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Running on Generators: Self-Generation, Power Outages and Firm Performance in Nigeria after the 2023 Fuel Subsidy Removal

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Abstract
Nigerian firms have long supplemented the grid with their own generators. In 2023 the petrol subsidy was removed and the naira was allowed to depreciate, and the price of the fuels that run those generators rose steeply. We ask how dependence on self-generation relates to sales, employment and margins among formal Nigerian establishments over FY2021 to FY2024, and whether the employment association differs from 2014. We use the World Bank Enterprise Survey Nigeria 2025 (N = 1,043; analytical samples of 891 to 922 establishments, 372 for the margin) and harmonised measures from the 2007, 2009 and 2014 waves. Survey-weighted logit and least-squares models relate the share of electricity drawn from the firm's own generator and monthly outage hours to real sales growth, employment continuity and a partial operating margin, with stratified design-based standard errors, unweighted, size-split and alternative-measure checks, and a pooled 2014 and 2025 test. In 2025, 86.4 per cent of establishments owned or shared a generator (against 70.7 per cent in 2014), and generators supplied on average 45.6 per cent of their electricity, even though the median number of outages per month had fallen from 30 to 10. Generator dependence is not associated with real sales growth. It is associated with a lower probability of keeping employment at or above its FY2021 level: establishments drawing at least half their electricity from generators were 9.5 points less likely to do so (p = 0.007). The association is concentrated among establishments with 20 or more employees and is on the extensive margin: high-dependence firms were more likely to have cut any jobs (18.3 against 10.0 per cent), not to have cut more deeply. In a suggestive comparison, the association is larger than in 2014. Outage hours, not generator dependence, are associated with lower partial margins. Generator-dependent firms kept pace with other firms on sales but were more likely to have reduced employment at all, especially larger firms. The pattern is consistent with the higher cost of self-generation after 2023 being absorbed partly through jobs, which suggests that the reliability of grid supply matters for formal employment as well as for output.

Keywords: *Power outages; self-generation; diesel generators; fuel subsidy; employment; firm performance; Nigeria; World Bank Enterprise Surveys****JEL classification:*** *L94; Q41; Q48; L25; O55.*

I. INTRODUCTION

Unreliable electricity is one of the most frequently cited obstacles to doing business in Nigeria, and the standard firm response is to generate power on site. Self-generation keeps machines and lights running during outages, but at a unit cost well above grid supply, and that cost depends directly on the price of petrol and diesel. Between 2021 and 2024 the economics of self-generation changed sharply. The petrol subsidy was removed at the end of May 2023, the official and parallel exchange-rate windows were unified in June 2023, and the naira depreciated steeply. The National Bureau of Statistics (NBS) reported an average retail diesel price of N1,406.05 per litre in August 2024, 64.6 per cent higher than a year earlier (NBS, 2024). At the same time the Electricity Act 2023 allowed states to regulate their own electricity markets, and in April 2024 the regulator raised the tariff for customers on the most reliable feeders ("Band A") to N225 per kWh, later reduced to N206.80 (Nigerian Electricity Regulatory Commission [NERC], 2024).

This paper asks how dependence on self-generation relates to firm outcomes over this period. Using the 2025 World Bank Enterprise Survey (WBES) for Nigeria, whose reference period compares FY2024 with FY2021, we examine three outcomes: real sales growth, employment continuity and a partial operating margin. We also describe how outages and self-generation have changed since 2007, and test whether the association between generator dependence and employment differs from that in the 2014 wave, when the petrol subsidy was in place.

The paper makes three contributions. First, it documents that generator use among formal Nigerian establishments was higher in 2025 than in 2014 even though outages had become less frequent, so that self-generation remains a structural rather than an emergency source of power. Second, it shows that generator dependence is unrelated to sales growth but associated with a lower probability of maintaining employment, concentrated among larger establishments and stronger than in 2014. Third, it separates two channels that are often conflated: outage intensity is associated with lower margins, while generator dependence is associated with employment adjustment.

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The analysis is descriptive and associational. Neither generator dependence nor outage exposure is randomly assigned, the two waves differ in coverage and conditions, and the survey does not record fuel spending directly. We therefore do not claim to estimate the effect of the subsidy removal. A companion paper (Sani & Apeh, 2026a) uses the same 2025 survey to study financing conditions and finds no detectable role for outage exposure in moderating the finance associations; the present paper studies power supply itself. The two papers differ in question, exposure and data. The companion paper asks how financing constraints, bank and non-bank working capital and electronic payments relate to continuity, growth, input sourcing and margins, and uses outage losses only as a binary moderator. This paper asks how the share of electricity from self-generation and monthly outage hours relate to growth, employment and margins, and adds the 2007 and 2009 waves; it shares no tables or text with the companion paper. Solar adoption, which appears in the same survey, is analysed in a separate companion paper on climate shocks and green practices (Sani & Apeh, 2026c) and is not repeated here. Both papers use the same definitions of the outcome variables so that their results can be compared.

II. RELATED LITERATURE

A large literature documents that electricity shortages reduce firm output and productivity. In India, shortages reduced manufacturing revenue and producer surplus, with the largest losses among plants without generators (Allcott, Collard-Wexler, & O'Connell, 2016); higher electricity prices led Indian firms to shift to less electricity-intensive products and lowered productivity (Abeberese, 2017). The expansion of electricity provision across Indian states raised manufacturing output (Rud, 2012), and Chinese industrial firms responded to shortages by buying intermediate inputs they would otherwise have produced, which raised their production costs (Fisher-Vanden, Mansur, & Wang, 2015). These studies show that firms adjust to the cost of power through their input mix, which motivates our question about labour. In Sub-Saharan Africa, outages are associated with lower sales, especially for firms without generators (Cole, Elliott, Occhiali, & Strobl, 2018), and with lower firm performance alongside other infrastructure costs (Eifert, Gelb, & Ramachandran, 2008). In Ghana, electricity shortages reduced the revenues and profits of small firms (Hardy & McCasland, 2021).

Self-generation is the main adaptive response. Firms are more likely to own generators when outages are frequent, when they are larger and when they export (Steinbuks & Foster, 2010). Generators reduce reported outage losses, but the reduction is partial and varies across firms (Oseni & Pollitt, 2015). Firms facing electricity constraints also change what they produce and how much they invest (Alby, Dethier, & Straub, 2013). For Nigeria, an early survey of manufacturers estimated that self-generation accounted for a large share of the cost of unreliable supply (Adenikinju, 2003). Evidence on employment is thinner: across Africa, power outages are associated with lower employment, particularly among less-skilled workers (Mensah, 2018).

Two gaps motivate this paper. Most studies treat generator ownership as protection against outages and ask whether it reduces losses; fewer ask what happens to firms that depend on generators when the cost of running them rises. And most of the evidence predates the 2023 Nigerian reforms, which changed fuel prices for every self-generating firm at once.

III. CONCEPTUAL FRAMEWORK AND HYPOTHESES

A firm facing unreliable grid supply chooses how much electricity to generate itself. Self-generation protects output during outages but raises the unit cost of electricity. When fuel prices rise, a generator-dependent firm can absorb the higher cost in its margin, pass it on in prices, or cut other costs. Labour is the largest flexible cost for most formal Nigerian firms, so a generator-dependent firm that keeps producing may adjust by shedding workers. Outages that are not covered by self-generation work differently: they interrupt production directly and should show up in lower sales or margins. These considerations give four hypotheses.

- H1: Generator dependence is negatively associated with real sales growth (the output channel).
- H2: Generator dependence is negatively associated with employment continuity (consistent with a cost-adjustment hypothesis, which the survey cannot test directly).
- H3: Outage intensity is negatively associated with the partial operating margin (the interruption channel).
- H4: The association between generator dependence and employment continuity is stronger in 2025 than in 2014, when fuel was subsidised.

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IV. DATA AND METHODS

4.1 Data

The WBES Nigeria 2025 (World Bank, 2025) covers 1,043 formal private establishments with five or more employees in manufacturing, retail and other services, sampled by stratified random sampling with strata defined by geopolitical zone, sector and size. Strict-eligibility weights (wstrict) are used throughout. For the benchmarks we use the WBES Nigeria 2007-2009-2014 file (World Bank, 2015), with the strict-eligibility weights for 2014 (N = 2,676) and the weights supplied for the earlier waves (wt) for 2007 and 2009. The waves differ in coverage, sampling frame and conditions, and the 2007 and 2009 weights are available only for part of each sample, so the long-run comparison is indicative.

4.2 Measures

Table 1. Variable definitions

Variable	Survey items	Definition
Generator share	c10, c11	Share of electricity from a generator owned or shared by the establishment (0 if no generator)
High generator dependence	c10, c11	1 if generator share is at least 0.5
Outage hours (log)	c6, c7, c8a, c8b	ln(1 + outages per typical month x average duration in hours), capped at 720; 0 if no outages
Outage losses	c6, c9a	Losses due to outages as % of annual sales; 0 if no outages
Real sales growth	d2, n3	1 if ln(FY2024 sales) exceeds ln(FY2021 sales x 1.974), the 2022 to 2024 rise in consumer prices
Employment continuity	l1, l2	1 if permanent full-time employment in FY2024 is at least its FY2021 level
Partial operating margin	d2, n2a, n2e, n2i	(Sales - labour - raw materials or goods for resale) / sales; manufacturing and retail; winsorised at 1st and 99th percentiles
Controls	b5, l2, a4a, b4, d3b, d3c, c22b, a2	Log age, log employment three years earlier, manufacturing, female ownership, exporter, website, zone indicators

Generator share is the main exposure. It captures how much of a firm's electricity depends on fuel prices, rather than whether a generator is merely available as backup. Outage hours capture interruption of grid supply. The two are only weakly correlated (r = 0.14), because firms in areas with poor supply but reliable self-generation can have many outage hours and high generator shares, while others run generators continuously regardless of reported outages.

4.3 Estimation

For binary outcomes we estimate survey-weighted logit models and report average marginal effects (AMEs) with delta-method standard errors; for continuous outcomes we estimate weighted least squares with HC3 standard errors. As a design-based check, we re-estimate every variance using Taylor linearisation within the 211 WBES strata (weighted scores centred within strata, scaled by $n_h/(n_h - 1)$); the resulting p-values are reported in the notes and lead to the same conclusions. The pooled test of H4 stacks the 2014 and 2025 samples with identical definitions and controls (website use is omitted because it is not consistently available in 2014) and interacts the exposure measures with a 2025 indicator.

Primary and secondary estimates. Our primary estimate compares establishments that draw at least half their electricity from generators (562 establishments) with those that draw less, using the binary high-dependence indicator. It is a direct comparison of two groups of firms, with controls, and does not depend on how generator share enters the model. The continuous generator share is the secondary measure. Its AME is the change in probability for a move from no self-generation to full self-generation, which extrapolates towards the ends of the distribution: under the weights 14.3 per cent of establishments have no generator and 7.3 per cent draw 90 per cent or more of their electricity from one, and the interquartile range runs from 30 to 70 per cent. We therefore also report the implied change per 10 percentage points, which is the more realistic scale for comparing firms.

$$\Pr(Y_i = 1) = \Lambda(\alpha + \beta \cdot \text{GenShare}_i + \gamma \cdot \ln(1 + \text{OutageHours}_i) + X_i'\delta + \zeta_{\text{zone}})$$

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V. RESULTS

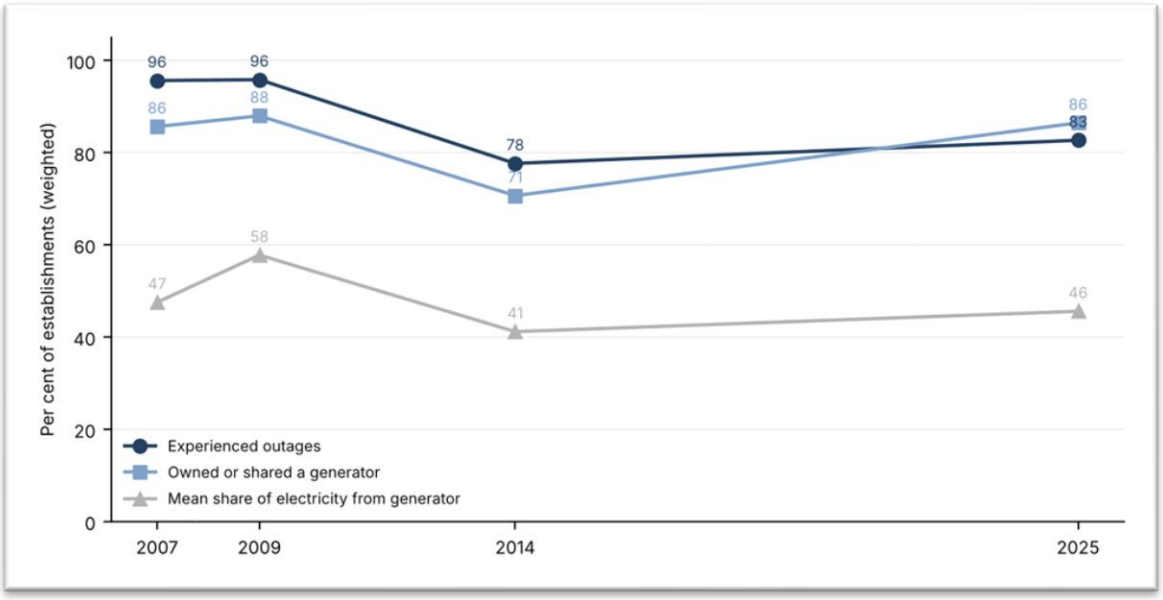
5.1 Power conditions, 2007 to 2025

Table 2. Power conditions among formal Nigerian establishments, 2007 to 2025 (weighted)

Indicator	2007	2009	2014	2025
Experienced outages (%)	95.6	95.8	77.6	82.7
Owned or shared a generator (%)	85.6	88.0	70.7	86.4
Electricity from generator, mean (%)	47.5	57.8	41.1	45.6
Electricity a major or very severe obstacle (%)	75.9	83.1	48.4	51.5
Outage losses, mean (% of sales)	9.4	5.8	12.5	5.1
Outages per month, median (affected firms)	25	30	30	10
Outage hours per month, median (affected firms)	n.a.	n.a.	203	37.5
Establishments	2,387	3,157	2,676	1,043

Note: 2007 and 2009 use the wt weights in the panel file, available for part of each sample; 2014 and 2025 use strict-eligibility weights. Outage duration is not comparable for the earlier waves. 2025 outage losses are reported by fewer establishments (n = 718). n.a. = not available.

Figure 1. Outages and self-generation, 2007 to 2025 (weighted per cent of establishments)



Source: authors' calculations from WBES Nigeria 2007, 2009, 2014 and 2025.

Outages remain almost universal (82.7 per cent of establishments in 2025), but they have become less frequent and shorter: the median affected establishment reported 10 outages in a typical month in 2025 against 30 in 2014, and about 38 outage hours a month against about 203. Self-generation has not declined with them. The share of establishments owning or sharing a generator rose from 70.7 to 86.4 per cent, and the average share of electricity drawn from generators was 45.6 per cent in 2025. About half of establishments (50.8 per cent) drew at least half their electricity from generators. Generators in Nigerian firms are therefore a primary rather than a backup source of power, which is what makes their operating cost sensitive to fuel prices.

Table 3. Self-generation by sector, size and location, 2025 (weighted)

Group	N	Generator (%)	Mean generator share (%)	Generator share >= 50% (%)	Outage losses (% of sales)
All	1,043	86.4	45.6	50.8	5.1
Manufacturing	485	84.2	46.4	53.6	4.4
Retail	127	85.8	43.2	45.8	6.5
Other services	431	87.4	45.6	50.6	5.1
Small (<20)	573	88.5	47.8	55.8	5.7
Medium/large (20+)	468	82.9	41.8	42.2	4.2
Lagos	229	91.4	38.6	37.4	2.7
South West excl. Lagos	115	92.0	62.2	79.4	8.5
South East	122	97.3	61.0	71.8	12.4

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Group	N	Generator (%)	Mean generator share (%)	Generator share >= 50% (%)	Outage losses (% of sales)
South South	150	97.2	58.7	75.3	13.8
North Central	164	87.6	42.9	39.7	0.9
North West	141	57.1	29.7	35.3	2.2
North East	122	66.4	29.0	30.1	0.7

Note: weighted shares; N is unweighted.

Dependence on generators is highest in the southern zones outside Lagos: mean generator shares are 62.2 per cent in the South West outside Lagos, 61.0 per cent in the South East and 58.7 per cent in the South South, against 38.6 per cent in Lagos and about 30 per cent in the North East and North West. Reported outage losses follow the same pattern. Smaller establishments are slightly more dependent on generators than larger ones.

5.2.Generator dependence, sales and employment

Table 4. Generator dependence, outage hours and firm outcomes, 2025

	(1) Real sales growth (AME, points)	(2) Real log sales growth (OLS)	(3) Employment continuity (AME, points)	(4) Partial margin (OLS, points)
Generator share (0 to 1)	+4.7 (5.9)	-0.003 (0.067)	-19.4*** (5.7)	-9.4 (8.1)
ln(1 + outage hours per month)	-0.1 (0.8)	-0.009 (0.011)	+0.2 (0.9)	-4.2*** (1.3)
Implied change per 10 points of generator share	+0.5	-0.0003	-1.9	-0.9
Weighted mean of outcome	12.6	-0.360	86.3	45.9
Observations	891	891	922	372
AUC or R^2	0.677	0.061	0.763	0.370

Note: survey-weighted estimates. Columns (1) and (3): logit average marginal effects in percentage points (robust standard errors in parentheses). Columns (2) and (4): weighted least squares, HC3 standard errors; column (4) is multiplied by 100 and estimated for manufacturing and retail. All models include log age, log employment in FY2021, manufacturing (retail in column 4), female ownership, exporter, website and zone indicators. Stratified design-based p-values for generator share: (1) 0.428, (2) 0.959, (3) < 0.001, (4) 0.147; for outage hours in (4): < 0.001. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Generator dependence is not associated with real sales growth. The AME of moving from no self-generation to full self-generation is +4.7 points (95% CI -6.8 to 16.2), and the continuous growth estimate is close to zero. H1 is not supported: firms that relied heavily on generators were no less likely than others to raise their real turnover.

Employment tells a different story. Generator dependence is associated with a 19.4-point lower probability of keeping employment at or above its FY2021 level for a move from no self-generation to full self-generation (95% CI -30.5 to -8.3; $p < 0.001$), or about 1.9 points per 10 percentage points of generator share. Against a weighted base rate of 86.3 per cent, the difference between a firm with no self-generation and a firm running entirely on generators is equivalent to more than doubling the share of establishments that reduced employment. The primary binary comparison gives the same picture: 81.7 per cent of high-dependence establishments kept employment at its FY2021 level against 90.0 per cent of others, and with controls the difference is -9.5 points ($p = 0.007$). This pattern is in line with H2. Outage hours are not associated with sales or employment, but they are associated with a lower partial margin: each log-unit increase in monthly outage hours is associated with a margin 4.2 points lower ($p = 0.002$). This is in line with H3. Generator dependence itself is not detectably associated with the margin.

5.3 Where the employment association is concentrated

Table 5. Generator share by sector and size: separate estimates

Subgroup	Real sales growth (AME, points)	N	Employment continuity (AME, points)	N
Manufacturing	+7.7 (11.7)	407	-17.2* (9.2)	428
Retail and other services	+5.5 (6.9)	484	-17.9*** (6.5)	494
Fewer than 20 employees	+3.3 (8.5)	488	-0.9 (7.3)	501
20 or more employees	+8.4 (7.8)	405	-34.8*** (8.9)	421
Interaction: generator share x manufacturing	-0.7 (12.3)	891	+1.2 (11.1)	922

Note: separate survey-weighted logit models for each subgroup with the controls of Table 4 (size models omit log employment in FY2021). AMEs of generator share in percentage points, robust standard errors in parentheses. The interaction row reports the

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marginal effect of the product term from the pooled model. Stratified p-value for 20 or more employees, employment: < 0.001. *** p < 0.01, ** p < 0.05, * p < 0.10.

The employment association is similar in manufacturing and in services, and the interaction term is close to zero. It differs sharply by size. Among establishments with 20 or more employees, the AME is -34.8 points (95% CI -52.3 to -17.3); among smaller establishments it is -0.9 points and indistinguishable from zero. Larger establishments have larger electricity loads and more scope to adjust headcount, so the pattern is consistent with the cost-adjustment hypothesis, but it does not test it, and it is also consistent with the alternative explanations discussed in Section 6.

The association is with whether a firm reduced employment at all, not with the average size of the change. In a model of the log change in employment, the coefficient on generator share is -0.037 (p = 0.455). Generator-dependent firms are more likely to have cut some jobs, but the data do not show that they cut much deeper on average. The distribution makes the same point: among high-dependence establishments, 18.3 per cent reduced employment, 21.4 per cent kept it exactly unchanged and 60.3 per cent increased it, against 10.0, 32.6 and 57.5 per cent of other establishments. The difference lies in whether firms cut at all (the extensive margin), while the share that expanded is similar. The employment continuity measure is binary and does not distinguish firms that held steady from those that grew, which is why we report this breakdown.

5.4 A suggestive comparison with 2014

This subsection is suggestive rather than confirmatory. The two waves differ in sampling frame, sector composition, weights and reference periods (FY2010 to FY2013 against FY2021 to FY2024), so we report the comparison with several adjustments and do not rely on it for the main conclusions.

Table 6. Generator share and outcomes in 2014 and 2025: separate and pooled estimates

Outcome	2014 (AME, points)	2025 (AME, points)	Difference 2025 - 2014	p (difference)	N (2014 / 2025)
Real sales growth	-8.5 (8.2)	+4.3 (5.8)	+7.5 (11.2)	0.506	1,268 / 893
Employment continuity	-9.5 (5.9)	-21.4*** (5.8)	-17.1** (8.4)	0.042	1,559 / 924
Employment continuity, high generator dependence (>= 50%)	-0.0 (3.2)		-13.9** (7.0)	0.048	2,483 pooled
Employment, generator share: 2014 reweighted to the 2025 sector and size mix			-16.4* (8.7)	0.061	2,483 pooled
Employment, high dependence (>= 50%): 2014 reweighted			-14.6** (7.2)	0.044	2,483 pooled
Employment, generator share: unweighted			-11.2* (6.1)	0.064	2,483 pooled
Employment, high dependence (>= 50%): unweighted			-13.8*** (4.4)	0.002	2,483 pooled
Employment, generator share: 2014 weights capped at the 99th percentile			-18.1** (8.3)	0.029	2,483 pooled

Note: identical definitions and controls in both years (log age, log employment three years earlier, manufacturing, female ownership, exporter, zone indicators, outage hours). The difference is the AME of the generator share x 2025 interaction in a pooled survey-weighted logit with year-specific strata. For the high-dependence row, the 2014 column reports the main effect in the pooled model. 2014 growth compares FY2013 with FY2010 sales deflated by consumer prices. *** p < 0.01, ** p < 0.05, * p < 0.10.

In 2014 the employment association was smaller (-9.5 points, p = 0.108). In the pooled model, the association is 17.1 points more negative in 2025 (p = 0.042; stratified p = 0.029). Using the binary high-dependence measure, the difference is -13.9 points (p = 0.048); in 2014 high-dependence firms were no less likely than others to maintain employment. The sales association did not change. The data are consistent with H4, but this comparison is suggestive only. The two waves differ in sampling frame, sector coverage and weights; the 2025 reference period also spans the exchange-rate unification, the rise in inflation to more than 30 per cent and the currency redesign, not only the fuel subsidy removal; and diesel, which many larger generators use, was already deregulated before 2023. Any of these differences could change the association, so the comparison cannot isolate the effect of fuel prices. We checked whether the result depends on the 2014 sample composition or on a few heavily weighted observations. Reweighting 2014 to the 2025 mix of sector and size gives a difference of -16.4 points (p = 0.061); capping the 2014 weights gives -18.1 points; and the unweighted difference is -11.2 points for generator share and -13.8 points for the binary measure (p = 0.002). Unlike the gender comparison in our companion paper on gender and credit access (Sani & Apeh, 2026d), the 2014 result is not driven by a few observations: the three largest weights account for 8 per cent of the weight among the 1,146 high-dependence establishments in 2014. The direction is consistent across checks, but the comparison remains suggestive.

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5.5 Robustness

Table 7. Robustness of the generator-share estimates

Specification	Real sales growth (AME, points)	Employment continuity (AME, points)	N (employment)
Main estimate (Table 4)	+4.7 (5.9)	-19.4*** (5.7)	922
Unweighted	-4.4 (4.4)	-9.1** (4.4)	922
Excluding Lagos	+2.7 (6.6)	-23.8*** (6.7)	710
Adding financing constraint, bank and non-bank working capital	+3.1 (5.7)	-20.9*** (5.3)	899
Outage losses (% of sales) instead of outage hours	+7.5 (6.7)	-14.3** (7.0)	681
High generator dependence (>= 50%) instead of share	+3.4 (3.5)	-9.5*** (3.5)	922
Nominal instead of real sales growth	-13.8* (7.1)		891

Note: survey-weighted logit AMEs in percentage points (robust standard errors) unless stated. *** p < 0.01, ** p < 0.05, * p < 0.10.

The employment association survives every check: it is smaller but still significant without weights, larger when Lagos is excluded, unchanged when financing conditions are added, and present with the alternative outage measure and with the binary dependence indicator. The real sales association remains close to zero throughout. With nominal growth as the outcome, the estimate is negative (-13.8 points, p = 0.051). Because 85.1 per cent of establishments raised their naira sales, this mainly distinguishes the minority whose naira sales fell; it does not alter the conclusion that generator dependence is unrelated to real growth.

VI. DISCUSSION

The results describe a consistent pattern. Formal Nigerian firms use generators to keep producing through unreliable grid supply, and in 2021 to 2024 those that depended on generators kept pace with other firms on sales. What distinguishes them is employment: they were more likely to reduce their workforce, the difference is concentrated among larger establishments, and it is larger than in the 2014 wave. Outages that are not covered by self-generation, by contrast, are associated with lower margins. One hypothesis that fits this pattern is that self-generation turns an output problem into a cost problem that firms absorb partly through jobs. The survey cannot test this, because it does not record fuel spending, generator running hours or when jobs were cut.

An illustrative calculation shows why the hypothesis is worth testing. Table 8 gives the fuel cost of one kWh from a small diesel generator under different assumed rates of fuel use (0.25 to 0.35 litres per kWh, an illustrative range that we assume rather than measure; actual consumption depends on generator size, age and load) and the diesel price, from the August 2023 level implied by the NBS year-on-year change (about N854 per litre) to N1,600. At the August 2024 average of N1,406 (NBS, 2024), fuel alone costs about N350 to N490 per kWh, against a Band A grid tariff of N206.80 (NERC, 2024); even at the lowest assumptions in the table, fuel costs about as much as Band A supply. The figures exclude maintenance and capital costs and are assumptions for illustration, not survey estimates. They also assume that a firm could obtain reliable Band A supply at that tariff, which many cannot: Band A applies only to feeders that promise long daily supply, and the survey records neither the tariff band firms are on nor how reliable their supply is.

Table 8. Illustrative fuel cost of generator electricity (naira per kWh)

Fuel use (litres per kWh)	N854 per litre	N1,000	N1,200	N1,406 (Aug 2024)	N1,600
0.25	214	250	300	352	400
0.30	256	300	360	422	480
0.35	299	350	420	492	560

Note: fuel cost only = assumed litres per kWh x diesel price; the fuel-use rates are illustrative assumptions, not survey or engineering estimates. Band A grid tariff: N206.80 per kWh (from May 2024). N854 is the August 2023 level implied by the NBS report of N1,406.05 in August 2024, 64.6 per cent higher than a year earlier: 1,406.05 / 1.646 = 854.2.

Several alternative explanations remain. Generator dependence is not randomly assigned: firms in locations with poor grid supply may also face weaker local demand or labour markets that zone indicators only partly capture. Firms that shed workers may also have shed grid connections or moved to generator supply for other reasons, so the direction of association is not identified. The 2014 comparison cannot isolate fuel prices from other differences between the waves, including the exchange-rate shock, inflation and changes in sampling. And because the survey does not record hours worked, firms that cut hours rather than jobs are not captured.

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6.1 Limitations

- Cross-sectional associations only; neither the 2023 reforms nor generator dependence is randomly assigned, and the two waves are not a panel.
- The 2025 questionnaire has no item on fuel spending, fuel type or generator running hours, and the electricity cost item does not separate grid from generator supply; the cost channel is therefore inferred, not measured.
- Employment continuity is binary; we show the decline, no-change and growth shares, but the survey does not record hours worked.
- Outage losses are missing for many establishments in 2025, which is why outage hours are the main interruption measure.
- The survey covers formal establishments with five or more employees; informal and micro-enterprises, which are often the most generator-dependent, are excluded.

VII. POLICY IMPLICATIONS

Two implications follow. Each is a policy option to evaluate, not an effect this analysis demonstrates. First, energy policy and employment policy may be linked. Because the employment association is concentrated in larger formal firms and stronger in 2025, evaluations of measures that improve the reliability of grid supply to industrial and commercial customers should track employment as well as output. Whether cost-reflective Band A supply is cheaper than self-generation for a given firm depends on its feeder, its actual tariff and the reliability it receives, which this survey does not observe.

Second, the Electricity Act 2023 creates room for state electricity markets and embedded generation. States in the South East, South South and the South West outside Lagos, where generator dependence is highest, are where mini-grid and embedded-generation arrangements for industrial clusters would be most worth piloting and evaluating.

VIII. CONCLUSION

Formal Nigerian establishments drew 45.6 per cent of their electricity from their own generators in FY2024, up from 41.1 per cent in 2014, even though outages had become less frequent. Over FY2021 to FY2024, generator-dependent firms kept their sales but were more likely to shed some workers, particularly larger firms, and in a suggestive comparison this association is stronger than in the 2014 wave. These are cross-sectional associations: the survey cannot show that the 2023 fuel price rises caused this pattern, and the comparison with 2014 is suggestive only. Firm surveys that record fuel spending and generator running hours, and panel data that follow the same firms before and after the reforms, would allow the cost channel to be tested directly.

DECLARATIONS

Data availability. The WBES data are available from the World Bank Enterprise Surveys and Microdata Library after registration and are not redistributed by the authors. A replication package with code that rebuilds every table, figure and manuscript from the raw files, a variable-construction guide and the results files accompanies the submission.

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