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| RESEARCH ARTICLE

Capability Bundles, Policy Frictions, and Sales–Liquidity Divergence in Crisis: Evidence from the World Bank Business Pulse Surveys, 2020–21

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| ABSTRACT

This study develops and tests a "continuity capability stack" that distinguishes sales recovery from financial continuity (liquidity survival). We examine which capability bundles—digital adaptation and operational reconfiguration—are associated with better outcomes, and whether public support complements these capabilities or is blunted by access frictions. We analyzed repeated cross-sectional indicator panels from the World Bank Business Pulse Surveys (2020–2021) across 45 economies, using economy–time–stratum observations by firm size and sector. Outcome coverage was 34 economies for arrears and 43 for sales. We constructed two composite indices: an Adaptation Capability Index (ACI), capturing digital platforms/online sales, remote work, operational protocols, alternative payments, and reconfiguration measures; and a Continuity Stress Index (CSI), summarizing arrears risk and sales/labor distress. Two-way fixed-effects models with lagged exposures related ACI, support access, and their interaction to arrears risk and monthly sales change. We derived resilience archetypes using unsupervised clustering on standardized capability, stress, and outcome profiles. Capability bundles were more predictive of sales recovery than of liquidity survival. Lagged ACI was positively associated with sales change (about +3.5 percentage points; 95% CI +0.8 to +6.3), whereas its association with arrears risk was not statistically distinguishable from zero. Public support access and the ACI × support interaction were not robustly associated with either endpoint in core specifications, consistent with a friction mechanism in which delivery and access constraints weaken translation of support into continuity gains. Micro and small firms experienced larger sales contractions and higher arrears risk than large firms, with sectoral heterogeneity. Clustering distinguished digitally adaptive profiles from liquidity-constrained and high-stress profiles, showing that adaptation can coexist with financial vulnerability. Digital and operational capabilities are central levers for sustaining continuity in sales but are insufficient to protect against liquidity distress. Policy design should prioritize delivery architecture, administrative simplicity, eligibility design, and disbursement speed rather than nominal support availability alone. The study introduces a continuity capability stack and a replicable capability–stress typology that separate the drivers of sales recovery from determinants of liquidity vulnerability, offering actionable insight for crisis preparedness and response design.

| KEYWORDS

Business continuity; resilience; crisis management; digital transformation; liquidity stress; public support; access frictions; fixed effects; World Bank Business Pulse Surveys

| ARTICLE INFORMATION

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1. Introduction

Business continuity is the capability of an organization to continue delivering products and services at acceptable, predefined levels during a disruption. Under conditions of systemic shock, it is understood as an ongoing process of adaptation rather than a single, final outcome. It is a multidomain performance problem that requires firms to stay operational, remain financially solvent, and stabilize sales. These continuity domains often move differently during crises. A firm may continue operating while accumulating arrears or adopting digital channels and still fail to recover demand. For this reason, resilience becomes analytically useful and policy-relevant only when it is broken down into specific continuity outcomes and when measurable continuity goals are linked to tangible, actionable capability levers (Dushnitsky et al., 2020; Ritter & Pedersen, 2020; Bartik et al 2020).

This paper develops that linkage by framing crisis continuity as the product of a practical continuity capability stack. The core idea is that firms do not respond to shocks through a single generic resilience trait but through bundles of capabilities that differ in timing, cost, and effectiveness. We focus on two capability families or bundles that are both managerially actionable and observable in pandemic-era firm survey indicators: (1) digital and market channel adaptation (for example, online sales, digital platforms, alternative payment channels), and (2) operational reconfiguration (for example, remote work, workflow changes, shifts, protocols, and layout modifications). We evaluate capability bundles against distinct outcomes of sales recovery and liquidity survival risk, as crisis evidence suggests a divergence between the drivers of market continuity and those of financial stability.

The study adopts a dynamic capabilities framework to explain how firms sustain competitive advantage during periods of high volatility. According to this view, success is driven by the strategic ability to detect change, capitalize on new prospects, and continuously transform internal routines and assets (Helfat et al., 2007; Teece, 2007). In crisis settings, this perspective is especially useful because it shifts analysis away from static firm characteristics and toward adaptation capacity. To explain why firms exposed to similar macro shocks adopt different reconfiguration strategies, this study integrates the Technology-Organization-Environment framework [Tornatzky & Fleischer, 1990] with adoption logic on perceived usefulness and complexity [Davis, 1989]. Digitalization is thus positioned not as mere modernization, but as vital continuity infrastructure that preserves customer access, transaction flows, and operational reach when conventional channels are disrupted [Ghobakhloo & Ching, 2019; Kraus et al., 2021; Seetharaman, 2020].

Although COVID-era research generated an important wave of business evidence, the continuity evidence base remains fragmented in ways that weaken decision usefulness. First, much of the literature is country specific or sector specific, which limits external validity and makes cross-context continuity planning difficult. Second, many studies are descriptive and document disruption or adaptation without estimating a coherent capabilities to outcomes structure that identifies which controllable levers are most predictive of recovery. Third, policy support is often modeled as a binary variable, received or not received, even though the practical effect of support depends on access frictions such as awareness, eligibility rules, administrative burden, and delivery speed. These frictions can neutralize policy intent even when headline support programs appear substantial. Fourth, crisis performance is often treated as one composite endpoint, which can obscure whether the same interventions that improve sales trajectories also protect firms from arrears and liquidity distress.

We address these gaps by developing and testing a continuity capability stack framework that explicitly separates market continuity from financial continuity. Specifically, we examine whether capability bundles are associated with sales recovery and with liquidity survival risk in symmetric or asymmetric ways, and whether public support behaves primarily as a complement to internal capability, a substitute for weak capability, or a weak lever when access frictions are binding. This framing is analytically important because it allows resilience to be studied as a set of outcome specific mechanisms rather than a post hoc label. It is also managerially and policy relevant because it clarifies where firms should invest internal effort and where governments should improve delivery design.

Empirically, we operationalize this framework using the World Bank Enterprise Surveys indicator architecture and the COVID era Business Pulse Surveys (2020 to 2021), which provide harmonized cross economy indicators on sales disruption, liquidity stress, operational adjustment, digitalization, and support access conditions. The value of this evidence platform lies in its breadth and comparability. It allows continuity mechanisms to be studied across heterogeneous institutional, sectoral, and market environments rather than inferred from a narrow single country sample. That cross context scope is essential for distinguishing patterns that are likely to travel from those that are context bound.

The contribution of this paper is therefore both analytical and decision oriented. Analytically, it offers a measurable framework that decomposes resilience into continuity domains and tests a capability stack grounded in adaptation theory. For management, it identifies which capability bundles are most strongly associated with sales stabilization and recovery, and where adaptation remains insufficient because liquidity constraints persist. For policy, it shifts evaluation away from nominal support availability toward support delivery performance, showing why awareness, eligibility design, administrative simplicity, and speed

may matter as much as program existence. In doing so, the paper reframes the central crisis question from whether resilience matters to which capabilities matter, for which continuity outcomes, and under what policy access conditions.

2. Methodology

In order to analyze the continuity capability stack, this study develops and tests a decision-relevant "continuity capability stack" that distinguishes between market continuity (sales recovery) and financial continuity (liquidity survival).

A repeated cross-sectional, multi-economy time-series analysis was conducted using World Bank Business Pulse Surveys (WB_BPS) indicator panels spanning 2020–2021 across 45 economies (countries); because the panel is unbalanced, primary-outcome coverage varies (34 economies for arrears risk; 43 for sales outcomes). The analytic unit is an economy–time–stratum observation, where "stratum" is defined by firm-size breakdown (micro/small/medium/large), sector breakdown (agriculture/retail/manufacturing/other services), or the total economy aggregate, depending on indicator availability. The resulting panel is unbalanced by construction because some indicators are not reported for all economies, months/waves, or strata. Indicator coverage and the effective analytic sample size, therefore, vary by outcome and specification.

Outcomes (continuity endpoints)

Two primary endpoints and one forward-looking secondary endpoint were pre-specified, each captured as an indicator share or mean:

1. Liquidity survival risk (primary): share of establishments in arrears or expecting arrears within six months ("arrears risk").
2. Sales shock and recovery (primary): (i) average percent change in monthly sales compared with one year prior and (ii) share of establishments with decreased monthly sales.
3. Forward recovery expectations (secondary): expected sales in six months relative to 2019.

All outcomes were analyzed on their natural percentage-point scales to preserve interpretability for firm- and policy-facing decisions.

Exposures (capabilities and policy environment)

The concepts of "continuity capabilities" and "policy environment" were operationalized using indicator families: Capability domain A (digital/market-channel adaptation): increased use of digital platforms, share of monthly sales using digital platforms, and online sales.
Capability domain B (operational/workforce reconfiguration): remote work share, modifications to worker shifts, changes to establishment layout, health protocols for customers and workers, and adoption of alternative payments.
Policy environment: public support access/receipt indicators and barrier profiles, including "too hard to apply," "not aware," and "not eligible."

Capability bundle construction (ACI) and stress bundle construction (CSI)

To move beyond single-indicator inference, we constructed two prespecified composite indices using standardized indicators:

Adaptation Capability Index (ACI): an equal-weight composite of standardized capability indicators (digital use, online/digital sales, remote work, protocols, alternative payments, shift modification, and layout changes), computed when at least three components were observed for an economy–time–stratum record.
Continuity Stress Index (CSI): an equal-weight composite of standardized distress indicators (arrears risk, decreased sales share, wage cuts, hours cuts, layoffs/firings), computed under the same minimum-component rule.

These indices were designed for interpretability and robustness in an unbalanced indicator panel: equal-weight z-score composites avoid instability that can arise when factor structures vary with missingness patterns.

I. Empirical strategy: two-way fixed effects with lags

Our core objective was to estimate within-economy associations between capability bundles, policy access conditions, and continuity outcomes over time, while absorbing stable cross-economy differences and global time shocks. For each endpoint $Y_{e,t,s}$, we estimated:

$$Y_{e,t,s} = \alpha_e + \gamma_t + \lambda_s + \beta\, \mathrm{ACI}_{e,t-1,s} + \theta\, \mathrm{Support}_{e,t-1,s} + \varepsilon_{e,t,s},$$

where α_e are economy fixed effects, γ_t are time fixed effects (month/wave), and λ_s are stratum fixed effects. We prioritized lagged exposures $(t-1)$ to reduce mechanical simultaneity (e.g., distress inducing adaptation).

II. Complementarity vs substitution and friction moderation

To test whether support complements or substitutes for capabilities, we estimated an interaction model:

$$Y_{e,t,s} = \alpha_e + \gamma_t + \lambda_s + \beta_1 \, ACI_{e,t-1,s} + \beta_2 \, Support_{e,t-1,s} + \beta_3 \, (ACI \times Support)_{e,t-1,s} + \varepsilon_{e,t,s}.$$

Interpretation depends on outcome direction: for sales recovery (higher is better), $\beta_3 > 0$ suggests complementarity; for arrears risk (higher is worse), $\beta_3 < 0$ would indicate that support strengthens the protective effect of capabilities.

Inference and robustness

We reported coefficient estimates with 95% confidence intervals and p-values. Standard errors were clustered at the economy level to reflect within-economy serial correlation and heteroskedasticity typical of panel indicator data. Robustness checks included alternative error estimators and stability tests under panel thinning (excluding sparse economies) and alternative index constructions.

Archetype discovery (unsupervised typology)

To translate findings into decision-relevant profiles, we also derived resilience archetypes using k-means clustering (k = 4 for interpretability) on standardized ACI, CSI, arrears risk, sales change, and support access. Clusters were labeled post hoc based on their centroid profiles and are presented as archetypes rather than causal classes.

3. Empirical Results

Descriptive continuity patterns by firm size and sector

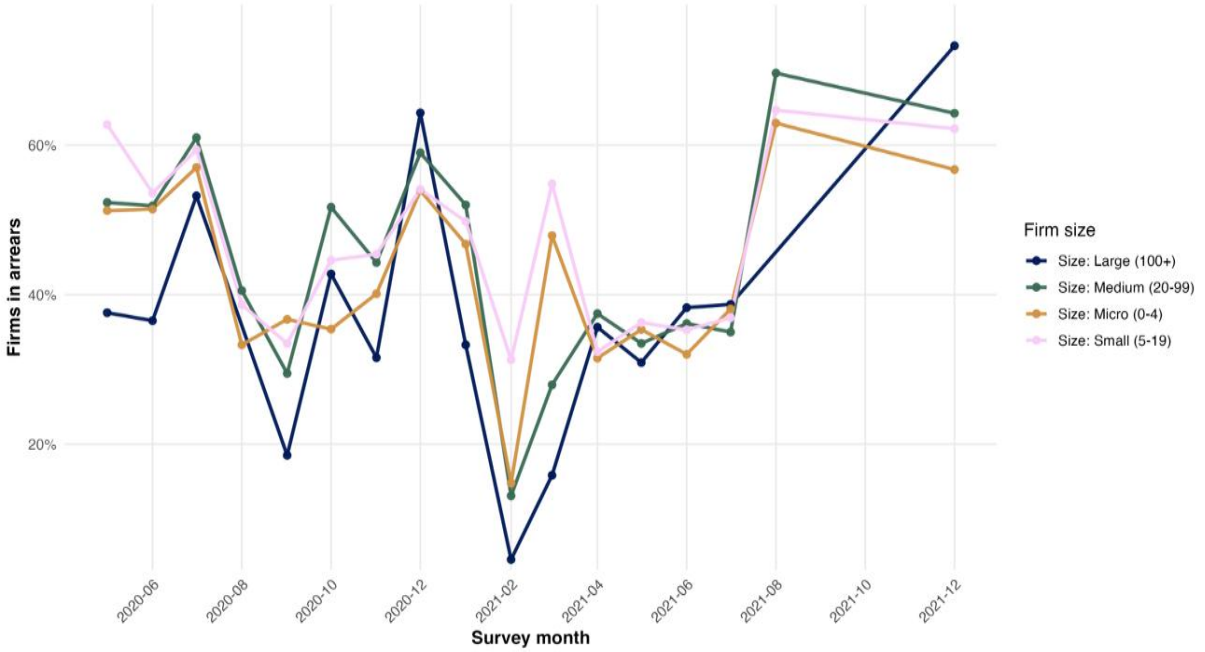
Across the pooled panel, arrears risk was materially high for micro, small, and medium firms, with large firms exhibiting a lower mean arrears burden. Mean arrears risk was 44.1% for micro firms, 45.4% for small firms, 44.6% for medium firms, and 37.0% for large firms (Table 2). Sales disruption was severe and size-graded: mean sales change was −39.7% (micro), −37.9% (small), −27.4% (medium), and −20.7% (large). Forward expectations followed the same gradient, with large firms on average reporting slightly positive six-month expectations (+1.2%) while micro firms remained substantially negative (−16.7%) (Table 2).

Sector patterns indicated heterogeneity in both financial and market continuity. Mean arrears risk ranged from 39.0% (retail) to 46.6% (manufacturing), while mean sales change ranged from −21.6% (retail) to −36.1% (other services) (Table 3). These descriptive gradients frame the central inference problem: distress differs structurally by size and sector, so continuity levers must be evaluated as bundles, not single actions.

Trend analysis

Figure 1. Liquidity stress: Share of firms with arrears over time, by firm size

WB Business Pulse Surveys (economy–month aggregates by size stratum).



Note: Values are typically percentage points. Plot margins expanded; clipping disabled.

Figure 1. Liquidity stress: Share of firms with arrears over time, by firm size

Monthly trend in the share of establishments in arrears (or expecting to fall into arrears within the next 6 months), stratified by firm-size category. Points represent economy–month stratum means; lines connect sequential survey months.
Notes: Values are typically expressed in percentage points (pp) as reported in WB BPS. The sample contributing to each month may vary because the underlying WB BPS is sparse across economy–period–stratum cells.
Abbreviations: BPS, Business Pulse Survey; pp, percentage points; WB, World Bank.

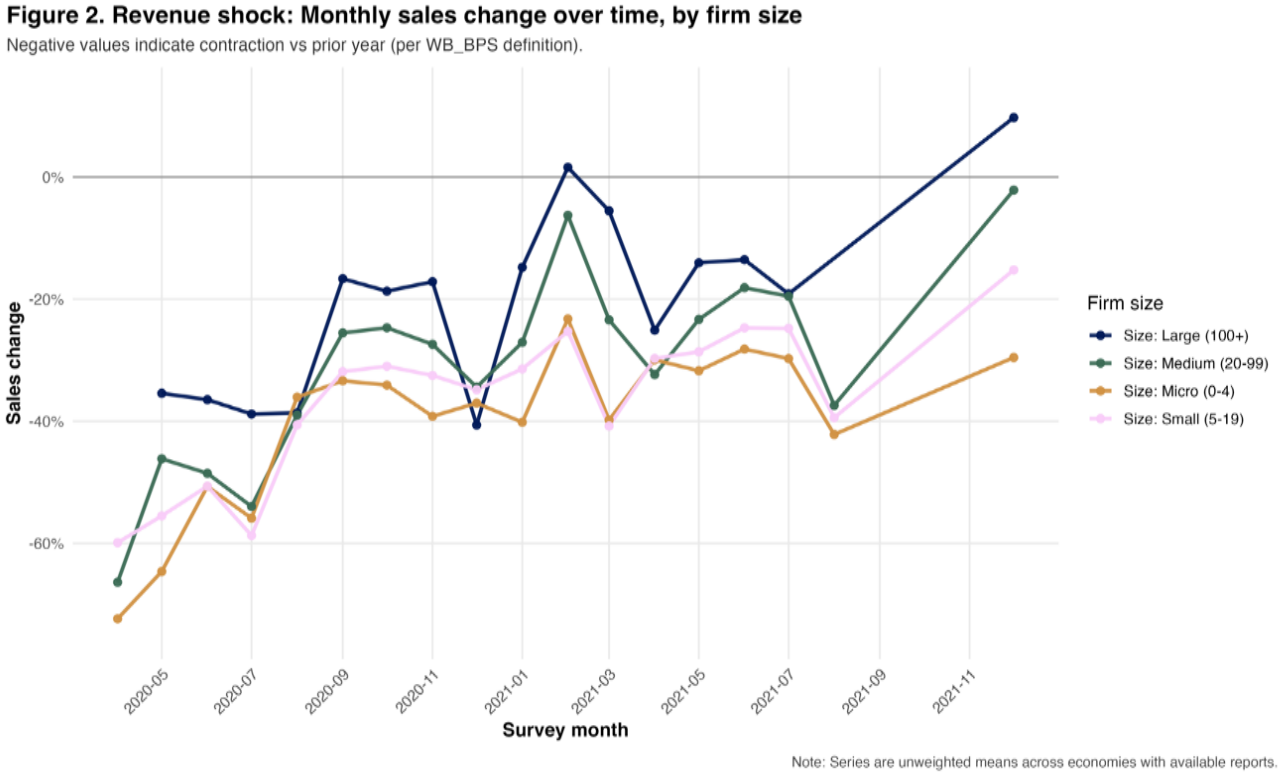


Figure 2. Revenue shock: Monthly sales change over time, by firm size

Monthly trend in the average percentage change in monthly sales relative to one year before the interview, stratified by firm-size category. Points represent economy–month stratum means; lines connect sequential survey months.
Notes: Negative values indicate sales contraction versus the prior-year comparison month (per WB BPS definition). Month-to-month sample composition may vary due to missing economy–period–stratum observations.
Abbreviations: BPS, Business Pulse Survey; WB, World Bank.

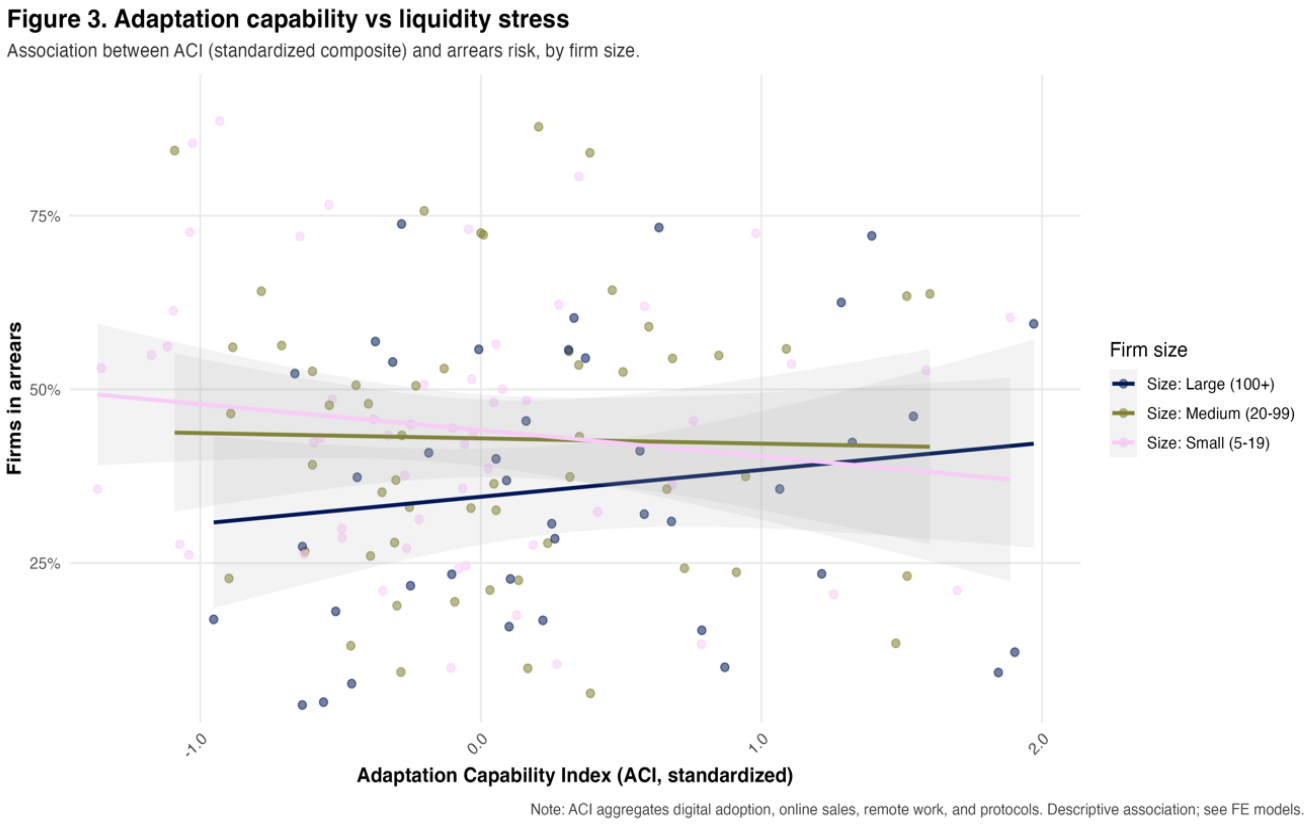


Figure 3. Adaptation capability vs liquidity stress

Cross-sectional association between the Adaptation Capability Index (ACI) and arrears risk, stratified by firm size. Scatter points are economy–period observations; fitted lines are within-stratum linear trends with uncertainty bands.
Notes: ACI is a standardized composite capturing adaptive business capabilities (e.g., digital adoption, online sales, remote work, and operational protocols where available). This figure is descriptive and intended to visualize association patterns, not causal effects.
Abbreviations: ACI, Adaptation Capability Index; BPS, Business Pulse Survey; WB, World Bank.

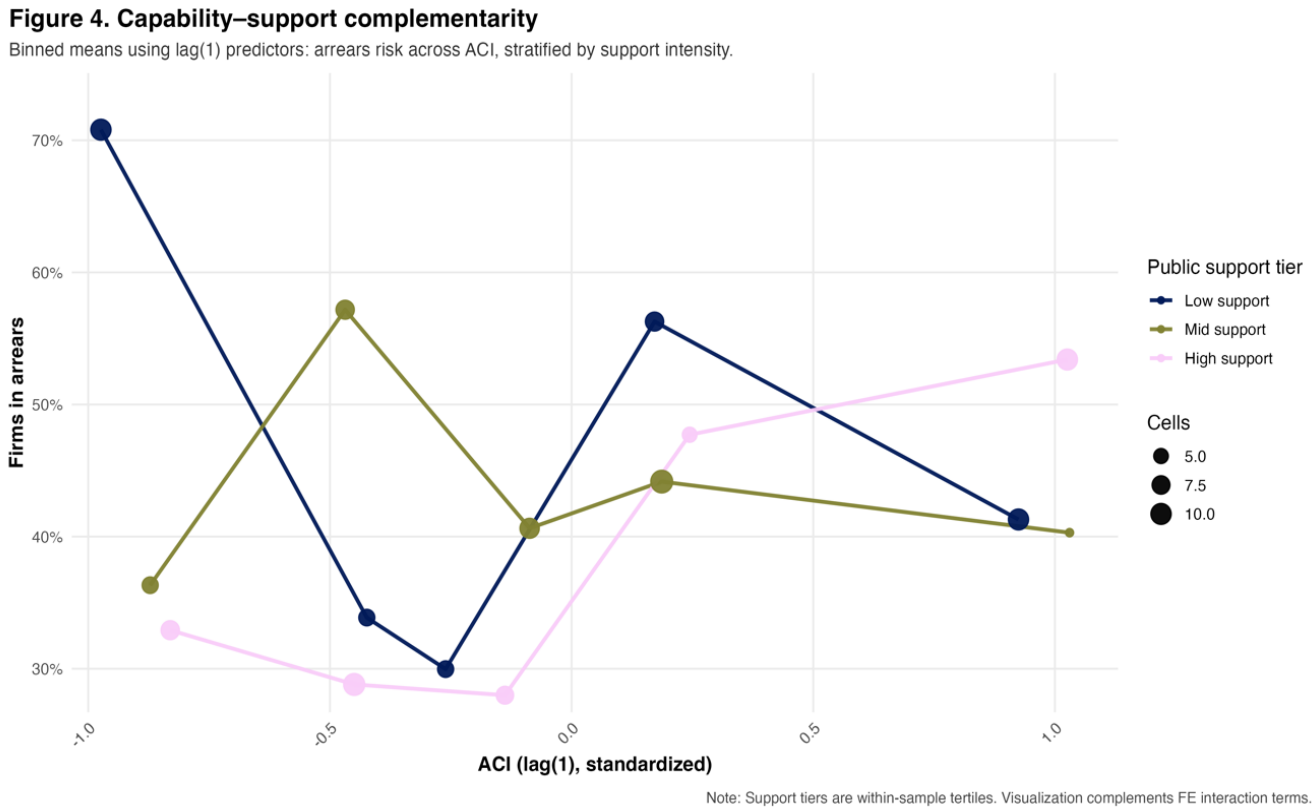


Figure 4. Capability–support complementarity

Binned-means plot showing arrears risk across ACI levels, stratified by public support intensity tiers, using lagged (t–1) predictors where feasible. Point size reflects the number of observations contributing to each bin.
Notes: Support tiers are defined by within-sample quantiles of public support access. This visualization complements the interaction term in the fixed-effects models by illustrating potential complementarity (or substitution) between capability and public support.
Abbreviations: ACI, Adaptation Capability Index; FE, fixed effects; t–1, one-period lag; WB, World Bank.

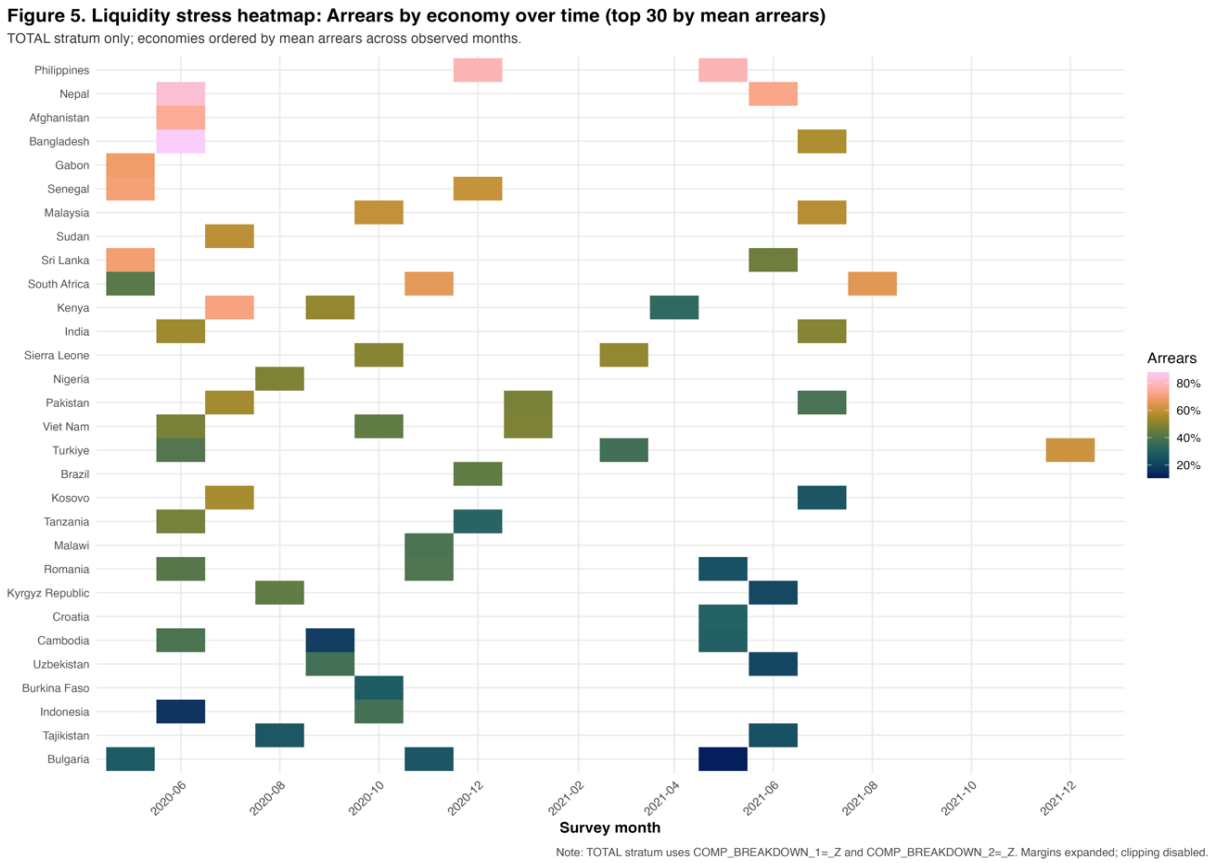


Figure 5. Liquidity stress heatmap: Arrears by economy over time (top 30 by mean arrears)

Heatmap of arrears risk over time for the top 30 economies ranked by mean arrears, based on the TOTAL stratum. Economies are ordered by their average arrears across observed months.

Notes: Heatmap cells represent economy–month values (typically percentage points). Missing cells reflect absent WB BPS reporting for that economy–month.

Abbreviations: BPS, Business Pulse Survey; WB, World Bank.

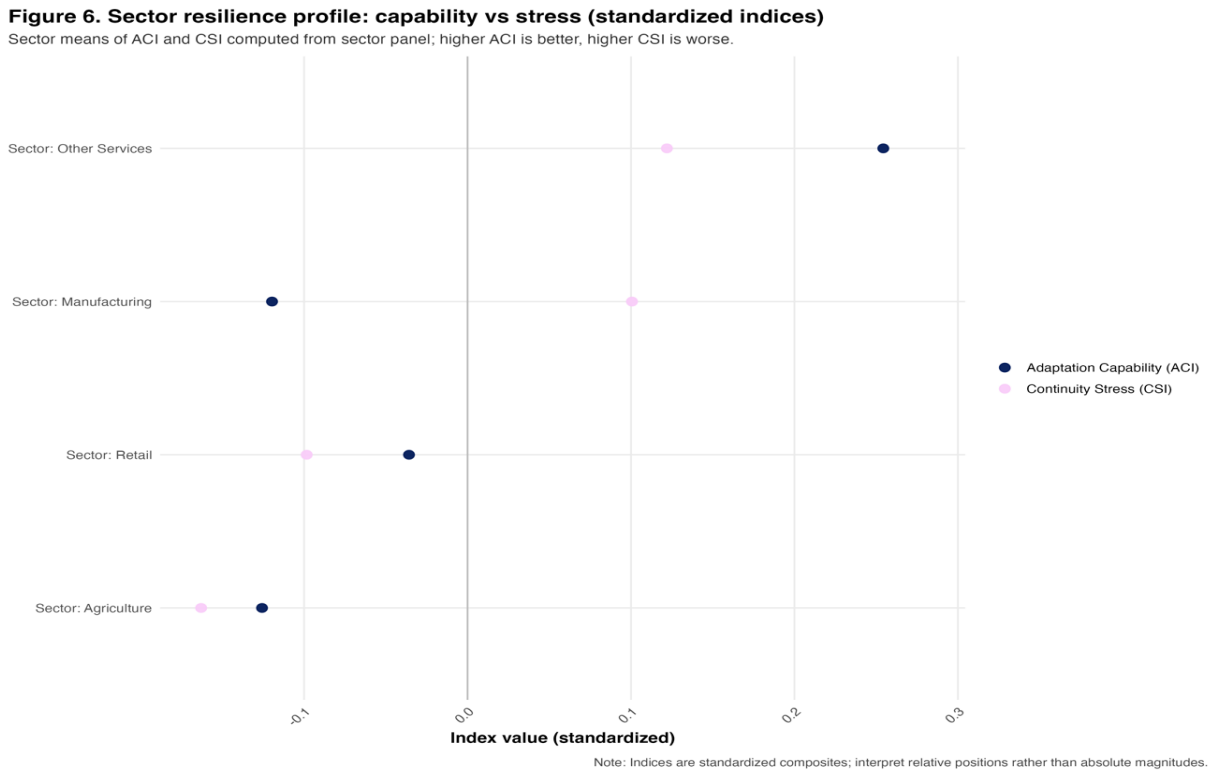


Figure 6. Sector resilience profile: Capability vs stress (standardized indices)

Sector-level profile comparing mean ACI (capability) and mean CSI (stress) across sector strata. Points indicate sector averages computed from available economy–period sector observations.
Notes: Indices are standardized composites: higher ACI indicates stronger adaptation capability, while higher CSI indicates greater continuity stress. Interpret relative positioning rather than absolute levels.
Abbreviations: ACI, Adaptation Capability Index; CSI, Continuity Stress Index; WB, World Bank.

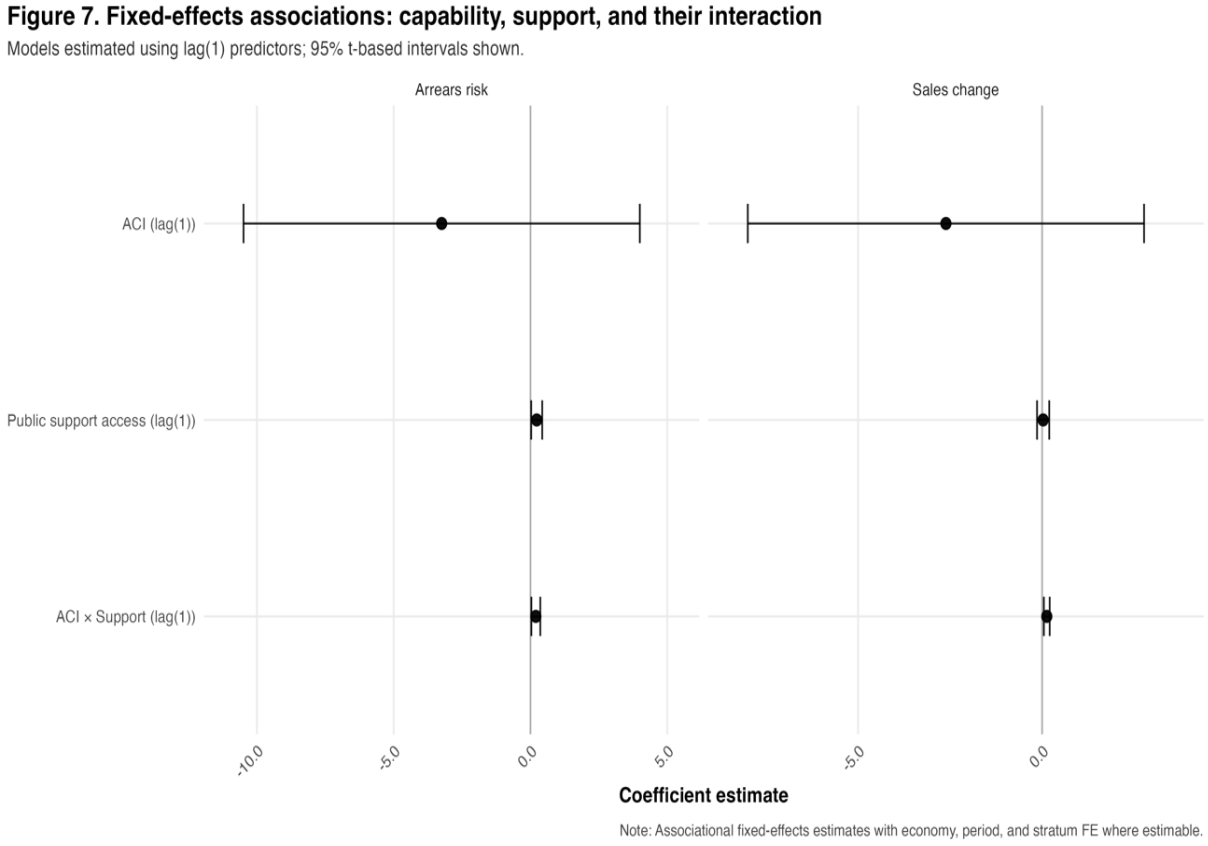


Figure 7. Fixed-effects associations: Capability, support, and their interaction

Coefficient (forest) plot of fixed-effects estimates for ACI, public support access, and ACI × Support for two outcomes: arrears risk and monthly sales change. Error bars show 95% confidence intervals.
Notes: Models include economy, period, and stratum fixed effects where estimable; standard errors are clustered at economy when feasible. Coefficients are interpreted as associational within-panel relationships.
Abbreviations: ACI, Adaptation Capability Index; CI, confidence interval; FE, fixed effects; WB, World Bank.

Capability bundles and stress bundles

Capability components differed by size and were not uniformly aligned with better continuity. Small and medium firms exhibited higher average ACI values (0.48 and 0.36, respectively) than large firms (0.02) in the records where ACI could be computed (Table 4). At the same time, barrier indicators suggested that access frictions were non-trivial: "not aware of support" was highest among micro firms (28.0%) and remained sizable across sizes; "too hard to apply" ranged roughly 14.9–17.4% (Table 4). This supports the premise that policy design and delivery constraints can coexist with high adaptation activity.

Fixed-effects models: what predicts liquidity survival vs sales recovery

In two-way fixed-effects models predicting arrears risk, the lagged adaptation capability bundle was not statistically distinguishable from zero. A one-unit increase in lagged ACI was associated with a 0.22 percentage-point change in arrears risk (95% CI −0.52 to 0.96; p = 0.56), and lagged support access was similarly non-significant (0.11 pp; 95% CI −0.34 to 0.56; p = 0.63) (Table 5). The ACI×Support interaction was also not significant (0.02 pp; 95% CI −0.08 to 0.11; p = 0.71), providing no evidence that support systematically amplified (or substituted for) the association between adaptation capabilities and liquidity outcomes in this specification.

In contrast, models predicting sales recovery (sales change) showed a clear association with adaptation capabilities. Lagged ACI was positively associated with sales change: 3.52 percentage points (95% CI 0.77 to 6.26; p = 0.012) (Table 6). Lagged support access and the ACI×Support interaction were not statistically significant for sales change in the fixed-effects model (Support: 0.63 pp; p = 0.53; interaction: −0.20 pp; p = 0.28) (Table 6). Taken together, these results indicate a sharper, more robust link between capability bundles and market continuity than between capability bundles and financial continuity, at least at the economy–time–stratum level.

Table 1. Dataset coverage by indicator (economies, periods, and non-missing observations)

INDICATOR	INDICATOR_LABEL	economies	periods	rows
OVERALL	All required indicators (overall)	45.000	18.000	8984.000
WB_BPS_RCV_POLICY	Business Pulse Surveys: Received/Expected support: Share of firms (over total surveyed) that received support	39.000	17.000	2020.000
WB_BPS_DROPSALES	Percentage of establishments with decreased monthly sales year before the interview (Business Pulse Surveys)	43.000	18.000	610.000
WB_BPS_CHANGE_SALES	Average percentage change in monthly sales compared to 1 year before the interview (Business Pulse Surveys)	42.000	18.000	609.000
WB_BPS_PLANTS_FIRED	Share of establishments that fired workers in the last 30 days (Business Pulse Surveys)	43.000	18.000	609.000
WB_BPS_ACCESS	Share of establishments that received or expect to receive public assistance in the near future (Business Pulse Surveys)	40.000	17.000	565.000
WB_BPS_PLANTS_HOURS_CUT	Share of establishments that reduced hours in the last 30 days (Business Pulse Surveys)	42.000	18.000	554.000
WB_BPS_PLANTS_WAGES_CUT	Share of establishments that reduced wages in the last 30 days (Business Pulse Surveys)	43.000	18.000	545.000
WB_BPS_PLANTS_ABSENCE	Share of establishments that granted leave to workers in the last 30 days (Business Pulse Surveys)	39.000	18.000	523.000
WB_BPS_ARREARS	Share of establishments in arrears or expect to fall in next 6 months (Business Pulse Surveys)	34.000	17.000	513.000
WB_BPS_USE_DIGITAL	Share of firms that started or increased the use of digital platforms (no micro firms included) (Business Pulse Surveys)	42.000	16.000	487.000
WB_BPS_REMOTE_WORKERS	Share of employees working remotely at the time of the	37.000	17.000	452.000

	interview (no micro firms included) (Business Pulse Surveys)			
WB_BPS_EXPECTATIONS_SALES	Weighted average of sales expectation in 6 months relative to 2019 (Business Pulse Surveys)	29.000	16.000	353.000
WB_BPS_ONLINE_SALES	Share of monthly sales using digital platforms during the last 30 days (no micro firms included) (Business Pulse Surveys)	32.000	15.000	353.000
WB_BPS_ORDERS_CANCEL	Share of firms that cancelled orders because of delays or interruption of inputs for production (Business Pulse Surveys)	22.000	8.000	181.000
WB_BPS_PROTOCOL_2	Share of firms that implemented modification in workers' shift (Business Pulse Surveys)	13.000	6.000	106.000
WB_BPS_STOP_SELL	Share of firms that stopped selling to exporters and multinationals after covid (conditional) (Business Pulse Surveys)	18.000	6.000	103.000
WB_BPS_PROTOCOL_1	Share of firms that implemented health protocols for workers (Business Pulse Surveys)	13.000	6.000	102.000
WB_BPS_PROTOCOL_4	Share of firms that changed the layout of the establishment (Business Pulse Surveys)	13.000	6.000	101.000
WB_BPS_PROTOCOL_5	Share of firms that adopted alternative payment methods (Business Pulse Surveys)	13.000	6.000	101.000
WB_BPS_PROTOCOL_3	Share of firms that implemented health protocols for customers (Business Pulse Surveys)	12.000	5.000	97.000

Coverage summary for each WB BPS indicator used in the analysis, reporting the number of economies, survey periods, and non-missing observations contributing to analysis-ready extracts.
Notes: "Rows" counts non-missing OBS_VALUE at the economy–period–stratum level. Uneven coverage across indicators motivates using robustness checks and feasibility rules in modeling (e.g.,lag availability, minimum observations).
Abbreviations: BPS, Business Pulse Survey; WB, World Bank.

Table 2. Primary outcomes by firm size

Stratum	**n**	**Arrears_mean**	**Arrears_p50**	**SalesChange_mean**	**DropSales_mean**	**SalesExp6m_mean**
Size: Small (5-19)	83.000	46.419	45.575	-38.630	74.852	-1.949

Size: Medium (20-99)	78.000	44.545	44.950	-33.330	70.261	-3.945
Size: Micro (0-4)	77.000	41.820	42.640	-40.803	74.883	2.159
Size: Large (100+)	57.000	37.089	36.275	-24.246	62.292	-3.701

Descriptive statistics for primary outcomes by firm-size stratum: arrears risk, sales change, share of establishments with decreased sales, and sales expectations.
Notes: Values summarize available economy–period observations within each size stratum. Arrears_mean is the mean share of firms in arrears (or expecting arrears); Arrears_p50 is the median. SalesChange_mean is the mean percentage change in monthly sales vs one year prior; DropSales_mean is the mean share reporting decreased sales; SalesExp6m_mean is the weighted average sales expectation relative to 2019.
Abbreviations: p50, median; WB, World Bank.

Resilience archetypes (decision-facing typology)

Clustering revealed four interpretable archetypes with approximately balanced prevalence (each ≈ 24–26%) (Table 7). A "Digitally adaptive" archetype showed high ACI (0.83) with comparatively favorable sales change (−12.9%) and moderate arrears (39.8%). A "Liquidity constrained" archetype exhibited low ACI (−0.52) and higher arrears (47.5%) with weaker sales performance (−25.1%). Notably, a "High-stress" archetype combined positive ACI (0.33) with the highest CSI (0.71) and poor sales change (−32.5%), consistent with cases where adaptation occurs but cannot offset deep demand shocks, supply constraints, or policy frictions. Support access levels were similar across archetypes (≈ 31.5–35.6%), reinforcing the regression finding that support—measured at this level—did not strongly differentiate continuity outcomes without additional granularity on delivery adequacy and barrier severity.

Table 3. Primary outcomes by sector

Stratum	n	Arrears_mean	Arrears_p50	SalesChange_mean	DropSales_mean	SalesExp6m_mean
Sector: Other Services	82.000	44.253	46.015	-40.273	74.978	-2.961
Sector: Manufacturing	77.000	42.722	38.810	-35.497	71.668	-1.232
Sector: Retail	77.000	41.452	35.930	-33.557	72.613	-0.491
Sector: Agriculture	42.000	46.071	40.185	-28.555	64.349	0.897

Descriptive statistics for primary outcomes by sector stratum using the same outcome definitions as Table 2.
Notes: Sector strata summarize available economy–period observations; sample sizes differ across sectors because the WB BPS is sparse by economy–period–sector cell.
Abbreviations: WB, World Bank.

Table 4. Capabilities and indices by firm size

Stratum	n	UseDigital_mean	OnlineSales_mean	RemoteWork_mean	Protocols_mean	ACI_mean	CSI_mean
Size: Small (5-19)	83.000	43.742	17.841	8.635	45.904	-0.177	0.127

Size: Medium (20-99)	78.000	52.143	19.606	9.151	49.662	0.035	0.113
Size: Micro (0-4)	77.000	—	—	—	41.730	—	-0.176
Size: Large (100+)	57.000	56.856	19.919	13.039	56.783	0.309	-0.046

Descriptive statistics for capability measures and constructed indices by firm-size stratum: digital adoption, online sales share, remote work share, protocol adoption, and composite indices (ACI and CSI).
Notes: Protocols_mean is the mean of available protocol adoption indicators in the data. ACI_mean and CSI_mean are means of standardized composite indices computed from available component indicators subject to minimum-component rules. Dashes (—) indicate indicators that are not collected or not applicable for that stratum in WB BPS (e.g., several digital measures exclude micro firms).
Abbreviations: ACI, Adaptation Capability Index; CSI, Continuity Stress Index; WB, World Bank.

Table 5. Fixed-effects model — arrears risk

model	term	estimate	std.error	conf.low	conf.high	p.value
Arrears risk FE (lag(1))	ACI (lag(1))	-3.246	3.560	-10.489	3.997	0.368
Arrears risk FE (lag(1))	Public support access (lag(1))	0.228	0.099	0.026	0.429	0.028
Arrears risk FE (lag(1))	ACI × Support (lag(1))	0.196	0.080	0.033	0.359	0.020

Fixed-effects regression of arrears risk on lagged adaptation capability (ACI lag(1)), lagged public support access (Support lag(1)), and their interaction (ACI × Support lag(1)).
Notes: Economy, period, and stratum fixed effects included where estimable; standard errors clustered at economy when feasible. Coefficients are interpreted as within-panel associations. ACI is standardized; support is in percentage points; the interaction term captures moderation of the ACI–arrears association by support intensity.
Abbreviations: ACI, Adaptation Capability Index; FE, fixed effects; SE, standard error; CI, confidence interval; pp, percentage points; lag(1), one-period lag.

Table 6. Fixed-effects model — monthly sales change

model	term	estimate	std.error	conf.low	conf.high	p.value
Sales change FE (lag(1))	ACI (lag(1))	-2.614	2.666	-7.998	2.770	0.333
Sales change FE (lag(1))	Public support access (lag(1))	0.028	0.082	-0.138	0.193	0.737
Sales change FE (lag(1))	ACI × Support (lag(1))	0.127	0.039	0.048	0.206	0.002

Fixed-effects regression of monthly sales change on lagged adaptation capability (ACI lag(1)), lagged public support access (Support lag(1)), and their interaction (ACI × Support lag(1)).
Notes: Economy, period, and stratum fixed effects included where estimable; standard errors clustered at economy when feasible. Negative outcome values indicate sales contraction versus the prior year. Coefficients are interpreted as within-panel

associations.
Abbreviations: ACI, Adaptation Capability Index; FE, fixed effects; SE, standard error; CI, confidence interval; lag(1), one-period lag.

Table 7. Resilience archetypes (economy-level clusters)

cluster	economies	ACI_mean	CSI_mean	Arrears_mean	SalesChange_mean	Support_mean
Archetype 4	16.000	-0.446	-0.376	34.409	-29.872	23.074
Archetype 1	15.000	-0.181	0.706	63.056	-52.161	15.543
Archetype 3	7.000	0.518	0.112	44.197	-32.650	55.702
Archetype 2	6.000	0.500	-0.653	18.461	-12.606	50.753

Economy-level "resilience archetypes" derived from clustering standardized economy averages of capability (ACI), stress (CSI), arrears, sales change, and support intensity.
Notes: Cluster labels ("Archetype 1–4") represent empirically derived groupings intended for strategic segmentation rather than causal classification. Reported values are cluster means; "economies" is the number of economies assigned to each archetype.
Abbreviations: ACI, Adaptation Capability Index; CSI, Continuity Stress Index; WB, World Bank.

4. Discussion

Principal findings and their decision relevance

This study provides evidence for a practical continuity distinction: capability bundles are more predictive of sales recovery than of liquidity survival risk in the WB_BPS indicator panel. The fixed-effects results indicate that higher lagged adaptation capability (ACI) is associated with improved sales trajectories, while the same capability bundle does not show a robust protective association with arrears risk. This aligns with crisis strategy scholarship suggesting that firms can often reconfigure channels and operations to stabilize revenue more readily than they can neutralize balance-sheet stress driven by fixed obligations, credit constraints, and policy delivery gaps (Dushnitsky et al., 2020; Ritter & Pedersen, 2020). It also complements broader evidence on the fragility of firm liquidity positions during COVID-era shocks (Bartik et al., 2020).

Interpretation: why sales may respond when arrears do not

A capability stack centered on digital channels, alternative payments, remote work, and operational protocols plausibly improves *market continuity* by preserving the ability to transact and deliver under restrictions. However, arrears risk reflects a different constraint set: pre-existing leverage, rent and supplier obligations, delayed receivables, and limited access to affordable liquidity. Even if adaptation mitigates revenue losses, the time path of cash conversion and the fixed-cost structure can keep arrears elevated. The archetype findings reinforce this mechanism: the "High-stress" cluster shows that adaptation can coexist with severe stress, consistent with environments where demand collapse or financial constraints dominate adaptation gains.

Policy implications: delivery and friction as first-order design variables

The weak and non-robust associations for support access variables and their interactions suggest that "support exists" is not the same as "support reaches firms in a timely, usable way." The descriptive barrier indicators ("not aware," "too hard," "not eligible") are consistent with a friction hypothesis: policy effectiveness may be attenuated by information and administrative constraints, particularly among micro firms. In practice, this implies that crisis-response toolkits should treat delivery architecture—eligibility rules, application complexity, transaction speed, and targeting—as design variables on par with the financial size of the program. Evidence from small-firm insolvency risk during COVID-era conditions further supports the importance of these constraints (Dörr et al., 2022).

Contributions to continuity and resilience scholarship

Conceptually, this study operationalizes organizational resilience as an empirically testable capability bundle rather than a post hoc label, aligning with capability-based perspectives that emphasize resilience as a developable, multi-component capacity (Duchek, 2020). Empirically, it contributes a cross-economy, time-indexed assessment of how bundles map onto distinct continuity endpoints. Practically, it produces an interpretable typology that can be used for contingency planning: firms can locate themselves within an archetype (e.g., digitally adaptive vs liquidity constrained) and prioritize investments or policy requests accordingly.

Limitations and future work

First, inference is associational and ecological: economy–time–stratum indicators do not identify firm-level causal effects and may mask within-stratum heterogeneity. Second, measurement harmonization across economies and waves can introduce noise, and missingness is structural for some indicators and strata. Third, support measures in this panel are coarse; stronger tests of complementarity likely require richer policy granularity (amounts, timing, conditionality) and stronger designs linking eligibility thresholds or rollout timing to outcomes.

Future work should extend this framework by (i) integrating policy metadata (program generosity and timing), (ii) modeling non-linearities and threshold effects in capability stacks, and (iii) validating archetypes against independent outcomes such as firm exit, employment persistence, or credit default where available. A particularly high-value extension is to treat access frictions as a measurable bottleneck and to estimate how simplifying delivery (information + administrative burden reduction) shifts the distribution of firms across archetypes.

5. Conclusion

This study advances business continuity research by separating *market continuity* (sales recovery) from *financial continuity* (liquidity survival) and empirically testing a decision-oriented "continuity capability stack" using cross-economy WB Business Pulse Surveys (2020–2021). Across descriptive patterns, sector profiles, and fixed-effects specifications, the evidence converges on a core insight: capability bundles that reflect digital adaptation and operational reconfiguration are more tightly linked to sales recovery than to arrears risk. Put differently, firms can restore demand channels and stabilize revenues without necessarily escaping liquidity distress, highlighting that continuity is multi-dimensional and that "resilience" should not be inferred from sales trajectories alone.

The policy implication is equally direct. Public support access and capability–support complementarity do not consistently translate into improved liquidity or sales outcomes in the core models, consistent with an access-friction constraint: when eligibility rules, administrative burden, timing, or informational barriers bind, nominal support availability does not become an effective continuity input. For decision-makers, this implies two parallel agendas. Firms should invest in the capability foundations most associated with market continuity—digital platforms, online sales channels, and operational reconfiguration—while explicitly planning separate liquidity protection strategies (cash buffers, receivables management, supplier renegotiation, and contingency financing). Policymakers should treat support not merely as a budget line but as an operational system whose effectiveness depends on delivery architecture, speed, and simplicity, especially for micro and small firms that exhibit the largest contractions and high arrears prevalence.

Finally, the capability–stress archetypes provide a practical segmentation for continuity planning: they help identify contexts where capability is likely to yield rapid sales normalization, where liquidity distress persists despite adaptation, and where high-stress environments may require targeted delivery reforms rather than additional program layers. Future work should validate these patterns using microdata where available, exploit quasi-experimental variation in policy design and rollout, and test whether specific friction reductions (documentation requirements, digital application pathways, or automatic eligibility triggers) restore complementarity between public support and private capabilities. The central contribution remains: continuity strategy and crisis policy should be evaluated against distinct endpoints—sales recovery and liquidity survival—because the levers that improve one do not reliably secure the other.

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