Small businesses, big dynamics

New Insights from High-Frequency Phone Surveys in Sub-Saharan Africa

Joint with Akuffo Amankwah, Pauline Castaing, Ivette Contreras, Amparo Palacios-Lopez, Ismael Yacoubou Djima

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The Pulse of Progress: Harnessing High-Frequency Survey Data for Development Research in the Polycrisis Era

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Background

Small businesses in developing countries:

- Prevalence
  - Small businesses employ a majority of non-agricultural workers (Hsieh & Olken, 2014)
  - Serve as critical source of income for millions of households, especially in rural settings
- Characteristics
  - Often informal, family-operated, and home-based (Nagler & Naude, 2017)
  - Small-scale, low-productivity, and low survival rate (McKenzie and Paffhausen , 2019)
- Challenges
  - Limited financial resources, poor access to financial services, and insufficient capital hamper their ability to recover from shocks (De Mel et al., 2012; Caballero-Morales, 2021)

Exposure of small businesses to recent global and regional crises:

- Global shocks
  - COVID-19 pandemic exposed financial and operational vulnerabilities in small businesses
  - Disruptions led to significant declines in sales and uneven recovery trajectories (Apedo-Amah et al., 2020)
- Regional challenges
  - Ongoing conflicts in countries such as Burkina Faso, Ethiopia, and Nigeria
  - Rising commodity prices and financial pressures due to the 2022 Russian invasion of Ukraine (Amankwah et al., 2024)

Motivation and Contribution

Key issues:

- Small businesses are rarely tracked in low-income countries due to infrequent and inconsistent data collection
- Limited systematic and recent evidence on small business patterns, prevalence, and performance in fast-changing environments

This study:

- Large-scale and cross-country study informing about the dynamics of small non-farm businesses in Sub-Saharan Africa during the COVID-19 pandemic and its aftermath
- Data: longitudinal and high-frequency phone survey data from six countries covering a period 2020 to 2024, including detailed questions on the operational status of firms at the time of the survey

Two main contributions:

- Adds to the literature on the dynamics of small non-farm businesses in Sub-Saharan Africa
  - Non-farm self-employment activities in the African households are mostly oriented around survival (Christiaensen, 2017)
  - As crises deepen and the need for support grows, it is crucial to understand how these small businesses survive and cope with shocks
- Adds to the debate on the benefits of using high-frequency data for real-time monitoring of crisis impacts
  - Recent studies used data from earnings reports (Hassan et al., 2020) and transaction records from credit and debit card purchases (Chetty et al., 2020) to highlight the negative effects of the COVID-19 shock on firm revenue and employment
  - Such data and tools are often unavailable in low-income countries, where businesses are characterized by a large informal sector (Ulyssea, 2020) and difficult to monitor

Data and Variables

High-Frequency Phone surveys

- Administered in 6 Sub-Saharan African countries: BFA, ETH, MWI, NGA, TZA, and UGA
- Panel dataset with 4 years coverage: from 2020 to 2024
- Uniform approach for questionnaire design, sampling, weighting, and fieldwork implementation
- Countries are part of the LSMS Integrated Survey on Agriculture (LSMS-ISA): access to pre-HFPS variables
- Harmonized LSMS-HFPS dataset available on github : github.com/lsms-worldbank

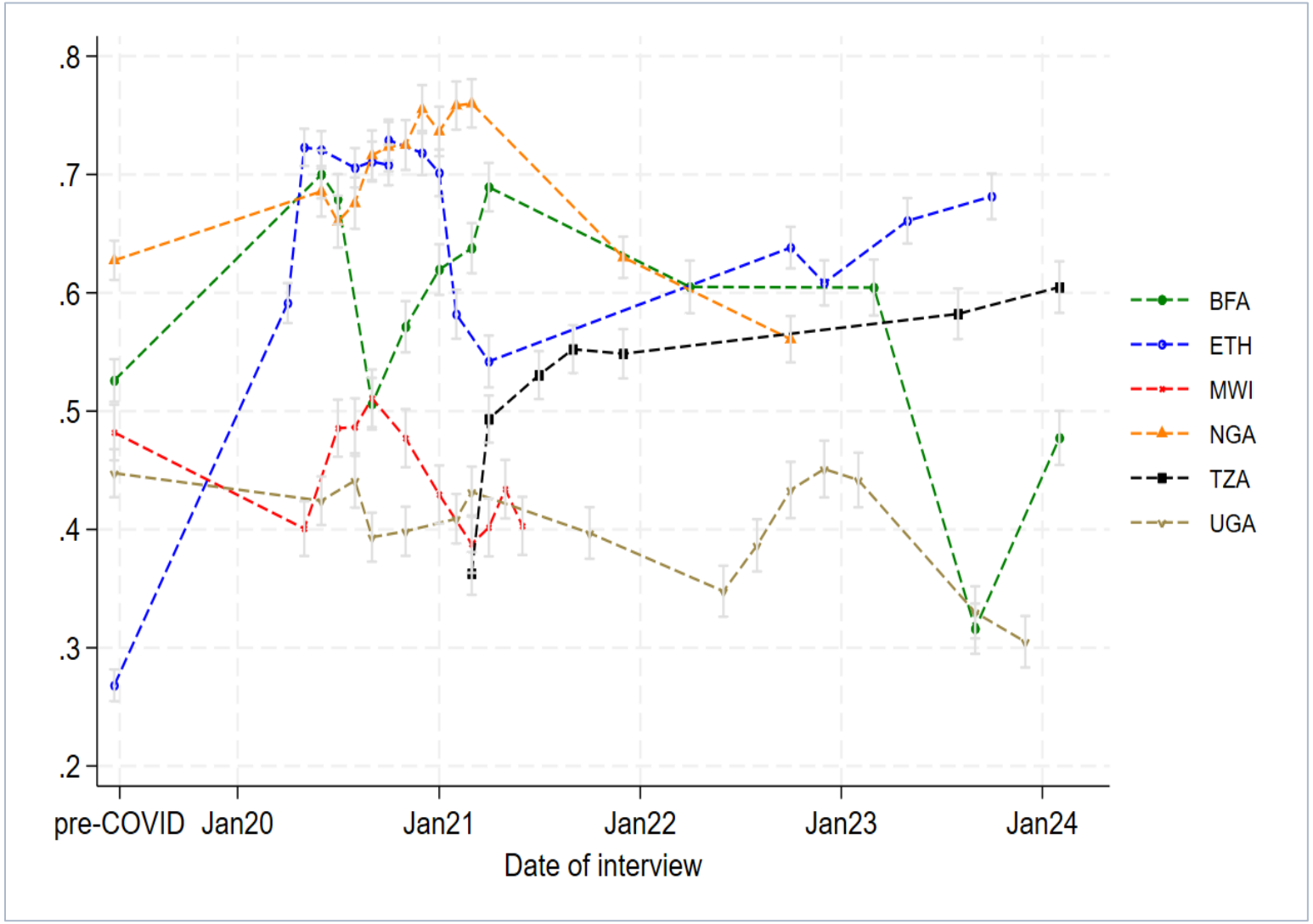
Variables

- Household Enterprise:
  - Any non-farm business operated in the household since last interview
  - Current operational status of the business (active, temporarily closed, permanently closed)

- Self-Reported Shock since last interview:
  - Income shock (loss of an income-earning member or loss of job)
  - Price shock (changes in input or output prices)

Household participation in non-farm enterprises (1/2)

Figure: Weighted share of households engaging in non-farm enterprises over time and space



- From 2020 to 2024, household entrepreneurship in Sub-Saharan Africa remains high
  - 60% in BFA, 47% in ETH, 49% in MWI, 68% in NGA, 56% in TZA, 40% in UGA
- Notable increase in participation to household enterprises during the early phases of the COVID-19 pandemic
  - Mobility restrictions severely disrupted economic activity (Palacios-Lopez et al., 2021; Contreras-Gonzalez et al., 2021)
  - Job losses likely fueled the growth of home-based income-generating activities

Household participation in non-farm enterprises (2/2)

Question: Is the post-COVID-19 rise in household enterprise operations driven by income shocks experienced during the pandemic?

Model: We use the first HFPS round with data on shocks, pre-HFPS NFE status, and estimate a linear probability model with OLS:

$$nfe\_operation_{hr} = \beta_0 + \beta_1 nfe\_operation\_precovid_h + \beta_2\, income\_shock_{hr} + \beta_3\, income\_shock_{hr} * nfe\_operation\_precovid_h + \gamma\, X_{hr} + \epsilon_{hr}$$

Main result:

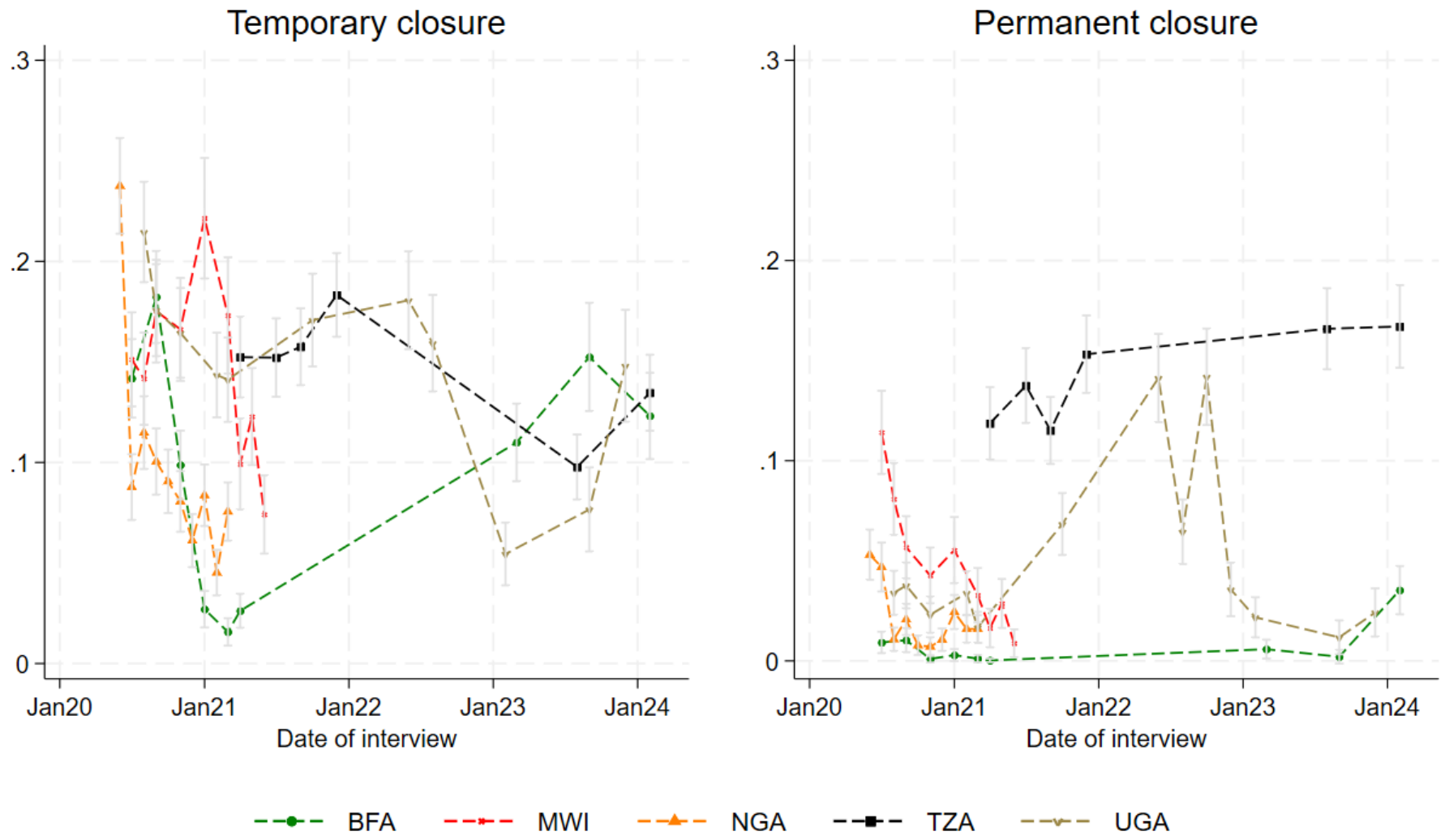
- Result for β_2: HHs that were not engaged in household enterprise prior to COVID-19 and faced an income shock are more likely to start operating a business
  - Starting a business can serve as a coping mechanism for households facing income shocks

	ALL	BFA	MWI	NGA	UGA
nfe operation pre-covid19	0.343***	0.328***	0.361***	0.275***	0.390***
	(0.013)	(0.025)	(0.026)	(0.026)	(0.022)
Income shock	0.110***	0.151***	0.040	0.157***	0.035
	(0.024)	(0.046)	(0.050)	(0.047)	(0.045)
nfe operation pre covid ##	-0.129***	-0.146***	-0.057	-0.175***	-0.058
income shock	(0.031)	(0.056)	(0.071)	(0.059)	(0.067)
Constant	0.358***	0.436***	0.325***	0.291***	0.205***
	(0.024)	(0.043)	(0.041)	(0.039)	(0.032)
Country fixed effects	YES				
Observations	7,541	1,860	1,644	1,950	2,087
R-squared	0.147	0.144	0.162	0.080	0.161

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Covariates (household size, sector, and household head dummy) are included in all models.

How much household enterprise closure is there? (1/4)

Figure: Weighted share of businesses that are closed



How much household enterprise closure is there? (2/4)

Method to estimate monthly closure of household enterprise:

- Firm closure is defined as the transition from being open or temporarily closed at one point in time to being reported as permanently closed in the subsequent survey round
  - Alternative 1: all temporarily closed businesses as permanently closed (upper bound)
  - Alternative 2: permanent business closure are considered temporary if business activity is observed in next round (lower bound)
- We calculate firm closure rates for each of the 117 survey-time interval combinations in our data
- Plot the firm closure rates for each survey-period combination
- Estimate a linear model to explore the relationship between firm closure rates and time

Months	Burkina Faso	Malawi	Nigeria	Tanzania	Uganda
1	1%	13%	2%	12%	3%
	[1% , 27%]	[10% , 44%]	[2% , 25%]	[8% , 34%]	[3% , 26%]
2	0%	13%	7%	11%	5%
	[0% , 45%]	[11% , 36%]	[4% , 33%]	[7% , 45%]	[4% , 28%]
3	1%	16%	7%	15%	8%
	[1% , 44%]	[15% , 37%]	[6% , 28%]	[8% , 45%]	[8% , 27%]
4	0%	21%	11%	20%	17%
	[0% , 49%]	[20% , 42%]	[10% , 29%]	[17% , 37%]	[16% , 35%]
5	2%	32%	11%	23%	10%
	[2% , 39%]	[32% , 70%]	[11% , 29%]	[19% , 50%]	[10% , 27%]
6	1%	24%	12%	23%	14%
	[1% , 44%]	[23% , 45%]	[11% , 29%]	[21% , 39%]	[13% , 33%]
7	2%	39%	13%		12%
	[2% , 32%]	[39% , 71%]	[12% , 28%]		[11% , 39%]
8	1%	28%	13%	27%	15%
	[1% , 44%]	[27% , 54%]	[13% , 29%]	[21% , 46%]	[14% , 32%]
9	2%	40%	14%	30%	15%
	[2% , 30%]	[40% , 68%]	[14% , 25%]	[26% , 44%]	[15% , 32%]

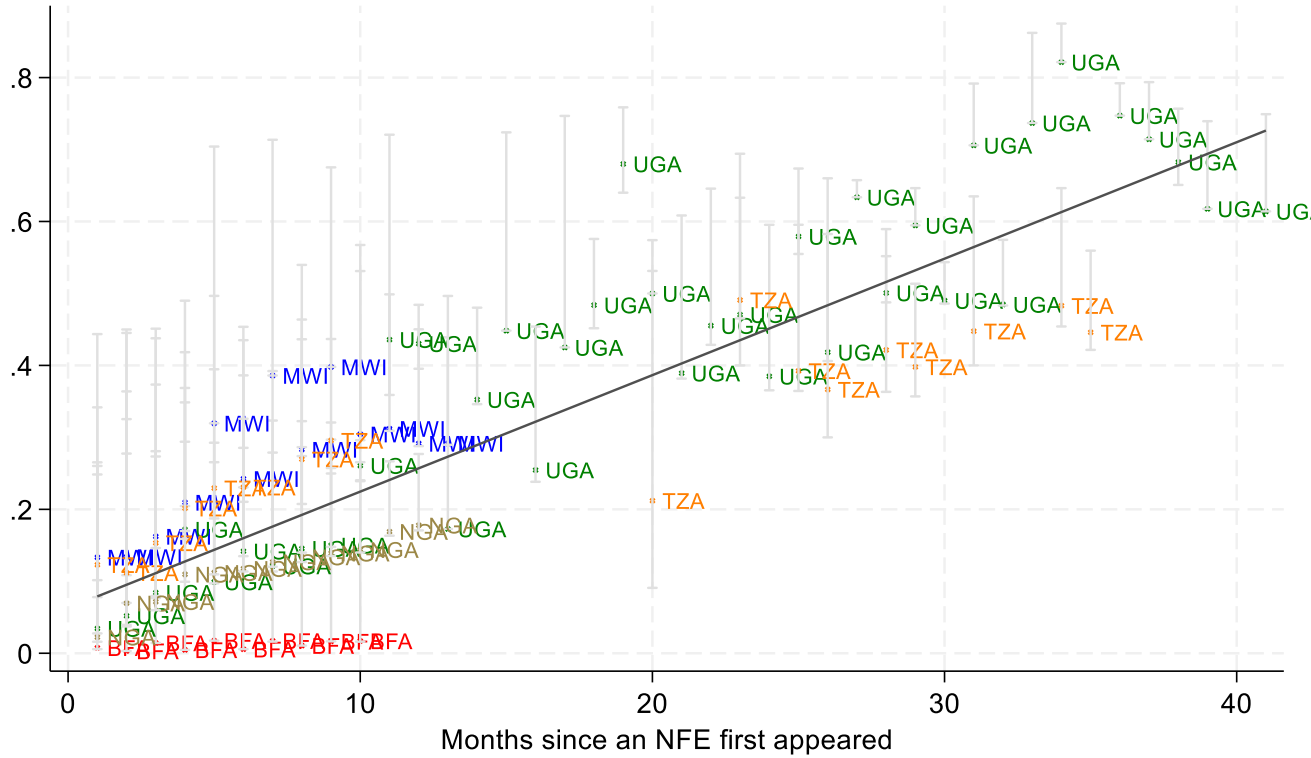
How much household enterprise closure is there? (3/4)

Table: Linear trends in household's NFE closure rate

	ALL	BFA	MWI	NGA	TZA	UGA
Months	0.016***	0.001*	0.015***	0.012***	0.009***	0.017***
	(0.003)	(0.001)	(0.005)	(0.001)	(0.001)	(0.001)
Constant	0.063	0.005	0.158***	0.040***	0.152***	0.080**
	(0.048)	(0.003)	(0.038)	(0.009)	(0.023)	(0.033)
Observations	117	36	13	12	17	39
R2	0.159	0.288	0.488	0.910	0.823	0.796
Annual exit rate	19%	1%	18%	14%	11%	20%

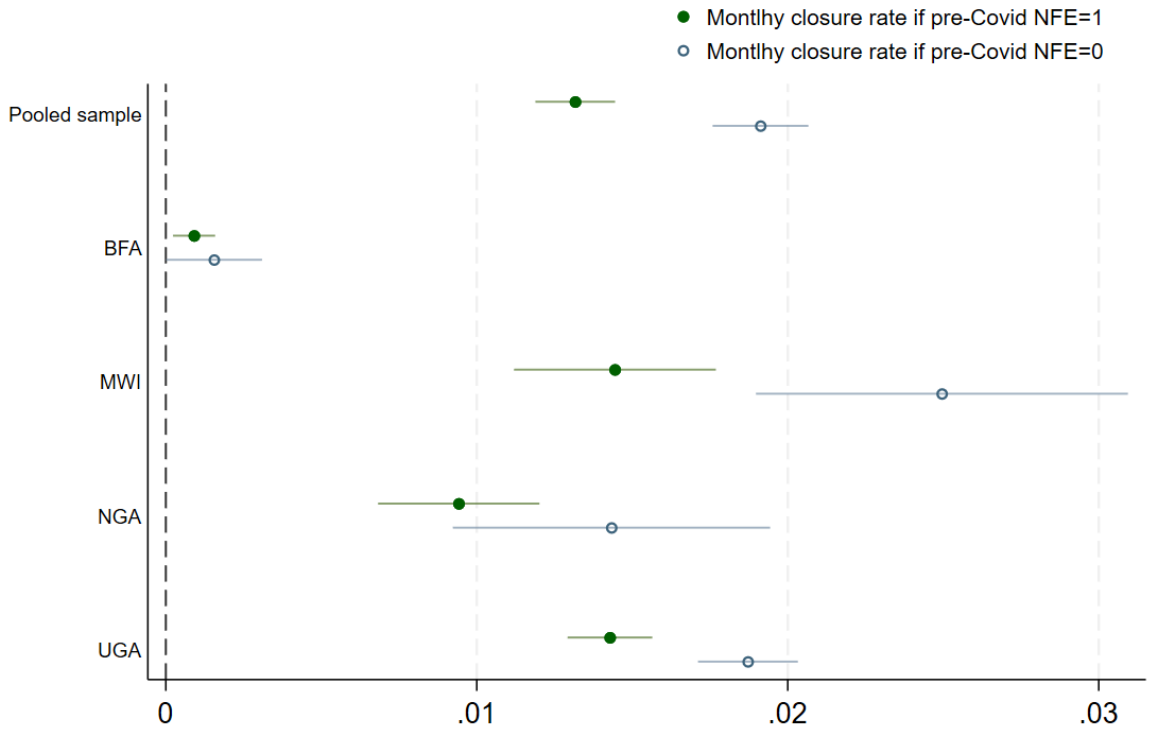
In the pooled regression, standard errors are clustered at the country level. *** p<0.01, ** p<0.05, * p<0.1.

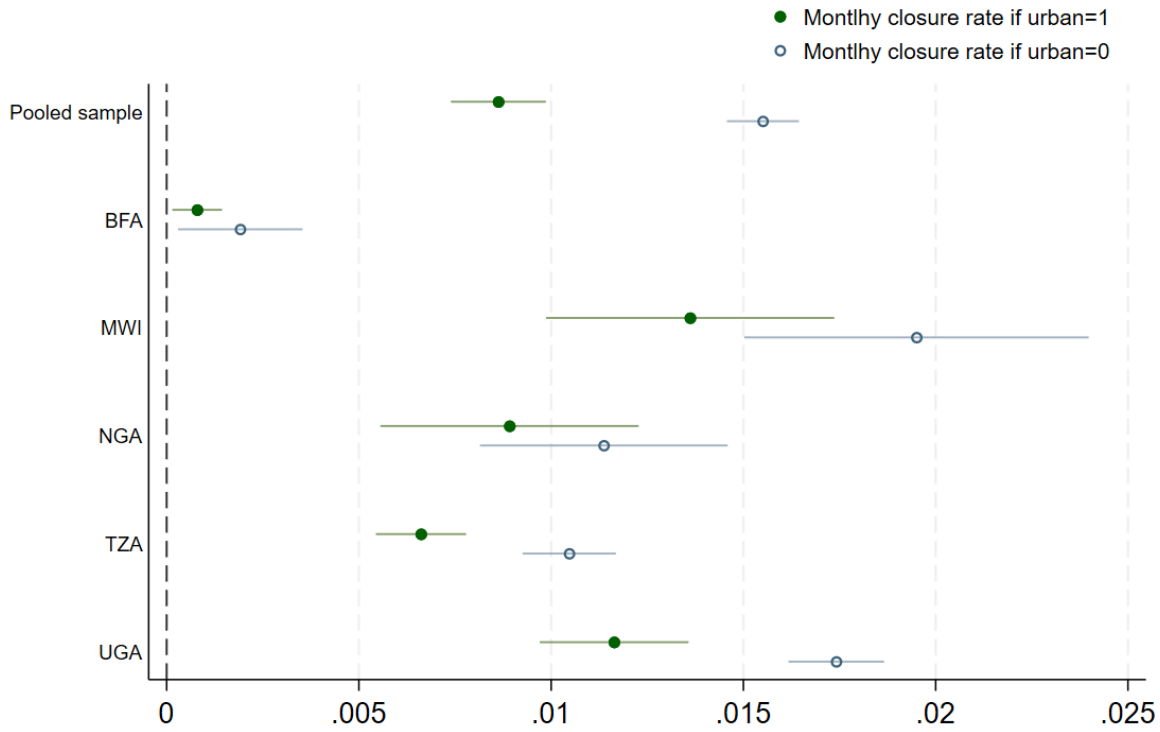
Figure: Estimated closure rates over different time horizons



How much household enterprise closure is there? (4/4)

Figures: Heterogeneity in monthly firm closure rate by pre-Covid NFE engagement and by sector (rural/urban)





What are the dynamic correlates of firm closure ? (1/2)

Model:

- NFE status can be modeled as a multinomial choice framework (McFadden, 1984; Ahituv and Kimhi, 2002)
  - Mutually exclusive status : the business is either currently active, temporarily closed, or permanently closed
- Our objective is to understand how different time-varying covariates influence the likelihood of each household's business falling into one of the three categories
- To achieve this, we apply a panel multinomial logit model with household fixed effects:

$$Closure_{hry} = \beta X_{hr} + \alpha_h + \eta_y + \epsilon_{hr}$$

- Reference group: the business is currently operating
- X_{hr} : income shock, price shock, the respondent is currently working in farming, the respondent is currently working in the wage sector, and the respondent is the household head.
- Year fixed effects are also included to the model.

What are the dynamic correlates of firm closure ? (2/2)

Table: Relative risk ratios from multinomial logistic estimations

POOLED SAMPLE

	Temporarily closed	Permanently closed
Income shock	1.321**	1.012
	(0.170)	(0.241)
Price shock	1.168	0.677
	(0.130)	(0.215)
hhsize	1.065	0.679***
	(0.070)	(0.055)
Work in wage sec	3.163***	1.198
	(0.619)	(0.368)
Work in agri sec	2.801***	1.121
	(0.358)	(0.312)
resp_head	0.830	1.047
	(0.131)	(0.642)
Year FE	YES	YES
Obs	3,187	3,187
Number of pnl_id	1,269	1,269

Standard errors clustered at the household level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

- Household enterprises temporarily shut down as a response to economic shocks, but they are not necessarily exiting the market permanently
  - HHs that experienced an income shock are more likely to temporarily close a business than keeping it active (MWI and NGA)
  - Income and price shocks are not associated with any risk of shutting down the business (both in the pooled and by country analysis)
- Temporary closures are strongly correlated with the work status of the main respondent, but permanent closures show no correlation
  - The relative risk of temporarily closing a business, as opposed to keeping it active, is higher if the main respondent currently works in the wage or agricultural sector
  - When farming or wage employment presents more opportunities or higher returns (due to seasonal opportunities or market conditions), households may temporarily pause their business operations

Summary and conclusions

Main findings:

- Substantial engagement in household enterprises across Sub-Saharan Africa, with participation rates ranging from 40% in Uganda to 68% in Nigeria between 2020 and 2024
- Engaging in non-farm businesses helps households to navigate income shocks like job loss caused by COVID-19
- On average, small businesses permanently closed at a rate of 1.6% per month
  - Higher closure rates for households in rural areas and without pre-pandemic experience in NFE
- Temporary closures are used as a strategy to mitigate the impact of income shocks, whereas permanent closures are not correlated with the occurrence of shocks

Survey-related lessons learned:

- HFPS are valuable to capture the fast-changing environments of Household Enterprises
- Collecting information on temporary closures helps to unpack some important dynamics

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Module on Household enterprises

CASES	11.	11a.
THREE CASES BASED ON LAST INTERVIEW AND EMPLOYMENT RESPONSES: CASE 1: HOUSEHOLDS THAT HAD AN NFE TEMPORARILY CLOSED AT LAST INTERVIEW **>> Q11a** CASE 2: HOUSEHOLDS THAT WERE OPERATING AT [LAST INTERVIEW] **>> Q11a** 3. HOUSEHOLDS THAT WERE NOT OPERATING AT [LAST INTERVIEW] AND THOSE THAT REPORTED BEING PERMANENTLY CLOSED LAST INTERVIEW **>> Q11**	Since my last phone call on [LAST INTERVIEW DATE], did you or any member of your household operate a non-farm family business? YES.1 NO..2 **>> NEXT SECTION**	CASE 1: What is the current status of your household's nonfarm business [PREFILLED DESCRIPTION] that one you said was temporarily closed when we last spoke on [LAST INTERVIEW DATE]? CASE 2: What is the current status of your household's nonfarm business [PREFILLED DESCRIPTION] that was operating when we spoke last time on [LAST INTERVIEW DATE]? CASE 3 : What is the current status of your household's nonfarm business? READ OPTIONS Open .....1 **>> Q11c** Temporarily closed ..2 Permanently closed ..3

Rounds with a module on Household Enterprise

Burkina Faso			Ethiopia			Malawi			Nigeria			Tanzania			Uganda		
Round	Fieldwork date	Sample size	Round	Fieldwork date	Sample size	Round	Fieldwork date	Sample size	Round	Fieldwork date	Sample size	Round	Fieldwork date	Sample size	Round	Fieldwork date	Sample size
EHCVM	2018-19	2,953	ESS	2018-19	4,277	IHPS	2019	1,726	GHS-P W4	2018-19	3,267				UNPS	2019-20	3,267
1	Jun-20	1,968	1	Apr-20	3,249	1	May-20	1,729	1‡	Apr-20	1,950	1	Mar-21	2,739	1‡	Jun-20	2,227
2*‡	Jul-20	1,860	2	May-20	3,107	2*‡	Jul-20	1,646	2*	Jun-20	1,820	2*‡	Apr-21	2,421	2*	Aug-20	2,199
3*	Sep-20	2,013	3	Jun-20	3,058	3*‡	Aug-20	1,624	3*‡	Jul-20	1,790	3*‡	Jul-21	2,339	3*	Sep-20	2,147
4*‡	Nov-20	2,011	4	Aug-20	2,878	4*	Sep-20	1,616	4*	Aug-20	1,789	4*	Sep-21	2,312	4*	Nov-20	2,136
6*‡	Jan-21	1,985	5	Sep-20	2,770	5*	Nov-20	1,589	5*	Sep-20	1,774	5*	Dec-21	2,197	5*	Feb-21	2,122
8*‡	Mar-21	1,967	6	Oct-20	2,703	7*‡	Jan-21	1,560	6*	Oct-20	1,762	8*	Aug-23	2,042	6*‡	Mar-21	2,100
9*	Apr-21	1,971	7	Nov-20	2,536	8*	Mar-21	1,551	7*	Nov-20	1,726	10*	Feb-24	1,942	7*	Oct-21	1,950
12	Apr-22	1,847	8	Dec-20	2,222	9*	Apr-21	1,545	8*‡	Dec-20	1,723				8*	Jun-22	1,881
17*	Mar-23	1,642	9	Jan-21	2,077	11*	May-21	1,541	9*	Jan-21	1,706				9*	Aug-22	1,871
19*‡	Sep-23	1,851	10	Feb-21	2,176	12*	Jun-21	1,533	10*	Feb-21	1,699				10*	Oct-22	1,668
21*	Feb-24	1,832	11	Apr-21	1,982				11*	Mar-21	1,680				11*	Dec-22	1,665
			13	Oct-22	2,876				13	Dec-21	2,922				12*	Feb-23	1,783
			14	Dec-22	2,509				18‡	Oct-22	2,461				14*‡	Sep-23	1,838
			16	May-23	2,336				GHS-P W5	2023-24	3,145				16*	Dec-23	1,795
			18	Oct-23	2,237												

(*) include questions on the current status of the non-farm enterprise (‡) include question on shocks

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Summary Statistics from HFPS Rounds Over Survey Countries

		Active NFE	Temporarily Closed NFE	Permanently closed NFE	Urban	HH size	Main resp in wage work	Main resp in farm work	Main resp is head	Income shock	Price shock
BFA	Mean	0.595	0.065	0.008	0.657	6.714	0.14	0.162	0.862	0.16	0.081
	SD	0.491	0.247	0.086	0.475	3.862	0.347	0.368	0.345	0.366	0.273
	N	20946	9990	9990	20947	20945	19067	19067	20945	9674	9674
ETH	Mean	0.473	.	.	0.71	4.516	0.354	0.305	0.795	.	.
	SD	0.499	.	.	0.454	2.287	0.478	0.461	0.404	.	.
	N	38716	0	0	38716	38716	38711	37912	38716	0	0
MWI	Mean	0.488	0.138	0.051	0.369	5.063	0.254	0.281	0.755	0.135	0.357
	SD	0.5	0.345	0.22	0.483	2.266	0.435	0.45	0.43	0.342	0.479
	N	15934	6934	6934	15934	15930	15433	15433	15929	4830	4830
NGA	Mean	0.676	0.093	0.033	0.395	6.42	0.139	0.329	0.784	0.234	0.588
	SD	0.468	0.29	0.179	0.489	3.828	0.345	0.47	0.411	0.423	0.492
	N	24802	13562	13562	24802	24798	24802	24802	24798	7924	7924
TZA	Mean	0.558	0.151	0.14	0.373	5.61	0.151	0.355	0.873	0.215	0.3
	SD	0.497	0.358	0.347	0.484	2.867	0.358	0.479	0.333	0.411	0.458
	N	15978	7821	7821	15992	14050	13732	13732	14049	4550	4550
UGA	Mean	0.395	0.156	0.057	0.252	5.593	0.106	0.484	0.741	0.192	0.232
	SD	0.489	0.363	0.232	0.434	2.746	0.308	0.5	0.438	0.394	0.422
	N	26764	10234	11787	27382	21062	27373	27373	19856	6165	6165

Estimates of firm exit rate in the literature

Study	Country	Datasets	Type of firm	Period	Firm closure rate
McKenzie and Paffhausen (2019)	Nigeria	Nigeria General Household Survey	Household non-farm	0.5 years	12%
McKenzie and Paffhausen (2019)	Nigeria	Nigeria General Household Survey	Household non-farm	1 year	21%
McKenzie and Paffhausen (2019)	Nigeria	Nigeria YouWiN! National Business Plan Competition Impact Evaluation Survey	Micro and small	1 year	35%
McKenzie and Paffhausen (2019)	Malawi	Malawi Business Registration Impact Evaluation Survey	Micro and small	1 year	12%
McKenzie and Paffhausen (2019)	Uganda	Uganda Women's Income Generating Support Impact Evaluation Survey	Micro and small	1.5 years	34%
Nagler & Naudé (2017)	Uganda	LSMS	Household non-farm	1 year	31%

Dynamic correlates of firm closure by country

Table: Relative risk ratios from multinomial logistic estimations

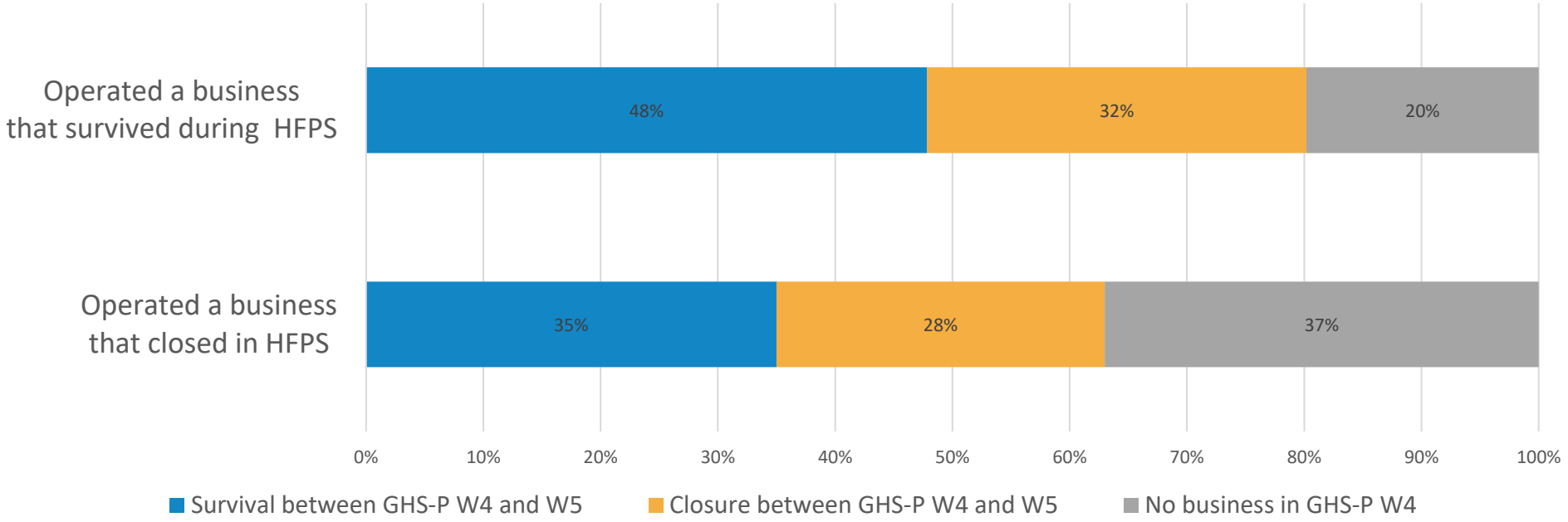
	ALL		BFA		MWI		NGA		TZA	
	Temporarily closed	Permanently closed	Temporarily closed	Permanently closed	Temporarily closed	Permanently closed	Temporarily closed	Permanently closed	Temporarily closed	Permanently closed
income_shock	1.321**	1.012	0.956	0.000***	1.218***	0.633	2.715***	1.446	0.813	0.641
	(0.170)	(0.241)	(0.126)	(0.000)	(0.019)	(0.207)	(0.852)	(0.570)	(0.222)	(0.235)
price_shock	1.168	0.677	1.740***	0.000***	1.080***	0.937	1.119	0.406*	1.100	1.971
	(0.130)	(0.215)	(0.302)	(0.000)	(0.010)	(0.326)	(0.292)	(0.211)	(0.266)	(0.836)
hhsize	1.065	0.679***	1.058	0.370	1.400***	0.981	1.082	0.614***	0.862	0.822
	(0.070)	(0.055)	(0.127)	(0.330)	(0.065)	(0.039)	(0.147)	(0.066)	(0.240)	(0.267)
wage_cur	3.163***	1.198	2.934**	3.658***	4.643**	1.482	2.642***	0.710	2.704**	1.689
	(0.619)	(0.368)	(1.347)	(1.359)	(3.608)	(1.160)	(0.821)	(0.302)	(1.121)	(0.800)
farm_cur	2.801***	1.121	3.075***	6.664*	3.435***	4.614***	2.042***	0.529***	2.111***	1.281
	(0.358)	(0.312)	(0.514)	(7.206)	(1.096)	(1.029)	(0.446)	(0.090)	(0.547)	(0.476)
resp_head	0.830	1.047	0.591*	0.000***	0.543***	0.209***	1.490	5.036	2.991	2.062
	(0.131)	(0.642)	(0.162)	(0.000)	(0.034)	(0.007)	(0.802)	(7.074)	(3.662)	(2.458)
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Obs	3,187	3,187	772	772	763	763	840	840	754	754
Number of pnl_id	1,269	1,269	225	225	309	309	329	329	377	377

Standard errors clustered at the household level are in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

How much household enterprise closure is there? (5/5)

- Reproduce similar estimates for Nigeria using GHS-Panel Waves 4 (2019) and 5 (2024)
- 54% of firms closed over a five-year period: annual closure rate of 11%
- Similar firm closure rate than the one estimated with HFPS (14%) BUT many inconsistencies in firm closure measurement across the two approaches

Cross-survey comparison of household's firm status in HFPS and GHS-Panel in Nigeria



Bibliography

Ahituv, A., & Kimhi, A. (2002). Off-farm work and capital accumulation decisions of farmers over the life-cycle: The role of heterogeneity and state dependence. *Journal of Development Economics*, 68(2), 329–353.

Chetty, R., Friedman, J. N., Hendren, N., Stepner, M., & The Opportunity Insights Team. (2020). How did COVID-19 and stabilization policies affect spending and employment? A new real-time economic tracker based on private sector data. *Working Paper* No. 27431. National Bureau of Economic Research.

Christiaensen, L. (2017). Agriculture in Africa – telling myths from facts: A synthesis. *Food Policy*, 67, 1–11.

Contreras, I., Oseni, G., Palacios-Lopez, A., Pieters, J., & Weber, M. (2021). The labor market impacts of COVID-19 in four African countries: April to October 2020 - Evidence from LSMS-supported high-frequency phone surveys on COVID-19. Washington, D.C.: The World Bank.

Hsieh, C., and Olken, B. 2014. The Missing "Missing Middle". Journal of Economic Perspectives, 28 (3): 89–108.

Nagler, P., & Naudé, W. (2017). Non-farm entrepreneurship in rural Sub-Saharan Africa: New empirical evidences. *Food Policy*, 67, 175–191.

McFadden, D. L. (1984). Econometric analysis of qualitative response models. In Z. Griliches & M. D. Intriligator (Eds.), *Handbook of Econometrics* (Vol. 2, pp. 1395–1457). Elsevier.

McKenzie, D., & Paffhausen, A. L. (2019). Small firm death in developing countries. *The Review of Economics and Statistics*, 101(4), 645–657.

Palacios-Lopez, A., Newhouse, D. L., Pape, U. J., Khamis, M., Weber, M., & Prinz, D. (2021). The early labor market impacts of COVID-19 in developing countries: Evidence from high-frequency phone surveys. *Policy Research Working Paper Series* 9510. Washington, D.C.: The World Bank.

Ulyssea, G. (2020). Informality: Causes and consequences for development. *Annual Review of Economics*, 12, 525–546.