The Impact of Black Economic Empowerment on the Performance of Listed Firms in South Africa

Matthias Busse, Nina Kupzig and Tim Vogel

Ruhr University Bochum, Germany

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Abstract

Black Economic Empowerment (BEE) is a policy that aims to empower black people and, thus, decrease racial inequality in South Africa. The program puts reformation pressure on firms and might strongly influence firm performance. This paper examines how BEE affects turnover, profits, and labor productivity of firms listed in South Africa. We use an extensive dataset covering a major share of listed firms between 2004 and 2019. The analysis employs fixed-effects regressions and instrumental variable approaches to account for endogeneity. Overall, we find that BEE has a positive impact on firms' sales, a positive but not robust impact on labor productivity, and no impact on profits. After accounting for heterogeneity in BEE scorecards applied, the positive effect of BEE on turnover and labor productivity becomes less pronounced. We conclude that BEE had a slightly positive effect on firm performance in the best case but also did not harm firms in the worst case. Thus, this study disproves the critique that BEE harms businesses, at least on the sample of listed firms. However, we propose that the policy should be further adapted to reduce the cost of compliance and focus on areas that bring structural change in South African companies, like the skills development dimension.

Key Words: BEE, Turnover, Labor Productivity, Inequality

JEL classification: C23**,** D22, J15, O12

Corresponding author:

Nina Kupzig, Ruhr University Bochum, Faculty of Management and Economics, Chair of International Economics, GD 03/329, Box GD 41, 44780 Bochum, Germany, E-mail: nina.kupzig@rub.de, Phone: +49-234-32-27050.

1. Introduction

During Apartheid, the non-white population suffered great injustice in South Africa. Blacks did not have adequate access to capital, land, or education due to restrictive Apartheid policies, resulting in severe racial inequality. In 1991, the average white per capita income was eleven times higher than Africans (Whiteford & van Seventer, 2000).[1] After the end of Apartheid in 1994, the South African government led by the African National Congress (ANC) decided that direct interventions were necessary to deal with this racial inequality to resolve economic disadvantages. The idea of Black Economic Empowerment (BEE) was born, which later evolved into Broad-Based BEE (B-BBEE).[2] Officially launched in 2004/2005, the B-BBEE program grades companies based on how "empowered" they are. For example, firms obtain a higher BEE score for transferring firm ownership to black people[3] or promoting and hiring them as board members or managers. They may also receive more points for setting up special training programs for blacks or procurement at firms that individuals from this group own.

BEE is a complex construct of policy measures with broad social and economic effects. One important research question is the impact of that program on firm performance, which is highly relevant for South African firms' (long-run) development and international competitiveness. From a theoretical perspective, BEE could positively or negatively affect firms. In terms of the positive effects, there are (at least) four different channels on how BEE may improve firm performance. Firstly, if discrimination was present in the labor market respectively within the firm, then reduced discrimination in hiring and promoting through BEE is likely to increase firm productivity since productive capacities enter the production process that have been previously kept out of it (Acemoglu et al., 2007). Secondly, BEE's skills development dimension may lead to improved overall spending on training and, hence, increased human capital levels within a company, resulting in higher labor productivity. Thirdly, a higher BEE score should also be an advantage in working with the government, as raising the BEE score could lead to more public contracts and, thus, higher turnover. Lastly, public recognition may improve through higher BEE ratings, which may benefit the firms' performance. For example, clients may value products more and thus, accept higher prices.

[1] The equivalent disparity ratios for the other two major population groups, namely Coloreds and Indians, compared to whites were 5.3 and 3.9, respectively. Although exact figures are not available for the period, we do have evidence that wealth was also very unequally distributed. The top 10% South African wealth owners, which were mainly whites, owned close to 90% of total net wealth (Chatterjee et al., 2022).

[2] In the following, we will use both abbreviations synonymously.

[3] We use the official definition of “black people”, which refer to Africans, Coloreds and Indians (B-BBEE Act No. 53, 2003).

In contrast, the BEE policy may also be associated with three adverse effects on firm performance. First of all, the BEE certification process is quite complex, and companies usually need additional staff and even external advisories to obtain a BEE certificate. This drives up costs (Duffett et al., 2009) and could lower profits. Secondly, the transfer of ownership to blacks may occur at discount prices leading to inflated firm costs (Acemoglu et al., 2007). If these costs distort firm investments, this may negatively influence firm performance. Finally, the practice of "fronting", which places black people as a front cover to the firm without allocating much decision power to them, may be associated with a negative impact on firm productivity if less productive employees are added to the firm's payroll (Duffett et al., 2009).

Given these opposing effects, the impact of BEE on firm performance is not clear from a theoretical point of view, and the evaluation remains an empirical question. Against this background, this paper analyzes how BEE influences the performance of South African firms regarding turnover, labor productivity, and operating profits, which are three critical firm performance measures. We add to the relatively limited existing literature in three ways: (1) We use a relatively large dataset of up to 258 firms and a prolonged period (2004-2019), incorporating firm and BEE information from various sources, some of which has not been used to date. At the same time, the extended period allows us to examine the mid-run effects, as the policy framework may take time to impact firm performance. (2) We account for heterogeneity in the BEE score variable due to different measurement systems, so-called scorecards, over time and, newly, within time using various subsample analyses. (3) We employ instrumental variable (IV) approaches to account for endogeneity related to an omitted variable bias or simultaneity. To the best of our knowledge, this is the first analysis in this research setting using such a large dataset with a long period and a broad sample of firms accounting for endogeneity and BEE score heterogeneity.

The paper is structured as follows. In the next part, we review the existing literature of empirical studies analyzing the effects of BEE on firms. We then provide a broad overview of the BEE policy framework in Section 3, including its rating system and its changes over time. Section 4 introduces the employed dataset, while Section 5 presents the empirical methodology. We present the empirical results in two parts: the main results in Section 6 and then various robustness checks and extensions in Section 7. The paper ends with concluding remarks, including some policy conclusions.

2. Literature Review

As BEE puts reformation pressure on firms to change ownership structures, employee compositions, and funding priorities, this policy might significantly affect various financial firm indicators. Given the importance of the program, empirical evidence regarding the impact of BEE on firms is relatively small. Generally, the literature can be divided into three strands: single-case studies of individual firms,

qualitative studies using large-scale interviews, and quantitative empirical studies, which primarily focus on shareholder wealth.

The first strand of literature contains single case studies of individual firms. These studies are typically dated earlier and focus on the transition into BEE compliance. Boshoff (2012), for example, investigates a small service firm between December 2007 and June 2009. Building on semi-structured interviews with management staff and documentary evidence, he finds that clients exerted great BEE pressure on the investigated firm. Furthermore, the investigated firm responded successfully to this transformation pressure within a broader strategic framework. Similarly, Arya et al. (2008) analyze the successful BEE transformation of ABSA Group Limited, a large South African bank. They provide evidence that the support of top managers is positively linked with a successful transformation. Further, they stress that the proactive interaction with external key stakeholders and the implementation of internal mechanisms to build linkages across business units are contributing to a successful change. In contrast, Fauconnier and Mathur-Helm (2008) detect several malpractices when analyzing the large B-BBEE deal of Kumba Resources in the mining industry. They draw on in-depth interviews with leaders involved in the deal and identify key challenges associated with B-BBEE transactions like the lack of sustainable funding, fronting, or securing suitable investors.

Another strand of literature relies on large-scale qualitative interviews to analyze the impact of BEE on several firms or industries. Horn (2014) investigates the BEE transformation in the automotive industry based on 30 interviews with several stakeholders from the industry. He states that sufficient training for new BEE-compliant suppliers is needed to enable BEE transformation in the industry. Duffett et al. (2009) analyze the challenges and benefits associated with BEE in the advertising industry in Cape Town, drawing on 12 interviews with the top full-service advertising agencies in the city. They find that the industry implemented transformation strategies relatively well, leading to an above-average BEE performance of the sector at the time. Further, interviewees believed that the BEE certificate increases their firm performance, for example, by obtaining new business and that the BEE recognition process was easily maintained once it was in place. However, Duffett et al. (2009) find that several challenges were attached to the setup of the recognition process, like high transformation costs, administrative hurdles and the complexity of the process. Krüger (2011) takes a broader perspective and does not concentrate on a specific industry. Interviewing 500 local South African firm managers in March and April 2010, he analyses how managers perceive the effect of BEE on ten business dimensions. Contrary to Duffett et al. (2009), his results indicate that most managers do not view BEE compliance to improve firm performance, although most managers stated to benefit from BEE personally. Lastly, a current study by Pike et al. (2018) investigates how small and medium enterprises in South Africa view BEE. Interviewing 22 owners of small and medium South African companies, he shows that BEE is perceived to promote tender corruption and economic strain while doing little to readdress the injustice of the past.

Lastly, few quantitative empirical studies evaluate the impact of BEE on specific firm performance measures. Such studies investigate listed firms in South Africa as these are the only firms for which BEE data are broadly available. They typically focus on the effect of BEE deals, the announcements of BEE deals, or BEE scores on selected financial variables like (abnormal) return to share price. Studies investigating the effect of BEE deals or the announcement thereof and shareholder wealth use an event study methodology and are typically dated earlier due to data availability. Chipeta and Vokwana (2011) investigate 57 BEE deals between 1999 and 2009 and find evidence that the market does not view BEE deals as favorable as they find negative cumulative abnormal returns. Furthermore, Alessandri et al. (2011) and Strydom et al. (2009) suggest that the effect of BEE deals on shareholder wealth may depend on specific firm or transaction characteristics like the intentions behind the BEE deal. Ward and Muller (2010) also find evidence for the importance of firm characteristics when investigating the effect of 118 BEE deal announcements on cumulative abnormal returns between 2000 and 2008. Although they find an overall positive effect, this effect is solely driven by small firms, while large firms experience a negative effect. Moreover, they find evidence for a timing effect. Companies announcing the BEE deal before May 2005 performed worse than those announcing the deal in the following years. Wolmarans and Sartorius (2009) support this finding by investigating the announcement of 125 BEE deals of 95 companies between 2002 and 2006. The authors only find a positive effect during the end of their study period.

A small number of studies investigate the effect of the BEE score and financial variables, including share returns. For example, Mehta and Ward (2017) investigate the effect of BEE scores on abnormal share returns. The authors use an event-study methodology for a sample of 118 companies between 2009 and 2015. They find a positive effect of BEE scores in the short term. However, this positive effect does not hold in the long term. Possibly, it is reversed due to the high cost of BEE compliance. Similarly, Ferreira and Villiers (2011) find a negative association between a firm's BEE score and its share return when investigating top empowered firms between 2005 and 2008 using an OLS estimation. Oppositely, Akinsomi et al. (2016) find that between 2006 and 2012, BEE-compliant companies outperformed non-compliant companies in financial variables like risk and return variables.

Closest to our study is the research of Acemoglu et al. (2007) and Dreyer (2021), who analyze the effect of BEE on similar firm performance measures compared to our studies. Acemoglu et al. (2007) investigate the impact of BEE on investment, labor productivity, and profitability over the period 2004 to 2006. They account for endogeneity by using an IV approach and employ a firms' BEE score to proxy BEE efforts. However, they do not find evidence for a significant impact of BEE on the selected firm performance measures. One reason for this could be the early timing of the study, as BEE scoring only started in 2004/2005. The paper by Dreyer (2021) investigates the effect of BEE scores respectively

BEE subscores on firm performance measured as the annual percentage change in turnover over the period 2004 to 2015. He employs fixed-effects, random-effects, and pooled ordinary least square regressions controlling for market capitalization, total revenue, and total assets. Like Acemoglu et al. (2007), he finds no significant relationship between this performance measure and BEE. Besides this, he finds BEE influencing price/earnings ratio negatively and the cost of equity positively.

3. The Application of BEE

The formalization of BEE started in the early 2000s when BEE was set into a legal framework, and its nature was broadened to a more-dimensional framework called B-BBEE. Based on the B-BBEE Act No. 53 (2003), the legal backbone of B-BBEE, the first Codes of Good Practices were introduced in 2004/2005 (DTI, 2004, 2005). The Codes of Good Practices contain so-called scorecards and represent the BEE rating system. According to these scorecards, firms receive an overall BEE score which is then tied to the firm's BEE status. Verification entities conduct the BEE assessment over 12 months – usually the firm's financial year – and certificates are valid for 12 months (Lindsay, 2015).

The 2004/2005 BEE scorecard consists of seven elements following the B-BBEE dimensions. Namely, these are ownership, management control, employment equity, skills development, enterprise development, socio-economic development, and preferential procurement (B-BBEE Act No. 53, 2003; South African Government, 2002). The ownership, management control, and employment equity dimensions measure how many black entities own, control, or manage the firm at various management and control levels, often distinguishing between females and males as well as disabled and non-disabled persons. The skills development element deals with the training of black employees and the number of black learners in the firm. While the enterprise development dimension rewards monetary and non-monetary support of firms fulfilling specific size and BEE criteria, the socio-economic development dimension accounts for contributions to corporate social investments extraneous to the regular business. Lastly, the preferential procurement element rewards choosing suppliers with high BEE scores.

In the scorecard, each of the seven elements contains several subelements connected to one or more criteria and their respective compliance targets and points. For example, a subelement of the 2004/2005 scorecard's management control element is the board participation. A criterion of this subelement is the share of black people on the executive board associated with a compliance target of 50%. Firms receive 1 point if they hit this target. The subscore of an element is the sum of all points achieved in its subelements, and the sum of all subscores presents the total BEE score. The scorecards provide different measures for so-called Large Enterprises, Qualifying Small Enterprises (QSE), and Exempt Micro

Enterprises (EMEs).[4] However, we solely concentrate on firms classified as Large Enterprises because most listed firms belong to this category.

Generally, firms are not obliged to become BEE compliant, but the government encourages firms with commercial incentives. For example, following the B-BBEE Act 2003, every organ of the state and public entity had to consider the BEE score in various interactions with the private sector like issuing licenses, the sale of state-owned entities, or partnerships (B-BBEE Act No. 53, 2003). By these mechanisms, BEE-compliant firms should have had a competitive advantage over non-compliant firms when interacting with the government (Lindsay, 2015). However, some sectors typically rely more on interactions with the government. The construction sector, e.g., is generally known to depend on public tenders, while the retail sector is not. Thus, some sectors are more incentivized than others. On the other hand, even firms not relying on government contracts were most likely pressured by the preferential procurement element of the BEE scorecards, as this element incentivizes firms that depend on government contracts to choose BEE-compliant contractors or distributors. This is commonly referred to as the "Trickle-down Effect" of B-BBEE (Mehta & Ward, 2017).

In 2007, the Codes of Good Practice were further adjusted. The scorecard was minorly changed, and more importantly, the status of so-called industry charters was clarified. Industry charters are made up of major stakeholders in the industry and introduce an industry-specific scorecard. Firms belonging to industries with charters have to comply with the charter scorecard instead of the generic scorecard. The charter scorecards differed from the generic scorecard regarding points and targets. Some charters like the financial or the property charter even introduce additional dimensions. However, all charters are obliged to comply with the generic scorecard to a large extent.[5]

In 2013, the Codes of Good Practice were again adjusted by publishing the amended Codes of Good Practices (DTI, 2013). It became effective on 1 May 2015 after a transition phase of 18 months (DTI, 2014, 2015).[6] This transition phase resulted in a BEE certificate mix of 2007 and 2013 Codes between 2013 and 2016. The 2013 Codes trimmed the number of scorecard elements from 7 to 5 and adjusted points and targets. Table 1 depicts a comparison of generic scorecards by elements. While it appears that the 2013 scorecard has significantly changed compared to the 2007 generic scorecard, the changes – in practice – were less pronounced: Some elements merged, and most of the criteria only slightly changed while targets were upward adjusted (DTI, 2013). As a result of these changes, the 2013 Codes appear to be stricter than the 2007 Codes, and most firms were expected to drop in their BEE level

[4] Later, a fourth category, namely startups, was introduced (DTI, 2013). Definitions are usually tied to a certain level of turnover.
[5] Table A1 in the Appendix provides an overview of charters since 2009.
[6] Note that the codes were first proposed in 2012 (B-BBEE Commission, 2018a). However, we refer to the date of gazetting when we call them the 2013 Codes.

without major changes in their firm processes (Lindsay, 2015). In view of the scorecard changes, we run additional regressions as robustness checks and extensions using a more homogenous sample with earlier scorecards.

Table 1 - Comparison of Generic Scorecards for Large Enterprises by Weights and Total Points

	2005	2007	2013	2019
Effective from	1 Nov 2005	9 Feb 2007	1 May 2015	1 Dec 2019
Gazette	Draft	29617	36928	42496
Elements				
Ownership	20+2	20+3	25	25
Management Control	10+1	10+1	15+4	15+4
Employment Equity	10	15+3	n/a	n/a
Skills Development	20	15	20+5	20+5
Preferential Procurement	20	20	n/a	n/a
Enterprise Development	10+1	15	n/a	n/a
Residual*/ Socio-Economic Development	10+1	5	5	5
Enterprise and Supplier Development	n/a	n/a	40+4	40+4
Total	100+5	100+7	104+14	104+14

Source: DTI (2004, 2007, 2013, 2019).
Notes: +X refers to X bonus points. In 2019, only targets changed but not weights. Hence, the change does not appear here. *The residual element entailed a company's corporate social investment activities. In the 2007 Codes, this residual element was renamed socio-economic development.

A significant change of the 2013 Codes was the associated amended B-BBEE Act which made it compulsory for organs of state and public entities to apply – as opposed to just considering – the BEE score when interacting with firms (B-BBEE Act No. 46, 2013). Furthermore, the amended Act obliged JSE-listed firms to report their BEE compliance to the newly established B-BBEE commission (B-BBEE Act No. 46, 2013), increasing the pressure to become BEE compliant for JSE-listed firms. However, in 2017 and 2018, only 30% and 43% of the listed firms fulfilled this mandatory reporting requirement, respectively (B-BBEE Commission, 2018b, 2019).

Due to the change of the Codes of Good Practices, charters had to amend their respective scorecards until 30 October 2015 (DTI, 2015). If the charter could submit an amended sector code by 30 October 2015, the former charter code stayed valid until the amended codes came into effect. As the Construction Sector and the Chartered Accountancy Sector failed to submit amended sector codes for approval, their sector codes based on the 2007 Codes were repealed, and firms in these sectors had to be certified by the generic scorecard (DTI, 2016). While the Construction Sector was able to gazette its sector codes in 2017 again, the Chartered Accountancy Sector has remained without a sector code ever since. In 2019, the DTI gazetted some further changes to the amended 2013 Codes (DTI, 2019). However, this period falls out of our estimation period.

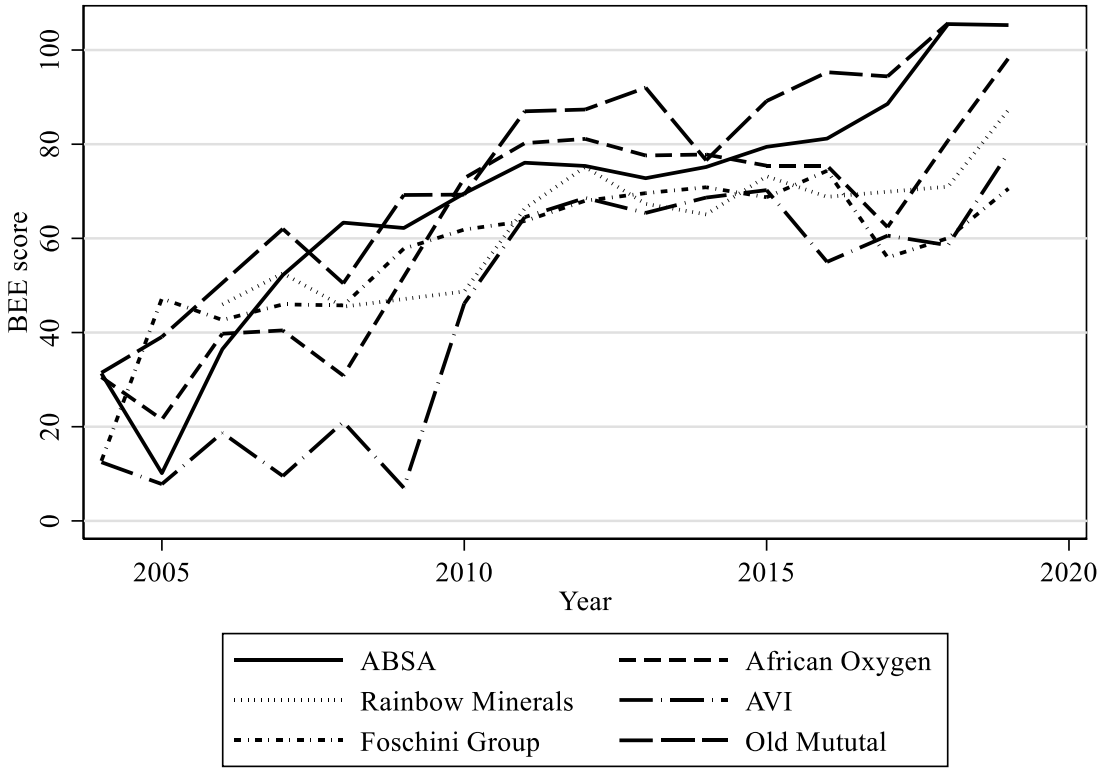
4. Data, Variables, and Descriptive Statistics

Our dataset consists of two parts. The first part contains general and financial information on all firms listed in South Africa between 2004 and 2019 provided by yearly publications by Who Owns Whom in South Africa (WOW). The information from WOW contains turnover, fixed assets, operating profits, number of employees, firm age, registration number, industry, and names of shareholders holding more than 1% of shares and their respective shares.[7] To classify industries, we use the Legacy Industry Classification Benchmark (ICB). All variables are cleaned and harmonized over the various WOW editions. Financial variables are converted to USD using the average yearly exchange rate and deflated using the GDP deflator from the World Bank Development Indicators. Due to missing values in the employee data, we carefully interpolate the variable using linear interpolation.[8] Appendix B presents all applied data transformations to the WOW data.

The second part of the dataset contains information on BEE scores using the annual publication "Most Empowered Firms" (MEC) by Empowerdex respectively Intellidex between 2004 and 2019. The MEC publication only includes information on the Top 200 resp. Top 100 listed firms. Furthermore, firms voluntarily participate in the MEC. Thus, it may not include all most empowered listed firms. However, it is reasonable to believe that most certified firms would want to participate in the MEC as it is the only broadly available medium on which firms can broadcast their BEE status. Moreover, to the best of our knowledge, we are first in amending the information from MEC with an extensive search on the open-access database Mpowered and internet research, including firms' websites to increase the sample size further and reduce the selection bias. This procedure increases the number of available BEE scores by over 11%, while it additionally increases the quality of information for another 17% of BEE observations (see Table 2). Mpowered is a platform on which firms voluntarily upload their BEE certificates that has experienced growing popularity in recent years.[9] The data from these sources are matched using the firm name and the year of the publication, respectively the date of issue of BEE certificates (see Appendix B for details). Whenever we have BEE information for a firm-year observation from MEC and Mpowered or the internet, we prefer the information from Mpowered or the internet because the MEC does not always include information on the applied scorecard or the achieved BEE subscores.

[7] This encloses all types of shareholder, meaning not all reported shareholders necessarily have voting rights. See also Table A2 in the Appendix for a definition of all variables used.
[8] We only interpolate for firms reporting at least for three years and clean duplicate values from the original data.
[9] The database was recently renamed to Beagle (https://www.beagledatabase.co.za/).

Figure 1 - Exemplarily Evolution of BEE Scores of Six JSE Companies



Source: Authors' compilation from BEE Data.

In detail, the MEC provides no information about the applied scorecard between 2009 and 2013 and it lacks information on the legislative setting, although the applied charter was stated for 2014 and 2015.[10] The different scorecards vary in criteria, targets, and achievable points, although they have to comply with the generic scorecard of the current legislative setting to a large extent. To deal with this heterogeneity in the analysis, we make a "best guess" for the applied scorecard using the information on future and past scorecards used by firms, maximum points achievable per scorecard, and scorecards most often used in the sector each year. As charters are formed per industry and are not optional, this strategy seems reasonable. The best guess proxy indicates that more than 70% of firm-year observations use the generic 2005 or 2007 Codes which are almost identical. Another 10% of firms employ the generic 2013 Codes. Furthermore, approximately 25% of firms do not change their scorecard, and another 25% only change from the generic 2007 Code to the 2013 Generic Code. Figure 1 presents the BEE scores of six large South African companies between 2004 and 2019. Notably, companies followed different paths, although a general upwards trend is observable.

[10] The first charter was introduced in 2009, hence all firms applied the Generic 2005 Codes or the Generic 2007 Codes which are relatively comparable. Hence, we exclude the period before 2009 here.

Table 2 - Overview of Observations, 2004-2019

	WOW	BEE	MEC	Mpowered	Internet	Share
2004	303	151	151			0.50
2005	291	155	155			0.53
2006	281	165	165			0.59
2007	307	161	161			0.52
2008	341	157	157	1		0.46
2009	330	171	168	10		0.52
2010	326	95	90	18		0.29
2011	324	111	99	39		0.34
2012	311	113	86	57		0.36
2013	304	113	88	57		0.37
2014	288	113	83	65		0.39
2015	300	120	93	72		0.40
2016	302	132	113	60	1	0.44
2017	305	128	106	71	1	0.42
2018	301	138	107	77	12	0.46
2019	226	120	83	58	14	0.53
Total	4,840	2,143	1,905	585	28	0.44

Note: 76 Singletons are still included, which are dropped in the estimation.
Only firms with non-missing information on Turnover are included.

Table 2 depicts the share of listed firms for which we have BEE information. Overall, the WOW data includes 4,840 firm-year observations with non-missing information on turnover. For 44% of these firm-year observations, BEE information is available. We cover between 29% and 59% of firms with information on turnover in each year. Overall, our largest estimation sample (Table 4) consists of 2,069 firm-year observations from 258 firms. The data is unbalanced, with an average of 7.4 observations per firm. The maximum number of observations per firm is 16. The unbalanced nature of the panel does not only stem from data availability but also firms' exit and entry. Since the BEE variable has several missings, we additionally use interpolated series. Namely, we forward interpolate missing information with the last BEE information available, filling gaps up to three years. The interpolated BEE variable increases the total number of observations in our regressions and reduces a potential bias in one of our IV approaches.[11]

Table 3 displays descriptive summary statistics of our complete dataset and (largest) estimation sample. Listed firms are, on average, relatively large, with more than 1.6 billion USD sales per year and more than 9,000 employees. However, the sizes vary considerably. The average BEE score reached is 52. While firms in the estimation sample are quite comparable to our complete dataset, firms with full available data tend to be somewhat larger in terms of turnover and number of employees.

[11] See the next section for details.

Table 3 – Descriptive Statistics

Complete Dataset					
	count	mean	sd	min	max
BEE	2,592	52.37	30.23	0	128.74
BEE interpolated	2,944	50.49	30.47	0	128.74
Turnover	4,840	1,687.46	8,332.87	0.067	224,704.70
Profits	5,426	175.56	1,296.46	-6,748	33,966.16
Labour Productivity	3,376	0.53	3.86	0.00021	174.09
Fixed Assets	4,984	802.74	3,892.39	0.065	83,602.54
Employees	3,837	9,607.09	20,986.80	1	340,597.00
Largest Estimation Sample					
BEE	1,898	54.64	28.93	0.43	128.44
BEE interpolated	2,178	52.39	29.50	0.43	128.44
Turnover	2,066	2,103.926	4,363.52	3.3	67,934.81
Profits	2,178	195.247	1,104.94	-6,354	19,778.62
Labour Productivity	2,066	0.55	4.65	0.004	174.09
Fixed Assets	2,178	819.73	2,807.95	0.11	79,609.82
Employees	2,178	11,566.42	21,259.59	1	340,597.00

Notes: Financial variables are depicted in million 2015 USD.

5. Empirical Strategy

We start with a similar approach to Acemoglu et al. (2007), estimating a panel fixed-effects model. We include firm and year fixed effects to control for various unobserved confounding factors that may introduce an omitted variable bias in this setting. Thus, our baseline model is:

$$\ln(y_{it}) = \alpha + \beta * BEE_{it} + \gamma' * x_{it} + \phi_i + \pi_t + \varepsilon_{it} \quad (1)$$

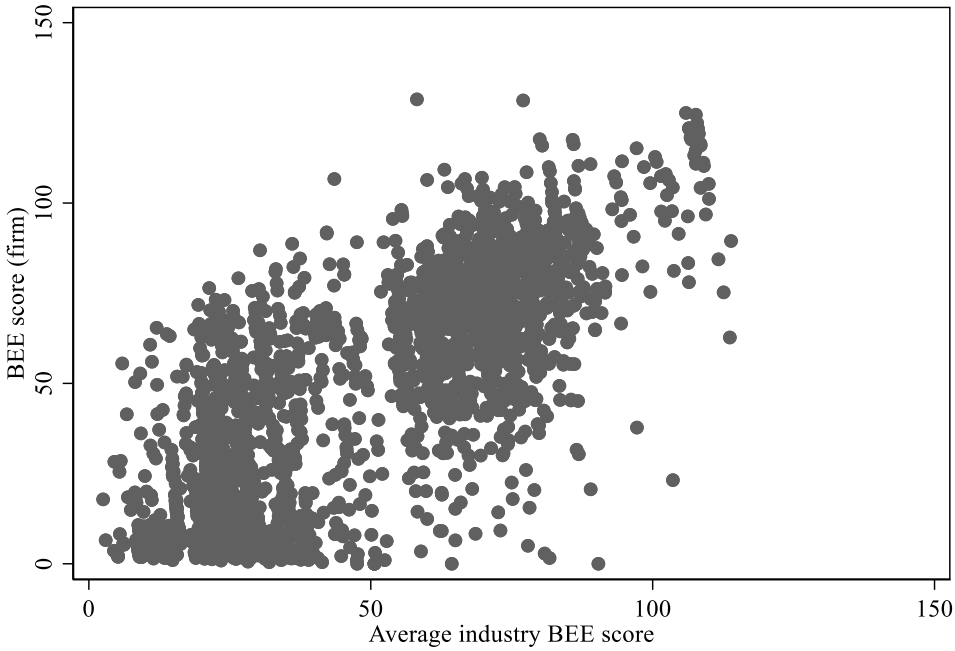
Here, y_{it} are different performance measures of firm i in year t, α is a constant, BEE_{it} is the firm's overall BEE score, x_{it} is a vector of control variables, ϕ_i are firm fixed effects and π_t are time fixed effects. The variable ε_{it} is the error term. We employ turnover, operating profits, and labor productivity as firm performance measures on the left-hand side. In the regression, one would like to include control variables that could influence production, which our fixed effects do not capture. The data available lets us control for two important applicable factors. Namely, we control for capital proxied by the value of fixed assets and labor proxied by the number of employees. For estimations of labor productivity, we respectively control for the value of fixed assets per employee. To reduce the skewness in the data, we take logs of all variables except the BEE variables. Since profits may be negative, we employ the inverse hyperbolic sine (asinh) transformation for this variable.

Two major challenges for causal identification arise. First, the broad nature of BEE implies a significant challenge for identification. Variables contributing to a higher BEE score may be readily identified as contributing to firm performance, too. For example, managers' personalities and abilities might influence the decision to invest in BEE as well as firm performance. If managers change during the study period,

this effect is not captured by firm fixed effects. Another challenge arises as more productive firms might also engage more with the government. Therefore, they may be more dependent on these contracts. At the same time, they have more resources to spend on BEE policies than low-performance firms leading to a higher BEE score of high-performance firms than low-performance firms. We deploy an IV approach to deal with these endogeneity issues. The comprehensive nature of BEE policies aggravates finding a valid instrument. Instruments proposed by Acemoglu et al. (2007) (and other possible instruments) have been considered but could not satisfy the relevance or excludability criterion based on our extended dataset. Among the considered instruments are, e.g., the fraction of shares held by the Public Investment Commission (PIC),[12] a dummy indicating if a firm is part of a BEE industry charter, the share of black owners, and the initial ownership of one shareholder controlling more than 50% of the firm.

Therefore, we resort to a shift-share instrument. The shift-share idea is to interact a global or industry-wide shock with a share variable that weighs how relevant this shock is to an individual firm or sector (Borusyak et al., 2022; Goldsmith-Pinkham et al., 2020). This strategy, therefore, combines multiple instruments with a specific weighting matrix. We interact the diversification of a firm's shares with the industry's average BEE score, excluding the score of the specific firm, to create a shift-share type instrument.

Figure 2 – Industry BEE Pressure on a Firm's BEE Decision



Notes: Pooled sample. Industry average do exclude the observed firm's own BEE score.

[12] The PIC is an asset management firm that is owned by the South African government. Its clients are mostly public sector entities focusing on the provision on social security (PIC, 2020).

The average BEE score in an industry is relevant to a firm's BEE because the firm competes for contracts with firms from the same sector. If the competitors have a higher BEE score, a firm has to increase its BEE engagement. It might not be considered for public contracts or be unattractive as a supplier to other companies if it does not. Figure 2 shows that this relationship is highly relevant for firms in our data. While it is plausible that the industry's BEE pressure is relevant for a firm's BEE decision and endogeneity might be reduced, excludability does not seem plausible. Hence, our identification relies on the excludability of the employed weights of the shares.

For the share part of our instrument, weighting the pressure of the industry's BEE, we use a measure of the diversification of a firm's shares in 2011. We choose 2011 as the index year representing the middle of our sample to increase the sample size. Robustness checks with shares using other years are provided in Table A4 in the Appendix but do not change our results. We exploit the shareholder information data taken from WOW. The Herfindal-Hirschman Index (HHI) is calculated using the shares of ownership of shareholders larger than 1%. To get an index of diversification, we subtract the HHI from one. Hence, larger values of our index indicate a more even distribution over shareholders:

$$Shareholder\ Diversification_{i,2011} = 1 - \sum_{k=1}^{K} share_{ik,2011}^{2} \quad (2)$$

where K are the shareholders holding the percentage $share_{ikj}$ of the firm i in 2011.

The diversification of shareholders can be relevant for a firm's BEE score in three ways. First, a larger number of more evenly distributed shareholders have a more diverse influence on the company. Hence, with higher diversification of shareholders, particular interests are getting less important. For example, a single individual or family that may have not only an economic but also a discriminatory interest would have less influence. The BEE score should, therefore, be higher if more diverse shareholders invest in a company. Second, the more shareholders a company has, the higher is the probability of black people being among the shareholders. As the share of black people directly increases the BEE score through the ownership dimension, the BEE score should be higher if more shareholders invest in a company. Third, following Acemoglu et al. (2007), companies with shareholders holding a majority of the shares probably engage less in BEE. Hence, having a more diverse shareholder structure should also lead to a higher BEE score through this channel.

On the other hand, diversification of shareholders has to be excludable to be a valid instrument. If shareholder diversification were not excludable, it would have to improve or downgrade firm performance directly. The literature suggests that a firm's ownership concentration might affect firm performance by reducing the controlling shareholder agency problem or restoring weak legal environments Given these concerns, Figure A1 in the appendix plots turnover and our diversification

measure. As no correlation is observable, we believe that shareholder diversification does not directly affect a firm's production process in our sample. Hence, the central identification assumption is that firms more diversely owned react differently, we suggest stronger, to higher industry BEE pressure. We will provide several robustness checks to this assumption with the results.

The IV specification used is the following:

$$\ln(y_{ijt}) = \alpha + \beta * \widehat{BEE}_{\iota jt} + \gamma' * x_{ijt} + \phi_i + \pi_t + \varepsilon_{ijt} \quad (3)$$

$$\widehat{BEE}_{\iota jt} = \lambda_0 + \lambda_1 * \overline{BEE_{\iota jt}}\ x\ Share\ Diversification_{i,2011} + \mu' * x_{ijt} + \nu_i + \varphi_t + \theta_{ijt} \quad (4)$$

with $\widehat{BEE}_{\iota jt}$ as the instrumented overall BEE score of firm i in sector j at time t, λ_0 is a constant, $\overline{BEE_{\iota jt}}\ x\ Share\ Diversification_{i,2011}$ is our described shift-share instrument, ν_i are firm fixed effects, φ_t are time fixed effects, and θ_{ijt} is the error term.

As for the second instrumental variable approach, we use the system Generalized Methods of Moments (GMM) estimator, introduced by Arellano and Bover (1995) and Blundell and Bond (1998). For the system GMM, we employ the baseline model from equation (1) and amend it by the lagged dependent variable on the right-hand side.[13] This estimator uses lagged levels and lagged differences of the endogenous variables, eliminating the need for external instruments. We are, therefore, able to examine the robustness of the IV results.

Another estimation challenge may be a potential systematic measurement error in the BEE score due to different applied scorecards. Applying different scorecards within time and changes in the scorecards over time may lead to biased estimations. For example, higher BEE scores might not only stem from advances in BEE goals but may also represent more BEE points being available in later applied scorecards. In fact, the biggest changes to scorecards and surging use of charter scorecards happened in and/or after 2015. In addition to the full sample (labeled *Full*), we will investigate this heterogeneity in BEE scores by estimating our models on more homogeneous subsamples. First, we use the subsample of all observations before 2015 (labeled *Before 2015*), where most firms used scorecards based on the 2005 and 2007 Codes, but charter scorecards are still included. However, following our best guess proxy for the applied scorecard, 7.5% of firm-year observations use a charter scorecard in this sample. Thus, we additionally use the subsample of observations most likely applying only the generic scorecards of the 2005 and 2007 definition (labeled *Generic old*). For this categorization, we use our best guess proxy

[13] Note that we use in these regressions only the interpolated BEE variable, as the system GMM is sensitive regarding missings in key variables.

scorecard. While the first subsample analysis is the strategy commonly applied when using BEE scores, the second one depicts a novel feature of our study.

6. Main Results

Table 4 presents the results of our baseline fixed-effects estimations on the full sample. We report the estimated coefficients for the different firm performance measures, namely turnover in columns (1) and (2), profits in columns (3) and (4), and labor productivity in columns (5) and (6). Whereas the first respective column presents results for the original BEE data, the latter column shows the effects for the interpolated BEE variable.

The fixed-effects estimates show a positive and significant effect of a higher BEE score for turnover. This applies to both the original BEE and the interpolated BEE variables. A one-point increase in the BEE score leads to a 0.1% increase in turnover. For the average firm of our sample, this one-point increase would translate into a rise in turnover of approximately 2 million USD. Both BEE coefficients in the regressions using profits and labor productivity are not statistically significant. All control variables are statistically significant and take the causal direction expected for turnover and labor productivity. More employees and fixed assets increase turnover and fixed assets per employee increase labor productivity. For the profit variable, we find a statistically significant, positive impact of fixed assets while the number of employees is not significant. Interpolating missing BEE values does not change our results significantly but reasonably increases the number of observations. We report the interpolated BEE variable only for the system GMM estimations and the original BEE variable for all other regressions.

Table 4 - Baseline Fixed-Effects Regression

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(Turnover)		asinh(Profits)		ln(Labor Productivity)	
BEE	0.001***		0.005		0.000	
	(0.00)		(0.00)		(0.00)	
BEE interpolated		0.001**		0.003		0.000
		(0.00)		(0.00)		(0.00)
ln(Employees)	0.154***	0.152***	-0.000	0.025		
	(0.02)	(0.02)	(0.14)	(0.14)		
ln(Fixed Assets)	0.312***	0.309***	0.728***	0.696***		
	(0.02)	(0.02)	(0.13)	(0.13)		
ln(Fixed Assets per Employee)					0.568***	0.557***
					(0.04)	(0.04)
N	1,789	2,069	1,893	2,178	1,789	2,069
R^2 within	0.389	0.371	0.032	0.028	0.548	0.529

Notes: Time and firm fixed effects are always included. Heteroscedasticity robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Next, we turn to the instrument variable estimations (Table 5). The results for the first stage equation show that the coefficients of the instrument are statistically significant at the 1% level for all estimations of turnover, profits, and labor productivity. All estimations also reach a satisfactory F-statistic. The C-test shows that endogeneity is a challenge for the turnover and labor productivity estimations. The C-test fails to reject the hypothesis of exogeneity for the profits estimation as the coefficient for BEE on profits is still insignificant in the instrumented regression compared to the fixed-effects regression.

The BEE score's impact on firm performance is also positive and significant after controlling for endogeneity for the turnover estimation, though the coefficient size increases by factor ten. While the estimation for profits remains fairly unchanged, we observe a positive and significant coefficient for labor productivity. This result could indicate that both benefits and costs of BEE as described above are present. BEE, e.g., in the form of skills development, might increase labor productivity through increased human capital. Hence, output and turnover would increase. However, investing in skills development increases the costs likewise and may leave profits unchanged.

The coefficients for our control variables remain mostly unchanged when we instrument the BEE variable. This outcome may indicate that the significant effect is not driven by the instrument grasping influence from observed confounders. Furthermore, we check the robustness of our shift-share instruments by switching out the shock and the share part, respectively. Table A3 in the Appendix shows the result using the industry averages of each observable covariate as an alternative shock part (keeping the diversification index as shares) and the firm's share of industry turnover as alternative shares (keeping the industry's average BEE score). This exercise shows that no random trend drives our instrumentation. As the F-statistics of the alternatives drop considerably, we believe that our identification assumption is valid.

Table 5 - IV Estimation

	(1) ln(Turnover)	(2) asinh(Profits)	(3) ln(Labor Productivity)
BEE	0.010***	-0.012	0.013**
	(0.00)	(0.03)	(0.01)
ln(Employees)	0.146***	0.033	
	(0.02)	(0.15)	
ln(Fixed Assets)	0.303***	0.760***	
	(0.02)	(0.14)	
ln(Fixed Assets per Employee)			0.570***
			(0.04)
N	1,658	1,762	1,658
First Stage BEE	(1)	(2)	(3)
Instrument	0.304***	0.294***	0.301***
	(0.06)	(0.05)	(0.06)
ln(Employees)	1.035*	0.956*	

	(0.60)	(0.58)	
ln(Fixed Assets)	0.855	0.810	
	(0.74)	(0.70)	
ln(Fixed Assets per Employee)			-0.061
			(0.50)
N	1,658	1,762	1,658
Kleinbergen-Paap F (Wald)	30.194	30.802	29.391
C-Test	0.008	0.518	0.004

Notes: Time and firm fixed effects are always included. Heteroscedasticity robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Another important test for shift-share instruments is the test for existing pre-trends. However, as our shift-share instrument consists of the BEE scores themselves, we cannot observe our instrument pre-treatment. Alternatively, we conduct a placebo test on the sample of non-compliant firm-year observations. Our instrument should only affect firm performance via the BEE score. Therefore, reduced form estimations should not show any significant effect of the instrument for BEE non-compliant firms in a given year. We assume firms on the JSE in a year without a BEE certificate are non-compliant for this particular year. [14] This assumption seems likely given the positive effects and recognition of being BEE compliant, even though there might be other theoretical or practical reasons why a certificate was not found. Table 6 presents the placebo test for our sample. As expected, our instrument does not significantly affect turnover and labor productivity for non-compliant firm-year observations, while it does impact the BEE-compliant firm-year observations. The test fails for the profit estimations. This is not overly concerning, as we do not find any effect of BEE on profits in any of our estimations.

Table 6 – Placebo Tests

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(Turnover)		asinh(Profits)		ln(Labor Productivity)	
Certificate	No	Yes	No	Yes	No	Yes
Instrument	-0.005	0.003***	0.006	-0.003	-0.004	0.004***
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
ln(Employees)	0.277***	0.156***	-0.215	0.021		
	(0.05)	(0.02)	(0.19)	(0.15)		
ln(Fixed Assets)	0.295***	0.312***	0.030	0.751***		
	(0.04)	(0.02)	(0.13)	(0.14)		
ln(Fixed Assets per Employee)					0.402***	0.570***
					(0.04)	(0.04)
N	1,200	1,658	1,256	1,762	1,200	1,658
R^2	0.967	0.979	0.572	0.723	0.874	0.908
R^2 within	0.289	0.401	0.002	0.033	0.274	0.558

Notes: Time and firm fixed effects are always included. Heteroscedasticity robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

[14] Using the interpolated BEE variable to divide the sample into compliant and non-compliant provides similar results.

One cautionary note has to be made looking at the summary statistics of these panels. In general, BEE-compliant firms – irrespective of the definitions applied – have on average more turnover, more shareholders, more fixed assets, more employees, and are older. While we control for these observable and unobserved time-invariant covariates, we cannot rule out the possibility that non-compliant firms are fundamentally different in unobserved time-variant covariates compared to BEE-compliant firms.

The second challenge for identification identified concerns the use of different scorecards. We perform the same analyses on a subsample that vastly reduces the heterogeneity in the treatment variable. In particular, we estimate the fixed effects and IV model using only all scorecards (incl. charter scorecards) for the period until 2015 (*Before 2015*) and in addition only using generic scorecards based on the 2005 and 2007 Codes (*Generic old*). Table 7 presents the results for the subsamples of the fixed-effects estimations. Coefficients for the control variables remain reasonably stable, which gives us confidence in the results for the subsample. Regarding the BEE variable, we find only a positive and significant coefficient for turnover when we use all scorecards before 2015. For labor productivity and profits, we do not establish any significant results. Consequently, we cannot rule out to find positive, statistically significant results only due to changing BEE categories and scorecards or a switch to a charter scorecard.

Table 7 – Robustness Check: Different Scorecards – Fixed-Effects Estimations

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(Turnover)		asinh(Profits)		ln(Labor Productivity)	
Sample	Before 2015	Generic old	Before 2015	Generic old	Before 2015	Generic old
BEE	0.001**	0.001	0.002	0.004	0.001	0.000
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
ln(Employees)	0.146***	0.126***	-0.031	0.072		
	(0.03)	(0.03)	(0.14)	(0.16)		
ln(Fixed Assets)	0.276***	0.270***	0.831***	0.732***		
	(0.03)	(0.03)	(0.18)	(0.18)		
ln(Fixed Assets per Employee)					0.565***	0.600***
					(0.06)	(0.06)
N	1,224	1,215	1,297	1,283	1,224	1,215
R^2 within	0.303	0.286	0.032	0.029	0.538	0.573

Notes: Time and firm fixed effects are always included. Heteroscedasticity robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Results for the IV estimations are reported in Table 8. Overall, the picture looks similar to the fixed-effects estimations. Again, only for the subsample of all scorecards before 2015, a statistically significant and positive effect of BEE on turnover is found. However, our instrumentation strategy breaks down significantly for both subsamples in this analysis with F-statistics below four and ten, respectively.

Table 8 – Robustness Check: Different Scorecards - IV

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(Turnover)		asinh(Profits)		ln(Labor Productivity)	

Sample	Before 2015	Generic old	Before 2015	Generic old	Before 2015	Generic old
BEE	0.016**	0.016	0.055	0.117	0.012	0.015
	(0.01)	(0.01)	(0.06)	(0.11)	(0.01)	(0.02)
ln(Employees)	0.139***	0.126***	-0.049	0.073		
	(0.03)	(0.03)	(0.15)	(0.17)		
ln(Fixed Assets)	0.270***	0.269***	0.784***	0.692***		
	(0.03)	(0.03)	(0.19)	(0.21)		
ln(Fixed Assets per Employee)					0.567***	0.601***
					(0.06)	(0.06)
N	1,141	1,132	1,214	1,200	1,141	1,132
First Stage BEE score	(1)	(2)	(3)	(4)	(5)	(6)
Instrument	0.211***	0.131*	0.209***	0.135*	0.212***	0.131*
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
ln(Employees)	0.368	-0.029	0.453	0.067		
	(0.73)	(0.71)	(0.73)	(0.71)		
ln(Fixed Assets)	0.515	0.140	0.536	0.172		
	(0.92)	(0.90)	(0.86)	(0.84)		
ln(Fixed Assets per Employee)					0.072	0.079
					(0.60)	(0.58)
N	1,141	1,132	1,214	1,200	1,141	1,132
Kleinbergen-Paap F	9.527	3.282	9.851	3.715	9.609	3.288
C-Test	0.014	0.123	0.319	0.174	0.140	0.306

Notes: Time and firm fixed effects are always included. Heteroscedasticity robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

7. Robustness Checks and Extensions

In view of some of the limitations of the IV methodology used so far, we proceed with the system GMM regressions using dynamic panel data. We employ the two-step system GMM estimator with the Windmeijer correction. We treat the lagged dependent variable and the BEE score as endogenous while assuming employees and fixed assets to be predetermined. We use lag 2 as the GMM-type instruments for the endogenous variables and lags 1-3 for the predetermined variables (to keep the number of instruments well below the number of firms). As the system GMM estimator can be sensitive regarding missing observations, we only report the results for the interpolated BEE variable. The results and test statistics are reported in Table 9. All specifications pass the Hansen J statistic test for overidentifying restrictions, which demonstrates the validity of the instrument set. The Arellano–Bond F-tests for serial correlation support all model specifications.

We use two samples, the complete set of firms (*Full*) and the restricted set using the generic scorecard (*Generic old*). The results are broadly in line with the previous IV approach. Again, we find BEE's positive and significant impact on firms' turnover. In contrast to the previous IV results, the BEE variable

is positive and significant for both the full sample and the subsample ”Generic old”.[15] For labor productivity, the outcome is similar, but the estimated coefficient's significance level drops below the conventional 10% threshold level once we use the subsample ”Generic old”. Again, we cannot establish any significant impact of the BEE policy on firm profits. Overall, these results underline the findings from the previous IV approach.

Table 9 – System GMM (Full Sample vs. Generic Scorecard)

	(1)	(2)	(3)	(4)	(5)	(6)
	ln(Turnover)		asinh(Profit)		ln(Labor Productivity)	
Sample	Full	Generic old	Full	Generic old	Full	Generic old
L.ln(Turnover)	0.773***	0.886***				
	(0.07)	(0.04)				
L.asinh(Profit)			0.693***	0.629***		
			(0.09)	(0.09)		
L.ln(Labor Productivity)					0.335***	0.482***
					(0.09)	(0.14)
BEE interpolated	0.002**	0.002*	0.000	-0.000	0.003**	0.002
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)
ln(Fixed Assets)	0.110***	0.030*	0.291*	0.038		
	(0.03)	(0.02)	(0.15)	(0.19)		
ln(Employees)	0.073**	0.030	-0.292**	-0.028		
	(0.03)	(0.03)	(0.14)	(0.27)		
ln(Fixed Assets per Employee)					0.321***	0.292***
					(0.06)	(0.06)
Observations	1,985	926	2,077	977	1,918	895
Firms	273	191	282	202	270	189
Instruments	162	134	162	134	107	90
AB 1 (p-value)[1]	0.00	0.00	0.00	0.01	0.01	0.03
AB 2 (p-value)[2]	0.78	0.60	0.14	0.23	0.20	0.73
Hansen Test (p-value)[3]	0.32	0.27	0.27	0.52	0.24	0.37

Notes: Estimations are based on the two-step system GMM estimator with Windmeijer corrected standard errors, small-sample adjustment, and orthogonal deviations. Constant terms and time dummies are always included but not reported. [1]Arellano-Bond-test that first-order autocorrelation in residuals is 0. [2]Arellano-Bond-test that second-order autocorrelation in residuals is 0. [3]Hansen-test of overidentification. * p<0.1, ** p<0.05, *** p<0.01.

The scorecards not only give an overall BEE assessment score, but also provide data on the various individual subdimensions of BEE. The finer breakdown gives us a more detailed view of the drivers of the relationship between BEE and firm performance. Unfortunately, instruments for each subdimension are not available, and we have to rely on fixed-effects estimates. However, the above results indicate that estimation on a consistent subsample may be the more rigorous robustness check. Table 10 provides fixed-effects estimates of all subdimensions from individual regressions containing all controls and fixed effects on both the full sample and ”Generic old” subsample. We only provide the results on

[15] Note that once we use the collapse option in STATA to drastically reduce the number of instruments per endogenous variable, significance levels decline and even the BEE variable in the turnover regressions is no longer significant.

turnover, as profits and labor productivity were not significantly associated with the BEE variables in prior estimations, and no subdimension for the latter had a significant coefficient.

Table 10 - Subdimensions (Full Sample vs. Generic Scorecard) – Turnover Fixed-Effects Estimations

		Full	N	R^2 within	Generic old	N	R^2 within
(1)	Management Control	0.003	1,718	0.393	-0.002	1,193	0.289
		(0.00)			(0.00)		
(2)	Employment Equity	-0.001	1,442	0.342	-0.001	1,194	0.288
		(0.00)			(0.00)		
(3)	Skills Development	0.006***	1,695	0.397	0.003	1,192	0.289
		(0.00)			(0.00)		
(4)	Ownership	0.003**	1,715	0.394	0.004**	1,193	0.291
		(0.00)			(0.00)		
(5)	Socio-Economic	0.011***	1,711	0.397	0.011**	1,192	0.295
	Development	(0.00)			(0.00)		
(6)	Preferential	0.001	1,443	0.343	0.000	1,190	0.288
	Procurement	(0.00)			(0.00)		
(7)	Enterprise	-0.004**	1,442	0.347	-0.003*	1,200	0.294
	Development	(0.00)			(0.00)		

Notes: Control variables, time and firm fixed effects are always included. Heteroscedasticity robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Skills development, ownership, socio-economic development, and enterprise development are the subdimensions that have a significant individual impact on turnover in the full sample. Apart from skills development, all these subdimensions are robust to the restricted subsample. The ownership and socio-economic development coefficients are positive, while enterprise development is negatively associated with turnover. The ownership dimension requires a change in firm processes and may, thus, influence firm performance. Contrary, the socio-economic development, and the enterprise development dimensions do not lead to changes within the firm as it measures a firm's monetary and non-monetary contributions to entities facilitating socio-economic development and monetary and non-monetary support of firms fulfilling specific size and BEE criteria, respectively. Therefore, money spent in these categories increases the BEE score but most likely does not change the firms' production process.

One reason for the difference in signs and statistical significances in the subdimensions could be differences in BEE investment strategies connected to firm size. For example, larger, more productive firms may be more likely to invest in the ownership and socio-economic dimensions, and smaller, less productive firms may invest more often in the enterprise development dimension. To analyze investment strategies, we divide our estimation sample into "small" (25th percentile in employees of our estimation sample) and "larger" firms and conduct t-tests on the average subscores as a share of the overall BEE score. To rule out that the results are driven by differences in applied scorecards, we again additionally conduct the analysis on a subsample only including the 2005 and 2007 Generic scorecard.

Table 11 - Comparison of BEE Subdimensions between Small and Large Firms

	Full			Generic old		
Subdimension	diff < 0	diff != 0	diff > 0	diff < 0	diff != 0	diff > 0
Management Control	1.0000	0.0000	0.0000	1.0000	0.0000	0.0000
Employment Equity	0.2662	0.5324	0.7338	0.2193	0.4386	0.7807
Skills Development	0.0000	0.0000	1.0000	0.0017	0.0034	0.9983
Preferential Procurement	0.0103	0.0206	0.9897	0.0002	0.0004	0.9998
Socio-Economic Development	0.0004	0.0008	0.9996	0.0007	0.0013	0.9993
Ownership	0.9815	0.0370	0.0185	0.9954	0.0092	0.0046
Enterprise Development	0.0030	0.0059	0.9970	0.0005	0.0011	0.9995
Note: The hypothesis is always based on mean(small)-mean(large) Full: Small: 447 observations, large: 1,342 observations Generic old: Small: 311 observations, large: 917 observations						

Table 11 presents the results of the t-test on the different means of the two samples. According to the results, smaller firms focus more on improving the BEE scores in management control and ownership. In comparison, larger firms invest relatively more in skills development, preferential procurement, socio-economic development, and enterprise development in our estimation sample. All our results hold for the smaller (more homogenous) sample.[16] This finding indicates that there may be differences in investment strategies among firms.

Regarding our finding in Table 10 (positive effects of skills development and socio-economic development on turnover), the t-tests in Table 11 indicate that this outcome may be driven by larger firms investing more into these subdimensions. While larger firms may invest more in skills development because it is easier for them due to existing training schedules, the increased investment in the socio-economic variable may be part of a "push strategy" to increase BEE scores to the next level without making significant changes. As larger firms have more available funds, it seems reasonable that large firms explore this strategy more often than small firms. This hypothesis is supported by the distribution of the scores in this dimension: 38% of firms have 0 points while 57% have 5 points, which is the maximum amount of points in the vast majority of scorecards.

However, we do not find evidence that smaller firms invest relatively more into the enterprise development dimension, which could drive the negative effect of this subdimension in Table 10. Instead,

[16] Reducing the sample to the Generic 2007 sample to reduce heterogeneity in the dimensions that experience a slight change in achievable points between the 2005 and the 2007 Codes (see Table 1), the t-test for the socio-economic dimension becomes insignificant while the rest remains unchanged.

larger firms invest again more into this subdimension, and, again, we observe a "push strategy" similar to the socio-economic development dimension, although less pronounced. Perhaps, it is more difficult for firms to find suitable candidate firms they can support to achieve points in this subdimension. Lastly, smaller firms invest relatively more into the ownership dimension. This result is, however, driven by the relatively smaller overall BEE score of small firms. In absolute terms, larger firms do also invest more into this subdimension.[17]

8. Conclusion

The BEE policy aims to empower historically disadvantaged individuals and, thus, decrease racial inequality in South Africa. We attempt to disentangle the effects of the complex policy on firm performance. South African firms and policymakers alike need to assess if gains through increased turnover and/or productivity outweigh transition and compliance costs and how to adapt (to) the policy. We analyze a large and detailed dataset on 258 JSE-listed companies from 2004 to 2019, explicitly addressing endogeneity challenges and accounting for heterogeneity in scorecards applied over time and charters. In particular, we employ fixed-effects and IV estimations on turnover, profits, and labor productivity and use restricted samples in addition to the full sample as a robustness check.

Summarizing our results, we find that a firm's BEE score positively influences turnover. A one-point increase in the BEE score leads to a 0.1% increase in turnover, translating to approximately 2 million USD for the average firm in our sample. Once we use the IV estimator, the coefficients are considerably higher, demonstrating an even more pronounced effect of BEE. For labor productivity, we also find a positive impact, but the results are less robust compared to turnover. Finally, we cannot establish any impact of the BEE policy on profits. In terms of an interpretation of these key results, we argue that BEE has positive and negative effects for firm performance due to its complexity. BEE-compliant firms have an advantage over non-compliant firms and may increase turnover, perhaps through government contracts or the Trickle-down Effect of the BEE Preferential Procurement element. Reduced discrimination in the labor market and enhanced human capital levels (partly through skills development) are likely to enhance labor productivity. While these effects increase firm profitability, BEE also comes with significant costs (e.g., compliance costs, ownership transfer, fronting), so firms are not better off in the aggregate.

As a cautionary note, we have to add that the statistically significant effects of BEE on firm performance become less robust using a more homogenous sample regarding the applied scorecards and ultimately break down in our strictest robustness checks. This finding highlights the importance of accounting for

[17] This also holds for the Management Control dimension while the results for the dimensions Skills development, Preferential Procurement, Socio-Economic Development and Enterprise Development remain the same.

different scorecards applied when studying the impact of BEE scores. Looking at the subdimensions of BEE and their impact on firm performance suggests that these positive effects are driven by investing in the BEE dimensions of ownership, skills development, and socio-economic development. However, further research is needed to assess if these effects stem from the better BEE performance or different investment strategies to optimize BEE scores by firm size. Our analysis in this regard is limited due to a lack of valid instruments for the different subdimensions.

Based on our findings, we suggest that BEE should be revised to reduce costs of adaption and focus on measures that can both fulfill the main target of BEE and increase the firm's competitiveness at the same time. This would incentivize companies to increase their efforts to overcome racial inequality in South Africa. As it stands, BEE is a complex policy implying high costs for certification and compliance. Targets could be focused on categories that can successfully bring changes into a firms' production structure, e.g., dimensions like skills development.

We are aware that BEE targets to empower blacks and not primarily firm performance, the measure under investigation in this study. Hence, a comprehensive evaluation of the overall performance of BEE as a policy is highly dependent on one's assessment of the success in its primary target, racial inequality. This is beyond the scope of this study, and an effort for appropriate data is needed to allow a more comprehensive investigation of distributional effects. However, this study disproves critique that BEE harms businesses, at least on the sample of listed firms in South Africa.

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Appendix A

Table A1 - Overview of Sector Scorecards by Publication Date and Gazette (2007-2020)

Sector	2007	Transform.	2013	2019
Generic	09 Feb 2007 29617		11 Oct 2013 36928	
Agriculture	28 Dec 2012 36035		08 Dec 2017 41306	
Chartered Accountancy	10 May 2011 34267	Repealed* 17 Feb 2016	Revised Draft 42417 26 Apr 2019	
Construction	05 Jun 2009 32305	Repealed* 17 Feb 2016	01 Dec 2017 41287	
Financial Services	14 Nov 2012 35914		01 Dec 2017 41287	
Forestry	12 Jun 2009 32320		21 Apr 2017 40803	
Information, Communication and Technology (ICT)	06 Jun 2012 35423		07 Nov 2016 40407	
Marketing, Advertising and Communcation (MAC)			01 Apr 2016 39887	
Property Sector	01 Jun 2012 35400		09 Jun 2017 40910 *21 Jun 17* *40926,* *28 Jun 17* *40941*	
Tourism Sector	22 May 2009 32259		20 Nov 2015 39430	Draft 27 Sep 2019
Integrated Transport Sector	21 Aug 2009 32511			
Defense Sector			09 Nov 2018 42021	
Mining & Minerals**	20 Sep 2010 33573		27 Sep 2018 41934 13 Dec 2018 42130	

Notes: *Repealed means that the charter was not able to adopt the 2013 Amended Codes: Firms had to comply with the generic 2013 Codes after the date of repeal. **Not listed by the DTI.
Source: Depicted number of Government Gazette.

Table A2 - Variables and Sources

Variable	Definition	Source
Turnover	Deflated firm's yearly sales in USD	WOW
Profit	Profit before investment income, interest received, interest & finance charges, exceptional items, and tax paid, and including profit/loss on foreign exchange	WOW
Labor Productivity	Turnover divided by the number of employees	Calculation from WOW data
Employees	Number of employees in a given year; linear interpolation of time series, if at least three unique values for a firm exist; original data is cleaned of duplicate values	WOW
Fixed Assets	Deflated, monetary value of fixed assets in USD	WOW
BEE	BEE score	MEC, Mpowered, Internet search
BEE interpolated	Forward interpolated BEE variable (up to three missing values replaced with last value)	MEC, Mpowered, Internet search

Note: All monetary variables are in USD and deflated using the GDP deflator.

Table A3 – Robustness Check: Shift-Share Instrument

ln(Turnover)	(1)	(2)	(3)	(4)
BEE	0.001	0.100	0.038	0.021
	(0.01)	(3.68)	(0.04)	(0.02)
ln(Fixed Assets)	0.308***	0.243	0.285***	0.304***
	(0.03)	(2.43)	(0.04)	(0.03)
ln(Employees)	0.157***	0.043	0.116**	0.130***
	(0.03)	(4.21)	(0.05)	(0.03)
N	1,674	1,675	1,668	1,638
First Stage	(1)	(2)	(3)	(4)
BEE				
ln(Fixed Assets)	0.632	0.660	0.574	0.767
	(0.73)	(0.73)	(0.73)	(0.75)
ln(Employees)	1.195**	1.144*	1.136*	1.052*
	(0.60)	(0.60)	(0.60)	(0.58)
Instrument (different shock)				
Average Industry Turnover	1.378			
	(0.94)			
Average Industry Assets		-0.021		
		(0.81)		
Average Industry Employees			1.349	
			(1.18)	
Instrument (different share)				
Firm Share of Industry Turnover				0.200
				(0.13)
N	1,674	1,675	1,668	1,638
Kleinbergen-Paap F (Wald)	2.169	0.001	1.306	2.392
C-Test	0.962	0.878	0.036	0.019

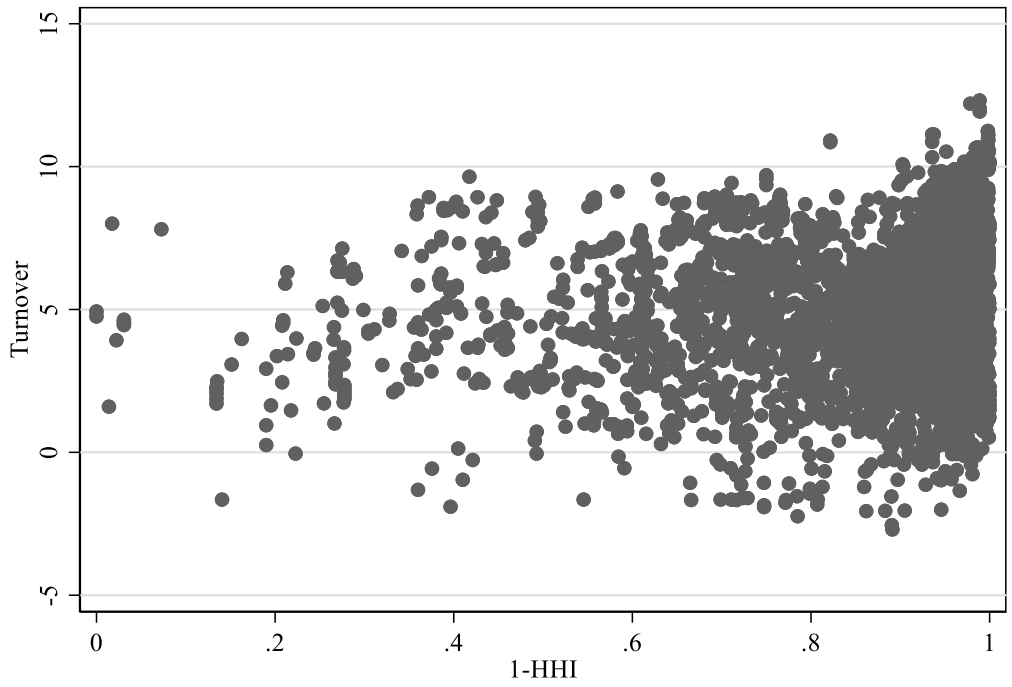
Notes: Time and firm fixed effects are always included. Heteroscedasticity robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Table A4 – Robustness Check: Different Index Year for Share Part

ln(Turnover)	(1)	(2)	(3)	(4)
BEE	0.019***	0.011***	0.008**	0.013***
	(0.01)	(0.00)	(0.00)	(0.00)
ln(Fixed Assets)	0.299***	0.306***	0.304***	0.303***
	(0.03)	(0.03)	(0.02)	(0.02)
ln(Employees)	0.138***	0.158***	0.152***	0.145***
	(0.03)	(0.03)	(0.02)	(0.03)
N	1,721	1,523	1,677	1,629
First Stage	(1)	(2)	(3)	(4)
BEE				
ln(Fixed Assets)	0.692	0.610	0.764	0.905
	(0.75)	(0.81)	(0.74)	(0.75)
ln(Employees)	0.965	0.969	1.142*	1.060*
	(0.63)	(0.62)	(0.61)	(0.62)
Instrument (all years)	0.194***			
	(0.05)			
Instrument 2005		0.327***		
		(0.06)		
Instrument 2010			0.311***	
			(0.06)	
Instrument 2015				0.301***
				(0.06)
N	1,721	1,523	1,677	1,629
Kleinbergen-Paap F	14.880	30.894	30.151	26.075
C-Test	0.000	0.005	0.060	0.001

Notes: Time and firm fixed effects are always included. Heteroscedasticity robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01.

Figure A1 – Shareholder Diversification and Turnover



Notes: Pooled sample.

Appendix B

Appendix B explains the data sources as well as the data cleaning procedure in detail. Note that some of the displayed observation may not enter the estimation sample due to missing values in key variables. Section B1 handles the harmonization procedures of the WOW data, while section B2 contains information on BEE scores.

B1. Firm Information

The general information of JSE-listed firms is taken from the annually published book by Who owns Whom between 2006 and 2020. The information has been carefully transferred to Stata. All firms have been assigned a unique id for which the information on name changes given in the books have been used to identify firms with a name change over the years.[18] Table B1 depicts all variables of interest in the WOW books. Note that typos and small inconsistencies in all variables of interest have been manually corrected (e.g., missing letters in shareholder or industry names).

Table B1 - List of WOW data

Variable	Description
Year	Year of WOW edition
Firm	Name of firm
Listed	Year/date of (last) listing
Founded	Year/date of founding
INC	Year/date of registration as an INC
Shareholder Year	Year from which shareholder information is reported
Shareholders	Name of all shareholders
Share	Respective share of shareholder
Employee	Number of employees
Registration Number	South African registration number (or foreign registration number if no South African registration number existed)
Currency	Currency of financial variables
Fixed Assets	Fixed assets for the latest 5 available years (or less)
Turnover	Turnover for the latest 5 available years (or less)
Operating Profit	Operating profit for the latest 5 available years (or less)
Delisted	Date of delisting
Renamed	Year of name change
New Name	New name if firm changed the name

Source: Own research.

[18] The only exception is EMIRA PROPERTY FUND LTD and EMIRA PROPERTY FUND, which have been matched due to further research.

Some of the variables needed to be harmonized over the different publications and some variables needed in the analysis had to be calculated from these variables. The following paragraphs give some detailed information about the applied methods and calculations.

B1.1. Currency

The 2019 and 2020 WOW editions does not include any information about the currency. However, we assigned the correct currency based on a list of currencies provided by WOW. The information about the currency used in a specific year for a specific firm shows some small inconsistencies between editions (these are 166 firm-year observations from 30 firms). Such firm-year combinations get assigned the most frequent reported currency. If all currency values have been reported equally often, the currency of the latest edition is chosen. This happens to 15 firm-year observations of 12 firms. At the end most firms report every year in the same currency. However, 33 firms changed their reporting over time (e.g., switched from GBP to ZAR). All appearing inconsistencies in the currency variable belong to such firms. The reason for this is that WOW often needed some time to adapt the reported currency. Thus, the applied algorithm to evaluate the correct currency for a given year showed some weakness (often stating the change a little bit too late). We have applied the following manual changes following abnormalities in the magnitude of the converted financial variables:

Table B2 - Applied Changes to Year of Currency Change

Id	Firm	Change	Assigned	New	Reason
80	ANGLOGOLD ASHANTI LTD	ZAR to USD	2013	2012	FA: 501→ 69 T: 50023→6559
148	BRAIT SA	USD to ZAR	2014	2015	PA: 2612→23334
259	DIMENSION DATA HOLDINGS PLC	ZAR to USD	2002	2000	FA: 417→9 T: 6697→1943 I: 507→78
346	GOLD FIELDS LTD	ZAR to USD	2013	2014	T:30628→2869 I:2533→258
523	NASPERS LTD	ZAR to USD	2015	2016	FA: 17300→1443 T:73092→5930
546	OANDO PLC	USD to NGN	2013	2012	FA: 1139 →130325 T: 3775→673182

Note: The column "Reason" displays the suspected change in financial variables. T means Turnover, FA means Fixed Assets, I means Investments and PA means Profit after Tax and Interests
Source: Own Research.

Two of the 33 firms presumably reported in Zimbabwean Dollar. These are CAFCA LTD and WANKIE COLLIERY FIRM LTD. Due to the inflation crisis in Zimbabwe, we do not believe that these financial variables are adequately interpretable. Thus, we exclude those two firms from the sample. We, anyway, did not find BEE information for these two firms. Further, we decide to adjust the currency of 10 additional firms more drastically as the reported currency changes lead to large shifts in the financial

variables, which seem implausible. Whenever possible, we compared annual reports to the data to confirm the chosen currency. The applied changes are:

Table B3 - Adjustments to Reported Currencies

Id	Firm	Adjustment
79	ANGLO AMERICAN PLC	Instead of switching between USD and ZAR, only USD
85	ATLATSA RESOURCES CORPORATION	Instead of switching between CAD and ZAR, only CAD
136	BHP GROUP PLC	Instead of switching between USD and ZAR, only USD
250	DATATEC LTD	Switch to USD in 2004 instead of 2014
409	INVESTEC LTD	Instead of switching between GBP and ZAR, only GBP
410	INVESTEC PLC	Instead of switching between GBP and ZAR, only GBP
414	IPSA GROUP PLC	Instead of switching between GBP and ZAR, only GBP
651	SABMILLER PLC	ZAR in 2000 instead of USD and USD thereafter (no switching to GBP - compareAnnual Report 2014)
664	SAPPI LTD	1999: ZAR, thereafter USD (instead of switching between USD and ZAR)
754	TRADEHOLD LTD	Switch to GBP in 2009 instead of 2014

Note: We dropped Investec LTD and Investec PLC as they show some abnormality in reporting.
Source: Own research.

B1.2. Financial Variables

Occasionally, the information for financial variables for the same year differs by WOW edition.[19] Table B4 gives a detailed overview of how many inconsistencies in the financial variables occur. In the case of an inconsistency, the information of the latest WOW edition was chosen to be correct as we assume that there might have been changes in the financial variables due to subsequent notifications.

Table B4 - Inconsistencies in the Financial Variables, Cleaned Sample

Variable	Inconsistencies (in %)
Fixed Assets	0.67
Turnover	1.07
Operating Profits	1.62
Investments and Loans	0.45
Total	2.94

Source: Own research.

[19] Note that there is an overlap in information between editions as every edition contains financial information for the last available 5 years.

B1.3. Industry

Firstly, we backwards interpolated the subsector information to fill in missing values about the subsector of a firm. This usually concerns observation that were extracted from a WOW book from another year (e.g., observations containing financial information from the year a firm got listed in which the firm was not yet included in the WOW books or a year in which the sector was not reported). The interpolation concerned 799 observations. However, some missing values in the subsector variable remain (this concern 52 observations from 30 firms after 2003).

Table B5 - Exception in Conversion from GCS to ICB

GCS Subsector	ICB Subsector	Note
PLATINUM	PLATINUM & PRECIOUS METALS	Common knowledge
STEEL	IRON & STEEL	Common knowledge
TELEVISION, RADIO & FILMED ENTERTAINMENT	BROADCASTING & ENTERTAINMENT	Common knowledge
EDUCATION BUSINESS TRAINING & EMPLOYMENT AGENCY	BUSINESS TRAINING & EMPLOYMENT AGENCIES	Common knowledge
HOSPITAL MANAGEMENT & LONG TERM CARE	HEALTH CARE PROVIDERS	Future Classification
DISCOUNT & SUPER STORES & WAREHOUSES	BROADLINE RETAILERS	Future Classification
ENGINEERING - CONTRACTORS	INDUSTRIAL MACHINERY	Future Classification
OTHER TEXTILES & LEATHER GOODS	CLOTHING & ACCESSORIES	Future Classification
SECURITY & ALARM SERVICES	BUSINESS SUPPORT SERVICES	Future Classification
VEHICLE DISTRIBUTION	SPECIALITY RETAILERS	Future Classification
WIRELESS TELECOMMUNICATIONS SERVICES	MOBILE TELECOMMUNICATIONS	Future Classification
MINING FINANCE	MINING (Sector)	ICB Sector

Source: Own research.

The WOW uses different classification systems for the industry classification between 2005 and 2020. From 2005 to 2007, the WOW uses the FTSE Global Classification System (GCS) 1999 to classify industries. Thereafter, WOW uses the ICB code. For continuous industry classification, the FTSE GCS 1999, as well as earlier versions of the ICB code, were converted to the Legacy ICB index. To convert the FTSE GCS to the 2005 ICB, an historical conversion map provided by FTSE Russel was used. From the 2005 ICB to the Legacy ICB only minor changes occurred (JSE, 2018). In detail, three additional subsectors were introduced and the subsector Farming & Fishing was renamed to Farming, Fishing & Planation. We accounted for these minor changes.

Some GCS subsectors were not contained in the provided conversion map or could only be assigned to an ICB Sector. We assigned these subsectors via common knowledge or using the future ICB classification of firms. Furthermore, one GCS subsectors could only be assigned to an ICB Sector. These exceptions are depicted in Table B5.

B1.4. Shareholder Information

Between 2015 and 2016, there was a change in reporting the shareholder information. Namely, in and before 2015, WOW reported the shareholder information for the previous year but from 2016 WOW reported the shareholder information for the current year. Thus, there is no shareholder information for the year 2015. To avoid a systematic bias the shareholder information from 2014 was extrapolated for 2015. Although the shareholder structure shows moderate changes over time, we believe that the bias stemming from extrapolation is smaller than from the missing information.

Further, sometimes the shareholder information of one firm for a specific year was reported in two different WOW editions. This concerns 176 observations from 4,821 observations in total. In this case, the shareholder information from the earlier edition was chosen and the second information was discarded.

To calculate the PIC Dummy, shareholders had to be classified as PIC. These are Public Investments Corporation Soc[20], Government Employees Pension fund, GEPF Equity, Unemployment Insurance Fund, Compensation Commissioner Fund, Compensation Commissioner Pension Fund, Associated Institutions Pensions Fund, and Government Institutions Pension Fund (PIC, 2020). Furthermore, all shareholders starting with "PIC" or "GEPF" were classified as PIC as some of the PIC/GEPF portfolios were externally managed in the past (PIC, 2006).

B1.5. A Note on Time Dimensions

Shareholder information is assigned to the year the information refers to. Before the harmonization process, the following years have been assigned: Financial variables and respective currencies are assigned to the year the information refers to in the respective WOW edition. The information on Industry, INC, Ticker, Registration Number, Number of Employees, Stock Market, Listed, and Founded are assigned to the respective WOW edition.

[20] Also referred to as Public Investors Comm, Public Investment Corporation, Public Inv Comm Int Equity, or Public Investment Commission (and similar).

B2. BEE Information

B2.1. Empowerdex

The first source for BEE scores is the annually published list of "Most Empowered Firms" by Empowerdex. The list by Empowerdex includes firm names, sometimes missing firm forms. However, for the majority of firms it is possible to assign the shortened name to the complete name provided by the WOW data.[21] Thus, the name, as well as the information of the year of publication, is used to assign the Empowerdex data to the WOW data. Note that we assume that the year of publication of the Empowerdex list corresponds to the year in which the BEE certificate was at least valid for 6 months, i.e., it is the year in which the greatest period covered by the certificate falls into. Comparing the matched BEE scores from Empowerdex with BEE certificates found online, it becomes apparent that this assumption holds for the majority of observations provided by MEC.

B2.2. Mpowered

All firms listed on the JSE have been searched on the database Mpowered on which firms can voluntarily upload their BEE certificates. The information from Mpowered is of high quality because it contains the original BEE certificates which include the date of issue, the BEE subscores and information about the applied scorecard. Whenever no information on the applied scorecard was depicted, we assumed the generic scorecard based on the 2007 Codes (18 observations).

To calculate the year the certificate was assigned to, we use the date of issue. Namely, we apply the following rule. Certificates issued in the first half of the year are getting assigned to that year. Certificates issued in the second half of the year are assigned to the consecutive year. Using this rule some duplicates appear, namely, a firm that gets assigned two BEE certificates to the same year. These cases have been thoroughly investigated. Usually, in such cases, the later of the two certificates is dropped. However, sometimes, one of the certificates gets assigned a different year (e.g., when there is almost one year between certificates). These exceptions are depicted below. There are two possible reasons for these exceptions:

1. The firm usually gets certificated in the middle of the year. Sometimes the date of issue is before 30 June and sometimes after that.
2. From the data it becomes apparent that the certificate was used by the firm for that year, e.g., a firm has a certificate assigned to 2015, two assigned to 2016, and one assigned to 2018. Then, the certificate assigned to 2016 with the younger date is assigned to 2017. Note that certificates

[21] If it was not possible the information on BEE has been dropped. Out of 2,081 observations 1,995 were matched.

with less than 170 days between them have been excluded from this strategy due to the short time period between certificates.

Table B6 - Exception in Year Assignment

Firm	Year	Date of Issue
AFGRI LTD	2016	28 Apr 2015
AFRICAN OXYGEN LTD	2014	28 Jul 2014
AFRICAN OXYGEN LTD	2016	15Apr2015
AFRICAN OXYGEN LTD	2018	05 May 2017
ALEXANDER FORBES GROUP HOLDINGS LTD	2017	30 May 2016
ANGLOGOLD ASHANTI LTD	2021	04 May 2021
ATTACQ LTD	2019	03 May 2018
DYNAMIC CABLES RSA LTD	2014	04 Jul 2014
CARGO CARRIERS LTD	2014	04 Jul 2014
CLICKS GROUP LTD (former NEW CLICKS HOLDINGS LTD)	2016	28 Apr 2015
CLOVER INDUSTRIES LTD	2014	11 Jul 2014
ENVIROSERV HOLDINGS LTD	2016	30 Apr 2015
EXXOTEQ LTD	2016	30 Apr 2015
HULAMIN LTD	2016	16 Aug 2016
ILLOVO SUGAR LTD	2016	16 Aug 2016
INFRASORS HOLDINGS LTD	2016	13 May 2015
INTERWASTE HOLDINGS LTD	2017	09 Jun 2016
SUN INTERNATIONAL LTD	2017	30 Apr 2015
MARTPROP PROPERTY FUND (former SA CORPORATE REAL ESTATE FUND)	2016	09 Apr 2015
MIX TELEMATICS LTD	2021	24 Jun 2020
MONDI LTD	2016	30 Apr 2015
MPACT LTD	2015	19 Mar 2014
NAMPAK LTD	2009	03 Jul 2009
SA CORPORATE REAL ESTATE LTD	2016	09 Apr 2015
SANLAM LTD	2010	16 Aug 2010
SANLAM LTD	2012	27 Jul 2012
SANTOVA LTD (former SANTOVA LOGISTICS LTD)	2016	24 Apr 2015
SPUR CORPORATION LTD	2016	30 Apr 2015
THE SPAR GROUP LTD	2016	30 Apr 2015
TSOGO SUN HOLDINGS LTD	2016	28 Apr 2015
TSOGO SUN HOLDINGS LTD	2017	09 Jun 2016
TONGAAT HULETT LTD*	2018	28 Jun 2017
VALUE GROUP LTD	2012	21 Jun 2011
VALUE GROUP LTD	2013	29 Jun 2012

Note: *formerly THE TONGAAT-HULETT GROUP LTD.
Source: Own research.

B2.3. Internet Research

All firms listed on the JSE on which we have missing BEE information for any year have been searched on the internet (including firms' websites). With this research, we have found 216 additional certificates (see Table B7 for an overview of years). Similar to Mpowered, we made few adjustments to the time dimensions, depicted in Table B8.

Table B7 - Found Certificates via Internet Research

Year	Certificates
2016	1
2017	1
2018	12
2019	27
2020	86
2021	89
Total	216

Source: Own research.

Table B8 - Adjustments to Year Assignments, Internet Research

Firm	Year	Issued
ALLIED ELECTRONICS CORPORATION LTD	2021	26 Jun 2020
CURRO HOLDINGS LTD	2021	22 Apr 2020
TOWER PROPERTY FUND LTD	2021	26 Jun 2020

Source: Own research.