Beyond Informality: The Importance of Residential-based Business *

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Abstract

Informal businesses operating from homes are typically excluded from traditional enterprise surveys and undelineated in informal sector analysis. We use nationally representative household survey data from Sub-Saharan Africa and original inclusive enterprise panel data from Ghana to show that these "residential-based informal enterprises" (RIEs) constitute a significant share of the economy, exhibit high persistence, and are significantly differentiated across many observable characteristics. Female entrepreneurs disproportionately sort into RIEs, a gap widening with each child. Conversely, male-owned RIEs positively select on observable profit margins. A simple model demonstrates how gender-asymmetric care burdens drive gendered patterns in location choice despite gender-neutral production.

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1 Introduction

Informal enterprises are widely recognized as the backbone of employment and livelihood in low- and middle-income economies (Maloney, 2004, Chen, 2012, La Porta and Shleifer, 2008). Economic research and policy discussions on firms in developing-country contexts have long been structured around the relative importance of and distinction between formal and informal firms (La Porta and Shleifer, 2014, Ulyssea, 2020, Dell'Anno, 2022), with little to no attention paid to *where* these firms operate. Specifically, the canonical informality literature omits the distinction between informal businesses that operate out of the home and those that operate out of more traditionally recognized business premises. In fact, informal businesses operating out of homes are routinely excluded from standard enterprise data collection protocols (Hardy et al., 2025).

This paper establishes "residential-based informal enterprises" (RIEs) as a central and non-transitory part of economic activity in Sub-Saharan Africa. We show that RIEs are more common than their non-residential informal enterprise (NRIE) counterparts according to 46 harmonized nationally representative household surveys from the World Bank Living Standards Measurement Study (LSMS) across 14 countries. We replicate and expand upon this finding with data from an original inclusive enterprise panel study in Aburi, Ghana. Our data collection protocols were explicitly designed to capture "hidden" residential-based businesses in concurrence with a traditional ("visible" structure) enterprise census, by simultaneously randomly sampling and screening households without any business signage. These data reveal that the importance of RIEs extend beyond their ubiquity; RIE sales, profits, and wage payments comprise the majority of output and earnings in our informal sector enterprise sample. A two-year panel follow-up on each identified business in our study shows high levels of persistence and location rigidity; 3 out of 4 RIEs survive, and fewer than 4% of surviving RIEs transition into NRIEs or formal enterprises.

Importantly, RIEs are not well represented by the average NRIE. In our inclusive enterprise data, RIEs produce less output and earnings for owners. RIEs are more marginalized, with their customers coming from much closer in distance, their owners

less likely to be association members and less likely to report formal business savings or mobile money capabilities. RIE owners' households have less overall resources, such as household income, per capita. RIE owners are also more marginalized. They are older, less educated, and more likely to be female than NRIE owners. They are also from households with more children and are more likely to report caring for children while working.

Interestingly, we also discover systematic gendered sorting into RIEs both continentally and locally. The share of RIEs among informal enterprises is higher for female owners than for males in the LSMS data, and this gap increases with each child. This per-child gender gap increase is strongest for children under 5, but robustly exists for any child under 18 years of age. Our inclusive enterprise data produce this same pattern for children under 15 (the only age cutoff available in those data). In contrast, despite the fact that RIEs on average have lower revenues and profits, male-owned RIEs enjoy significantly higher profit margins (measured by profit-to-sales ratio) than male-owned NRIEs, a location premium not detected among female owners. Both gendered location sorting mechanisms by number of children and by profit margin remain robust when evaluated together.

We rationalize this descriptive empirical pattern with a simple household–firm model, where an entrepreneur makes a location choice between RIE and NRIE based on gendered carework responsibilities and a gender-neutral production function. An entrepreneur must fulfill a minimum carework requirement that is exponentially saturating in the number of children and gender-asymmetric. Female entrepreneurs face a higher baseline carework burden and a steeper crowd-out of business time per child due to social norms. Operating an RIE allows for a degree of complementarity where carework time is partially productive when the enterprise is also located at home (through better multitasking). Operating an NRIE offers a direct production output premium (e.g., its visibility provides greater market access to customers), but lower profit margins from sales (due to higher operating costs). Both these productivity parameters vary across individuals but do not differ by gender ex ante. An entrepreneur chooses to operate an RIE if and only if their NRIE profit margin is below a specific threshold. This threshold is increasing in the number of children, significantly faster

for women. The model implies that a male owner's choice to operate an RIE is relatively more sensitive to the profit margin advantage while a female owner's choice to operate an RIE is better predicted by the number of children in her household.

This paper makes three key contributions. First, it documents the scale, persistence, and distinct features of RIE activity in Sub-Saharan Africa. This implies that analyzing informal enterprises without accounting for home-based work (either by excluding them or failing to delineate them (Ulyssea, 2018, McCaig and Pavcnik, 2021, McKenzie and Paffhausen, 2019, Islam and Amin, 2023)) introduces significant measurement bias and/or masks critical within-sector heterogeneity. Recent papers that do include and delineate such firms in data and analysis have indeed found important differences in their insights across groups (Adoho and Doumbia, 2022, Nwaka and Emeagwali, 2024). Our inclusive sampling strategy offers a potentially scalable pathway to consistently include and delineate these residential-based firms in future data collection. Second, this paper advances the literature on gender gaps in microenterprises (De Mel et al., 2009a, Hardy and Kagy, 2018, 2020, Delecourt and Fitzpatrick, 2021). Specifically, we expand on closely related work from Nwaka and Ike (2024), who study a gender gap in the share of RIEs in Nigeria, by documenting continental gender gaps in RIE participation and exploring the mechanisms driving gendered sorting across Sub-Saharan Africa. Third, by incorporating the household composition of the firm owner into the firm owner's optimization problem, this paper adds to a nascent literature acknowledging that small firm production decisions cannot be analyzed in a vacuum of only business characteristics, but require consideration of the embeddedness of the owner within a household structure (Bernhardt et al., 2019, Hardy et al., 2022). We empirically document and model household care burden as a key driver of firm location choice.

The remainder of the paper is organized as follows. Section 2 describes the LSMS data and key variables as well as our inclusive enterprise data collection. Section 3 establishes the scale, persistence, and divergent characteristics of RIEs. Section 4 documents gendered selection into RIEs. Section 5 presents the model that rationalizes previous empirical findings. Section 6 concludes.

2 Data

2.1 Living Standards Measurement Survey Data

We compile a cross-country business-level dataset from 46 LSMS household survey rounds across 14 Sub-Saharan African countries, spanning 2009 to 2023.[1] The LSMS surveys are implemented by the World Bank in collaboration with each country's national statistical office and are designed to produce nationally representative cross-sectional data on households. We use the non-farm enterprise module (whenever available), which enumerates all businesses owned by a member in the household, to construct the business-level data.[2]

For each business, the survey collects detailed information on the location of operation (for example, whether it operates from the household dwelling, a market stall, or a separate fixed premise), and its formalization status (such as registration with tax authorities or other government agencies). Given the design of the survey, we are able to link each business (and owner) to the household roster information. This allows for determination of the gender of the business owner(s) and the number (by age) of people in that owner's household.

2.2 Original Inclusive Enterprise Data

We conduct an original inclusive data collection in Aburi, a peri-urban township in Ghana, with a firm listing and a baseline survey in June-July 2022 and a follow-up in August-September 2024 forming a two-year panel. The listing was designed to onboard all permanent fixed-premise businesses and a representative sample of household-based businesses in this area. This unique combination of fixed premise enumeration

[1] See https://www.worldbank.org/en/programs/lsms for more details about LSMS. Appendix Table A1 provides details on data availability and harmonization. Four country-survey rounds are excluded due to insufficient quality in key variables.

[2] The business-level dataset can be analyzed using the same survey weights provided by the LSMS for household characteristic analysis to produce nationally representative stylized facts, with the caveat that enterprises co-owned across multiple households may be over-represented. Hardy et al. (2025) provide analysis suggesting this sampling weight issue is not a key concern. Although mobile businesses are effectively represented in the enterprise data available in LSMS, we drop them from the main analysis in this paper in accordance with the limitations of our original enterprise data and leave expanded analysis of this business category to future work.

and household-based business enumeration allows us to capture a more complete picture of the enterprise landscape that traditional enterprise survey approaches miss. We divide the Aburi township's 10.81 square kilometers into 43 enumeration areas, each varying from 0.01 to 1.35 square kilometers based on structure density.[3] Each enumerator was assigned to one of these enumeration areas, started at a randomly determined spot, and proceeded to canvas the entire map area in a snake-like pattern.[4]

Three structure types were approached during listing: (1) every non-residential business structure, (2) every household with signage of a business, and (3) every fifth household without signage.[5] When approaching (1) non-residential structures and (2) households with signage, we surveyed every business owner that operated a business in this location. When approaching (3) households without signage, we surveyed only resident owners who operate businesses within their households[6] or as mobile businesses. With each sampled owner, we inquire about every business they own in Aburi and ask them to identify the primary business if more than one.[7]

The listing identified 1,704 businesses in operation as of May 2022 for which owners anticipated operating for at least one month in the next six months.[8] After excluding 209 mobile businesses,[9] the analysis sample comprises 1,495 businesses, including 1,280 businesses operating in a non-residential business structure or a household with signage for business, and 215 businesses operating within households without any signage. These businesses are owned by 1,409 owners. This leads to an overall estimated

[3] A map of Aburi and the enumeration areas is shown in Appendix Figure A1.

[4] This portion of the fieldwork was conducted as part of a class at New York University Accra. A random subset of enumerators had a randomly-matched student shadow on any given listing day.

[5] Any business identified via unsigned household approaches is thus up-weighted by a factor of 5 in analysis.

[6] A business is operated within the household if the sales process happens within the household location. Business owners that produce goods within a household and then bring them to a non-residential location for sale, are considered a non-residential business owners within our study. In Aburi, there are no specific market days. Our sampling strategy covers all marketplaces.

[7] About 7% of listed owners operated more than one business, and about 2% of listed firms are co-owned by more than one owners. A careful de-duplication exercise was conducted at the end of the data collection to randomly keep only one co-owner's responses for the co-owned enterprise outcomes, and the choice of response kept does not impact any findings presented in the paper.

[8] We also initially identified six private schools, but drop them from the study because private school operations differ categorically from typical businesses.

[9] It remains challenging to sample mobile business owners symmetrically across origin and destination locations given the nature of mobile businesses. Our sampling approach includes resident owners operating mobile businesses outside of Aburi, while omitting those residing outside of Aburi but operating mobile businesses within Aburi.

number of 2,355 businesses and 2,197 owners in Aburi as of May 2022 after applying sampling weights. The follow-up in August-September 2024 tracked the operational status and structure type of 99.6% of all originally identified businesses.[10]

In both baseline and follow-up rounds, we collect key firm outcomes for every business, and more detailed information for the primary business. We define the formality of a firm as being registered with any government agency.[11] We follow De Mel et al. (2009b) in our measurement of profits and sales, which is consistent regardless of firm location. We measure formality, sales, profits, and wage bills for all businesses, and main products, average customer distance (in walking minutes), assets, financial inclusion, and business integration for primary businesses only. We also measure detailed personal and household outcomes. For firm owners, we measure their age and education background at baseline, income sources across both rounds, and caregiving practices at their primary place of work in the follow-up round. We also inquired about owner household composition across both rounds, including the number of children aged 15 or below, as well as household income and liquidity levels. We follow Hardy et al. (2022) in our measures of household income and liquidity.

3 The Importance of Residential Business

3.1 Scale of RIE

RIEs form a quantitatively important component of the economy across many countries in Sub-Saharan Africa. Figure 1(a) displays the share of RIE, NRIE, and formal enterprises across our 46 LSMS enterprise samples. The LSMS data imply that RIEs account for approximately half of all enterprises represented and are also the largest category out of the three for the majority of country-years (constituting 30-70% of all

[10]For the 4.9% of businesses for which owners did not complete the follow-up survey, we recorded observational operational status and location. For the 3.1% of firms we observed to be operational but for which owner did not complete a follow-up, we assume their formality status remains unchanged.

[11]Government institutions and authorities listed by owners include Ghana Revenue Authority, Ghana Enterprise Agency, Ministry of Works and Housing, Registrar General's Department, and District Assembly.

represented firms).[12]

Our inclusive enterprise data shows a similar pattern, where RIEs account for 39% of all businesses and 60% of informal businesses analyzed in our sample (Figure 1(b)).[13] These data also provide more detailed business information to support the importance of RIEs beyond count. RIEs account for over a quarter of total sales (27%) and profits (28%) and pay around a fifth (19%) of wages for non-owner workers at enterprises in our study sample. This is of slightly higher magnitude than NRIEs, which contribute 26%, 27%, and 17% of total sales, profits, and wages, respectively.[14]

3.2 Persistence of RIE

Operating an informal business in a residential location is far from a transitory choice. Over the two-year panel, around 80% of firms in our original sample remain open (Figure 1(c)). The survival rate for RIEs is 74%, which is only modestly lower than that of NRIEs and formal firms.[15]

Conditional on firm survival, we also observe very little switching in our sample across locations and formality. RIEs are particularly rigid. Only about 2% of RIEs transition into NRIEs over the 2-year panel. NRIEs are more likely than RIEs to formalize (about 6% vs. 1%) and formal firms are more likely to fall back to NRIEs than RIEs (3% vs. 1%).[16]

[12]The prominence of RIEs is especially, though not only, true for businesses owned by women (Appendix Figure A2). Their prominence is also not impacted by the inclusion of mobile businesses, whether for the gender-pooled or the gender-disaggregated analysis (Appendix Figures A3 and A4).

[13]This pattern is also consistent across all four industry categories represented by the inclusive enterprise data. RIEs constitute the majority of the informal sector across professional, manufacturing, and retail enterprises and close to half of informal service enterprises within our sample (Appendix Figure A5). Interestingly, RIEs and NRIEs sell very similar products according to reports of the main product sold by owners. The top 5 products/services among RIEs are food, clothes, charcoal, drinks, and hair services. The top 5 products/services among NRIEs are food, clothes, drinks, snacks, and hair services.

[14]The economic importance of RIEs is again especially true for female-owned firms in our sample (Appendix Figure A6(a)) but not insignificant for male-owned firms either (Appendix Figure A6(b)).

[15]Similar patterns are observed in both genders, despite male-owned firms generally being more likely to survive (Appendix Figure A7).

[16]Note that, although mobile businesses are omitted from our original sample (and baseline categories) due to concerns about accurate representation from our sampling protocols, we include the mobile business category in the follow-up panel analysis and find limited switching to this category from all baseline firm categories considered.

3.3 Delineation of RIE

RIEs are not well represented by NRIEs. That is, the average RIE, its owner, and their household, are significantly different from the average NRIE, owner, and household. Table 1 summarizes difference tests between RIEs and NRIEs represented in our inclusive enterprise data across a myriad of observable owner, household, and business characteristics.[17] Owners are categorized across RIE and NRIE by their primary business category.[18]

RIE owners (in Panel A) are more often female (92% versus 79% of NRIE owners) and more often report performing carework at their businesses (56% versus 46%). They are around two years older and report half a year less of education, on average. RIE households (in Panel B) are larger, with slightly more children. RIE households (in Panel B) are also poorer, measured by household income per capita or total income from other household members, though owners report similar amounts of liquidity per capita (a measure of access to emergency funds through personal savings and broader network support).

RIEs (in Panel C) post lower sales and profits and are less financially included, with lower levels of mobile money usage and lower likelihood of having savings account for the business. RIEs have been operational for a slightly shorter period of time (although not statistically significant) than NRIEs. RIEs also face lower market access compared to NRIEs, as evidenced by serving a smaller average customer radius and being less integrated with other owner networks, with their owners less likely to belong to business associations.

[17] Appendix Tables A2 and A3 report tests for differences between RIEs and NRIEs across a fuller set of owner and household characteristics, as well as a fuller set of primary-business and enterprise-level characteristics, respectively. These tables also include tests for differences between the formal and the informal sectors.

[18] There are no RIE owners that also own an NRIE in our sample. Ownership of a second business is rare and operating outside one's primary business category is exceedingly rare, with only a few NRIE owners also owning a formal firm. Having any alternative income to primary business profits (from paid work, other businesses, or farming) is also uncommon and does not differ meaningfully between RIEs and NRIEs.

4 Gendered Sorting into RIE

4.1 The Role of Household Composition in Enterprise Sorting

Owning an RIE is robustly predicted by household composition. Considering only informal firms, Table 2 shows how owning an RIE is related to owner gender and the number of children in a household in the LSMS data. The outcome variable equals one if the firm is located in a residential location (RIE), and is regressed on the owner's gender, number of children in the owner's household, and the interaction of the two. Standard errors are clustered at the household level. We define a household member as a child by three age thresholds. The results show that female entrepreneurs with no children at home are about 9-12 percentage points more likely to operate RIEs compared to men (whose RIE share is 40 percent), and the gender gap survives the inclusion of country and year fixed effects (Columns (2), (4) and (6)).

The gender gap in RIE share widens with each additional child, and it widens faster with younger children. Each additional child under 18 is associated with roughly a 1 percentage point higher probability of RIE operation for male owners, and an additional 1.8 percentage points for female owners. Lowering the child age cutoff makes the female gradient steeper. For a female owner, each additional child under 5 years old increases the likelihood of having an RIE by 4.6 percentage points. We strongly reject the null that number of household children does not predict RIE ownership for female owners across all child age cutoffs.

We re-estimate this gender-childcare interaction specification in our inclusive enterprise data and find consistent results. Column (1) of Table 3 reports owner gender, number of children under 15, and their interaction as predictors of RIE status. Standard errors are clustered at the owner level. Female owners with no children are 16 percentage points more likely to operate RIEs than men without children. This gender gap also widens with each additional child under the age of 15.[19]

[19]Due to the lack of a complete household roster, we cannot further distinguish children's age in the inclusive enterprise data.

4.2 Observable Firm Productivity and Enterprise Sorting

The inclusive enterprise data has detailed firm performance measures, allowing us to evaluate the role of firm profit margin in shaping location choices. Column (2) of Table 3 shows the interaction of firm profit margin and owner gender as predictors of RIE status. The coefficient for profit margin is positive and significant for male owners, indicating that more profitable male-owned enterprises are more likely to operate from home. For female owners, we cannot reject the null that profit margin does not predict RIE status. The positive coefficient for male-owners is close to fully offset by a negative gender interaction coefficient of similar magnitude. This pattern remains robust when including the gender-childcare interaction.[20]

5 A Model of Business Location Choice

To rationalize these patterns documented in our empirical results, we develop a static model where an informal enterprise owner chooses between operating from the household (RIE) and a dedicated non-residential premise (NRIE) to maximize profits, subject to gendered carework constraints in an otherwise gender-neutral environment. Our model depicts how gender-neutral production and cost functions can still produce gender gaps in location decisions and other business outcomes due to gender differences in household care burdens.

5.1 Model Setup

Carework Time Requirement and Business Time Availability Each owner i has business time availability $l_i \geq 0$ remaining after a carework time requirement $c_i \geq 0$ is deducted from a unit time endowment ($l_i = 1 - c_i$). The required carework time c_i is determined by the owner's gender $g_i \in \{f, m\}$ and number of children n_i in their

[20]This pattern is also not driven by differences in industry composition between RIE and NRIE owners. Appendix Table A4 re-estimates the specifications in Table 3 with industry fixed effects included. The coefficients on profit margin and its interaction with owner gender remain economically and statistically similar.

individual household:

$$c_i \equiv c_g(n_i) \;=\; 1 - \phi_g \, e^{-\lambda_g n_i} \tag{1}$$

We assume $0 \leq \phi_f < \phi_m$ (females face a higher baseline carework requirement) and $\lambda_f > \lambda_m \geq 0$ (each additional child increases female carework time faster). This gender asymmetry reflects two empirically documented social norm patterns in low-income settings: (i) allocating a higher general household care burden to women (e.g., cooking, cleaning, and other daily maintenance tasks) regardless of number of children, and (ii) assigning primary caregiving responsibility to women, so each additional child raises a mother's obligatory carework more than a father's (Jayachandran, 2021). Figure 2(a) plots this relationship between the number of children n_i, business time l_i, and carework requirement c_i, showing that male owners always have more business time available than female owners regardless of the number of children, and this gap increases exponentially in the number of children.

Revenue Possibilities by Location The business revenue that can be produced with remaining business time availability (after an individual's carework time requirement is met) is not directly gendered, but instead depends on the business location $s \in \{0, 1\}$, where $s = 0$ denotes operating an RIE and $s = 1$ an NRIE. Define the revenue for owner i with location choice s:

$$Y(l_i, \delta_i; s) \;=\; \frac{1}{1 - \delta_i s}\big(l_i + \rho(1 - s)(1 - l_i)\big) \tag{2}$$

where $\rho \in (0, 1)$ represents the unique home-production benefit through which carework time is also productive at an RIE (as owners are better able to multitask business operation during carework),[21] and $\delta_i \in (0, 1)$ denotes each owner's individual production advantage from operating an NRIE (e.g., better market access with a permanent commercial structure). Here $1/(1 - \delta_i)$ can be viewed as the NRIE production

[21] Note that we are making a few simplifying assumptions here that do not impact the key insights of the model. The assumption of zero multitasking at NRIE locations is somewhat stylized for simplicity. We acknowledge that previous literature (Delecourt and Fitzpatrick, 2021) suggest that such multitasking is also possible at NRIE locations, though our empirical results in Table 1 suggest less so than at RIEs. We are also assuming the labor input elasticity is 1. We extend the model to capture varying elasticity in Appendix B and the main implications remain qualitatively the same.

efficiency multiplier.

Profit Possibilities by Location The business profits generated from business revenue are also location-specific:

$$\Pi(l_i, \delta_i, \kappa_i; s) = (1 - \kappa_i s) Y(l_i, \delta_i; s) \tag{3}$$

with each individual owner's $\kappa_i \in (0, 1)$ capturing the increased cost of operating an NRIE, as a proportion of revenue, relative to operating an RIE (including location-related explicit and implicit costs).[22] Denote $m_i = 1 - \kappa_i$ as the NRIE profit margin (i.e., profits over sales).[23]

The Owner's Location Decision Problem Each owner i chooses their optimal location s_i that maximizes profits given gender-neutral parameters n_i, δ_i, κ_i, gender-specific parameters ϕ_g and λ_g, and universal parameter ρ. The profit maximization problem implies productivity parameter thresholds at which owners will switch between NRIE and RIE locations. For example, there exists an NRIE profit margin threshold $\bar{m}_i$, below which the owner will choose to operate an RIE:

$$\bar{m}_i \equiv \bar{m}(n_i, \delta_i; \lambda_g, \phi_g) = (1 - \delta_i) \left(\frac{\rho}{\phi_g e^{-\lambda_g n_i}} + (1 - \rho) \right) \tag{4}$$

Intuitively, for a profit margin $m_i < \bar{m}_i$, the cost of maintaining a business premise and of giving up the home co-production benefit outweighs the market-access advantage of operating an NRIE.

[22] For example, firms with more visibility may attract resource-extracting stakeholders (Nason et al., 2024, Huang et al., 2019).

[23] Note that this simplified functional form implies profits and sales are the same for an RIE, which has a benchmark profit margin level of one, higher than the owner's NRIE alternative. This model assumption is qualitatively consistent with the empirical result that RIEs on average have higher profit margins than NRIEs (Appendix Table A3). In Appendix B we relax this assumption to allow for a non-zero cost share for RIEs and show that the main implications hold.

5.2 Model Implications

Sorting by Household Composition The model has implications for the observed relationship between owners' location choices and their household composition. Because the NRIE profit margin threshold increases with the number of children, the share of owners whose profit margins meet the threshold is lower for owners with more children. This is consistent with our finding in the inclusive enterprise data that RIE owners have more children (Table 1).

The model also rationalizes the findings from Tables 3 and 2 that female owners are disproportionately more likely to be RIE, even with no children, and that this gender gap in RIE ownership widens with each additional child. This is because rhe NRIE profit margin threshold is increasing in the carework requirement, driven simultaneously by the number of children n_i, the baseline care requirement $1 - \phi_g$ and the child burden multiplier λ_g:

$$\frac{\partial \bar{m}_i}{\partial n_i} = (1 - \delta_i) \frac{\rho}{\phi_g e^{-\lambda_g n_i}} \lambda_g > 0 \tag{5}$$

$$\frac{\partial \bar{m}_i}{\partial \lambda_g} = (1 - \delta_i) \frac{\rho}{\phi_g e^{-\lambda_g n_i}} n_i > 0 \tag{6}$$

$$\frac{\partial \bar{m}_i}{\partial \phi_g} = -(1 - \delta_i) \frac{\rho}{\phi_g e^{-\lambda_g n_i}} \frac{1}{\phi_g} < 0 \tag{7}$$

We plot the $\bar{m}$ surface over various combinations of number of children n and production efficiency $1/(1-\delta)$ in Figure 2(b), by gender. For female owners, the threshold is generally higher, more affected by the number of children, and less rapidly decreasing in production efficiency than for male owners.

Sorting by Profitability Regardless of the owner's gender, the model generates a location gap in revenue and profit between RIEs and NRIEs, consistent with Table 1. Additionally, because female owners have generally higher NRIE profit margin thresholds than their male counterparts, the average ex post (observed) female NRIE owner profit margin will be higher and closer to the RIE benchmark of one. On the other hand, male owners will switch to NRIEs at lower profit margin thresholds, meaning

the ex post (observed) profit margins among male-owned NRIEs will be well below the benchmark RIE profit margin.

To approximate the ex post gendered location choices implied by our model, we simulate 1,000,000 owners' decision problems and plot the implied location choices for different levels of number of children n_i and NRIE profit margin draws $m_i = 1 - \kappa_i$ for both female and male owners in Figure 2(c).[24] The simulated share of RIE increases in the number of children, and is more pronounced among female owners; the share decreases in NRIE profit margin draws, and is more pronounced among male owners. These simulation results are consistent with our findings in the inclusive enterprise data. While we only observe owners' realized location choices, Columns (2) and (3) in Table 3 show that the realized profit margins among male RIEs are well above that of the male-owned NRIEs on average, consistent with the simulation results. This positive RIE-NRIE margin gap for women is compressed relative to men.

6 Conclusion

By documenting the prevalence, persistence, and distinctive nature of residential-based informal enterprises (RIEs), this paper challenges a foundational, and often implicit, assumption in the enterprise and development literature: that informal businesses form a largely homogeneous class of non-residential micro-units separable from their owner and owner household characteristics. The empirical patterns established across both LSMS data for 14 countries and our inclusive two-year panel in Aburi, Ghana, demonstrate that residential business location is neither an incidental operational detail nor a temporary survival strategy. Instead, residential-based business location represents a sustained decision that fundamentally shapes business performance and is shaped by household demographic constraints. As peri-urban areas across the Global South expand rapidly, municipal policies often enforce strict zoning separation between commercial hubs and residential zones. Investigating how urban infrastructure, local market accessibility, and neighborhood-level digital integra-

[24] Each owner faces idiosyncratic draws of the market-access advantage $\delta_i \sim U(0,1)$ and the cost share $\kappa_i \sim U(0,1)$, independent of one another and of (g_i, n_i).

tion (e.g., mobile money, localized e-commerce platforms) reduce the "market-access penalty" for residential firms represents a crucial area for future spatial development research and policy.

For female owners, our analysis suggests that the residential location is a persistent equilibrium response to non-market constraints. The positive productivity selection observed only among male RIE owners highlights a stark contrast in how men and women leverage residential space. For male-owned firms, operating from home acts primarily as a low-overhead, margin-maximizing strategy. For female owners, residential operation is often a necessary spatial compromise driven by high childcare burdens that offset potential revenue gains from market-center locations. Future experimental work should directly evaluate whether subsidized, high-quality community or center-based childcare enables female RIE owners to either transition into higher-yielding non-residential locations, or reallocate uninterrupted hours to home-based production, thereby closing the productivity-margin gap.

To properly contextualize our findings, several analytical boundaries given current data availability should be noted. Standard enterprise surveys that rely on visible street-level listings systematically miss a majority of female-owned, home-based businesses. LSMS and other household sampling-based datasets are unique in their inclusion of RIEs. However, while our LSMS analysis establishes cross-national stylized facts across Sub-Saharan Africa, these data do not typically allow for systematic tracking of enterprises over time and provide a very limited insight into the details of enterprise production and costs. Our inclusive enterprise panel allows for such tracking over time and deepened analysis through an expanded set of enterprise observables, but is limited as of now to a single context. Future research must expand and innovate on cost-effective and scalable sampling methodologies (such as household-based screening) to prevent RIE data gaps in enterprise datasets and allow for future RIE analysis at a truly global scale.

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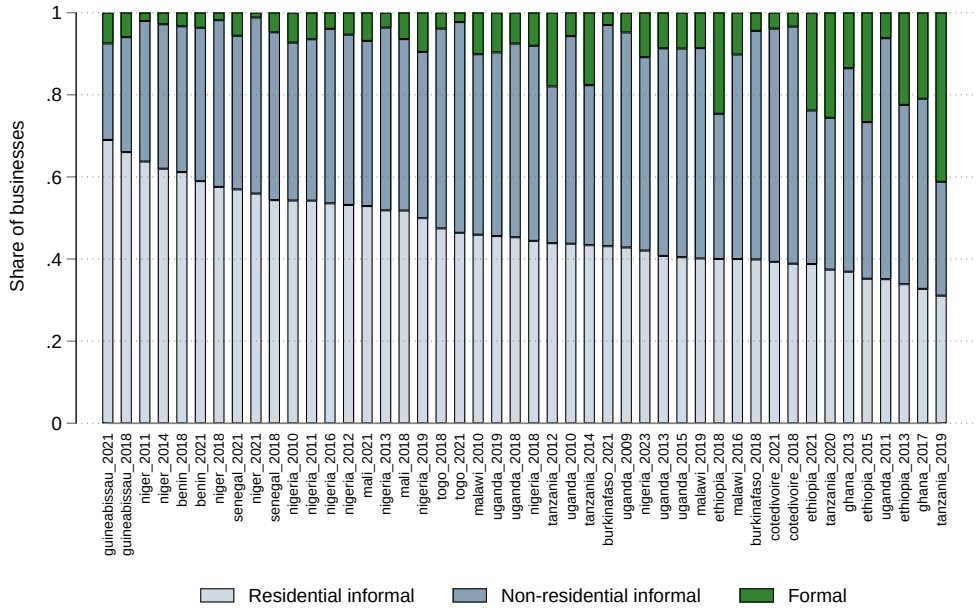
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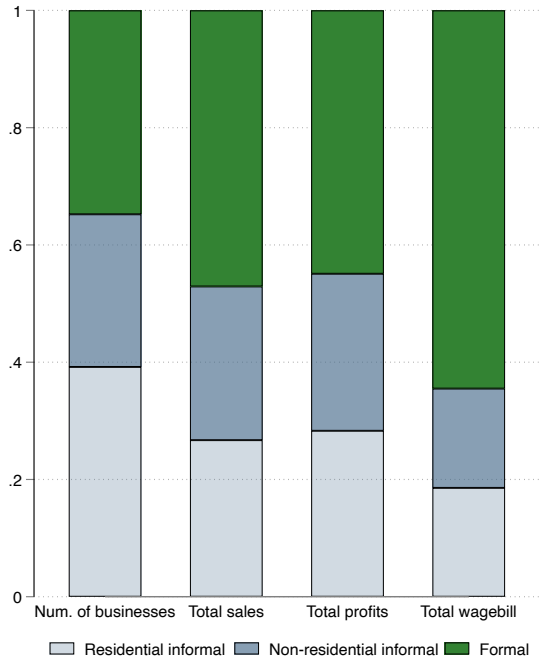
Figures

Figure 1: The Scale and Persistence of Enterprise Formality and Location

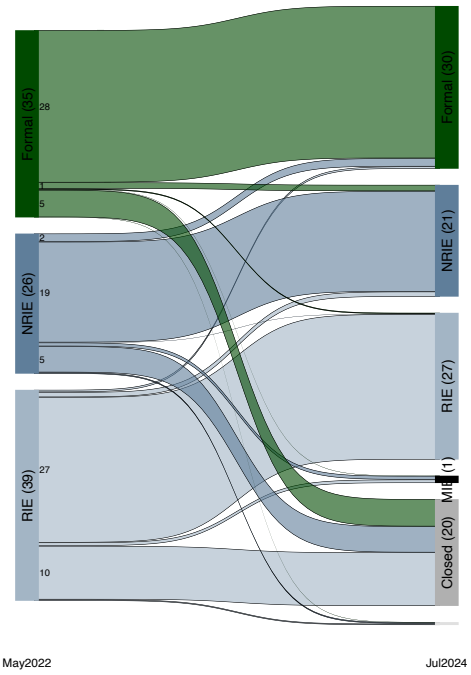
(a) Share of Enterprises across Sub-Saharan Africa (LSMS)



(b) Share of Economic Activity



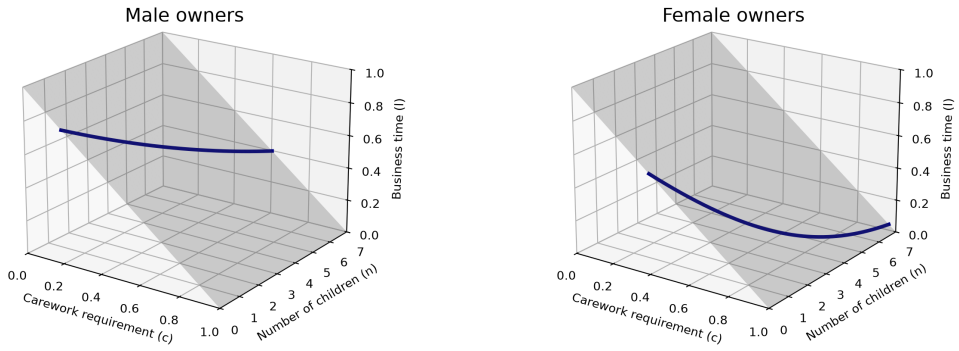
(c) Persistence of Formality and Location



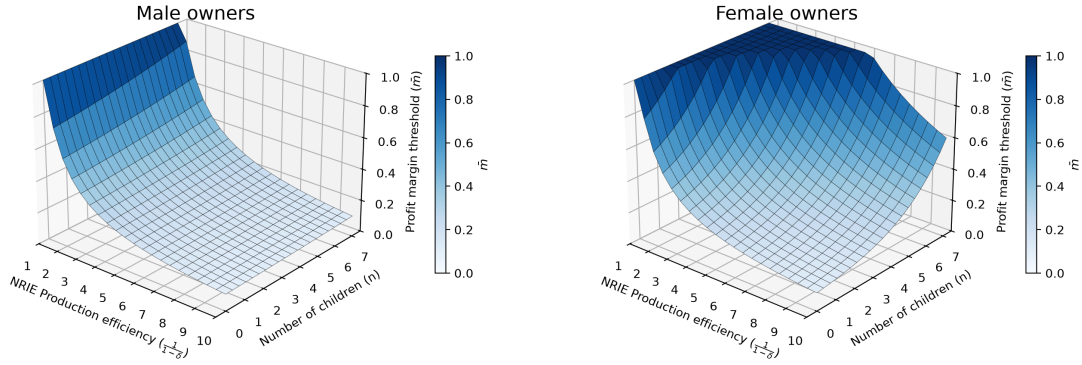
Notes: *"Formal"* firms are defined as being registered with a central or local government authority. **Panel (a)** shows the share of firms according to available nationally representative household survey (LSMS) data from Sub-Saharan Africa by country and year, with relevant survey weights applied; mobile firms are excluded. **Panels (b)** and **(c)** show the share and persistence, respectively, of economic activity in Aburi, Ghana, as of May 2022 and through July 2024, according to our inclusive enterprise data. Top 1% of sales, profits and wage bill are winsorized. Mobile businesses identified in May 2022 are excluded. Firms identified through households without signage are weighted by 5; otherwise by 1. *RIE*, *NRIE* and *MIE* in Panel (c) represent informal enterprises in residential locations, non-residential locations, and unfixed locations, respectively.

Figure 2: Model Implied Gender Gaps

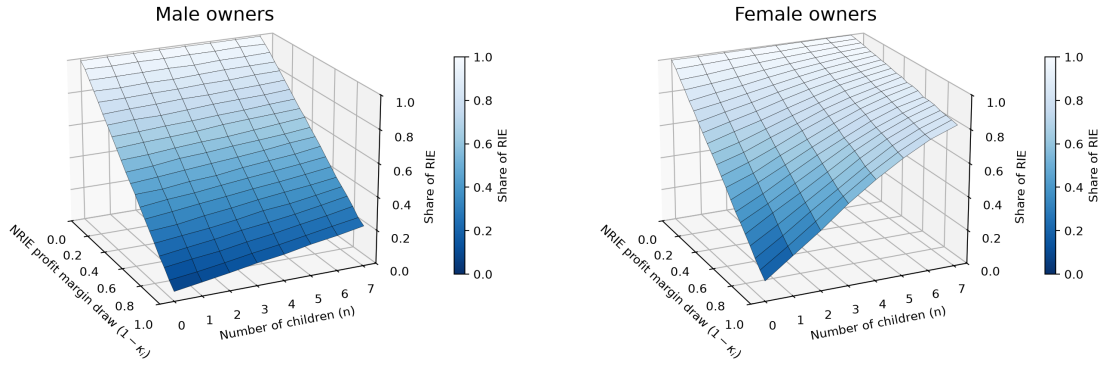
(a) Business and Carework Time Allocation by Gender



(b) Profit Margin Threshold $\bar{m}$ by Gender



(c) Simulated Share of RIEs by Gender



Notes: The figures are based on a gender-neutral parameter $\rho = 0.2$ and a set of gendered carework parameters $(\phi_f, \phi_m, \lambda_f, \lambda_m) = (0.6, 0.8, 0.4, 0.1)$. **Panel (a)** plots the time allocation between carework and business operation determined by the number of children in a household. **Panel (b)** plots the profit margin threshold $\bar{m}$ surface. An owner with an NRIE profit margin m_i below the surface will choose to operate an RIE, and vice versa. **Panel (c)** shows the simulation results of the realized share of owners choosing to operate a business at home (RIE) among informal business owners within each gender. We simulate 1,000,000 observations with 50% male and 50% female. The cost share κ and market advantage δ each follows an independent uniform distribution between 0 and 1. The number of children (n) is drawn between 0 and 7 with equal probability.

Tables

Table 1: Informal Enterprise Characteristics by Location in Inclusive Enterprise Data

	Informal			
	All (1)	RIE (2)	NRIE (3)	Difference (2) - (3)
Panel A: Owner Characteristics				
Female	0.87	0.92	0.79	0.13***
Owner education	8.75	8.53	9.07	-0.54*
Owner age	45.27	46.30	43.74	2.56**
Has non-business income	0.03	0.03	0.04	-0.01
Has any other business	0.06	0.06	0.07	-0.01
Has a bus. outside primary bus.category	0.00	0.00	0.00	-0.00
Any carework	0.52	0.56	0.46	0.10**
Panel B: Household Characteristics				
Married	0.42	0.38	0.47	-0.09**
Household size	3.83	4.09	3.43	0.66**
Number of kids	1.87	2.04	1.61	0.44**
Household income p.c.	456.59	390.64	561.71	-171.08***
Household liquidity p.c.	272.88	261.60	290.87	-29.27
Other household income	649.43	581.01	751.40	-170.39***
Panel C: Primary Business Characteristics				
Sales	1613.15	1313.33	2061.02	-747.69***
Profits	467.97	386.82	589.41	-202.59***
Customer distance	53.90	40.59	73.68	-33.08***
Years of operation	8.92	8.39	9.71	-1.32
Business association	0.15	0.12	0.18	-0.06**
Accepts mobile money payments	0.39	0.35	0.45	-0.10**
Has savings	0.29	0.26	0.34	-0.08**

Notes: *RIE* and *NRIE* represent informal enterprises in residential locations and non-residential locations, respectively. *Owner age* and *Owner education* are measured in completed years. *Has non-business income* is an indicator that the owner has non-zero income from wage jobs, agriculture, or any other sources, on top of income earned from their business(es). *Has any other business* is an indicator that the owner operates at least one secondary business in addition to the primary business. *Has a bus. outside primary bus. category* indicates the owner operates at least one secondary business in a different formality and location category from the primary business. *Any carework* indicates the owner cared for any child at the business premises. *Household income p.c.* is the total monthly income received by all adults in the business owner's household, including wages, business profits, agriculture income, and income from other sources, divided by the household size. *Household liquidity p.c.* is the total amount of money the business owner could mobilize urgently in a typical week, divided by the household size. *Other household income* is the total monthly income of all other adult household members. *Business association* is an indicator that the owner belongs to a trade or business association. *Has savings* is an indicator that the business uses a savings account. *Customer distance* is measured using walking minutes. *Sales*, *Profits*, *Household liquidity* and *Household income* and *Other household income* are measured in Ghanaian Cedis and their top 1% values are winsorized. Firms identified through households without signage are weighted by 5; otherwise by 1. Mobile businesses are excluded from the sample. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table 2: Selection into Residential Informal Enterprises in Sub-Saharan Africa

	(1)	(2)	(3)	(4)	(5)	(6)
Female	0.096***	0.092***	0.092***	0.089***	0.119***	0.116***
	(0.011)	(0.011)	(0.011)	(0.011)	(0.009)	(0.009)
Children under 18	0.010***	0.009***				
	(0.002)	(0.002)				
Female × Children under 18	0.018***	0.018***				
	(0.003)	(0.003)				
Children under 15			0.009***	0.008***		
			(0.003)	(0.003)		
Female × Children under 15			0.022***	0.023***		
			(0.003)	(0.003)		
Children under 5					0.008	0.005
					(0.006)	(0.006)
Female × Children under 5					0.046***	0.047***
					(0.007)	(0.007)
Year FE	No	Yes	No	Yes	No	Yes
Country FE	No	Yes	No	Yes	No	Yes
Observations	127,024	127,024	127,022	127,022	127,024	127,024
Pr > F (Children for Female)	0.00	0.00	0.00	0.00	0.00	0.00
Mean Residential (Male)	0.402	0.402	0.402	0.402	0.402	0.402

Notes: The outcome variable in all columns is an indicator that the owner's primary business is operated in a residential location. The sample includes all informal primary businesses with a non-missing business location; mobile businesses are excluded. Columns (1) and (2) measure children in the owner's household as the number under 18, columns 3 and 4 as the number under 15, and columns 5 and 6 as the number under 5. Even-numbered columns include country and year fixed effects; odd-numbered columns include no fixed effects. "Pr > F (Children for Female)" is the *p*-value of the test that the total effect of children for female owners, the child main effect plus the female-by-child interaction, equals zero. "Mean Residential (Male)" is the weighted share of male-owned businesses operated in a residential location in the estimation sample. The data pool 46 country-year LSMS surveys from 14 Sub-Saharan African countries (2009–2023). All regressions are weighted by LSMS survey sampling weights, and standard errors are clustered at the household level. *p< 0.10, **p< 0.05, ***p< 0.01.

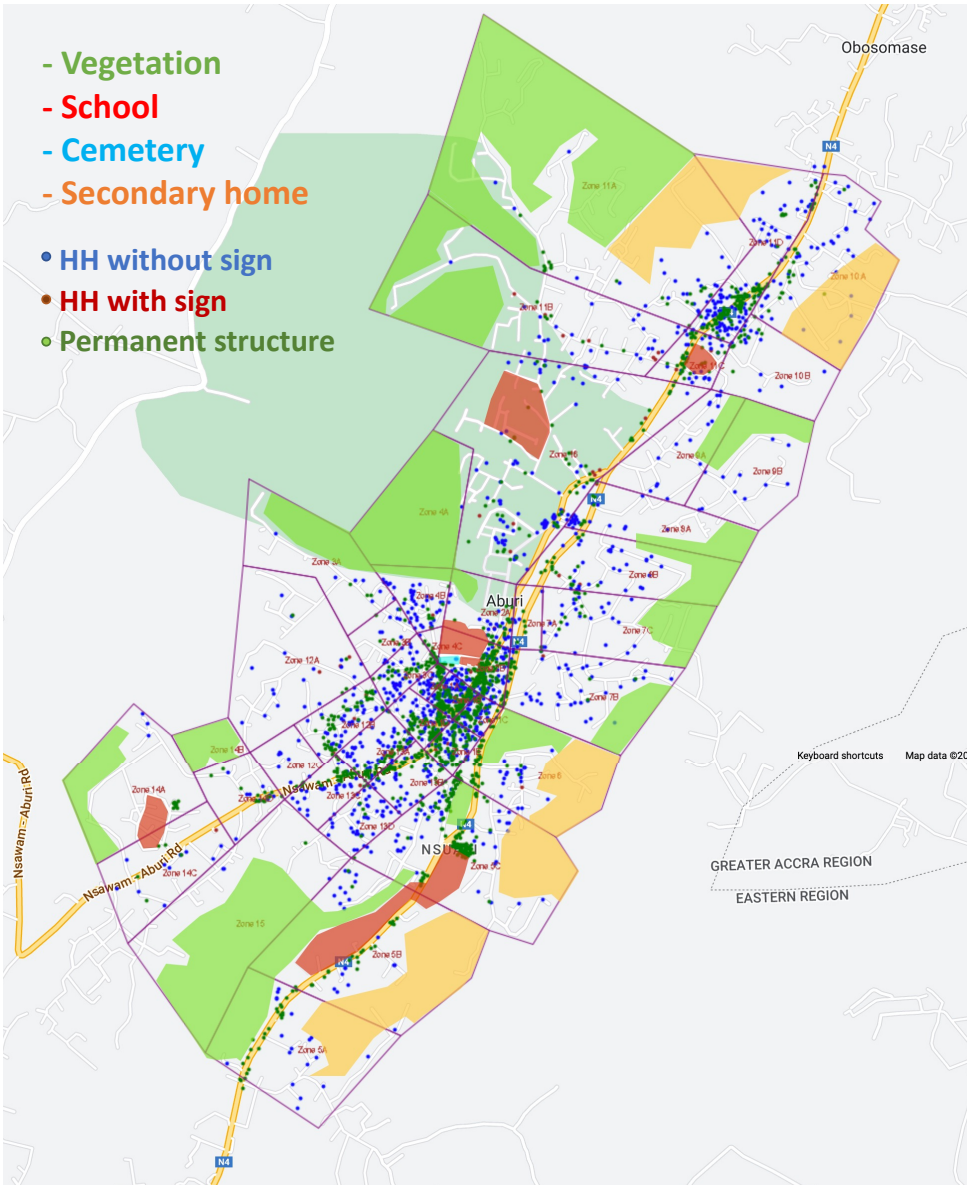
Table 3: Selection into Residential Informal Enterprises in Inclusive Enterprise Data

	(1)	(2)	(3)
Female	0.162*	0.536***	0.449**
	(0.0850)	(0.183)	(0.189)
Children under 15	-0.0345		-0.0478*
	(0.0333)		(0.0256)
Female × Children under 15	0.0611*		0.0735***
	(0.0342)		(0.0268)
Profit Margin		0.785**	0.844**
		(0.386)	(0.365)
Female × Profit Margin		-0.671*	-0.740*
		(0.406)	(0.387)
Observations	758	743	743
Mean Residential (Male)	0.37	0.37	0.37
Pr > F (Children under 15 for Female)	0.00		0.00
Pr > F (Profits Margin for Female)		0.37	0.42

Notes: The outcome variable in all columns is an indicator that the owner's primary business is operated in a residential location. The sample includes all informal primary businesses in Aburi; mobile businesses are excluded. Column 1 is unconditional. Columns 2 and 3 are conditional on non-zero sales in May 2022. "Children under 15" is the number of children in the owner's household that are of 15-years old or younger. "Profit margin" is the ratio between profits and sales, where top 1% of sales and profits are winsorized. "Pr > F (Children under 15 for Female)" is the p-value of the test that the total effect of children for female owners, i.e., the child main effect plus the female-by-child interaction, equals zero. "Pr > F (Profit-Margin for Female)" is the p-value of the test that the total effect of profit margin for female owners, i.e., the profit margin main effect plus the female-by-profit-margin interaction, equals zero. "Mean Residential (Male)" is the weighted share of male-owned businesses operated in a residential location in the estimation sample. All regressions are weighted by the survey sampling weights (where firms identified through households without signage are weighted by 5; otherwise by 1), and standard errors are clustered at the owner level. *p< 0.10, **p< 0.05, ***p< 0.01.

A Appendix: Figures and Tables

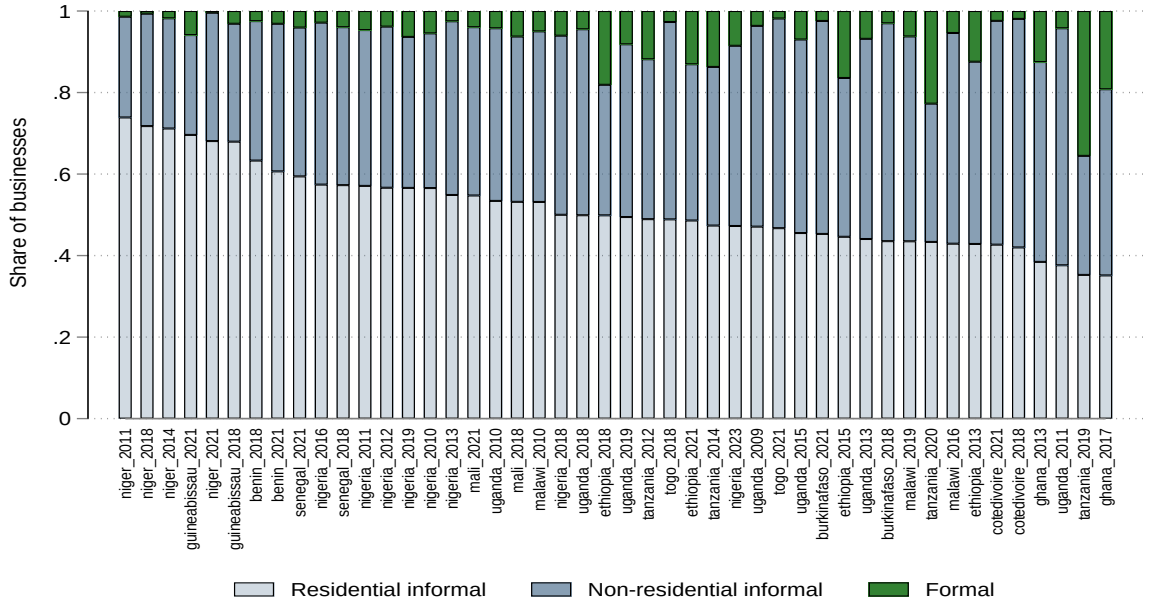
Figure A1: Map of Enumeration Areas Covered in Inclusive Data Collection



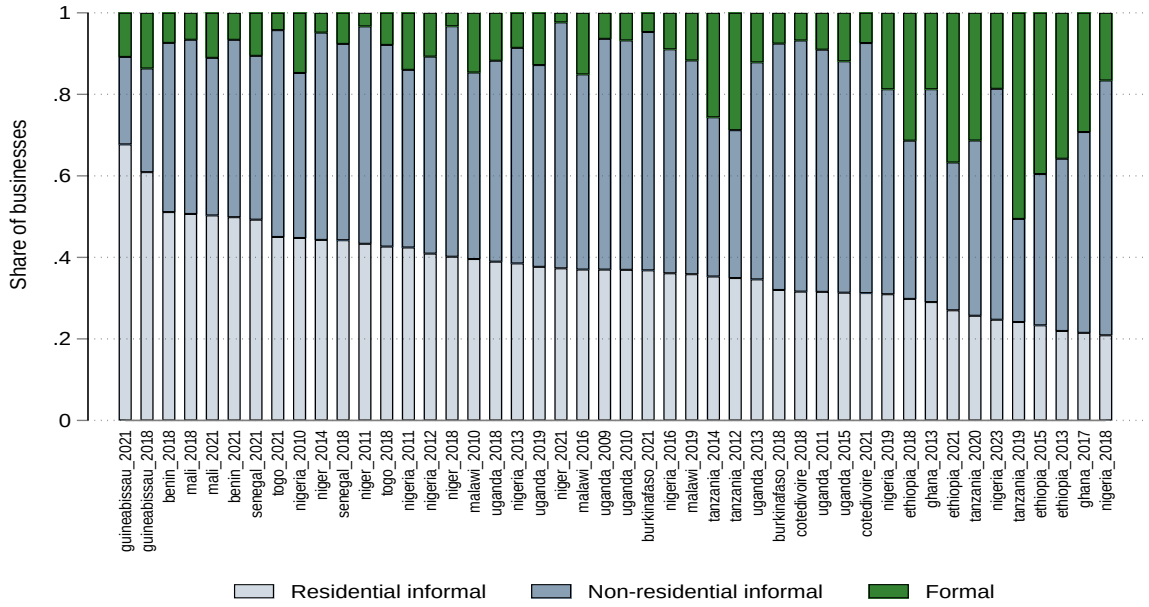
Notes: This map shows the enumeration areas in Aburi, Ghana. Polygons show the enumeration zones and dots indicate all structures approached during the firm listing exercise, by type. Blue dots represent household structures without signage for businesses, brown dots represent households with signs and green dots represent permanent business premises. Note that some of the approached household structures without signage may not have any owners residing in the household. Shaded polygons indicate the types of land without structures to be approached, where green correspond to vegetation, red for school zones, cyan for cemeteries, and orange for secondary holiday houses that are not regularly occupied.

Figure A2: Share of Enterprises across Sub-Saharan Africa (LSMS), by Gender

(a) Female-Owned Enterprises

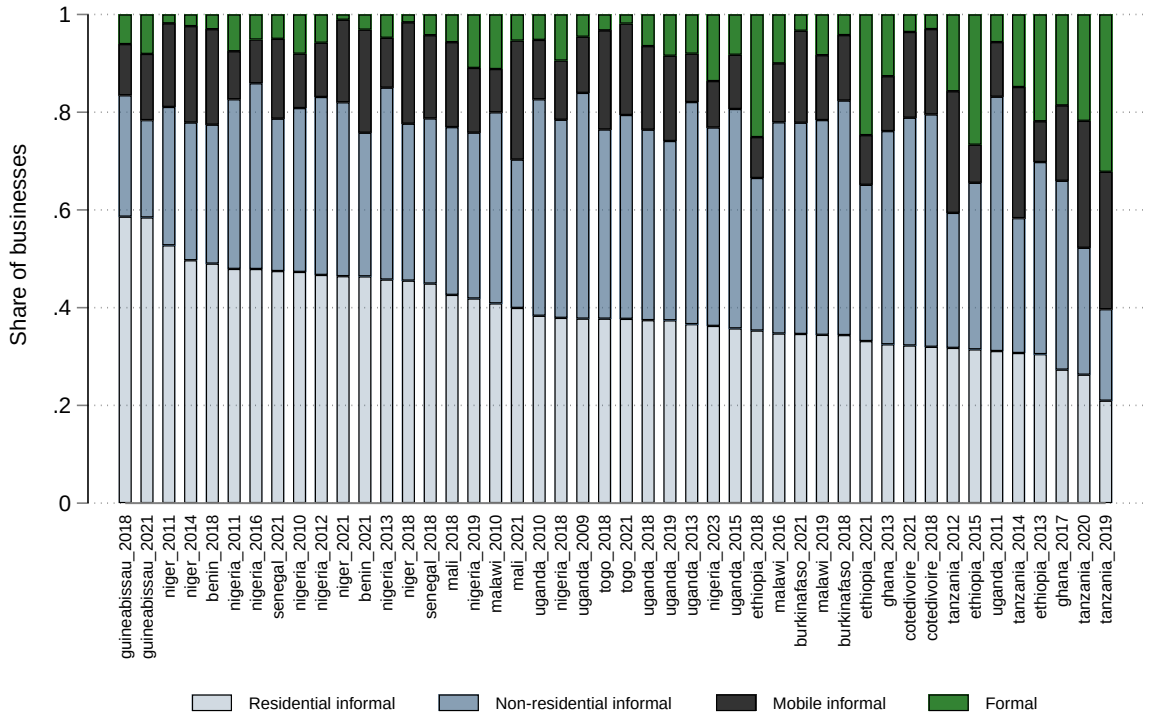


(b) Male-Owned Enterprises



Notes: *"Formal"* firms are defined as being registered with a central or local government authority. **Panel (a)** shows the share of firms with at least one female owner according to available nationally representative household survey (LSMS) data from Sub-Saharan Africa by country and year, with relevant survey weights applied; mobile firms are excluded. Sample covers 46 country-years across 14 countries, 2009–2023. **Panel (b)** shows the corresponding share of only male-owned firms.

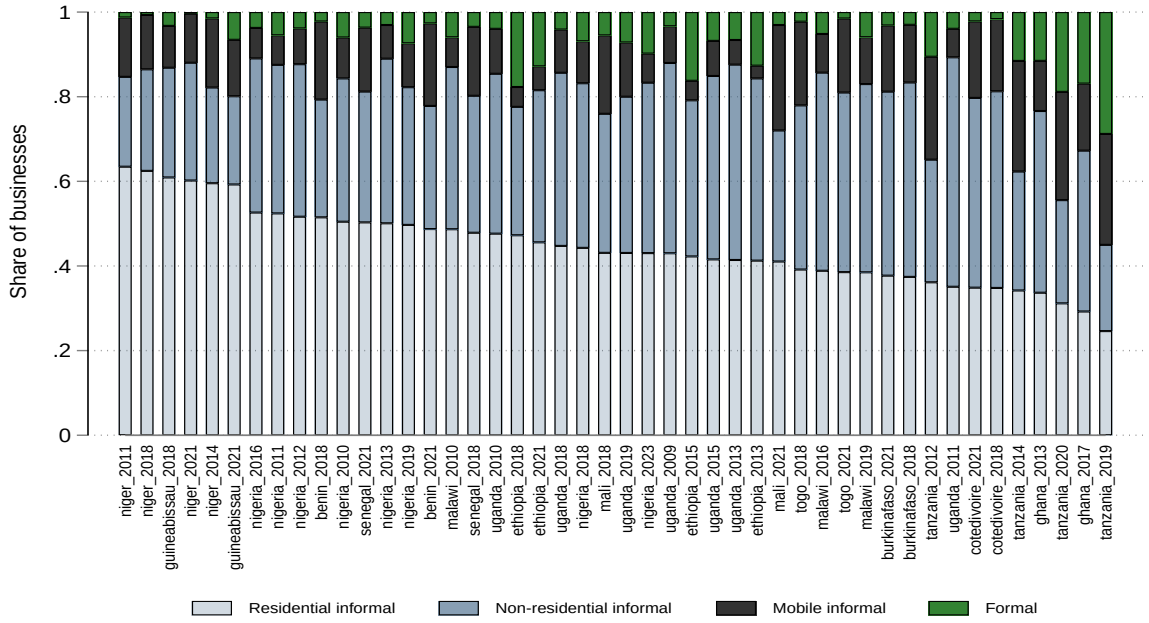
Figure A3: Share of Enterprises across Sub-Saharan Africa (LSMS) including Mobile Businesses



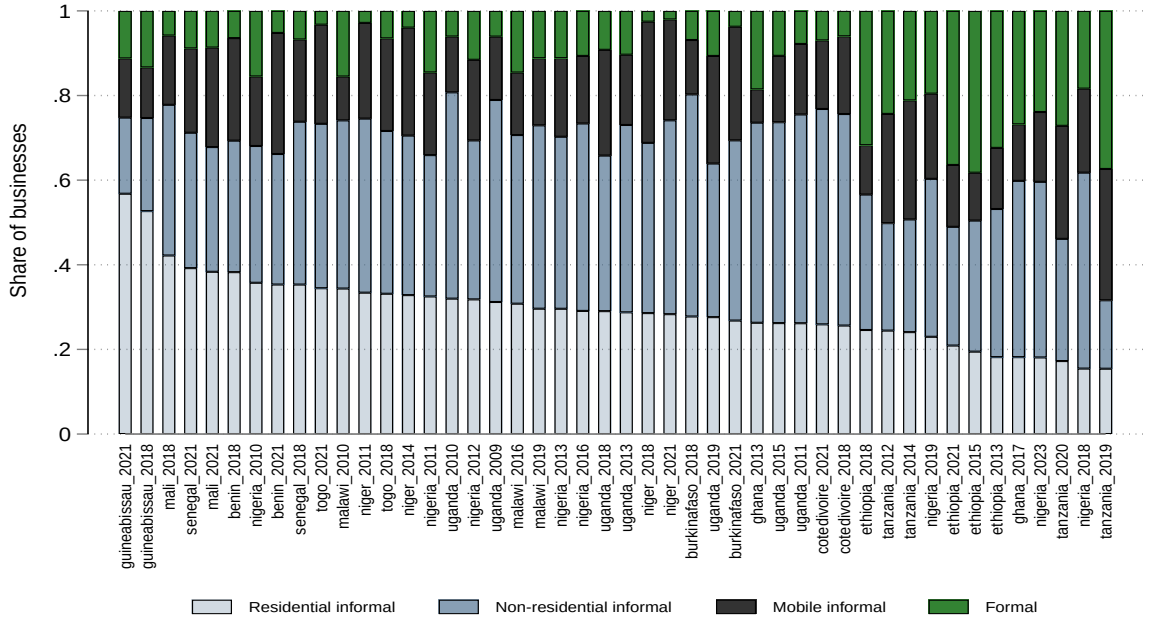
Notes: *"Formal"* firms are defined as being registered with a central or local government authority. *"Mobile"* firms are included in the analysis and have no fixed location. The few firms that are both mobile and formal are counted in the *"Formal"* category. The figure shows the share of firms according to available nationally representative household survey (LSMS) data from Sub-Saharan Africa by country and year, with relevant survey weights applied. The sample covers 46 country-years across 14 countries, 2009–2023.

Figure A4: Share of Enterprises across Sub-Saharan Africa (LSMS) including Mobile Businesses, by Gender

(a) Female-Owned Enterprises

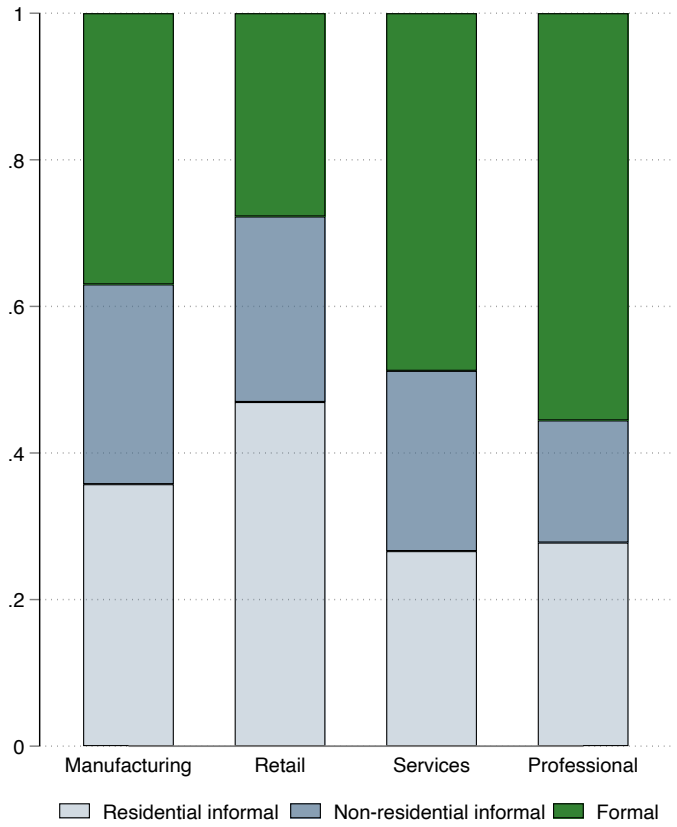


(b) Male-Owned Enterprises



Notes: *"Formal"* firms are defined as being registered with a central or local government authority. *"Mobile"* firms are included in the analysis and have no fixed location. The few firms that are both mobile and formal are counted in the *"Formal"* category. **Panel (a)** shows the share firms with at least one female owner according to available nationally representative household survey (LSMS) data from Sub-Saharan Africa by country and year, with relevant survey weights applied. The sample covers 46 country-years across 14 countries, 2009–2023. **Panel (b)** shows the corresponding share of only male-owned firms.

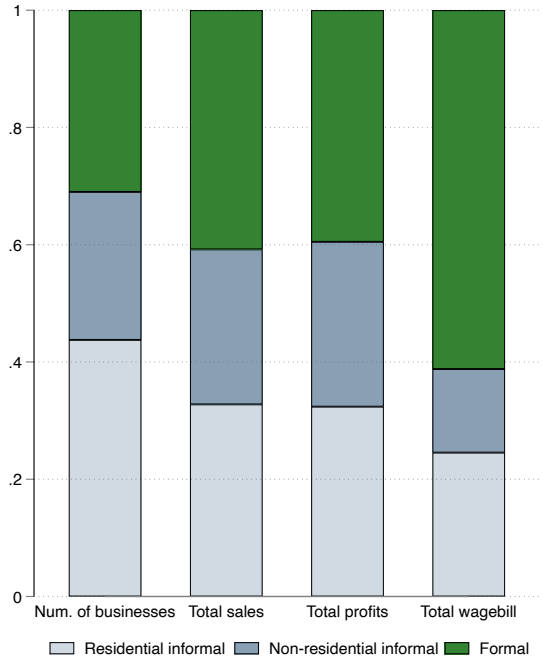
Figure A5: Share of Businesses in Inclusive Enterprise Data, by Industry



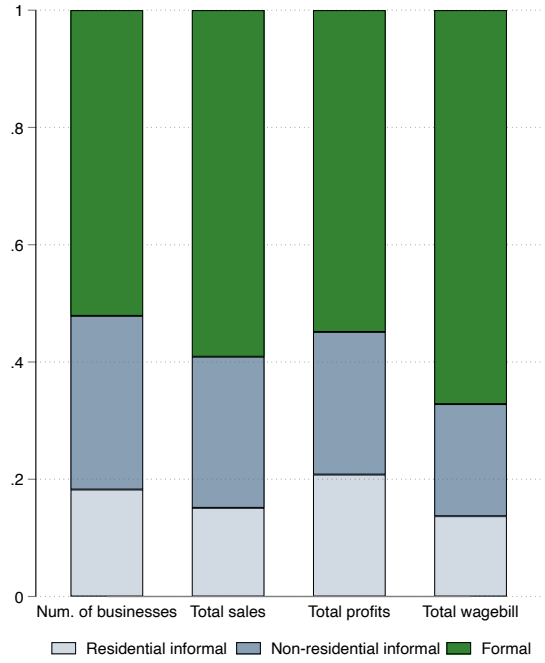
Notes: *"Formal"* firms are defined as registered with a central or local government authority. This figure shows the share of sampled firms in our inclusive enterprise data collection by formality and location, across the four industries represented by this sample. Firms identified through households without signage are weighted by 5; otherwise by 1. Mobile businesses are excluded.

Figure A6: Share of Economic Activity in Inclusive Enterprise Data, by Gender

(a) Female-Owned Enterprises



(b) Male-Owned Enterprises

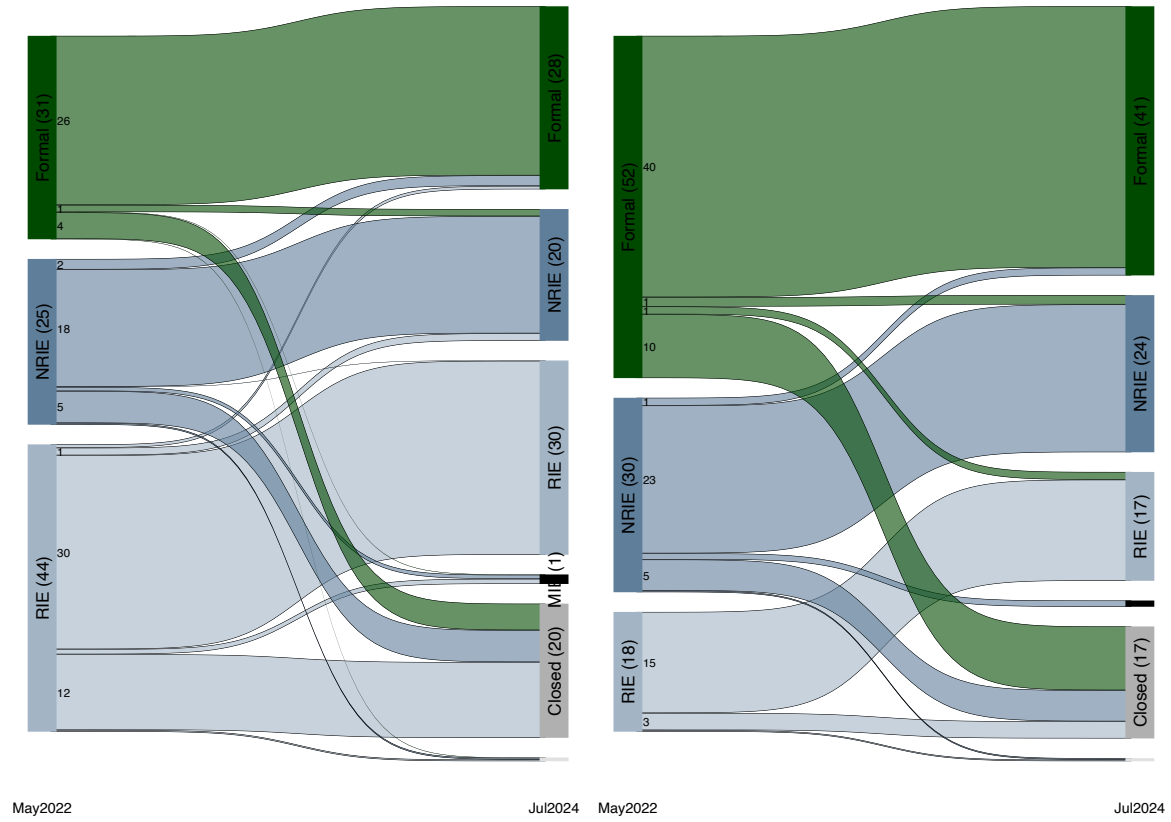


Notes: *"Formal"* firms are defined as registered with a central or local government authority. **Panel (a)** shows the share of female-owned firms, by formality and business location in our inclusive data collection in Aburi. Firms identified through households without signage are weighted by 5; otherwise by 1. Mobile businesses are excluded. **Panel (b)** shows the corresponding share of male-owned firms. Only five firms are co-owned by owners of both genders. As we randomly keep one owner's response for enterprise outcomes, this leads to three of these firms classified as female-owned and two as male-owned.

Figure A7: Persistence of Formality and Location in Inclusive Enterprise Data, by Gender

(a) Female-Owned Enterprises

(b) Male-Owned Enterprises



Notes: *"Formal"* firms are defined as registered with a central or local government authority. Among informal firms, *"RIE"* operate from the home, *"NRIE"* from fixed premises outside the home, and *MIE* have no fixed location. *"Closed"* refers to businesses that were no longer operational as of July 2024. *Missing* observations reflect owner refusals during the follow-up survey and the observational survey on operational status. **Panel (a)** shows the share of female-owned firms that closed or transitioned across groups between May 2022 and July 2024, by formality and business location. Firms identified through households without signage are weighted by 5; otherwise by 1. Mobile businesses identified in May 2022 are excluded. **Panel (b)** shows the corresponding share of male-owned firms. Only five firms are co-owned by owners of both genders. As we randomly keep one owner's response for enterprise outcomes, this leads to three of these firms classified as female-owned and two as male-owned.

Table A1: List of Enterprise Data Sources for Sub-Saharan Africa (LSMS)

Country	Year	Country	Year
Benin	2018	Nigeria	2010
Benin	2021	Nigeria	2011
Burkinafaso	2018	Nigeria	2012
Burkinafaso	2021	Nigeria	2013
Cote divoire	2018	Nigeria	2016
Cote divoire	2021	Nigeria	2018
Ethiopia	2013	Nigeria	2019
Ethiopia	2015	Nigeria	2023
Ethiopia	2018	Senegal	2018
Ethiopia	2021	Senegal	2021
~~Ghana~~	~~2009~~	~~Tanzania~~	~~2008~~
Ghana	2013	~~Tanzania~~	~~2010~~
Ghana	2017	Tanzania	2012
Guinea bissau	2018	Tanzania	2014
Guinea bissau	2021	Tanzania	2019
~~Liberia~~	~~2018~~	Tanzania	2020
Malawi	2010	Togo	2018
Malawi	2016	Togo	2021
Malawi	2019	Uganda	2009
Mali	2018	Uganda	2010
Mali	2021	Uganda	2011
Niger	2011	Uganda	2013
Niger	2014	Uganda	2015
Niger	2018	Uganda	2018
Niger	2021	Uganda	2019

Notes: This table lists the available LSMS data for Sub-Saharan Africa for 2008 - 2023. Countries and years shown with strike-throughs correspond to data sources with insufficient quality in one or more key variables, which resulted in their exclusion from the main analysis. Specifically, country-years lacking location information (Ghana 2009) or formality information (Tanzania 2008 and 2010) are excluded. Liberia 2018 was a survey specifically focused on forestry and is excluded from the analysis. Our analysis data set consists of 46 LSMS household survey rounds across 14 Sub-Saharan African countries, spanning 2009 to 2023.

Table A2: Owner and Household Characteristics by Formality and Location

	All	Formality status			Informal firms		
	Mean (1)	Informal (2)	Formal (3)	Difference (2) - (3)	RIE (4)	NRIE (5)	Difference (4) - (5)
Panel A: Owner Characteristics							
Female	0.82	0.87	0.73	0.13***	0.92	0.79	0.13***
Owner education	9.40	8.75	10.59	-1.84***	8.53	9.07	-0.54*
Owner age	45.20	45.27	45.06	0.21	46.30	43.74	2.56**
Has non-business income	0.04	0.03	0.05	-0.02	0.03	0.04	-0.01
Has any other business	0.07	0.06	0.07	-0.01	0.06	0.07	-0.01
Has a bus. outside primary bus.category	0.01	0.00	0.03	-0.03***	0.00	0.00	-0.00
Any carework	0.47	0.52	0.39	0.13***	0.56	0.46	0.10**
Has a wage job	0.01	0.01	0.01	0.00	0.02	0.01	0.01
Number of businesses	1.07	1.07	1.08	-0.01	1.07	1.07	-0.00
Has any formal business	0.36	0.00	1.00	-1.00***	0.00	0.01	-0.01**
Has any residential business	0.39	0.60	0.01	0.59***	1.00	0.01	0.99***
Has any non-residential business	0.27	0.40	0.03	0.37***	0.00	1.00	-1.00
Owner hours	50.54	47.75	55.61	-7.86***	45.21	51.53	-6.33***
Panel B: Household Characteristics							
Married	0.48	0.42	0.58	-0.16***	0.38	0.47	-0.09**
Household size	3.77	3.83	3.67	0.15	4.09	3.43	0.66**
Number of kids	1.79	1.87	1.65	0.22	2.04	1.61	0.44**
Number of adults	1.98	1.96	2.03	-0.07	2.05	1.82	0.23
Number of females	0.93	0.92	0.95	-0.03	0.99	0.82	0.17
Number of males	1.05	1.03	1.08	-0.04	1.06	1.00	0.06
Number of girls	0.92	0.96	0.84	0.12	1.06	0.83	0.23**
Number of boys	0.87	0.90	0.80	0.10	0.99	0.78	0.20*
Household income p.c.	536.80	456.59	688.58	-231.99***	390.64	561.71	-171.08***
Household liquidity p.c.	320.71	272.88	411.53	-138.65***	261.60	290.87	-29.27
Other household income	729.30	649.43	874.47	-225.04***	581.01	751.40	-170.39***

Notes: *"Formal"* firms are defined as being registered with a central or local government authority. *RIE* and *NRIE* represent informal enterprises in residential locations and non-residential locations, respectively. *Owner age* and *Owner education* are measured in years. *Has non-business income* is an indicator that the owner has non-zero income from wage jobs, agriculture, or any other sources, on top of income earned from their business(es). *Has any other business* is an indicator that the owner operates at least one secondary business in addition to the primary business. *Has a bus. outside primary bus. category* is an indicator that the owner operates at least one secondary business in a different formality and location category from the primary business. *Any carework* is an indicator that the owner cared for any child at the business premises. *Has a wage job* is an indicator that the owner has a wage job. *Owner hours* is the number of hours that the owner worked in the primary business in a typical week. *Household size* is the number of adults and children in the household, including the owner themselves. *Household income p.c.* is the total monthly income received by all adults in the business owner's household, including wages, business profits, agriculture income, and income from other sources, divided by the household size. *Household liquidity p.c.* is the total amount of money the business owner could mobilize urgently in a typical week, divided by the household size. *Other household income* is the total monthly income of all other adult household members. *Household liquidity*, *Household income* and *Other household income* are measured in Ghanaian Cedis and their top 1% values are winsorized. Firms identified through households without signage are weighted by 5; otherwise by 1. Mobile businesses are excluded. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A3: Firm-level Characteristics by Formality and Location

	All	Formality status			Informal firms		
	Mean	Informal	Formal	Difference	RIE	NRIE	Difference
	(1)	(2)	(3)	(2) - (3)	(4)	(5)	(4) - (5)
Panel A: Primary Firm Characteristics							
Sales	2025.31	1613.15	2776.35	-1163.20***	1313.33	2061.02	-747.69***
Profits	551.53	467.97	703.48	-235.51***	386.82	589.41	-202.59***
Profit-to-Sales Ratio	0.36	0.37	0.34	0.03***	0.38	0.35	0.03*
Wagebill	124.89	69.54	225.94	-156.40***	63.88	77.96	-14.07
Assets	7304.88	4481.70	12446.86	-7965.16***	2726.32	7090.12	-4363.80***
Has any workers	0.11	0.06	0.19	-0.13***	0.05	0.08	-0.02
Number of workers	0.45	0.26	0.81	-0.55***	0.21	0.33	-0.12**
Years of operation	9.85	8.92	11.54	-2.61***	8.39	9.71	-1.32
Business is co-owned	0.03	0.02	0.04	-0.02**	0.01	0.04	-0.03***
Business association	0.22	0.15	0.36	-0.21***	0.12	0.18	-0.06**
Has savings	0.38	0.29	0.54	-0.25***	0.26	0.34	-0.08**
Has a loan	0.09	0.08	0.11	-0.03*	0.08	0.07	0.00
Accepts mobile money payments	0.49	0.39	0.67	-0.28***	0.35	0.45	-0.10**
Customer distance	69.60	53.90	98.20	-44.30***	40.59	73.68	-33.08***
Industry							
Retail	0.40	0.44	0.32	0.12***	0.49	0.38	0.11**
Services	0.11	0.09	0.14	-0.06***	0.07	0.11	-0.04
Manufacturing	0.48	0.46	0.51	-0.05	0.43	0.50	-0.07
Professional	0.02	0.01	0.02	-0.01	0.01	0.01	-0.00
Panel B: Firm Characteristics							
Sales	1972.56	1599.73	2672.52	-1072.79***	1339.91	1993.51	-653.60***
Profits	556.21	469.91	717.93	-248.01***	400.47	575.33	-174.86***
Profit-to-Sales Ratio	0.36	0.37	0.34	0.03***	0.38	0.35	0.03**
Has any workers	0.24	0.16	0.40	-0.24***	0.15	0.19	-0.04
Number of workers	0.43	0.24	0.77	-0.53***	0.20	0.32	-0.12**
Years of operation	9.63	8.72	11.34	-2.62***	8.19	9.53	-1.34*
Industry							
Retail	0.40	0.45	0.32	0.13***	0.48	0.39	0.09**
Services	0.11	0.08	0.15	-0.07***	0.07	0.10	-0.03
Manufacturing	0.48	0.46	0.51	-0.05	0.43	0.50	-0.06
Professional	0.02	0.01	0.02	-0.01	0.01	0.01	0.00

Notes: *"Formal"* firms are defined as being registered with a central or local government authority. *RIE* and *NRIE* represent informal enterprises in residential locations and non-residential locations, respectively. *Business association* is an indicator that the owner belongs to a trade or business association. *Has savings* is an indicator that the business uses a savings account. *Has a loan* is an indicator that the business has a loan outstanding. *Customer distance* is measured using walking minutes. *Sales*, *Profits*, *Wagebill* and *Assets* are measued in Ghana cedis, and their top 1% values are winsorized. The sample includes primary businesses (Panel A) and all businesses (Panel B) owned by sampled owners in Aburi. Firms identified through households without signage are weighted by 5; otherwise by 1. Mobile businesses are excluded. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.

Table A4: Selection into Residential Informal Enterprises in Inclusive Enterprise Data (with Industry Fixed Effects)

	(1)	(2)	(3)
Female	0.148*	0.545***	0.453**
	(0.0884)	(0.179)	(0.186)
Children under 15	-0.0304		-0.0420*
	(0.0336)		(0.0254)
Female × Children under 15	0.0574*		0.0679**
	(0.0346)		(0.0268)
Profit Margin Ratio		0.920**	0.961***
		(0.374)	(0.356)
Female × Profit Margin Ratio		-0.737*	-0.787**
		(0.398)	(0.381)
Industry FE	Yes	Yes	Yes
Observations	758	743	743
Mean Residential (Male)	0.37	0.37	0.37
Pr > F (Children under 15 for Female)	0.00		0.00
Pr > F (Profits Margin for Female)		0.17	0.20

Notes: The outcome variable in all columns is an indicator for the owner's primary business operated in a residential location. The sample includes informal primary businesses in Aburi; mobile businesses are excluded. Column 1 is unconditional. Columns 2 and 3 are conditional on non-zero sales in May 2022. "Children under 15" is the number of children in the owner's household that are of 15-years old or younger. "Profit margin" is the ratio between profits and sales. "Pr > F (Children under 15 for Female)" is the *p*-value of the test that the total effect of children for female owners, i.e., the child main effect plus the female-by-child interaction, equals zero. "Mean Residential (Male)" is the weighted share of male-owned businesses operated in a residential location in the estimation sample. All regressions are weighted by the survey sampling weights (where firms identified through households without signage are weighted by 5; otherwise by 1), include industry fixed effects, and have standard errors clustered at the owner level. *p< 0.10, **p< 0.05, ***p< 0.01.

B Model Appendix

We derive a more generalized model which implies the baseline model in this paper as a special case. First, we relax the assumption that labor enters the production function linearly by allowing for labor elasticity $\beta > 0$. Second, the baseline model assumes that production at RIE ($s = 0$) carries no cost, i.e., cost share κ_i is only applied to NRIEs. This makes the realized profit margin degenerate at exactly 1 for RIEs and $1 - \kappa_i$ for NRIEs. We relax this assumption by allowing for a non-zero cost share $\eta\kappa_i$ for RIEs, with $\eta \in [0, 1)$ indexing the cost advantage of RIEs relative to NRIEs ($\eta = 0$ recovers the baseline exactly; $\eta \to 1$ means home production becomes almost as costly as in non-residential premises).

We re-derive the profit margin threshold under this generalization, show that it collapses to the baseline threshold at $\eta = 0$ and $\beta = 1$, and prove that the model's central comparative statics, i.e., the threshold falling in the number of children n_i, and being strictly lower for women at every n_i, are preserved.

B.1 Setup

We adopt every primitive of the baseline model without change: the carework time requirement (increasing and saturating in the number of children), the remaining business time availability, and the production function. Denote β as the labor elasticity and $\eta \in [0, 1)$ as the cost-share multiplier of RIE relative to NRIE. The profit function can be rewritten as

$$\Pi(l_i, \delta_i, \kappa_i; s, \eta) = \begin{cases} (1 - \eta\kappa_i)\, Y(l_i, \delta_i; 0), & s = 0 \\ (1 - \kappa_i)\, Y(l_i, \delta_i; 1), & s = 1 \end{cases} \tag{8}$$

where operating an RIE incurs a cost share $\eta\kappa_i$ and operating an NRIE continues to incur the cost share of κ_i. At $\eta = 0$, this equation recovers the profit function in the main text exactly.

To keep the algebra compact, define

$$Y_i^0 \equiv \big(\rho + (1-\rho) l_i\big)^{\beta} \tag{9}$$

$$Y_i^1 \equiv \frac{(l_i)^{\beta}}{1-\delta_i} \tag{10}$$

as the RIE and NRIE revenue levels, respectively. As both ρ and δ_i are between zero and one, revenue from home production is always lower than that from the non-residential premise: $Y_i^0 < (l_i)^{\beta} < Y_i^1$. The RIE and NRIE profits can be rewritten as $\Pi(l_i, \delta_i, \kappa_i; 0, \eta) = (1 - \eta\kappa) Y_i^0$ and $\Pi(l_i, \delta_i, \kappa_i; 1, \eta) = (1 - \kappa_i) Y_i^1$, respectively.

B.2 The Generalized Profit Margin Threshold

The owner chooses to operate an NRIE ($s_i = 1$) if and only if profits from their NRIE is greater than that from their RIE. Otherwise, they will choose to operate an RIE.

Proposition 1 (Generalized profit margin threshold) *Fix g_i, n_i, $\delta_i \in (0,1)$, $\eta \in [0,1)$, and let Y_i^0, Y_i^1 be as in equation* (9)*. Define $\bar{m}_i$ as the owner's profit margin threshold where the owner selects $s_i = 1$ iff $m_i > \bar{m}_i$:*

$$\bar{m}_i \equiv \bar{m}(n_i, \delta_i; \eta, \lambda_g, \phi_g) = \frac{(1-\eta) Y_i^0}{Y_i^1 - \eta Y_i^0} \tag{11}$$

$$= (1-\delta_i)\Big(\frac{\rho}{\phi_g e^{-\lambda_g n_i}} + (1-\rho)\Big)^{\beta} f(\eta) \tag{12}$$

where

$$f(\eta) = \frac{(1-\eta)}{1 - \eta(1-\delta_i)\left(\frac{\rho}{\phi_g e^{-\lambda_g n_i}} + (1-\rho)\right)^{\beta}} \in (0,1]$$

The home production cost multiplier $f(\eta) \in (0,1]$ is decreasing in η and $f(0) = 1$. At $\eta = 0$ and $\beta = 1$, equation (12) *collapses exactly to the baseline threshold in the main text.*

B.3 Comparative Statics

The baseline model's two central implications are that the location bar falls with the number of children and it falls steeper for women with each additional child. The next proposition shows that both predictions survive the generalization.

Proposition 2 (Comparative statics of the generalized threshold) *Fix $\eta \in [0,1)$. Then the profit margin threshold is increasing in n_i, λ_g and decreasing in ϕ_g.*

$$\frac{\partial \bar{m}_i}{\partial n_i} = \left[(1-\delta_i)\frac{\rho}{\phi_g e^{-\lambda_g n_i}}\lambda_g\right] \frac{[f(\eta)]^2\beta\left(\frac{\rho}{\phi_g e^{-\lambda_g n_i}} + (1-\rho)\right)^{\beta-1}}{1-\eta} > 0$$

$$\frac{\partial \bar{m}_i}{\partial \lambda_g} = \left[(1-\delta_i)\frac{\rho}{\phi_g e^{-\lambda_g n_i}}n_i\right] \frac{[f(\eta)]^2\beta\left(\frac{\rho}{\phi_g e^{-\lambda_g n_i}} + (1-\rho)\right)^{\beta-1}}{1-\eta} > 0$$

$$\frac{\partial \bar{m}_i}{\partial \phi_g} = -\left[(1-\delta_i)\frac{\rho}{\phi_g e^{-\lambda_g n_i}}\frac{1}{\phi_g}\right] \frac{[f(\eta)]^2\beta\left(\frac{\rho}{\phi_g e^{-\lambda_g n_i}} + (1-\rho)\right)^{\beta-1}}{1-\eta} < 0$$

At $\eta = 0$ and $\beta = 1$, these collapse exactly to the baseline levels in the main text.

B.4 Realized Margins

The baseline model's realized profit margin is degenerate: 1 for every RIE and $m_i = 1 - \kappa_i < 1$ for every NRIE. Under equation (8), the realized margins become $1 - \eta\kappa_i$ (RIE) and $1 - \kappa_i$ (NRIE), for the *same* underlying cost draw κ_i faced by an owner.

Proposition 3 (Non-degenerate margin gap) *For every $\eta \in [0,1)$ and every $\kappa_i \in (0,1)$,*

$$1 - \eta\kappa_i \;>\; 1 - \kappa_i, \tag{13}$$

so the realized margin of an RIE owner strictly exceeds that of an NRIE owner facing the same κ_i. Unlike the baseline ($\eta = 0$), the RIE cost margin is not fixed at 1 but varies across owners as $1 - \eta\kappa_i \in (1-\eta,\, 1)$, a range that shrinks toward 1 as $\eta \to 0$ and widens toward $(0,1)$ as $\eta \to 1$.