tax incentive packages and economic conditions more generally (Zee et al. 2002: 1503). These factors explain the dearth of empirical analyses that focus specifically on accelerated depreciation allowances, especially for developing countries. Nonetheless, a number of studies have investigated the effects of the accelerated depreciation programme adopted in the United States after September 2001 (see e.g., House and Shapiro 2008; Hulse and Livingstone 2010). The results of these studies have varied. Wielhouwer and Wiersma (2017: 603–4) listed possible explanations for the limited success of such programmes, including the reality that they are often introduced in times when firms have low profits and lack the cash flows required to benefit from the incentives. Their own analysis for the Netherlands suggested that discretionary systems—which allow firms to accelerate or postpone depreciation—may be more effective than systems that only allow accelerated depreciation (Wielhouwer and Wiersma 2017). In a recent analysis of the bonus depreciation programme in eastern Germany, Eichfelder and Schneider (2018) found that the scheme significantly boosted large manufacturing firms' investment in structures, but not in equipment. It also had timing effects, in that investment shifted to years in which more generous depreciation allowances were available.

Chai and Goyal (2008) analysed the use of tax concessions in six member countries of the Eastern Caribbean Currency Union. In addition to estimating the tax revenue costs of the extant incentives (import-related tax exemptions and CIT holidays), they undertook simulations of the possible effects of alternative measures. These included a standard depreciation scheme within a tax holiday regime and an accelerated depreciation scheme with a loss carry-forward. Both cases assumed an initial investment of US$30 over a three-year period, a 30 per cent tax rate, and a 10 per cent discount rate. The accelerated depreciation scheme yielded higher net profits in present value terms.

2.3 South Africa

Recent general reviews of tax incentives to encourage investment (Amra and Ellse 2016; Calitz et al. 2013; Department of Planning, Monitoring, and Evaluation 2018) all highlight the considerable scope of such incentives in South Africa and the dearth of evidence regarding their effectiveness. The list of tax incentives in Calitz et al. (2013: 11–13, 17–19) includes accelerated depreciation schemes. The Department of Planning, Monitoring, and Evaluation (2018) distinguishes between

[11] This argument is often linked to debates about the efficacy of selective industrial policies based on the belief that governments can 'pick winners'. Pack and Saggi (2006) surveyed this debate.

[12] In the case of tax holidays, these include strong incentives for tax avoidance, ample scope for investors to extend the duration of the tax break, and the non-transparency of revenue losses (Zee et al. 2002: 1503–4).

direct business incentives (mainly subsidies and grants), indirect (tax) incentives, other business incentives (mainly information services), and the various Sectoral Education and Training Authority grant programmes. It notes that accelerated depreciation allowances are the most prominent indirect business incentives in South Africa. Neither paper analyses these allowances in more detail, however.

Researchers from the School of Public Policy at the University of Calgary have calculated METRs for the years 2005 to 2017 for South Africa and 91 other countries (cf. Bazel et al. 2018).[13] According to their calculations, the overall METR decreased in South Africa from 15.6 per cent in 2005 to 14.2 per cent in 2008, and then remained at that level until 2017 (Bazel et al. 2018: 36). In 2017, the METRs for manufacturing and services industries were 15.6 per cent and 14.0 per cent respectively (Bazel et al. 2018: 34). The overall METR for South Africa was well below the unweighted average for this sample of countries (21.6 per cent), and was also lower than the median (57 countries had higher values than South Africa, while 34 had lower values). The reality that South Africa's standard CIT rate of 28 per cent was higher than the unweighted sample average (24.7 per cent) suggests that tax incentives possibly have a significant impact on the country's METR.

Two reports by the World Bank (2015, 2016) confirmed that tax incentives markedly reduced the tax burden on South African firms and hence corporate investment. Accelerated depreciation allowances were the main reasons why the METRs were so much lower than the statutory CIT rates (World Bank 2015: 21). While the calculated METRs varied considerably across sectors (World Bank 2015: 9), the World Bank (2016: 6) stated that the METRs for mining and manufacturing implied 'very generous' incentives. In addition, it argued:

> Further work is needed to determine whether the corporate tax code and system of accelerated depreciation and investment allowances may be (i) encouraging greater capital investment at the expense of labour, (ii) favouring some sectors at the expense of others who offer greater growth and job potential, and (iii) […] generating their intended benefits relative to their cost. (World Bank 2015: 9)

Unsurprisingly, the tax incentive effects of accelerated depreciation provisions also varied across sectors. According to the World Bank (2015: 28), the tax depreciation provisions for the manufacturing, coal mining, forestry and fishing, and construction sectors were more generous than the economic values. By contrast, the tax depreciation provisions for the financial and business sector were neutral in terms of their incentive effects, while those for tourism, transport, storage, and communication, and electricity, gas, and water were less generous than the economic levels.

3 Depreciation allowances in South Africa

General depreciation allowances are complemented by a number of accelerated depreciation allowances in South Africa, as summarized in Table 1. Although this paper deals primarily with depreciation allowances, we add information on investment allowances, as they often occur as close alternatives or as complementary incentives.

[13] For a brief summary of the calculation method, see Bazel et al. (2018: 4). The following variables were taken into account: effective CIT rates, inflation rates, depreciation allowances, the method of inventory accounting, and average tax rates on assets, sales of capital inputs, capital transfers, and financial transfers.

Table 1: Accelerated depreciation allowances and investment allowances for companies under the South African Income Tax Act

Provision (section in Act)	Asset	Useful life/rate
	Accelerated depreciation allowances	
12B	Renewable energy assets	▪ 50%, year 1; 30%, year 2; 20%, year 3
12C	Manufacturing assets	▪ 20% for 5 years (used assets) ▪ 40%; 20%; 20%; 20% (new and unused)
12D	Pipelines, transmission lines, and railway lines	▪ 10% per annum for pipelines used for the transportation of natural oil ▪ 5% annually for all affected assets ▪ 6.67% per annum for lines and cables used for the transmission of electronic communication from 1 April 2015
12DA	Rolling stock	▪ 20% per annum for 5 years
12E	Small business corporations	▪ 100% (manufacturing assets) ▪ 50%; 30%; 20% (non-manufacturing assets) ▪ equal instalments over the remaining years (moving expenses)
12F	Airport and port assets	▪ 5% per annum on cost
13(1)	Buildings and improvements in a process of manufacturing	Erection of the building or qualifying improvements commenced: ▪ on or after 14 March 1961 but before 1 January 1989 – 2% per annum ▪ on or after 1 January 1989 but before 1 July 1996 (including improvements) – 5% per annum ▪ on or after 1 July 1996 but before 30 September 1999 (including improvements) – 10% per annum ▪ on or after 1 October 1999 (including improvements) – 5 % per annum
13*bis*	Buildings used by hotel keepers	Erection of the building or qualifying improvements commenced: ▪ post 1 July 1965 – 2% per annum ▪ post 4 June 1988 – 5% per annum ▪ post 4 June 2004 – 10% per annum
13*ter*	Residential buildings	▪ 2% residential building annual allowance ▪ Add an additional 10% initial building allowance (applicable for buildings erected on or after 1 April 1982 and before 21 October 2008)
13*quat*	Urban development zones	▪ 20% in year brought into use and 8% thereafter for 10 years (erection of a new building, or extension of or addition to any building) ▪ 20% in year brought into use and 20% thereafter for 4 years (improvements to an existing building or part of a building) ▪ 25% in year brought into use, 13% for 5 years, and 10% in the 7th year (erection of a new building or extension of or addition to any building related to a low-cost residential unit) ▪ 25% in the year brought into use and 25% thereafter for 3 years (improvements to an existing building or part of a building, related to a low-cost residential unit) ▪ 55% and 30% (where the taxpayer purchased a building or part of a building from a developer)
13*quin*	Commercial buildings	▪ 5% per annum on the cost of the building or improvement. ▪ 55% of the acquisition price of the part acquired and 30% of the acquisition price if an improvement part is acquired (part-acquisitions)

		Investment allowances
12I	Industrial policy projects (IPP)	▪ 55% on cost of new and unused manufacturing used in IPP with preferred status ▪ 100% on cost of new and unused manufacturing used in IPP located in industrial development zone (IDZ) ▪ 35% on cost of new and unused manufacturing used in IPP without preferred status ▪ 75% on cost of new and unused manufacturing used in IPP without preferred status located in IDZ
12S	Buildings in special economic zones	▪ 10% per annum on cost of buildings or improvement
12U	Additional deduction for roads and fences in respect of the production of renewable energy	▪ Provides for a deduction for expenditure incurred in respect of the construction of a road or a fence (including foundation and/or supporting structure). The deduction is available where it is expenditure incurred for the purpose of trade of a person generating electricity which exceeds 5 megawatts from wind power, solar energy, hydropower (not more than 30 megawatts), biomass comprising organic wastes, landfill gas or plant material, or improvements to the above.
13*sex*	Residential units	▪ 5% per annum on the cost of any new and unused residential units, and additional 5% if it is a low-cost residential unit
15 and 36	Mining capital allowances: companies involved in mining are allowed a deduction for 'capital expenditure' (as defined) incurred, but it may not result in an assessed loss. Balance carried forward.	▪ Exploration – 100% deduction limited to mining income ▪ Capital expenditure – 100% allowance limited to mining income ▪ Additional 10% for 'post-1973 gold mine' or 12% for 'post-1990 gold mine'
26B and 10th Schedule	Fiscal stability agreements: specific provisions for oil and gas companies	Oil and gas company may deduct from its oil and gas income: • all expenditure and losses actually incurred in respect of exploration and production (of whatever nature) • additional 100% of its expenditure of a capital nature actually incurred in respect of exploration • additional 50% of its expenditure of a capital nature actually incurred in respect of production In other words, expenditure of a capital nature qualifies for a double deduction in respect of exploration, and for a 150% deduction in respect of production

Note: table reflects the position as at the promulgation of the Taxation Laws Amendment Act 2016.

Source: authors' compilation based on data from National Treasury (1994–2018).

Table 1 allows some observations. In addition to the standard tax depreciation allowances that apply to all companies, as defined by asset-specific tax-defined depreciation periods, there are also a number of incentives that apply to different sectors according to the nature of the business, such as manufacturing and mining. There are also a number of special allowances legislated to serve specific goals, such as to develop a particular activity (e.g., urban development) or industry (e.g., the film industry). We also distinguish between depreciation allowances that allow a faster write-off of assets than the accounting policies or economic lifetime of assets, and investment allowances, which are related to the cost of investment rather than the cost of 'consuming' capital (which is similar to depreciation). Furthermore, both medium-sized/large companies and smaller companies have access to specific additional tax allowances. The activities/sectors that receive accelerated depreciation allowances are agriculture, mining, the film industry, the hotel sector, rolling stock, airports and port assets, urban development zones, small business corporations, special economic zones, and roads and fences in respect of the production of renewable energy. From a sectoral perspective, investment allowances add further incentives to investment in mining, manufacturing, energy, and construction, among others. By definition, activities/sectors that require more capital investment are bound to be the activities/sectors that qualify for tax

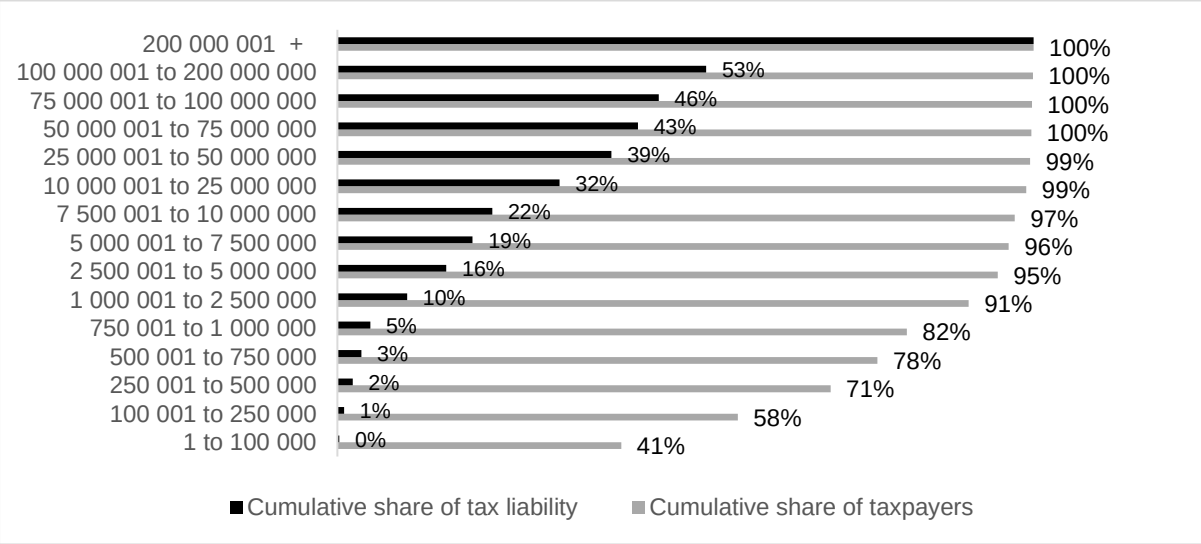
depreciation allowances. The extent to which employment is correlated with capital—that is, the structural capital/labour ratio—is decisive for the impact of these allowances on employment creation.

4 Empirical results

An explanation of the South African Revenue Service (SARS) tax data extraction, cleaning, and management is given in Sithole et al. (2020).

4.1 Depreciation allowance benefits: corporate taxable income distribution

Figure 3: Cumulative share of tax liabilities (per cent) and taxpayers (per cent) and with positive taxable incomes (by group, ZAR values), 2018



Source: SARS (2019).

Figure 3 shows the cumulative share of taxpayers and tax liabilities with positive taxable incomes in 2018. The bottom 99 per cent of companies with positive taxable incomes accounted for 39 per cent of taxable corporate income. The taxable incomes of these companies ranged up to 50 million ZAR.[14] The top one per cent (that is, companies with taxable incomes in excess of 50 million ZAR) accounted for the remaining 61 per cent. Companies with taxable incomes above 200 million ZAR contributed 47 per cent of CIT.

4.2 Tax benefits from depreciation and investment allowances

Table 2, which contains corporate income assessed data for the period 2014 to 2017, presents overarching perspectives on the benefits that companies derive from depreciation allowances.

[14] The amount on the vertical axis in Figure 1 (37.5 million ZAR) is the mid-point of an interval with a maximum amount of 50 million ZAR.

Table 2: Corporate benefits from tax depreciation and investment allowances, 2014–17 (million ZAR, current year prices)

Financial item	2014	2015	2016	2017	Total 2014–17	Average 2014–17
(1) Net accounting profit (all enterprises)	1,534,431	1,771,525	2,124,515	1,970,348	7,400,819	1,850,205
(2) Net accounting loss (all enterprises)	290,515	694,017	341,798	532,875	1,859,205	464,801
(3) Taxable income before assessed losses (all enterprises)	636,757	659,535	718,062	738,932	2,753,287	688,322
(4) Taxable loss (all enterprises)	189,504	419,136	222,781	214,081	1,045,501	261,375
(5) Accounting depreciation (all enterprises)	205,543	232,747	235,228	247,922	921,440	230,360
(6) Tax depreciation allowed (all enterprises)	500,077	575,254	564,856	532,966	2,173,015	543,288
(7) Investment allowances (all enterprises)	3,820	3,537	4,332	4,692	16,382	4,095
(8) Tax depreciation allowed in excess of accounting depreciation (all enterprises)	294,534	342,507	329,628	285,044	1,251,713	312,928
(9) Tax benefit due to depreciation allowances (enterprises with taxable income>0*) (at average rate of taxable income group)	42,277	67,968	34,534	27,217	171,997	42,999
(10) Tax benefit due to investment allowances (enterprises with taxable income>0*) (at average rate of taxable income group)	657	627	618	521	2,423	606
(11) Total tax expenditure (enterprises with taxable income>0*) (at average rate of taxable income group) (8+9)	42,934	68,596	35,152	27,738	174,419	43,605

Note: *average tax rates could only be calculated for enterprises with positive taxable income.

Source: authors' calculations based on anonymized computation data from SARS (2019).

Based on the accounting records of approximately 410,000 companies, accounting profits totalled 7.4 trillion[15] ZAR over this period, with average annual profits of 1.85 trillion ZAR per year (line 1). Accounting losses totalled 1.86 trillion ZAR or 464.8 billion ZAR on average per annum (line 2). Corporate profits after the tax policy debit and credit adjustments to accounting profits and losses over the four years amounted to 2.8 trillion ZAR, with average annual profits at 688.3 billion ZAR (line 3). Companies with taxable income above 100 million ZAR generated 56.41 per cent of the total profits after policy adjustments.[16]

Companies with taxable income above 100 million ZAR generated more than 60 per cent of the total taxable income and tax payable. Companies with taxable income between 10 million ZAR and 100 million ZAR contributed 35 per cent, and the remainder was paid by companies with taxable income of less than 10 million ZAR.[17] Losses by loss-making companies after debit and credit adjustments totalled more than 1 trillion ZAR or 261.4 billion ZAR per annum on average (line 4). Companies in a non-taxable income position accounted for close to 99 per cent of the assessed tax losses after adjustments for tax depreciation and investment allowances. Assessed losses brought forward from previous years totalled 2.5 trillion ZAR over the period 2014 to 2017 at an average annual amount of 636.5 billion ZAR. Close to 97 per cent of these losses were carried over by companies in a taxable loss. Taxable income after utilizing current year and previous year's losses totalled 2.6 trillion ZAR at an average amount of 872.3 billion ZAR per annum. The chances to recoup losses from prospective future taxable income must have been on the low side, except of course in respect of new undertakings with a generally accepted longer lag between investment and the generation of profits.

Depreciation deducted as an expense in the accounting records of companies totalled 921.4 billion ZAR for the period 2014 to 2017 at an average annual amount of 230.4 billion ZAR (line 5). The share of accounting depreciation deducted by companies with taxable income above 100 million ZAR per annum was 43 per cent, and for companies in a taxable loss the percentage was 40 per cent. In contrast, tax depreciation totalled 2.2 trillion ZAR at an average annual amount of 434.6 billion ZAR (line 6). Close to 50 per cent of the tax depreciation was claimed as a debit adjustment by companies in a taxable loss, and 35 per cent by companies with a taxable income above 100 million ZAR. These allowances consisted of general, across-the-board depreciation that applied to all companies and varied according to the type of asset and lifespan allowed for under CIT law, as well as special (accelerated) tax depreciation allowances as listed in Table 1.

The difference between accounting depreciation and tax depreciation totalled 1,251.6 billion ZAR over the period 2014 to 2017, with an average annual difference of 312.9 billion ZAR (line 8). The tax expenditure cost of this difference at the average tax rates that applied to the different taxable income groups[18] was 172.0 billion ZAR or 43.0 billion ZAR per annum on average (line 9).

The tax data set contains data on investment allowances too. These allowances totalled 16.4 billion ZAR for the period 2014 to 2017, or close to an average of 4.1 billion ZAR per annum (Table 2, line 7). For the period 2014 to 2017, the tax expenditure cost at the corporate marginal tax rate of

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[15] In this section, one million=1,000,000 or 10^6; one billion=1,000,000,000 or 10^9; one trillion=1,000,000,000,000 or 10^{12}.

[16] This ratio was calculated from SARS's computational data.

[17] These ratios were calculated from SARS's computational data.

[18] The average rate was calculated as the ratio between the assessment tax payable and the assessment taxable income For the income group above zero and up to one million ZAR, the rate for the period 2014 to 2017 was calculated as 21.3 per cent; for the group above one million ZAR and up to 100 million ZAR the rate was 28.8 per cent; for the group above 100 million ZAR it was 28.0 per cent.

28 per cent was 4.6 billion ZAR or 1.1 billion ZAR on average per annum.[19] The manufacturing sector was the most significant sector accessing investment allowances, with a share of more than 60 per cent.

It is estimated that the average tax liability of companies in a taxable income position for the period 2014 to 2017 was 34.7 billion ZAR per annum less, due to the difference between tax depreciation and accounting depreciation. The average percentage difference in tax liabilities of companies with taxable income above 100 million ZAR per annum was 17.8; for companies with taxable income between 10 million ZAR and 100 million ZAR the difference was 13 per cent; for companies with taxable income less than 10 million ZAR the difference was 11.6 per cent.

The total tax expenditure cost for the treasury in respect of tax depreciation and investment allowances was 174.4 billion ZAR or 43.6 billion ZAR on average per annum for the period under review (Table 2, line 11). This is equal to three per cent of the imputed CIT before accounting for assessed losses carried forward.

We next present the sectoral distribution pertaining to tax depreciation and investment allowances (Table 3—see also the amounts in Table 2). The identified sectors reflect the self-selection options provided by SARS to companies when they submit their tax returns. Hence, they are not the same as the standard industrial classification sectors used in national account statistics. In this regard, a reconciliation exercise is still underway at SARS. The last row also shows a relatively large category of 'other'.

Close to 80 per cent or 145 billion ZAR of total accounting depreciation was deducted by five sectors, and these were the capital-intensive sectors, namely electricity and water, manufacturing, mining, transport, and the finance sector. Due to its broad classification, the latter is the biggest sector in the ITR14 tax returns. Construction is added as an important sector when depreciation according to tax legislation is considered.

The sector with the highest share of profits after the debit and credit adjustments to accounting profits (calculated from figures in column 3) was the financial sector (31 per cent), followed by manufacturing (19 per cent) and wholesale and retail trade (15 per cent). The shares of these sectors in taxable income and tax liability (when calculated from columns 2 and 4) remained similar after the utilization of assessed losses. This implies that proportionally the use of carried-over losses was similar between non-capital-intensive and capital-intensive sectors. The latter are of course also significant contributors to CIT.

The total average tax rate for all sectors over the four years was about 2.5 percentage points below the statutory company tax rate of 28 per cent. This suggests that, in the aggregate, there was scope for an across-the-board reduction in the company tax rate to 25.5 per cent as an alternative for these tax depreciation allowances, that is, including general accounting depreciation. If only accelerated allowances were to be eliminated, there still would be scope to reduce the company tax rate from 28 per cent to below 27 per cent, given that total tax depreciation amounts to about double the accounting depreciation.

[19] Calculated as explained in a previous footnote.

Table 3: Sectoral data, averages for 2014–17, million ZAR (in values of the particular years)

Sector	Accounting profit	Taxable income	Profits after adjustments	Tax liability	Accounting depreciation	Tax depreciation	Reduction in tax liability due to tax depreciation	Investment allowances
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Agriculture	26,530	20,627	14,742	5,926	6,127	16,745	6,008	120
Community services	77,676	57,385	37,265	15,874	11,258	19,377	6,894	360
Construction	13,020	30,847	22,000	8,774	4,567	46,269	16,582	13
Electricity, water	2,454	11,055	7,781	1,884	16,425	58,139	468	199
Financial services	196,893	288,504	169,264	80,081	21,417	90,338	49,455	252
Manufacturing	34,510	156,430	102,102	43,731	31,443	51,704	18,090	1,981
Mining	62,603	67,584	43,643	18,668	37,384	54,938	17,515	76
Transport	18,537	100,715	63,707	27,696	37,891	68,773	11,563	200
Wholesale and retail trade	103,793	130,341	83,956	36,074	16,211	25,193	9,452	73
Other	944,148	8,783	6,197	5,187	1,566	3,154	0	4
Total	**1,480,164**	**872,271**	**550,657**	**243,896**	**184,288**	**434,631**	**136,027**	**3,276**

Source: authors' calculations based on anonymized computation data from SARS (2019).

Accounting depreciation as a percentage of total fixed assets was equal to 3.5 per cent for companies in a taxable loss, and for companies with a taxable income of more than 100,000 million ZAR per annum the percentage was 8.3. Tax depreciation as a percentage of total fixed assets was 10.2 per cent for companies with a taxable loss, and for companies with taxable income above 100 million ZAR per annum the percentage was 15.7.

4.3 Depreciation allowances and employment

The impact of tax depreciation allowances on employment is an important issue in view of South Africa's exceptionally high unemployment rate, which was measured at 29.1 per cent in the fourth quarter of 2019. Although this is not the subject of this paper, a few general remarks are in order. What is important is the complementarity between capital and labour given the capital intensity of any particular sector, rather than the capital intensity itself. One way of calculating the intrinsic capital/labour ratio is to divide the accounting depreciation (i.e. 'consumption' of capital) by the employment cost (see column 3 of Table 4), assessing the likely employment to be added before deciding on any such incentives—a requirement strongly emphasized in the literature.

Table 4: Average ratio of (i) depreciation cost (D) to employment cost (E) by sector; (ii) total employment; (iii) ratio: gross capital formation (C) to employment (L), selected sectors, various years

Sector	**Period**	**D/E***	**Employment numbers (1,000)****			**C/E (SARB) ZAR per worker (deflated by urban consumer price index, normalized on 2004)**		
			Highest	**Lowest**	**2004–18** Average	**2004–18**	**2009–13**	**2014–18**
Forestry and fishing	2004–18	0.22	N/A					
Mining	2016–18	0.37	522 (2012)	444 (2005) 455 (2018)	484	58,421	90,516	79,716
Manufacturing	2004–18	0.19	1,451 (2004)	1,219 (2018)	1,316	48,520	64,906	85,820
Electricity	2004–18	0.48						
Construction	2004–18	0.13	737 (2008)	534 (2004)	651	7,442	11,256	11,587
Trade	2004–18	0.11	2,215 (2018)	1,846 (2004)	2,060	11,384	12,373	12,877
Transport	2004–18	0.36						
Business services	2004–18	0.08						
Personal services	2004–18	0.11						

Note: *calculated from data from StatsSA (2018). **Calculated from South African Reserve Bank (SARB) employment data for 2010, index numbers for other years. N/A: not available.

Sources: authors' calculations based on data from StatsSA (2018) and SARB.

On average, electricity, mining, and transport were the most capital-intensive sectors. Gold mining receives depreciation allowances in recognition of the long lag between investment and income generation, and transport enjoys investment allowances (see Table 1). Another metric is the ratio between capital formation and the number of employees. This metric clearly shows the rising capital cost per worker in real terms over the period (the last three columns of Table 4), that is, the trend of capital intensification and reduced labour absorption. For mining, the rise during the middle period was partly reversed from 2013 to 2018. Trade has become a major source of employment, also reflecting small business employment, which receives special depreciation allowances (see Table 1). Admittedly, employment is a function of many things other than depreciation allowances. But it is not possible in the aggregate to attribute any employment trend

directly to the presence or absence of tax depreciation allowances. It is difficult to make such a judgement on a sectoral basis; a micro analysis is required of individual projects that receive special depreciation allowances. That is also why proper cost-benefit analysis needs to be done when one is considering the introduction of such allowances and periodically monitoring their achievements.

4.4 Impact of tax depreciation on loss-making companies

An analysis of turnover ratios of companies, as calculated from SARS (2019) computation data, indicates that companies with annual taxable income above 100 million ZAR have on average a gross profit ratio of 25 per cent and a net accounting profit ratio of 14 per cent, with a taxable income ratio of nine per cent. Companies in a taxable loss position do have gross profit ratios close to the aforementioned companies, but the net accounting ratios are on average minute, and they have taxable loss ratios. Companies with taxable income under 10 million ZAR have close to zero ratios.

An important fiscal question is how much tax revenue is lost because of depreciation allowances that enable loss-making or low-profit companies to remain in business while continuing to write off losses against taxable income. The 2020 budget (National Treasury 2020: 42) recognized this:

> When a company's tax-deductible expenses exceed its income, it records an assessed loss. Often, the loss is carried forward to the next year and is offset against taxable income in that year. Over the past few years, there has been an international trend to restrict this practice. Government proposes broadening the corporate income tax base by restricting the offset of assessed losses carried forward to 80 per cent of taxable income, for years of assessment commencing on or after 1 January 2021. This is viewed as a reasonable approach that affects all businesses equally, rather than restricting the number of years for carrying forward assessed losses, which would disproportionately hurt businesses with large initial investments or long lead times to profitability.

Tax losses carried forward amounted to more than one trillion ZAR over the four years of this investigation. Tax depreciation enables companies to reduce their taxable income by writing off more than accounting depreciation. We have already seen that this amounted to 1,251 billion ZAR (see Table 2, line 8). When companies make taxable losses, tax depreciation allowances contribute to (bigger) losses that are carried forward from year to year. As long as companies incur taxable losses on account of tax depreciation, the latter presents an incentive for highly capital-intensive companies to increase capital expenditures that could be at the cost of more labour-intensive activities. The above-mentioned announcement in the 2020 budget in essence is a cash flow measure that deals with symptoms and not causes. The real issue is the perpetual availability of the tax incentive, irrespective of whether profit is made. Tax depreciation rules should be more aligned with accounting depreciation, and tax incentive schemes should contain a sunset clause with regular monitoring so that the continuation of tax-driven businesses can be curtailed earlier rather than later.

4.5 Tax benefits from investment allowances

The intended or unintended impact of tax depreciation allowances is strengthened by investment allowances, which most experts regard as inferior to depreciation allowances as tax incentives to

stimulate private investment.[20] The SARS data enables an overview of such allowances in South Africa, although it is a slight digression from the topic of this paper.

The total investment allowances of 2.4 million ZAR amounted to only 1.7 per cent of tax depreciation allowances (which totalled 169.9 billion ZAR). Table 1 showed that investment allowances are in respect of research and development (Sections 11B and 11D), industrial assets, land, and conservation (Section 37D), and brownfield and greenfield projects (Section 12I). It is not too surprising, therefore, that more than half of the benefits accrued to manufacturing, in which the ratio of investment allowances to depreciation allowances of 7.5 per cent was much higher than the average of 1.7 per cent for all the sectors combined.

4.6 Three sets of depreciation data

The South African Reserve Bank (SARB) calculates depreciation data in total and by sector, which is currently under revision. They use the permanent inventory model to estimate consumption of fixed capital based on gross fixed capital formation and service life expectations. The service, or useful, life of an asset is often different from the depreciation period that the tax authorities allow for tax purposes. Further, the service life of an asset differs across industries. The straight-line depreciation method is used.

StatsSA (2018) publishes data (by economic sector) on the consumption of capital. It collects the data from the financial statements of companies; hence, depreciation would be as defined by the accounting standards, and the depreciation rates would be as per company policy.

The information used in this paper and in Jansen et al. (2020) is the first set of verified micro accounting depreciation and tax depreciation data that SARS and the National Treasury have made accessible to researchers.

Scholars will in future have to decide which of these data sets provides the best information for their particular research purposes.

4.7 Panel data analyses

The SARS tax computation data set was investigated to assess the feasibility of panel data regression analysis, using time series and cross-sectional data. The volatility of the firm-level data, and the reduction in data points that a removal of outliers would have caused, did not make it possible to obtain credible results. Further micro data verification will be required for this purpose.

5 Conclusions and proposals

The aim of this paper was to analyse the nature, extent, and purpose of tax depreciation allowances in South Africa, against the backdrop of relevant literature and the widespread use of such incentives. As in many other countries, depreciation allowances in South Africa are no longer actively used as an instrument of macroeconomic stabilization; instead, they now serve as a

[20] According to Zee et al. (2002: 1505), depreciation allowances have fewer disadvantages than any other corporate tax rate incentive. Two notable disadvantages of investment allowances are that they tend to 'distort the choice of capital investments in favor of short-lived ones' and 'qualified enterprises may attempt to abuse the system by selling and purchasing the same assets to claim multiple allowances, or by acting as a purchasing agent for enterprises not qualified to receive the incentive' (Zee et al. 2002: 1504).

structural policy instrument to incentivize direct domestic and foreign investment in the medium to long term. While empirical evidence regarding the impact of depreciation allowances on output and employment remains ambiguous, it is now widely acknowledged that their potential is very limited when other influential factors are not conducive to investment.

South Africa has a set of accelerated depreciation allowances in place, and some of them are strengthened by investment allowances. Although there exist widespread doubts about the usefulness of tax incentives, depreciation allowances are regarded as better than the other incentives, despite having drawbacks of their own. The activities or sectors that receive accelerated depreciation allowances are agriculture, mining, the film industry, the hotel sector, rolling stock, airports and port assets, urban development zones, small business corporations, special economic zones, and roads and fences in respect of the production of renewable energy. Many of these allowances have been in force for many years, and their continuation raises questions about the apparent lack of sunset clauses and the irregular evaluation of their effectiveness.

On average, tax depreciation resulted in a reduction of 19.0 per cent in tax liability, at the cost of 139 billion ZAR to the treasury. The cost (in the sense of foregone tax revenue) of general and special tax depreciation allowances was equivalent to 2.5 percentage points of the 28 per cent statutory company tax rate, which is an indication of the scope for corporate tax reduction. If only accelerated allowances were to fall away, there would still be scope to reduce the company tax rate from 28 per cent to below 25 per cent, given that total tax depreciation amounts to about double accounting depreciation.

The calculated average tax rate (i.e. the ratio of assessed tax to calculated taxable income) of companies with taxable incomes below one million ZAR varied substantially between economic sectors—from as low as 18.5 per cent (transport, storage, and communication) to 24.5 per cent (financial intermediation, insurance, real-estate, and business services). While tax depreciation allowances are of significant value to smaller companies, their contribution to the treasury is quite small. In 2018 there were 152,387 companies with tax liabilities below 10 million ZAR. This meant that 97.3 per cent of the total number of registered taxpaying companies contributed 22 per cent of company tax. The rest (4,259 or 2.7 per cent of the total) paid 78 per cent of total corporate tax.

Investment allowances add further incentives to investment in mining, manufacturing, energy, and construction, among others. Investment allowances amounted to 8.6 billion ZAR, which reduced the tax liability by 2.4 billion ZAR.[21]

By definition, the activities and sectors that require more capital investment are bound to qualify for tax depreciation allowances. Arguably, the impact of depreciation allowances on employment depends more on changes in the capital/labour ratio when investment increases than on capital intensity itself. It is not possible in the aggregate to attribute any employment trend directly to the presence or absence of tax depreciation allowances. Employment effects are more appropriately assessed at project level.

The 2020 national budget provided for a major change in dealing with accumulated losses for tax purposes. In this paper we have shown the major effect of losses on the tax revenue of the government, and how tax depreciation can continue to keep non-profit-making companies afloat. The solution to the loss of tax revenue for the treasury does not lie in treating symptoms, as in the

[21] This was calculated by applying the calculated average tax rates for the different taxable income groups, namely 21.3 per cent (>0, <100,000), 28.8 (≥100,000, ≤10,000,000) and 28.0 per cent (>10,000,000).

budget announcement. The cause needs to be addressed, which is the continued availability of accelerated tax depreciation allowances. This calls for the termination of such benefits at a certain stage and according to pre-announced criteria, which should be included in an appropriate sunset clause.

Before any analysis was attempted, a huge effort was put into verifying the tax computation data. SARS's tax computation data now adds a third set of data on corporate tax and tax depreciation to the depreciation data published by SARB and StatsSA. Scholars will in future have to decide which of these data sets provides the best information for their particular research purposes. SARS's efforts to synchronize its self-selected sectoral data with the standard industrial classification of economic sectors will be important for credibility.

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