

SA-TIED

Southern Africa – Towards Inclusive Economic Development

SPECIAL REPORT

A platform for evidence-based policy formulation

Lessons from SA-TIED



About the programme

Southern Africa – Towards Inclusive Economic Development ([SA-TIED](#))

SA-TIED is a unique collaboration between local and international research institutes and the government of South Africa. Its primary goal is to improve the interface between research and policy by producing cutting-edge research for inclusive growth and economic transformation in the southern African region. It is hoped that the SA-TIED programme will lead to greater institutional and individual capacities, improve database management and data analysis, and provide research outputs that assist in the formulation of evidence-based economic policy.

The collaboration is between the United Nations University World Institute for Development Economics Research (UNU-WIDER), the National Treasury of South Africa, the International Food Policy Research Institute (IFPRI), the Department of Monitoring, Planning, and Evaluation, the Department of Trade, Industry and Competition, South African Revenue Service, Trade and Industrial Policy Strategies, and other universities and institutes. It is funded by the National Treasury of South Africa, the Department of Trade, Industry and Competition of South Africa, the Delegation of the European Union to South Africa, IFPRI, and UNU-WIDER.

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Table of contents

Acknowledgements	4
Minister's foreword	5
Executive summary	6
1 Introduction	11
1.1 Reaping benefits from unique partnerships	11
1.2 Responsive and policy-relevant research of highest quality	12
1.3 Inclusivity for greater impact	12
2 Novel data and analytical approaches	13
2.1 The power of tax data	13
2.2 Building a solid foundation for research and evidence-based policy-making	14
2.3 Active policy-bridging and media outreach	15
3 Innovative research-based policy evidence	17
3.1 Work Stream 1 - Enterprise development for job creation and growth	17
3.2 Work Stream 2 - Public revenue mobilization for inclusive development	20
3.3 Work Stream 3 - Macroeconomic modelling for policy formulation	23
3.4 Work Stream 4 - Turning the tide on inequality	27
3.5 Work Stream 5 - Climate change and energy transition as drivers of change	32
3.6 Work Stream 6 - Regional growth for southern Africa's prosperity	36
4 Conclusion	40
References	41
Further reading	46
Appendices	47

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Minister's foreword

South Africa's economic challenges are well-documented and reflected in low economic growth, declining levels of productivity, and rising unemployment and inequality. Growing our economy and building the labour force that can be absorbed by a growing economy should be our main focus. Ultimately, this comes down to the concrete action we can take to improve economic growth.

In considering the options available to raise economic growth and lower unemployment, poverty and inequality, policy makers must at all times be informed by research of the highest quality. This is why I am particularly proud of the efforts of the Southern Africa – Towards Inclusive Economic Development (SA-TIED) programme. The programme was launched, in partnership with the United Nations University World Institute for Development Economics Research (UNU-WIDER) and the International Food Policy Research Institute (IFPRI), with an ambitious target to produce at least 150 individual research studies during the lifetime of the three year project. Upon completion, the programme exceeded this goal, with more than 175 studies published under various thematic areas. It has been a cornerstone in the programme that all research produced meets the highest professional standards and is rigorous in character. These studies, many of which were published by the young and rising future economic leaders of South Africa and often in collaboration with some of the top academics in the world, is reviewed in this report together with their policy implications.

The SA-TIED programme was able to respond to sudden and critical challenges arising on the South African policy agenda. For example, research was rapidly produced to inform policy formulation in response to the COVID-19 pandemic and is currently the source of some of the most advanced research aimed at understanding the inequality dynamics in South Africa. SA-TIED was also able to provide technical research support to Operation Vulindlela, a key policy initiative jointly implemented by the National Treasury and The Presidency.

SA-TIED has been able to be at the forefront of the most pressing policy issues because it continues to explore modern terrains for data-driven research and policy-making. One such area has been a dedicated focus on developing new datasets based on South

African administrative tax data, which opened up avenues for research in areas and topics that were not possible before in South Africa. The use of administrative tax data has allowed policy makers insight into areas such as how behavioural factors affect optimal policy design, and how to evaluate long-run effects of social programmes and tax incentives. In the process, the quality and breadth of evidence used to inform policy noticeably improved, as is shown in our review of the detailed working papers in this report.

The best policy research requires a wide and diverse network of researchers, including from around the world, as well as direct collaboration with South African public servants, to ensure that research is able to inform policy debates. More than 300 researchers contributed to the SA-TIED studies, of which 60 per cent were authored or co-authored by women and two-thirds by South African nationals. In addition, responding to the programme's objective of fostering policy bridging and building capacities, 18 per cent of the studies published have a South African public servant as an author or co-author.

Since the commencement of the programme, research and training staff from more than 70 organizations from around the world engaged directly with SA-TIED under the various activities relating to the programme's research production and capacity building. Some 27 of these organizations are South African universities, research institutes, and government departments. I would like to conclude by stressing that South Africa is on its way to fulfilling the high hopes for socio-economic progress of its people. Policy choices informed by quality research can make a major difference in moving forward policy implementation in this magnificent country full of passion and potential. As we prepare for SA-TIED Phase 2, the programme will continue to work alongside decision makers to build the evidence base for improved policy-making.

Executive summary

The Southern Africa – Towards Inclusive Economic Development (**SA-TIED**) programme provides a platform for researchers and policy makers to work together to address today's major development challenges. The programme's unique design and core principles focus on tailored support to the policy environment. The major achievements of SA-TIED have been possible because the programme is predicated on deep engagement between researchers and public institutions and because of the commitment of its partners to work together to improve the interface between research and policy-making. The networks and effective partnerships being built by the SA-TIED programme will continue to strengthen evidence-based policy formulation in the years to come.

What follows is a summary of the programme's major research contributions to the policy environment. These contributions are not policy proposals, but are meant to inform the policymaking process and fill important gaps in our evidence base. The research presented in the body of this report—all recently published under the SA-TIED programme—fills crucial knowledge gaps and supports policy formulation to address key challenges and promote inclusive development in the region. In 2022, SA-TIED embarks on a second phase. The programme will continue to rely on the same key principles that have proven successful. A strong emphasis on developing synergies through collaboration and inclusivity is reflected across the entire programme—in research, capacity building, and policy-bridging.

The road to a robust and resilient economy

The need for developing a dynamic and productive enterprise sector sits at the very core of two of South Africa's main policy challenges: structural unemployment and inadequate economic growth. Several cross-cutting interventions that can **enhance firm- and sector-level productivity and generate more rapid and inclusive economic growth** are recommended:

- Misallocation of finance capital across firms reduces total factor productivity (TFP) to 16–22 per cent beneath its potential. Consequently, policy measures which support greater access to private sector finance, particularly for small and medium sized enterprises (SMEs), need re-calibration. Improved targeting of public support for smaller firms to unlock financing opportunities can create productivity growth of up to 2.2 per cent per annum.¹
- South Africa can reap high productivity gains from research and development (R&D), but participation in programmes that support R&D is low. Support for R&D should be increased, while new initiatives to increase uptake and improve access to programmes at the sector level are needed.
- Worker mobility—when workers move from one firm to another—generates positive spillover

effects, but these spillovers are lower in South Africa than elsewhere. This indicates a clear need to continue and to enhance policies that support firm-level training initiatives.

Trade policy is a key component of **South Africa's industrial policy package** and can support economic growth when well targeted:

- Support for broader adoption of internationally competitive technology can assist trading firms. Crucially, investments in R&D and foreign direct investment (FDI) promotion should target specific types of exporting firms to reap the largest returns. Promotion of FDI to the input-supplying sector, particularly through production upgrading and investment in research and skills, can yield some of the greatest gains. The biggest returns, however, are found to come from those firms that both supply products for global value chains (GVCs) and invest in innovation themselves.
- Industrial policy support for firms that trade in customized intermediates is also recommended. Many South African firms choose to import intermediate inputs, rather than produce them domestically or offshore them through vertical integration. Expanding local ownership of the intermediate input supply chain is a potential growth opportunity for South Africa.

¹ The key findings listed in this summary, like this one, are all referenced and cited in the body of the report. Please see References for the complete list of SA-TIED working papers cited in this report.

Generating employment growth, especially for youth and other economically vulnerable groups, is critical to ensuring inclusive development:

- Younger firms—and those in the wholesale and retail and the communication and recreation sectors—and firms that participate in public job training programmes are most likely to employ youth.
- Training subsidies correlate positively with the absorption of youth employment. To obtain the full impact of training initiatives, increased government support to start-ups is called for.
- The employment tax incentive (ETI), which subsidizes payroll for low-wage and employed youth, has increased youth employment, is important in increasing average wages among employed youth, and supports businesses—especially financially constrained—that collect it. There are important caveats, however, and the impact of the ETI should remain the subject of ongoing research.

- Almost half of South African firms hire an ETI-eligible worker, but only around 13 per cent of them—the largest firms—claim the ETI subsidy. Steps to improve accessibility of smaller firms to the ETI tax benefit can improve its impact.
- Temporary workers make 30 per cent less than their full-time counterparts and 80 per cent of this gap is in benefit contributions. Additions to a 2015 reform—intended to reduce the vulnerability of temporary workers—are needed, as the policy has not succeeded in its aims.

Finally, new evidence on profit-shifting and transfer mispricing show that certain tax avoidance strategies by firms, if checked, could substantially increase public revenue returns from economic growth. Given the concentration of corporate tax planning among the largest firms, a key policy recommendation for the revenue authority is to implement a tax avoidance flagging system to detect firms which may systematically abuse the existing tax system.

On the way to fiscal sustainability and economic security for South Africans

SA-TIED research on public revenue mobilization, much of it utilizing newly available administrative tax data, fills key knowledge gaps on optimal fiscal policy.

The goal of **a more efficient tax system** which can help South Africa balance its development priorities in terms of a fairer distribution of income, a sustainable budget, and the improved well-being of its people can be advanced.

- The South African corporate income tax (CIT) gap is estimated to be 11 per cent of the tax base, or 2 per cent of GDP. A large percentage of revenue comes from the CIT, and strategies that reduce the gap can enhance revenues.
- One strategy, tax audits, is more effective at increasing compliance than previously believed because they result in geographic spillovers—neighbouring firms also report greater taxable income.
- The CIT system leads to very different effective tax burdens across sectors, and in ways that are not necessarily promoting investments in new industries. It also heavily favours debt over equity financing, which likely contributes to the deterioration of firm resilience in crisis times.

- Research on the taxable income responses to personal income tax rates in South Africa suggests that further increases in tax rates may lead to significant erosion of the tax base. However, closer attention to the 'bunching' behaviour of taxpayers, both individuals and businesses in South Africa, and strategies to reduce it should be explored. International evidence suggests that taxing property is one of the least distortive tax instruments and the scope of potential reforms in this area merit further investigation.
- South Africa can also make progress in the area of corrective taxation—using tax incentives for goals other than efficiency or redistribution—including both environmental and health taxes.

On the spending side, public programmes that **invest in greater equality and the economic security of South Africans are an important part of any inclusive development process.**

- The South African fiscal policy response to the coronavirus shock has important lessons. Poverty rates actually decreased at the height of the pandemic, relative the pre-pandemic period, as a result of new benefits being extended to previously ineligible population groups.

- The fiscus can get more value by improving redistributive taxes and transfers. For example, simulations reveal that replacing zero-rated value-added tax (VAT) items with a flat-rated VAT, when the additional revenue is spent on direct transfers, yields better reductions in poverty and inequality at a lower cost.
- A system of tax credits—rather than deductions—for household medical expenditures

achieves public health goals with greater distributional fairness.

- The 2016 pension-savings tax incentive reform did not make the system more progressive as was hoped, indicating a need for further policy action in this arena.

New advances in macroeconomic modelling help policy formulation

SA-TIED research on macroeconomic policy has a number of important implications for fiscal policy, including major advancements in understanding the role government expenditures can play in economic recovery:

- Several efforts were made to estimate fiscal multipliers—how much additional economic growth results from government expenditure—under different conditions and using different methods and models. Instead of one multiplier with a single constant value, there are a number of values, each relevant in specific circumstances.
- Estimated multipliers depend on the stage of the business cycle and are found to be higher during recessions than during booms. Furthermore, the behaviour of the financial sector, such as banks' credit supply responses to fiscal stimulus, can magnify the effect of fiscal policy, especially when there is slack in the economy.
- There are large differences between the multipliers for government consumption spending, government investment spending, and taxes: the multiplier effects of tax changes are negative and much larger than those of government spending and government investment expenditures have a stronger and more lasting effect on GDP than current expenditures.
- These results provide strong bases for policy makers choosing between different combinations of increased investment, increased current spending, and tax decreases within an expansionary budget deficit policy or vice-versa when reducing the deficit.
- To assess the multiplicative power of fiscal policy, decision makers should assess the economy's cyclical position and compare multipliers for different components (expenditures vs. taxes)

of the budget. Large differences in multiplier values suggest that such analysis can greatly optimize fiscal policy.

- The effectiveness of fiscal policy is highly dependent on the degree of crowding-in or -out of private sector expenditure, spillover effects on the private sector through a higher risk premium, and the interaction between fiscal policy and monetary policy.
- In terms of tax policy, the efficacy of personal income tax (PIT) as a macro-stabilisation tool indicates that any effort by the government to reduce the budget deficit via personal income tax increases, especially without fiscal credibility and monetary backing, will further stifle an already ailing economy.

On **monetary policy**, SA-TIED research suggests:

- Monetary policy has heterogeneous effects—for example, greater impacts on smaller firms relative larger ones—which are necessary to consider to improve policy efficiency.
- With respect to the central mandate of the South African Reserve Bank (SARB), SA-TIED research supports the bank's claim to follow a Taylor rule in a flexible inflation-targeting framework.
- The calculation of South Africa's sacrifice ratio also indicates that the SARB has achieved inflation reduction and stabilization without significant cost to the country's unemployment rate.
- Since the global financial crisis, monetary policy has reduced the burden of fiscal adjustment in response to rising debt and a rising risk premium. But, further shocks to the risk premium could offset any gains from the current stance of monetary policy.

The path to greater equality

At the end of apartheid in 1994, South Africa had the world's highest measured income inequality. Almost 30 years later, little to no progress has been made with regard to the country's extremely high levels of income inequality. The persistence of high inequality has arguably emerged as South Africa's largest developmental challenge.

SA-TIED research on the drivers of inequality reveals how inequalities in a number of important dimensions intersect to maintain the country's inequality.

Research that yields **a deeper understanding of the equalizing and dis-equalizing components of South Africa's inequality is a foundational step on the path to greater equality:**

- South Africa has an extensive set of social safety net, education, and health policies, and the fiscal policies of the government are among the most redistributive of middle-income countries. Yet, children have a 95 per cent chance of being in the same position in the earnings distribution as their parents. The reproduction of intergenerational inequality and poverty, regardless of individual merit or ability, is largely explained by a limited set of inherited traits, especially race.
- There is some evidence that the spillovers, intersections, and scale impacts that currently trap people can be reversed through good coordination and harmonization across policies that address water, electricity, housing, education, health, and public transport.

- Policy coordination of social security interventions and direct employment interventions can create aggregate or collective returns that are very much larger than project-specific returns, especially for those most disadvantaged.
- Substantial gender wage gaps are contributors to overall wage inequality. The size of these wage gaps, and the scale of their contribution to overall inequality, is heterogenous across sectors and across the earnings distribution, creating opportunities for more targeted equality interventions.
- The labour market is a key driver of the levels and changes in inequality. Real wage increases in South Africa have largely gone to top income earners. Policy packages that focus on employment creation, active labour market interventions, and education can help create a platform for an economic system that generates greater upward mobility.
- The formal sector is characterized by a monopsonistic labour market with strong sectoral bargaining and strong unions. Such a labour market has important implications for the design of labour market, competition, and even company tax policies. SA-TIED research provides a strong endorsement of formal consultative and evidence-led engagements between social partners around labour market policy formulation.

Climate leadership and the shift to a clean energy future

The South African government has committed to reduce greenhouse gas emissions to between 398 and 614 metric tons of carbon dioxide equivalent (MtCO_{2e}) by 2030 and between 212 and 428 MtCO_{2e} by 2050. To limit warming to 1.5°C, emissions need to fall to below 348 MtCO_{2e} by 2030. **South Africa is well-positioned to meet this benchmark and become a global leader in renewable energy** if it can succeed in a large-scale transition of the energy sector, which accounts for nearly 80 per cent of the country's total emissions:

- South Africa can meet its emissions goals on time by following the least-cost path to more variable renewable energy (VRE)—particularly solar photovoltaic (PV) and wind—in planning its energy future.
- Solar PV and wind are the least expensive power generation technologies in South Africa and could account for 70 per cent of South Africa's energy

production by 2050, if unconstrained. Shifting to renewable energy has a net positive impact on real GDP and employment, with gains shared widely across the economy.

- For South Africa, the most affordable energy future is one that sees future energy requirements met by expansions of VRE, instead of Eskom's fleet of coal-fired power plants. Cost-optimal energy models argue for no new coal-fired plants and the retrofitting of nearly all existing coal-fired plants with new technologies to meet minimum emissions standards (MES) by 2025.

SA-TIED research exploring **the potential impacts of climate change in the region** consistently demonstrates that higher global emissions have worse, and more variable, outcomes than lower emissions scenarios:

- Climate change is predicted to lower agricultural yields and increase demand for water, even in the best scenarios. This highlights a need to invest in resilient agriculture, water, and food systems, especially as regions with vulnerable households are most sensitive to large climatic changes. Because the effects of climate change vary by region and industry, policy makers should develop adaptation strategies at different spatial and industrial levels.
- Investments in climate-resilient energy generation and road infrastructure and innovations in electricity trade policy can alleviate price and supply shocks.
- Increased price and financial stability resulting from investments in climate mitigation and adaptation.
- New policy mechanisms that would enable central bank support of climate mitigation and adaptation programmes.

The **transition to a low-carbon economy** also presents opportunities, such as:

- The benefits associated with improved land use planning techniques that ensure agriculture does not increase environmental costs.

Igniting growth for all of Southern Africa

South Africa has a major role to play in promoting regional growth and development. As the largest exporter in the region and the largest importer of regional goods, South Africa's prosperity is interconnected to that of its neighbours. Providing **practical guidance on how to exploit opportunities to spur regional industrial development** was a key aim of research produced under SA-TIED.

- Special Economic Zones (SEZs) offer substantial potential in the region, but they often fail due to inappropriate design and poor implementation.
- SEZs in the Eastern Cape, South Africa, are latent drivers of growth and employment that can be better harnessed by improving infrastructure and local supplier capabilities. Other SEZs in Southern Africa require the addition of capable business service provision, streamlined regulations and procedures, coherent incentive structures, and organization around strategic

anchor industries to kickstart the formation of agglomeration economies.

- More can be done in practical terms to promote local regional suppliers to supermarkets. Supermarket procurement systems, trading requirements, and product placement practices often exclude or inhibit regional producers.
- There is a powerful role that supermarket chains can play through supplier development programmes (SDPs). Governments in some countries have played an active role in facilitating links between suppliers and retailers to stimulate supplier development. Countries such as Malaysia and Mexico upgrade suppliers to meet supermarket standards and facilitate linkages between suppliers and retailers. The Southern African Development Community (SADC) region could look to these experiences for inspiration.

1 Introduction

During 2014–16, the National Treasury of South Africa (National Treasury) and the United Nations University World Institute for Development Economics Research (UNU-WIDER) collaborated on a research project entitled *Regional Growth and Development in Southern Africa*. It produced new insights on firm-level performance, public revenue mobilization, and regional trade opportunities. The project facilitated novel research opportunities and in-depth cooperation between researchers and public institutions in South Africa and the region, as well as beyond with international partners. Furthermore, the project played an important role in making anonymized administrative tax data available for research, placing South Africa at the forefront in this important area of research.

Building on the significant momentum achieved and with the objective of scaling up the engagement, the partners involved launched a three-year programme, Southern Africa – Towards Inclusive

Economic Development (**SA-TIED**) in November 2017. Implemented during the period 2018–21, the SA-TIED programme has aimed to address domestic and international constraints to realising the growth potential of Southern Africa in general and South Africa in particular. The programme sought to create and develop a platform for evidence-based policy formulation to allow the Southern African region to prosper by: (i) tackling existing structural challenges supported by the production of policy-relevant economic research; (ii) building capacity of national and regional partners; and (iii) establishing efficient communications and policy-bridging channels to ensure policy uptake.

Recognizing that South Africa plays a crucial role as a vehicle for growth and prosperity in the region, the partners designed the SA-TIED programme deliberately to support and collaborate with key departments within the economic cluster of the South African government.

1.1 Reaping benefits from unique partnerships

The programme distinguished itself by including a unique network of implementing partners. They encompass two renowned international research institutes, UNU-WIDER and the International Food Policy Research Institute (IFPRI), together with five leading South African-based institutions, including the National Treasury, the South African Revenue Services (SARS), the Department of Planning, Monitoring and Evaluation (DPME), the Department of Trade, Industry and Competition (dtic), and Trade & Industrial Policy Strategies (TIPS). Funding came from the participating partners alongside financial support from the Delegation of the European Union to South Africa.

From the outset, the partners structured the programme around the key principle of pairing government agencies with international experts from UNU-WIDER and IFPRI to address some of the most pressing concerns in South Africa and its neighbours in the region. Programme implementation took place in six thematic Work Streams:

- i Enterprise development for job creation and growth (led by National Treasury and UNU-WIDER)
- ii Public revenue mobilization for inclusive development (led by SARS and UNU-WIDER)

- iii Macroeconomic modelling for policy formulation (led by National Treasury and UNU-WIDER)
- iv Turning the tide on inequality (led by National Treasury and UNU-WIDER)
- v Climate change and energy transition as drivers of change (led by DPME and IFPRI)
- vi Regional growth for Southern Africa's prosperity (led by TIPS, dtic, and UNU-WIDER)

With each Work Stream anchored in a government department, the SA-TIED programme gained two notable benefits. First, it positioned the programme to understand—and respond to—existing knowledge gaps in key policy areas both within the respective departments and across the government. Second, it gave SA-TIED a unique entry point to disseminate research and, in extension hereof, increase the likelihood of research uptake amongst policy makers.

1.2 Responsive and policy-relevant research of highest quality

The partners launched the SA-TIED programme with an ambitious overall target to produce at least 150 individual research studies during the lifetime of the project. Upon completion, the programme exceeded this goal, with more than **175 studies** published under the six Work Streams. It has been a cornerstone in the programme that all research produced meets the highest professional standards and is rigorous in character.

To achieve this objective, senior researchers from UNU-WIDER and IFPRI have carefully reviewed and quality assured all studies produced, and they made sure the studies met the academic threshold to merit publication in the respective institutional working paper series. Furthermore, peer-reviewed academic journals have accepted a dozen studies produced under the programme, and many more are currently in the pipeline for such publication.

In addition to scholarly rigour, the programme was equally committed to being agile in its research production in response to sudden and critical challenges arising on the South African policy agenda. The best way to exemplify this is how, first, research was rapidly produced to inform policy formulation to curb the impact of the COVID-19 pandemic. Second, SA-TIED was able to provide technical support to Operation Vulindlela, a key policy initiative jointly implemented by the National Treasury and The Presidency. The aim of Operation Vulindlela is to raise the level of economic growth by expediting the implementation of structural reforms in the network industries of electricity, freight transport, digital communications, and water, as well as visas for skills and tourism.

1.3 Inclusivity for greater impact

Throughout SA-TIED Phase I, emphasis has been on inclusivity across both individuals and institutions. This has been a priority to: (i) mobilize and secure critically important nuance in the activities undertaken; (ii) ensure diversity and fair representation; (iii) increase broad-based support for the activities of the programme; and (iv) build the capacities of SA-TIED stakeholders.

To promote sharing and inclusivity of the research portfolio of SA-TIED, the programme launched seven Requests for Research Proposals (RFRPs) under its six Work Streams. In total, the programme received more than 400 applications under these RFRPs, of which 111 came from South African individuals and organizations.

Due to the programme's wide and diverse network of researchers in South Africa, in the region, and around the world, and their direct collaboration with South African public servants, SA-TIED managed to engage notable numbers in research authorships. More than

300 researchers contributed to the SA-TIED studies, of which 60 per cent were authored or co-authored by women and two-thirds by South African nationals. In addition, responding to the programme's objective of fostering policy bridging and building capacities, 18 per cent of the studies published have a South African public servant as an author or co-author.

Since the commencement of the programme, research and training staff from more than 70 organizations from around the world engaged directly with SA-TIED under the various activities relating to the programme's research production and capacity building. Some 27 of these organizations are South African universities, research institutes, and government departments.

2 Novel data and analytical approaches

Building on the foundation of the 2014–16 research collaboration between UNU-WIDER and the National Treasury, the SA-TIED programme sought to scale up past successes while also exploring new approaches to reaching its overarching objectives. First, SA-TIED promoted a noteworthy expansion of the infrastructure

around the South African tax administrative data. Second, SA-TIED targeted—and significantly increased—the efforts at building domestic research capacities. Third, SA-TIED deployed new and innovative approaches to ensure uptake of SA-TIED research.

2.1 The power of tax data

Countries need data and evidence to create, evaluate, and amend policy. South Africa has been at the vanguard of data collection in sub-Saharan Africa in recent decades with strong institutions gathering data for research purposes. Making tax administrative microdata available for research purposes underscores this tradition and places South Africa in the lead of big data research for development.

This process picked up speed in 2014 when UNU-WIDER and the National Treasury collaborated on the programme Regional Growth and Development in Southern Africa, which included a dedicated focus on developing new datasets based on South African tax administrative data. The project invested in new infrastructure to setup a modest data lab and brought in data scientists and senior researchers to compile the first datasets. The project made tax data publicly available to researchers.

The new data opened up avenues for research in areas and topics that were not possible before in South Africa. It permitted analyses at the level of the firm, rather than at sector levels, allowing for more detailed and nuanced insights. The data also provided both snapshots and longer views of the entire formal workforce, allowing for studies of the labour market with a higher degree of credibility. Lastly, the level of detail available in the tax data allowed for the examination of existing policy issues from new angles and perspectives.

Dedicated investments for a world-class data lab

With the launch of the SA-TIED programme, research around the tax administrative data remained a top priority. Substantial resources, drawn from the SA-TIED programme as well as the National Treasury, were invested in the infrastructure supporting the storage and accessibility of the data. This resulted in the opening of the National Treasury Secure Data Facility (NT-SDF) in 2019, a major achievement. The opening of the data lab represented a landslide for tax data research in South Africa. It dramatically increased the amount of available work stations

for researchers, expanded computing power and processing capacity, and strengthened the data security set-up. Moreover, it became a meeting point for local and international researchers as well as policy makers working on the data. They developed synergies among one another, which contributed to the generation of new knowledge and networks.

Attracting and building the human resources required to run an international top data lab was key. Full-time positions were funded by the programme to support daily operations, and a research assistant programme was developed. Research assistants worked with data managers to clean, improve, and make innovative use of the tax data to the benefit of the greater research community.

The operational scale-up around the tax administrative data also brought network opportunities at the level of individuals. The programme and experience in the lab offered a unique opportunity for young economists and data scientists to get involved in work on the tax data (e.g. through the previously mentioned Research Assistant Scheme). The skills acquired cut across those used in big data analytics and academia, which opened up a number of opportunities for the individuals involved. SA-TIED-employed personnel and consultants have gone on to work in national statistics departments, to pursue PhDs in data science, and to work on tax data in other countries.

New institutional breakthroughs and partnerships

There are two key institutions when it comes to making tax administrative data available for research in South Africa: the SARS, authorized to collect tax data from firms and individuals, and the National Treasury, making the data available in anonymized and cleaned datasets through the NT-SDF. This setup requires close collaboration between the two parties as well as well-developed skill sets amongst those involved in the process of cleaning and transferring the data. The SA-TIED programme therefore deployed a team of consultants at both

institutions to provide support to their respective employees working on the data. In addition to technical assistance, the programme included a range of tailored trainings and seminars, co-arranged at the two organizations, to advance capabilities and bolster the institutional collaboration around the tax data.

The programme also actively sought cooperation with new entities to explore and develop the nexus of research and South African administrative data. The best example of this is the programme's collaboration with Statistics South Africa, the national statistical service of South Africa. Statistics South Africa agreed to host metadata on the tax administrative data prepared by SA-TIED on its website, which is a great advantage for researchers working in this area.

Another breakthrough happened in early 2021, when a partnership with the Office of the Chief Procurement Officer was established. The objective is to develop a comprehensive public procurement database, open to researchers, that can be used for effective oversight and to improve government policy. This partnership with the division of the National Treasury responsible for modernizing and overseeing the South African public procurement system will rely on this unique source of administrative data.

2.2 Building a solid foundation for research and evidence-based policy-making

In its efforts to foster development and reduce the gap between research and policy-making, the SA-TIED programme actively engaged in capacity development efforts. The programme developed a series of focused activities directed at two main groups of stakeholders: (i) South African public servants from implementing and partner agencies and (ii) younger professionals and students aspiring to pursue a career in academia or government.

Targeted efforts to build capacities of government officials

With the aim of improving economic research capacity within the government sector, and to increase the skill set of economists engaged in rigorous economic policy analysis, SA-TIED launched two key longer-term initiatives, *PhD Scholarships* and *Staff Secondment Scholarships*, for South African government officials employed across the four government departments involved in the programme.

The PhD Scholarship programme offered financial support to undertake a PhD degree domestically

Exploring modern terrains for data-driven research and policy-making

Due to the dedicated efforts under the past two engagements between UNU-WIDER and the National Treasury, it is now possible to do types of research not possible seven years ago. New policy research areas enabled by data developments under SA-TIED include: (i) how behavioural factors affect optimal policy design; (ii) how to credibly evaluate long-run effects of landmark social programmes and tax incentives; and (iii) how to make changes to these programmes informed by a better understanding of the levels of impact. In the process, the quality and breadth of evidence used to inform policy noticeably improved, as is shown in our review of the detailed working papers later in this report (Ebrahim and Cassim 2021).

In total, close to one-third of all research studies published under the SA-TIED umbrella makes use of the tax administrative data. To showcase these studies, and to highlight other achievements and general information in relation to the data, a dedicated webpage² was set up at the beginning of the programme.

or abroad, and after an open and competitive call, SA-TIED awarded PhD Scholarships to 12 public servants, including eight women, from three departments, the National Treasury, the SARS, and the dtic. One of the recipients graduated during the implementation of the SA-TIED Programme while the remaining cohort members are in various stages of completing their degrees.

As an additional opportunity for government staff, SA-TIED launched a series of Staff Secondment Scholarships. This initiative offered staff members the opportunity for secondment domestically or abroad for a duration of up to three months. SA-TIED awarded four Secondment Scholarships in total under this initiative to staff members from the National Treasury, DPME, and the dtic.

In parallel with these two scholarship programmes, SA-TIED planned and implemented a variety of courses and technical workshops for employees from government agencies. The partners tailored these shorter-term initiatives to respond to pressing needs and address skill shortages within the respective

² sa-tied.wider.unu.edu/data

departments. The instructors responsible for these trainings were identified from the UNU-WIDER and IFPRI global networks of experts. The courses and workshops varied in shape and form, from in-person training to virtual classes, and in content, from the application of microeconomic models to the use of statistical software. Throughout the implementation of the SA-TIED programme, 23 such short-term training courses took place, with over 430 attendees, of whom 256 were women.

Supporting the next generation of researchers and policy makers in South Africa

The SA-TIED programme prioritized capacity development initiatives to support the next generation of policy makers and researchers in South Africa. Two such initiatives, the *Young Scholars Programme* and the *Research Assistant Scheme*, ran throughout the duration of SA-TIED.

The Young Scholars Programme aimed to expose master-level students from South African universities to the research currently conducted in government as well as the public sector work environment in general. In addition, it allowed participants to exchange research

ideas with fellow students and receive feedback on their thesis research from senior academics affiliated with UNU-WIDER and IFPRI. Since the commencement of the initiative, 45 students, including 21 women, from nine different South African universities, participated in the programme as young scholars. An integral part of the initiative was to provide the students with a platform to publish their thesis research as an SA-TIED Young Scholars Paper. SA-TIED published more than 35 Young Scholars Papers and upgraded two such papers of outstanding quality to regular SA-TIED Working Papers.

The Research Assistants Scheme is an opportunity for talented, South African master-level students. It provides them with a prospect to grow their data analytical capacities while supporting the daily work within the SA-TIED programme and the National Treasury in general. Throughout the SA-TIED programme, more than 10 Research Assistants from South African universities supported the programme's analytical efforts at the National Treasury—ranging from direct support to the tax administrative data and the everyday work at the Secure Data Facility, to hands-on analytical work within the various divisions of the National Treasury.

2.3 Active policy-bridging and media outreach

Dissemination of research findings for evidence-based policy-making was at the heart of the programme mandate of SA-TIED. The programme partners were committed to engage with policy makers and other relevant stakeholders during the programme to support a conducive environment for policy development and evidence-based discussions. Examples of policy-bridging efforts and outreach activities include the dynamic *SA-TIED Seminar Series*, *SA-TIED Policy Dialogues*, and various outputs synthesizing key implications, such as *SA-TIED Policy Briefs* and *SA-TIED Synthesis Notes*.

An essential part of the programme's commitment to communicate was the SA-TIED programme website, sa-tied.wider.unu.edu, launched in February 2018. The website serves as a dissemination platform for all research produced under the SA-TIED umbrella and provides many opportunities to engage with the programme. It includes a range of feature stories and impact pieces that demonstrate the reach and impact of the programme and a dedicated section on the tax administrative data, with detailed descriptions of the datasets, information on how to access it, and highlighted research studies utilizing it.

Bringing research to the desk of policy makers

In an attempt to disseminate core research findings to policy makers, academics, and the public in South Africa and beyond, the programme launched its SA-TIED Seminar Series. The initiative served as a platform where SA-TIED researchers from the programme's six Work Streams could present their findings to key stakeholders. The seminars proved to be a great forum to discuss implications of research findings with those actively engaged in the development and formulation of economic policies in South Africa and the region.

At programme closure, SA-TIED has organized more than 30 seminars, the majority hosted at the National Treasury and the SARS to ensure easy access for policy makers. In total, more than 750 individuals attended the seminars, of whom 60 per cent were women. Almost 90 per cent of seminar participants were South African nationals.

While the SA-TIED Seminars were open to the broader public and included an academic presentation, the SA-TIED Policy Dialogues sought an alternative route to disseminate and discuss the implications of the research



produced. Varying in format, from closed meetings to public round-table discussions, Policy Dialogues were a strategically important platform. Here SA-TIED researchers and policy makers came together to discuss specific topics and identify ways in which SA-TIED findings could support evidence-based policy-making in South Africa and beyond. By programme closure, the Work Streams have organized more than 10 Policy Dialogues, covering topics such as labour-enhancing growth, fiscal planning, and energy transitions.

Tailored and easily-accessible formats to advance uptake

To support and further dissemination and uptake, a key activity of SA-TIED was communicating the knowledge produced in easily-accessible *SA-TIED Briefs* based on selected Working Papers. SA-TIED produced these Briefs for policy makers and key decision makers in South Africa and the region, as an important contribution to the policy-bridging ambition of the programme. By the end of the programme, more than 40 Briefs, each distilling an individual SA-TIED Working Paper, were published.

In addition to the Briefs summarizing individual studies, the programme also produced a series of seven *SA-TIED Synthesis Notes*, one for each of the six thematic Work Streams alongside a separate SA-TIED Synthesis Note on the work carried out in relation to the tax administrative data. These outputs distill the research at a portfolio level and highlight the main research achievements of each Work Stream and their implications for policy-making and future research. The key take-aways from these Synthesis Notes are in focus in the following section of this report.

3 Innovative research-based policy evidence

3.1 Work Stream 1 - Enterprise development for job creation and growth

Development context and policy challenges

The need for developing a dynamic and productive enterprise sector sits at the very core of two of South Africa's main policy challenges: structural unemployment and inadequate economic growth. A decisive turnaround creating robust economic growth and productive jobs at a massive scale is now indispensable to a prosperous and inclusive society.

Unemployment is particularly severe among young people on whom future progress depends. The youth unemployment rate was 51.4 per cent in the 2013–16 period (Ngandu and Chisadza 2018). Moreover, the rise in temporary work is highly problematic as these workers are vulnerable and unprotected (Cassim 2020).

To address these problems, the South African government introduced various incentives through the Sector Education and Training Authorities (SETA). Yet, the effectiveness of these programmes has been questioned (Turner et al. 2013). The government has also pursued an export-led growth strategy through its National Development Plan, the Industrial Policy Framework, and the Industrial Policy Action Plan, and the country has indeed become increasingly integrated into the global economy. However, misallocation of resources contributes significantly to disappointingly low productivity growth (Newman et al. 2019). The key question is what constrains enterprise development, employment growth, and productivity improvements in South Africa?

Thematic topics and key research findings

Research focused on firms, their economic performance, and how they adapt to changes in incentives and regulations along four thematic sub-clusters: (i) Productivity and innovation; (ii) International trade, multinationals, and export performance; (iii) Temporary and youth employment; and (iv) Energy costs.

Productivity and innovation

SA-TIED addressed in a concerted way the role of innovation, labour mobility, and the impact of resource misallocation on productivity and growth in this sub-cluster. Selected studies and findings include:

- Steenkamp et al. (2018) uncovered that the elasticity of output with respect to research and development (R&D) lies within the range observed in studies of more developed countries. This is so despite the significantly lower innovation intensity in South Africa, and this finding suggests that the

return to innovation is potentially quite high. This is in line with the theory that countries further away from the technological frontier may obtain a boost through technological catch-up. Moreover, Naidoo (2020) shows that investing in R&D has a positive direct effect on employment growth.

- Amusa et al. (2019) investigated the effect of industry clustering, firm age, and market concentration on productivity, and found that all three factors drive productivity improvements. However, when considering the manufacturing sector exclusively, this result is no longer well determined.
- Newman et al. (2019) estimated that misallocation of labour and capital in the South African manufacturing sector causes total factor productivity to be 16 to 22 per cent lower than optimally possible. The underlying issue is primarily misallocation in finance provision, which is severely lacking for smaller firms. By alleviating distortions, productivity could grow by approximately 2.2 per cent per annum. Another result is that heterogeneity effects in firm size are associated with a negative serial correlation in firm growth (Mamburu 2018). Along with Newman et al. (2019), Mamburu (2018) therefore suggests providing better public support and access to finance to small and medium enterprises.
- Hlatshwayo et al. (2020) investigated the extent to which worker mobility results in productivity spillover effects between firms. They find that this is, in general, the case for South African firms. Yet unlike research conducted in more developed countries, the high skills deficit in South Africa is found to be a limiting factor for productivity spillover effects occurring through the labour mobility mechanism, pointing to the importance of support for firm-level training initiatives.

International trade, multinationals, and export performance

This sub-cluster developed a number of key findings regarding firm behaviour that cut across a range of crucial issues starting with the fact that the global value chain (GVC) revolution has facilitated the rise of multinational companies and created new ways to conduct tax avoidance through profit shifting.

- Wier and Reynolds (2018) investigated profit-shifting behaviour at the top of the firm size

distribution. Their findings suggest that the OECD underestimates the total tax loss due to profit shifting by more than 80 per cent because of neglecting heterogeneity in size. Specifically, they find that the largest 10 per cent of firms account for 98 per cent of the total estimated tax loss. Wier (2018) also investigated transfer mispricing, in which firms can reduce their tax bill in one country by giving a high price on items flowing from a low-tax country to a high-tax country. The study finds evidence of transfer mispricing by lead firms in South Africa, and the author suggests a system for the revenue authorities that flags firms that diverge from the so-called ‘arm’s-length pricing’.

- Globalization and the fragmentation of production networks have led more and more South African manufacturing firms to substitute intermediate inputs produced onshore with imports. Pretorius et al. (2019) found that contrary to firms in the developed world, rather than offshoring the production of intermediates, South African firms import intermediates. Accessibility of cheap imports, especially from China, has had a negative competition effect, explaining part of the deindustrialization process occurring in South Africa. Torreggiani and Andreoni (2019) confirm this, finding that increased Chinese import penetration is highly negatively associated with employment growth, sales growth, and survival rates. The study also finds that investing in innovation and capability building reduced the negative impact of Chinese import competition.
- Accumulation of new capabilities and innovation is essential for an export-led growth strategy to succeed. Sørensen (2020) investigated the hypothesis that the presence of lead firms, with superior technology and knowledge, can induce spillover effects that increase the productive knowledge of domestic manufacturing firms. Examining economic complexity from a micro-level perspective, he finds evidence of foreign direct investment (FDI)-induced export complexity upgrading at the firm level. In particular, he finds evidence of vertical upstream relationships, meaning that it is crucial to target FDI promotion on the input-supplying sector. Mazzi et al. (2020) investigated the learning-by-exporting hypothesis and found that only firms that trade in customized intermediates and simultaneously invest in innovation in the post-entry period appear to gain a significant productivity premium.
- Edwards and Hlatshwayo (2020) investigated the weak manufacturing export response to depreciation in the real exchange rate observed between 2010 and 2014. They find that, on average, exporters kept the domestic value of export prices fixed and passed through the full

reduction of the depreciation to the foreign denominated price. Despite this, the observed quantitative response was limited, indicating that other factors are at play—such as high distribution costs, foreign tariffs, and destination retail margins. They also find strong heterogeneity effects in the responsiveness across firm size, destination, and product composition.

Youth unemployment and temporary employment services

Youth unemployment and temporary employment leave many South Africans economically vulnerable and reduce future economic prospects.

- Ngandu and Chisadza (2018) identified niches in which the absorption of youth employment is highest. They find that wholesale and retail, communication, and recreation sectors are more likely to employ young people than agriculture, public services, or manufacturing. Younger firms employ young people, whereas more established high profit and export firms do so to a much lesser extent. The authors also discover that the firms registered for training subsidies have a higher absorption rate. At the same time, the authors argue that to obtain the full impact, support must increase to cover the entire training cost.
- Temporary work is increasing worldwide and in South Africa as well. Cassim and Casale (2018) investigated the implications for wages and benefits. They find a significantly higher wage penalty than found in other studies from the developed world. Their results suggest that total earnings on average drop by 30 per cent when individuals move from fulltime to temporary work. Eighty per cent of the penalty is due to the differences in benefit contributions (for pension, medical aid, etc.). In 2015, South Africa passed a new amendment to the Labour Relations Act to better regulate and offer greater protection to temporary workers. In a related study, Cassim (2020) investigated the impact of the amendments focusing on job duration. Her findings are mixed and they suggest that the short-term effect of the law was minor, possibly reflecting that the law was not fully implemented at the time of the study.

Energy costs

Electricity has become increasingly expensive in South Africa, as tariffs have risen steeply since 2008. SA-TIED researchers explored the implications of rising energy costs on households and firms.

- Goliger and McMillan (2018) explored whether tipping points loom for the largest firms. Their findings suggest that investing in self-generation of renewable energy has become a viable option for many firms, even if tariffs do not increase





significantly. At the same time, it poses a risk to the business model of the state electricity provider and local government revenue, which is highly dependent on the tariff income.

- Tariff rises affect households similarly. Goliger and Cassim (2018) find that middle-income households are highly vulnerable in this regard, as they may not have the necessary capital to invest in off-grid and energy-saving technology. Assuming that 35 per cent of households, which can afford to invest, will invest in off-grid technologies, associated with falling relative cost over the next decade, Goliger and Cassim (2018) estimate that residential electricity sales might drop by a third.

Policy recommendations

A wide range of policy implications emerge from these research findings.

First, South Africa has significant catch-up potential. Given the high returns to R&D investment, it merits support and promotion. R&D positively affects long-run productivity and employment growth. However, the uptake of existing incentives is low. Establishing new sectoral-level initiatives to improving governance and accessibility of incentives is a complementary policy to increased investments in R&D. Existing policies that support and encourage R&D investments should be continued and expanded.

Second, there are no 'low hanging fruits' when it comes to worker mobility and productivity. The structure and current skills deficit in the South African labour market means that it is unlikely that productivity gains through labour mobility will be a driver of productivity growth in South African manufacturing in the years to

come. There is a clear need to continue and enhance policies that support firm-level training initiatives. However, there are encouraging positive direct effects of agglomeration on productivity, suggesting that this is a route to pursue. Future research on the spatial distribution of jobs and the potential for productivity gains through both agglomeration and worker mobility will better contribute to policy adjustments.

Third, smaller firms find it difficult to access credit, and there is evidence of significant misallocation of capital across firms that negatively impacts aggregate productivity growth. Consequently, policy measures need to be re-calibrated to address the constraints facing firms on the smaller side of the firm-size distribution. This entails improving the accessibility and governance of firm-level labour training initiatives and better targeted public support in providing access to credit to smaller firms.

Fourth, given the scale of profit shifting and transfer mispricing among the largest firms, a key policy recommendation for the revenue authority is to implement a tax avoidance flagging system to detect firms which may systematically abuse the existing system. Noting that the presence of multinationals in a supplier relationship does improve the economic complexity of domestic firms, policy makers should be alert to the potential benefits associated with FDI.

Fifth, only those domestic firms which both trade in GVC-related products and invest in R&D get a productivity gain when they enter the international market. Industrial policy needs fine-tuning so that these firms are supported where appropriate. Intermediate manufacturers should also not be overlooked. And, promotion of FDI should target especially the input-supplying sector, particularly through production upgrading and investment in research and skills. All

these considerations are in addition to targeting sectors where South Africa has a competitive edge.

Sixth, South African exports are highly concentrated among large firms, and these firms rely heavily on imported intermediate inputs. This dampens the overall response in export volumes to currency depreciation. Policy should therefore target a number of factors that constrain exports other than the exchange rate. This includes high distribution costs and remoteness but also structural features that limit the responsiveness of South African firm exports to depreciation such as electricity bottlenecks, limited competition, labour market constraints, and uncertainty. Overall, there is need for targeted approaches to relieve the many interacting constraints on firms entering international markets. Seventh, given that younger and smaller firms are more likely to help address the current youth unemployment problem, they merit particular attention.

Moreover, training subsidies correlate positively with the absorption of youth employment. However, to obtain the full impact of training initiatives, increased government support to cover training costs and assistance to start-ups is called for. In parallel, since the amendments passed to protect temporary workers have not been efficient, they are in need of revision.

Eighth, as the relative cost of alternative energy technology falls due to rising tariffs, firms and households will adjust their consumption and investment decisions. Both firms and households are likely to go off-grid by investing in generating their own electricity. This will have implications for the revenue of the state-owned electricity provider in South Africa (Eskom), which is already in a perilous financial position. The South African government needs to balance fiscal support for Eskom with tariff rates that do not strain households and businesses.

3.2 Work Stream 2 - Public revenue mobilization for inclusive development

Development context and policy challenges

South Africa has respectable fiscal capacity, with the tax-to-GDP ratio clearly above that of other African countries and other middle-income economies in the pre-COVID-19 period. The tax rate also increased slightly during the decade following the financial crisis in 2008. However, the pandemic has led to a sharp reduction in revenue, even when measured against lower GDP. According to the National Treasury, the estimated tax-to-GDP ratio stood at 24.6 per cent in fiscal year 2020/21, compared to 26.3 the previous year.³ The decline is due to automatic stabilization (i.e. the fact that when incomes decline, the tax rate falls in a progressive system) and to the tax deferral opportunities offered to firms during the crisis.

While tax revenues may pick up again as the effects of the pandemic wane, the deficit is persistent and the sustainability of revenue continues to be vital.

Some ten years ago, the UK Institute of Fiscal Studies (IFS) put together a major review of the characteristics of a good tax system, known as the Mirrlees Review (see Mirrlees et al. 2011). The Mirrlees Review emphasizes that a good tax system:

- Minimizes the efficiency costs to society (such as the possible negative impacts of taxation on employment, savings, and investment) for given distributional goals;

- Keeps administration and compliance costs at bay;
- Achieves fairness in other aspects than the distributional sense, such as fairness of procedure; and
- Is transparent.

The review notes that a simple, neutral, and stable system is more likely to reach these goals than a complex, non-neutral, and frequently changing organization of taxation. While these considerations would be crucial even if there were no fiscal deficits, they are of core importance when there is extraordinary pressure on revenues.

Our research builds on the guidelines in the Mirrlees Review and evaluates the South African tax system from three different perspectives.⁴ First, we consider what findings research under the work stream on tax has revealed about the efficiency (costs) of the tax system. Second, we consider how well the South African tax system fares in terms of its distributional justice goals. Third, we address several aspects of the implementation of taxation.

³ Source: The 2021 Budget Review by the National Treasury.

⁴ Please see Ebrahim et al. (2019) for a review of work conducted on tax in South Africa prior to the present research programme.

Thematic topics and key research findings

Taxation and economic efficiency

Taxes may distort many real economic outcomes. Examples are the supply and demand of labour and rates of avoidance and evasion. A useful summary measure (see Saez et al. 2012 for a review) is how much the tax base—i.e. taxable income—reacts to changes in tax rates. This notion, the elasticity of taxable income, captures both decisions in the real economy and broader responsiveness, such as avoidance.

Kemp (2020b) examines the responsiveness of the South African tax system. Since there have been few actual tax rate changes in the personal income tax code, he uses the idea of bracket creep (or fiscal drag). This involves the insight that because of larger-than-expected wage inflation, some taxpayers are pushed into a higher marginal tax rate. Using the individual panel (described by Ebrahim and Axelson 2019) covering the years 2010–16, the author finds that the elasticity of taxable income with respect to the retention rate (1 minus the marginal tax rate) is approximately 0.4 and the corresponding elasticity of broad income (income before any deductions) would be 0.2. The responses are concentrated among higher income groups. These results are well in line with the international literature, and they suggest that further tax increases would cause a reduction in the tax base and undermine the revenue goals, at least without offsetting measures to avoid tax planning and avoidance.

Boonzaaier et al. (2019) have previously used the bunching approach in the South African context to examine bunching in the corporate income tax, and Pillay Bell (2020) extended the work in her analysis of the personal income tax. She finds no bunching among wage earners, which is a common finding in the literature. However, the self-employed (i.e. owners of non-corporate firms) are very responsive to the kink points in the tax system. Moreover, the bunching behaviour is especially prevalent around the highest kink point. As common in the bunching literature, the estimated elasticities are small even for the self-employed. Nevertheless, the findings indicate that there is a clear response among the self-employed, who have more leeway in adjusting their incomes than wage earners do, that needs to be considered in formulating tax policy.

Governments use tax incentives to alter economic behaviour. One of the most important of the South African tax incentives is the Employment Tax Incentive, the ETI. It is a tax reduction offered to the employers of low-paid (initially below ZAR6,000 a month) young workers (those aged 29 or less). The maximum duration of the ETI claim is two years, with the maximum amount lowered by 50 per cent during the second year. ETI aims to raise the labour

demand for young unskilled workers and is well motivated due to the high youth unemployment rate.

Ebrahim and Pirttilä (2019) study the employment and earnings impact of the policy at the individual level. Using both survey and administrative data, they do not find that the system would have increased the employment rate of the target group. The policy did lead to a small increase in the hiring rate of eligible youth and an increase among the mean earnings among the target group. A longer-term follow-up is ongoing. Marcelin et al. (2019) have examined the firm-level impacts of the policy. They find that the policy contributed to greater profits and investments in the firms which used the system, and that the impacts were clearer in financially constrained firms.

Some of the tax incentives may not necessarily be very salient or even created on purpose. Kari et al. (2019) uncover the investment incentives embedded in the South African corporate income tax system. They find that the effective tax rates vary across industries in a way that is not necessarily contributing to productivity growth. The effective marginal tax rates for investment in buildings and power generation and mining plants are negative on average, whereas the corresponding tax rates on software and computers, for instance, are much higher. The authors also document the clear debt bias entailed in the tax system. It may encourage firm-leverage and vulnerability to external shocks. They also discuss the mitigation of these distortions. Calitz et al. (2020) scrutinize depreciation-allowance tax incentives. They document the large tax expenditure incurred because of these allowances and question the efficiency of the expenditure.

Taxes and redistribution

The overall tax and benefit system should contribute to meeting the distributional goals of society. However, this does not imply that every tax instrument be designed with distributional equity in mind. It is sufficient that the overall fiscal system is sufficiently redistributive. Gcabo et al. (2019) examine this idea. They study the impacts of a reform package where the goods that are now subject to zero rating in the value-added tax be taxed instead at the standard rate, while the revenues go for financing targeted transfers instead. Such reforms lead to lower poverty and inequality than under the current practice, suggesting that addressing distributional concerns via zero rating in the value-added tax system is an inefficient way of using public money. One could design a system yielding more poverty reduction or one with greater revenue to the government with the same poverty reduction.

Nhamo and Mudimu (2020) examine, in turn, the distributional consequences of tax allowances for medical expenditure. Their analysis confirms that tax credits (where the tax benefit is of equal rand amount to all) are more desirable from a distribution

perspective than tax deductions, which lower taxable income. The reason is that the value of the latter is greater for high-income earners with higher marginal tax rates. However, limiting the additional medical expenses allowance would bring a further increase in progressivity. In contrast, the 2016 pension-savings tax incentive reform did not make the system less regressive (Redonda and Axelson 2021), calling for further assessment of this use of tax expenditures.

The corona pandemic has posed a huge challenge to the safety net provided by the fiscal system. Barnes et al. (2021) evaluate how well the South African tax-benefit system performed in providing cushioning to households against the economic shock brought about by the crisis. They combine information from the up-to-date National Income Dynamics Study – Coronavirus Rapid Mobile Survey (NIDS-CRAM), altering the dataset that underpins SAMOD, a tax-benefit model for South Africa. They also incorporate the new policies introduced in 2020 to the model. They include greater benefit amounts and two new policies: the COVID-19 Temporary Employer/Employee Relief Scheme (TERS) and the COVID-19 Social Relief of Distress (COVID-SRD). The impact of these new measures, especially the latter, has been crucial in providing relief during the crisis. Since people who previously had not been eligible for any transfer now started to receive benefits, the estimated poverty and inequality at the height of the crisis actually fell in comparison to just before the crisis.

Tax administration

One way to examine the revenue efficiency of the tax system is a tax gap analysis. Jansen et al. (2020) conduct such analysis for the South African corporate income tax system. They use a top-down approach, computing as yardstick the tax base and possible revenues using an alternative means (with the help of national accounts concepts), which they contrast with the actual tax receipts. They estimate that the South African corporate income tax gap amounts to 11 per cent of the tax base or two per cent of GDP. This is a sizeable shortfall in revenues, calling for further examination of the underlying reasons.

Although not part of SA-TIED, the study by Lediga et al. (2020b) is a very useful analysis of the impacts of an enforcement intervention in South Africa. In the study, the authors used the business register to provide third-party information about firms not previously included in the tax net. Although the number of tax-paying firms increased drastically, the impact

on actual revenues was modest. This is because the newly taxed firms were small and because their compliance along the intensive margin—conditional on registering—was poor. The results point to the potential of third-party information to support the fiscus, but also that the revenue gain from including the remaining informal firms may be small.

Lediga et al. (2020a), in turn, provide interesting evidence on the impacts of tax audits in South Africa. They show that audits have spillovers: firms that are geographical neighbours to audited firms also report greater incomes. Therefore, the total impact of audits on revenue are larger than the additional revenue from audited firms alone would suggest.

Policy recommendations

South Africa's tax system performs well in generating revenue compared to many other countries. Together with social grants, the entire tax/benefit system also has considerable distributive capacity. However, the research findings under SA-TIED Work Stream 2 confirm that there are several aspects to improve.

Key to sustainable growth for any country is productivity growth; and the taxation of firms and their owners is important for business dynamism. Yet, according to SA-TIED research, the South African corporate income tax system leads to very different effective tax burdens across sectors, and in ways that are not necessarily promoting investments in new industries. The system also heavily favours debt over equity financing, which likely contributes to the deterioration of firm resilience in crisis times. Depreciation allowances are sizeable and entail a large tax expenditure.



At the same time, reform of corporate business taxation is challenging because of the significant role that these taxes play in revenue generation. When it comes to distributional goals, a key recommendation is to rely more on the tax instruments best suited for the purpose—i.e. direct benefits instead of zero rating in value-added taxation. The South African policy response to the coronavirus shock has been striking. Benefits for earlier ineligible population groups—out of the labour force working age population—were introduced. The result was that poverty decreased at the height of the crisis (second quarter of 2020) compared to the pre-COVID-19 situation.

Research on the taxable income responses to personal income tax rates in South Africa suggest that further increases in tax rates may lead to significant erosion of the tax base, at least without offsetting measures to limit tax planning. These findings underscore the need to develop redistributive capacity on the benefit side, rather than via (especially indirect) taxes.

3.3 Work Stream 3 - Macroeconomic modelling for policy formulation

Development context and policy challenges

South Africa's economy, viewed through the standard measures of real macroeconomic variables, has been chronically weak. In the ten years 2010–19, the average annual growth rate of GDP was 1.6 per cent, growth of GDP per capita was 0.1 per cent, and measured unemployment rose from 24.9 to 28.7 per cent or more than 40 per cent on a broad measure. These indicators are evidence of long-term trends conditioned by structural problems worse than those comparable countries face.

A growth decomposition by Sahoo et al. (2021) identifies, on a regional basis for South Africa and the Common Monetary Area (CMA), the components of growth trends in GDP and per capita GDP. The main macroeconomic policy tools, monetary policy and fiscal policy, directed by the South African Reserve Bank (SARB) and the National Treasury, respectively, address medium-term fluctuations around these trends. The fact that the reduction and stabilization of inflation was achieved with only a small resulting GDP loss (Gereziher and Nuru 2021), is a mark of monetary policy success. In parallel, the maintenance of sovereign debt on a sustainable path for much of the past two decades is a mark of fiscal policy success, notwithstanding more recent deterioration of debt sustainability.

Importantly, medium-term fiscal and monetary policy designs do not directly address the structural problems underlying South Africa's poor long-term trends. Nonetheless, fiscal and monetary policies

Some tax forms would require further analysis. International evidence suggests that taxing property is one of the least distortive tax instruments and the scope of potential reforms in this area merit further investigation. South Africa can also make progress in the area of corrective taxation—using tax incentives for goals other than efficiency or redistribution—including both environmental and health taxes.

A crucial part of a well-functioning tax system is an efficient tax administration. Our research indicates that the tax gap in the Corporate Income Tax (CIT) is sizeable, amounting to approximately 10 per cent of the CIT base. While there are few examples of studies on the revenue impacts of tax enforcement interventions, further research in this area would hold considerable promise also from the point of view of developing tax processes.

can indirectly affect the economy's structural characteristics, and the structure of the economy itself influences the ability of monetary and fiscal policies to moderate fluctuations around the long-term trend.

The most salient structural feature of South Africa is extreme income inequality. It relates to high structural unemployment, and the industrial and labour market structures of the economy. They, in turn, have fundamental roots in failures of the education system and obstacles created by the apartheid legacy. Although not captured by standard macroeconomic data since they measure aggregate behaviour or per capita averages, income inequality can be affected by the two main arms of macroeconomic policy, fiscal policy operated through adjusting budget deficits, and monetary policy implemented by the SARB.

Inequality is a thread that directly and indirectly links the macroeconomic studies discussed here. Together the outputs demonstrate that, in South Africa, income inequality links systematically with macroeconomics. The research supports the broad conclusion that, since reduced inequality is a national objective, the design of fiscal and monetary policy could contribute to it.

Thematic topics and key research findings

Monetary policy

Since 2000, the SARB has operated monetary policy within a flexible and forward-looking inflation-targeting framework, found to be consistent with a Taylor rule reaction function (Bold and Harris 2018). Changes

in its principal interest rate tool transmit through the economy partly via banks' prime rate. Merrino (2020a, 2020b) found that unexpected deflationary policy shocks worsen wage inequality and, although the effects are symmetrical for expansionary policies, structural labour market inequalities may cause monetary policy effects to generate lasting increases in inequality. A study by Aye et al (2020) and others using tax administrative data finds that monetary policy also has effects on wealth inequality. Monetary policy generally increases wealth Gini inequality while it decreases the wealth 90–10 percentile differential.

While monetary policy effects occur through the effect of policy interest rates on wage earnings, two other studies address the potential effects on income distribution through other channels. For example, inflation targeting with floating exchange rates is associated with greater nominal rate volatility than other policy regimes. Mukalayi (2021) finds that increased nominal exchange rate volatility has a welfare effect in that it depresses the growth of aggregate consumption. Aye and Harris (2019) find that real effective exchange rate volatility resulting from rand fluctuations affect the functional distribution of income in South Africa with higher volatility causing a decline in the labour share. On plausible assumptions, such a change in the labour share implies a worsening individual income distribution.

Another example of monetary policy's heterogeneous effects is the finding, using administrative tax data, that small manufacturing firms' balance sheet effects from monetary policy changes are large, unlike those of medium and large firms (Lesame 2019). Disproportionate negative effects on small firms of interest rate rises potentially depress their reward structures compared to larger firms with impacts on income inequality.

The success of monetary policy in controlling inflation and the redistribution effects that accompany unexpected high inflation depends on the SARB's ability to forecast inflation well. Ntshakala and Harris (2018) find that it is possible to extract information about future inflation from the yield curve to add inputs into the forecasting process. Martin (2019) finds that compared with traditional methods, machine-learning methods can yield strong efficient forecasts of South Africa's GDP, while Makatjane and Van Wyk (2020) find that they can assist the SARB to foresee periods of high exchange rates.

Fiscal policy

The role of budget deficits and government debt as developmental tools and as instruments to stimulate

output has been prominent in policy debates in South Africa since 1994. At the heart of the debate is whether deficit-financed government spending (fiscal expansion) stimulates economic growth, or whether it sets in motion responses that diminish, and possibly offset, any stimulatory effects. Several papers make major contributions to estimating the value of the fiscal multiplier in South Africa in relation to medium-term growth.⁵ The fiscal multiplier is a measure of the ability of changes in government spending, or government spending minus tax revenue, to stimulate changes in GDP by a greater or lesser amount than is spent (multiplier greater or less than plus one).

The fiscal multiplier is very sensitive to economic interactions that are indirect responses to a change in government spending. Increases in net government spending can induce responses such as:

- Increased interest rates or reductions in private credit (i.e. 'crowding out') in financial markets and institutions;
- Increased net imports rather than domestic production ('import leakage');
- Reduced private sector consumption to meet expected future taxes ('Ricardian equivalence').

There are other offsetting, or reinforcing, responses; therefore, estimates of South Africa's fiscal multiplier vary according to the extent to which the model is designed to capture such effects. Various SA-TIED papers use a variety of models, with different ways of recognizing such effects. A common feature is the recognition of financial sector interactions, which accords with the significance that the country's unusually large and developed financial sector has in South Africa.

Together, this research demonstrates that the fiscal multiplier does not have a unique, constant value, but varies according to economic conditions and policy actions. Policy makers are faced with numerous fiscal multipliers, each applicable in different circumstances. Several papers contribute to our knowledge, estimating likely fiscal multipliers for South Africa under different conditions and expanding our understanding of their determinants. They report a wide range of estimates, varying from below one (and possibly negative) (Kemp 2020a) to between two and three (Makrellov et al. 2020), with a range of values in between (Merrino 2021).

Three sets of findings are particularly important.

⁵ The long-run growth of capacity output is assumed to be dependent on trends in the supply of labour and capital and on increases in total factor productivity due to technological change—supply-side forces which are not susceptible to the demand-side changes induced by government expenditure.



First, and particularly for policy makers, estimated values are contingent on the stage of the business cycle. The fiscal multiplier is always found to be higher during recessions than during booms. By one estimate, the multiplier is only 0.1 after six quarters when the economy is expanding, but 1.2 when in recession (Merrino 2021). This implies that increased net government spending has a powerful expansionary effect in recession, but not when the economy is rising towards capacity output. Similarly, another estimate finds a multiplier of zero after eight quarters in an upswing, but 0.33 in a recession (Kemp 2020a). A third estimate finds reduced multipliers when the output gap is smaller (Makrelov et al. 2018).

A second major contribution expands our understanding of how financial sector behaviour influences the fiscal multiplier. Makrelov et al (2020). model financial institution behaviour on the assumption that the risk premium firms pay on financial credit declines when GDP increases, which stimulates further GDP growth. This increased availability of credit to the private sector—when fiscal expansions improve bank balance sheets and reduce credit premiums—adds to the direct effect of fiscal expansion and amplifies multiplier values.

This is the opposite of what crowding-out theories predict. The Makrelov et al. model of bank behaviour receives robust empirical support from the linear projection estimates of Merrino (2021). Kemp (2020a),

by contrast, assumes that monetary policy responds to fiscal expansions with an increase in the policy rate. In those circumstances, the effects of the fiscal expansion are dampened, similar to a ‘crowding-out’ effect. Kemp’s assumption is also consistent with the empirical finding of Merrino (2021) that counter-effects from monetary policy occur when output nears its full potential. As Bold and Harris (2018) illustrate, the SARB’s policy has historically followed a Taylor rule, lending further merit to the assumption.

These results have important policy implications, including the need for fiscal policy makers to consider financial conditions, such as the state of bank balance sheets, and to analyse fiscal policy’s potential interaction with monetary policy before embarking on a fiscal expansion or fiscal consolidation.

A third contribution relates to the ‘multiplier’ power of the discrete elements of the budget deficit—there are large differences between the multipliers for government consumption spending, government investment spending, and taxes. The multiplier effects of tax changes are negative and much larger than those of government spending (Kemp and Hollander 2020). And, government investment expenditures have a stronger and more lasting effect on GDP than do current expenditures, partly because of its stronger effect on the supply of credit (Merrino 2021). These results provide strong bases for policy makers choosing between different combinations of increased investment, increased current spending, and tax decreases within an expansionary budget deficit policy or vice-versa when reducing the deficit. For example, Hollander (2021) shows that an investment-driven fiscal stimulus that is debt-financed can reduce the government debt-to-GDP ratio. This result is accentuated in periods of economic slack, when monetary policy is typically also accommodative.

The modelling techniques used to estimate fiscal multipliers in South Africa include DSGE models (Kemp and Hollander 2020); a stock-flow consistent model with bounded rationality (Makrelov et al. 2020); and time series models (Kemp 2020a, Merrino 2021). Multiplier effects were also calculated within a South African Social Accounting Matrix (SAM) (Arndt et al. 2020a). The disaggregated nature of the SAM implies that the multiplier effects of fiscal policy work through the linkages between agents in different sectors. Because the macroeconomic structure of the SAM-based models is consistent with the national accounts that underlie macroeconomics, these economy-wide models provide a useful complement to the standard aggregate models.

Research using South African (and one Zimbabwean) economy-wide models provides a basis for calculating multipliers that explicitly consider sectoral links, and they are used for that purpose within National Treasury

(van Seventer et al. 2018; van Seventer and Davies 2019; Davies et al. 2018). The disaggregated SAM approach allows policy makers to consider important nuances, such as the impact of public expenditure on the consumption behaviour of different household groups. For example, as South Africa entered lockdown during the COVID-19 pandemic, a research team used SAMs to estimate the short-run economic impacts of the government response, including budgetary effects (Arndt et al. 2020a; Arndt et al. 2020b). The analysis informed the government's COVID-19 emergency budget, and subsequent data on the economy's performance largely corroborated the estimates.

SAM multipliers tend to be greater than those estimated using macroeconomic models, such as the models by Makrelov et al. (2018, 2020) and Kemp and Hollander (2020). This is because SAM models assume a perfectly elastic supply of factors and outputs with fixed coefficients. Computable General Equilibrium (CGE) models, for which SAMs are the basis, incorporate supply-side constraints and behavioural responses involving changes in factor proportions or in expenditure shares in consumption spending (Davies and van Seventer 2020a,b; Maskaeva and Msafiri 2021). This explains why fiscal multipliers calculated from CGE models are lower than those estimated using SAM models.

Debt-financed fiscal stimulus (DFFS) programmes directly stimulate aggregate demand through government expenditure or tax cuts, but their effectiveness is highly dependent on the degree of crowding-in or -out of private sector expenditure, spillover effects on the private sector through a higher risk premium, and the interaction between fiscal policy and monetary policy. An important facet of this debate, that has received limited attention in the literature, surrounds the quantitative and dynamic effects of DFFS programmes on interest rates. Hollander (2021) shows that in South Africa, historically low interest rates and stable inflation have reduced the burden of fiscal adjustment in response to rising debt and a rising risk premium. If fiscal policy remains unsustainable, however, a negative feedback loop between increasing debt servicing costs (through a higher risk premium) and rapid debt accumulation may push the country into a sovereign debt crisis and an economic collapse with severe long-term consequences.

From a tax policy point of view, the progressive structure of personal income tax makes it a distribution tool of after-tax income. Loate et al (2021) develops a new narrative account of actual personal income tax (PIT) changes implemented between 1996 and 2019 and use this narrative measure as a proxy for structural tax shocks in a structural vector autoregressions (SVAR) framework. Tax changes have been highly pro-cyclical. Tax cuts during the economic boom of the mid 2000s, motivated by the desire to increase

the potential growth of the economy, followed by deficit-driven tax increases over the past few years despite the weakness of the economy. Cuts in personal income taxes boost output and reduce unemployment. While PIT is a powerful fiscal policy tool for macro-stabilisation and long-term policy objectives, any effort by government to reduce the budget deficit via personal income tax increases, especially without fiscal credibility and monetary backing, will further stifle an already ailing economy.

Labour market structure

The output gap and associated unemployment condition medium-term macroeconomic policy. However, fully addressing medium-term unemployment requires an understanding of long-term structural unemployment and the relation between them. Two SA-TIED arenas of research generate new knowledge of the labour market structure and its relation to income inequality. First, Davies and Seventer (2020a, 2020b) examine the role of technological innovation in polarizing the job market. Second, d'Agostino et al. (2020) study racial polarization of the labour market between middle- and high-paid formal employment and the low-paid formal and informal occupations. The latter occupations employ the predominant share of Black Africans.

An important global trend, from which South Africa is not immune, is the rising use of automation, robots, and artificial intelligence in the workplace. Davies and van Seventer (2020a) find some evidence that this has already displaced middle-skill jobs relative to high and low skilled. However, the authors suggest that South Africa lags the advanced economies in adopting this technology, so the full impact is yet to materialize. In Davies and van Seventer (2020b), the authors look ahead to what the future impact might be and what factors influence it. The key argument is that the creation of new jobs will partially offset the loss of jobs to machines, and that this offset is stronger if the economy grows. However, the authors also caution that even with mitigation of job losses, new technology reinforces South Africa's already unacceptable income inequality.

D'Agostino et al. (2020) apply machine-learning methods to study the drivers of the inequality revealed by the Post-Apartheid Labour Market Series (PALMS) data series (Kerr and Wittenberg 2019; Merrino 2020a). Their results quantify the significance of racial group membership (a White-Black dichotomy), the labour market's division between formal and informal employment, and the size of the tertiary (service) sector relative to manufacturing. Using those findings, they construct a DSGE macroeconomic model consistent with South Africa's fractured labour market and suitable for analysing how fiscal policy shocks affect racial groups differently.

Policy recommendations

The results obtained by the research discussed here have several implications for policy.

The research on fiscal policy, particularly fiscal multipliers, details the reasons why it is important for policy makers to recognize that, instead of there being one multiplier with a single, constant value, there are a number of values, each relevant in specific circumstances. To assess the multiplicative power of fiscal policy, decision makers should assess the economy's cyclical position and compare multipliers for different components (expenditures vs. taxes) of the budget deficit. Large differences in multiplier values suggest that such analysis can greatly optimize fiscal policy.

It also demonstrates how policy decisions can be strengthened by giving full recognition to the interdependence of variables and decisions across sectors. In particular, the research shows that the behaviour of the financial sector, such as banks' credit supply responses to fiscal stimulus, can magnify the effect of fiscal policy (crowding in), especially in periods of cyclical slack in the economy. By contrast, the SARB's endogenous response, i.e. a rate hike, will diminish the multiplier—analogueous to crowding out. For policy makers, analysis of financial sector conditions and behaviour, and of the interaction between fiscal and monetary policy, is required for sound estimates of fiscal policy's macroeconomic effects. The effectiveness of fiscal policy is highly

dependent on the degree of crowding-in or -out of private sector expenditure, spillover effects on the private sector through a higher risk premium, and the interaction between fiscal policy and monetary policy.

In terms of tax policy, the efficacy of personal income tax (PIT) as a macro-stabilisation tool indicates that any effort by the government to reduce the budget deficit via personal income tax increases, especially without fiscal credibility and monetary backing, will further stifle an already ailing economy.

The results on the heterogeneous effects of monetary policy—such as the finding that policy changes have greater effects upon small firms than large firms—indicate that policy efficiency can be strengthened by considering heterogeneity. And, the effects on income and wealth inequality should also be taken into account.

With respect to the central mandate of the SARB, our research supports the bank in its claim to follow a Taylor rule in a flexible inflation-targeting framework. Furthermore, the calculation of South Africa's sacrifice ratio indicates that inflation reduction and stabilization has been achieved without significant cost to the country's unemployment rate. Since the global financial crisis, monetary policy has reduced the burden of fiscal adjustment in response to rising debt and a rising risk premium. But, further shocks to the risk premium could offset any gains from the current stance of monetary policy.

3.4 Work Stream 4 - Turning the tide on inequality

Development context and policy challenges

Post-apartheid South Africa was launched in 1994 with a Gini coefficient of 0.68, in competition with Brazil for the world's highest measured income inequality. This income inequality has not fallen over the post-apartheid era. There are no national data in South Africa that contradict this high level, and disbelief of the data has been replaced by an acceptance that South Africa functions to generate extreme inequality. This is a matter of huge concern.

Gradín et al. (2021) take stock of a vast literature showing why inequality has emerged as a key, perhaps the key, development challenge. It holds implications for economic growth and redistribution. Some of the most influential social science of the last decade shows that inequality works to embed social exclusion and chronic poverty. It sits at the heart of understanding how and why economic growth can sometimes lift all boats and eradicate poverty, but in other contexts leave the poor increasingly marginalized.

Against this background and against the experience of post-apartheid development, South Africa's very high inequality is a top-priority concern in terms of developing a viable and sustainable society. South Africa's income inequality serves as an outcome indicator for the daily playing out of profoundly unequal livelihoods and opportunities that limit the potential of the country, a theme which cuts across the whole of the SA-TIED programme.

Thematic topics and key research findings

Our research can broadly be categorized into two groups: analysing inequality and poverty dynamics, and the labour market. The former is concerned with measuring income and wealth inequality and studying inequality and poverty dynamics, while the latter relates to earnings inequality and labour market dynamics. We summarize each of these four topics in what follows and identify key findings.



Measuring income and wealth inequality

There is a substantial existing literature in South Africa on poverty and inequality issues (see Leibbrandt et al. 2016). To deepen this literature, we invested heavily in the production, cleaning, and quality assessment of company and individual tax data. As already discussed, these data have the potential to accurately measure and analyse levels and trends in inequality, and to undergird evidence-based policy analysis (Chatterjee 2019; Chatterjee et al. 2020; Kerr and Wittenberg 2019; Kerr 2020). The gender lens has been given special attention, too (see Ebrahim and Lilenstein 2019; Mosomi 2019). Bassier and Woolard (2020) combine tax data and household survey data to make two critical points. First, in the years between 2003 and 2015, nearly 60 per cent of the population earned zero taxable income. Over the same period, the incomes of the top 5 per cent of income earners increased by 5.1 per cent per annum. Second, the growth in real incomes of the top 5 per cent after the 2008–09 recession was more than double the rate of growth of gross national income (GNI). In contrast, the incomes of the other 95 per cent stagnated or, in the case of the bottom of the distribution, showed only slight growth. Between 2003 and 2016, the real incomes of the top 1 per cent almost doubled. And in the six years between 2010 and 2016, the income shares of the top 1 per cent increased from 10.5 per cent to 12.6 per cent of total GNI.

The top percentile in the income distribution, which starts at a taxable income of ZAR800,000 per annum, has a much higher wealth-to-income ratio than the rest of the earnings distribution, and income from sources other than salaries, particularly capital, increases rapidly in the top two percentiles. The composition of top incomes is important to note because it is a key factor explaining why top incomes have grown rapidly while other incomes have not. A second component of this fast, post-recession growth in top incomes is due to labour market dynamics. The labour income of high-skilled professionals at the top of the income distribution has also risen with their bargaining power, as they are not easily replaced.

In sum, then, the SARS tax data have been critical to understanding income inequality, because they enable the study of top incomes, whose growth relative to the rest of the distribution has a large but previously underexplored impact on measured inequality. The use of administrative data has also helped identify more top earners than previously thought. For instance, Credit Suisse in 2016 estimated that there were about 45,000 dollar-millionaires in South Africa. Bassier and Woolard (2020) put the number at about 182,000.

This work by Bassier and Woolard has led to a new recognition of the importance of income flows from wealth, and of the benefits that flow from wealth. There is very little research on wealth in South Africa, mostly because the tax data necessary to analyse wealth was previously inaccessible. The recent accessibility of these data has been very important in understanding inequality dynamics and in informing the very active discussion on wealth taxes in South Africa.

Chatterjee (2019) provides an agenda for the measurement and analysis of wealth in South Africa. Chatterjee et al. (2020) initiate this agenda by taking stock of wealth data. They triangulate survey data, tax data, and national accounts data to derive best possible estimates of the distribution of personal wealth. Because these data underestimate the value of capital, real levels of wealth inequality are likely higher than estimated. Even so, South Africa has internationally unparalleled levels of wealth concentration, and wealth inequality has also not decreased since apartheid (Chatterjee et al. 2020).

Inequality and poverty dynamics

For policy to be effective, the intersecting social processes that generate these inequality levels need to be understood. Research on the drivers of inequality and, in particular, on South Africa's intergenerational and intra-generational social dynamics have contributed. Piraino (2015) shows that the combined effect of unequal access to foundational assets forms the basis for

reproduction of intergenerational inequality and poverty, regardless of individual merit or ability.

Piraino (2015) estimates an intergenerational earnings elasticity of 0.62 to 0.67, meaning parents' earnings will largely determine children's future earnings, and finds that a limited set of inherited traits, especially race, explains this. Finn et al. (2016) shows that this immobility is particularly strong for those at the bottom and the top of the earning distribution. At these ends of the earnings distribution, children have a 95 per cent chance of being in the same position in the earnings distribution as their parents. These figures are a very strong indication of the transmission of disadvantage and advantage across generations.

South Africa's intra-generational social mobility has remained very low too. Zizzamia et al. (2019) show that, over the past decade, social mobility has slowed and even stalled. Only one in four people can be considered part of the stable middle class or the elite. Poverty is also much more pervasive than a cross-sectional analysis, which provides a snapshot at a certain time, tells us. National poverty is estimated at 55 per cent. Zizzamia et al. estimate a figure of 60–79 per cent. 49 per cent of the population live in chronic, persistent poverty, in addition to which 11 per cent are classified as 'transient poor', and about 19 per cent are part of a 'vulnerable middle class'. Both of the latter groups remain vulnerable to poverty from one year to the next, transitioning into periodic poverty.

These poverty dynamics highlight the stark racial footprint of South Africa's inequality. For the less than 9 per cent of the current population who are White, 93.6 per cent are consistently non-poor. By contrast, only about 9 per cent of Black Africans are consistently non-poor and about 63 per cent are in poverty nearly all the time. All in all, White people continue to access opportunities in relation to health, incomes, employment, education, and living conditions which enable them to maintain their privileged positions.

A series of SA-TIED Working Papers fill in important details on how inequalities, in a number of important dimensions, intersect to undergird this inequality persistence. The administrative tax datasets contain employment, employment duration, and spatial location data (where workers reside and work) for all formal sector employed in South Africa. Van der Merwe and Krygsman (2020) make innovative use of these data to show a strong negative relationship between increased commuting distance and employment duration. Spatial mapping indicates a job-housing mismatch in South African metropolitan areas and limited employment search areas for lower-income workers compared with higher-income workers, leading to poverty traps and further inequality.

We also fill in important detail on the pernicious correlation between where you live and the quality of education and health care that you receive. Selkirk (2019) uses South Africa's participation in international numeracy tests to investigate the reasons for very high inequalities in mathematics achievement in South Africa. She shows a notable positive relationship between scores on the test and the socio-economic status of a learner and other learners at the same school. In turn, Bridgman (2020) assesses the returns to better sanitation by evaluating the relative contributions of household sanitation and public service delivery in reducing the likelihood of orphans being stunted. Household access to sanitation significantly reduces this penalty. Better coordination of both private and public provision holds promise for providing lasting solutions to stunting, with aggregate policy returns exceeding the sum of returns on individual policies. Harrichurran et al. (2021) analyse time-use data to explore how household composition influences inequalities in the amount of leisure time granted men and women. Household composition and leisure consumption are shown to be highly gendered, with women typically living in larger households and consuming less leisure than men. This lower leisure consumption for women may have negative implications for their productivity in terms of paid and unpaid work, and for their well-being.

Thus, coming into COVID-19, inequalities in socio-economic life were characterized by precariousness and vulnerability for three quarters of South Africa. Schotte and Zizzamia (2021) investigate the impact of the COVID-19 pandemic on livelihoods in urban South Africa. Using national panel data tracking South Africans through the pandemic in 2020, they show how the shock deepened economic vulnerabilities that preceded the crisis. Then qualitative work shows that survivalist livelihood strategies were undermined by the economic disruption to the informal sector. The co-variate nature of the shock rendered social networks and informal insurance mechanisms ineffective, causing households to liquidate savings, default on insurance payments, and deepen their reliance on government grants. In addition, the disruptive impact of the pandemic on schooling may deepen inequalities and constrain future upward mobility.

Earnings inequality

Labour market earnings are key in driving both the levels and changes in inequality. A number of papers in SA-TIED have therefore taken stock of South Africa's earnings and earnings inequality. Kerr and Wittenberg (2019) analyse survey data, Kerr (2020) analyses tax data, and Kerr (2021) interrogates and compares survey data and tax data. Across these data sources it is clear that, like income and wealth inequality, earnings inequality in South Africa is

amongst the highest in the world, and that this has remained so throughout the post-apartheid period. Such high earnings inequality is a problem, because it cannot reflect productivity maximization and therefore an employment-maximizing labour market.

Our research reveals the following: first, it is clear that very high aggregate measures of inequality do not imply a static aggregate earnings inequality or distribution of earnings. The bottom of the earnings distribution caught up to the median, median real earnings has been roughly constant, and the top of the distribution moved away from the median. Finn and Leibbrandt (2018) show that, from 2001 to 2014, average real earnings of workers rose from ZAR5,740 to ZAR7,951. Over the same period, real wage increases went mostly to top earners, and overall inequality increased. The Gini coefficient, a standard measure of inequality, was raised from 0.552 to 0.634, an atypically large increase.

There is a strong gender dimension to earnings inequality, too. Ebrahim and Lilenstein (2019) document the possibilities provided by tax data to further this analysis. The extensive review by Mosomi (2019) shows that substantial gender wage gaps contribute significantly to overall wage inequality, and that the distribution of employment by sector and occupation in South Africa exhibits strong gender patterns. Van Rensburg et al. (2020) provide an excellent example of the use of tax data to extend this analysis. They examine the impacts of changing trade patterns on the gender distribution of earnings. Trading firms constitute 70 per cent of employment in South African manufacturing. These firms exhibit greater gender wage gaps than non-trading firms. The effect seems to be driven by trading firms requiring more flexibility from their workforce in interactions with customers and suppliers across continents and time zones.

So, extreme earnings differentials are deeply entrenched in the salary and wage structures in the formal economy. The country has a labour market that is segmented by race and gender in a job-scarce economy. Indeed, the preceding analysis of earnings inequality does not include the unemployed 'zero-earners'. Alongside these earnings dynamics, the unemployment rate has risen from just over 20 per cent to 30 per cent over the last decade.

Labour market dynamics

Understanding the above earnings dynamics is very important for policy analysis. A key limitation has been a great paucity of information available on the demand for labour and the behaviour of firms. With SA-TIED's facilitation of access to company tax data, this has been one of the biggest research gaps SA-TIED has sought to fill. Budlender (2019) offers an excellent introduction to the data and especially the new administrative firm-level panel data put together for use in the lab. Moreover, using administrative tax records from

South Africa for the period 2011–14, Bassier (2019) finds that firm wage premia explain 25 per cent of the total wage variance. This accords with a similar finding from Kerr (2021), who finds that differences in average earnings between firms are higher than in developed countries, although lower than in Brazil. Clearly, firm-specific factors play an important role in wage-setting within the existing regulatory framework. Indeed, Bassier (2019) goes on to show that these firm premia account for 60 per cent of the gender wage gap, and 40 per cent of the gap between workers in the middle and the bottom of the income distribution.

This suggests that firms hold fairly strong monopsony power in hiring and setting wages. That said, Bassier (2019) finds that unions substantially increase rent-sharing and wage-premia in firms. Bassier (2021) follows on to investigate the role of South Africa's sectoral-level wage bargaining. He concludes that sectorally bargained wage increases tend to compress the labour market structure upwards, highlighting an interplay between institutional regulation, monopsonistic competition, and firm heterogeneity that reaches beyond the direct impact on bargaining council firms. So, the legislated wage bargaining structure has a bearing on wage setting and employment growth, increasing inequality and lowering labour absorption, but so too does the concentrated output market structure.

High levels of concentration are also a problem for labour absorption in local labour markets. Amodio et al. (2020) study the relationship between product market competition and labour market outcomes, and test whether individual labour market outcomes differ systematically in district municipalities where employment is more concentrated in less-competitive high mark-up sectors. They find that higher employment concentration in high mark-up sectors is associated with higher unemployment and lower likelihood of transitions from unemployment to employment. This is especially the case for Black, lower educated, and young individuals. At the same time, Piek et al. (2020) use anonymized tax data to show negative employment effects of a large increase in agricultural minimum wages. These effects are dynamic outcomes in the sense that they are predominantly due to the slower creation of new jobs following the minimum wage rather than to the destruction of existing jobs. These results provide a possible explanation of the South African paradox of some dis-employment from large minimum wage increases despite large wage non-compliance.

These are not simple labour market dynamics, but they are filling a key knowledge gap on wage setting and employment creation on which very little was known before tax data was made available for analysis. Neither simple union and sectoral wage rigidity models nor simple monopsony models are good foundations for policy. For example, Budlender

(2019) shows that conclusions on whether mark ups are 'high' or 'low' are heavily dependent on the method used, and there is little evidence mark ups have increased over the last decade. Amidst this complexity, the evidence from research becomes especially important, and there is much unfinished work for SA-TIED in terms of putting the pieces in place to develop a stylized model of the South African labour market to inform policy-making. These data and these background dynamics are already proving useful in assessing current labour market interventions.

The Employment Tax Incentive (ETI) is a major policy intervention in South Africa aimed at reducing high rates of youth unemployment. Ebrahim (forthcoming) provides a descriptive overview of the ETI from 2014–18, revealing that around 50 per cent of firms hire an eligible worker, but only around 13 per cent of firms claim the subsidy. This raises questions about the factors influencing firm decisions to claim the subsidy.

The top 20 firms account for around 25 per cent of the total value of claims. The take-up rate is high among large firms and low among small firms. Yet, rigorous evaluations show positive employment impacts for small firms rather than large ones. This descriptive context is useful in understanding why carefully designed evaluations show disappointing returns to the policy. Budlender and Ebrahim (2021) consolidate this evidence and take account of spillover effects onto non-targeted employees. These seem to be confounding the estimation of direct employment impacts. Adequately controlling for these improves the returns. This paper also shows that the ETI has increased youth employment but notes several important caveats and suggests that the ETI remain the subject of ongoing research.

Landman and O'Clery (2020) offer a similarly nuanced assessment of the impact of South Africa's Employment Equity Act on female inter-industry labour mobility and the gender wage gap. The Employment Equity Act No. 55 of 1998 was introduced by the South African government to address the legacy of apartheid and ensure equitable representation of Black people and women in the labour market. This paper shows some positive results from this policy. As a firm becomes compliant with the Act, this increases the diversity of sectors from which the firm hires new female workers and increases the firm's average female wage. The more male-dominated an industry is, the higher is its female inflow diversity and the smaller its gender wage gap, particularly among the group of firms that comply with the Act compared to those that are exempt.

Policy recommendations

Our research has shown a society that continues to generate extremely high inequalities with a flourishing

top-end, a thin middle class, an extensive precariat, and 30 per cent of the population who are trapped in poverty. The middle 40 per cent of the wealth distribution is almost as asset-poor as the bottom 50 per cent. Such inequality in wealth and income imposes a major constraint on South Africa's growth.

The lack of inclusivity of the development process places huge stresses on the fiscus. The country has an extensive set of social safety net, education, and health policies that provide a base platform for this society. COVID-19 put this system to the test. Emergency funding was channelled through this system, stressing it with the augmentation of a rapidly implemented grant to the non-employed. The system passed the test. However, low employment creation raises a key sustainability issue. This platform is not launching people onto sustainable trajectories in which they become contributors funding this system rather than claimants from the system.

Inequalities persist because they reinforce each other outside and inside the labour market. There is also some evidence that the spillovers, intersections, and scale impacts that currently trap people can be reversed through good coordination and harmonization across policies that address water, electricity, housing, education, health, and public transport. This requires policy coordination of social security interventions and direct employment interventions. Aggregate or collective returns can be very much larger than project-specific returns, especially for those most disadvantaged, including women and youth.

There are very high returns to research that assess these interactions. This is true too in terms of labour market policies. The formal sector is characterized by a monopsonistic labour market with strong sectoral bargaining and strong unions. These make it very hard for smaller enterprises and the self-employed to integrate. Such a labour market has important implications as to how to design and implement minimum wage policies, competition policies, and even company tax policies in a way that promotes employment across them all. Certainly, this research provides a strong endorsement of formal consultative and evidence-led engagements between government and business around labour market policy formulation. Finally, the great stress on the fiscus places great demands on the quality of expenditures in each and every programme. However, it also necessitates brave policy prioritization and policy choices within a coherent policy framework.

3.5 Work Stream 5 - Climate change and energy transition as drivers of change

Development context and policy challenges

The unavoidable warming and substantial potential departures from prevailing global weather patterns associated with climate change are likely to be major drivers of migration, agriculture, and international trade. The transformation of the energy system necessary to reduce emissions to levels consistent with a stable climate have direct and potentially powerful implications for the nature of infrastructure investment, agriculture, and trade.

As part of the global effort to mitigate against climate change, the South African government has committed to reducing emissions to between 398 and 614 MtCO₂e⁶ by 2030 and between 212 and 428 MtCO₂e by 2050 relative to a business-as-usual reference case (RSA 2015). To align the country's contributions to limit warming to 1.5°C, emissions need to fall to below 348 and 224 MtCO₂e by 2030 and 2050, respectively. This would require more ambitious mitigation efforts (Climate Transparency 2020). The energy sector, which includes electricity and liquid fuels, accounts for nearly 80 per cent of total emissions, and is key to reducing emissions.

This context points to South Africa facing two sets of wide-ranging policy challenges. The first is concerned with the energy sector and the transition to a low carbon economy. Rapid advances in variable renewable energy (VRE) technologies along with country commitments to reduce greenhouse gas (GHG) emissions are prompting global shifts in energy production patterns, notably electricity production. VRE technologies are now cost-competitive with traditional technologies in many countries, including South Africa (Arndt et al. 2018).

While VRE technologies pose new challenges for systems integration (i.e. matching electricity supply with demand on a smooth and continuous basis), several circumstances suggest that these challenges will not hinder the expansion of VRE globally (see Arndt et al. 2018 for more detail). Nevertheless, incorporating past policy lessons and anticipating continued advances in technologies complicate matters and demand policy insights, as do concerns around consumer adoption, business and financing solutions, and infrastructure improvements and build-out.

Newer tools exploit current data and modelling capabilities to inform policy- and decision-making. These capabilities increasingly add value

to integrated energy-economic decision making that crosses traditional sector boundaries such as transportation and power, power and industry, and the energy–water–food nexus (Kumar et al. 2017).

The second broad policy challenge concerns climate extremes and variability. Southern Africa is particularly vulnerable to the impacts of climate change. Projected warmer temperatures, less predictable rainfall, and shorter growing windows threaten the stability of the agricultural sector, households that depend on it, and food security more broadly. In addition, insufficient water supply complicates allocative risks to agriculture, industries, households, and power generation. Flooding and excessive heat can also undermine the durability of critical infrastructure, such as roads. These multiple climate stresses, along with an inability to adequately adapt or respond to them, have important consequences for households, workers, and industries that depend on the environment.

The effects of climate change are not uniform. Policy makers must urgently identify, develop, and implement priority adaptation measures now, as responding later may become more expensive and potentially less effective. Importantly, to understand the potential risks of climate change to the economy and to identify appropriate policy responses, regional differences at an economic level and the channels by which climate change could affect them are of central importance.

Thematic topics and key research findings

Energy and the transition to a low-carbon economy

We focused on improving the energy-economic modelling tool for South Africa (i.e. the SATIMGE⁷), such that it can aid in further energy and mitigation analysis.

The updated analytical framework provides useful information for policy development aimed at limiting the costs of changes in the energy system to the economy. The research assessed, for example, the role of renewable energy in power generation and the implications of cleaner power for the uptake of clean technologies in other sectors. The same goes for the implications of these changes on energy emissions by sector and the implications of these changes on economic development and employment at the sectoral level. Finally, we assessed the trade-offs between increased mitigation ambition and economic growth. Key findings include:

⁶ Metric tons of carbon dioxide equivalent.

⁷ SATIMGE is a hard-linked South Africa full sector energy model (SATIM) and Computable General Equilibrium (CGE) economy-wide model for South Africa.

- VRE sources—specifically solar photovoltaic (solar PV⁸) and wind—are the least-cost power technology options for South Africa. By 2050, if unconstrained, solar PV and wind would account for more than 70 per cent of total power generation.
- At the national level, shifting to renewable energy has a net positive impact on real GDP and employment, with gains shared widely across the economy. As power generation requires less investment, resources can reallocate toward other uses. Moreover, the relative electricity price decreases when compared with other electricity technology mixes.
- Cleaner electricity also enables the use of clean technologies in other sectors. For instance, the uptake of electric vehicles in both private and freight transport. In private transport, electric vehicles prevail by 2050.
- Despite increases in electricity demand, the lower costs of electric and other clean technology vehicles increase their usage and decrease transport costs. Electrification of transport in particular results in declining crude oil and petroleum imports which improves the trade balance.
- Although the impacts of these changes on the economy are widely positive, the transition to



Photo by Dustin Hackert

cleaner growth will harm certain industries, primarily fossil-fuel-producing sectors. In addition, global demand for these products is likely to decrease, and infrastructure constraints limit production.

- Considering the growing global need for more ambitious mitigation policy, policy makers must limit the costs of mitigation (Merven et al. 2021). Decreasing energy emissions to 385Mt per annum by 2030 in South Africa produces a small negative impact on real GDP. Decreasing energy emissions beyond 385Mt imposes increasingly higher costs to the economy relative to the reduction of emissions. However, it is possible to mitigate these negative impacts by increasing energy efficiency.

Summing-up, a least-cost path for energy planning in South Africa includes substantial solar PV and wind and meets South Africa's current Nationally Determined Contribution. Purposefully excluding these technologies increases the cost of mitigation. Our research furthermore demonstrates that changes in consumption preferences resulting from improved incomes shifts the economic structure in favour of services production (Merven et al. 2020). Energy demand therefore decreases as household and production demand declines, and the economy becomes less energy intensive.

Finally, the findings discussed here are dependent on a smooth transition away from fossil fuels toward renewable energy sources, the efficient shift of resources in the economy, and the availability of the necessary skills demanded. Inefficiencies

⁸ A PV system or solar power system is a power system designed to supply usable solar power by means of photovoltaics.

in the shifting of resources or resource scarcity could increase the costs of a transition to cleaner energy, negatively affecting the economy.

Climate extremes and variability

Climate trajectories vary for many reasons, including imperfect human understanding of the global climate system, uncertainties in emissions paths, and the inherent chaotic properties of the climate system and climate models. The climate modelling undertaken recognizes the need for a comprehensive set of plausible future climates with variation in weather added on top of climate trends. Drawing from a large ensemble of climate/weather futures, the studies follow a distribution of outcomes across a chain of analytical models to rigorously analyse climatic, biophysical, and economic futures across different emissions and mitigation regimes.

Key findings include:

- Global climate mitigation policy can limit negative effects in agriculture and economic activity more broadly. Despite seemingly small differences in temperature, by 2065, differences between emissions scenarios can be critical for crop yields and are indicative of the value of global greenhouse-gas mitigation strategies (Thomas, Robertson, Strzepek, and Arndt forthcoming). Variability in temperature and precipitation, the frequency of extreme weather events, yield losses, and negative economic outcomes tend to be higher in scenarios in which global emissions constraints are not sufficiently high.
- Schlosser et al. (2020) and Thomas, Schlosser, Strzepek, Robertson, and Arndt (forthcoming) find that, without stricter global climate targets, temperatures in South Africa will likely increase considerably. At the same time, projections of median temperatures and rainfall vary considerably across regions. Coastal areas tend to have moderate changes in temperature as compared to inland regions. In the western part of South Africa, there is a greater risk of lower rainfall, although this is less severe if global agreements to limit emissions are in force.
- The uncertainty in climate/weather futures rises with time, especially under higher emissions scenarios. For example, what would be a one in 100-year flood event in 2025 becomes a one in 30-year flood event in 2065 in a scenario which includes no further commitments beyond those agreed to in the Paris Accord. If further emissions restrictions limit warming to two degrees, a one in 100-year drought event in 2025 would become a one in 40-year drought event in 2065. Limiting this uncertainty and variability through

effective mitigation reduces the variability of economic outcomes.

- Understanding the range of economic impacts possible because of climate change, particularly on agricultural production, food prices, and household welfare, is important for designing adaptation measures at different spatial and industrial levels. For example in Southern Africa, higher emissions scenarios project that yields may decline between the 2020s and 2060, with median sorghum yields falling by 10 per cent and median maize yields by 8 per cent (Thomas, Robertson, Strzepek, and Arndt forthcoming).
- In Zambia, expectations are that crop yields will fall through 2050, worsening as climate change effects tighten (Ngoma et al. 2020). Because maize is a key staple for the region and is the most vulnerable crop, climate change undermines food security and household welfare. Agricultural production moves toward the northern regions, as the southern and western parts of Zambia, already challenged by low rainfall, are now subject to increased variability. Tembo et al. (2020) explore the effect of climate on roads and energy and find that, in the absence of global mitigation policies, GDP will be 6 per cent lower than what it would be in a scenario in which climate change does not occur.
- Manuel et al. (2020) also find that climate change negatively affects the agricultural sector in Mozambique—particularly maize and cassava. Likewise, Thomas, Robertson, Strzepek, and Arndt (forthcoming) determine negative outcomes for rain-fed maize in South Africa, the most important crop by harvested area. They find that, by the 2060s, the higher emissions scenario reduces the median yield by 7.4 per cent compared to 3.5 per cent in a lower emissions scenario. The range of outcomes widens over time.
- Hartley et al. (2021) explore the economic impacts of climate change across crops and regions in South Africa and determine that across all regions, the median gross value added is lower with climate change than without. The authors observe considerable variation in the production of sugarcane, oilseeds, and summer cereals. Thus, regions that produce these crops tend to exhibit more variation in agricultural value added. Variation in production is not only due to climatic effects. A shift toward irrigated production in response to higher prices as rain fed yields fall also contributes. Thomas, Robertson, Strzepek, and Arndt (forthcoming) project a consistent increase in demand for irrigation water across all hydro-climatic zones by 2060, as demand, water

requirements for irrigated crops, and irrigated area all increase.

- In addition, municipal and industrial (M&I) water use is projected to increase due to population and economic growth. As the economic value of M&I water use is much higher than the value of almost all agricultural uses, reallocation of limited supply will constrain agricultural water supply further. Furthermore, climate change will exacerbate this constraint.

A final important finding is that climate change also increases the risk of flooding, as higher emissions scenarios estimate a significant increase in mean and high extreme run-off over time (Thomas, Schlosser, Strzepek, Robertson, and Arndt forthcoming). Although annual run-off appears more likely to increase than decrease, the probability of lower run-off at the national level remains substantial, and especially so in certain geographies. Moreover, the spatial and temporal distribution of areas with projected increases in run-off do not coincide with areas which demand higher irrigation. Finally, there is a lack of reservoir storage infrastructure to store any additional water flows. Due to environmental and budget constraints, it will be difficult to increase reliable water supply via reservoirs or inter-basin transfers, even if streamflow increases.

Policy recommendations

Variable renewable energy (VRE)—particularly solar PV and wind—is the least expensive power generation technology in South Africa. As a result, transitioning to a renewable energy system produces multiple benefits. On top of environmental benefits and the health benefits of reduced air pollution, there are economic gains, including increases in real GDP and employment. A reduction in real resource allocations to power generation drives these economic gains, making greater real resources, notably investment, available to other sectors of the economy. Lower power costs also increase incentives to use clean technologies in sectors like electric vehicles. With electricity substituting for liquid fuels, trade becomes more balanced as crude oil and petroleum imports decline.

At the macroeconomic level and in terms of the environment, the changes implied by an energy transition are net positive. Remarkably, South Africa can meet its Nationally Determined Contribution by adhering to a least-cost path for energy planning. Nevertheless, following this least-cost path implies that some sectors will be negatively impacted, especially coal mining and other fossil-fuel-producing sectors. Shrinking these sectors inevitably imposes transition costs; however, avoiding these transition costs by precluding the use of VRE technologies increases mitigation costs in electricity and other

sectors. Higher mitigation costs place a drag on South Africa's economy relative to the least-cost path and run counter to the recognized need for more robust mitigation policy to help stabilize the climate globally.

Several SA-TIED Working Papers explain how to scale down fossil fuel production throughout the transition process. These studies also describe and emphasize the importance of efficiency in the transition process to maximize net positive economic gains. Finally, the potential for new sectors can facilitate a move toward cleaner growth at minimal cost, such as replacing the internal combustion engines in motor vehicles with a cleaner alternative.

Because climate change effects (e.g., warmer temperatures, erratic rainfall, truncated growing windows, or flooding) vary by region and industry, policy makers should develop adaptation strategies at different spatial and industrial levels.

The SA-TIED research exploring the potential impacts of climate change in the region consistently demonstrate that higher global emissions have worse, and more variable, outcomes than lower emissions scenarios. A wide range of potential climate futures—exacerbated by the risks of extreme weather—complicates the set of policy options available. South Africa will share in gains from global mitigation efforts and thus has interests in the success of these processes. Still, in many instances, biophysical impacts point to lower yield and increased pressure on water demand, regardless of emissions scenarios. This highlights a need to invest in resilient agriculture, water, and food systems, especially as regions with vulnerable households are most sensitive to large climatic changes.

In addition to the costs and physical risks of climate change on production, prices, government expenditure, and more, the transition to a low-carbon economy also presents opportunities. Thus, there is a need to coordinate policy across different sectors. Ngoma et al. (2020) identify improved land-use-planning techniques to ensure that land converted to agriculture does not require high environmental costs. Tembo et al. (2020) detect investments in climate-resilient energy generation and road infrastructure as well as electricity trade policy to alleviate price and supply shocks associated with climate change. Hartley et al. (2021) prioritize food security over food sovereignty policies, as climate change will likely hinder domestic growing conditions.

Ongoing analysis to assess climate risks and responses to those challenges remains important in understanding the impacts on food, energy, infrastructure, and economic systems. Arndt et al. (2020c) assess the implications of climate mitigation and adaptation for price and financial stability and suggest policy mechanisms through which

central banks can support these efforts. As many emerging and developing countries are savings-constrained, funding for adaptation and mitigation efforts are likely to be external, highlighting the importance of macroeconomic stability as a key policy requirement. Arndt et al. also describe ways

to identify and quantify risks and climate-induced supply shocks and then to consider how these risks and shocks interact with financial sector dynamics. Considerable analytical and modelling efforts are required to understand these dynamics.

3.6 Work Stream 6 - Regional growth for southern Africa's prosperity

Development context and policy challenges

South Africa dominates the Southern African regional economy. It comprises the region's largest market and is the overriding player in regional trade and investment. As a result, regional trade issues often centre on the theme of 'unequal exchange'. South Africa's regional trading partners frequently complain that it makes insufficient effort to promote industrial development in economies trading with it.

This is not altogether surprising. The South African government has pursued an export-led growth strategy through its National Development Plan, the Industrial Policy Framework, and the Industrial Policy Action Plan. The country has become increasingly integrated into the global economy, often ahead of its regional neighbours, at their expense. Thus, coming to grips with what constrains regional trade in Southern Africa—combined with providing practical guidance on how to exploit opportunities to spur regional industrial development—was a key aim of our work.

Thematic topics and key research findings

The work centred around three broad themes: lessons of success and failure in the design of spatial industrial policies, opportunities to expand intra-African trade, and the role of agro-industry in regional trade.

Spatial Industrial Policies

Agglomerations pose a collective action problem which governments can address by concentrating investments in high-quality institutions, social services, and infrastructure in a limited area, such as a Special Economic Zone (SEZ) (UNIDO 2009; Farole 2011). Africa was a latecomer to spatial industrial policies (Newman and Page 2017) and has had a poor track record of success. For that reason, we attempted to focus on lessons of success and failure for the design of SEZs.

Karambakuwa et al. (2020) evaluate strategies for developing successful SEZs and transnational zones for Southern African countries to spur growth and employment. While selected countries across the world have successfully implemented export-oriented industries through spatial industrial policy, the authors find that most SEZs in Southern Africa fail to bring adequate growth and employment due to numerous

constraints. The authors assess case studies across the world comparing different regions on selected indicators related to a best-practice framework. The framework represents the key components of successful SEZs: institutional arrangements; the operational framework; framework for expansion; and the presence of reflection/review mechanisms. Further, the authors identify best practices and review the implications for implementation.

Phiri and Manchishi (2020) argue that the successful use of SEZs as economic tools for export-led industrial development in East Asia propelled a wave of similar initiatives across Africa. In Southern Africa, Zambia and South Africa instituted SEZs in their respective legal and institutional frameworks in the 2000s as mechanisms for catalysing industrialization and employment creation. Using a case-study approach, they find that SEZs in the Eastern Cape, South Africa, are largely latent drivers of growth and employment hampered by inadequate infrastructure and weak local supplier capabilities. SEZs in Lusaka, Zambia, face similar constraints but are further hampered by inadequate business services, burdensome regulations and business procedures, a fragmented incentive framework, institutional coordination failures, and a weak design that does not leverage strategic anchor industries for greater agglomeration economies, thus rendering them white elephants.

Dube et al. (2020) find that SEZs in Africa are generally regarded as underperforming relative to their peers in the rest of the world. They focus on the design features of African SEZs that may help explain this underperformance and identify the key design attributes of SEZ programmes that could enhance their success. A case study of six Southern African countries—Mauritius, Namibia, South Africa, Tanzania, Zambia, and Zimbabwe—assesses if these countries' SEZ programmes meet the ideal design features. The study finds that key design attributes are missing in these countries, which creates problems in the implementation of SEZ programmes. More importantly, the study identifies a lack of on-site and off-site infrastructure, with dedicated authorities to provide such infrastructure, as the main drawback for SEZ programmes in failing countries. The study recommends that countries should pay

attention to all the key design attributes of their SEZ programmes to enhance their success.

Habiyaremye (2020) finds that despite more than two decades of economic integration efforts, levels of spatial inequality remain high within the Southern African Development Community (SADC). Owing to persistent delays in the implementation of the SADC integration agenda, infrastructure connectivity is still inefficient, while cumbersome customs also continue to impede the free movement of goods and services. This hampers the growth potential of planned spatial development initiatives in the region. This study analyses how the development of regional growth corridors and the deepening of SADC integration could help to ease existing connectivity bottlenecks and unlock the dynamic gains of closer intra-regional collaboration. It identifies territorial collaboration between metropolitan clusters and rural areas, connected by transport corridors (or 'growth corridors'), as a way forward. The study also explores the absorptive capacity requirements for structural transformation and surveys existing facilities and incentives for technological capability building.

Opportunities to expand intra-African trade

Mofo (2020) finds that plastics are ubiquitous across the Southern African region and play an important role in multiple industries. Most plastic products are based on a value chain that is grounded in petroleum refining, posing an environmental challenge. Plastic manufacturing in South Africa suffers from the high cost of polymers as inputs. Mozambique is endowed with large natural gas deposits. This research assesses the potential for the sustainable development of a plastics value chain in Southern Africa, with the aim of future-proofing the industry against changes in the petroleum space while bolstering growth in plastics manufacture and fostering a more equitable regional distribution of plastics activities. The study found that there is strong regional value chain potential between South Africa and Mozambique, with Mozambique producing natural gas feedstock and South Africa providing labour, capital, and technology. South African plastic manufacturers may also benefit from better input prices derived from better priced natural gas from Mozambique.

Turok and Visagie (2020) argue that service industries are increasingly important in international trade and offer additional paths to economic development; and there are many opportunities to expand trade in services between South Africa and other African economies. For example, improvements in urban planning, design, and governance are vital to create more productive and liveable cities, and South Africa has many such capabilities to support urbanization in Africa. Yet, South African companies have been relatively unsuccessful at exporting this expertise, while more successful at exporting retail, financial,

and telecoms services. One reason is that urban infrastructure projects are discrete, risky, and costly, and South African companies have tended to go it alone, with minimal commitment to host nations and little support from governments or other firms. Furthermore, there has been no concerted effort in South Africa to promote tradable urban services as a package of capabilities that could unleash greater economic dynamism within both source and host countries. Robb and Paelo (2020) find that low levels of broadband penetration combined with poor quality of services present a challenge to growth and development in SADC. Their paper performs a comparative analysis of the competitive dynamics of telecommunications markets in four SADC countries and relates this to outcomes for consumers. From a mobile phone perspective, a common theme is that while entrants have attracted subscribers, they have struggled to grow revenues and compete effectively due to network effects and the high cost of building a network. Fixed markets are underdeveloped and highly concentrated. Access to fixed and mobile infrastructure is a challenge, in spite of regulations mandating access in most countries. Where mobile money has taken off, this has sometimes exacerbated network effects and enhanced the market power of incumbents, although the development of interoperability in some countries has had a positive impact. The findings suggest that regulation has often been ineffective in facilitating competition in telecommunications markets in SADC.

Ledger (2019) examines the political economy of non-tariff barriers to trade. She argues that increased intra-regional trade in Southern Africa will have a positive impact on economic growth. However, this requires shifting loyalties from the national to the regional. Tension between the goals of long-term regional development and shorter-term national imperatives remains unresolved. This study presents a review of recent and current local content regulation (LCR) initiatives across a sample of the SADC countries. LCRs are widely used across these countries, and their use has increased recently. Evidence suggests that the impact of LCRs is mixed, depending on their national context, whether they are implemented in line with the genuine desire to deliver local development, and whether they can remain corruption free. LCRs may have long-term positive domestic and regional benefits if they support sustainable local enterprise development and employment. In time, this should translate into higher levels of growth across the region, and thus drive higher levels of trade.

Banga and Balchin (2019) explore the potential for South Africa to become an engine for intra-regional trade and industrial development by linking other Southern African countries to its global value chains and, in the process, improving its global trade competitiveness. The study identifies 'lead products' exported by South Africa, and then uses



revealed comparative advantage and unit cost analysis to identify intermediate inputs in which Southern African countries have competitiveness to export that is currently untapped due to a lack of supply capacity or other factors. Such products are potential areas where regional investments could lead to the successful creation of regional value chains. The study also identifies 'new markets' for agricultural lead products exported by South Africa, which could open new opportunities for Southern Africa to supply intermediate agricultural inputs.

The role of agro-industry in regional trade Bosiu and Vilakazi (2020) argue that the growth of African multinational companies in Southern and Eastern Africa in recent decades brings with it a great opportunity for development of productive capacity in the region and greater regional integration. This study identifies three emerging multinationals in the region—Trade Kings (from Zambia), Export Trading Group (Kenya), and Mount Meru (Tanzania)—that have developed capabilities over time to become effective competitors of incumbent food production companies in other country markets. By analysing the history, growth, competitive strategies, and capabilities of the firms, the study identifies factors that appear to have shaped their expansion in the region and the key lessons from their experiences. Drawing from interviews and publicly available information, the paper also analyses the various constraints the companies have faced in growing their businesses, particularly across borders in the region, with a view to identifying opportunities for policy that might help such companies to grow production capacity in local economies.

Black et al. (2020) suggest that regional integration in Africa is underway but achieving progress requires that the gains are widely spread. South Africa's huge regional trade surplus in manufactured goods is already leading to protectionist pressures in neighbouring countries. Agro-processing is a large sector, which is widely regarded as having significant potential, but the export performance of the region has been quite poor if South Africa is excluded. Intra-regional trade is dominated by South Africa's exports to the region. The share of processed goods in agricultural trade has

increased but only modestly, and regional value chains are failing to include the small economies of Southern Africa. Constraints include tariff and non-tariff barriers, weak infrastructure, demanding quality standards as well as weakly developed local suppliers. Policies to promote the development of suppliers outside of South Africa are required along with more generic measures such as improvements in the regulatory and investment environment, and better infrastructure.

Das Nair and Landani (2020) analyse the role of supermarkets in regional trade. Supermarkets are strong catalysts to stimulate the growth and development of producers and suppliers of processed food and manufactured products in Southern Africa. The paper assesses the role of supermarkets and governments in developing supplier capabilities through supplier development programmes. In South Africa, supermarkets are shifting from 'checkbox' compliance of social responsibility objectives to developing the capabilities of their suppliers in a manner that is mutually beneficial, commercially oriented, and long term in nature. There is still considerable scope to replicate, broaden, and deepen these programmes, including extending them to the region. The paper draws lessons from the Namibian Retail Sector Charter of 2016 as the first and only sector-wide intervention in the region that combines a voluntary code of conduct and supplier development commitments. The paper further highlights interventions internationally through codes of conduct as a useful way to reduce possible abuses of supermarket buyer power.

Lowitt (2020) finds that interest in industrial hemp has revived in the past 20 years. Malawi is considering legalizing the cultivation of industrial hemp as an alternative cash crop to tobacco with great potential. The study considers the potential and challenges of creating an industrial hemp value chain between South Africa and Malawi, with Malawi concentrating on upstream cultivation and South Africa on downstream value-adding activity. The research supports a finding that industrial hemp offers strong opportunities as a niche market even if mainstream demand is slow to materialize or does not materialize at all. It also shows

that undertaking such an inter-regional endeavour would be considerably more complicated than initially envisaged, given the agricultural structure of the Malawian economy and its smallholder farmers.

Policy recommendations

A wide range of policy implications emerge from these research findings.

First, spatial industrial policies, such as Special Economic Zones (SEZs), offer substantial potential to increase regional trade, but implementation is crucial, and appropriate design is critical. Case studies of six Southern African countries—Mauritius, Namibia, South Africa, Tanzania, Zambia, and Zimbabwe—find that these countries' SEZ programmes fail to meet the ideal design features for SEZs, creating problems in the implementation of SEZ programmes.

Other case studies find that SEZs in the Eastern Cape, South Africa, are largely latent drivers of growth and employment, hampered by inadequate infrastructure and weak local supplier capabilities. SEZs in Lusaka, Zambia, face similar constraints but are further burdened by inadequate business services, burdensome regulations and procedures, a fragmented incentive framework, institutional coordination failures, and weak design that does not leverage strategic anchor industries for greater agglomeration economies. Lack of developed SEZ geographic areas, especially the requisite on-site and off-site infrastructure, with dedicated authorities to provide such infrastructure, is the main drawback for SEZ programmes in failing countries.

Second, South Africa's role as an investor in the expanding regional food retail sector offers significant opportunities to source agricultural products in regional markets, but the design of promotional efforts—including product placement—ultimately determines impact. Previous studies have showed that the modernization of supermarket procurement systems and trading requirements in the region placed pressure on suppliers with regard to the ability to supply the required volumes, maintain consistency, ensure quality, and contain costs of supplying products. To supply

supermarkets, suppliers in Southern Africa have to address these 'critical success factors' and, as large buyers, supermarket chains put pressure on suppliers to meet their requirements. However, the studies also revealed the obstacles to suppliers accessing supermarket shelf space and the threat of excluding suppliers from participating in value chains through the exertion of buyer power by supermarket chains.

Third, in Southern Africa, the large supermarket chains, in many cases, are able to control pricing in their trading terms by controlling elements such as listing fees, rebates, advertising allowances, promotion fees, payment period terms, settlement discounts, and new store openings fees. These elements were shown to collectively account for around 10–15 per cent of the price of the product sold to supermarkets, placing considerable strain on supplier margins by reducing the prices paid to suppliers.

There is a powerful role that supermarket chains can play through supplier development programmes (SDPs) to assist in the building of supplier capabilities to meet supermarket requirements and in easing the terms of access to shelf space. Fortunately, there has been a shift in more recent approaches by supermarket chains with regards to supplier development. The chains recognize that intimate involvement with suppliers, deep expertise sharing, and investments are critical to supplier's success in the long run. Retailers are starting to approach supplier development more as part of mutually beneficial, commercially-oriented investment than in the past.

Governments in some countries have played an active role in facilitating links between suppliers and retailers to stimulate supplier development. Countries such as Malaysia and Mexico have government programmes that upgrade suppliers to meet supermarket standards and facilitate linkages between suppliers and retailers. The SADC region could look to these experiences for inspiration.

4 Conclusion

South Africa faces deep structural problems. These include high levels of inequality, spatial distortions, low levels of human capital, the uneven quality of public services, and inadequate state capacity. These challenges have been exacerbated by the COVID-19 shock. As recent SA-TIED research demonstrates, the economic effects of the pandemic are both far reaching and will likely be long-lasting. Although a wide range of policies, many building on SA-TIED research, aim to address these problems, a lot remains to be done, strongly underpinning the rationale for a second phase of SA-TIED.

To build on the many achievements shared in this synthesis report and respond to the continued demand for tailored support to the policy environment in meeting the development challenges in South Africa, SA-TIED will embark on a second phase. Phase II of the programme will continue to rely on the same key principles that have proven successful. A strong emphasis on developing synergies through collaboration and inclusivity will be reflected across the entire programme, including in research, capacity building, and policy bridging. The continued development of a world-class research infrastructure around South Africa's tax administrative data would certainly be advisable. And, building and strengthening the mutual confidence and trust among the partners will continue to be essential to programme success.

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Appendices

SA-TIED research papers

The following 162 SA-TIED research papers have been published as of 29 September 2021:

Workstream	Title	Author(s)
WS1	How large is the wage penalty in the labour broker sector? Evidence for South Africa using administrative data	Cassim & Casale
WS1	Household tipping points in the face of rising electricity tariffs in South Africa	Goliger & Cassim
WS1	The tipping point: The impact of rising electricity tariffs on large firms in South Africa	Goliger & McMillan
WS1	On the persistence of growth for South African firms	Mamburu
WS1	Employer characteristics and youth employment outcomes in the formal sector in South Africa	Ngandu & Chisadza
WS1	Innovation activity in South Africa: Measuring the returns to R&D	Steenkamp et al.
WS1	Tax-motivated transfer mispricing in South Africa: Direct evidence using transaction data	Wier
WS1	Big and “Unprofitable”: How 10% of Multinational Firms Do 98% of Profit Shifting	Wier & Reynolds
WS1	Offshoring (and inshoring) within South African manufacturing firms: An analysis of the labour market effects	Pretorius et al.
WS1	Dancing with dragons: Chinese import penetration and manufacturing firms’ performances in South Africa	Torreggiani & Andreoni
WS1	Resource misallocation and total factor productivity: manufacturing firms in South Africa	Newman et al
WS1	Agglomeration and productivity in South Africa - Evidence from firm-level data	Amusa et al.
WS1	Firm-level employment growth in South Africa - the role of innovation and exports	Naidoo
WS1	Exchange rates and firm export performance in South Africa	Edwards & Hlatshwayo
WS1	Turnin’ it up a notch: How spillovers from foreign firms boost top-line product complexity of manufactured exports in South Africa	Sorensen
WS1	Worker mobility and productivity spillovers: An emerging market perspective	Hlatshwayo et al.
WS1	Industry classification in the South African tax microdata	Budlender & Ebrahim
WS1	Regulating the temporary employment sector: The impact of amendments to the Labour Relations Act	Cassim
WS1	The minimum wage and firm networks: Evidence from South Africa	Tan
WS1	Firm’s Resilience to Financial Constraints: The Role of Trade Credit	Marcelin
WS1	Exporters and Global Value Chains Participation: An Empirical Assessment of South African Firm	Avenyo et al.
WS1	Firm and product survival analysis: Evidence from South African tax administrative and product data	Mishi et al.
WS2	The creation of an individual-level panel using administrative tax data in South Africa	Ebrahim & Axelson
WS2	Can a wage subsidy system help reduce 50 per cent youth unemployment? Evidence from South Africa	Ebrahim & Pirttila
WS2	Tax Research in South Africa	Ebrahim et al.
WS2	Modelling Value-Added Tax in South Africa: Assessing the distributional impact of the recent increase in the VAT rate and options for redress through the benefits system	Gcabo et al.
WS2	Combatting debt bias in South African firms: The case for an ACE	Kari et al.
WS2	Subsidized labour and firms: Investment, profitability and leverage	Marcelin et al.
WS2	The elasticity of taxable income - New data and estimates for South Africa	Kemp
WS2	Shifting from deductions to Credits: unpacking the distributionale ffects of medical expenditure considerations in South Africa	Nhamo & Mudimu
WS2	Taxpayer responsiveness to taxation: Evidence from bunching at kink points of the South African income tax schedule	Bell
WS2	Depreciation allowances in South Africa	Calitz et al.

WS2	The corporate income tax gap in South Africa - A top down approach	Jansen et al.
WS2	Distributional effects of pension - and health related tax expenditures in South Africa	Redonda
WS2	Simulating personal income tax in South Africa using administrative data and survey data: A comparison of PITMOD and SAMOD for tax year 2018	Steyn et al.
WS2	Assessing pension-related tax expenditures in South Africa: Evidence from the 2016 retirement reform	Axelson & Redonda
WS2	Analysis of the distributional effects of COVID-19 and state-led remedial measures in South Africa	Barnes et al.
WS2	Evaluation of the accounting and taxation differences of South African firms	Schutte et al.
WS3	Urbanization, Structural Transformation and Rural-Urban Linkages in South Africa	Arndt, Davies and Thurlow
WS3	The Effect of Real Exchange Rate Volatility on Income Distribution in South Africa	Aye & Harris
WS3	Identifying monetary policy rules in South Africa with inflation expectations and unemployment	Bold & Harris
WS3	The Impact of Higher Leverage Ratio on the South African economy	Davies et al.
WS3	A 2013 Social Accounting Matrix for Zimbabwe	Davies & van Seventer
WS3	Using Economy-Wide Modelling for South African Policy Analysis: an introduction	Davies & Van Seventer
WS3	Labour Market Polarization in South Africa: a decomposition analysis	Davies & van Seventer
WS3	Trade Liberalization and South African Manufacturing: looking back with data	Driver
WS3	The information content of the yield spread about future inflation in South Africa	Harris & Ntshakala
WS3	Empirical estimates of fiscal multipliers for South Africa	Kemp
WS3	A medium-sized, open-economy, fiscal DSGE model of South Africa	Kemp & Hollander
WS3	The size distribution of monetary policy effects between South African manufacturing firms: firm-level evidence from administrative tax data	Lesame
WS3	Stock-and-flow-consistent macroeconomic model for South Africa	Makrelov et al.
WS3	Fiscal multipliers in South Africa: The importance of financial sector dynamics	Makrelov et al.
WS3	Balance sheet changes and the impact of financial sector risk-taking on fiscal multipliers	Makrelov et al.
WS3	Measuring labour earnings inequality in post-apartheid South Africa	Merrino
WS3	Wage Inequality under Inflation-Targeting in South Africa	Merrino
WS3	Accounting for fiscal obligations and contingent liabilities in public-private partnerships in South Africa: A framework for analysis	Mokanse et al.
WS3	A 2015 Social Accounting Matrix for South Africa	van Seventer et al.
WS3	A 2016 Social Accounting Matrix for South Africa with an Occupationally Disaggregated Labour Market Representation	van Seventer & Davies
WS3	Wealth Inequality and CO2 Emissions in Emerging Economies: The Case of BRICS	Aye
WS3	Monetary Policy and Wealth Inequality in South Africa: Evidence from Tax Administrative Data	Aye et al.
WS3	Petrol price regulations in South Africa: Is it Meeting its intended Objectives?	Crompton et al
WS3	The impact of alternate regulatory arrangements in the petroleum sector and its impact on the policy economy	Crompton et al.
WS3	Structural Estimates of the South African Sacrifice Ratio	Gerezihir & Nuru
WS3	The asymmetric impact of economic policy uncertainty on firm-level investment in South Africa: firm-level evidence from administrative tax data	Lesame
WS3	Youth Unemployment Hysteresis in South Africa: Macro-Micro Analysis	Maskaeva & Msafiri
WS3	State-dependent fiscal multipliers and financial dynamics: An impulse response analysis by local projections for South Africa	Merrino
WS3	Structural estimates of the South African sacrifice ratio	Nuru
WS3	Sources of Output Growth in Select Countries of the Common Monetary Area and Provinces of South Africa	Sahoo et al.
WS3	Regional and Sub-regional Analyses of Macroeconomic policy strategies for Growth and Equality in Southern Africa	Sahoo et al.

WS3	Fiscal Policy, Labour Market and Inequality: Diagnosing South Africa's Anomalies in the Shadow of Racial Discrimination	Scarlato et al.
WS3	Identifying structural changes in the exchange rates as a regime-switching process	Van Wyk & Maketjane
WS3	Do fiscal regimes matter for fiscal sustainability in South Africa? A Markov-switching approach	Woldu
WS3	Labour Market Polarization in South Africa: Economy-Wide Scenarios	Van Seventer & Davies
WS3	Incorporating regional linkages in estimates of output multipliers in southern Africa	Woldu
WS3	The impacts of public expenditure innovations on real exchange rate volatility in South Africa	Nuru & Gereziher
WS4	Earnings in the SARS IRP5 data	Kerr
WS4	Measuring Wealth Inequality in South Africa: An Agenda	Chatterjee
WS4	Gender and the South African Labour Market Policy relevant research possibilities using South African tax data	Ebrahim & Lilenstein
WS4	Distributional Changes in the Gender Wage Gap in the Post-Apartheid South African Labour Market	Mosomi
WS4	Inequality and the Generational Economy in South Africa: Race-Disaggregated National Transfer Accounts for South Africa	Oosthuizen
WS4	Snakes and Ladders and Loaded Dice: Poverty dynamics and inequality in South Africa between 2008-2017	Zizzamia et al.
WS4	Product market competition and labour market rigidities: Evidence from South Africa	Amodio et al.
WS4	Earnings and Employment microdata in South Africa	Kerr & Wittenberg
WS4	Markups and Market Structure in South Africa: What can be learnt from new administrative data?	Budlender
WS4	The Wage-Setting Power of Firms: Rent-Sharing and Monopsony in South Africa	Bassier
WS4	Job Spells in an Emerging Market: evidence from apartheid and post-apartheid South Africa	Hill et al.
WS4	The Relationship Between Transport Accessibility and Employment Duration	Van Der Merve
WS4	Separating employment effects into job destruction and job creation - Evidence from a large minimum wage increase in the agricultural sector using administrative tax data	Piek
WS4	A new demographic model of South African population	Kerr
WS4	The impact of the Employment Equity Act on female inter-industry labour mobility and the gender wage gap in South Africa	Landman & O'Clery
WS4	Estimating the distribution of household wealth in South Africa	Chatterjee
WS4	Exclusive growth? Rapidly increasing top incomes amidst low national growth in South Africa	Bassier & Woolard
WS4	Orphans and stunted growth: Investigating the potential of spatial network effects in service delivery for reducing stunting in orphans	Bridgman
WS4	The influence of household composition on leisure time in South Africa — A gender comparison	Harrichurran et al.
WS4	Globalization and gender inequality: Evidence from South Africa	Van Rensburg et al.
WS4	Measuring earnings inequality in South Africa using household survey and administrative tax microdata	Kerr
WS4	Effects of COVID-19 on people's livelihoods in low-income and disadvantaged communities in urban South Africa	Schotte
WS4	The livelihood impacts of COVID-19 in urban South Africa: A view from below	Schotte & Zizzamia
WS4	Estimating employment responses to South Africa's Employment Tax Incentive	Budlender & Ebrahim
WS4	The impact of centralized bargaining on spillovers and the wage structure in monopsonistic labour markets	Bassier
WS5	Developments in variable renewable energy and implications for developing countries	Arndt et al
WS5	South African Agricultural Productivity in the Global Context: Comparisons using FAO Data	Arndt & Nin Pratt
WS5	A data revolution for agricultural production statistics in sub-Saharan Africa	Arndt et al.
WS5	Climate change and developing country growth: The cases of Malawi, Mozambique, and Zambia	Arndt et al.
WS5	Faster than you think: Renewable energy and developing countries	Arndt et al.
WS5	Global land reform experiences: A review for South Africa	Davies et al.

WS5	Assessing the Energy and Carbon Footprints of Exploiting and Treating Brackish Groundwater in Cape Town	Gobin et al.
WS5	Part 2 - Quantifying the Macro- and Socio-Economic Benefits of a Transition to Renewable Energy in South Africa Part 2: Economic Impacts	Hartley et al.
WS5	Factors influencing maize farmers' interest in crop insurance in Swaziland	Mbonane & Makhura
WS5	Least-cost integrated resource planning and cost-optimal climate change mitigation policy: Alternatives for the South African electricity system	McCall et al.
WS5	Road Freight and Energy in South Africa	Merven et al.
WS5	Quantifying the Macro- and Socio-Economic Benefits of a Transition to Renewable Energy in South Africa - Part 1: The Energy Landscape	Merven et al.
WS5	Long term modelling of household demand and its implications for energy planning	Merven et al.
WS5	Improved representation of coal supply for the power sector for South Africa	Merven et al.
WS5	The changing nature of hydroclimatic risks across Southern Africa	Schlosser et al.
WS5	Modelling the costs of constraining the transition to renewable energy in South Africa	Merven et al.
WS5	Impact of Covid-19 on the South African economy: An initial analysis	Arndt et al.
WS5	Impacts of climate change on agriculture and household welfare in Zambia: An economy-wide analysis	Ngoma et al.
WS5	Deciphering the biodiversity-production mutualism in the global food security debate	Seppelt et al.
WS5	Economic implications of climate change in Zambia	Tembo et al.
WS5	Climate uncertainty and agricultural vulnerability in South Africa	Hartley et al.
WS5	Private Transport Modelled in SATIMGE and the Socio-Economic Impacts of Evs	Merven et al.
WS5	Climate change and its implications for central banks in emerging and developing economies	Arndt et al.
WS5	Internal migration and energy poverty in South Africa	Roux
WS5	Economic implications of climate change in agriculture sector in Mozambique	Manuel et al.
WS5	Skilled labour emigration in South Africa: Exploring the long-term implications	Halstein
WS5	Feed biomass production may not be sufficient to support emerging livestock demand: Model projections to 2050 in Southern Africa	Enahoro
WS5	Interrelations between the water, energy and food systems and climate change impacts in the Zambezi River Basin	Payet-Burin & Strzepek
WS5	Development of a modelling framework to analyze the interrelations between the water, energy and food systems in the Zambezi River Basin	Payet-Burin & Strzepek
WS6	Black cat, white cat - lessons to be learned from ASEAN	Lowitt
WS6	Charity begins at home — The political economy of non-tariff barriers to trade in Southern Africa	Ledger
WS6	Evaluating the impact of global oil prices on SADC and the potential for increased trade in bio-fuels and natural gas within the region	Moyo
WS6	Spreading the gains: Prospects and policies for the development of regional value chains in the automotive and food/retailing sectors in Southern Africa	Black et al.
WS6	Exploring the potential for growth and trade in fruit and oilseed-to-edible oils value chains following political shifts in Zimbabwe	Chisoro-Dube et al.
WS6	Linkages and Spillover Effects of South African FDIs in Southern African Countries: The Case of Agro-processing Firms	Nandonde et al.
WS6	Linking Southern Africa to South Africa's Global Value Chains	Balchin & Banga
WS6	Motorcycles Parts & Aftermarket Industry Regional Value Chain in Southern Africa	Mtanga & McCamel
WS6	Moving up the copper value chain in Southern Africa	Makgetla et al.
WS6	South African gold mining and local procurement in Tanzania and Ghana	Smith et al.
WS6	The contribution of tradable services within southern Africa	Turok & Visagie
WS6	The role of supermarket chains in developing food, other FMCG and consumer goods suppliers in regional markets	Das Nair & Landani
WS6	Agro-processing, value chains and regional integration in Southern Africa	Black et al.
WS6	Making agricultural value chains more inclusive through technology and innovation	Das Nair & Landani

WS6	Assessment of demand in agro-processing machinery in the SADC region	Chigumira
WS6	Initial considerations for the creation of an inter-regional industrial hemp value chain between Malawi and South Africa	Lowitt
WS6	A comparative review of export processing zones in Southern Africa in the wake of sustainable development goals	Adu-Gyamfi et Al.
WS6	Comparative approaches to key issues in the economic regulation of telecommunications markets in South Africa, Tanzania, Zambia, and Zimbabwe	Robb & Paelo
WS6	Competition and inclusive regional economic growth in food production: Barriers to entry and the role of African multinational corporations	Bosiu and Vilakazi
WS6	Resource Sector Concessions and Spatial Development in Southern Africa	Halstein
WS6	Special economic zones in Southern Africa	Dube et al.
WS6	The effect of policy uncertainty on South Africa, SADC and beyond	Douch
WS6	Future-proofing the plastics value chain in Southern Africa	Mofo
WS6	Special economic zones and transnational zones as tools for Southern Africa's regional growth: Lessons from international best practices	Karambakuwa et al.
WS6	Competitive dynamics of telecommunications markets in South Africa, Tanzania, Zambia, and Zimbabwe	Robb & Paelo
WS6	Fast tracking the SADC integration agenda to unlock regional collaboration gains along growth corridors in Southern Africa	Habiyaremye
WS6	Building malls or metros? South Africa's exports of tradable urban services to the rest of Africa	Turok & Visagie
WS6	Special Economic Zones in Southern Africa: White Elephants or Latent Drivers of Growth and Employment? The Case of Zambia and South Africa	Phiri and Manchishi
WS6	COVID-19 and trade facilitation in Southern Africa: Implications for the AfCFTA	Mataba & Ismail
WS6	Learning from experience: Special Economic Zones in Southern Africa	Makgetla
WS6	The COVID-19 pandemic and the economy in Southern Africa	Makgetla
WS6	Barriers to entry and the role of African multinational corporations: Entrants in intermediate industrial products (inputs into construction)	Nsomba & Vilakazi
WS6	The regulation of interconnection and regulatory alignment in the Southern African Development Community	Nsomba

SA-TIED young scholar papers

The following 38 SA-TIED young scholar papers have been published as of 29 September 2021:

No.	Title	Author
1	The impact of competition on bank risk-taking in sub-Saharan Africa	Bosiu
2	South African Bank Regulation: Basel III, Default Risk and Contagion	Chiliza
3	The economic performance and competitiveness of manufacturing firms in Johannesburg, South Africa	Kaziboni
4	Machine Learning vs Traditional Forecasting Methods: An Application to South African GDP	Martin
5	An application of the Boone Indicator to the South African Banking Sector	Mokobane
6	Trends in International Mathematics and Science Study Numeracy 2015 — An analysis of South African mathematics performance	Selkirk
7	The Effect of Language on Labour Market Success for Immigrants and Citizens in South Africa	Zien et al.
8	Food and Nutrition Policy in South Africa: The National Vision, Policy Space and Policy Alignment	Delpoit
9	Distortions to incentives in South African agriculture: A case study of the wheat industry	Day
10	Determinants of commercial orientation and the level of market participation by women maize farmers in Eswatini: A Case Study of the Highveld Region	Dlamini
11	Measuring the competitive trends of the South African citrus industry	Dlikilili & van Rooyen

12	The Framework Convention on Tobacco Control's recommendations on price and tax measures: Barriers to implementation in South Africa	Filby
13	Small-scale embedded generation in South Africa: Implications for energy sector transformation from a local government perspective	Filipova & Morris
14	An Assessment of South Africa's Non-Genetically Modified Maize Export Potential	Mawasha et al.
15	Using information-sharing systems to address opportunistic behaviour between tomato farmers and brokers in Zambia	Munsaka
16	Words can change worlds: An impact evaluation of Shine Literacy	Stollberg
17	The savings behaviour of informal settlement households with social grant recipients: A case study of Freedom Park, Soweto	Thosago
18	Determinants of intra-East African Community (EAC) Trade	Majara
19	Industrialization for Economic Transformation: Economy-Wide Impacts of Agro-Processing Development in Tanzania	Mazungunye
20	Measuring the Efficiency Effect of Integration in the South African Development Community	McGraw
21	The international political economy of economic integration - how international integration deters bilateral conflict	Scribante
22	Adoption of and willingness to pay for organic fertilizer by smallholder farmers	Zondo
23	Impact evaluation of Funda Wande in-service teacher coaching intervention: Findings from the first year	Meiring
24	Effects of labour immigration on per capita income growth and unemployment	Nyagweta
25	Examining Fisher's Hypothesis at a disaggregated analysis for South Africa — An asymmetric approach	Mbekeni
26	The manufacturing sector FDI and economic growth in South Africa	Kolisi
27	Does exchange volatility hurt South African domestic consumption?	Mukalayi
28	The Influence of the US Monetary Policy on the South African Economy	Ntshunsha
29	Physio-economic impacts of climate change on maize production in South Africa	Magodora
30	Regional inequality and rural dependency in South Africa: How can opposing trends in regional inequality be explained?	Redders
31	Public debt–economic growth nexus: Case of South Africa	Ngotana
32	The alcohol and tobacco use and labour market nexus in South Africa	Bello
33	Measuring women's empowerment in selected Southern African countries	Nyathi & Benhura
34	Public service wage bill and economic growth: Evidence from South Africa	Mbaleki
35	A decomposition analysis of health poverty trends in South Africa	Maiwashe
36	The implications of the African Continental Free Trade Area on South African agricultural trade	Seti
37	Financial inclusion and food security nexus: Evidence from the Southern African Development Community	Machili
38	The business environment and economic development: How the ease of doing business in sub-Saharan Africa relates to its economic growth	Muhanika

SA-TIED policy briefs

The following 40 SA-TIED policy briefs have been published as of 6 August 2021:

Author	Title of the brief
Amusa et al.	Spatial dynamics of firm productivity in South Africa
Mamburu	Firms with high-growth episodes in South Africa — Are they persistently high-growth firms?
Ngandu & Chizadza	Finding optimal solutions for efficient youth labour policies: what kind of firms employ young people in South Africa?
Pretoria et al.	The impact on jobs and earnings of offshoring in South Africa
Sorensen	Turning it up a notch: can foreign direct investment help South Africa increase the complexity of its exports
Torreggiani & Andreoni	Dancing with dragons Can South African firms compete with Chinese imports?
Wier & Reynolds	Revenue losses from tax-motivated mispricing in South Africa
Wier & Reynolds	The impact of tax havens on South African Revenue
Gcabo et al.	Balancing tax collection and equality — the case of value-added tax in South Africa

Jansen et al.	Estimating tax gaps in the non-financial sector: a pathway to effective tax collection in South Africa
Nhamo	Are credits or deductions better in public health spending? The impact on equality outcomes in South Africa
Barnes et. al.	The distributional impact of COVID-19 and the state emergency packages in South Africa
Lesame	Impacts of monetary policy on firms by firm size in SA
Merrino	Wage inequality in postapartheid South Africa
Kemp & Hollander	Policy implications of empirically estimated fiscal multipliers for South Africa
Kemp & Hollander	Fiscal multipliers and debt dynamics using a DSGE approach
Mosomi	The gender wage gap in post-apartheid South Africa
Oosthuizen	Racial inequality and demographic change in South Africa — Impacts on economic development
Zizzamia et al.	A game of snakes and ladders with loaded dice — socioeconomic class and poverty in South Africa
Tembo	Climate change impacts on Zambia’s energy and agriculture sectors
Merven et al.	Least-cost power pathway for South Africa
Hartley et al.	A just transition to cleaner energy in South Africa
Black et al.	Can agro-processing value chains strengthen regional integration in southern Africa?
Alfred Moyo	Strengthening SADC trade in alternative fuels — Reducing the impact of global oil prices
Black et al.	Deepening regional integration in Southern Africa
Habiyaremye	Tackling poverty and inequality in Southern Africa – transnational growth corridors as a solution
Lowitt	Developing a Malawi–South Africa value chain for industrial hemp: What are the challenges?
Phiri et al.	Solutions for designing better special economic zones programmes in Africa
Visagie et al.	Can trade in services bolster regional development in Southern Africa?
Aye	Does exchange rate volatility amplify existing inequalities in South Africa?
Arndt et al.	Climate change implications for central banks in emerging and developing economies
Le Roux & Choumert-Nkolo	Internal migration and energy poverty in South Africa
Hartley et al.	Climate uncertainty and agricultural vulnerability in South Africa
Hill et al.	Job duration in apartheid and post-apartheid South Africa
Mofo	Unlocking a regional plastics value chain between Mozambique and South Africa: Natural gas as a key
Phiri et al.	Special economic zones in Zambia and South Africa: Blueprint, experiences and outcomes
Turok & Visagie	Technology, tourism, malls and metros: Promises and pitfalls of tradable services in Africa
Chatterjee	Extreme inequalities: The distribution of household wealth in South Africa
Lesame	Monetary policy and firm size in South Africa
Halstein	Skilled labour emigration in South Africa: Exploring the long-term implications

SA-TIED institutional partners

The following 21 organizations have contributed to SA-TIED as of 30 July 2021:

No.	Organization Name	No.	Organization Name
1	Trade and Industrial Policy Strategies, South Africa (TIPS)	12	Zambia Institute for Policy Analysis (ZIPAR)
2	Southern African Social Policy Research (SASPRI)	13	Zimbabwe Economic Policy Analysis and Research Unit (ZEPARU)
3	University of Cape Town	14	Nelson Mandela Metropolitan University
4	Human Sciences Research Council, South Africa (HSRC)	15	Indian Institute of Technology Bhubanesw
5	Overseas Development Institute (ODI)	16	Roma Tre University [Università degli Studi Roma Tre]
6	Institute For African Alternatives	17	University of Essex
7	University of Johannesburg	18	The Public Affairs Research Institute (PARI)

8	University of the Witwatersrand Wits	19	The Council for Scientific and Industrial Research (CSIR)
9	Council on Economic Policies	20	University of Hertfordshire
10	Stellenbosch University [Universiteit Stellenbosch]	21	Birmingham City University
11	University of Oxford		

SA-TIED short-term training courses

The following 23 SA-TIED training courses have been organized as of 30 July 2021:

No.	Training courses
1	Technical workshop on Reassessing macroeconomics: implications for South Africa
2	Technical workshop: An introduction to SAMOD, a South African tax-benefit microsimulation Model
3	An online modelling course
4	Making macroeconomic policy models relevant for South Africa
5	Technical workshop: An introduction to economy-wide multiplier models
6	A review of time-series analysis
7	Learning to use tax data for policy research - the individual panel
8	Training on forecasting in large macroeconomic models for South Africa
9	Training on forecasting in large macroeconomic models for South Africa
10	Modelling Distance Course
11	SA-TIED synthetic data training course
12	SA-TIED microdata curation for secure data centres training course
13	A training workshop on microsimulation model for personal tax income
14	SA-TIED introduction to data analysis using Stata training course
15	SA-TIED introduction to data analysis using Stata training course
16	CGE Modelling Workshop
17	Introduction to Stata - capacity building workshop
18	Introduction to Stata, online capacity building workshop
19	Introduction to SAMOD: a South African tax-benefit microsimulation model
20	Training on data analysis using R
21	Tax revenue mobilization in South Africa
22	A training workshop on Introduction to Data Analysis using R
23	A training workshop on Secure Data and Metadata Management