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RESEARCH ARTICLE

Is the Southern African Development Community (SADC) afflicted by premature deindustrialisation?

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Abstract

A key driver of growing youth unemployment across African economies was identified by Rodrik (2016) as "premature deindustrialisation", where developing countries move out of labour-absorptive, low-income manufacturing and into low value-added services sooner than their industrialised counterparts did so historically. Developing countries also make this transition at lower rates of per capita income than their wealthier peers. Manufacturing has, traditionally, been the primary channel through which employment growth has occurred, creating a sustained middle class, which in turn strengthens the political equilibrium (Acemoglu et al., 2019). A preliminary descriptive analysis of manufacturing performance in Africa reveals starkly divergent trajectories between SADC and non-SADC countries. SADC's output and employment growth as a measure of manufacturing performance is worse than that of non-SADC countries in Africa. This paper quantitatively examines whether SADC is an outlier, controlling for intervening variables. Specifically, we employ econometric modelling with a focus on introducing decade-region interaction effects to ascertain whether SADC suffers a statistically significant difference in industrialisation trends when compared with countries in the rest of Africa. We account for this discrepancy by referring to the weak performance of SADC's dominant economy, South Africa, and further consider whether the industrialisation prospects of other SADC countries are adversely impacted by a relatively strong reliance on oil and mineral rents. Finally, we propose some adjustments to the current SADC Industrialisation Strategy (2015-2063).

Keywords: Industrial strategy, Premature deindustrialisation, Manufacturing capacity, African political economy, International trade

Introduction/Background

Youth unemployment is a significant global concern. It is an especially concerning development challenge across African economies, given relatively high fertility rates in the latter. By 2100, Africa will account for four elevenths of the world's population (United Nations Department of Economic and Social Affairs, 2023). The nature of this concern is multivariate. In the first instance, high quality jobs provide dignity. Job income is also a means to an end. As a growing body of literature suggests, such income, broadly distributed, is central to the creation of a sizeable middle class without which political and social stability weakens (Acemoglu et al., 2019).

This brings us back to the question of employment. Part of the challenge is that growth should translate into wage growth, according to standard classical models, but this has not occurred because productivity growth has largely been driven by technological progress at the expense of lower-skilled labour. More gains have also accrued to the owners of technology, undermining the bargaining power of workers that had originally been institutionalised during the early waves of democratisation. As Acemoglu puts it: "Shared prosperity thus depends not only on productivity growth but also on the right composition of technology, institutions, and norms … The necessity of markets for driving innovation does not make them sufficient for producing social benefits" (Acemoglu, 2023).

Notwithstanding some of the profound challenges to shared prosperity created by technological innovation, a standard precept within the economics literature remains that – at least historically – industrialisation has been the dominant channel through which job growth has occurred. In particular, it has been a conduit through which low-skilled workers have been absorbed into the economy (Rodrik, 2016, 2017). However, in many African countries, manufacturing growth has slowed, limiting this channel for employment growth.

In 2016, economist Dani Rodrik published a seminal paper entitled Premature Deindustrialisation. Rodrik identified a phenomenon in which developing countries appeared to be "running out of industrialisation opportunities sooner and at much lower levels of income compared to the experience of early industrialisers" (Rodrik, 2016, p. 1). Rodrik argued in the same vein as Acemoglu that even in relatively wealthy countries, where manufacturing has continued to grow, lower-skilled workers have been left worse off, with concomitant political implications. Rodrik noted that the deindustrialisation trend appeared to be more severe in Latin America and sub-Saharan Africa.

This paper examines the industrialisation trend within sub-Saharan Africa by grappling with two questions: First, are there significant differences in regional "deindustrialisation" trends between different regions in Africa? Second, what accounts for these differences if they exist? As explained in the following section, the Southern African Development Community (SADC) appears to be particularly afflicted by deindustrialisation. We show that there is solid empirical evidence to suggest that the region is indeed an outlier. There is no shortage of policy documents and regional strategies and roadmaps, but these often appear to fall short of their stated ambitions. Why this outcome has materialised in the SADC region and what can be done about it primary concern of this study.

We suggest that there are two main explanations for this. First, South Africa, the region's dominant economy experienced diminishing economic and industrialisation prospects, especially during the latter part of our sample period of 1990 to 2019. Second, the dynamics of Dutch Disease may be in effect, whereby a reliance on natural resource rents displaces physical capital and skills from other sectors in the economy and leaves countries susceptible to the inherent volatility of commodity prices (Nguimkeu & Zeufack, 2019).

The paper proceeds as follows. Section two reviews the literature since Rodrik's paper was published, with the main emphasis on papers and policy documents that address the SADC region. Section three delineates the data and methods used to establish whether SADC is an outlier. Section four reports the results. Section five discusses the findings in light of the literature and articulates the policy implications thereof. Section six concludes.

Literature Review

Rodrik's seminal paper, published in the Journal of Economic Growth in 2016, opened with a key observation that for countries which remain mired in poverty,[1] "many observers and policy makers believe future economic hopes rest in important part on fostering new manufacturing industries" (Rodrik, 2016, p. 2). Rodrik notes that unlike other sectors such as mining and finance, manufacturing has traditionally absorbed significant quantities of unskilled labour. He tentatively suggests that globalisation can best account for the premature move from premature peak manufacturing to low value-add services in sub-Saharan African countries. Asian economies were best suited, for a set of clear reasons, to benefit from post-1990 globalisation opportunities. The summary finding of his 2016 paper is best cited in full: "Since 1990, countries have reached peak manufacturing employment and output shares at incomes that are around forty percent of the levels experienced before 1990. The employment effects are statistically significant. The output effects, which are almost equally large on average, are also quite heterogenous across different country groups" (Rodrik, 2016, p. 21).

Rodrik observes that in sub-Saharan Africa (SSA) the effects of the trend are manifest in urban migrants crowding into low-value or 'petty' services instead of manufacturing, and few signs of industrial resurgence despite some investment in that direction, particularly from China.

Although the debate on (de)industrialisation is ongoing and robust, the latest empirical analyses tend to confirm Rodrik's pessimistic thesis. However, none satisfactorily examine whether SADC is an outlier (in terms of inter-regional performance) or not, and if so, why.

Rodrik's headline finding was that for countries that industrialised before 1990, the average peak manufacturing employment share was 21.5 per cent at an average GDP per capita of USD 11,048 (measured in 1990 US dollars). Post-1990, the employment share dropped to 18.9 per cent for industrialising countries, while the average GDP per capita plummeted to USD4,273 (Rodrik, 2016). Peak manufacturing output across the two periods dropped to 24.1 per cent of total GDP (at GDP per capita of USD20,537) from 27.9 per cent pre-1990 (at a GDP per capita average of USD47,099).These trends do not necessarily imply that industrialisation strategies should be abandoned, but they certainly suggest that the assumptions behind them require reflection or at least further interrogation (Rodrik, 2016).

Nguimkeu and Zeufack (2019, p. 1) suggest that Rodrik's 2016 findings may not hold true, given the small sample of only 11 sub-Saharan African countries,[2] or "that these conclusions [premature deindustrialisation] do not apply to many or even most countries of the region". They attempt to address the small sample size and the dearth of premature deindustrialisation literature on sub-Saharan Africa by building a database of 41 countries for the period 1960 to 2016. Their results "overwhelmingly do not support the finding that SSA countries have begun to deindustrialise prematurely" (Nguimkeu & Zeufack, 2019, p. 3). Regional heterogeneity is thus another finding and, as our own research will show, they do find evidence of deindustrialisation in southern Africa but are careful to point out that they are unable to confirm whether it is premature or not. In their econometric regressions, following Rodrik's standard model, Nguimkeu & Zeufack (2019) only find statistically significant results for deindustrialisation in southern Africa, which they suggest may also be driving the results for the rest of the continent.

[1] In the years since 2016, poverty alleviation in developing countries has experienced further challenges in the form of supply-chain shocks. Most notable among these was the Covid-19 global pandemic (International Monetary Fund, 2021).

[2] The eleven sub-Saharan African countries in Rodrik (2016)'s initial sample are: Botswana, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Nigeria, Senegal, South Africa, Tanzania and Zambia.

In 2020, Mensah (2020) published a paper confirming Rodrik's (2016) view regarding SSA specifically. He concluded that replicating Rodrik's results using the Economic Transformation Database (ETD)[3] draws the same conclusion; but increasing the sample size to 18 and then 45 produces different patterns and trends. For the 18 countries in the ETD, "we observe employment deindustrialisation and output industrialisation in Africa" (Mensah, 2020, p. 17). However, in extendinging that sample to all SSA countries the evidence was inconclusive, pointing to stagnation in both output and employment terms, on average. Like Nguimkeu and Zeufack (2019), though, they find regional heterogeneity, with southern Africa deindustrialising and east Africa industrialising. Mensah (2020) infers that this is because the southern Africa region is characterised by relatively high income levels, the industrial structure is capital-intensive, which makes it less attractive for greenfield manufacturing investments than its low-cost competitors in east Africa.

From a policy perspective, in determining the reasons for average stagnation Mensah argues that reducing trade frictions within Africa to advance intra-and inter-regional trade (for instance through the African Continental Free Trade Agreement (AfCFTA)) will advance the structural transformation of the region. This has the potential to boost efforts by African countries to industrialise in both employment and output terms. In similar vein, Naudé and Tregenna (2023, Abstract) argue that the establishment of the AfCFTA is timely, but its "benefits will only be realised if countries also improve infrastructure to overcome the negative consequences of adverse geographies, improve trade facilitation to exploit learning-by-exporting from intra-African trade, and facilitate urbanisation".

Byiers et al. (2018) analyse industrial policy in Africa and suggest that the rise of regional strategies makes theoretical sense in light of the potential for regional market integration for value chain exploitation. However, their analysis suggests that these regional strategies often ignore competition dynamics in specific sectors between countries. Moreover, national industrialisation strategies are often at odds with regional industrial objectives because the mechanisms used to pursue national industrialisation such as the insertion of barriers to trade in the form of protective tariffs contradict the commitments that would be required to achieve regional industrialisation.

However, Byiers et al. (2018) do not examine empirically whether these strategies have been effective. This study fills the gap by engaging with questions of policy efficacy after presenting our empirical findings. Consistent with this line of enquiry, the SADC industrialisation strategy specifically acknowledges the difficulties of designing an appropriate regional integration strategy given the economic diversity of member states (Southern African Development Community, 2015). Notwithstanding this strategy, Alence (2022) points out that the results of various industrialisation efforts have been disappointing. He notes that, since 2019, "trade among African countries only account[ed] for only about one-eighth of the continent's total trade, and Africa's trade with the rest of the world remains skewed in ways that echo the colonial era" (Alence, 2022, p. 1).

Concurring with Nguimkeu and Zeufack (2019), Kruse et al., 2022) note that there is evidence for a manufacturing renaissance in sub-Saharan Africa more generally. Like most scholars on the subject, they recognise that "a modern sector that absorbs workers is crucial for economic development and poverty reduction" (Kruse et al., 2022, p. 2). Despite their relative optimism about a manufacturing renaissance in sub-Saharan Africa, they recognise that the level of manufacturing activity in the region is increasing but still low in comparison with other global regions. Nonetheless, the manufacturing em-

[3] This database is compiled by the Groningen Growth and Development Centre (GGDC) in conjunction with the United Nations University's World Institute for Development Economics Research (UNU-WIDER).

ployment share has clearly grown, on average, quite substantially since 1990 in large African countries such as Ethiopia and Kenya. Technically, the econometric estimates (excluding Mauritius, which is an outlier) report "that the average economy in SSA had a manufacturing employment share of about 1.9 per centage points higher in the 2010s than in the 1990s" (Kruse et al., 2022, p. 8). This is a very different finding to Rodrik (2016).

The authors acknowledge that selection bias could be at play in both instances, given that they use different countries and different datasets. In their estimation of only 11 countries in the Rodrik sample, though, Kruse et al. (2022) report that they find no significant industrialisation trend for SSA even in the 2010s. Rodrik's estimation ends in 2011. Clearly, then, the results for SSA are sensitive to country coverage. Moreover, they find that "heterogeneity within regions and across decades is important for the interpretation of broader regional trends" (Kruse et al., 2022, p. 12). It is this lacuna that generates the rationale for an inquiry into whether the SADC region is an outlier in terms of industrialisation performance.

From a policy perspective, Kruse et al. (2022) argue that industrialisation efforts may yield opportunities for growth and development. They find that there is a growth in SSA of unregistered informal firms that are labour absorptive but not productively efficient. While they make no specific recommendations towards addressing this, they do point to the need for more research on the issue. It seems clear that rising labour costs in China and its attempted move towards a more service-orientated economy creates industrialisation opportunities for economies within SSA, but automation and capital deepening may attenuate the labour-absorptive impacts. This diminishes the prospects for greater inclusivity in exploiting manufacturing opportunities. Nonetheless, as McMillan & Zeufack (2023) point out, even if the capital intensity of manufacturing precludes significant employment gains, the indirect employment gains associated with manufacturing could be substantial. Regarding poor productivity growth among small firms, they argue that integrating some of the productive ones into domestic value chains could have large payoffs.

Asmal et al. (2023) utilise the same Economic Transformation Database (ETD) database as Kruse et al. (2022) (but not Nguimkeu and Zeufack) to compare apples with apples. They use use Nguimkeu and Zeufack's estimation technique on the basis of applicability. These authors attempt to resolve the debate between Rodrik's (2016) findings, on the one hand, and later findings by the abovementioned authors. They use a fixed effects fractional logit model, which "does not suffer from the incidental parameters problem commonly associated with fixed effects of non-linear panel models, such as the one used by Rodrik (2016)" (Asmal et al., 2023, p. 9). Their descriptive data notes moderate growth off a low base for manufacturing in the SSA region, and that 12 of eighteen countries in the dataset experienced an increase in the share of employment from manufacturing.

Asmal et al. (2023) confirm that there is evidence of employment industrialisation in the Kruse et al. (2022) specification that controls for income and demographic trends, but that this disappears when estimating the specification using the fixed effects fractional logit estimator. Using the Rodrik (2016) specification, Asmal et al. (2023) find mixed evidence for deindustrialisation in the SSA region. This finding is softened when Mauritius is excluded from the dataset, suggesting a possible renaissance as argued by Kruse et al. (2022). Overall, they find strong evidence of employment deindustrialisation when the sample changes or additional control variables are included in the regression equation: "Ultimately, our findings suggest that the SSA manufacturing sector has not experienced an African renaissance and that the current SSA manufacturing sector growth trajectory, if it continues,

will be unable to generate the number of jobs hoped for by African policymakers" (Asmal et al., 2023, p. 24). Whether employment share or manufacturing output was used as the dependent variable, the findings remained robust.

Considering these empirical findings, the somewhat pessimistic view held by Rodrik (2016) appears to be corroborated. At best, any manufacturing renaissance for which some evidence may be found is occurring outside of southern Africa. This does not necessarily imply that regional industrialisation strategies are obsolete, but it does imply that a clear view of how to optimally remove the barriers to its success must be developed. Misalignment between national and regional interests also needs to be fully appreciated, especially in the southern African context, where South African hegemony has a potentially negative effect both on industrialisation potential and intra-regional trade (Alence, 2022). Trade and industrialisation are deeply intertwined; any policy analysis needs to recognise this too.

Moyo (2020) has recently written that the SADC region remains highly dependent on commodities and has experienced concomitantly low levels of industrialisation since gaining independence from colonial powers. She explores the effect of globalisation on industrialisation in the region. In line with Rodrik's view, her conclusion is that globalisation is a key channel through which SADC persists as a commodity producer/exporter while importing most of its manufactured products. While Moyo attributes this to the 'neoliberal' architecture of global trade and finance, she nonetheless recognises that globalisation provides opportunities for SADC to accelerate the production of high value-added goods for domestic consumption. In arguing that SADC can facilitate the implementation of its Industrialisation Strategy and Roadmap (Southern African Development Community, 2015), she does not address the critical issue raised by Naudé & Tregenna (2023) that regional and national strategies often contradict one another. Moreover, as indicated below, Moyo's work does not provide an empirical assessment of whether deindustrialisation is more acute within SADC compared with other regions. As indicated above, very few studies do this; ours adds to an emerging scholarship that examines regional heterogeneity in industrialisation performance, especially since 2010.

Data and methods

Overall approach

This study pursued a mixed-methods empirical strategy. Specifically, regression analysis was used to identify whether the Southern African Development Community (SADC) grouping of countries is in fact an outlier within the African context. Section 4 reports on the results of our econometric modelling. Section 5 builds on our quantitative contributions by evaluating the existing SADC industrialisation strategy (SADC, 2015). This section establishes our empirical approach, with a focus on outlining our data and setting, providing model specification, and discussing the caveats of our approach.

Data and setting

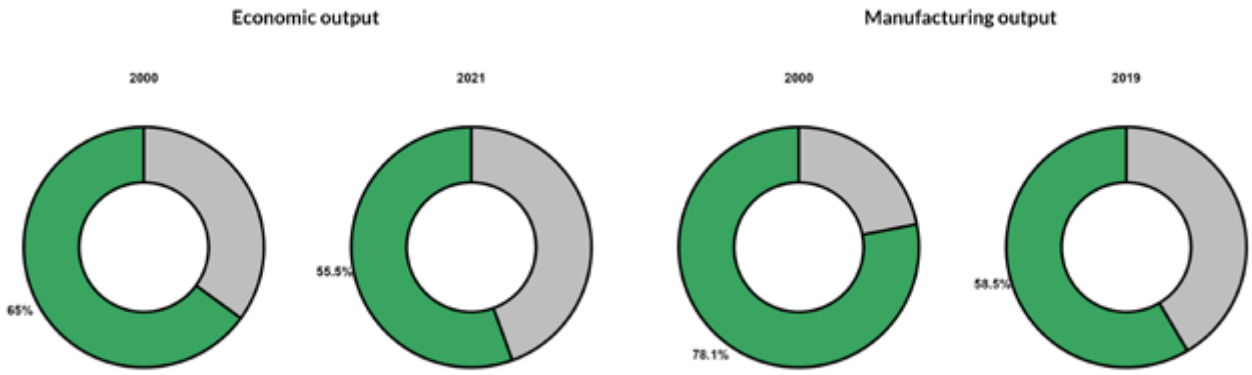
SADC is a regional intergovernmental organisation, which as of January 2023 comprises sixteen member states.[4] SADC's origins lie in the formation of the Southern African Development Co-ordination Conference (SADCC) in 1980, consisting of several of the 'frontline states' (Southern African Development Community, 2023). A principal motive behind this incipient grouping was a desire to

[4] These member states are Angola, Botswana, Comoros, Democratic Republic of the Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia and Zimbabwe.

apply pressure on the South African government to bring its racially segragationist system of government, Apartheid, to an end. For SADCC countries, this goal had the supplementary economic benefit of helping them reduce their dependence on the South African economy, the most dominant force in the region (Davies, 1992; Schoeman, 2002). Following the commencement, in 1990s, of South Africa's transition to democracy,[5] SADCC members began discussions on the adoption of a framework which emphasised collaborating on specific developmental and economic considerations. During the transition, SADCC member states formed the new Southern African Development Community in 1992.

The key economic initiatives SADC, formed in 1992, has sought to implement include: the SADC Protocol on Trade (1996); the creation of two Regional Indicative Strategic Development Plans (2003 and 2020); the launch of the SADC Free Trade Area (2009); and the SADC Industrialisation Strategy and Roadmap (2015) (SADC, 2023). Although SADC has made some progress on the overarching goal of reducing the region's economic dependence on South Africa since its founding, Figure 1 shows that more headway needs to be made if this is indeed a plausible economic objective.[6] While in 2021 South Africa comprised just over 15 per cent of SADC's total population, it still accounts for more than half of SADC's total economic and manufacturing output measured in actual prices without adjustments for inflation.[7]

Figure 1: South Africa (shaded green) as a share of SADC (key indicators)



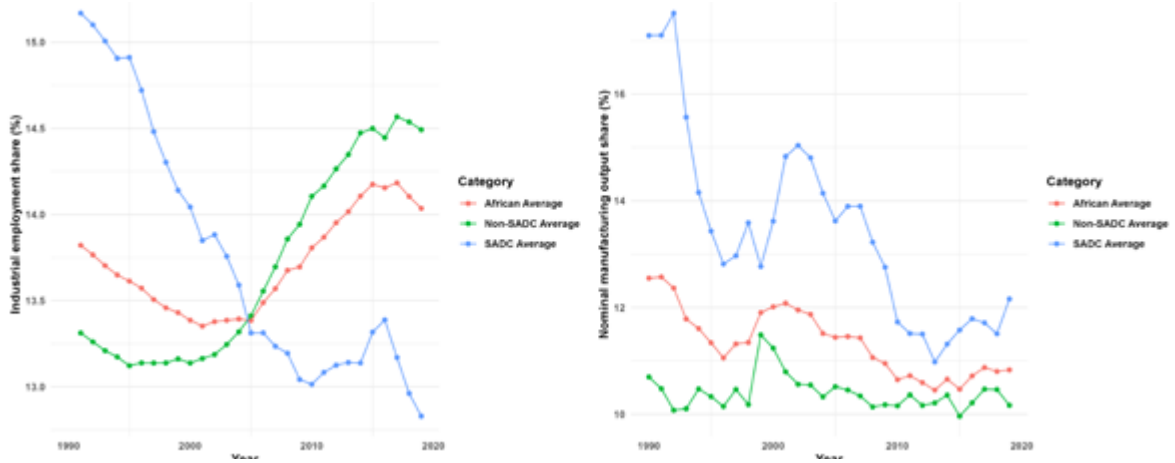
Raw Data Source: World Bank (2022). calculations own

Notwithstanding the ongoing dependence on South Africa, SADC countries have, on average, traditionally reported a stronger manufacturing base than non-SADC African countries. Prior to (and during) the 1990s, this was evident in manufacturing capacity in both employment[8] and output[9] as a proportion of Gross Domestic Product (GDP) in nominal terms. However, as Figure 2 shows, the SADC

[5] South Africa first became a SADC member state in August 1994 – following its first democratic elections in April of that year.
[6] To some extent South Africa's reduced share of SADC's economic output is attributable to its own domestic economic struggles, as opposed to being solely caused by robust economic growth in other SADC countries. Economic growth within the region remains inconsistent, while South Africa has experienced weak growth since 2009. Power supply deficiencies and inadequate investment in transportation infrastructure are among the key factors responsible for this.
[7] Where manufacturing output is measured in nominal terms: at current prices without adjustments for inflation.
[8] When industrial employment is taken as a proportion of total employment.
[9] When manufacturing value added (MVA) is taken as a proportion of aggregate Gross Domestic Product (GDP) in nominal terms.

region[10] has experienced a sustained average decline in manufacturing employment (from 15.2 per cent in 1991 to 12.8 per cent in 2019) and output (from 17.1 per cent in 1990 to 12.2 per cent in 2019) over the last thirty years. By contrast, average industrial employment levels in non-SADC African countries saw a general rise over the same period (from 13.3 per cent in 1991 to 14.5 per cent in 2019). These averages are calculated with respect to country-level averages. Thus, Figure 2 does not reflect South Africa's dominant standing within SADC, but rather average trends in manufacturing within the region. Compared to this SADC trend, the non-SADC pattern in manufacturing output has fluctuated more, though the gap between SADC and non-SADC averages has closed in recent years due to the decline in SADC's manufacturing output.

Figure 2: Trends in Average Industrial Employment and Manufacturing Output



Raw Data Source: World Bank (2022); own calculations

These contrasting descriptive trends between SADC and non-SADC African countries are distinct and, therefore, worthy of more rigorous quantitative examination. The descriptive trends have been observed elsewhere, including the United Nations Conference on Trade and Development (2021). From a statistical modelling perspective, there are some recent articles which point to regional heterogeneity across Africa, with southern Africa often identified as the most probable region in which deindustrialisation is present (Asmal et al., 2023; Mensah, 2020; Nguimkeu & Zeufack, 2019). However, these studies have not sought to specifically isolate this grouping of countries within their model specifications as a means of testing whether the descriptive trends hold, and to what extent they hold across different time periods.

Furthermore, existing studies classify a country as Southern African according to delineations from the United Nations (UN) and the African Union (AU). The problem is that there is no co-ordinated "Southern African deindustrialisation strategy" which encompasses all countries classified as part of the region by either the UN or the AU (which offer different demarcations in any case). There is, however, an existing SADC strategy, enabling us to isolate the countries within this region within our statistical models. Thus, a principal focus of this research article is to make some progress in addressing

[10] Throughout this article, the list of SADC countries remains constant throughout the period of analysis which ranges from 1990 and 2019. In this regard, the definition of SADC in this article is geographical as much as political/administrative. It refers to a group of countries who have at one point in time been SADC member states and who collectively reflect a deindustrialisation trend which appears to outpace the rest of the continent. Thus, even though SADC itself was formed in 1992, and prominent member states such as South Africa (1994) and Democratic Republic of the Congo (1997) only formally joined after this date, they are included as 'SADC' countries for the entire period.

this gap by determining whether the SADC countries have been experiencing 'deindustrialisation' at a faster rate than their African peers. The rest of this section specifies the statistical model used and the scope of the analysis.

Model specification

The base model used in this study follows the central structure used by others including Chenery et al. (1986), Rodrik (2016) and Kruse et al. (2022).[11] The base specification used in these studies can be summed up as:

$$\text{Mshare}_{it} = \beta_0 + \beta_1 \ln Y_{it} + \beta_2 (\ln Y)^2_{it} + \beta_3 \ln P_{it} + \beta_4 (\ln P)^2_{it} + \gamma \text{PD}_t + \varepsilon_{it}, \ (1).$$

Mshare_{it} denotes the dependent variables related to the industrial employment share and manufacturing output share (in nominal and real terms)[12] for each country *i* at time period *t*. In line with the conventions set by earlier studies, the dependent variables are measured on a bounded scale, with values falling between 0 and 1. β_0 represents the constant and ε the residual terms. While ln*Y*, and $(\ln Y)^2$ are the natural logarithms of income per capita and its squared values, In*P* and $(\ln P)^2$ represent the same for aggregate population values. Finally, the term PDt signifies the period dummies used within the model. The time period encompasses three decades covering the period 1990 to 2019. In order to contextualise our findings within the broader debate on this topic, which segments periods by decade (Asmal et al., 2023; Kruse et al., 2022; Rodrik, 2016), we follow the same approach in our own models. The period dummies we report in our results section are the two most recently completed decades of the 2000s (2000-2009) and 2010s (2010-2019).

This study added two more intervening variables to these base models. The first is a dummy for the SADC region ($d_{i=c}$) to determine whether the descriptive trends we observed hold within a more rigorous quantitative framework. As a result of our decision to introduce this SADC country dummy variable, we do not include a further control for country-level fixed effects because this would open up our results to the problem of multicollinearity, wherein overly correlated predictor variables artificially inflate our standard errors, distorting our results.[13] The second was a set of variables ($\beta_5 R_{it}$) denoting the resource dependence of economies measured in three dimensions: oil rents, natural gas rents and mineral rents measured as a share of total GDP.[14] The inclusion of these resource rent variables was motivated by the links found between the prevalence of natural resource endowments and a variety of adverse developmental, governance and political outcomes (Brooks & Kurtz, 2016; Fails, 2019; Harvey, 2021b; Shaxson, 2007; Wright et al., 2013). The model specification following the introduction of these two variables is:

[11] One key difference between these pioneering models, and the base ones used in this paper is that whereas this study wholly focuses on Africa, the preceding studies looked at developing countries generally, or a combination of developing and developed countries (Kruse et al., 2022; Rodrik, 2016).

[12] Whereas nominal measures of manufacturing value added do not account for annual inflation, real measures of manufacturing value added do adjust for inflation by holding prices constant (at 2015 constant US$ values).

[13] This has the added disadvantage of making it harder to specifically isolate the effect of the SADC group of countries within our models, to test how regional heterogeneity interacts with our period dummies. As Achen (2005, p. 18) argues, "giving credibility to statistical specification, linear or otherwise, requires at least one of two supports—either a formal model or detailed data analysis". In this case, controlling for both regional effects and country-level fixed effects would not offer any clarity on whether SADC countries are acting uniquely as a group, precisely because of the overlap between the two variables.

[14] All of these dimensions are measured as a share of total GDP.

$$\text{Mshare}_{it} = \beta_0 + \beta_1 \ln Y_{it} + \beta_2 (\ln Y)^2_{it} + \beta_3 \ln P_{it} + \beta_4 (\ln P)^2_{it} + \beta_5 R_{it} + \gamma \text{PD}_t + d_{i=c} + \varepsilon_{it}, \quad (2).$$

To enable us to observe how the period and regional dummies interact with one another over time, the interaction term ($\delta \text{PD}_t \times d_{i=c}$) was included, with the interaction effect represented by δ:

$$\text{Mshare}_{it} = \beta_0 + \beta_1 \ln Y_{it} + \beta_2 (\ln Y)^2_{it} + \beta_3 \ln P_{it} + \beta_4 (\ln P)^2_{it} + \beta_5 R_{it} + \gamma \text{PD}_t + \text{d}_{i=c} + \delta \text{PD}_t \times \text{d}_{i=c} + \varepsilon_{it}, \quad (3).$$

Finally, we find compelling the argument posited by Asmal et al. (2023) that the deindustrialisation debate should enable a clear comparison which acknowledges the different specifications and data sources which prior studies have used. To that end, with each of the models expanded on above, we also report on the results where the main specification was a fractional logit model, previously used by Nguimkeu & Zeufack (2019) and Asmal et al. (2023).[15] The SADC-interaction term inclusive version of this fractional logit model is below:

$$\mathbb{E}[\text{Mshare}_{it} \mid \text{X}_{it}\, \alpha_i] = \Lambda\, [\beta_0 + \beta_1 \ln Y_{it} + \beta_2 (\ln Y)^2_{it} + \beta_3 \ln P_{it} + \beta_4 (\ln P)^2_{it} + \beta_5 R_{it} + \gamma \text{PD}_t + \text{d}_{i=c} + \delta \text{PD}_t \times \text{d}_{i=c} + \varepsilon_{it}], \quad (4)$$

Caveats

Due to us specifically orientating our research objective toward determining whether the SADC was an outlier within the African context, we opted to use a different dataset to that used by (Kruse et al., 2022) and (Asmal et al., 2023). Those studies used the GGDC/UNU-WIDER Economic Transformation Database (ETD),[16] which contains data encompassing 51 countries spanning the developing world (Kruse et al., 2022). Of these, only 18 are in sub-Saharan Africa, and in turn, only eight of these are in SADC, severely distorting the available sample. Thus, for the purpose of our study, using this database is inadmissible as it would sacrifice clarity.

Instead, in line with the only other referenced study to assess industrialisation trends in sub-Saharan Africa as a whole (Nguimkeu & Zeufack, 2019), the principal source we used to measure the indicators of income per capita, total population, manufacturing output share and resource rents[17] was the World Bank's World Development Indicators (World Bank, 2022). Data used for industrial employment was adapted from the International Labour Organisation (2022). Data availability was a principal reason behind the decision to make the period 1990 to 2019 the focal point of our analysis. Economic data for many African countries before this period is irregular. Compounding matters, the Covid-19 pandemic had a significant impact on the accuracy of contemporaneous national economic

[15] A fractional logit model is a modelling estimation technique which allows for the estimation in cases where the dependent variable is bounded (i.e. limited) between 0 and 1. It differs from the traditional binary-coded logit model in that it can account for any values which fall within those bounded parameters. In the case of this paper, the dependent variables within the fractional logit models are scaled accordingly. So a country with a real manufacturing output share of 15 per cent out of aggregate real Gross Domestic Product in a given year is coded as 0.15.

[16] Rodrik (2016) uses a predecessor version of this database.

[17] We incorporate gas rents, mineral rents and oil rents in this study. The World Bank calculates each indicator by accounting for the difference between the value of the commodity's production at regional prices and the total costs of producing that commodity (World Bank, 2022). We note that this measure gives some idea (though not the entire picture), of the dependence which a specific country has on resource rents. A measure which accounts for export revenue from these commodities would likely give a clearer idea of this, but the annual data for African countries on this measure is inconsistent.

estimates, necessitating the exclusion of statistics from 2020 and 2021 within the analysis (International Monetary Fund, 2021). The World Bank and ILO datasets contain annual statistics for most African countries for the 1990-2019 period.

Due to a lack of World Bank data, two African countries were excluded from the models which have nominal manufacturing output share as the dependent variable, the Central African Republic and Comoros. These two countries, and a further country, Seychelles, also lacked sufficient data for the indicator recording the share of industrial employment in a country. Of these countries, Comoros and Seychelles are currently SADC member states. For the measure of real manufacturing output, a further four countries lacked data for the thirty-year period: Eritrea, Liberia, Somalia and South Sudan, none of which are in SADC. However, there are more 'absent values' in this variable, especially during the 1990s due to a lack of data for manufacturing value added at constant prices.

Results

The results shown in the first three models in Table 1 report on the basic linear models first adapted by Rodrik (2016). Models 4 through 6 report on the results obtained when we inserted the basic model structure into a fractional logit specification endorsed by Nguimkeu & Zeufack (2019) and Asmal et al. (2023). Like Rodrik (2016), we abbreviate our main dependent variables in the following way: *nommva* represents manufacturing output share measured in nominal value added terms; *realmva* represents manufacturing output share measured in real value added terms; and *indemp* represents the share which industrial employment accounts for as a proportion of total employment.

The first three models reported on in Table 1 indicate that the basic model is much stronger when predicting variation in industrial employment than it is in accounting for variation in either of the measures accounting for manufacturing output (assessing R^2 and Adjusted R^2 values). Since they use different estimation techniques, we cannot make a direct comparison between the coefficient sizes produced when using the linear specification and when using the fractional logit specification. However, we do note that the direction (whether a coefficient is positive or negative), and the associated level of statistical significance of each coefficient is the same in both sets of models. Finally, although we reiterate that we use a different dataset and a different sample to both, our findings with regard to the period dummies echo the initial pattern of deindustrialisation identified by Rodrik (2016) and not the subsequent 'rennaissance' found by Kruse et al. (2022). Specifically, in our models, the period dummies for the 2000s (2000-2009) and 2010s (2010-2019) reveal that the deindustrialisation trend was uniformly stronger in Africa during the 2010s across the three indicators (more distinct negative coefficients). This trend is broadly consistent with a global commodity price boom during those two decades, which may suggest evidence of Dutch Disease – that is, natural resource dependence crowding out manufacturing growth (Nguimkeu & Zeufack, 2019) .

Table 1: Results of the base models

	Linear specification			**Fractional logit specification**		
	nommva	**realmva**	**indemp**	**nommva**	**realmva**	**indemp**
	(1)	(2)	(3)	(4)	(5)	(6)
ln (Population)	0.004 (0.017)	0.019 (0.018)	-0.071*** (0.019)	0.046 (0.161)	0.211 (0.179)	-0.515*** (0.150)

ln (GDP per capita)	0.065*** (0.018)	0.030 (0.019)	0.121*** (0.015)	0.699*** (0.174)	0.277 (0.189)	1.842*** (0.137)
ln (Population^2)	0.0002 (0.001)	-0.0003 (0.001)	0.002*** (0.001)	0.001 (0.005)	-0.004 (0.006)	0.016*** (0.005)
ln (GDP per capita^2)	-0.003** (0.001)	-0.001 (0.001)	-0.005*** (0.001)	-0.033*** (0.012)	-0.008 (0.013)	-0.095*** (0.009)
2000s	-0.015*** (0.004)	-0.011** (0.005)	-0.025*** (0.004)	-0.145*** (0.043)	-0.112** (0.050)	-0.223*** (0.031)
2010s	-0.040*** (0.005)	-0.038*** (0.005)	-0.054*** (0.004)	-0.389*** (0.047)	-0.366*** (0.053)	-0.432*** (0.032)
Constant	-0.274* (0.140)	-0.251* (0.150)	0.133 (0.162)	-6.134*** (1.354)	-5.740*** (1.485)	-5.519*** (1.335)
Observations	1,336	1,173	1,408	1,336	1,173	1,408
R^2	0.121	0.077	0.547			
Adjusted R^2	0.117	0.072	0.545			
Residual std. error	0.064	0.067	0.055			
F statistic	30.502***	16.260***	281.475***			

Note: *p<0.1; **p<0.05; ***p<0.01

Table 2 builds on the basic models presented in Table 1 by introducing the dummy variable recording SADC countries and the three intervening variables concerning the three dimensions of resource dependence and manufacturing capacity. Given the traditionally stronger manufacturing base of SADC countries, the coefficients for the SADC dummy variable for manufacturing output share is positive. However, in both specification types, and even when including intervening variables, SADC countries are negatively correlated with trends in industrial employment. This corroborates the fact that average industrial employment in SADC countries has consistently trailed that of non-SADC countries since 2005 (see Figure 2). In terms of the overall predictive accuracy of the expanded multivariate linear models (R^2 and adjusted R^2), this is slightly higher when industrial employment is the dependent variable. The distinction is clearer when looking at the models which have manufacturing output as the dependent variables. In these instances, the expanded models account for more than double the variation than in the basic models.

Table 2: Results of the expanded models without interaction terms

	Linear specification			**Fractional logit specification**		
	nommva	**realmva**	**indemp**	**nommva**	**realmva**	**indemp**
	(1)	(2)	(3)	(4)	(5)	(6)
ln (Population)	0.045*** (0.016)	0.050*** (0.018)	-0.050*** (0.019)	0.435*** (0.150)	0.507*** (0.173)	-0.292* (0.152)
ln (GDP per capita)	0.106*** (0.016)	0.067*** (0.019)	0.118*** (0.016)	1.043*** (0.161)	0.602*** (0.182)	1.844*** (0.142)
ln (Population^2)	-0.001** (0.001)	-0.001** (0.001)	0.001** (0.001)	-0.012** (0.005)	-0.014** (0.006)	0.008* (0.005)
ln (GDP per capita^2)	-0.006*** (0.001)	-0.004** (0.001)	-0.004*** (0.001)	-0.057*** (0.011)	-0.031** (0.013)	-0.094*** (0.010)

Gas rents share	0.038*** (0.003)	0.030*** (0.003)	0.013*** (0.002)	0.303*** (0.020)	0.241*** (0.023)	0.101*** (0.017)
Mineral Rents share	-0.002*** (0.001)	-0.002*** (0.001)	-0.0003 (0.001)	-0.023*** (0.007)	-0.023*** (0.008)	-0.002 (0.005)
Oil rents share	-0.002*** (0.0002)	-0.001*** (0.0002)	-0.001*** (0.0002)	-0.019*** (0.002)	-0.014*** (0.002)	-0.008*** (0.001)
2000s	-0.014*** (0.004)	-0.010** (0.006)	-0.027*** (0.004)	-0.139*** (0.038)	-0.097** (0.046)	-0.229*** (0.031)
2010s	-0.047*** (0.004)	-0.040*** (0.005)	-0.060 *** (0.004)	-0.460*** (0.042)	-0.389*** (0.050)	-0.483 *** (0.033)
SADC countries	0.024*** (0.004)	0.025*** (0.004)	-0.015*** (0.003)	0.222*** (0.034)	0.236*** (0.039)	-0.149*** (0.029)
Constant	-0.717*** (0.130)	-0.609*** (0.145)	-0.018 (0.163)	-10.261*** (1.259)	-9.110*** (1.436)	-7.225*** (1.366)
Observations	1,330	1,167	1,396	1,330	1,167	1,396
R^2	0.296	0.198	0.571			
Adjusted R^2	0.291	0.191	0.568			
Residual std. error	0.057	0.063	0.053			
F statistic	55.535***	28.534***	184.283***			

Note: *p<0.1; **p<0.05; ***p<0.01

The final set of regression results, reported in Table 3 add the interaction terms which allow us to observe whether the patterns of industrialisation in SADC countries change over the included time periods. These results provide substantiation for the descriptive trends seen in Figure 1 which suggest that SADC countries have experienced unique deindustrialisation trends compared with non-SADC African countries, especially in the most recent complete decade.

Table 3: Results of the expanded models with interaction terms

	Linear specification			Fractional logit specification		
	Nommva	realmva	indemp	Nommva	realmva	indemp
	(1)	(2)	(3)	(4)	(5)	(6)
ln (Population)	0.046*** (0.016)	0.052*** (0.018)	-0.051*** (0.019)	0.444*** (0.150)	0.522*** (0.173)	-0.284* (0.152)
ln (GDP per capita)	0.102*** (0.016)	0.065*** (0.019)	0.116*** (0.016)	1.015*** (0.162)	0.581*** (0.183)	1.808*** (0.142)
ln (Population^2)	-0.001** (0.001)	-0.001** (0.001)	0.002** (0.001)	-0.012** (0.005)	-0.014*** (0.006)	0.008* (0.005)
ln (GDP per capita^2)	-0.006*** (0.001)	-0.003** (0.001)	-0.004*** (0.001)	-0.056*** (0.011)	-0.030** (0.013)	-0.091*** (0.010)
Gas rents share	0.038*** (0.003)	0.029*** (0.003)	0.013*** (0.002)	0.303*** (0.020)	0.238*** (0.023)	0.097*** (0.017)

Mineral Rents share	-0.002*** (0.001)	-0.002*** (0.001)	-0.0003 (0.001)	-0.023*** (0.007)	-0.023*** (0.008)	-0.003 (0.005)
Oil rents share	-0.002*** (0.0002)	-0.001*** (0.0002)	-0.001*** (0.0002)	-0.019*** (0.002)	-0.014*** (0.002)	-0.008*** (0.001)
2000s	-0.013*** (0.005)	-0.002 (0.006)	-0.021*** (0.004)	-0.136*** (0.048)	-0.025 (0.062)	-0.194*** (0.036)
2010s	-0.041*** (0.005)	-0.032*** (0.006)	-0.051*** (0.005)	-0.402*** (0.052)	-0.313*** (0.065)	-0.431*** (0.038)
SADC countries	0.031*** (0.006)	0.039*** (0.007)	0.002 (0.006)	0.273*** (0.057)	0.348*** (0.069)	-0.049 (0.048)
2000s: SADC	-0.003 (0.008)	-0.018* (0.010)	-0.018** (0.008)	-0.002 (0.076)	-0.152* (0.090)	-0.115* (0.065)
2010s: SADC	-0.019** (0.008)	-0.020** (0.010)	-0.030*** (0.008)	-0.151* (0.078)	-0.163* (0.091)	-0.175*** (0.065)
Constant	-0.711*** (0.130)	-0.617 *** (0.145)	-0.011 (0.163)	-10.258*** (1.260)	-9.208 *** (1.433)	-7.195 *** (1.362)
Observations	1,330	1,167	1,396	1,330	1,167	1,396
R^2	0.299	0.201	0.575			
Adjusted R^2	0.293	0.193	0.572			
Residual std. error	0.057	0.063	0.053			
F statistic	46.919***	24.244***	156.189***			

Note: *p<0.1; **p<0.05; ***p<0.01

Across the three dependent variables and when employing either specification, the SADC membership dummy reports negative correlations when interacting with the 2000s (2000s: SADC) and the 2010s (2010s: SADC). That these correlations are constantly stronger (in terms of both coefficients and level of statistical significance) in the latter period indicates that the divergence between SADC and non-SADC trends has become more distinct in recent years. It is also interesting to note here the relationship between resource dependence and manufacturing capacity. Across the two sets of expanded models, mineral and oil rents are negatively correlated with manufacturing capacity, potentially suggesting that the presence of these natural resources is having a limiting effect on the ability of countries to industrialise. In terms of the overall predictive accuracy of the interaction term inclusive linear models (R2 and adjusted R2), these are slightly higher than in the Table 2 models which excluded these terms.

On the whole, the results we present offer a further basis for the trend identified in the literature that regional heterogeneity in industrialisation trends is present on the African continent (Asmal et al., 2023; Mensah, 2020). Our models sought to specifically isolate the trend within the SADC region, and further sought to test how these trends changed over different time periods. In particular, our finding that deindustrialisation within the SADC region was more apparent during the most recent complete decade (2010s) offers policymakers within the region cause to reconsider the region's existing industrialisation strategy. The next section discusses s these policymaking implications in greater depth.

Discussion

SADC's deindustrialisation in a policy context

In 2015, SADC finalised and published its regional industrial strategy entitled, SADC Industrialization Strategy and Roadmap (SADC, 2015). The document outlines several quantitative and qualitative goals. The qualitative objectives express a general desire among SADC member states for "socio-economic transformation" and greater regional cooperation, with a focus on strengthening industrial capacity (SADC, 2015, p. 3). The strategy's quantitative goals are much clearer and offer a benchmark according to which we can use our own findings on industrialisation within SADC to assess the region's capability of achieving them. We outline the goals SADC established for itself in terms of manufacturing output and industrial employment below:

1. To double the share of manufacturing value added (MVA) in GDP to 30 per cent by 2030 and to 40 per cent by 2050, including the share of industry-related services.
2. To increase the share of industrial employment to 40 per cent of total employment by 2030. (SADC, 2015, p. 3)

Given our focus on manufacturing output and industrial employment, our main concern is in tracking how SADC is performing in realising these two objectives. The SADC industrialisation strategy does not specify whether attainment of these goals occurs when the SADC country average on each indicator crosses the relevant benchmark (i.e. each country is weighted the same), or measured in terms of SADC's aggregate economic output and employment statistics. In the second scenario, this would, at that stage, largely be contingent on South Africa meeting industrialisation targets in time.

Using either method, SADC's prospects for realising its first set of goals by 2030 are minimal.[18] Our statistical models have established that, on an overall basis, SADC was deindustrialising on all three measures during the 2010s. Furthermore, even if we only look at our most recent sample year (2019), achieving these targets would mean that most SADC countries would have to increase their manufacturing output at rates which substantially outpace their overall economic growth. Table 4 provides a summary of how SADC countries were performing in relation to tracking in terms of achieving the relevant targets in 2019.

Table 4: Distribution of SADC countries in 2019 relative to SADC's 2030 industrialisation targets

			Number of SADC countries which fell between each share range in 2019				
Indicator	**2030 Goal**	**SADC country average (2019)**	**5% to 15%**	**15% to 25%**	**25% to 30%**	**30% plus**	**No data**
Nominal value added	**30% of GDP**	12.2%	11 countries including South Africa	3 countries (DRC, Lesotho and Zimbabwe)	1 country (Eswatini)	0 countries	1 country (Comoros)
Real value added	**30% of GDP**	11.7%	12 countries including South Africa	2 countries (DRC and Lesotho)	0 countries	1 country (Eswatini)	1 country (Comoros)
Industrial employment	**40% of total employment**	12.8%	9 countries	5 countries including South Africa	0 countries	0 countries	2 countries (Comoros, Seychelles)

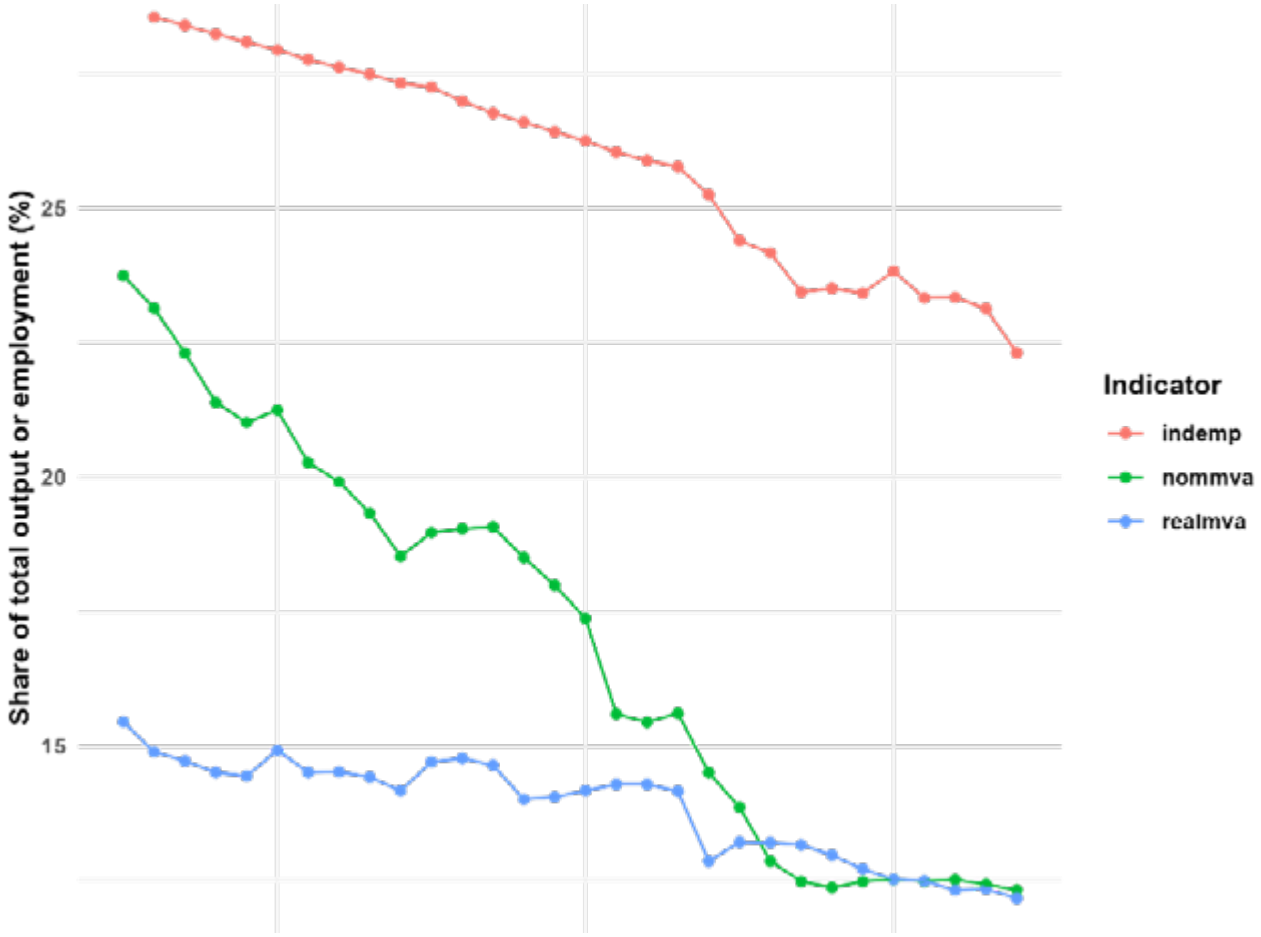
The distribution of countries in Table 4 reveals the extent to which most SADC countries are struggling to keep pace with the required industrialisation trends to meet the region's 2030 goal. Of the 16

[18] This is especially so considering how our dataset stopped in 2019 and therefore our models did not account for the subsequent disruption supply shocks including the Covid-19 pandemic, and ensuing 'lockdowns' caused.

SADC countries, only Eswatini, the fourth smallest economy in the region, appeared certain to meet the 2030 objective of having manufacturing output account for at least 30% of total economic output when measured in both real and nominal terms. The 2030 target of having 40% of all employment accounted for by industrial employment appears similarly quixotic. Only Eswatini, Mauritius and South Africa reported shares of at least 20% in 2019, with none of them exceeding 25% (World Bank, 2022).

Given South Africa's dominant economic position within the region, realising the 2030 objectives in aggregate terms would require a drastic turnaround in manufacturing output from South Africa. Figure 3 displays the trends in South Africa in recent decades in terms of industrial employment and manufacturing output (in both nominal and real terms). On all three indicators, South Africa has seen a consistent decline over the last thirty years, reflecting manufacturing's gradually decreasing prominence within the South African economy. The post-2019 economic disruptions caused by Covid-19 lockdowns and more persistent power outages are also likely to have further facilitated this trend toward deindustrialisation in SADC's largest economy.

Figure 3: Trends in Average Industrial Employment and Manufacturing Output for South Africa



Source: World Development Indicators (2023); own calculations

The low probability that SADC will meet its own industrialisation targets and the weak manufacturing prospects of its largest economy gain salience when considered in light of our introduction, which identified youth unemployment as a core challenge which the SADC region will have to address urgently. As Alence (2022) shows, intraregional trade is relatively well-developed within the SADC region compared to other African regional groupings, but this trade remains South African-centric. This

is likely unsustainable in the long run for several reasons, but the most important one is demographic: although still a 'young' country in the global context, South Africa is ageing at a faster rate than the rest of SADC and the African continent as a whole. Figure 4 provides a useful illustration of this by contrasting the age group breakdown of relevant entities in 2021 and 2063.[19] While projected proportion of South Africans of working age (15 to 64) population is expected to broadly track SADC and continental averages, that trend will not hold much longer considering the noticeably smaller composition of non-working age youth South Africa is projected to have by 2063 compared to SADC.

Figure 4: Composition of key population groups, 2021 versus 2063 projections

(United Nations Department of Economic and Social Affairs, 2023)

Therefore, any industrialisation strategy for the SADC region would have to both consider how to revive the manufacturing industry within the groups major economy, while also bolstering the manufacturing capacity of other member states given these seismic demographic undercurrents. Below, we briefly consider more insightful contributions to the discussion around reinvigorating industrialisation in the SADC region and reflect on how they can prompt some modification to SADC's existing regionalisation strategy.

An opportunity to course correct

The SADC industrialisation strategy is primarily orientated towards structural transformation. It specifically mentions modernisation and closer regional integration, and emphasises that the "strategic thrust must shift from reliance on resources and low-cost labour to increased investment and enhanced productivity of both labour and capital" (SADC, 2015, p. 1). In our view, the emphasis should not necessarily be on reducing reliance on natural resources per se, but rather the careful harnessing of those natural resources to contribute to appropriate industrialisation pathways that do not lock

[19] 2063 is the year which is intended to mark the culmination of SADC's industrialisation strategy, designed to coincide with the centennial anniversary of the establishment of the Organisation of African Unity (SADC, 2015).

SADC countries into low-value manufacturing. Part of the priority also needs to confront Dutch Disease dynamics. Dutch Disease is a two-fold phenomenon in which the natural resource sector crowds out physical capital and skills from other sectors in the economy, on the one hand, and drives currency volatility, on the other, as commodity prices are inherently unstable. Currency value appreciation on the back of demand for commodities can render manufactured products for export uncompetitive. Any industrialisation strategy needs to explicitly address, in tandem, these two dimensions as functionally contingent.

Recommendations

First, given that mining will increasingly employ fewer people directly because of technological advances, there should be a regional strategy to provide skills to the labour force that connect to mining either upstream or side-stream (predominantly in technology, research and development). These skills will likely have relevance in multiple sectors, making investment productively and allocatively efficient.

Second, a regional sovereign wealth fund (SWF) can be considered, though it would have to be independently governed to avoid corruption and inefficient allocation. The benefit of an SWF is that it can direct investments towards building manufacturing capability that initially feeds off natural resource endowments but becomes increasingly independent thereof in the long run. This would help to alleviate currency volatility, too. However, the swiftest way to avoid currency volatility and undue devaluation is for countries in the SADC region to avoid corruption, from state capture to rigging elections.

Third, in addition to addressing Dutch Disease effects, SADC countries need to tap into global value chains that will create efficient manufacturing and service sector opportunities connected to natural resource endowments (Gatune & Cloete, 2022). However, this has to be fundamentally different to a narrow focus on downstream beneficiation, which remains an underpinning of too many conversations pertaining to industrialisation (Hausmann et al., 2008). The word "beneficiation" is mentioned 17 times in the SADC 2015 strategy alone and is lengthily elaborated on pages 17 and 18. SADC countries are simply not able to directly compete with countries such as China in the realm of producing final manufactured goods such as solar panels. However, there may be opportunities to add value to required copper locally, for instance, before exporting it as a high-bulk, low-value commodity; this is what the SADC strategy calls "Value Chain Development" (SADC, 2015, p. 18).

This should only be pursued if it enhances a country's comparative advantage, lest it be subject to the deficiencies of post-colonial early independence import-substitution-industrialisation misadventures that left many African countries highly indebted. It also has to be done with a view to the ecological imperatives of the future. As Gatune and Cloete note: "For the regional economy to be truly green, waste-tracking and mapping technologies need to be developed, which is the first step in reorganising mining value chains" (Gatune & Cloete, 2022, p. 16).

Fourth, such opportunities are, nonetheless, connected to energy availability and reliability, which remains a fundamental deficiency across the region. This issue is explicitly addressed on page 11 of the SADC 2015 industrialisation strategy. The strategy is correct to indicate that "governments should step up the involvement of independent power providers to ease the burden on government investment spending" (SADC, 2015, p. 11). It is also correct to note that "alternative sources of energy should be exploited with a particular focus on renewables" (SADC, 2015, p. 11). One of the benefits of a focus on the

latter is that some of the critical raw materials required to feed global energy and transport revolutions towards lower carbon emissions are mined in southern Africa (lithium, for instance); these can be processed with relatively low-intensity energy, unlike aluminium smelters. Another benefit of pursuing greener renewable technologies is that they typically avoid extensive sunk capital costs (white elephants), such as those associated with the sub-optimal Medupi and Kusile coal power stations built in South Africa, which also offload extensive negative environmental and social externalities onto poor communities.

SADC countries therefore need to be aware of the climate and stranded asset risks (Siyobi, 2021) associated with pursuing oil and natural gas. Comparable experience from the continent suggests that oil wealth is more likely to create a resource curse (Harvey, 2021) than to provide widespread electrification. To the contrary, solar micro-grids, while relatively expensive, avoid the costs of centralised transmission grids and can largely avoid unproductive rent-seeking typically associated with oil and gas. The implementation of the SADC strategy has to be laser-focused in delivering renewable energy at speed. Otherwise, industrialisation will remain impractical.

Fifth, in this regard we find the view expressed in Naudé and Tregenna (2023, p.38) highly relevant: "The establishment of the AfCFTA is timely, as it would provide for larger market size, could potentially reduce the burden of distance to the coast for landlocked countries, and raise competitiveness against Chinese imports". However, as they rightly warn, such benefits would only be realised if infrastructure improvements are executed to ameliorate the negative consequences of adverse geography. Moreover, continued corruption and chaos at border posts within the region constitute a non-tariff barrier to trade that severely undermines the already-limited comparative advantage that exists within the region.

Finally, SADC countries should take note of cutting-edge research pertaining to industrial policy and how it is changing in light of new geopolitical realities. A paper prepared for the Annual Review of Economics (Juhász et al., 2023), for instance, notes that the salience of industrial policy has risen greatly as governments have increasingly utilised it to address a variety of problems such as the green transition, supply chain resilience, good job availability and geopolitical competition between China and the United States. The authors argue that the best industrial policy from examples around the world are no longer inward-looking and protectionist, but typically target export promotion (Juhász et al., 2023). The most successful appear to be those that utilise a broad range of policies that are more effective together than the standard use of subsidies or tariffs (typical of trade policy, for instance).

Moreover, they should include "customised public services and inputs that are tailored to firms' needs and target specific obstacles to productivity enhancing investments" (Juhász et al., 2023, p. 4). Interestingly, the authors are also of the view that manufacturing will not be able to provide the kind of labour absorption it did in the past. Therefore, they recommend using "industrial" policies to enhance productivity in services. It is our view, however, that the manufacturing comparative advantage will continue to move away from China, and if SADC countries can provide infrastructure, energy and appropriate skills, the benefits of natural resource endowments could still be utilised to both promote industrialisation and, paradoxically, reverse currently prevalent resource curse dynamics.

Conclusion

In this paper, we sought to examine whether the Southern African Development Community is in fact an outlier within the context of industrialisation patterns on the African continent. Our article drew

on a burgeoning literature on the topic of deindustrialisation, a debate which was initially sparked by a seminal paper by Rodrik (2016). We adopted a mixed-method approach with our literature review informing our ultimate model design. In turn, our empirical findings influenced our analysis of SADC's existing industrialisation strategy, and our identification for the potential readjustment of this strategy.

The notion that there might be regional heterogeneity in industrialisation patterns across the developing world also springboards off the work of Rodrik (2016). Others, most notably Asmal et al. (2023), Kruse et al. (2022), Mensah (2020), and Nguimkeu & Zeufack (2019) have found further indications to this effect. Specifically, within the African context, we find that there is good reason to believe that the SADC group of countries is emerging as a region where deindustrialisation in both employment and output terms is growing more distinct. The crucial finding supporting this assertion is contained in our models which include an interaction term between our SADC regional dummy and a time-based variable (see Table 3).

In essence, we find that the coefficient for the interaction term between the SADC regional dummy and the time-based variable becomes more distinctly negative with each passing decade. This finding holds when we employ a traditional linear model specification, as well as when we utilise a fractional logit model. Although it is a subject which requires further scholarly inquiry, a related finding that a reliance on oil and mineral rents is negatively correlated with industrial employment and manufacturing output suggests that the Dutch Disease phenomenon may be in effect. This could be curbing industrialisation prospects in many oil and mineral reliant countries in both SADC and Africa as a whole.

Our core finding has natural implications for the SADC region, particularly with regard to its existing industrialisation strategy intended to benchmark the region for the period between 2015 and 2063. Current trends indicate that whether measured in aggregate terms or average terms, SADC will fail to meet its existing industrial employment and manufacturing output objectives by 2030. Furthermore, even if the region's dominant economy of South Africa succeeds in revitalising its manufacturing base, policymakers responsible for regional industrial strategy coordination will need to consider the reality that South Africa's population is ageing at a faster rate than its SADC peers. In re-evaluating SADC's industrialisation roadmap, these policymakers would also do well to heed existing geopolitical and energy provision realities.

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