



BEYOND STARTUP BIRTHS: FORMAL ENTREPRENEURIAL-SYSTEM RESILIENCE THROUGH LLC REGISTRATION, DEREGISTRATION AND REGISTRY STOCK AFTER GLOBAL SHOCKS, 2006-2024. CROSS-COUNTRY REGISTRY EVIDENCE WITH NIGERIA IN COMPARATIVE PERSPECTIVE

ADELODUN, S. S.¹, IKUPOLATI, A.O.², BABA, K. O.³, & MOHAMMED, I. L.⁴,

¹Department of Finance, University of Abuja, FCT, Nigeria: segun.adelodun@uniabuja.edu.ng

²Department of Entrepreneurship Studies, University of Abuja, FCT, Nigeria: ikupolatialexander@gmail.com

³Department of Entrepreneurship Studies, University of Abuja, FCT, Nigeria: baba.kabir@uniabuja.edu.ng

⁴Department of Industrial Relations and Personnel Management, University of Ilorin, Nigeria: ilias.lm@unilorin.edu.ng

Corresponding Author Email: baba.kabir@uniabuja.edu.ng
<https://doi.org/10.70118/ajibfd.02012026010>

KEYWORDS

formal entrepreneurship;
resilience; business
registration;
deregistration; firm
dynamics; Nigeria;
COVID-19

ABSTRACT

The sharp rise in company registrations after the pandemic raises a simple question: did formal entrepreneurship renew, or did startup births merely rebound? We examine the eighth edition of the World Bank Entrepreneurship Database for 2006-2024. After removing 29 offshore financial centres and standardising economy names, the panel covers 160 economies and contains 2,493 economy-years of new limited-liability company (LLC) registrations, 1,664 observations on formal deregistrations and 1,789 on registered LLC stock. Each outcome is expressed per 1,000 working-age adults. The analysis distinguishes four features of resilience: resistance at the onset of the shock, recovery among economies in which entry density fell in 2020, renewal against an economy-specific pre-pandemic trend, and consistency between registry flows and stock. Evidence comes from paired shock comparisons, Kaplan-Meier estimates, constant-sample checks, alternative trend windows, a placebo forecast and 4,999 nonparametric resamples. Median entry density declined by 6.2% between 2008 and 2009 and by 4.2% between 2019 and 2020. For the 107 economies observed at all four endpoints, however, the median paired difference was 4.2 percentage points and its interval included zero. The two contractions therefore cannot be ranked with confidence. The equivalent deregistration difference was -28.6 points and its interval excluded zero. Of the 89 economies whose entry density fell in 2020, an estimated 50.0% had recovered by 2021, 67.1% by 2022 and 76.8% by 2024. Median entry density stood 16.2% above its 2019 level in 2022. By 2024, it was 7.5% below the path fitted over 2015-2019, although that result weakened when the longer trend window was used. Nigeria moved from 0.805 registrations per 1,000 working-age adults in 2019 to 1.115 in 2022, placing it 24.3%-39.5% above the two fitted paths. Since Nigeria reports no deregistration series and no stock observation after 2020, the evidence supports an entry-recovery claim, not a claim about the resilience of the wider entrepreneurial ecosystem.

ARTICLE HISTORY

Received: 13/07/2026
Revised form: 30/08/2026
Accepted: 10/09/2026
Available online: 20/09/2026

1. Introduction

The pandemic produced an awkward pattern. Firms endured restrictions on movement, a collapse in demand and acute pressure on cash flow, yet company registrations recovered quickly and in several economies passed their pre-pandemic levels. In Britain, much of the increase came from first-time solo founders and online retail. Those pandemic cohorts were also less likely to hire and more likely to dissolve than earlier cohorts (Bahaj et al., 2024). A rise in registrations may therefore sit alongside weak survival, little job creation and rapid churn. Birth counts, on their own, say too little about resilience.

Work on entrepreneurial resilience is mainly concerned with how ventures and the systems around them adapt under strain. Research on business dynamics takes a different view, concentrating on entry, exit, survival and the movement of resources. The two traditions meet, but they are not substitutes. Entrepreneurial ecosystems include finance, knowledge, institutions, networks, skills and demand (Cao & Shi, 2021; Wurth et al., 2022). Business registries do not observe these elements directly. What they reveal is narrower: the formal corporate machinery through which LLCs enter, leave and remain on the register.

Our concern is therefore formal entrepreneurial-system resilience. Five questions guide the inquiry. How did LLC registrations and formal deregistrations move over the 2008-2009 and 2019-2020 transitions, and what happens when both shocks are compared for the same economies? How quickly did economies that lost entry density regain the 2019 level? Did registration return to the path implied by 2015-2019? Are entry, deregistration and stock internally consistent? Finally, how does Nigeria

compare with economies in its region and income group?

This study addresses a measurement problem that is easily overlooked in cross-country assessments of entrepreneurial recovery. A rise in registrations after a shock does not, by itself, establish that the formal entrepreneurial system has recovered, because entry may increase while exit is delayed, registered stock is weakly reconciled, or the earlier growth path is not restored. The contribution of the paper is therefore to distinguish four related but separate matters: initial resistance, return to the pre-shock level, renewal of the earlier trend, and administrative consistency between registry flows and stock. The analysis also examines whether the results remain when offshore financial centres are excluded, reporting samples are held constant, censoring is recognised and alternative trend windows are used. These comparisons are descriptive and are not presented as causal estimates.

2. Literature and conceptual framework

2.1 Resilience is a process, not a count

Venture resilience describes the capacity to preserve, alter or rebuild activity when conditions turn adverse. Kuckertz et al. (2020) showed how quickly startups changed their operations during COVID-19. Reviewing the early evidence, Kuckertz and Brändle (2022) found uncertainty, scarce resources and digital adaptation at the centre of the discussion. At the system level, the question shifts from what one venture does to whether important functions and relationships endure, reorganise and renew. Buratti and Menter (2026), for example, find that network structure may sustain employment recovery without producing a comparable response in regional output. Their result cautions against reading resilience from one indicator.

Business-demography data offer observable, though incomplete, evidence about system outcomes. Entry creates room for experimentation. Exit can release resources, but it can also destroy viable capacity when firms close during a crisis. The economic meaning of reallocation thus depends on which firms disappear, not merely on the number that leave. Across 34 economies, low-productivity firms were more likely to close during COVID-19, whereas digital presence and innovation reduced exit risk, particularly for smaller firms (Muzi et al., 2023). Registry totals reveal neither productivity nor motive. We therefore study formal movements without treating every deregistration as productive cleansing.

The ecosystem literature also gives reason to treat resilience as a property of relationships and functions rather than as a simple count of organisations. O'Connor and Audretsch (2023) describe regional entrepreneurial ecosystems as interdependent systems in which adaptation depends on the condition of several connected elements. This view is consistent with the argument of Cao and Shi (2021) that ecosystem structures differ between advanced and emerging economies. It follows that registry measures can inform an assessment of formal business dynamics, but they cannot stand in for finance, knowledge, networks, skills or market demand. The present study therefore uses registry evidence as a bounded indicator of the formal entrepreneurial system rather than as a complete measure of ecosystem health.

Evidence from the pandemic further shows why entry figures require cautious interpretation.

Benedetti-Fasil et al. (2022) relate post-pandemic startup formation to employment outcomes and show that the employment implications of new cohorts need not move one-for-one with the number of startups. Santos et al. (2023) emphasise the role of digitalisation in entrepreneurial adaptation, while Berger et al. (2025) document changes in business dynamics and venture financing during the crisis period. Taken together, these studies suggest that a registration rebound may reflect adaptation, lower entry costs or changing financing conditions, but the economic quality of that rebound must be judged with evidence on persistence, exit and subsequent activity.

2.2 Why COVID-19 altered registry signals

The global financial crisis was transmitted chiefly through finance and aggregate demand. COVID-19 added restrictions on workplaces, rapid digital substitution, exceptional fiscal assistance, insolvency moratoria and interruptions to public administration. Business support arrived quickly in many countries, but access was uneven and generally easier for formal firms (Cirera et al., 2021). OECD evidence records an early fall in registrations followed by markedly different rebounds across countries, while bankruptcies remained unusually low (OECD, 2021). The distinction between formal and informal activity is especially important in African economies, where the measured stock of registered firms captures only part of the productive business population (Cruz et al., 2025). Consequently, fewer formal deregistrations in 2020 may reflect delayed legal processing or temporary forbearance rather than fewer economic closures.

2.3 A bounded measurement framework



Figure 1. Bounded measure of formal entrepreneurial-system resilience

We treat resistance as the immediate change in registration density from 2019 to 2020. Level recovery records the time taken to regain the 2019 density. Trend renewal asks whether post-2020 observations returned to the path fitted over 2015-2019. Registry coherence compares net reported flows with the observed change in stock. Read together, these measures describe the formal corporate system more fully than entry alone. They still reveal nothing directly about entrepreneurial intention, informal activity, employment, productivity, finance or ecosystem networks.

3. Data and methods

3.1 Source, scope and cleaning

The data come from the eighth-edition workbook of the World Bank Entrepreneurship Database (World Bank, 2026b). The unit of analysis is the economy-year. A new LLC is a company registered during the calendar year; a

closed LLC is one formally removed from the register; and total LLCs refer to the year-end registered stock. For comparability across economies and over time, each series is divided by the population aged 15-64 and multiplied by 1,000. National business registries provide most observations, although other public agencies are used where necessary (World Bank, 2026a). For Nigeria, the reporting authority is the Corporate Affairs Commission.

The firms worksheet has 3,591 rows and 190 economy labels. In line with the published methodology, we removed 29 Eurostat offshore financial centres marked with an asterisk because shell-company registrations can distort the trend. Trimming stray spaces also brought Brazil's two labels together. The cleaned analytical file contains 3,040 rows for 160 economies. Missing observations were left missing, reported zeros were retained, and no Nigerian deregistration value was created or imputed.

Table 1. Coverage after the official offshore-centre exclusion

Series	Economy-years	Economies	Years
New LLC registrations	2,493	158	2006-2024
Formal LLC deregistrations	1,664	111	2006-2024
Registered LLC stock	1,789	117	2006-2024

Note. The 160-economy analytical frame includes economies with no observation on a given series. In 2024, coverage falls to 116 economies for registrations, 85 for deregistrations and 77 for stock.

3.2 Estimands

The principal estimands are changes in registration, deregistration and stock density, measured per 1,000 working-age adults. Percentage changes are calculated only where the relevant observations are available for the same

economy at both endpoints. The direct comparison of the two shocks is more restrictive: it retains only economies observed in 2008, 2009, 2019 and 2020, so that differences are not produced by changes in country composition. Unweighted economy medians and interquartile ranges are reported because registry revisions

and differences in administrative practice produce long-tailed distributions in which the mean is easily influenced by a small number of extreme observations. Uncertainty around each cross-economy median is summarised by a percentile interval from 4,999 resamples of economies with replacement (seed 20260729). For the direct shock comparison, the resampling unit is the within-economy difference between the two percentage changes. These intervals describe uncertainty in the cross-economy median and do not incorporate the estimation error of each national trend.

Trend renewal is estimated separately for registration, deregistration and stock density. For each economy we fit $\ln(y_{it}) = \alpha_i + \beta_i t + \varepsilon_{it}$ over 2015-2019, provided that at least four positive observations are available. The later gap is $100[\exp\{\ln(y_{is}) - (\hat{\alpha}_i + \hat{\beta}_i s)\} - 1]$. Unlike $\ln(1 + y)$, this form is unaffected by a change in measurement scale. Registration and stock values are positive throughout. Eighteen reported deregistration zeros remain in the descriptive results but cannot be used in a logarithmic trend. Checks use a 2013-2019 window with at least five positive observations, count-based log trends and a placebo in which 2014-2018 predicts 2019.

Resistance is determined before recovery is examined. An economy is classified as resistant when its observed registration density in 2020 is at least as high as in 2019. Such economies are not included in the recovery risk set because they did not experience the decline whose reversal is being measured. The recovery analysis is therefore confined to economies observed in both

2019 and 2020 whose density fell in 2020. Recovery occurs in the first subsequent year in which density reaches or exceeds the 2019 level. Economies that do not recover are right-censored in their last observed year, and economies with no observation after 2020 are censored before the first recovery interval. Kaplan-Meier estimates are reported with Greenwood 95% intervals. Sensitivity checks require declines of more than 1%, 5% and 10%, and use recovery thresholds of 90%, 95% and 100% of the 2019 baseline. Registry coherence is measured as $|\Delta \text{Stock} - (\text{Registrations} - \text{Deregistrations})| / \text{Stock}$.

3.3 Identification limits and robustness

The empirical design is deliberately descriptive. Because the pandemic affected all economies, there is no credible untreated group for a conventional synthetic-control comparison. In a two-way fixed-effects specification, common year effects would absorb a global shock; removing those effects would instead combine the shock with other worldwide changes. The estimates are therefore interpreted as benchmarked changes and not as causal effects of the pandemic or of any policy response. To assess the sensitivity of the descriptive results to reporting composition, the analysis holds the sample constant among economies reporting in every year from 2019 to 2024. A Mann-Whitney test compares 2019 entry density for economies that report in 2024 with those that do not. The 2019-2022 rebound is also described by current World Bank income group and region, with Kruskal-Wallis tests used as omnibus comparisons. Results based on raw counts provide a further check on conclusions drawn from population-standardised densities.

4. Results

4.1 Resistance and observed rebound

Table 2. Matched-endpoint changes in formal LLC densities

Series	Window	N	Median %	95% bootstrap interval	P25	P75
Registration density	2008-2009	118	-6.2	[-10.0, -3.6]	-18.6	6.1
Registration density	2019-2020	142	-4.2	[-7.6, -1.8]	-16.3	5.7
Registration density	2019-2022	131	16.2	[8.7, 21.3]	-1.9	34.4
Deregistration density	2008-2009	71	10.8	[5.0, 15.9]	-8.3	32.5
Deregistration density	2019-2020	104	-11.0	[-24.8, -5.3]	-38.2	3.5
Deregistration density	2019-2022	94	1.6	[-7.4, 11.9]	-23.0	30.8
Stock density	2008-2009	88	6.0	[4.3, 7.0]	2.4	8.7
Stock density	2019-2020	96	4.7	[3.3, 5.8]	2.4	7.7
Stock density	2019-2022	85	13.3	[10.3, 16.6]	8.2	25.2

Note. Primary outcomes are per 1,000 working-age adults. Offshore centres are excluded. Intervals resample economies. The 2008-2009 window captures a late-GFC transition, not the full crisis effect.

Entry density fell across both transitions, by 6.2% from 2008 to 2009 and by 4.2% from 2019 to 2020. Deregistration moved in opposite directions: it rose by 10.8% in the earlier period

and fell by 11.0% in the later one. These medians come from different reporting samples, so they cannot by themselves show that the shocks differed.

Table 3. Direct paired comparison on identical economies

Series	N	2008-09 %	2019-20 %	Paired difference, pp	95% bootstrap interval
Registration density	107	-6.1	-5.1	4.2	[-2.5, 6.0]
Deregistration density	70	10.5	-11.2	-28.6	[-47.6, -14.5]
Stock density	78	5.2	4.7	-0.8	[-2.5, 0.4]

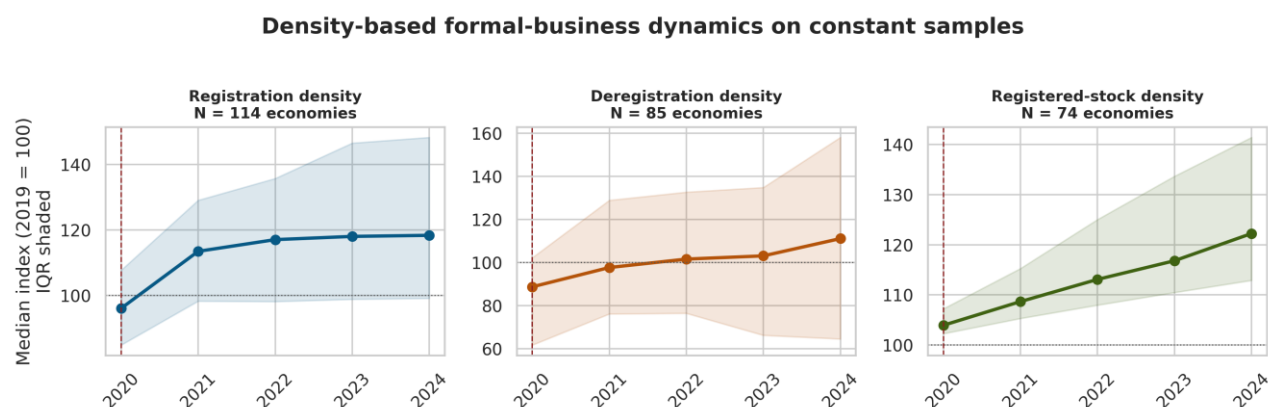
Note. Difference equals the 2019-2020 change minus the 2008-2009 change within each economy. A positive registration difference denotes a smaller contraction in 2019-2020.

For economies observed at all four endpoints, the median registration difference is 4.2 percentage points, with an interval of [-2.5, 6.0]. Since the interval includes zero, the data do not distinguish the severity of the two entry contractions. Deregistration is different. Its paired difference is -28.6 points [-47.6, -14.5], a pattern consistent with unusually weak visibility of formal exit in 2020. This remains an administrative association, not evidence that

policy forbearance caused the decline. The paired stock comparison is also inconclusive.

By 2022, median entry density was 16.2% above 2019. The direction matches raw registrations, which were 18.9% higher. Density is primary because it removes changes in the working-age population and matches the World Bank's comparative indicator.

Figure 2. Density-based formal-business dynamics on constant reporting samples



Note. Each panel holds the economy set constant from 2019 through 2024. Lines are medians; shading is the interquartile range.

4.2 Resistance first, recovery second

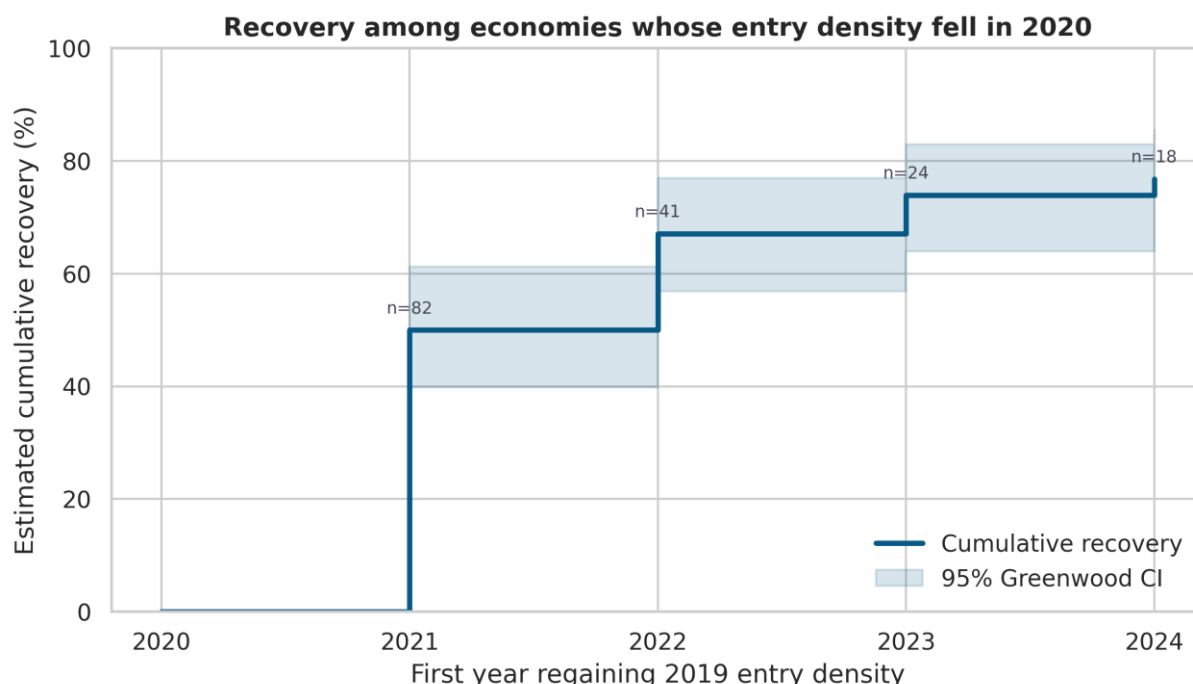
Of the 142 economies observed in both 2019 and 2020, 53 maintained or increased their 2019 entry density. We regard these economies as resistant. Entry density fell in the other 89, which form the recovery cohort. Seven have no observation after 2020 and are censored before the first recovery interval.

For the declining economies still at risk, estimated cumulative recovery reached 50.0% in 2021, 67.1% in 2022 and 76.8% in 2024. The Greenwood interval for 2024 is [67.0%, 85.5%]. A stricter cohort of 71 economies observed in

every year from 2021 to 2024 gives similar results: 69.0% had recovered by 2022 and 78.9% by 2024.

Small movements around zero do not drive the result. When a decline must exceed 5%, 70 economies remain and an estimated 72.2% recover the full 2019 density by 2024. With a decline greater than 10% (N = 53), the figure is 64.7%. Less exacting recovery thresholds raise the estimate for the original 89-economy cohort to 84.8% at 95% of baseline and 90.0% at 90% of baseline. Full return to baseline is the most conservative definition, but the choice of threshold still matters.

Figure 3. Recovery among economies whose entry density fell in 2020



Note. Recovery is conditional on an observed 2020 decline. Labels show economies at risk at each interval. Greenwood 95% confidence intervals are shaded.

4.3 Trend renewal and forecast uncertainty

Table 4. Density gaps from economy-specific 2015-2019 log trends

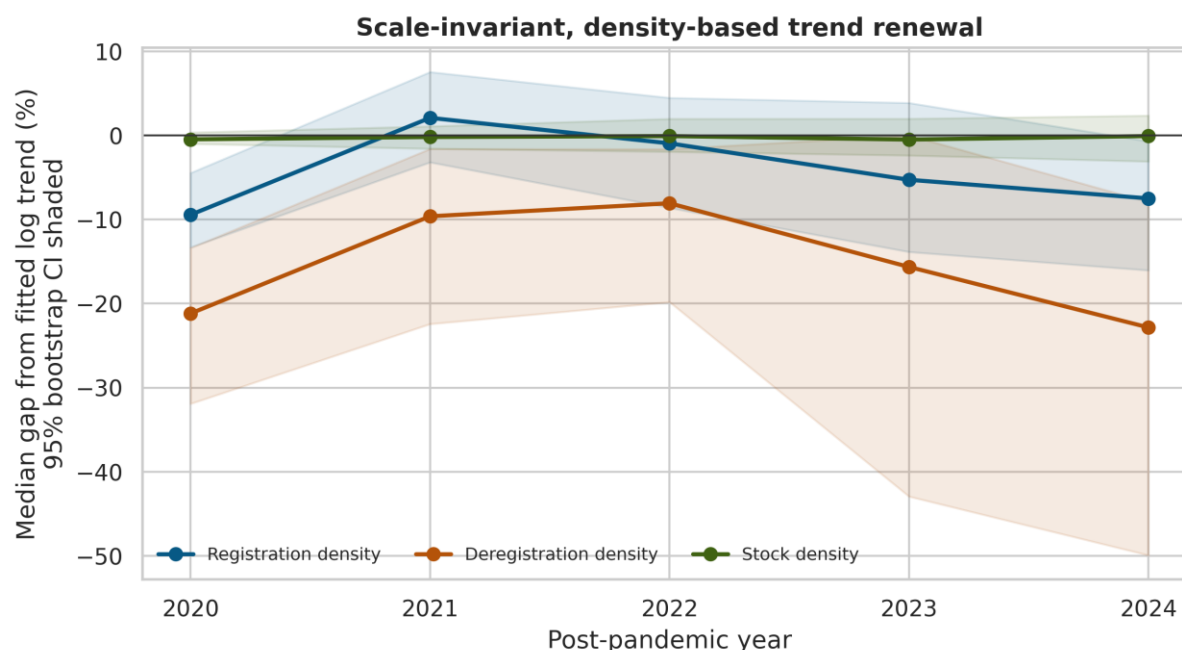
Series	Year	N	Median gap %	95% bootstrap interval	P25	P75
Deregistration density	2020	94	-21.2	[-31.9, -13.4]	-40.9	1.2
Deregistration density	2022	86	-8.1	[-19.8, -1.6]	-52.9	27.7
Deregistration density	2024	76	-22.8	[-49.9, -7.9]	-76.5	22.2
Registration density	2020	135	-9.4	[-13.3, -4.5]	-22.3	2.9
Registration density	2022	126	-1.0	[-8.6, 4.5]	-25.4	19.6
Registration density	2024	111	-7.5	[-16.1, -0.7]	-33.5	28.0
Stock density	2020	92	-0.5	[-1.0, 0.3]	-2.2	1.9
Stock density	2022	82	-0.1	[-2.0, 2.0]	-4.5	4.0
Stock density	2024	72	-0.1	[-3.1, 2.3]	-8.6	6.8

Note. Trends use $\ln(\text{density})$ and positive observations. Eighteen zero deregistration observations remain in descriptive tables but cannot enter log trends. Intervals describe uncertainty in the median across economies.

Entry density stood 9.4% below its fitted path in 2020. It moved slightly above trend in 2021, while the estimates for 2022 and 2023 were inconclusive. Using the 2015-2019 window, the median gap in 2024

was -7.5%, with a 95% interval of [-16.1%, -0.7%]. Deregistration remained below its fitted path. Stock density did not differ clearly from trend.

Figure 4. Scale-invariant, density-based trend renewal



Note. Shaded areas are percentile 95% bootstrap intervals for the cross-economy median; they are not national forecast intervals.

4.4 Robustness and registry coherence

Table 5. Entry-density trend sensitivity

Year	2015-19 gap	95% interval	N	2013-19 gap	95% interval	N
2020	-9.4	[-13.3, -4.5]	135	-9.8	[-13.4, -4.9]	133
2021	2.1	[-3.2, 7.5]	124	2.7	[-2.5, 7.7]	123
2022	-1.0	[-8.6, 4.5]	126	-1.4	[-8.2, 6.0]	124
2023	-5.3	[-13.9, 3.9]	116	-5.2	[-11.3, 3.0]	115
2024	-7.5	[-16.1, -0.7]	111	-8.9	[-17.2, 0.1]	110

Note. The 2019 placebo median entry-density gap is -0.5% with an interval containing zero, supporting short-horizon calibration but not causal identification.

Extending the trend window gives a 2024 entry-density gap of -8.9%, but its interval reaches zero [-17.2%, 0.1%]. The suggestion of incomplete renewal is therefore weak and sensitive to the years used for fitting. Log trends in raw registration counts likewise yield a negative but inconclusive gap for 2024. On the constant density sample, entry remained 18.3% above 2019 in 2024. Changing reporters did not create the observed level rebound.

There is no visible baseline-size pattern in attrition. The 115 economies reporting entry density in 2024 had a median 2019 density of 1.820; the corresponding median for the 27 non-reporters was 2.156 (Mann-Whitney $p = .467$). This test cannot exclude selection on unobserved registry quality. The descriptive group results show more variation. Median entry growth from 2019 to 2022 ranged from 6.9% in high-income economies to 24.3% in low-income economies (income-group omnibus $p = .060$). Across

regions, it ranged from 7.0% in Europe and Central Asia to 34.4% in Sub-Saharan Africa (regional omnibus $p = .035$). Current classifications are used only for description, and the omnibus tests do not locate pairwise differences.

The stock-flow audit covers 1,296 economy-years. The median absolute reconciliation gap is only 0.068% of stock; 78.9% of observations fall within one percentage point and the 90th percentile is 2.82%. Most records are internally close, but the residual gaps show why registrations minus deregistrations cannot be treated as an exact stock identity.

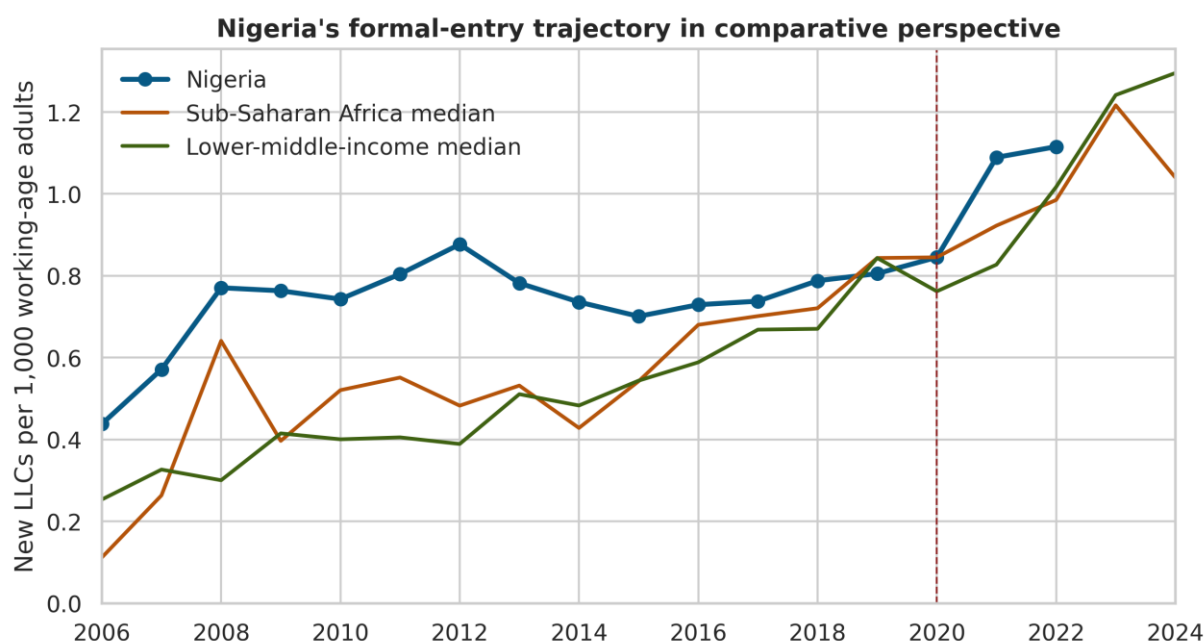
4.5 Nigeria in comparative perspective

Nigeria's entry density increased from 0.805 registrations per 1,000 working-age adults in

2019 to 0.845 in 2020, 1.089 in 2021 and 1.115 in 2022. By 2022 it was above both the Sub-Saharan African median of 1.054 and the lower-middle-income median of 0.918. Against the 2015-2019 log-density path, Nigeria was 1.1% above trend in 2020 and 24.3% above it in 2022. The longer 2013-2019 path produces gaps of 7.8% and 39.5%. Both specifications indicate acceleration, although they disagree about its size.

Nigeria's registered stock rose from 1.522 million in 2019 to 1.620 million in 2020 and lay almost exactly on either fitted path. No stock figure is available after 2020, however, and no comparable deregistration series is reported. The evidence supports resistance and acceleration in formal entry. It cannot establish survival, net firm creation or resilience of the wider ecosystem.

Figure 5. Nigeria's formal-entry trajectory in comparative perspective



Note. The Nigeria series ends in 2022. Offshore centres are excluded from peer medians.

5. Discussion

5.1 What recovered?

The results indicate that recovery must be interpreted with reference to the benchmark

being used. Of the 142 economies observed in both 2019 and 2020, 53 did not experience an initial decline in entry density and are therefore better described as resistant than as recovered. Among the remaining 89 economies, which constitute the recovery cohort, the estimated

proportion returning to the 2019 level reached 50.0% by 2021, 67.1% by 2022 and 76.8% by 2024. These figures show that the post-pandemic rebound was widespread among economies that had declined, but they should not be read as recovery rates for the full cross-country sample.

The matched comparison with the late global financial crisis also qualifies a simple historical narrative. For the same economies observed at all four endpoints, the difference between the two registration contractions is not estimated with sufficient precision to conclude that one shock produced a smaller fall in entry than the other. Deregistration behaves differently: the marked downward shift in 2019-2020 is consistent with reduced administrative visibility of exit during the pandemic period. Insolvency relief, moratoria and interruptions to registry processes offer plausible explanations, but the present design does not permit their individual effects to be identified.

The evidence on trend renewal is less decisive than the evidence on return to the pre-shock level. Under the 2015-2019 fitting window, the median registration gap in 2024 is -7.5% and its interval narrowly excludes zero. When the fitting period is extended to 2013-2019, the estimated gap is -8.9% but the interval includes zero. The reasonable interpretation is therefore that entry levels recovered strongly, while evidence of a complete return to the earlier growth path remains sensitive to the period used to define that path. This distinction is important because a system may regain its previous level without resuming its previous rate of expansion.

Deregistration presents a different picture. Its fall in 2020 contrasts with the late phase of the financial crisis and remains below the fitted path in later observations. This pattern is consistent with evidence that policy support, insolvency moratoria and disrupted administrative processing initially suppressed recorded

bankruptcies and formal exits (OECD, 2021, 2023). It should not be interpreted as proof that distressed firms remained economically active. Similarly, continuing growth in registered stock may indicate persistence on the register as well as genuine survival. The combined evidence therefore supports a distinction between administrative continuity and productive business resilience.

5.2 Contribution to entrepreneurship research

The contribution to entrepreneurship research lies chiefly in separating measures that are often combined in discussion. Resistance, return to baseline, renewal of trend and registry coherence answer different questions about the formal business system. Startup births measure an inflow of registered entities; they do not reveal employment, productivity, survival quality or the adaptive capacity of the wider ecosystem. This distinction is particularly important in emerging economies, where structural gaps, resource constraints and differences in institutional arrangements make direct transfer of ecosystem interpretations from advanced economies problematic (Cao & Shi, 2021). The findings thus support a more disciplined use of business-demography indicators in resilience research.

An LLC registry is not an entrepreneurial ecosystem. Even so, it matters for policy because incorporation provides legal identity, limited liability and access to formal contracting. Efficient registration may support recovery, while weak exit records conceal the quality of that recovery. This narrower interpretation allows business-demography evidence to inform ecosystem research without pretending that registry totals measure networks or productive capability.

5.3 Implications for Nigeria

For Nigeria, the principal implication is the need to improve the measurement of firm continuity before drawing broad conclusions from the rise in registrations. The Corporate Affairs Commission would benefit from stable annual series for registration, deregistration, suspension, restoration and active status, with breaks in definitions and administrative procedures clearly documented. Subject to appropriate legal and data-governance safeguards, anonymised cohort identifiers could also be linked with tax filing, employment and credit records. Such linkage would make it possible to distinguish formal incorporation from firms that proceed to sustained economic activity.

Useful monitoring would follow each cohort after 12, 24 and 36 months and record survival, first employment, tax filing, female ownership and state distribution. Digital incorporation may lower the cost of entry, but productive resilience still depends on finance, electricity, skills and demand. Our results justify continued attention to entry efficiency. They provide no test of those complementary conditions.

6. Limitations and future research

Several limits shape the interpretation. The database covers LLCs, not sole proprietors or informal businesses. Legal deregistration may occur long after economic activity has ceased. Annual national totals hide sector, gender, age and cohort quality. Current regional and income classifications are descriptive groupings rather than historical institutional treatments. Reporting is unbalanced and possibly non-random; comparing baseline density cannot reveal selection on unobserved registry quality. Recovery is observed only at annual intervals, seven declining economies have no post-2020 observation, and Kaplan-Meier estimation

assumes non-informative censoring. Resistance and recovery also depend on operational thresholds, although the main rebound survives alternative definitions. Log trends exclude 18 zero deregistration observations, and short linear paths may project temporary registry reforms into the future. The bootstrap intervals describe cross-economy medians, not national forecast uncertainty or source error. Finally, universal exposure to the pandemic rules out a causal reading of the estimates.

Further work should move to monthly registry microdata, model reporting delay explicitly and connect incorporation cohorts with employment and tax outcomes. Staggered reforms to digital registries may offer better opportunities for causal analysis. For Nigeria, the immediate research need is a linked Corporate Affairs Commission, tax and employment panel. Comparative studies should state offshore exclusions in advance and retain the legal definitions used by each source.

7. Recommendations

First, agencies responsible for company registration should report entry, deregistration and active-stock series on a consistent annual basis and publish clear notes on changes in definitions, administrative procedures and backlogs. This is particularly important where deregistration may be delayed by legal processes or temporary policy measures. Better documentation would improve both national monitoring and cross-country comparability.

Second, policy assessment should not use registration growth as a sufficient indicator of entrepreneurial recovery. Where data permit, registration cohorts should be followed for survival, employment, tax filing and access to finance at regular intervals. In Nigeria, cooperation among the Corporate Affairs Commission and relevant tax, employment and

financial authorities would permit a more reliable distinction between paper incorporation and sustained business activity, provided that legal and data-protection requirements are observed.

Third, future evaluations of entrepreneurial-system resilience should report both level recovery and trend renewal, and should state clearly whether the evidence concerns the formal corporate sector or the wider entrepreneurial ecosystem. This practice would reduce the risk of treating short-term increases in startup births as evidence of durable productive resilience.

8. Conclusion

The study set out to determine whether the post-pandemic rise in company registrations represented a broader recovery in the formal entrepreneurial system or chiefly a rebound in startup births. The evidence shows that formal company creation contracted across both the 2008-2009 and 2019-2020 transitions, but the paired comparison does not provide a firm basis for judging either contraction to be smaller. The post-pandemic rebound in entry levels is much clearer. Among economies observed in 2019 and 2020, 53 resisted the initial decline, while an estimated 76.8% of the 89 economies that did decline had regained the 2019 level by 2024. These results remain broadly intact under the principal checks for sample composition and alternative recovery thresholds.

The evidence is less conclusive when resilience is judged against the earlier trend or against the wider set of registry outcomes. The primary trend specification places 2024 registration density modestly below its pre-pandemic path, but the longer fitting window includes zero. Formal deregistration remains unusually weak, while registered stock continues to rise, a combination that may reflect delayed visibility of exit as well as continuing firm survival. Nigeria records a strong acceleration in

formal entry: its 2022 density exceeds the 2019 level, the relevant peer medians and both fitted paths. However, the absence of a deregistration series and of stock observations after 2020 prevents a broader claim about survival, net firm creation or the resilience of the complete entrepreneurial ecosystem. The central conclusion is therefore that startup births are informative, but they provide a sounder measure of formal renewal when interpreted together with exit, stock, censoring and the quality of registry administration.

Declarations

Funding: This research received no external funding.

Conflict of interest: The authors declare no conflict of interest.

Data and code availability: The raw eighth-edition workbook and methodology are publicly available from the World Bank Entrepreneurship Database. The exact source workbook, analysis code, offshore-exclusion list, processed data, model outputs, validation records and figures used for this article are archived at <https://doi.org/10.5281/zenodo.21709896>.

Ethics: This study uses aggregate economy-year administrative statistics and contains no personal data.

Author contributions: B.K.O., S.S.A. and I.L.M. contributed to the conception of the study, interpretation of the evidence and critical revision of the manuscript. B.K.O. prepared the initial manuscript and coordinated the analysis and revisions. All authors reviewed and approved the final manuscript.

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Appendix A. Exploratory rebound heterogeneity

Table A1. Entry-density change from 2019 to 2022 by income group and region

Dimension	Group	N	Median %	95% bootstrap interval	Omnibus p
Income group	High income	45	6.9	[-0.0, 13.9]	0.060
Income group	Low income	13	24.3	[-2.9, 41.2]	0.060
Income group	Lower middle income	33	22.1	[7.8, 32.1]	0.060
Income group	Upper middle income	39	19.1	[13.3, 30.0]	0.060
Region	EAP	18	10.5	[4.1, 23.4]	0.035
Region	ECA	46	7.0	[0.0, 17.5]	0.035
Region	LAC	17	17.7	[6.6, 55.0]	0.035
Region	MNA	12	14.2	[-27.0, 22.5]	0.035
Region	SSA	33	34.4	[13.6, 39.7]	0.035

Note. Groups with fewer than five economies are omitted. Income groups and regions are descriptive World Bank classifications. Omnibus p-values come from Kruskal-Wallis tests and do not identify pairwise differences.

Appendix B. Reproducibility checklist

Table B1. Reproduction decisions

Item	Decision
Source file	EntrepreneurshipDatabase 8th Edition.xlsx; Firms data sheet.
Exclusion	All 29 economy labels marked with an asterisk as offshore centres.
Name cleaning	Trim leading/trailing whitespace; remove asterisk only after exclusion.
Missingness	Retain reported zeros descriptively; never convert missing observations to zero; no imputation. Log trends require positive values.
Primary statistic	Density per 1,000 working-age adults; unweighted economy median; P25/P75; 4,999-resample percentile bootstrap uncertainty interval.
Paired shocks	Identical economies observed in 2008, 2009, 2019 and 2020; bootstrap within-economy difference in percentage changes.
Trend	ln(density) economy-specific trend, 2015-2019; ≥ 4 positive observations; alternative 2013-2019; ≥ 5 .
Recovery	Classify 2020 resistance first; among decliners, first year regaining baseline; Kaplan-Meier right-censoring with Greenwood intervals.

Thresholds	Decline cut-offs: 0%, -1%, -5%, -10%; recovery targets: 90%, 95%, 100% of 2019 density.
Validation	Constant 2019-2024 sample; 2019 placebo; attrition test; heterogeneity; raw/density comparison; stock-flow audit.
Random seed	20260729.

Note. The archived replication record contains the exact source version, scripts, processed outputs, validation files, figures and README at <https://doi.org/10.5281/zenodo.21709896>.