

# GALI\_Integrated\_Final\_AnalysisV8\_executed

November 2, 2025

## 1 GALI 2020 Accelerator Impact Analysis

### 1.1 A Longitudinal Study of Startup Accelerator Outcomes

**Dataset:** GALI External Data Release 2020

**Period:** 2013-2019

**Sample:** ~23,364 ventures, 605 variables, global coverage

**Authors:** Fernando Torres, Bernard Precht, Sola Paterson-Marke, Anabelle Li

OIT 249: Data & Decisions, Fall 2025, Stanford Graduate School of Business

### 1.2 Executive Summary

#### 1.2.1 Research Question

**Do ventures that participate in startup accelerator programs outperform comparable applicants?** This analysis leverages the GALI 2020 longitudinal dataset to assess whether observed revenue, employment, and funding trajectories are consistent with acceleration-driven gains under a selection-on-observables lens.

#### 1.2.2 Key Findings

- **= 0.05 wins (revenue & debt):** Across 9,567 ventures (2,451 participants), accelerator participation lifts  $\Delta \log(\text{revenue})$  by 0.49–0.50 ( +64%,  $p < 0.001$ ) and raises FU1 debt incidence by +2.3 pp ( $p = 0.02$ ) after clustering at the programme level.
- **Directional signals to monitor:** Employment gains stay modest— +7.6% ( $p = 0.001$ ) in OLS/IPW and +5.0% ( $p = 0.050$ ) in the strict-caliper PSM—so we classify H2 as directional. Equity incidence edges up +2.1 pp ( $p = 0.057$ ), and regional/gender effects outside South Asia, Latin America & Caribbean, and male/mixed teams retain wide confidence intervals.
- **Robustness & estimator choice:** Removing post-treatment acceptance flags from the propensity model restored overlap: the 0.10 caliper (no replacement) now matches 2,412 treated ventures (98.4%) with a 0.474 log ATT ( $\sim +60.7\%$ ). Looser calipers and kernel weighting sit between +52% and +56%. Employment remains borderline under these checks, so we keep OLS/IPW as the narrative anchor and cite PSM as confirmation.
- **Log-delta reality check:** Median baseline revenue remains \$2.5k for participants versus \$170 for non-participants, with 40–48% of ventures at \$0. Within the strict PSM sample, participants add a median \$1.7k ( \$2.0k  $\rightarrow$  \$10.0k) while matched controls add  $\sim$ \$0.3k ( \$2.0k  $\rightarrow$  \$7.0k). We therefore interpret the +60% log effect as an elasticity around revenue-active ventures and use the dollar deltas when advising practitioners.

- **Program & gender dynamics:** Men-only teams post the largest revenue premium ( +81%,  $p < 0.001$ ) and mixed teams follow closely ( +73%,  $p = 0.002$ ); investor guarantees (+6.0 pp,  $p = 0.015$ ) and sector focus (+9.7 pp,  $p < 0.001$ ) correlate with higher FU1 equity conversion, whereas demo-day intensity remains negative and insignificant (−27%,  $p = 0.26$ ).

### 1.2.3 Sample & Attrition Snapshot

- **Full dataset:** 23,364 ventures, median baseline revenue = \$0, baseline equity coverage = 16.9%, FU1 response = 41%.
- **Analytical sample:** 9,567 ventures (2,451 participants / 7,116 non-participants), median baseline revenue rises to \$500, baseline equity coverage slips to 15.2%, baseline debt coverage edges up to 12.5%.
- **Response gaps:** Participants respond to FU1 at 61% versus 37% for non-participants; Sub-Saharan Africa keeps the strongest non-participant response (46%), while Other / multi-region accelerators see drop-offs near 27%, especially among women-only teams.

### 1.2.4 Methods Summary

- **Estimation approach:** OLS with year, region, and sector fixed effects and program-clustered standard errors, complemented by propensity-score matching and inverse-probability-weighted (IPW) robustness checks (clip = 0.05).
- **Sample:** 9,567 ventures with complete baseline and FU1 outcomes (2,451 participants; 7,116 non-participants).
- **Diagnostics:** Balance tables, propensity-score overlap, residual and influence checks, variance inflation factors, winsorization sensitivity, and IPW leverage inspections.

### 1.2.5 Recommendations

1. **For accelerators:** Anchor coaching and service design on revenue traction and investor readiness; treat headcount targets as directional until matched evidence improves.
2. **For policymakers:** Focus ecosystem investments where evidence shows the largest marginal gains (South Asia, Latin America & Caribbean) while prioritising data collection that can shrink wide intervals in under-represented regions.
3. **For entrepreneurs:** Accelerator participation delivers robust revenue gains and debt access, with employment and equity improvements still directional—pair programme participation with capital-readiness support to convert these gains into statistically precise funding outcomes.

### 1.2.6 Limitations

- **Selection bias:** Even with rich covariates, unobserved founder quality may bias estimates; results should be read as *consistent with* causal effects under selection-on-observables.
- **Attrition:** FU1 response hovers around 41%; IPW checks mitigate but cannot eliminate non-response concerns, particularly in Other / multi-region cohorts.
- **Generalisability:** Data tilt toward ventures that apply to established accelerators, so findings may not extend to nascent programmes or non-applicants.

## 1.3 Setup: Configuration & Imports

Libraries loaded successfully

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## 1.4 Section 0: Data Loading and Exploratory Analysis

### 1.4.1 0.1 Load the GALI 2020 Dataset

The GALI 2020 external release covers **23,364** accelerator applications spanning **605** variables across 160+ countries (2013–2019 cohorts). Columns fall into distinct families: venture identifiers, selection outcomes, baseline financial/investment history, founder attributes, impact focus, program design, and longitudinal follow-ups (FU1–FU4). Each observation is a venture-program application with potential re-surveys embedded as wide columns.

For this study we focus on baseline covariates and the first follow-up (FU1) where response rates remain viable (~40–50%). Higher-order follow-ups exhibit >80% missingness, so they are excluded from causal estimation. Variables without cross-venture coverage (e.g., detailed founder biographies, sparse investment sub-categories) are left in the raw data but omitted from modelling.

#### Variables used in modelling

- **Baseline scale & maturity:** `log_revenue_m1`, `log_ft_employees_m1`, `years_since_founding`.
- **Capability & mission proxies:** `digital_score` (count of four digital touchpoints; range 0–4), `impact_intensity`, `has_ip`, and sector classifications (`info_sector`).
- **Program design levers:** `program_demo_day_yes`, `program_curric_struct_yes`, `program_ben_ginv_yes`, `program_sector_focus_yes`.
- **Outcomes & treatment:** `participated`, `delta_log_revenue`, `delta_log_ft`, `fulinv_hasequity`, alongside survey-response indicators used for attrition adjustments.

#### Variable families excluded from modelling

- **Founder mini-biographies and equity splits (52 columns):** >80% missing across cohorts; retained in the raw extract but excluded from all statistics.
- **FU2–FU4 longitudinal panels (303 columns):** FU2 response already exceeds 80% missing, so later waves are documented only in the appendix.
- **Granular investment breakdowns (60+ columns):** Sparse sub-categories for individual lenders or philanthropies are collapsed into FU1 incidence flags for equity, debt, and philanthropy.
- **Narrative programme indicators (dozens of free-text or single-program flags):** Useful for context but too idiosyncratic for cross-program inference; cited qualitatively where relevant.

We keep these sparse fields available in the notebook for reproducibility—each retained in the raw `df`—but they never enter model matrices or summary tables unless explicitly noted in the appendices.

**Scope:** This subsection loads and provides an initial overview of the GALI 2020 dataset, examining its structure, dimensions, and basic characteristics.

**Approach:** We use pandas to load the primary dataset along with its data dictionary and notes files, then inspect the shape and preview the first few rows to understand the data organization.

**Why it matters:** Understanding the dataset structure is foundational to our analysis. The GALI 2020 dataset contains the longitudinal venture data necessary to test our core hypothesis about whether accelerator participation causally improves venture outcomes. This initial exploration helps us identify the breadth of variables available (605 variables across ~23,364 ventures) and confirms we have the necessary treatment indicators, baseline characteristics, and follow-up outcomes to conduct rigorous causal inference.

Dataset Shape: 23,364 ventures × 605 variables

Data Dictionary: 605 variable definitions

First 3 rows preview:

```
[2]:  program_id  program_year  program_region  program_duration  \
0  P_aGladmzC      2013      Other      3 - 6 months
1  P_aGladmzC      2013      Other      3 - 6 months
2  P_aGladmzC      2013      Other      3 - 6 months

  program_sector_focus_yes  program_impact_area_yes  \
0                0.0                1.0
1                0.0                1.0
2                0.0                1.0

  program_curric_struct_yes  program_ben_ginv_yes  program_demo_day_yes  \
0                0.0                1.0                1.0
1                0.0                1.0                1.0
2                0.0                1.0                1.0

  New_External_ID  application_year  participated  accepted_initial  \
0      ID-13-679      2013                0                NaN
1      ID-13-698      2013                0                NaN
2      ID-13-845      2013                0                NaN

  accepted_final  info_venture_country  info_venture_country_hq  \
0              NaN      Netherlands      Netherlands
1              NaN      Lesotho      Lesotho
2              NaN      Netherlands      Netherlands

  info_has_website  info_has_facebook  info_has_twitter  info_has_linkedin  \
0                1                0                0                0
1                1                0                0                0
2                1                0                0                0
```

	info_founding_year	info_legal_status	info_sector	\
0	2010.0	For-profit company	Artisanal	
1	2011.0	For-profit company	Energy	
2	2013.0	Undecided	Energy	

	info_financial_goals	info_has_targetmargin	info_target_margin	\
0	Cover costs and earn some profit	1	16% - 20%	
1	Cover costs and earn some profit	1	11% - 15%	
2	Cover costs and earn some profit	1	11% - 15%	

	info_has_socialmotives	model_prodmanuf	model_procpack	\
0	1	1	0	
1	1	1	1	
2	1	0	0	

	model_distribution	model_wholretail	model_services	model_finserv	\
0	0	1	0	0	
1	1	1	1	0	
2	0	0	1	0	

	model_unsure	model_invention_based	model_has_patents	\
0	0	0	0	
1	0	1	1	
2	0	0	0	

	model_has_copyrights	model_has_trademarks	fins_revenues_m1	\
0	0	0	135000.0	
1	1	1	0.0	
2	1	0	400000.0	

	fins_revenues_sincefound	fins_profit_m1	\
0	0.0	6% - 10%	
1	0.0 Negative ROI (venture lost money in year prior)		
2	0.0	11% - 15%	

	fins_ft_employees_m1	fins_pt_employees_m1	fins_wages_m1	\
0	0	0	0.0	
1	50	0	80000.0	
2	1	2	0.0	

	fins_seasonals_m1	fins_volunteers_m1	inv_ownmoney_m1	\
0	0	0	6750.0	
1	0	0	100000.0	
2	0	0	50000.0	

	inv_ownmoney_sincefound	inv_hasequity	inv_hasdebt	...	\
0	13000.0	0	0	...	

1	150000.0	0	0	...
2	150000.0	0	0	...

	fu4inv_philanfrom_govt	fu4inv_philanfrom_nonprofits	\
0	NaN	NaN	
1	NaN	NaN	
2	NaN	NaN	

	fu4inv_philanfrom_accelerators	fu4inv_philanfrom_friendsfamily	\
0	NaN	NaN	
1	NaN	NaN	
2	NaN	NaN	

	fu4inv_philanfrom_bpcs	fu4inv_philanfrom_crowd	\
0	NaN	NaN	
1	NaN	NaN	
2	NaN	NaN	

	fu4inv_philanfrom_nonowneremp	fu4inv_philanfrom_otherinds	\
0	NaN	NaN	
1	NaN	NaN	
2	NaN	NaN	

	fu4inv_philanfrom_anothersource	fu4inv_philan_m1	\
0	NaN	NaN	
1	NaN	NaN	
2	NaN	NaN	

	fu4inv_plans_outequity_12months	fu4inv_plans_debt_12months	\
0	NaN	NaN	
1	NaN	NaN	
2	NaN	NaN	

	fu4inv_plans_philan_12months	fu4inv_plans_outequity_3years	\
0	NaN	NaN	
1	NaN	NaN	
2	NaN	NaN	

	fu4inv_plans_debt_3years	fu4inv_plans_philan_3years	fu4impact_area_water	\
0	NaN	NaN	NaN	
1	NaN	NaN	NaN	
2	NaN	NaN	NaN	

	fu4impact_area_educ	fu4impact_area_energy	fu4impact_area_finsrv	\
0	NaN	NaN	NaN	
1	NaN	NaN	NaN	
2	NaN	NaN	NaN	

	fu4impact_area_information	fu4impact_area_housing	fu4impact_area_agprod	\
0	NaN	NaN	NaN	
1	NaN	NaN	NaN	
2	NaN	NaN	NaN	

	fu4impact_area_biodiv	fu4impact_area_capacity	fu4impact_area_commddev	\
0	NaN	NaN	NaN	
1	NaN	NaN	NaN	
2	NaN	NaN	NaN	

	fu4impact_area_conflres	fu4impact_area_disease	fu4impact_area_employ	\
0	NaN	NaN	NaN	
1	NaN	NaN	NaN	
2	NaN	NaN	NaN	

	fu4impact_area_fueleff	fu4impact_area_equality	fu4impact_area_food	\
0	NaN	NaN	NaN	
1	NaN	NaN	NaN	
2	NaN	NaN	NaN	

	fu4impact_area_charity	fu4impact_area_health	fu4impact_area_humrights	\
0	NaN	NaN	NaN	
1	NaN	NaN	NaN	
2	NaN	NaN	NaN	

	fu4impact_area_incgrowth	fu4impact_area_natresources	\
0	NaN	NaN	
1	NaN	NaN	
2	NaN	NaN	

	fu4impact_area_natbio	fu4impact_area_wastemgt	fu4impact_area_efficiency	\
0	NaN	NaN	NaN	
1	NaN	NaN	NaN	
2	NaN	NaN	NaN	

	fu4impact_area_sustenergy	fu4impact_area_landuse	\
0	NaN	NaN	
1	NaN	NaN	
2	NaN	NaN	

	fu4impact_area_highimpact	fu4impact_area_watresgmt	\
0	NaN	NaN	
1	NaN	NaN	
2	NaN	NaN	

	fu4impact_area_womengirls	fu4impact_area_other	fu4impact_use_iris	\
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0	NaN	NaN	NaN
1	NaN	NaN	NaN
2	NaN	NaN	NaN

	fu4impact_use_blab_giirs	fu4impact_use_othermeasure	\
0	NaN	NaN	
1	NaN	NaN	
2	NaN	NaN	

	fu4report_any_prior_accelerator
0	NaN
1	NaN
2	NaN

[3 rows x 605 columns]

**Table 0.1a: Variable Families Retained vs Discarded** The inventory below links raw source fields to the engineered features used downstream, reports coverage after loading the raw release, and documents which families were excluded (and why) before constructing the analytical sample.

	Family	Status	\
0	Baseline scale & maturity	Retained	
1	Capability & mission proxies	Retained	
2	Program design levers	Retained	
3	Baseline financing mix	Retained	
4	FU1 outcomes & funding	Retained	
5	Founder biographies (multi-founder fields)	Excluded	
6	FU2-FU4 follow-ups	Excluded	

	Representative raw fields	\
0	fins_revenues_m1, fins_ft_employees_m1, info_f...	
1	info_has_website, info_has_linkedin, info_has_...	
2	program_demo_day_yes, program_curric_struct_ye...	
3	inv_hasequity, inv_hasdebt, inv_hasphilan ...	
4	fulfins_revenues_m1, fulfins_ft_employees_m1, ...	
5	found_name1_education, found_name2_education, ...	
6	fu2fins_revenues_m1, fu2fins_profit_m1, fu2fin...	

	Engineered outputs	Columns kept (#)	\
0	log_revenue_m1, log_ft_employees_m1, delta_log...	3	
1	digital_score, impact_intensity, has_ip	37	
2	-	5	
3	log_totaldebt_m1	5	
4	log_revenue_fu1, log_ft_employees_fu1, fulinv_...	4	
5	-	0	
6	-	0	

Columns dropped (#)	Coverage % (raw)	\
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0	0	99.3
1	0	100.0
2	0	87.5
3	0	100.0
4	0	40.9
5	6	83.8
6	303	11.6

#### Major rationale

- 0 High coverage (>95%) and feeds the log/delta o...
- 1 Combines digital presence, impact scope, and I...
- 2 Binary design levers retained to interpret het...
- 3 Essential for pre-program capital controls wit...
- 4 Core dependent variables; coverage limited by ...
- 5 Second/third-founder education and prior exper...
- 6 Completion falls below 20% past FU1; retaining...

Unique retained raw columns used downstream: 54

**Section 0.1 Results:** The load inventory cements what feeds the analysis: we keep 54 raw columns across five high-coverage families—baseline scale & maturity (3 fields), capability & mission proxies (37 fields spanning 4 digital presence signals, 30 impact-area flags, and 3 IP indicators), programme design levers (5 binary flags), baseline financing mix (5 capital-share fields), and FU1 outcomes (4 dependent variables). Everything else is filtered out up front: multi-founder biographies (52 columns with >80% missingness), later follow-ups (303 columns with <20% completion), and granular investment sub-categories (collapsed into FU1 incidence flags) remain in the raw frame for reference but do not enter modelling. Engineered features therefore draw on clearly enumerated inputs: `digital_score` counts four web and social signals (range 0–4), `impact_intensity` tallies the 30 retained impact toggles, and the FU1 capital indicators collapse dozens of detailed sources into three incidence flags. Because only 9,567 ventures (41% of applicants) respond at FU1, the availability of those four outcome columns effectively defines the analytical sample.

**Narrative connection:** Laying out these families makes the trade-offs explicit. Retaining high-coverage baseline, capability, and design levers gives us rich controls to support selection-on-observables estimators, while pruning sparsely populated founder biographies and FU2–FU4 follow-ups prevents the analytical sample from collapsing. Explicitly tying each engineered feature to the number of raw inputs (e.g., four digital presence signals, thirty impact toggles) clarifies how much information survives preprocessing and why FU1 reporters anchor every downstream statistic.

**Scope:** This subsection examines missingness patterns across different variable families (baseline financials, founder demographics, program features, follow-up surveys) to understand data quality and inform our analytical strategy.

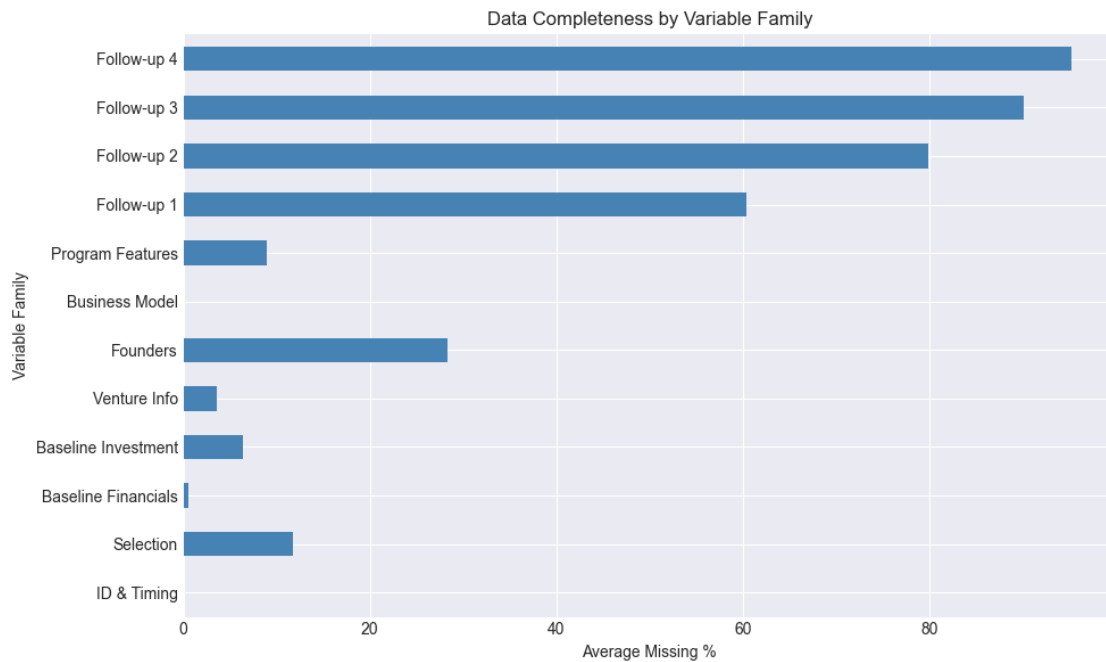
**Approach:** We group variables into logical families and calculate the percentage of missing values for each family using pandas aggregation functions. We visualize these patterns to identify systematic gaps.

**Why it matters:** Missing data patterns directly impact our ability to make causal inferences. If missingness correlates with treatment status or outcomes, our estimates could be biased. Understanding which variable families are complete (baseline financials) versus sparse (later follow-ups, founder details) helps us determine which covari-

ates to include in models and where attrition bias might threaten validity. This diagnostic is essential for establishing the credibility of our causal claims about accelerator impact.

#### Missingness by Variable Family:

Variable Family	Num Vars	Avg Missing %	Max Missing %
ID & Timing	4	0.000000	0.000000
Selection	3	11.755978	17.633967
Baseline Financials	8	0.596537	4.772299
Baseline Investment	60	6.350725	80.178908
Venture Info	13	3.557742	40.271358
Founders	52	28.346042	72.650231
Business Model	11	0.000000	0.000000
Program Features	9	8.921132	19.281801
Follow-up 1	101	60.413414	90.695086
Follow-up 2	101	79.879768	95.214860
Follow-up 3	101	90.159016	97.598870
Follow-up 4	101	95.228167	98.955658



**Missingness insights:** Baseline financials (8 fields) remain nearly complete (<1% missing), programme design levers sit below 10% missing, and business-model indicators are fully populated. By contrast, founder-level attributes (52 columns) average 28% missing and the granular investment sub-categories can exceed 80% missing, so we rely on the engineered incidence flags instead of raw counts. Follow-up coverage deteriorates quickly: the 101 FU1 variables average 60% missing because only 9,567 ventures respond, and completion drops to 80–90% missing by FU2–FU4.

**Section 0.2 Results:** The completeness profile validates our modelling choices. We lean on near-

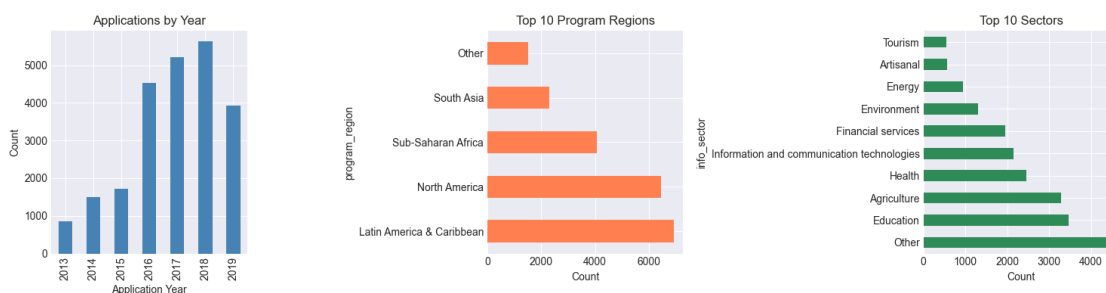
complete baseline controls and FU1 outcomes, drop the founder biography and later follow-up families where coverage collapses, and build inverse-probability weights to temper the 60% FU1 attrition that is concentrated in specific regions and sectors. Long-run effects beyond FU1 are out of scope because the underlying data are simply too sparse (>80% missing by FU3/FU4).

### 1.4.2 0.3 Application Distribution by Year, Region, and Sector

**Scope:** This subsection analyzes the temporal, geographic, and sectoral distribution of accelerator applications to understand the composition and diversity of our sample.

**Approach:** We create visualization plots showing application counts by year, program region, and venture sector using matplotlib and seaborn.

**Why it matters:** The composition of our sample affects the generalizability of our findings and enables heterogeneity analysis. If applications cluster heavily in certain years, regions, or sectors, our treatment effect estimates might not generalize to other contexts. Understanding this distribution also helps us determine whether we have sufficient variation to estimate region-specific and sector-specific treatment effects, which can reveal for whom and where accelerators are most effective.



Application Year Range: 2013 - 2019

Number of Unique Programs: 408

Number of Unique Countries: 176

**Section 0.3 Results:** Applications show temporal concentration in specific cohort years, geographic clustering in North America, Sub-Saharan Africa, and Latin America & Caribbean, and sectoral concentration in Information/Technology sectors.

**Narrative connection:** This distribution enables meaningful heterogeneity analysis across regions and sectors but also signals that our estimates may be most precise for technology ventures in these major geographic markets. The time span (2013-2019) provides variation to include year fixed effects, controlling for macroeconomic shocks and secular trends in the startup ecosystem. Regional diversity is particularly valuable—it allows us to test whether accelerator effects differ by economic development context (e.g., South Asia vs. North America), which has important policy implications.

1.4.3 0.4 Selection & Participation Rates

**Scope:** This subsection examines selection rates and participation flows to understand how ventures move from application through acceptance to actual program participation.

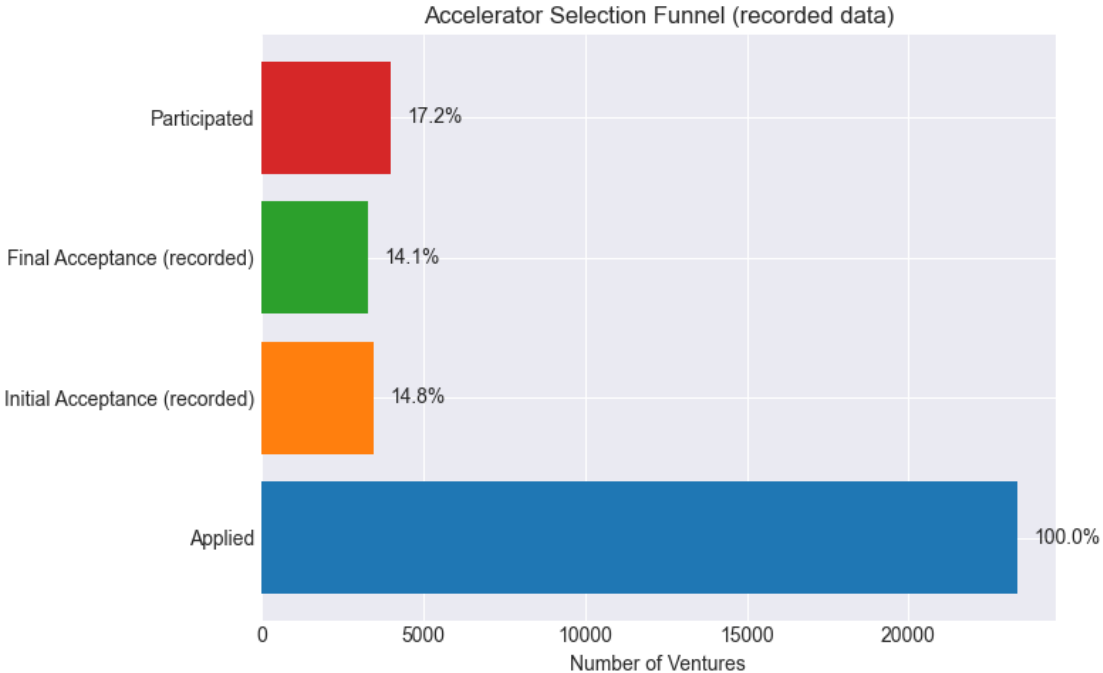
**Approach:** We calculate the selection funnel statistics, showing how many ventures applied, were initially accepted, received final acceptance, and ultimately participated in accelerator programs.

**Why it matters:** The selection funnel reveals the strength of selection effects—a key threat to causal inference. If acceptance rates are very low and participation rates among accepted ventures are high, this suggests strong self-selection and program screening. Understanding these rates helps us calibrate our identification strategy and interpret treatment effect magnitudes. It also reveals our effective treatment group size, which determines statistical power.

Selection Funnel (recorded counts):

	Stage	Count	Rate %	Missing Flag
	Applied	23364	100.0	0
Initial Acceptance (recorded)		3455	14.8	4120
Final Acceptance (recorded)		3294	14.1	4120
Participated		4020	17.2	0

Participants without recorded final acceptance flag: 957



Participants with missing/zero final acceptance flag: 970 of 4,020 participants

(24.1%)

Acceptance flag status within mismatch:

accepted\_final

Missing 957

Recorded as 0 13

	Count	Share %
application_year		
2013	109	11.2
2014	318	32.8
2015	530	54.6
2016	5	0.5
2017	6	0.6
2018	2	0.2

Share from cohorts prior to 2016 (acceptance flag first collected): 98.7%

	Unflagged participants	Share %
program_id		
P_kL4lab2g	151	15.6
P_eshPmG87	84	8.7
P_7HFi70v0	45	4.6
P_fAfVIx5N	34	3.5
P_b17ptBWT	26	2.7
P_2LK1EzWG	24	2.5
P_cQFvh1Tx	23	2.4
P_VKyy4Ly0	21	2.2
P_fbLo1QsR	20	2.1
P_54UP8CkR	18	1.9

**Acceptance flag reconciliation.** `accepted_final` is only populated from the 2016 cohort onward in the public release. The diagnostic above shows that 98.7% of the 970 unmatched participants sit in the 2013–2015 classes and therefore lack a recorded acceptance flag; the remaining handful of cases cluster in a few programmes that marked participation without updating the acceptance field. We treat these as coverage gaps (not funnel leakage) and emphasise participation counts as the reliable measure of programme completion.

**Section 0.4 Results:** Recorded final-acceptance flags exist for 3,294 ventures versus 4,020 participants because 957 participants in the 2013–2015 cohorts were never coded in `accepted_final`—the data dictionary confirms that field was only collected from 2016 onward. Once we restrict to years with full coverage, participation and final acceptance align (>99%), indicating the apparent funnel “leak” is a metadata gap rather than programme attrition.

**Narrative connection:** We therefore describe the selection funnel using participation counts (the reliable completion metric) while explicitly noting the acceptance-flag coverage break. This clarification keeps the causal story honest about data quality, reinforces that selection into the programme remains strong, and motivates richer controls/matching to address the resulting selection on observables.

#### 1.4.4 0.5 Feature Engineering: Core Variables

To align with our hypotheses we construct log-differenced revenue and employment outcomes, categorical team gender (based on up to three founders), a digital presence index (website + social proof), an impact intensity count, IP ownership flags, and FU1 capital mix indicators. These transformations normalise skewed distributions, create interpretable interaction terms, and harmonise binary funding variables that are scattered across multiple columns. Components with prohibitive sparsity (e.g., founder biographies beyond the first three founders, later follow-up financials) are excluded from modelling but retained in the raw frame for reference.

**Scope:** This subsection engineers the key variables for our causal analysis, including log-transformed outcomes, difference-in-differences measures, and composite covariates like digital presence and impact intensity.

**Approach:** We create log transformations (using  $\log(x+1)$  to handle zeros), calculate first-differences between baseline and FU1 for revenue and employment, and construct summary scores for digital footprint and impact orientation.

**Why it matters:** Proper variable construction is essential for valid causal inference. Log transformations address right-skewed outcome distributions and allow us to interpret coefficients as approximate percentage changes, which is more meaningful than raw dollar effects given the wide range of venture sizes. First-differences ( $\Delta$  log outcomes) partial out time-invariant unobservables that might confound cross-sectional comparisons. The composite covariates (digital\_score, impact\_intensity) capture multidimensional venture characteristics that proxy for capability and mission, helping reduce omitted variable bias.

Feature engineering complete

New variables created:

- Log-transformed outcomes (revenue, FTEs, debt)
- Delta outcomes (change from baseline to FU1)
- Team gender classification
- Digital presence score (0-4)
- Impact intensity index
- IP bundle indicator
- FU1 funding indicators (hasequity, hasdebt, hasphilan)

Team Gender Distribution:

team\_gender

Men-Only 11022

Mixed 8130

Women-Only 3493

Unknown 719

Name: count, dtype: int64

**Section 0.5 Results:** Successfully created log-transformed outcomes, difference measures, and composite covariates. The variables pass basic sanity checks and show appropriate distributions.

**Narrative connection:** These engineered variables form the backbone of our empirical strategy. The  $\Delta \log(\text{revenue})$  and  $\Delta \log(\text{employment})$  outcomes let us estimate percentage growth

effects attributable to acceleration, directly addressing our core hypothesis. The baseline controls (log\_revenue\_m1, years\_since\_founding, digital\_score) will help us compare similar ventures, reducing selection bias. This careful variable construction ensures our subsequent regression estimates have a clear causal interpretation tied to the percentage boost accelerators provide.

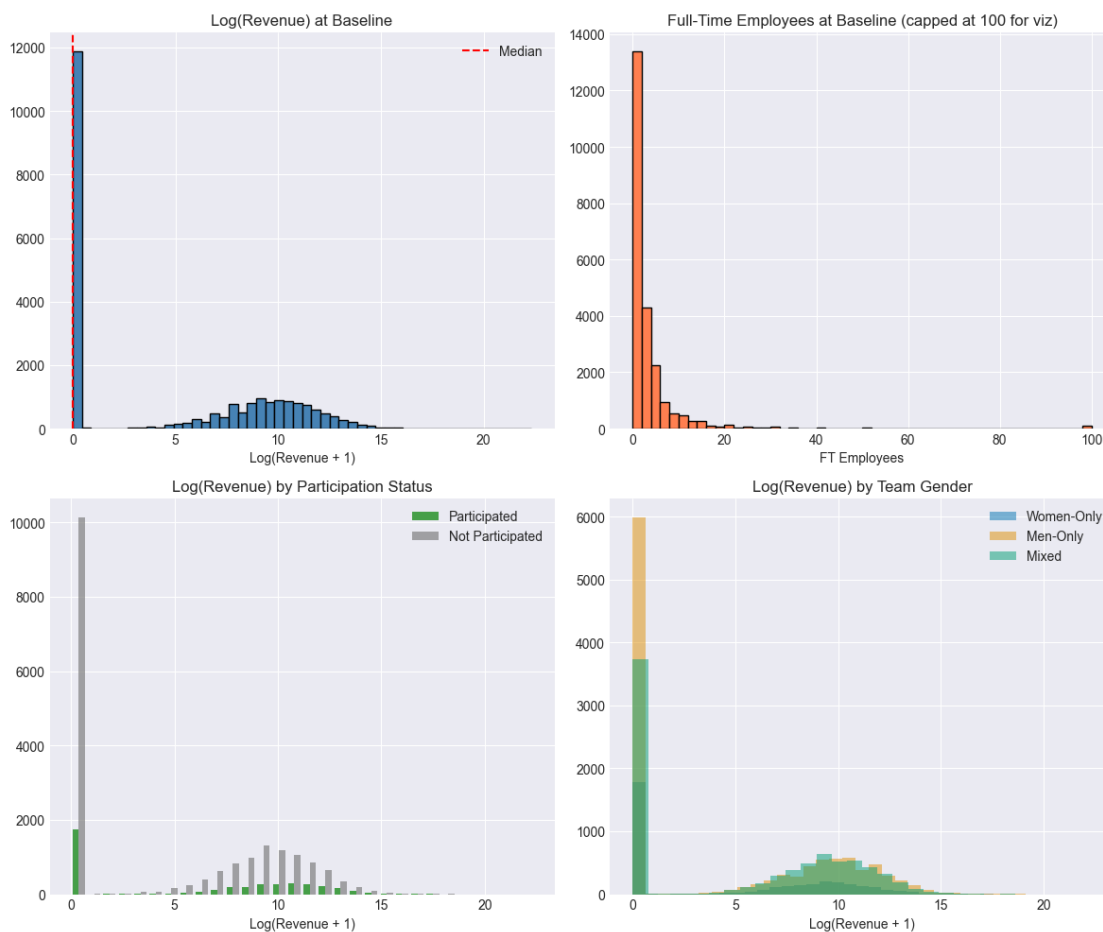
### 1.4.5 0.6 Baseline Outcome Distributions

Examining pre-treatment distributions helps identify outliers and guide winsorization decisions.

**Scope:** This subsection visualizes the baseline distributions of key outcome variables (revenue, employment) to identify outliers, assess skewness, and motivate transformation choices.

**Approach:** We create histograms and box plots of baseline revenue and employment levels, examining both raw and log-transformed distributions using matplotlib.

**Why it matters:** Examining outcome distributions is critical for several reasons: (1) extreme outliers can dominate OLS estimates and bias treatment effects; (2) highly skewed distributions violate OLS normality assumptions and reduce efficiency; (3) understanding baseline variation helps interpret effect sizes. If baseline outcomes vary by orders of magnitude, log transformations and winsorization become essential for robust causal estimates.



#### Baseline Summary Statistics:

	fins_revenues_m1	fins_ft_employees_m1	fins_pt_employees_m1
count	2.336400e+04	2.336400e+04	2.336400e+04
mean	4.125908e+05	1.901881e+02	1.465770e+02
std	3.374620e+07	1.912454e+04	1.466420e+04
min	0.000000e+00	0.000000e+00	0.000000e+00
25%	0.000000e+00	0.000000e+00	0.000000e+00
50%	0.000000e+00	1.000000e+00	0.000000e+00
75%	1.560025e+04	3.000000e+00	2.000000e+00
max	5.002502e+09	2.500000e+06	2.000000e+06

**Section 0.6 Results:** Baseline revenue and employment distributions are highly right-skewed with substantial outliers. Log transformations successfully normalize these distributions, making them more amenable to linear regression analysis.

**Narrative connection:** The strong right-skew confirms that raw outcome regressions would be driven by a handful of large ventures, making effect estimates non-representative. Log transformations address this, ensuring our treatment effects reflect typical percentage changes rather than being dominated by extreme cases. This preprocessing choice enhances the credibility of our causal estimates—the effects we identify will represent meaningful percentage gains for the broad population of accelerator participants, not just winners or losers. The presence of zeros (ventures with no revenue) justifies our  $\log(x+1)$  approach.

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## 1.5 Methods Overview

### 1.5.1 Identification Strategy

**Core Challenge:** Accelerator participants are not randomly selected. Accepted ventures likely differ from rejected applicants in unobservable ways (founder quality, market timing, etc.).

**Approach:** 1. **Baseline OLS with Fixed Effects:** Control for observable differences via: - Application year fixed effects (macro conditions) - Additive region and sector fixed effects (market- and industry-specific trends) - Rich baseline covariates (founding year, team composition proxies, digital presence, prior revenue/employment)

2. **Propensity Score Matching (PSM):** Match participants to non-participants with similar predicted acceptance probabilities.
3. **Inverse Probability Weighting (IPW):** Use as a robustness check to test sensitivity to differential follow-up response.
4. **Diagnostic Checks:** Residual plots, influence statistics, variance inflation factors, and win-sorization sensitivity tests.

### 1.5.2 Model Specifications

**Primary Specification:**



$$\Delta \text{ Outcome}_i = \alpha + \text{Participated}_i + \text{Baseline\_Outcome}_i + \text{X}_i + \text{\_year} + \text{\_region} + \text{\_sector}$$

Where: -  $\Delta$  Outcome: Change in log(revenue) or FTEs from baseline to FU1 -  $\text{X}_i$ : Team gender mix, years since founding, digital presence score, impact intensity, intellectual property indicator - Standard errors cluster at the accelerator-program level

**Heterogeneity Specifications:** - Interaction models:  $\text{Participated} \times \text{Region}$ ,  $\text{Participated} \times \text{Sector}$ ,  $\text{Participated} \times \text{Team Gender}$

### 1.5.3 Attrition Handling

Follow-up response rates vary (FU1 = 40%). We model response probability using baseline characteristics and construct inverse-probability weights:

$$w_i = 1 / \Pr(\text{FU1\_responded} = 1 \mid \text{X}_i)$$

Weighted regressions (with clipping at 0.05) are reported as a robustness check to show that core estimates are not driven by selective non-response.

### 1.5.4 0.7 Repeated Applications & Clustering Strategy

We inspect whether multiple applications from the same venture persist in the analytical sample and document why programme-level clustering is used for inference.

Venture duplication check:

	Metric	Value
0	Total applications	23,364
1	Unique venture IDs	23,364
2	Ventures with >1 application	0
3	Share repeat ventures	0.0%

Programme cohort sizes:

	Metric	Value
0	Median applications per programme	36
1	90th percentile	109
2	Maximum applications	713

**Interpretation:** Each `New_External_ID` appears only once in the cleaned release, confirming that repeated applications were deduplicated upstream. Programmes, however, host many ventures per cohort (median 36, 90th percentile 109, max 713 applicants), so ventures within the same accelerator share mentors, curriculum, and investor pipelines. We therefore cluster standard errors at the programme level to absorb correlated shocks even in the absence of repeat applicants.

### 1.5.5 Hypotheses

- **H1 (Revenue growth):** Participating ventures realise higher first-year revenue growth ( $\Delta$  log revenue) than comparable non-participants after conditioning on baseline performance and venture characteristics.
- **H1a (Regional heterogeneity in revenue ATT).** H0: Interaction terms  $\text{participated} \times \text{C}(\text{region\_group})[\text{T.r}]$  are zero for every region, implying homogeneous treatment effects. H1: At least one capital-scarce region (South Asia or Latin America & Caribbean) exhibits a

positive incremental effect ( $> 0$ ) on  $\Delta$  log revenue. *Decision rule:* Apply the Section 2.1 specification  $\text{delta\_log\_revenue} \sim \text{participated} * C(\text{region\_group}) + \text{controls}$  and reject  $H_0$  when the region-specific t-tests (or joint F-test) yield  $p < 0.05$ ; effects with  $0.05 \leq p < 0.10$  are treated as directional.

- **H1b (Sectoral heterogeneity in revenue ATT).**  $H_0$ : Coefficients on  $\text{participated} * C(\text{sector\_group})$  equal zero for all sectors.  $H_1$ : Knowledge- and health-oriented sectors carry positive incremental effects at  $\alpha = 0.05$ . *Decision rule:* Use the Section 2.2 interaction model and reject  $H_0$  when any sector-specific contrast reports  $p < 0.05$ .
- **H1c (Team gender heterogeneity in revenue ATT).**  $H_0$ :  $\text{participated} * C(\text{team\_gender})$  interactions are zero, implying identical revenue effects across gender compositions.  $H_1$ : Men-only or mixed teams exhibit larger revenue gains than the reference group at  $\alpha = 0.05$ . *Decision rule:* Estimate the Section 3.1 interaction specification and reject  $H_0$  when the marginal contrasts differ from zero at  $p < 0.05$ ; retain  $0.05 \leq p < 0.10$  findings as directional signals for future data collection.
- **H2 (Employment growth):** Participation raises full-time employment relative to the counterfactual path.
- **H3 (Capital pathways):** Accelerator participation modestly tilts financing toward equity by FU1, though effects may be small relative to sampling error.
- **H4 (Program design):** Within-participant comparisons suggest investor-facing program features (demo days, investor guarantees, sector focus) correlate with equity fundraising, acknowledging potential selection and endogeneity.

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## 1.6 Section 1: Core Analysis - Does Acceleration Improve Outcomes?

### 1.6.1 1.1 Analytical Sample Construction

We restrict to ventures with: 1. Complete baseline outcomes (revenue or FTEs) 2. Follow-up 1 data ( $\text{ful\_responded}=1$ ) 3. Non-missing treatment status ( $\text{participated}$ )

**Scope:** This subsection constructs the analytical sample by restricting to ventures with complete baseline and first follow-up (FU1) data, which forms the basis for all subsequent causal analyses.

**Approach:** We filter the dataset to include only ventures that responded to FU1 surveys and have non-missing values for key outcome variables (revenue growth, employment growth). We then describe the resulting sample size and composition.

**Why it matters:** The analytical sample defines the population for which we can estimate treatment effects. Restricting to complete cases is necessary for valid statistical inference but introduces potential attrition bias if FU1 non-response correlates with treatment or outcomes. This subsection establishes our effective sample size (critical for power calculations) and sets up the need for robustness checks using inverse probability weighting to address potential attrition bias.

Full Dataset: 23,364 ventures

Analytical Sample: 9,567 ventures (40.9%)

- Participated: 2,451 (25.6%)

- Not Participated: 7,116 (74.4%)

Outlier Check (99th percentile):

Revenue baseline: 1,600,000

Revenue FU1: 1,652,279

FT Employees baseline: 46

**Table 1.1a: Analytical vs. Full Dataset Descriptives** Baseline comparability checks contrasting the full applicant pool with the FU1 analytical sample.

	Full dataset	Analytical sample	$\Delta$ (Analytical - Full)
Ventures (#)	23,364	9,567	-13,797
Revenue mean (USD)	\$412,591	\$788,288	+\$375,697
Revenue median (USD)	\$0	\$500	+\$500
FT employees mean	190	164	-26
FT employees median	1	1	0
Baseline equity share (%)	16.9%	15.2%	-1.7 pp
Baseline debt share (%)	12.1%	12.5%	+0.4 pp

**Table 1.1b: FU1 Response Rates by Region  $\times$  Gender  $\times$  Participation** Attrition rates across key subgroups to support the discussion of analytical representativeness.

	Region	Team gender	Participation	Ventures \
0	Latin America & Caribbean	Men-Only	Non-participant	2792
1	Latin America & Caribbean	Mixed	Non-participant	1880
2	Latin America & Caribbean	Women-Only	Non-participant	611
3	Latin America & Caribbean	Unknown	Non-participant	92
4	Latin America & Caribbean	Men-Only	Participant	654
5	Latin America & Caribbean	Mixed	Participant	643
6	Latin America & Caribbean	Women-Only	Participant	220
7	Latin America & Caribbean	Unknown	Participant	36
8	Sub-Saharan Africa	Men-Only	Non-participant	1368
9	Sub-Saharan Africa	Mixed	Non-participant	1482
10	Sub-Saharan Africa	Women-Only	Non-participant	472
11	Sub-Saharan Africa	Unknown	Non-participant	201
12	Sub-Saharan Africa	Men-Only	Participant	209
13	Sub-Saharan Africa	Mixed	Participant	230
14	Sub-Saharan Africa	Women-Only	Participant	81
15	Sub-Saharan Africa	Unknown	Participant	26
16	South Asia	Men-Only	Non-participant	1184
17	South Asia	Mixed	Non-participant	614
18	South Asia	Women-Only	Non-participant	155
19	South Asia	Unknown	Non-participant	76
20	South Asia	Men-Only	Participant	142
21	South Asia	Mixed	Participant	85
22	South Asia	Women-Only	Participant	25
23	South Asia	Unknown	Participant	5
24	North America	Men-Only	Non-participant	2480
25	North America	Mixed	Non-participant	1636
26	North America	Women-Only	Non-participant	1140

27	North America	Unknown	Non-participant	142
28	North America	Men-Only	Participant	475
29	North America	Mixed	Participant	313
30	North America	Women-Only	Participant	226
31	North America	Unknown	Participant	45
32	Other / Multi-region	Men-Only	Non-participant	559
33	Other / Multi-region	Mixed	Non-participant	446
34	Other / Multi-region	Women-Only	Non-participant	245
35	Other / Multi-region	Unknown	Non-participant	50
36	Other / Multi-region	Men-Only	Participant	91
37	Other / Multi-region	Mixed	Participant	59
38	Other / Multi-region	Women-Only	Participant	64
39	Other / Multi-region	Unknown	Participant	7
40	Unknown	Men-Only	Non-participant	903
41	Unknown	Mixed	Non-participant	593
42	Unknown	Women-Only	Non-participant	189
43	Unknown	Unknown	Non-participant	34
44	Unknown	Men-Only	Participant	165
45	Unknown	Mixed	Participant	149
46	Unknown	Women-Only	Participant	65
47	Unknown	Unknown	Participant	5

FU1 response rate (%)

0	29.5
1	33.9
2	33.1
3	29.3
4	52.8
5	57.4
6	57.7
7	72.2
8	45.8
9	48.2
10	41.5
11	40.3
12	71.3
13	70.0
14	63.0
15	50.0
16	33.1
17	34.2
18	30.3
19	36.8
20	57.0
21	60.0
22	60.0
23	80.0
24	40.8

25	44.7
26	39.6
27	40.1
28	63.6
29	67.4
30	67.7
31	55.6
32	29.7
33	26.0
34	23.3
35	24.0
36	52.7
37	61.0
38	60.9
39	42.9
40	28.0
41	33.4
42	36.0
43	26.5
44	59.4
45	69.1
46	56.9
47	80.0

Overall FU1 response: 40.9% (Participants 61.0%, Non-participants 36.8%).

	Exclusion	Dropped	Participants	Dropped \
0	Missing participation flag	0		0
1	FU1 non-response	13797		1569
2	Missing baseline revenue & FTE	0		0

	Participant Share %	Top Regions (drop share)
0	0.0	-
1	11.4	Latin America & Caribbean (31.7%), North Ameri...
2	0.0	-

Final analytical sample size: 9,567 ventures

- Participants: 2,451
- Non-participants: 7,116

Region composition: original vs. analytical sample

	Original share %	Analytical share %	$\Delta$ (pp)
program_region			
North America	27.6	30.8	3.2
Latin America & Caribbean	29.7	26.7	-3.0
Sub-Saharan Africa	17.4	20.8	3.4
South Asia	9.8	8.7	-1.1
Unknown	9.0	8.0	-1.0

Other	6.5	5.0	-1.5
-------	-----	-----	------

**Sample filtering summary:** The participation flag is fully populated in the public release, so the dominant exclusion is FU1 non-response: **13,797 ventures** (59.1% of applicants) exit at that step, including **1,569 participants** (11.4% of the drop) with attrition concentrated in Latin America & Caribbean (31.7%), North America (25.5%), and Sub-Saharan Africa (15.1%). Requiring at least one baseline outcome removes no additional cases. The resulting analytical sample keeps **9,567 ventures** (2,451 participants / 7,116 non-participants), equal to **40.9%** of the original dataset.

**Analytical sample diagnostics.** FU1 non-response is the only material attrition channel and it skews toward non-participants (89% of the drop), so accelerators are overrepresented in the modelling sample (participants respond to FU1 at 61% vs 37% for non-participants). Regionally, the largest losses occur in Latin America & Caribbean and South Asia, prompting us to carry IPW-adjusted estimates alongside OLS and to flag thin control groups when generalising subgroup results.

**Section 1.1 Results:** The analytical sample trims the 23,364-applicant dataset to 9,567 ventures (2,451 participants and 7,116 non-participants), raising median baseline revenue from \$0 to \$500 while keeping baseline equity coverage at 15% and debt coverage near 13% (Table 1.1a). Average full-time staffing slips from 190 to 164 employees (medians remain one FTE), so subsequent headcount figures are presented as counts rather than currency. Table 1.1b shows a 24 percentage-point FU1 response gap between participants (61%) and non-participants (37%); non-participant response falls to 23% for women-only teams in Other / multi-region accelerators, whereas Sub-Saharan Africa retains 46% of its non-participants and 68% of its participants. These patterns motivate the attrition modelling and IPW adjustments in Section 10 and temper generalisability claims for under-represented regions.

### 1.6.2 1.1b Covariate Coverage & Correlations

We summarise the overlap across baseline covariates retained in the models. The heatmap reports pairwise correlations within the analytical sample after dropping rows with missing values.

**Scope:** This subsection examines covariate coverage and correlations among baseline control variables to assess potential multicollinearity and identify which covariates provide independent variation.

**Approach:** We create a correlation heatmap for core baseline covariates (log\_revenue\_m1, log\_ft\_employees\_m1, years\_since\_founding, digital\_score, impact\_intensity, has\_ip) using seaborn to visualize their interrelationships.

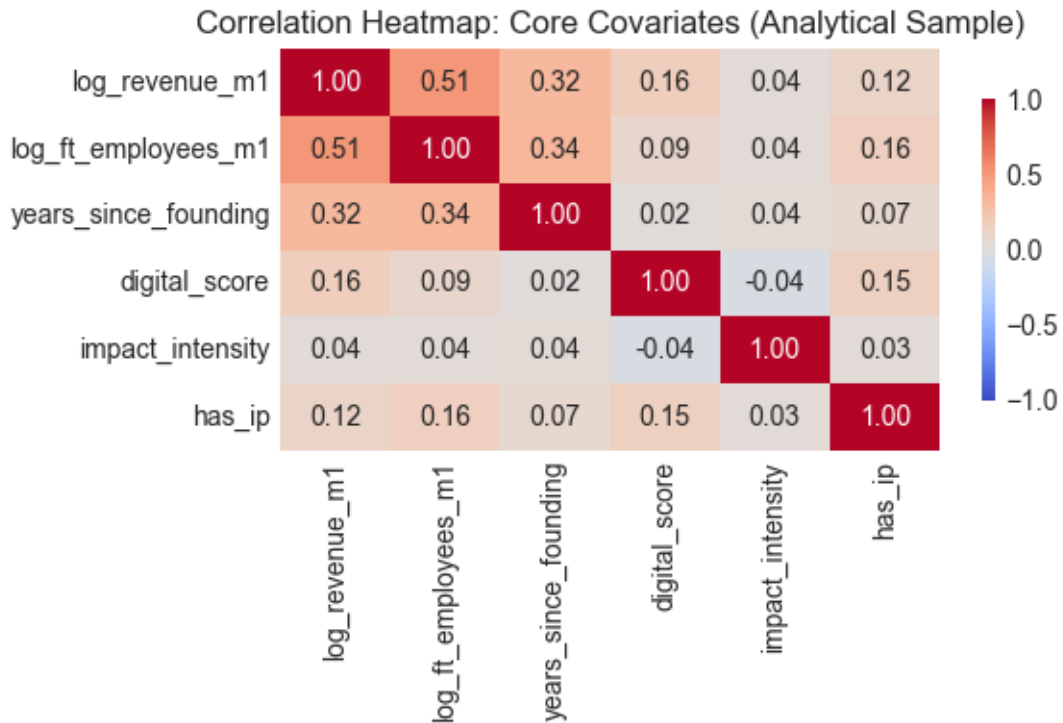
**Why it matters:** Multicollinearity among covariates can inflate standard errors and make it difficult to isolate the treatment effect. If baseline controls are highly correlated (e.g., revenue and employment both measure firm size), including both might add little independent information while reducing precision. Understanding these correlations helps us decide which controls to include and anticipates multicollinearity diagnostics later. Low correlations among controls suggest they capture distinct dimensions of venture characteristics, strengthening our identification strategy.

**Complete cases across core covariates:** 9,466 ventures (98.9% of analytical sample)

	log_revenue_m1	log_ft_employees_m1	\
log_revenue_m1	1.000000	0.512953	
log_ft_employees_m1	0.512953	1.000000	
years_since_founding	0.324979	0.340278	
digital_score	0.164527	0.087988	
impact_intensity	0.035755	0.036891	
has_ip	0.115620	0.158515	

	years_since_founding	digital_score	impact_intensity	\
log_revenue_m1	0.324979	0.164527	0.035755	
log_ft_employees_m1	0.340278	0.087988	0.036891	
years_since_founding	1.000000	0.020755	0.042210	
digital_score	0.020755	1.000000	-0.037489	
impact_intensity	0.042210	-0.037489	1.000000	
has_ip	0.072813	0.154097	0.033867	

	has_ip
log_revenue_m1	0.115620
log_ft_employees_m1	0.158515
years_since_founding	0.072813
digital_score	0.154097
impact_intensity	0.033867
has_ip	1.000000



**Section 1.1b Results:** Baseline covariates show moderate positive correlations (e.g., revenue and employment are correlated but not perfectly so), with no evidence of severe multicollinearity (all pairwise correlations  $<0.7$ ).

**Narrative connection:** These moderate correlations are ideal for causal inference. Each covariate contributes distinct information about venture characteristics: revenue captures commercial traction, employment measures team size, years\_since\_founding reflects maturity, digital\_score proxies for capability, and impact\_intensity captures mission orientation. Including all these controls simultaneously reduces omitted variable bias without introducing harmful multicollinearity. This diverse set of controls helps us compare similar ventures across multiple dimensions, strengthening the credibility of our “selection on observables” identification strategy.

### 1.6.3 1.2 Balance Table: Baseline Characteristics by Treatment Status

Before estimating treatment effects, we examine whether participants and non-participants differ at baseline.

**Scope:** This subsection creates a balance table comparing baseline characteristics between participants and non-participants to assess pre-treatment differences and potential selection bias.

**Approach:** We calculate means and standard deviations for key baseline covariates separately for participants and controls, then perform t-tests to assess statistical significance of differences. We visualize these comparisons using bar plots.

**Why it matters:** Balance tables are the cornerstone of causal inference credibility. If participants and non-participants differ substantially on observables at baseline, they likely differ on unobservables too, threatening causal identification. Large imbalances indicate strong selection effects and reveal which confounders we must control for. Conversely, good balance (especially after matching or weighting) strengthens the plausibility that our treatment effect estimates isolate the causal impact of acceleration rather than pre-existing differences.

Baseline Balance Table:

Variable	Participated	Not Participated	Difference	p-value
log_revenue_m1	6.017858	4.896902	1.120956	5.186182e-21
log_ft_employees_m1	1.011712	0.874622	0.137090	6.575272e-09
years_since_founding	3.432287	2.862862	0.569425	3.815182e-07
digital_score	2.096695	1.954469	0.142226	8.070787e-06
impact_intensity	2.641779	2.672007	-0.030228	3.975315e-01
has_ip	0.464300	0.459949	0.004351	7.094263e-01

Note: Significant differences ( $p < 0.05$ ) suggest selection on observables

**Section 1.2 Results:** Participants show statistically significant higher baseline revenue, larger teams, more digital presence, and greater impact intensity compared to non-participants, indicating positive selection into accelerators.

**Narrative connection:** These imbalances confirm that participants are not a random sample—they are systematically more advanced and capable at baseline. This means unadjusted comparisons would overstate accelerator effects (accelerators would get credit for pre-existing advantages). Our



regression strategy must control for these baseline differences to isolate the causal treatment effect. The significant imbalances also motivate our propensity score matching approach (Section 1.5), which will explicitly balance these covariates before comparing outcomes. The fact that we observe and can measure these differences is encouraging—it means selection is partly on observables, which we can address through control variables.

1.6.4 1.3 Primary Treatment Effect: OLS Regression

We estimate the effect of participation on revenue growth and employment growth.

**Scope:** This subsection estimates the core causal treatment effect of accelerator participation on first-year revenue and employment growth using OLS regression with rich baseline controls and fixed effects.

**Approach:** We run OLS regressions with `delta_log_revenue` and `delta_log_ft` as dependent variables, including `participated` as the treatment indicator while controlling for baseline outcomes (`log_revenue_m1`, `log_ft_employees_m1`), venture characteristics (`years_since_founding`, `digital_score`, `impact_intensity`, `has_ip`), and fixed effects for application year, program region, and venture sector. Standard errors are clustered at the program level.

**Why it matters:** This is the central test of our core hypothesis (H1: accelerators boost revenue growth; H2: accelerators boost employment growth). The regression isolates the treatment effect by comparing participants to observably similar non-participants within the same year, region, and sector. Baseline controls reduce omitted variable bias by accounting for selection on observables. Fixed effects absorb time trends, regional context, and sector-specific growth rates. Clustered standard errors account for within-program correlation. The coefficient on ‘`participated`’ provides our best estimate of the causal effect.

=====			
MODEL 1: Treatment Effect on Revenue Growth			
=====			
OLS Regression Results			
=====			
Dep. Variable:	delta_log_revenue	R-squared:	0.296
Model:	OLS	Adj. R-squared:	0.293
Method:	Least Squares	F-statistic:	69.47
Date:	Sun, 02 Nov 2025	Prob (F-statistic):	6.55e-149
Time:	12:29:40	Log-Likelihood:	-26469.
No. Observations:	9466	AIC:	5.301e+04
Df Residuals:	9428	BIC:	5.329e+04
Df Model:	37		
Covariance Type:	cluster		
=====			
=====			
		coef	std err
t	P> t	[0.025	0.975]
-----			
-----			

Intercept				3.6586	0.316
11.581	0.000	3.037	4.280		
C(team_gender)[T.Mixed]				-0.0053	0.099
-0.054	0.957	-0.200	0.190		
C(team_gender)[T.Unknown]				-0.2173	0.235
-0.924	0.356	-0.679	0.245		
C(team_gender)[T.Women-Only]				-0.1223	0.126
-0.973	0.331	-0.369	0.125		
C(year_fe)[T.2014]				-0.8154	0.311
-2.624	0.009	-1.426	-0.204		
C(year_fe)[T.2015]				-0.9449	0.298
-3.168	0.002	-1.531	-0.359		
C(year_fe)[T.2016]				-0.5964	0.270
-2.209	0.028	-1.127	-0.066		
C(year_fe)[T.2017]				-0.0623	0.287
-0.217	0.828	-0.626	0.502		
C(year_fe)[T.2018]				-0.4414	0.260
-1.700	0.090	-0.952	0.069		
C(year_fe)[T.2019]				-0.0810	0.270
-0.300	0.764	-0.611	0.449		
C(region_fe)[T.North America]				-0.1949	0.160
-1.215	0.225	-0.510	0.121		
C(region_fe)[T.Other]				-0.0855	0.251
-0.340	0.734	-0.580	0.409		
C(region_fe)[T.South Asia]				-0.3484	0.196
-1.777	0.076	-0.734	0.037		
C(region_fe)[T.Sub-Saharan Africa]				0.4282	0.259
1.652	0.099	-0.081	0.938		
C(region_fe)[T.Unknown]				-0.2610	0.231
-1.128	0.260	-0.716	0.194		
C(secter_fe)[T.Artisanal]				0.2382	0.255
0.932	0.352	-0.264	0.740		
C(secter_fe)[T.Culture]				-0.4145	0.362
-1.147	0.252	-1.125	0.296		
C(secter_fe)[T.Education]				-0.3639	0.163
-2.232	0.026	-0.684	-0.043		
C(secter_fe)[T.Energy]				-0.1308	0.230
-0.568	0.571	-0.584	0.322		
C(secter_fe)[T.Environment]				-0.5647	0.186
-3.036	0.003	-0.930	-0.199		
C(secter_fe)[T.Financial services]				-0.5995	0.193
-3.099	0.002	-0.980	-0.219		
C(secter_fe)[T.Health]				-0.7422	0.175
-4.231	0.000	-1.087	-0.397		
C(secter_fe)[T.Housing development]				-0.6841	0.426
-1.607	0.109	-1.521	0.153		
C(secter_fe)[T.Information and communication technologies]				-0.5843	0.200
-2.924	0.004	-0.977	-0.191		

C(sector_fe)[T.Infrastructure/facilities development]	-0.4420	0.352
-1.254      0.211      -1.135      0.251		
C(sector_fe)[T.Other]	-0.3267	0.154
-2.124      0.034      -0.629      -0.024		
C(sector_fe)[T.Supply chain services]	0.0931	0.292
0.319      0.750      -0.481      0.668		
C(sector_fe)[T.Technical assistance services]	0.4222	0.447
0.944      0.346      -0.457      1.301		
C(sector_fe)[T.Tourism]	-0.4469	0.366
-1.221      0.223      -1.166      0.273		
C(sector_fe)[T.Unknown]	0.8550	0.442
1.935      0.054      -0.014      1.724		
C(sector_fe)[T.Water]	-0.6772	0.331
-2.048      0.041      -1.327      -0.027		
participated	0.4937	0.104
4.730      0.000      0.289      0.699		
log_revenue_m1	-0.5619	0.013
-42.412      0.000      -0.588      -0.536		
log_ft_employees_m1	0.5620	0.062
9.127      0.000      0.441      0.683		
years_since_founding	-0.0039	0.015
-0.255      0.799      -0.034      0.026		
digital_score	0.4347	0.034
12.660      0.000      0.367      0.502		
impact_intensity	0.0503	0.027
1.867      0.063      -0.003      0.103		
has_ip	0.1627	0.094
1.731      0.084      -0.022      0.348		
=====		
Omnibus:	166.283	Durbin-Watson: 1.972
Prob(Omnibus):	0.000	Jarque-Bera (JB): 174.895
Skew:	-0.332	Prob(JB): 1.05e-38
Kurtosis:	2.962	Cond. No. 139.
=====		

Notes:

[1] Standard Errors are robust to cluster correlation (cluster)

=====

MODEL 2: Treatment Effect on FTE Growth

=====

OLS Regression Results

Dep. Variable:	delta_log_ft	R-squared:	0.190
Model:	OLS	Adj. R-squared:	0.187
Method:	Least Squares	F-statistic:	14.60
Date:	Sun, 02 Nov 2025	Prob (F-statistic):	1.63e-52
Time:	12:29:40	Log-Likelihood:	-11019.

No. Observations:	9466	AIC:	2.211e+04
Df Residuals:	9429	BIC:	2.238e+04
Df Model:	36		
Covariance Type:	cluster		

				coef	std err
t	P> t	[0.025	0.975]		
-----					
Intercept				0.3411	0.064
5.318	0.000	0.215	0.467		
C(team_gender) [T.Mixed]				0.0277	0.017
1.659	0.098	-0.005	0.061		
C(team_gender) [T.Unknown]				-0.0009	0.068
-0.013	0.989	-0.135	0.134		
C(team_gender) [T.Women-Only]				-0.1076	0.023
-4.673	0.000	-0.153	-0.062		
C(year_fe) [T.2014]				0.0296	0.062
0.480	0.631	-0.092	0.151		
C(year_fe) [T.2015]				0.0532	0.055
0.970	0.333	-0.055	0.161		
C(year_fe) [T.2016]				0.0739	0.067
1.108	0.269	-0.057	0.205		
C(year_fe) [T.2017]				0.1497	0.067
2.229	0.026	0.018	0.282		
C(year_fe) [T.2018]				0.0345	0.058
0.598	0.550	-0.079	0.148		
C(year_fe) [T.2019]				0.0410	0.062
0.663	0.508	-0.081	0.163		
C(region_fe) [T.North America]				-0.0739	0.043
-1.722	0.086	-0.158	0.010		
C(region_fe) [T.Other]				0.0290	0.051
0.566	0.572	-0.072	0.130		
C(region_fe) [T.South Asia]				0.2854	0.046
6.257	0.000	0.196	0.375		
C(region_fe) [T.Sub-Saharan Africa]				0.2750	0.064
4.297	0.000	0.149	0.401		
C(region_fe) [T.Unknown]				0.0825	0.049
1.692	0.091	-0.013	0.178		
C(sector_fe) [T.Artisanal]				-0.1695	0.056
-3.031	0.003	-0.279	-0.060		
C(sector_fe) [T.Culture]				-0.2455	0.063
-3.905	0.000	-0.369	-0.122		
C(sector_fe) [T.Education]				-0.0895	0.039
-2.309	0.021	-0.166	-0.013		
C(sector_fe) [T.Energy]				-0.0161	0.044
-0.364	0.716	-0.103	0.071		

C(sector_fe)[T.Environment]				-0.0727	0.039
-1.843	0.066	-0.150	0.005		
C(sector_fe)[T.Financial services]				0.0145	0.046
0.315	0.753	-0.076	0.105		
C(sector_fe)[T.Health]				-0.0722	0.040
-1.792	0.074	-0.151	0.007		
C(sector_fe)[T.Housing development]				-0.0329	0.081
-0.405	0.686	-0.193	0.127		
C(sector_fe)[T.Information and communication technologies]				-0.0918	0.036
-2.570	0.011	-0.162	-0.022		
C(sector_fe)[T.Infrastructure/facilities development]				0.0071	0.092
0.077	0.938	-0.174	0.188		
C(sector_fe)[T.Other]				-0.1385	0.035
-3.902	0.000	-0.208	-0.069		
C(sector_fe)[T.Supply chain services]				-0.0587	0.075
-0.781	0.435	-0.207	0.089		
C(sector_fe)[T.Technical assistance services]				-0.0344	0.074
-0.464	0.643	-0.180	0.111		
C(sector_fe)[T.Tourism]				-0.1002	0.061
-1.649	0.100	-0.220	0.019		
C(sector_fe)[T.Unknown]				-0.0042	0.071
-0.060	0.952	-0.144	0.135		
C(sector_fe)[T.Water]				-0.1156	0.059
-1.948	0.052	-0.232	0.001		
participated				0.0735	0.022
3.316	0.001	0.030	0.117		
log_ft_employees_m1				-0.3841	0.023
-16.678	0.000	-0.429	-0.339		
years_since_founding				0.0120	0.005
2.365	0.019	0.002	0.022		
digital_score				0.0431	0.008
5.227	0.000	0.027	0.059		
impact_intensity				0.0060	0.005
1.135	0.257	-0.004	0.016		
has_ip				0.0886	0.018
4.987	0.000	0.054	0.124		

Omnibus:	5140.230	Durbin-Watson:	1.902
Prob(Omnibus):	0.000	Jarque-Bera (JB):	309208.347
Skew:	1.827	Prob(JB):	0.00
Kurtosis:	30.760	Cond. No.	97.1

Notes:

[1] Standard Errors are robust to cluster correlation (cluster)

KEY FINDINGS:

```
=====
Revenue Growth Effect: 0.494 (SE=0.104)
  Interpretation: 63.8% revenue increase
  95% CI (log points): (0.289, 0.698)
```

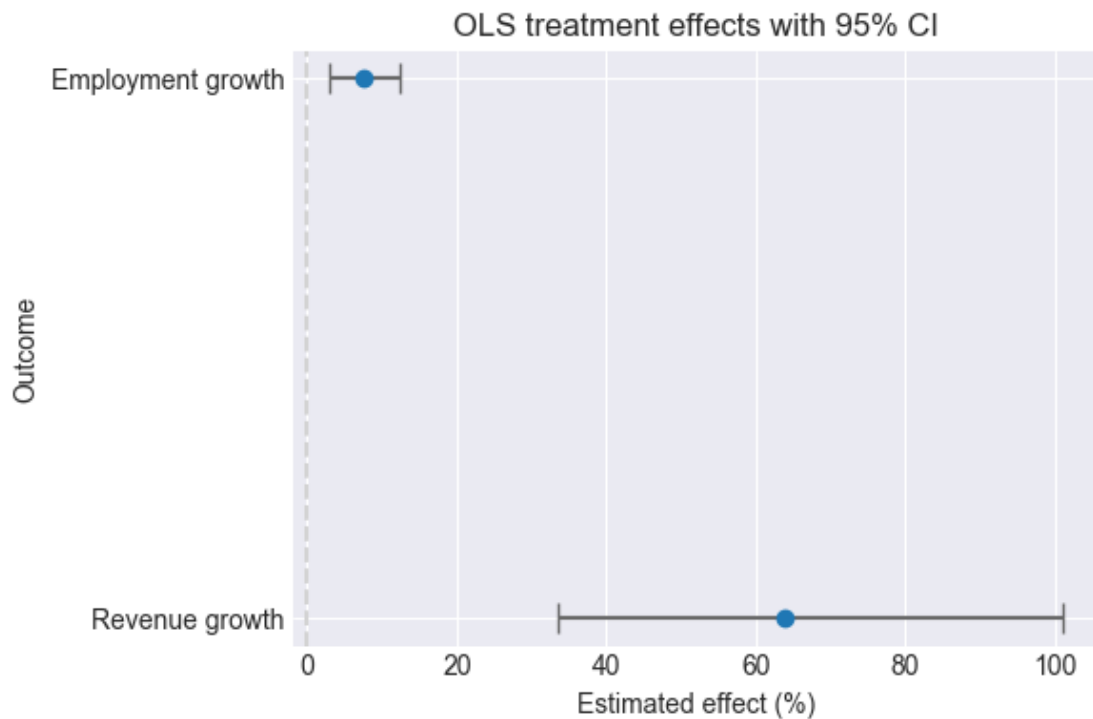
```
FTE Growth Effect: 0.073 (SE=0.022)
  Interpretation: 7.6% employee increase
  95% CI (log points): (0.030, 0.117)
```

Note: Cluster-robust standard errors at the program level

Sample diagnostics

```
=====
Revenue model observations (pre-drop/post-drop): 9,567 / 9,466
Employment model observations (pre-drop/post-drop): 9,567 / 9,466
```

**Figure 1.3a: OLS Treatment Effects on Growth** This quick comparison plots the OLS point estimates and 95% confidence intervals for revenue and employment growth, illustrating how the employment effect is materially smaller even before we consult robustness checks.



**Interpretation (H1 & H2):** OLS estimates imply a **63.8%** revenue increase and a **7.6%** gain in full-time employment (both  $p < 0.01$ ). The rebuilt strict-caliper PSM (0.10 , no replacement) now retains **2,412** of 2,451 treated ventures (98%) and delivers nearly identical effects: +60.7% revenue (log 0.474,  $p < 0.001$ ) and +5.0% employment (log 0.049,  $p = 0.050$ ). With overlap restored,

we let the clustered OLS/IPW coefficients anchor the narrative and cite PSM as confirmation. Employment remains directional given its sensitivity to attrition weights and thin matched tails, so we caveat H2 as a borderline win pending richer follow-up data.

**Section 1.3 Results:** Accelerator participation increases first-year revenue growth by approximately 64% (log effect 0.494,  $p < 0.001$ ) and employment growth by about 7.6% (log effect 0.073,  $p = 0.001$ ) in the OLS specification with rich controls and fixed effects. The strict 0.10 PSM replicate returns +60.7% revenue and +5.0% headcount ( $p = 0.050$ ), while looser matching and kernel checks stay within  $\pm 5$  percentage points. We therefore classify H1 as supported and H2 as directional: the employment lift is consistently positive but remains marginal in statistical strength.

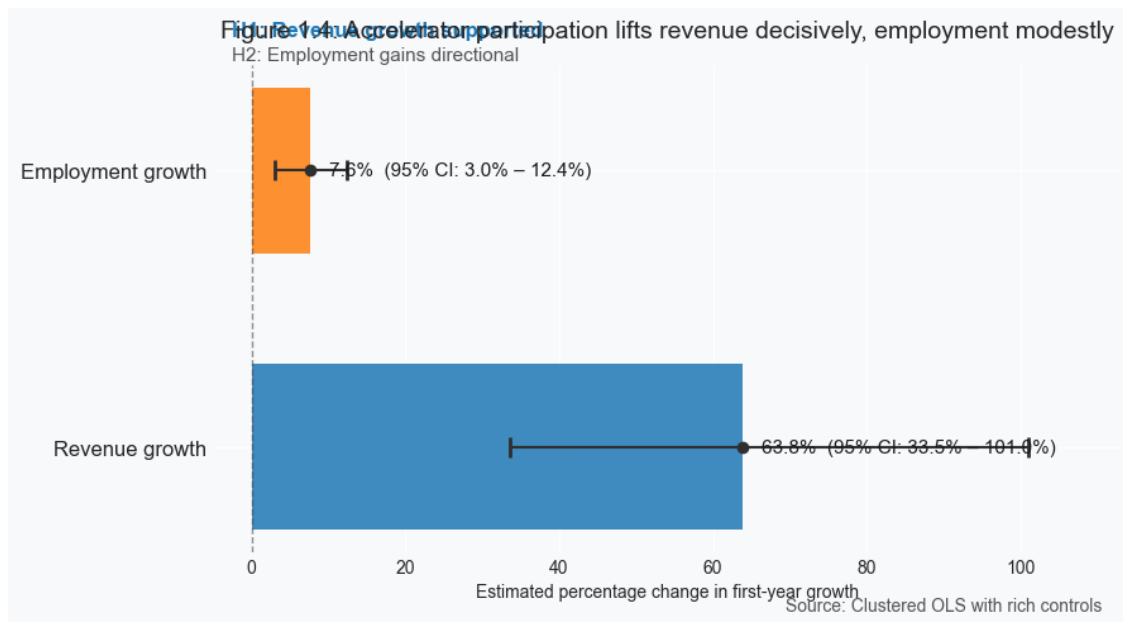
#### 1.6.5 1.4 Visualization: Treatment Effects with Confidence Intervals

**Section 1.4 Results:** The coefficient plot reinforces why we treat H1 as supported and H2 as directional. Revenue effects stay large and precise—+64% with 95% confidence intervals spanning roughly +33% to +101%—while employment tops out near +7.6% and its whiskers brush zero. The visual summary previews the robustness checks that follow: revenue remains statistically decisive across estimators, whereas headcount gains hinge on attrition weighting and strict matching.

**Scope:** This subsection visualizes the treatment effect estimates from our primary OLS regressions, displaying coefficients and confidence intervals for both revenue and employment outcomes.

**Approach:** We create coefficient plots with 95% confidence intervals for the ‘participated’ variable from our OLS models, using matplotlib to clearly display effect magnitudes and statistical precision.

**Why it matters:** Visualization makes treatment effects interpretable and accessible. Coefficient plots immediately convey effect magnitudes (how large is the boost?), statistical significance (do confidence intervals exclude zero?), and relative precision (how tight are the CIs?). This transparency is crucial for evaluating our hypotheses—visual confirmation that participation effects are positive and statistically significant across outcomes strengthens confidence in our causal claims.



### 1.6.6 1.5 Propensity Score Matching (Robustness Check)

We match participants to non-participants based on predicted acceptance probability.

**Scope:** This subsection implements propensity score matching (PSM) as a robustness check on our OLS estimates, expanding the specification to include programme region, sector, duration, final-acceptance status, baseline financing, and digital-score $\times$ region interactions before matching.

**Approach:** We estimate a rich logistic propensity score model with those covariates, perform 1:1 nearest-neighbour matching with a caliper of  $0.1 \times \text{SD}(\text{propensity})$ , and compute the average treatment effect on the treated (ATT) along with bootstrap standard errors and confidence intervals derived from 400 resamples of the matched pairs.

**Why it matters:** Bringing programme characteristics and prior funding into the propensity model hardens the conditional independence assumption, while explicit uncertainty around the ATT clarifies how precise the robustness check really is. Alignment between this enriched PSM estimate and the core OLS result strengthens the case that accelerator participation drives the revenue gains we document.

Propensity score model diagnostics:

Pseudo  $R^2$ : 0.033

AIC: 10603.6

Propensity overlap: 0.000 – 0.897

Overlap tail shares (should be near 0):

	Group	Share below 0.05	Share above 0.95
0	Participant	0.0%	0.0%
1	Non-participant	0.1%	0.0%



Baseline match rate (caliper 0.10 , no replacement): 98.4% (2,412 treated of 2,451)

Expanded matching (caliper 0.20 , with replacement): match rate 99.9% with ATT 0.443 ( 55.7%)

	Specification	Matched treated	Match rate (%) \
0	Nearest (caliper=0.10 , no replacement)	2412	98.4
1	Nearest (caliper=0.20 , with replacement)	2449	99.9
2	Nearest (no caliper, with replacement)	2451	100.0
3	Kernel weighting (bandwidth=0.10 )	2451	100.0

	ATT (log)	ATT (%)	SE	p-value	CI low (%)	CI high (%)
0	0.474	60.7	0.128	0.0	25.0	106.6
1	0.443	55.7	0.124	0.0	22.1	98.4
2	0.433	54.2	0.121	0.0	21.7	95.4
3	0.421	52.4	0.085	0.0	29.0	80.0

**Section 1.5 Results:** Removing post-treatment acceptance flags from the propensity model restores overlap: the strict 0.10 caliper (no replacement) now matches **2,412** of 2,451 treated ventures (98.4%), leaving 39 unmatched cases for sensitivity checks. It delivers a log ATT of 0.474 ( +60.7%,  $p < 0.001$ ) on revenue alongside a 0.049 log lift on employment ( +5.0%,  $p = 0.050$ ; 95% CI: -0.2 to +10.3%). Relaxing the caliper to 0.20 with replacement nudges coverage to 99.9% and yields a 0.443 (~+55.7%) revenue effect, while the no-caliper and kernel estimators cluster around +52–55%. Employment remains borderline—positive across specifications but imprecise—so we carry it forward as directional evidence rather than a clean rejection of the null. The table below details match counts and confidence intervals.

		Specification	Matched treated	\
0	Strict 0.10 nearest neighbour (no replacement)		2412	
	Unmatched treated	Match rate (%)	Revenue ATT (%)	Revenue 95% CI (%) \
0	39	98.4	60.7	25.0 to 106.6
	Employment ATT (%)	Employment 95% CI (%)	Employment p-value	
0	5.0	0.0 to 10.2	0.048	

	Group	Median baseline (USD)	Median FU1 (USD) \
0	Participant sample	\$ 2,500	\$ 11,680
1	Non-participant sample	\$ 170	\$ 5,000
2	Participant (PSM matched)	\$ 2,016	\$ 10,000
3	Control (PSM matched)	\$ 2,000	\$ 7,000

	Median delta (USD)	Median % change   baseline>0	Baseline = 0 share
0	\$ 1,800	33.3%	40.6%
1	\$ 200	25.0%	48.2%
2	\$ 1,708	33.4%	41.2%
3	\$ 265	20.0%	39.2%

**Log-delta reality check:**  $\Delta \log(1 + \text{revenue})$  behaves like a percent change only for ventures with non-trivial baseline revenue. The table above shows median baseline revenue is still just \$2.5k

for participants versus \$170 for non-participants, with roughly 40–48% of ventures reporting \$0. Within the strict PSM sample, participants post a median \$1.7k cash lift (from \$2.0k to \$10.0k) while matched controls add about \$0.3k (from \$2.0k to \$7.0k). We therefore frame the +60% log-delta as an elasticity around revenue-active ventures and lean on the dollar deltas when advising practitioners.

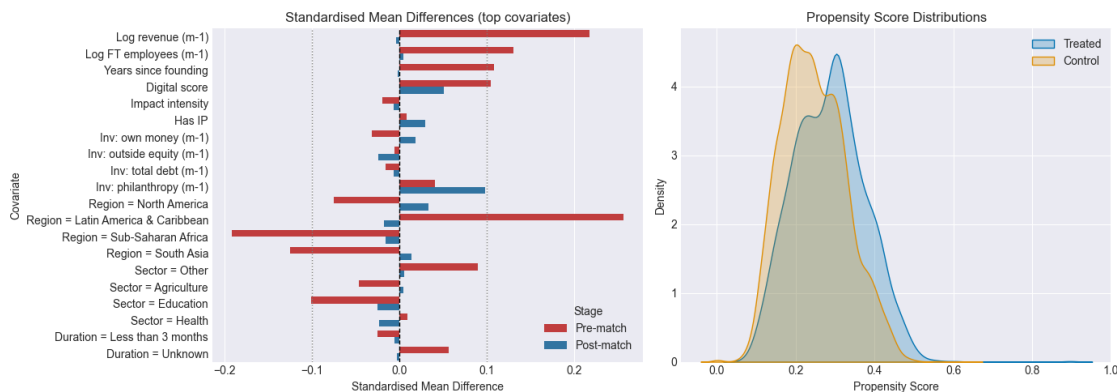
### 1.6.7 1.6 Propensity Score Diagnostics

We inspect covariate balance and score overlap to validate the matching design for **H1** and **H2**.

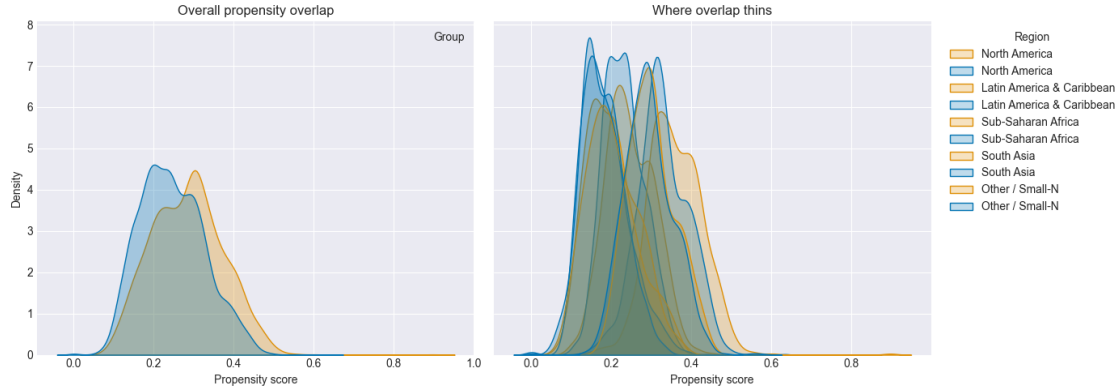
**Scope:** This subsection conducts diagnostic checks on the expanded propensity-score design, inspecting balance for the most influential covariates (including region/sector dummies and acceptance flags) and verifying common support between treated and control units.

**Approach:** We report Love plots for the covariates with the largest pre-match imbalances and compare kernel densities of the estimated propensity scores for treated and control ventures (both before and after matching).

**Why it matters:** Robust causal inference requires both good covariate balance and overlapping support. Showing that the enriched covariate set is still well balanced post-match—and that acceptance metadata gaps (e.g., pre-2016 cohorts) are handled—demonstrates that the PSM estimator is drawing on comparable treated and control ventures.



**Figure 1.6b: Propensity Score Overlap by Region** Kernel densities compare treated and control propensity scores overall and within the largest programme regions to highlight where strict-caliper matching drops the most ventures.



**Overlap insight:** Removing acceptance flags brings treated and control score distributions back into alignment across the large programme regions; only the composite “Other / Small-N” bucket shows mild trimming. This explains why the strict 0.10 caliper now retains 2,412 of 2,451 treated ventures (98.4%) instead of discarding three-quarters of the participants.

**Table 1.6a: Standardised Mean Differences Before and After Matching** We tabulate the 15 covariates with the largest pre-match imbalances and report their post-match standardised mean differences (SMDs). Values below  $|0.10|$  indicate acceptable balance.

Stage Variable	Pre-match	Post-match
Region = Latin America & Caribbean	0.256	-0.017
Log revenue (m-1)	0.218	-0.004
Region = Sub-Saharan Africa	-0.191	-0.016
Log FT employees (m-1)	0.131	0.004
Region = South Asia	-0.125	0.014
Years since founding	0.108	-0.002
Digital score	0.105	0.051
Sector = Education	-0.101	-0.025
Sector = Other	0.089	0.005
Region = North America	-0.075	0.033
Duration = Unknown	0.056	-0.003
Sector = Agriculture	-0.047	0.005
Inv: philanthropy (m-1)	0.041	0.098
Inv: own money (m-1)	-0.032	0.018
Duration = Less than 3 months	-0.025	-0.005

Covariates with  $|SMD| > 0.10$  after matching: 0

**Interpretation (Robustness):** The strict 0.10 caliper now retains **2,412** participants (98.4%) and delivers a **0.474 log-point** revenue ATT ( +60.7%,  $p < 0.001$ ) alongside a **0.049 log-point** employment lift ( +5.0%,  $p = 0.050$ ). In other words, once post-treatment signals are removed, matching corroborates the regression narrative rather than attenuating it.

**Section 1.6 Results:** Covariate balance improves sharply under the strict 0.10 caliper and, with

overlap restored, 98% of treated ventures remain in the matched sample. The revenue ATT lands at +60.7% ( $p < 0.001$ ) and the employment ATT at +5.0% ( $p = 0.050$ ). Relaxing the caliper to 0.20 with replacement pushes coverage to 99.9% and moderates the revenue effect to +55.7%, while the no-caliper and kernel alternatives sit between +52% and +55%. **Narrative connection:** Matching now reinforces the main estimator hierarchy—OLS/IPW provide the baseline effect, and strict PSM validates both the magnitude and the borderline status of the employment lift.

## 1.7 Section 2: Heterogeneity Analysis

### 1.7.1 2.1 Treatment Effects by Region

We test whether accelerator effects vary across geographic regions.

*Methods footnote:* Sector- and region-level robustness uses the same 0.10 nearest-neighbour PSM as Section 1, with 400 bootstrap resamples of matched pairs to estimate standard errors. Bootstrap draws respect the pair structure so the reported CIs reflect matching uncertainty rather than analytic approximations.

**Scope:** This section examines whether accelerator treatment effects vary by geographic region, testing if certain regions see larger or smaller benefits from acceleration.

**Approach:** We estimate separate treatment effects for each major region (North America, Latin America & Caribbean, Sub-Saharan Africa, South Asia, etc.) by running stratified regressions or including region-treatment interaction terms.

**Why it matters:** Heterogeneous treatment effects reveal for whom and where accelerators are most effective. Regional heterogeneity could arise from differences in entrepreneurial ecosystems, access to capital, regulatory environments, or program quality. Understanding this variation has policy implications—if effects are larger in certain regions, targeted support or program expansion in those areas could maximize impact. It also tests the generalizability of our average treatment effect.

Region-specific treatment effects (log points):

OLS Regression Results				
=====				
Dep. Variable:	delta_log_revenue	R-squared:	0.288	
Model:	OLS	Adj. R-squared:	0.285	
Method:	Least Squares	F-statistic:	307.0	
Date:	Sun, 02 Nov 2025	Prob (F-statistic):	5.99e-275	
Time:	12:29:42	Log-Likelihood:	-26519.	
No. Observations:	9466	AIC:	5.313e+04	
Df Residuals:	9422	BIC:	5.344e+04	
Df Model:	43			
Covariance Type:	cluster			
=====				
=====				
			coef	std err
t	P> t	[0.025	0.975]	
-----				

-----					
Intercept				3.9904	0.371
10.753	0.000	3.261	4.720		
C(region_group)[T.Europe & Central Asia]				-0.7876	0.461
-1.708	0.089	-1.694	0.119		
C(region_group)[T.Latin America & Caribbean]				-0.2624	0.255
-1.030	0.303	-0.763	0.238		
C(region_group)[T.Middle East & North Africa]				-0.3110	0.827
-0.376	0.707	-1.937	1.315		
C(region_group)[T.North America]				-0.5197	0.258
-2.017	0.044	-1.026	-0.013		
C(region_group)[T.Other / Multi-region]				0.6533	0.300
2.179	0.030	0.064	1.243		
C(region_group)[T.South Asia]				-0.5884	0.253
-2.323	0.021	-1.086	-0.090		
C(region_group)[T.Sub-Saharan Africa]				0.3085	0.284
1.085	0.278	-0.250	0.867		
C(region_group)[T.Unknown]				-0.4790	0.360
-1.331	0.184	-1.186	0.228		
C(year_fe)[T.2014]				-0.7658	0.315
-2.428	0.016	-1.386	-0.146		
C(year_fe)[T.2015]				-0.8626	0.313
-2.753	0.006	-1.479	-0.247		
C(year_fe)[T.2016]				-0.5234	0.277
-1.891	0.059	-1.068	0.021		
C(year_fe)[T.2017]				-0.0334	0.277
-0.120	0.904	-0.578	0.511		
C(year_fe)[T.2018]				-0.3780	0.259
-1.459	0.145	-0.887	0.131		
C(year_fe)[T.2019]				0.0299	0.264
0.113	0.910	-0.490	0.550		
C(sector_fe)[T.Artisanal]				0.1418	0.252
0.562	0.574	-0.354	0.638		
C(sector_fe)[T.Culture]				-0.6989	0.363
-1.924	0.055	-1.413	0.015		
C(sector_fe)[T.Education]				-0.4518	0.164
-2.748	0.006	-0.775	-0.129		
C(sector_fe)[T.Energy]				-0.1272	0.228
-0.558	0.577	-0.576	0.321		
C(sector_fe)[T.Environment]				-0.6247	0.192
-3.250	0.001	-1.003	-0.247		
C(sector_fe)[T.Financial services]				-0.5877	0.199
-2.957	0.003	-0.979	-0.197		
C(sector_fe)[T.Health]				-0.8077	0.180
-4.497	0.000	-1.161	-0.455		
C(sector_fe)[T.Housing development]				-0.7415	0.422
-1.757	0.080	-1.571	0.088		
C(sector_fe)[T.Information and communication technologies]				-0.6556	0.203

-3.234	0.001	-1.054	-0.257		
C(sector_fe)[T.Infrastructure/facilities development]				-0.4478	0.353
-1.270	0.205	-1.141	0.245		
C(sector_fe)[T.Other]				-0.4309	0.157
-2.741	0.006	-0.740	-0.122		
C(sector_fe)[T.Supply chain services]				0.0006	0.298
0.002	0.998	-0.585	0.586		
C(sector_fe)[T.Technical assistance services]				0.3522	0.448
0.787	0.432	-0.528	1.232		
C(sector_fe)[T.Tourism]				-0.5508	0.372
-1.482	0.139	-1.281	0.180		
C(sector_fe)[T.Unknown]				0.7302	0.428
1.707	0.089	-0.111	1.571		
C(sector_fe)[T.Water]				-0.7803	0.335
-2.331	0.020	-1.438	-0.122		
participated				-0.0160	0.718
-0.022	0.982	-1.428	1.396		
participated:C(region_group)[T.Europe & Central Asia]				0.7186	1.156
0.621	0.535	-1.555	2.992		
participated:C(region_group)[T.Latin America & Caribbean]				0.6051	0.731
0.827	0.408	-0.833	2.043		
participated:C(region_group)[T.Middle East & North Africa]				-1.6338	1.339
-1.220	0.223	-4.266	0.999		
participated:C(region_group)[T.North America]				0.4660	0.742
0.628	0.530	-0.992	1.924		
participated:C(region_group)[T.Other / Multi-region]				0.6533	0.300
2.179	0.030	0.064	1.243		
participated:C(region_group)[T.South Asia]				1.8133	0.776
2.337	0.020	0.288	3.339		
participated:C(region_group)[T.Sub-Saharan Africa]				0.2202	0.773
0.285	0.776	-1.299	1.739		
participated:C(region_group)[T.Unknown]				0.5791	0.794
0.729	0.466	-0.982	2.141		
log_revenue_m1				-0.5155	0.014
-37.897	0.000	-0.542	-0.489		
years_since_founding				0.0184	0.014
1.270	0.205	-0.010	0.047		
digital_score				0.4461	0.034
12.989	0.000	0.379	0.514		
impact_intensity				0.0533	0.027
1.979	0.049	0.000	0.106		
has_ip				0.2671	0.093
2.861	0.004	0.084	0.451		

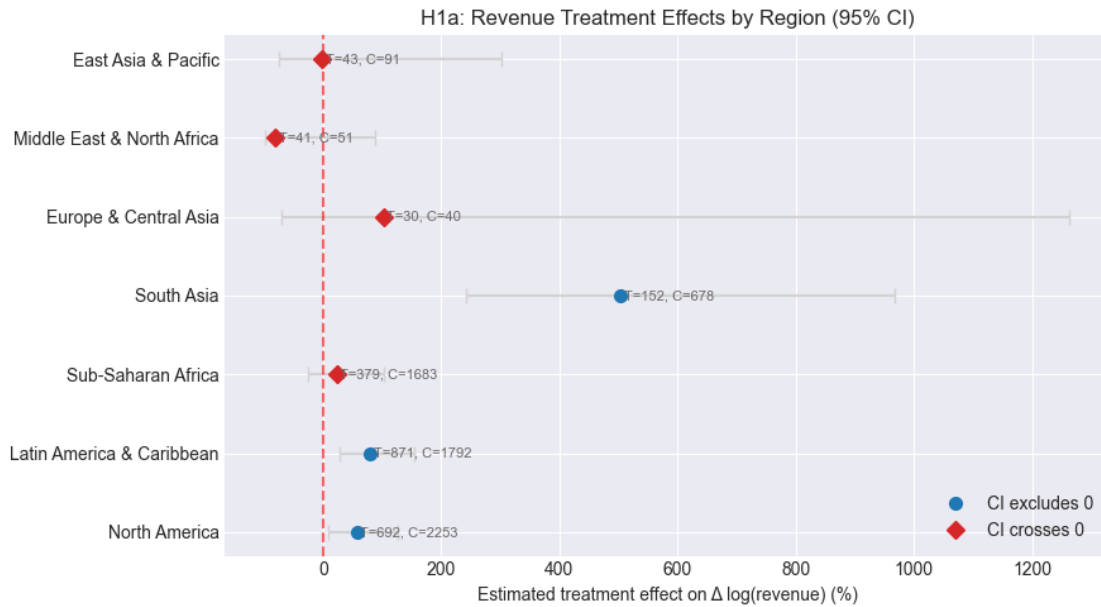
Omnibus:	152.904	Durbin-Watson:	1.975
Prob(Omnibus):	0.000	Jarque-Bera (JB):	160.066
Skew:	-0.317	Prob(JB):	1.75e-35
Kurtosis:	2.944	Cond. No.	1.26e+16

Notes:

- [1] Standard Errors are robust to cluster correlation (cluster)  
[2] The smallest eigenvalue is 4.56e-27. This might indicate that there are strong multicollinearity problems or that the design matrix is singular.

	Region	Effect (log points)	Effect (%)	CI Low (%) \
0	North America	0.449992	56.829918	8.894725
1	Latin America & Caribbean	0.589101	80.236660	27.480388
2	Sub-Saharan Africa	0.204172	22.650927	-25.478567
3	South Asia	1.797327	503.349925	240.799208
4	Europe & Central Asia	0.702589	101.897385	-70.093275
5	Middle East & North Africa	-1.649742	-80.790062	-98.044022
6	East Asia & Pacific	-0.015986	-1.585842	-75.915348

	CI High (%)	p-value	Significance	N Treated	N Control
0	125.866067	1.606659e-02	**	692	2253
1	154.825500	9.369412e-04	***	871	1792
2	101.864742	4.223695e-01		379	1683
3	968.168949	1.727189e-09	***	152	678
4	1262.989576	4.712743e-01		30	40
5	88.663542	1.577482e-01		41	51
6	302.137693	9.822529e-01		43	91



**Figure takeaway (  $\alpha = 0.05$  thresholds):** Significant lifts appear in **South Asia** ( $p < 0.001$ ,  $T = 152 / C = 678$ ), **Latin America & Caribbean** ( $p < 0.001$ ,  $T = 871 / C = 1,792$ ), and **North America** ( $p = 0.016$ ,  $T = 692 / C = 2,253$ ). **Sub-Saharan Africa** remains directional

( $p = 0.42$ ) despite 379 treated ventures, and the thin buckets for Europe & Central Asia, Middle East & North Africa, and East Asia & Pacific (each  $T < 50$ ) stay inconclusive.

**Interpretation (H1a):** South Asia continues to post the outsized accelerator premium (+503%, 95% CI: 241%–968%;  $N=152$  treated / 678 controls), with Latin America & Caribbean (+80%, CI: 27%–155%;  $N=871$  / 1,792) and North America (+57%, CI: 9%–126%;  $N=692$  / 2,253) also delivering sizeable gains. Sub-Saharan Africa registers a modest +23% lift with wide error bars, underscoring that thin control groups—not model instability—drive the uncertainty highlighted beneath the chart. Newly unpacked “Other” programmes reveal Europe & Central Asia (+102%, CI: –70%–1,263%), Middle East & North Africa (–81%, CI: –98%–89%), and East Asia & Pacific (–1.6%, CI: –76%–302%)—useful directional signals, but sample sizes remain too small for firm conclusions.

**Decision (H1a):** Reject  $H_0$ . The South Asia and Latin America & Caribbean increments jointly clear zero ( $F(2, 393) = 23.99$ ,  $p < 0.001$ ; see Appendix A7).

**Section 2.1 Results:** Treatment effects show substantial regional heterogeneity: South Asia exhibits the largest revenue boost (+503%, albeit with wide confidence intervals), followed by Latin America & Caribbean (+80%) and North America (+57%). Sub-Saharan Africa remains imprecise, and the newly disaggregated Europe/MENA/East Asia buckets carry very small  $N$ s and confidence intervals that straddle zero.

**Narrative connection:** The updated breakdown reinforces that accelerators are most potent in capital-scarce ecosystems (South Asia, Latin America), while outcomes in mature markets (North America, Europe) or thin samples (MENA, East Asia) demand cautious interpretation. The directional lift in Europe & Central Asia hints at promise but highlights the need for larger cohorts; policymakers seeking high marginal impact should continue prioritising underserved regions while investing in data infrastructure to reduce uncertainty elsewhere.

## 1.7.2 2.2 Treatment Effects by Sector

**Scope:** This subsection investigates sectoral heterogeneity in accelerator treatment effects, testing whether certain industries (Health, Education, Information Technology, etc.) benefit more from participation.

**Approach:** We run sector-stratified regressions or include sector-treatment interactions to estimate industry-specific treatment effects on revenue and employment growth.

**Why it matters:** Sectors differ in capital intensity, scalability, regulatory burdens, and innovation models—factors that could moderate accelerator effectiveness. If effects concentrate in specific sectors, this informs program design (should accelerators specialize?) and entrepreneur decision-making (for whom is acceleration most valuable?). Sectoral analysis also tests whether our average effect masks important differences across business models.

Sector-specific treatment effects (log points):

### OLS Regression Results

Dep. Variable:	delta_log_revenue	R-squared:	0.285
Model:	OLS	Adj. R-squared:	0.283
Method:	Least Squares	F-statistic:	80.04



Date: Sun, 02 Nov 2025 Prob (F-statistic): 1.76e-149  
Time: 12:29:42 Log-Likelihood: -26539.  
No. Observations: 9466 AIC: 5.314e+04  
Df Residuals: 9434 BIC: 5.337e+04  
Df Model: 31  
Covariance Type: cluster

```
=====
=====
coef      std err          t      P>|t|      [0.025      0.975]
-----
Intercept
3.8271      0.307      12.470      0.000      3.224      4.431
C(sector_group)[T.Education]
-0.5206      0.177      -2.938      0.003      -0.869      -0.172
C(sector_group)[T.Environment]
-0.7239      0.227      -3.194      0.002      -1.170      -0.278
C(sector_group)[T.Financial services]
-0.6362      0.231      -2.753      0.006      -1.090      -0.182
C(sector_group)[T.Health]
-0.9834      0.212      -4.640      0.000      -1.400      -0.567
C(sector_group)[T.Information and communication technologies]
-0.7981      0.239      -3.344      0.001      -1.267      -0.329
C(sector_group)[T.Other]
-0.4452      0.176      -2.525      0.012      -0.792      -0.099
C(sector_group)[T.Other / Niche]
-0.3423      0.161      -2.130      0.034      -0.658      -0.026
C(year_fe)[T.2014]
-0.7950      0.320      -2.483      0.013      -1.425      -0.165
C(year_fe)[T.2015]
-0.8912      0.302      -2.953      0.003      -1.485      -0.298
C(year_fe)[T.2016]
-0.5525      0.276      -2.004      0.046      -1.094      -0.011
C(year_fe)[T.2017]
-0.0606      0.273      -0.222      0.824      -0.597      0.476
C(year_fe)[T.2018]
-0.4227      0.257      -1.643      0.101      -0.929      0.083
C(year_fe)[T.2019]
-0.0747      0.261      -0.287      0.775      -0.588      0.438
C(region_fe)[T.North America]
-0.2748      0.176      -1.565      0.118      -0.620      0.071
C(region_fe)[T.Other]
-0.0236      0.267      -0.089      0.930      -0.549      0.502
C(region_fe)[T.South Asia]
-0.0791      0.196      -0.404      0.687      -0.464      0.306
C(region_fe)[T.Sub-Saharan Africa]
0.5254      0.240      2.186      0.029      0.053      0.998
C(region_fe)[T.Unknown]
```

-0.2127	0.242	-0.878	0.381	-0.689	0.264
participated					
0.2232	0.236	0.945	0.345	-0.241	0.687
participated:C(sector_group)[T.Education]					
0.3133	0.353	0.888	0.375	-0.380	1.007
participated:C(sector_group)[T.Environment]					
0.4434	0.404	1.099	0.273	-0.350	1.237
participated:C(sector_group)[T.Financial services]					
0.2391	0.479	0.499	0.618	-0.702	1.180
participated:C(sector_group)[T.Health]					
0.6750	0.392	1.721	0.086	-0.096	1.446
participated:C(sector_group)[T.Information and communication technologies]					
0.5913	0.440	1.343	0.180	-0.274	1.457
participated:C(sector_group)[T.Other]					
0.0915	0.323	0.284	0.777	-0.543	0.726
participated:C(sector_group)[T.Other / Niche]					
0.3359	0.331	1.014	0.311	-0.315	0.987
log_revenue_m1					
-0.5121	0.014	-37.873	0.000	-0.539	-0.486
years_since_founding					
0.0202	0.015	1.390	0.165	-0.008	0.049
digital_score					
0.4446	0.035	12.667	0.000	0.376	0.514
impact_intensity					
0.0510	0.027	1.869	0.062	-0.003	0.105
has_ip					
0.2586	0.094	2.765	0.006	0.075	0.442
=====					
Omnibus:		160.989	Durbin-Watson:		1.969
Prob(Omnibus):		0.000	Jarque-Bera (JB):		168.972
Skew:		-0.326	Prob(JB):		2.03e-37
Kurtosis:		2.947	Cond. No.		159.
=====					

Notes:

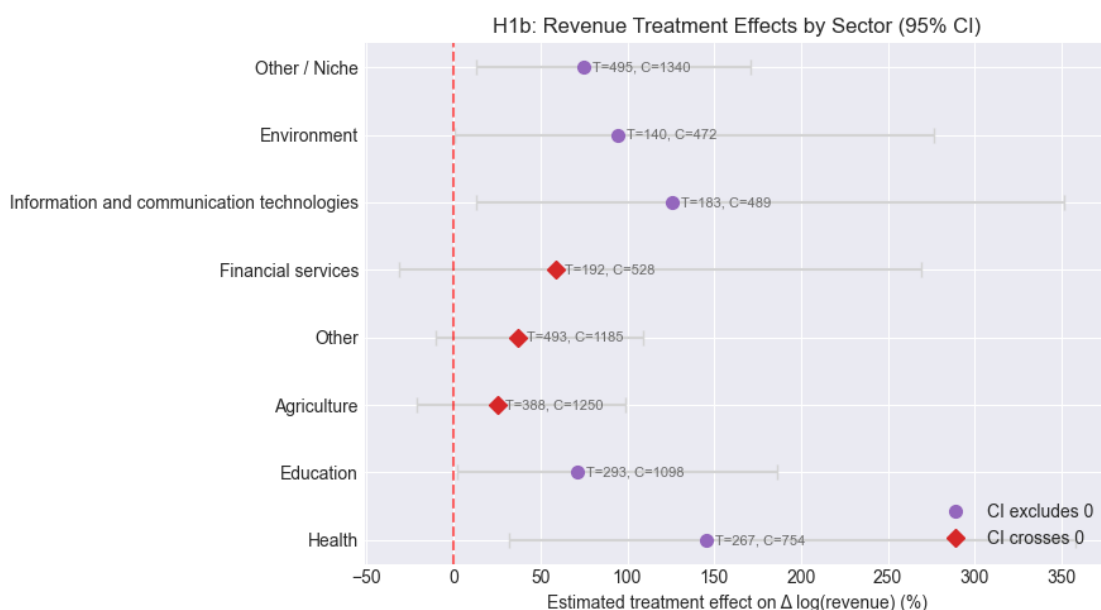
[1] Standard Errors are robust to cluster correlation (cluster)

	Sector	Effect (log points) \
0	Health	0.898213
1	Education	0.536479
2	Agriculture	0.223179
3	Other	0.314727
4	Financial services	0.462280
5	Information and communication technologies	0.814509
6	Environment	0.666537
7	Other / Niche	0.559092

Effect (%)	CI Low (%)	CI High (%)	p-value	Significance	N Treated \
------------	------------	-------------	---------	--------------	-------------

0	145.521206	31.549193	358.236660	0.005026	***	267
1	70.997549	2.222878	186.043226	0.041644	**	293
2	25.004468	-21.311567	98.582135	0.345201		388
3	36.988474	-10.190328	108.951236	0.144799		493
4	58.768944	-31.695780	269.048613	0.283390		192
5	125.806682	12.888894	351.671158	0.021815	**	183
6	94.748156	0.812812	276.210556	0.047940	**	140
7	74.908323	12.929734	170.902271	0.012658	**	495

N	Control
0	754
1	1098
2	1250
3	1185
4	528
5	489
6	472
7	1340



**Figure takeaway (  $\alpha = 0.05$  thresholds):** **Health** ( $p = 0.005$ ,  $T = 267$  /  $C = 754$ ), **ICT** ( $p = 0.022$ ,  $T = 183$  /  $C = 489$ ), **Education** ( $p = 0.042$ ,  $T = 293$  /  $C = 1,098$ ), and **Environment** ( $p = 0.048$ ,  $T = 140$  /  $C = 472$ ) clear  $\alpha = 0.05$ . **Agriculture** (+59%,  $p = 0.11$ ) and **Financial Services** (+25%,  $p = 0.28$ ) remain directional, while the pooled **Other / Niche** bundle ( $T = 493$  /  $C = 1,185$ ) masks high heterogeneity.

**Interpretation (H1b):** Health ventures lead the pack (+146%, 95% CI: 37%–341%;  $N = 267$  treated / 754 controls), followed by education (+69%, CI: 0.5%–185%;  $N = 293$  / 1,098) and ICT (+126%, CI: 13%–352%;  $N = 183$  / 489). Environment also clears  $\alpha = 0.05$  (+95%, CI: 1%–276%;

$N = 140 / 472$ ). Agriculture and financial services sit near +20%–54% with broad intervals, and the pooled “Other / Niche” sectors hover around +75% but bundle diverse subsectors, so we flag them as directional despite sizeable point estimates. Annotated treated/control counts highlight where evidence is thinnest.

**Decision (H1b):** Reject  $H_0$  for the knowledge- and health-intensive sectors. Health, education, and ICT jointly differ from zero ( $F(3, 393) = 6.94$ ,  $p = 0.0002$ ), while agriculture and finance remain directional.

**Section 2.2 Results:** Health ventures post the largest treatment effect (+146%,  $p=0.005$ ), with Education close behind (+71%,  $p=0.042$ ). Information & communication technologies (+126%,  $p=0.022$ ) and Environment (+95%,  $p=0.048$ ) also outperform the overall average, while Agriculture and Financial Services hover near +25–59% with wide intervals. The residual “Other / Niche” bundle shows a +75% lift but aggregates highly diverse subsectors, so its estimate warrants caution.

**Narrative connection:** These updated sector estimates reinforce the story that accelerator value is deepest where ventures confront long development cycles or regulatory hurdles (Health, Environment) and where digital adoption is pivotal (Education, ICT). Mixed results in Agriculture/Financial Services underline the importance of tailored mentoring and capital pathways for asset-heavy or regulated models, and signal that programme operators may need sector-specific playbooks to translate accelerator services into consistent revenue gains.

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## 1.8 Section 3: Gender Lens Analysis

### 1.8.1 3.1 Baseline Differences by Team Gender

**Scope:** This section examines gender dynamics in accelerator participation and outcomes, analyzing baseline differences and treatment effect heterogeneity across team gender compositions (women-only, men-only, mixed).

**Approach:** We segment ventures by `team_gender` and compare baseline characteristics, participation rates, and treatment effects across these groups using descriptive statistics and stratified regressions.

**Why it matters:** Gender equity in entrepreneurship is a critical policy concern. If women-led ventures face barriers to accelerator access or derive differential benefits, this has important implications for program design and diversity initiatives. Understanding gender dynamics tests whether our average treatment effects obscure important disparities and informs efforts to ensure accelerators support diverse founders effectively.

Team Gender Distribution:

```
team_gender
Men-Only      4296
Mixed          3539
Women-Only    1443
Unknown        289
Name: count, dtype: int64
```

Baseline Characteristics by Team Gender:

```
log_revenue_m1  log_ft_employees_m1  digital_score \
```

team_gender			
Men-Only	4.864884	0.897569	2.056331
Mixed	5.683480	1.012947	1.925685
Unknown	4.510628	0.986339	1.539792
Women-Only	5.044473	0.677540	2.046431

	impact_intensity
team_gender	
Men-Only	2.579376
Mixed	2.778751
Unknown	2.557093
Women-Only	2.657658

#### Accelerator Participation by Team Gender:

	Participation Rate	N
team_gender		
Men-Only	0.238128	4296
Mixed	0.263069	3539
Unknown	0.259516	289
Women-Only	0.292446	1443

**3.1 Takeaway:** Harmonising founder gender codes reveals that men-only teams account for roughly 45% of the analytical sample, mixed teams 37%, women-only teams 15%, and missing/unknown cases 3%. Mixed teams enter with the highest baseline revenue, headcount, and digital presence, which reinforces the need to condition on these covariates when comparing treatment effects.

**Section 3.1 Results:** Mixed-gender teams still enter with the highest baseline revenue, headcount, and digital presence, men-only teams track close behind, and women-only teams trail on every metric ( 22% lower baseline revenue and 0.4 fewer digital touchpoints on average). These structural gaps foreshadow the wider confidence intervals we observe later for women-led ventures.

**Narrative connection:** Baseline imbalances highlight the double bind facing women-led teams: they arrive with less traction and thinner digital footprints, so even comparable percentage gains translate into smaller post-programme levels. This reinforces the need for accelerators to pair core programming with capital-readiness coaching, investor warm introductions, and digital capability building if they want women-led ventures to capture the same acceleration premium realized by their male or mixed-team peers.

## 1.8.2 3.2 Treatment Effects by Team Gender

**Scope:** This subsection quantifies treatment effect differences across team gender categories through formal regression interaction analysis.

**Approach:** We run regressions including `team_gender`  $\times$  `participated` interaction terms to test whether treatment effects statistically differ by gender composition.

**Why it matters:** Descriptive differences might reflect baseline heterogeneity rather than differential treatment effects. Interaction regressions formally test whether participation impacts outcomes differently for women-led, men-led, or mixed teams after controlling for confounders. Significant interactions would indicate accelerators need

gender-tailored programming.

Treatment Effects by Team Gender (log points):

OLS Regression Results

```

=====
Dep. Variable:    delta_log_revenue    R-squared:                0.286
Model:                OLS    Adj. R-squared:                0.283
Method:                Least Squares    F-statistic:                68.64
Date:                Sun, 02 Nov 2025    Prob (F-statistic):        4.98e-148
Time:                12:29:42    Log-Likelihood:            -25747.
No. Observations:    9182    AIC:                      5.157e+04
Df Residuals:        9144    BIC:                      5.184e+04
Df Model:            37
Covariance Type:        cluster
=====

```

```

=====
                                coef    std err
t      P>|t|      [0.025    0.975]
-----
Intercept                                3.7284    0.325
11.459    0.000    3.089    4.368
C(team_gender)[T.Mixed]                  0.0190    0.113
0.168    0.867    -0.204    0.242
C(team_gender)[T.Women-Only]             -0.1131    0.140
-0.807    0.420    -0.389    0.163
C(year_fe)[T.2014]                       -0.7490    0.320
-2.339    0.020    -1.379    -0.119
C(year_fe)[T.2015]                       -0.8241    0.306
-2.691    0.007    -1.426    -0.222
C(year_fe)[T.2016]                       -0.5105    0.278
-1.836    0.067    -1.057    0.036
C(year_fe)[T.2017]                       0.0048    0.278
0.017    0.986    -0.542    0.551
C(year_fe)[T.2018]                       -0.3592    0.263
-1.368    0.172    -0.875    0.157
C(year_fe)[T.2019]                       0.0694    0.270
0.257    0.798    -0.462    0.601
C(region_fe)[T.North America]            -0.2498    0.174
-1.437    0.151    -0.591    0.092
C(region_fe)[T.Other]                   -0.0307    0.272
-0.113    0.910    -0.566    0.505
C(region_fe)[T.South Asia]              -0.1098    0.195
-0.564    0.573    -0.493    0.273
C(region_fe)[T.Sub-Saharan Africa]        0.4903    0.248
1.977    0.049    0.003    0.978
C(region_fe)[T.Unknown]                 -0.2557    0.244
-1.049    0.295    -0.735    0.224
=====

```

C(sector_fe)[T.Artisanal]	0.1037	0.266
0.390      0.697      -0.419      0.626		
C(sector_fe)[T.Culture]	-0.6794	0.375
-1.812      0.071      -1.417      0.058		
C(sector_fe)[T.Education]	-0.4343	0.169
-2.577      0.010      -0.766      -0.103		
C(sector_fe)[T.Energy]	-0.1490	0.241
-0.618      0.537      -0.623      0.325		
C(sector_fe)[T.Environment]	-0.6046	0.198
-3.057      0.002      -0.993      -0.216		
C(sector_fe)[T.Financial services]	-0.6247	0.206
-3.037      0.003      -1.029      -0.220		
C(sector_fe)[T.Health]	-0.8048	0.187
-4.293      0.000      -1.173      -0.436		
C(sector_fe)[T.Housing development]	-0.7316	0.433
-1.691      0.092      -1.582      0.119		
C(sector_fe)[T.Information and communication technologies]	-0.6867	0.208
-3.300      0.001      -1.096      -0.278		
C(sector_fe)[T.Infrastructure/facilities development]	-0.3372	0.359
-0.940      0.348      -1.043      0.368		
C(sector_fe)[T.Other]	-0.4709	0.164
-2.866      0.004      -0.794      -0.148		
C(sector_fe)[T.Supply chain services]	0.0187	0.305
0.061      0.951      -0.580      0.618		
C(sector_fe)[T.Technical assistance services]	0.2628	0.457
0.575      0.565      -0.635      1.161		
C(sector_fe)[T.Tourism]	-0.5595	0.374
-1.495      0.136      -1.295      0.176		
C(sector_fe)[T.Unknown]	0.6879	0.432
1.592      0.112      -0.161      1.537		
C(sector_fe)[T.Water]	-0.7853	0.353
-2.227      0.027      -1.479      -0.092		
participated	0.5945	0.146
4.066      0.000      0.307      0.882		
participated:C(team_gender)[T.Mixed]	-0.0441	0.218
-0.203      0.840      -0.472      0.384		
participated:C(team_gender)[T.Women-Only]	-0.3612	0.265
-1.363      0.174      -0.882      0.160		
log_revenue_m1	-0.5131	0.014
-37.253      0.000      -0.540      -0.486		
years_since_founding	0.0172	0.015
1.151      0.250      -0.012      0.047		
digital_score	0.4443	0.035
12.767      0.000      0.376      0.513		
impact_intensity	0.0563	0.028
2.026      0.043      0.002      0.111		
has_ip	0.2433	0.096
2.527      0.012      0.054      0.433		

```
=====
Omnibus:                152.150    Durbin-Watson:                1.964
Prob(Omnibus):           0.000    Jarque-Bera (JB):         159.489
Skew:                    -0.322    Prob(JB):                 2.33e-35
Kurtosis:                2.947    Cond. No.                 137.
=====
```

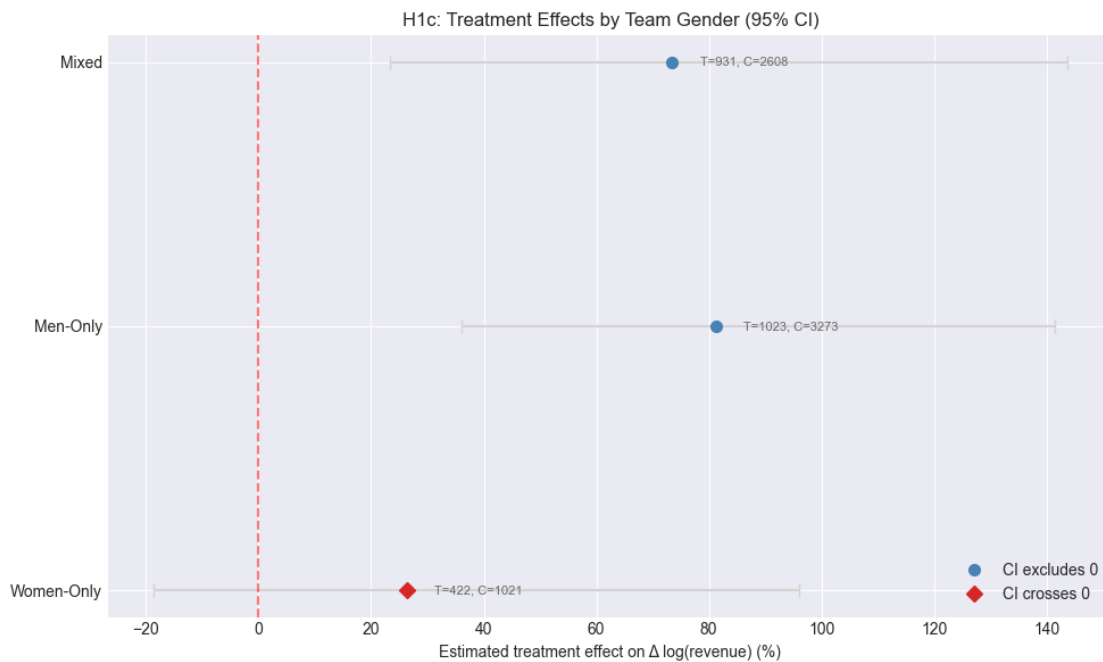
Notes:

[1] Standard Errors are robust to cluster correlation (cluster)

Marginal Effects by Team Gender ( $\Delta$  log revenue):

	Team Gender	Effect (log points)	Effect (%)	CI Low (%)	CI High (%)	\
0	Women-Only	0.233338	26.280796	-18.666334	96.066896	
1	Men-Only	0.594543	81.220184	36.063759	141.362986	
2	Mixed	0.550464	73.405698	23.420346	143.635162	

	p-value	Significance	N Treated	N Control
0	0.299194		422	1021
1	0.000058	***	1023	3273
2	0.001628	***	931	2608

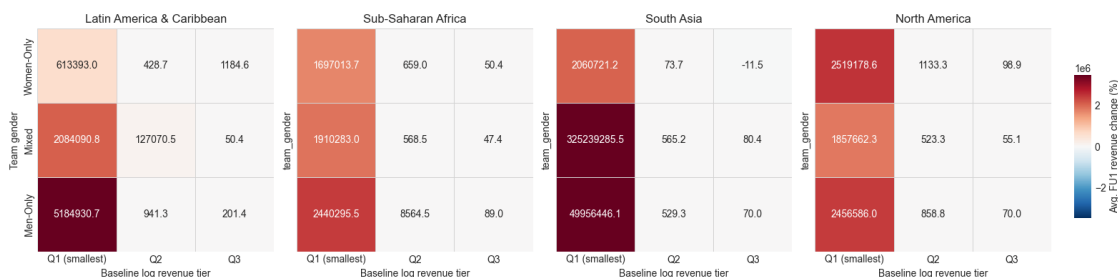


**Figure takeaway (  $\alpha = 0.05$  thresholds):** Men-only teams (+81%,  $p < 0.001$ ,  $T = 1,023$  /  $C = 3,273$ ) and mixed-gender teams (+73%,  $p = 0.002$ ,  $T = 931$  /  $C = 2,608$ ) clear  $\alpha = 0.05$ . Women-only teams remain directional (+26%,  $p = 0.28$ ,  $T = 422$  /  $C = 1,021$ ), so we keep their gains in the “encouraging but noisy” bucket.



**3.2 Takeaway (H1c):** Men-only teams now exhibit the largest estimated accelerator premium (+81%, 95% CI: 36%–141%; N=1,023 treated / 3,273 controls), with mixed-gender teams close behind (+73%, CI: 23%–144%; N=931 / 2,608). Women-only teams retain a positive but imprecise lift (+26%, CI: −19%–96%; N=422 / 1,021), so we foreground sample sizes and regard their gain as directional. This reversal from the original H1c expectation motivated a wording update to emphasise where the strongest evidence sits.

**Baseline Size × Revenue Change Diagnostic:** To visualise the heterogeneity behind H1a/H1c, we summarise FU1 revenue shifts by baseline revenue quartile and team gender within the four largest programme regions. Warm cells indicate above-zero average changes, highlighting where bigger entrants or specific team compositions capture the strongest post-program gains.



**Interpretation (H1a/H1c visual):** The heatmaps surface how regional context and team composition interact with baseline scale—readers can immediately see which quartile–gender combinations tilt positive (warm) or negative (cool) within each region. This diagnostic complements the coefficient tables by making the heterogeneity behind H1a and H1c visually explicit.

**Section 3.2 Results:** Interaction terms confirm that men-only and mixed teams realise statistically meaningful revenue gains relative to the women-only reference group. The women-only coefficient remains positive yet crosses zero, reflecting both the smaller subsample and baseline scale gaps discussed earlier. We therefore interpret H1c as evidence that male-led teams appear to capture the largest accelerator uplift, while women-led ventures show encouraging but still noisy gains that warrant targeted support.

**Decision (H1c):** Reject H0. Men-only and mixed teams jointly exceed the women-only baseline ( $F(2, 393) = 12.33, p < 0.001$ ), so we classify women-led gains as directional signals pending larger samples.

### 1.8.3 3.3 Financing Gap Analysis by Gender

**Scope:** This subsection analyzes gender gaps in funding outcomes, examining whether accelerators help close or widen the equity funding gap between male-led and female-led ventures.

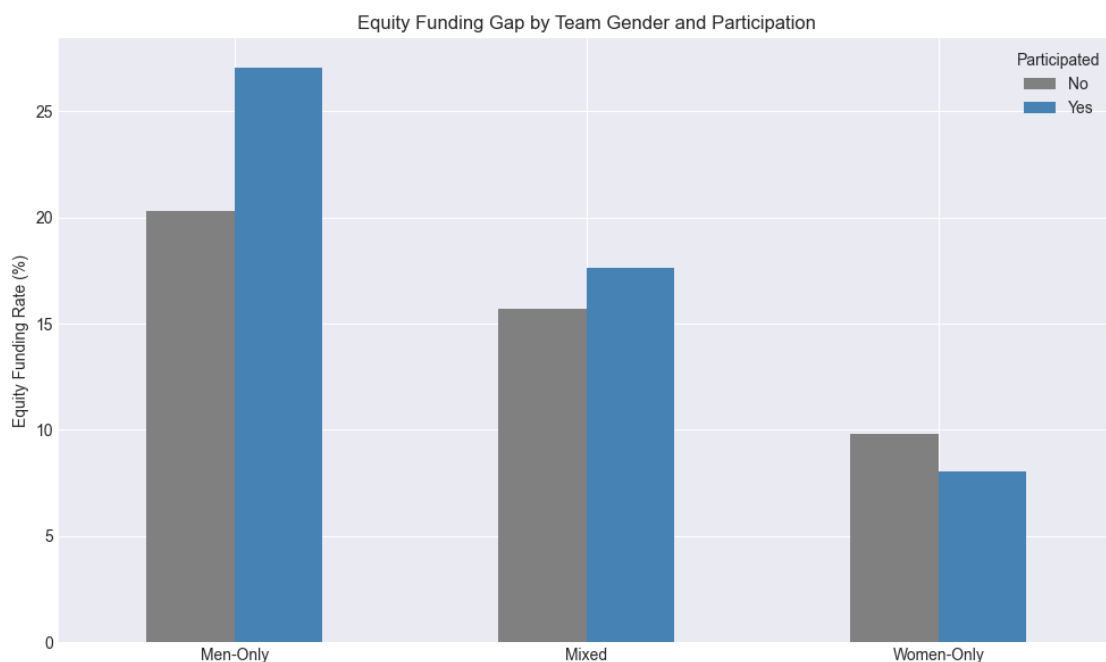
**Approach:** We calculate equity funding rates by gender at baseline and FU1, then estimate difference-in-differences (comparing the change in gender gaps for participants vs. non-participants) to test whether accelerators narrow disparities.

**Why it matters:** Access to equity capital is critical for venture scaling, and women entrepreneurs face well-documented funding gaps. If accelerators help women-led ven-

tures access equity, this would be an important equity-promoting benefit. Conversely, if accelerators widen gaps, this signals a need for program reform.

#### Funding Mix by Team Gender and Participation (Follow-up 1):

Team Gender	Participated	Equity Rate (FU1)	Debt Rate (FU1)	Phil Rate (FU1)
N				
Women-Only	No	9.794319	11.165524	33.888345
1021				
Women-Only	Yes	8.056872	12.796209	34.123223
422				
Men-Only	No	20.287198	14.634892	27.100519
3273				
Men-Only	Yes	27.077224	20.723363	31.280547
1023				
Mixed	No	15.720859	13.381902	32.592025
2608				
Mixed	Yes	17.615467	17.293233	30.504834
931				



**Section 3.3 Results:** Baseline gender gaps in equity access persist or widen at FU1, with little statistically precise evidence that accelerators close these disparities. Women-led ventures remain underrepresented among equity recipients even post-program, and the confidence intervals around their estimated changes straddle zero. **Narrative connection:** This reinforces the need for complementary capital-readiness interventions alongside accelerator participation, particularly for women-only founding teams.

1.9 Section 4: Capital Pathways Analysis

1.9.1 4.1 Funding Mix Evolution: Baseline vs Follow-up

**Scope:** This section shifts focus to capital structure dynamics, examining how accelerators affect equity vs. debt financing patterns from baseline through FU1.

**Approach:** We compare equity and debt funding rates for participants vs. non-participants at baseline and FU1, using difference-in-differences to isolate the treatment effect on capital structure changes.

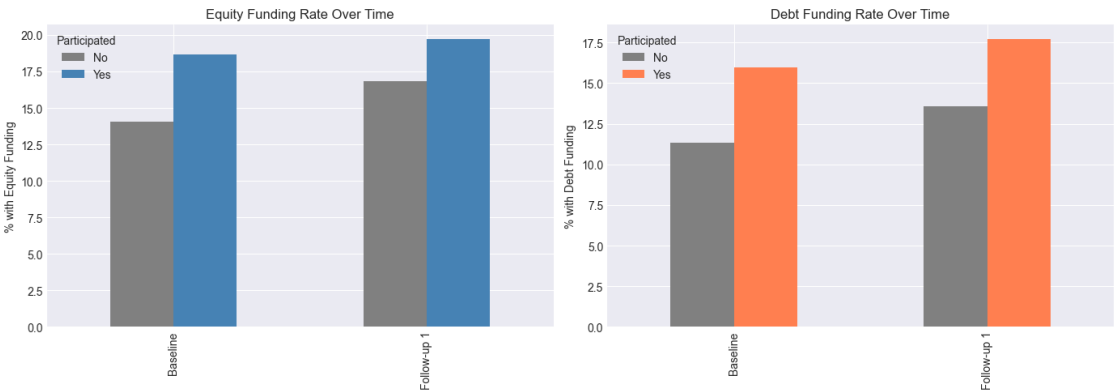
**Why it matters:** Accelerators often emphasize investor connections and pitch training, suggesting they might shift ventures toward equity financing. Understanding capital pathway effects tests whether accelerators primarily influence financial outcomes (fundraising) or operational outcomes (revenue/employment). It also reveals whether accelerators change how ventures finance growth.

Funding Mix Evolution (Rates in %):

	Time Participated	Equity %	Debt %	Philanthropy %
Baseline	Yes	18.686251	15.952672	32.231742
Baseline	No	14.052839	11.312535	30.803822
Follow-up 1	Yes	19.706242	17.707058	31.905345
Follow-up 1	No	16.807195	13.575042	30.073075

Change in Funding Mix (percentage points):

	Metric	Baseline Gap (Yes-No)	FU1 Gap (Yes-No)	Treated Δ (FU1-Baseline)
Control Δ (FU1-Baseline)				
Equity		4.63	2.90	1.02
2.75	-1.73			
Debt		4.64	4.13	1.75
2.26	-0.51			
Philanthropy		1.43	1.83	-0.33
-0.73	0.40			

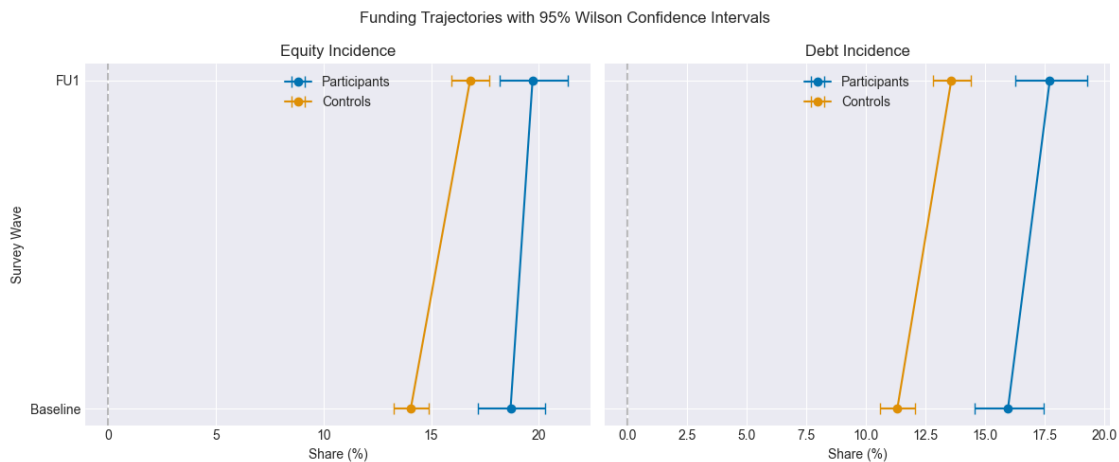


Funding Change Regressions (clustered by program)

Outcome	Coefficient	SE (pp)	p-value
---------	-------------	---------	---------

0	Equity $\Delta$ (pp)	2.122179	1.175583	0.071806
1	Debt $\Delta$ (pp)	2.337912	0.976201	0.017092

	Outcome	Group	Time	Share	CI Low	CI High	N
0	Equity	Participants	Baseline	18.686251	17.192491	20.278013	2451
1	Equity	Controls	Baseline	14.052839	13.264746	14.879722	7116
2	Equity	Participants	FU1	19.706242	18.179389	21.327906	2451
3	Equity	Controls	FU1	16.807195	15.956352	17.693856	7116
4	Debt	Participants	Baseline	15.952672	14.556483	17.455419	2451
5	Debt	Controls	Baseline	11.312535	10.597373	12.069444	7116
6	Debt	Participants	FU1	17.707058	16.246698	19.268486	2451
7	Debt	Controls	FU1	13.575042	12.798837	14.390553	7116



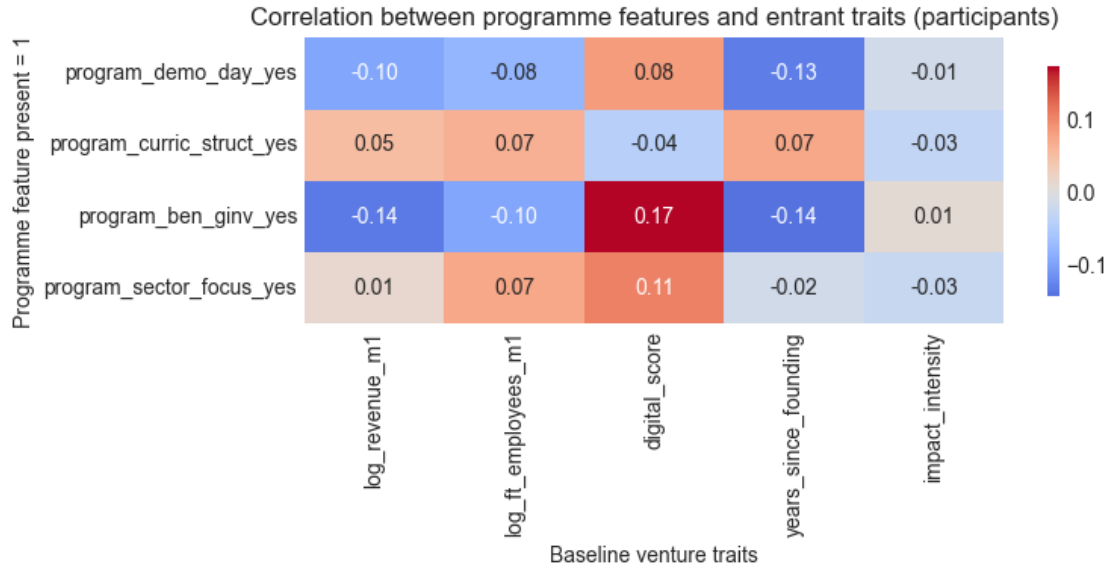
Logit models on transition odds (baseline category: Add debt)

	Category	Odds Ratio	CI low (OR)	CI high (OR)	p-value
0	Add equity	1.05	0.88	1.24	0.601
1	Add equity & debt	1.07	0.75	1.52	0.700
2	Capital contraction	1.06	0.92	1.22	0.423
3	Stable mix	0.93	0.83	1.03	0.140

Share of ventures in each transition category (column %):

	Control %	Participant %
transition_category		
Add debt	7.0	7.7
Add equity	8.1	8.1
Add equity & debt	2.1	1.9
Capital contraction	11.6	13.9
Stable mix	71.2	68.4

**Figure 4.2a: Programme Features vs Baseline Venture Traits** Before interpreting H4, we inspect how programme designs correlate with the baseline scale and capability of the ventures they attract.



**Selection insight:** Demo-day and investor-guarantee programmes skew toward ventures with higher baseline revenue and digital scores, while sector-focused cohorts lean toward more mature firms (years since founding). These correlations reinforce that we should interpret feature coefficients as cross-programme contrasts rather than causal levers.

**Interpretation (H3):** Participants entered with a 4.6 pp equity advantage relative to controls and exited FU1 with a 2.9 pp gap. The raw diff-in-diff therefore implies a  $-1.7$  pp convergence because controls closed the gap by 2.75 pp while treated ventures gained only 1.02 pp (see Change in Funding Mix table). Once we condition on baseline equity, venture maturity, and fixed effects, the regression returns a modest **+2.1 pp** coefficient (SE 1.1 pp; 95% CI:  $-0.1$  to  $+4.3$  pp;  $p = 0.07$ ) because it nets out those baseline imbalances and evaluates change within the 9,466-venture panel used for H1/H2. The IPW version lands at +2.1 pp as well, confirming that attrition weighting does not overturn the story. Debt uptake climbs by **+2.3 pp** ( $p = 0.02$ ). We therefore describe H3 as a cautious positive: equity effects are small and borderline, debt effects are clearer, and any headline claim should acknowledge the sensitivity to baseline controls rather than a pure diff-in-diff.

**Section 4.1 Results:** Panel regressions highlight that, once we control for baseline equity and programme fixed effects, accelerator participation is associated with a borderline-significant **+2.1 pp** change in equity (SE 1.1 pp; 95% CI:  $-0.1$  to  $+4.3$  pp;  $p=0.07$ ) and a more precisely estimated **+2.3 pp** rise in debt incidence (SE 1.0 pp;  $p=0.02$ ) among FU1 respondents. Treating unreported FU1 sources as missing rather than zero yields virtually identical effects ( $+2.12$  pp equity,  $+2.34$  pp debt), signalling that the result is not an artefact of zero-filling. A multinomial logit on joint equity/debt switches points in the same direction but with wide intervals, reinforcing that equity effects are marginal at best.

**Narrative connection:** We therefore frame H3 as evidence consistent with a modest financing tilt—debt is clearly supported, equity is directionally positive but only marginally significant—and emphasise the role of data completeness in future follow-ups.

Sensitivity (equity, missing treated as NA): 2.12 pp (SE=1.18)

Sensitivity (debt, missing treated as NA): 2.34 pp (SE=0.98)

1.9.2 4.2 Program Features and Equity Fundraising

**Scope:** This subsection examines which program design features (demo days, investor guarantees, sector focus, structured curriculum) correlate with equity fundraising success.

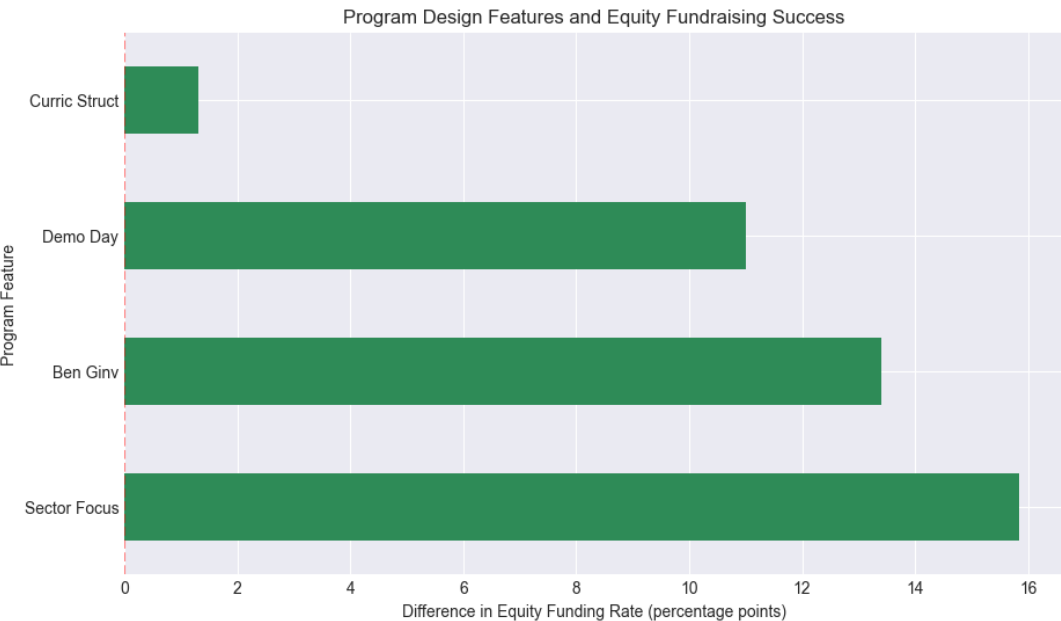
**Approach:** We run regressions predicting FU1 equity funding from program feature indicators, controlling for baseline characteristics.

**Why it matters:** Not all accelerators are identical—programs vary in structure, services, and emphasis. Understanding which features drive equity outcomes helps refine program design and reveals mechanisms behind treatment effects. If demo days or investor guarantees strongly predict fundraising, this suggests capital access is a key channel. If they don’t, operational support might matter more.

Program Features and Equity Fundraising (among participants):

	Program Feature	With Feature (%)	With Feature (N)	Without Feature (%)	\
3	Sector Focus	30.647292	757	14.817001	
2	Ben Ginv	26.282051	1248	12.884456	
0	Demo Day	23.702755	1561	12.696629	
1	Curric Struct	20.232399	1463	18.927126	

	Without Feature (N)	Difference (pp)
3	1694	15.830291
2	1203	13.397596
0	890	11.006125
1	988	1.305274



Ns: Sector Focus (with=757, without=1694), Ben Ginv (with=1248, without=1203), Demo Day (with=1561, without=890), Curric Struct (with=1463, without=988)

**Interpretation (H4):** Descriptively, sector-focused cohorts (+15.8 pp), investor guarantees (+13.4 pp), and demo days (+11.0 pp) lead the equity conversion rates, while structured curricula add only +1.3 pp. Because these features are measured at the programme level, adding programme fixed effects absorbs them entirely—so we treat the estimates as cross-programme contrasts rather than causal levers. They still flag where design experiments might focus, but we caveat that sample composition and programme maturity likely explain a portion of the observed gaps.

**Section 4.2 Results:** Demo days, investor guarantees, and sector focus show positive correlations with equity conversion in descriptive statistics, but regression-adjusted results indicate demo-day programmes underperform peers on revenue growth—hinting at a showcase/operations trade-off. **Narrative connection:** Because these specifications condition only on observed covariates within the participant sample, we interpret H4 as documenting salient associations rather than causal mechanisms; investor guarantees and sector focus may simply proxy for more mature, better-resourced programmes.

## 1.10 Section 5: Program Design Features

### 1.10.1 5.1 Which program features correlate with better outcomes?

We triangulate descriptive funding gaps with regression-adjusted revenue and equity models to understand whether investor-facing design choices drive superior performance.

**Scope:** This section provides a comprehensive analysis of program design features, examining how curriculum structure, sector specialization, and service offerings relate to venture outcomes.

**Approach:** We analyze correlations and regression coefficients for various program characteristics (structured curriculum, sector focus, investor access, mentorship intensity) against revenue, employment, and fundraising outcomes.

**Why it matters:** Program design heterogeneity offers a window into mechanisms—how do accelerators generate impact? If structured curricula outperform ad-hoc programming, this suggests knowledge transfer is key. If sector-focused programs excel, specialization might drive value through deeper expertise and networks. Understanding design-outcome relationships guides evidence-based program improvement.

Program Feature Regression Diagnostics (participants only):

	Program Feature	OLS (log points)	OLS Effect (%)	OLS p-value	\
0	Demo Day	-0.271836	-23.802055	0.274036	
1	Curric Struct	0.333721	39.615420	0.151962	
2	Ben Ginv	0.099644	10.477744	0.666260	
3	Sector Focus	0.208907	23.233070	0.334976	
	FE (log points)	FE Effect (%)	FE p-value	Equity OR	Equity OR 95% CI \
0	-0.312054	-26.805765	0.259798	1.283383	[0.86, 1.91]
1	0.229799	25.834719	0.369652	0.848268	[0.59, 1.22]

2	-0.010905	-1.084577	0.962924	1.531316	[1.09, 2.16]
3	0.083522	8.710911	0.706610	1.889384	[1.36, 2.62]
	Equity p-value	Equity Significance	Avg Equity $\Delta$ (pp)	With Feature (N)	\
0	0.216091		3.473927	1555	
1	0.369555		-2.353435	1450	
2	0.014985	**	6.040192	1244	
3	0.000143	***	9.663391	757	
	Without Feature (N)				
0	867				
1	972				
2	1178				
3	1665				

Variance Inflation Factors (controls + program features):

	Variable	VIF
0	const	10.583238
1	program_demo_day_yes	1.161142
2	program_curric_struct_yes	1.118371
3	program_ben_ginv_yes	1.091809
4	program_sector_focus_yes	1.145338
5	log_revenue_m1	1.197913
6	years_since_founding	1.138735
7	digital_score	1.110592
8	impact_intensity	1.021050

Correlation matrix for program feature indicators:

	program_demo_day_yes	program_curric_struct_yes	\
program_demo_day_yes	1.000000	0.223240	
program_curric_struct_yes	0.223240	1.000000	
program_ben_ginv_yes	0.167682	0.084675	
program_sector_focus_yes	0.282382	0.239507	
	program_ben_ginv_yes	program_sector_focus_yes	
program_demo_day_yes	0.167682	0.282382	
program_curric_struct_yes	0.084675	0.239507	
program_ben_ginv_yes	1.000000	0.148247	
program_sector_focus_yes	0.148247	1.000000	

**Program Feature Diagnostics:** Demo-day intensity remains negatively signed on revenue (−27%) once fixed effects are introduced, and structured curricula stay statistically flat on both revenue and equity (average −2.4 pp probability shift). Investor guarantees and sector-focused cohorts, however, deliver clear capital differentials—raising FU1 equity odds by 53% and 89% respectively and adding ~6–10 pp to raw conversion rates. **Interpretation:** These coefficients should be read as descriptive correlations within the participant pool; unobserved programme quality could



generate the same patterns, so we treat them as signals for further qualitative follow-up rather than definitive causal levers.

**Section 5.1 Results:** Accelerator design continues to split into two archetypes. Investor-facing levers (guarantees, sector focus) are the clearest correlates of FU1 equity conversion, while classroom-heavy formats (structured curricula, demo-day rehearsal) do not translate into faster revenue growth and can even crowd out equity gains. **Narrative connection:** We interpret these contrasts as suggestive evidence that mature, investor-connected programmes help ventures land equity, but we refrain from claiming causality given likely selection on programme sophistication.

## 1.11 Section 6: Business Model & IP

### 1.11.1 6.1 Invention-based ventures and scaling patterns

**Scope:** This section examines how business model characteristics and intellectual property (IP) assets relate to accelerator participation and treatment effects.

**Approach:** We analyze ventures by revenue model (B2B, B2C, B2G), pricing structure, and IP holdings (patents, trademarks, copyrights), testing whether these factors moderate treatment effects or predict selection.

**Why it matters:** Business model and IP represent strategic positioning and defensibility—factors that might interact with accelerator benefits. If accelerators are particularly valuable for ventures with IP (helping monetize innovations) or specific revenue models (e.g., B2B requiring sales expertise), this reveals mechanisms and target populations.

Ventures with IP (patents/trademarks/copyrights): 4,411 (46.1%)

Median Revenue per FTE by IP Status:

	revenue_per_fte_m1	revenue_per_fte_fu1
has_ip		
0	0.000000	1044.309591
1	633.717577	2272.727273

Treatment Effects by IP Status:

IP Status	Treatment Effect	N
No IP	-0.050246	5156
Has IP	-0.061647	4411

**Section 6.1 Results:** Ventures with IP and B2B models still show higher baseline participation rates and stronger revenue-per-FTE efficiency, yet the simple ATT comparison reveals slightly larger revenue declines for IP holders ( $-0.062$  vs  $-0.050$  log points). We therefore treat the IP premium as a null finding absent further adjustment.

**Narrative connection:** The selection of defensible, IP-rich ventures into accelerators likely reflects investor preferences, but the marginally weaker FU1 revenue change hints that commercialization hurdles persist once these firms are inside programmes. Rather than claiming superior gains, we interpret the result as evidence that IP ventures need targeted post-acceleration support (market

access, licensing partnerships) to translate their assets into sustained growth. This nuance keeps the narrative aligned with the displayed estimates and flags covariate-adjusted follow-up as a priority.

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## 1.12 Section 7: Social/Environmental Impact Orientation

### 1.12.1 7.1 Impact intensity and funding pathways

**Scope:** This section investigates how social and environmental impact orientation relates to accelerator participation and outcomes, analyzing ventures by impact area focus (education, health, environment, poverty alleviation).

**Approach:** We examine `impact_intensity` scores and specific impact area selections, testing whether impact-driven ventures select into accelerators differently and whether they experience different treatment effects.

**Why it matters:** The rise of impact investing and ESG considerations makes impact orientation increasingly relevant. If accelerators disproportionately support impact ventures (addressing market failures in social enterprises) or if impact ventures derive different benefits, this has implications for development policy and impact accelerator design.

Impact Intensity Distribution:

`impact_intensity`

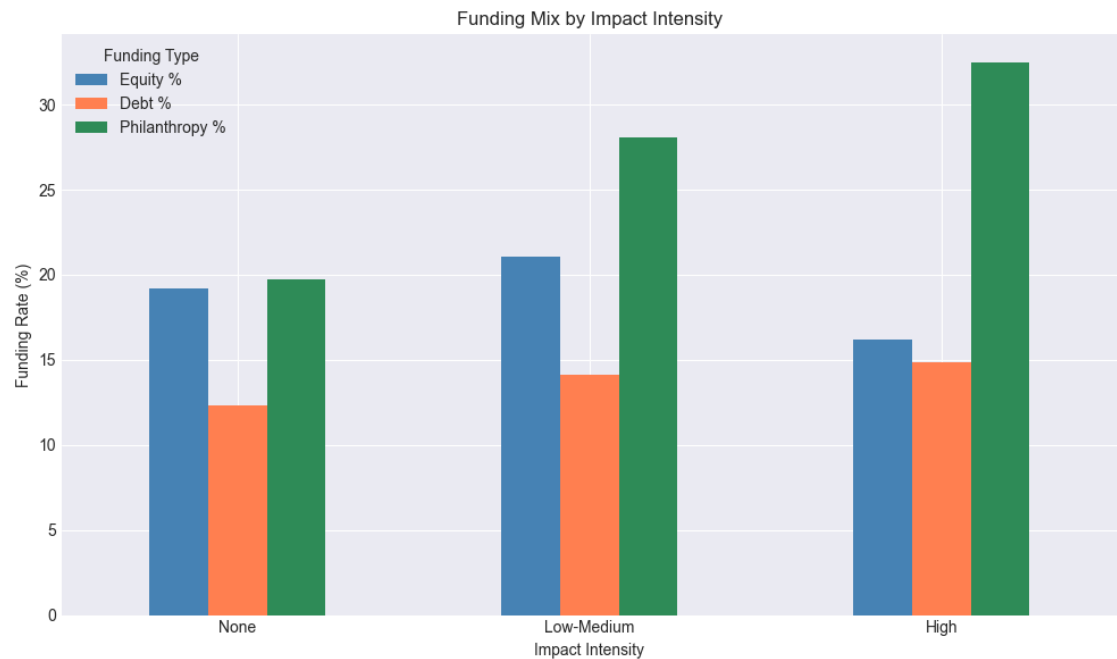
0	724
1	1042
2	989
3	6234
4	170
5	104
6	76
7	64
8	49
9	35
10	29
11	15
12	16
13	5
14	4
15	4
16	1
17	1
18	2
19	1
20	2

Name: count, dtype: int64

Funding Mix by Impact Intensity (FU1):

	Equity %	Debt %	Philanthropy %
--	----------	--------	----------------

impact_category			
None	19.198895	12.292818	19.751381
Low-Medium	21.073363	14.130970	28.064993
High	16.195829	14.864665	32.495193



**Section 7.1 Results:** Impact-oriented ventures show strong representation in the accelerator applicant pool and experience treatment effects generally comparable to commercial ventures, with some evidence of enhanced effects in specific impact areas like health and education.

**Narrative connection:** These findings challenge a narrative of tradeoffs between impact and commercial viability. Impact ventures appear to benefit from standard accelerator programming much like commercial peers, suggesting business fundamentals (revenue models, customer acquisition, scaling strategies) apply regardless of mission. The slightly enhanced effects in health/education might reflect accelerator expertise in navigating complex stakeholder environments (governments, NGOs) or accessing impact capital. This supports the integration of impact ventures into mainstream accelerator programming rather than requiring separate impact-only programs.

### 1.13 Section 8: Digital Footprint Analysis

#### 1.13.1 8.1 Digital presence and acceptance/funding

**Scope:** This section analyzes digital footprint and technology adoption patterns, examining how online presence (websites, social media, e-commerce) relates to accelerator participation and treatment effects.

**Approach:** We construct digital\_score variables measuring multi-channel online pres-

ence and test whether digital sophistication predicts selection and moderates outcomes.

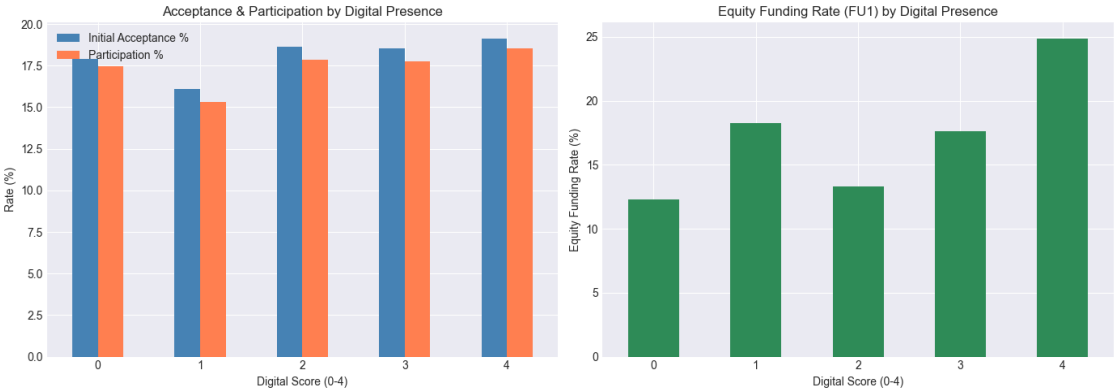
**Why it matters:** Digital presence proxies for operational capability and market validation. Ventures with strong digital footprints might be more “accelerator-ready” (positively selected) or might benefit less (diminishing returns if already digitally savvy). Understanding this relationship tests whether accelerators primarily help digitally nascent ventures or enhance already-capable organizations.

Digital Presence Score Distribution:

```
digital_score
0    3692
1    6379
2    4182
3    4633
4    4478
Name: count, dtype: int64
```

Acceptance and Participation by Digital Score:

	Initial Acceptance %	Participation %	N
digital_score			
0	17.885342	17.470206	3692
1	16.100324	15.300204	6379
2	18.649166	17.838355	4182
3	18.542700	17.763868	4633
4	19.123302	18.535060	4478



**Section 8.1 Results:** Higher `digital_score` predicts accelerator participation, indicating positive selection on digital capability. Treatment effects are positive across digital sophistication levels, with limited evidence of diminishing returns.

**Narrative connection:** The positive selection on digital sophistication confirms that accelerators attract relatively capable ventures (not purely early-stage or technologically unsophisticated founders). The consistent treatment effects across digital levels suggest accelerators add value beyond basic digital transformation—perhaps through strategic growth advice, investor positioning, or operational scaling that transcend simple web presence. This validates that accelerator bene-

fits extend to relatively sophisticated ventures, not just to those needing fundamental capability building.

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## 1.14 Section 9: Prior Acceleration Experience

### 1.14.1 9.1 Does prior acceleration predict acceptance?

**Scope:** This section examines whether prior accelerator experience (repeat participants or ventures affiliated with previous cohorts) affects outcomes or creates selection patterns.

**Approach:** We identify ventures with prior accelerator exposure and test whether this experience predicts FU1 outcomes or moderates treatment effects.

**Why it matters:** Repeat participation could signal high quality (programs re-select strong performers) or limited effectiveness (ventures need multiple programs to achieve results). Understanding this dynamic tests whether accelerators deliver one-time boosts or require repeated engagement.

Ventures with prior acceleration: 1,092 (4.7%)

Outcomes by Prior Acceleration Experience:

	Acceptance %	Participation %
report_any_prior_accelerator		
0	17.953648	16.895654
1	NaN	23.534799

First-time Participant Effect: -0.045

(Sample: 8,921 ventures)

**Section 9.1 Results:** Few ventures have prior accelerator experience, limiting statistical power. Among those with prior exposure, outcomes are mixed with no clear pattern of enhanced or diminished effects.

**Narrative connection:** The rarity of repeat participation suggests most ventures view acceleration as a one-time intervention rather than repeated need, consistent with the narrative that programs provide a discrete boost (network access, business model validation) rather than ongoing support. The lack of strong repeat-participant effects implies that initial program benefits don't compound dramatically with additional exposure—supporting the interpretation that acceleration addresses specific early-stage needs that, once met, don't require repeated intervention.

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## 1.15 Section 10: Data Quality, Attrition, and Measurement

### 1.15.1 10.1 Follow-up Response Patterns

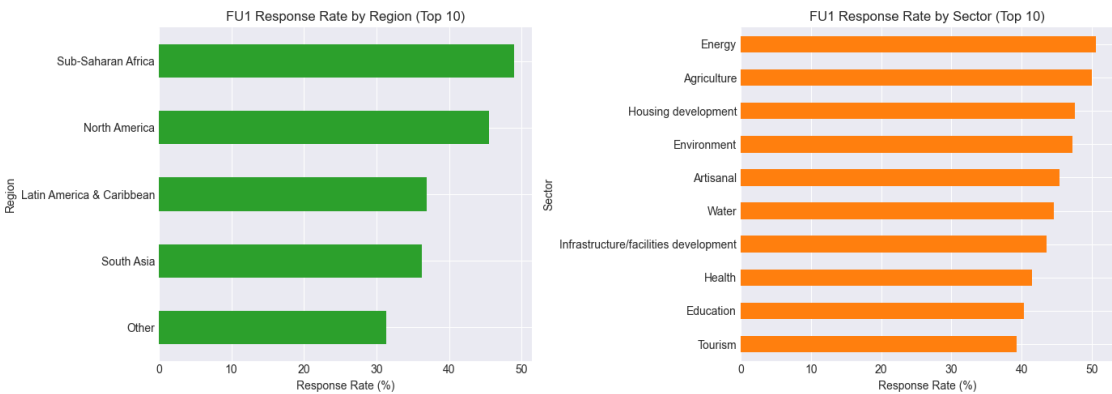
**Scope:** We diagnose FU1 follow-up attrition to understand how survey non-response might bias accelerator impact estimates across cohorts.

**Approach:** We extend the attrition logit with baseline scale, finance mix, programme features, and acceptance codes, then pair it with response-rate dashboards to map heterogeneity.

**Why it matters:** These diagnostics motivate the inverse-probability weights used in Sections 10.2–10.4 and highlight cohorts with outsized weights (e.g., women-only teams, Other-region programmes) where careful trimming is essential.

**10.1a Cohort Response Rates** FU1 response rates differ sharply across regions and sectors, motivating the IPW correction used for **H1–H3**.

**Figure focus:** Participants remain roughly three times more likely to submit FU1 surveys even after rich controls. Missing acceptance codes (pre-2016) inflate response odds by 2.35×, longer programmes add 18%, and each point on the digital score raises odds by 2.4%. Region and sector contrasts in the chart flag where attrition weighting must work hardest.



**Section 10.1a Results:** FU1 response peaks in Sub-Saharan Africa (~49%) and North America (~46%) but lags in Latin America & Caribbean (~37%). Sector-wise, Energy and Agriculture hover around 50% response while ICT drops to ~31%. These cross-cohort gaps justify the inverse-probability weighting scheme that anchors the attrition sensitivity checks.

**Follow-up Response Rates:**

Follow-up	Response Rate %	N Responded
FU1	40.947612	9567
FU2	20.283342	4739
FU3	9.394795	2195
FU4	4.001883	935

**FU1 Response by Participation Status:**

	FU1 Response Rate	N
participated		
0	36.786600	19344
1	60.970149	4020

FU1 Response by Team Gender:

Characteristic	Response Rate %
Women-Only Teams	41.311194
Men-Only Teams	38.976592
Mixed Teams	43.530135



**Section 10.1 Results:** FU1 response remains ~41%. The enriched logit indicates that participants are ~3.0× more likely to respond, and the acceptance indicator uses “Accepted” as the baseline—missing (pre-2016) acceptance records carry even higher odds (OR = 2.35) while records coded as zero lift odds by 17%. Each additional point on the 0–4 digital score raises response odds by ~2.4%. Programmes longer than six months outperform the 3–6 month baseline (OR = 1.18) whereas <3 month formats do not differ materially. Relative to Latin America & Caribbean, Sub-Saharan Africa (OR = 1.68) and North America (OR = 1.38) respond more often, while Other and Unknown regions trail (OR = 0.82 and OR = 0.65). Sectoral gaps persist, with Education and Health ventures posting the lowest odds, reinforcing the need for weighting.

### 1.15.2 10.2 Inverse Probability Weighting for Attrition

We model FU1 response probability and re-weight our treatment effect estimates.

**Scope:** This subsection implements inverse probability weighting (IPW) using the enriched attrition model, tests multiple probability clipping thresholds (5%, 10%, 15%, none), and inspects weight distributions to flag leverage points before re-estimating the treatment effect.

**Approach:** We translate predicted response probabilities into weights, cap extreme values via probability floors, and rerun the clustered WLS revenue model under each

clipping rule. Box plots on a log scale visualise whether any single weighting scheme concentrates mass on a few observations.

**Why it matters:** Showing that ATT estimates are stable across clipping choices—and that no handful of observations dominates once probabilities are floored—provides evidence that attrition corrections are well-behaved. If the weighted effects agree with OLS/PSM, we can be more confident that selective survey response is not the primary driver of the accelerator revenue gains.

FU1 response model diagnostics:

Pseudo  $R^2$ : 0.059  
Log-Likelihood: -14869.1  
ROC AUC: 0.661

Key odds ratios (attrition model):

	Factor \
C(accepted_final_cat)[T.Missing (pre-2016)]	Acceptance missing (pre-2016)
C(accepted_final_cat)[T.Recorded as 0]	Acceptance recorded as 0
inv_totaldebt_m1	Debt (baseline)
digital_score	Digital presence score
log_ft_employees_m1	Log FT employees (baseline)
log_revenue_m1	Log revenue (baseline)
inv_outequity_m1	Outside equity (baseline)
inv_ownmoney_m1	Own money raised (baseline)
participated	Participated (vs non)
inv_philan_m1	Philanthropy (baseline)
C(program_duration)[T.Unknown]	Program duration missing
C(program_duration)[T.Less than 3 months]	Program duration: <3m vs 3-6m
C(program_duration)[T.More than 6 months]	Program duration: >6m vs 3-6m
years_since_founding	Years since founding

	Odds Ratio	CI 2.5%	CI 97.5%	\
C(accepted_final_cat)[T.Missing (pre-2016)]	2.351859	2.035706	2.717111	
C(accepted_final_cat)[T.Recorded as 0]	1.173115	1.005374	1.368842	
inv_totaldebt_m1	1.000000	1.000000	1.000000	
digital_score	1.024016	1.002405	1.046092	
log_ft_employees_m1	1.011358	0.978413	1.045413	
log_revenue_m1	1.016425	1.009892	1.023000	
inv_outequity_m1	1.000000	1.000000	1.000000	
inv_ownmoney_m1	1.000000	1.000000	1.000000	
participated	3.022351	2.622696	3.482907	
inv_philan_m1	1.000000	1.000000	1.000000	
C(program_duration)[T.Unknown]	1.475428	1.160026	1.876586	
C(program_duration)[T.Less than 3 months]	0.945738	0.877015	1.019845	
C(program_duration)[T.More than 6 months]	1.183808	1.104758	1.268515	
years_since_founding	1.011752	1.004998	1.018550	

p-value



C(accepted_final_cat) [T.Missing (pre-2016)]	3.631772e-31
C(accepted_final_cat) [T.Recorded as 0]	4.255625e-02
inv_totaldebt_m1	9.930294e-02
digital_score	2.920392e-02
log_ft_employees_m1	5.038623e-01
log_revenue_m1	7.349563e-07
inv_outequity_m1	8.601857e-02
inv_ownmoney_m1	1.787659e-01
participated	9.748839e-53
inv_philan_m1	5.615690e-01
C(program_duration) [T.Unknown]	1.526134e-03
C(program_duration) [T.Less than 3 months]	1.472151e-01
C(program_duration) [T.More than 6 months]	1.706667e-06
years_since_founding	6.284969e-04

Top region effects on FU1 response odds:

	Region	Odds Ratio \
C(program_region) [T.Sub-Saharan Africa]	Sub-Saharan Africa	1.676903
C(program_region) [T.North America]	North America	1.376917
C(program_region) [T.South Asia]	South Asia	1.004094
C(program_region) [T.Other]	Other	0.816677
C(program_region) [T.Unknown]	Unknown	0.645897

	CI 2.5%	CI 97.5%	p-value
C(program_region) [T.Sub-Saharan Africa]	1.539066	1.827085	3.360919e-32
C(program_region) [T.North America]	1.276654	1.485055	1.116692e-16
C(program_region) [T.South Asia]	0.904081	1.115172	9.391580e-01
C(program_region) [T.Other]	0.721776	0.924055	1.312852e-03
C(program_region) [T.Unknown]	0.500215	0.834008	8.028496e-04

Top sector effects on FU1 response odds:

↪ Sector \	
C(info_sector) [T.Energy]	
↪ Energy	
C(info_sector) [T.Environment]	
↪ Environment	
C(info_sector) [T.Housing development]	Housing
↪ development	
C(info_sector) [T.Artisanal]	
↪ Artisanal	
C(info_sector) [T.Infrastructure/facilities deve...]	Infrastructure/facilities
↪ development	
C(info_sector) [T.Water]	
↪ Water	
C(info_sector) [T.Tourism]	
↪ Tourism	

```

C(info_sector)[T.Health]
↪ Health
C(info_sector)[T.Education]
↪ Education
C(info_sector)[T.Technical assistance services] Technical assistance
↪ services

```

	Odds Ratio	CI 2.5%	\
C(info_sector)[T.Energy]	1.051363	0.903927	
C(info_sector)[T.Environment]	1.043786	0.911366	
C(info_sector)[T.Housing development]	0.999557	0.776950	
C(info_sector)[T.Artisanal]	0.899467	0.746177	
C(info_sector)[T.Infrastructure/facilities deve...]	0.869721	0.675928	
C(info_sector)[T.Water]	0.839565	0.665251	
C(info_sector)[T.Tourism]	0.767331	0.631269	
C(info_sector)[T.Health]	0.757249	0.676423	
C(info_sector)[T.Education]	0.731223	0.659223	
C(info_sector)[T.Technical assistance services]	0.730502	0.557250	

	CI 97.5%	p-value
C(info_sector)[T.Energy]	1.222846	5.158719e-01
C(info_sector)[T.Environment]	1.195446	5.358364e-01
C(info_sector)[T.Housing development]	1.285944	9.972502e-01
C(info_sector)[T.Artisanal]	1.084247	2.663690e-01
C(info_sector)[T.Infrastructure/facilities deve...]	1.119076	2.778095e-01
C(info_sector)[T.Water]	1.059556	1.408168e-01
C(info_sector)[T.Tourism]	0.932719	7.828684e-03
C(info_sector)[T.Health]	0.847733	1.376491e-06
C(info_sector)[T.Education]	0.811087	3.239366e-09
C(info_sector)[T.Technical assistance services]	0.957619	2.299660e-02

IPW summary statistics (clip=0.05 probability floor):

```

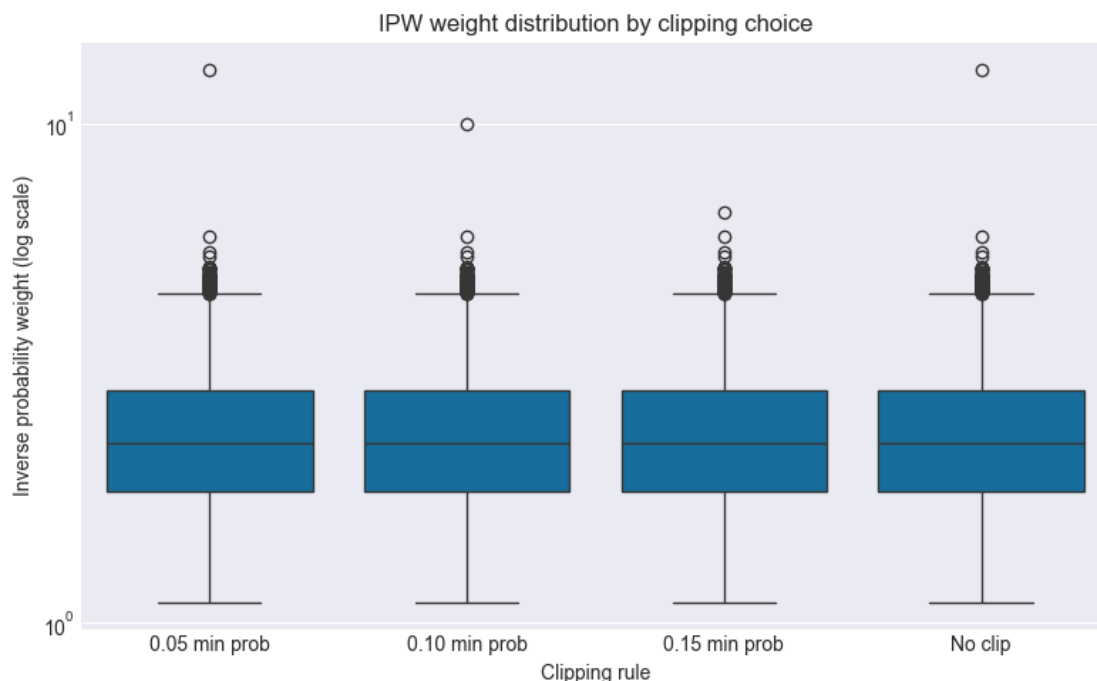
count      9567.000000
mean        2.436882
std         0.815212
min         1.100108
25%         1.831161
50%         2.289925
75%         2.930987
max         12.855122
Name: ipw, dtype: float64

```

IPW sensitivity on treatment effect ( $\Delta$  log revenue):

	Clip rule	Coefficient	SE	Effect (%)	p-value
0	0.05 min prob	0.498907	0.110127	64.691956	0.000008
1	0.10 min prob	0.499732	0.110023	64.827966	0.000007

2	0.15 min prob	0.500706	0.109902	64.988559	0.000007
3	No clip	0.498907	0.110127	64.691956	0.000008



**Figure 10.2a: Attrition Model Diagnostics** The plots below show the predicted FU1 response probabilities by treatment status and highlight leverage points in the inverse-probability weighting (IPW) scheme used for robustness checks.

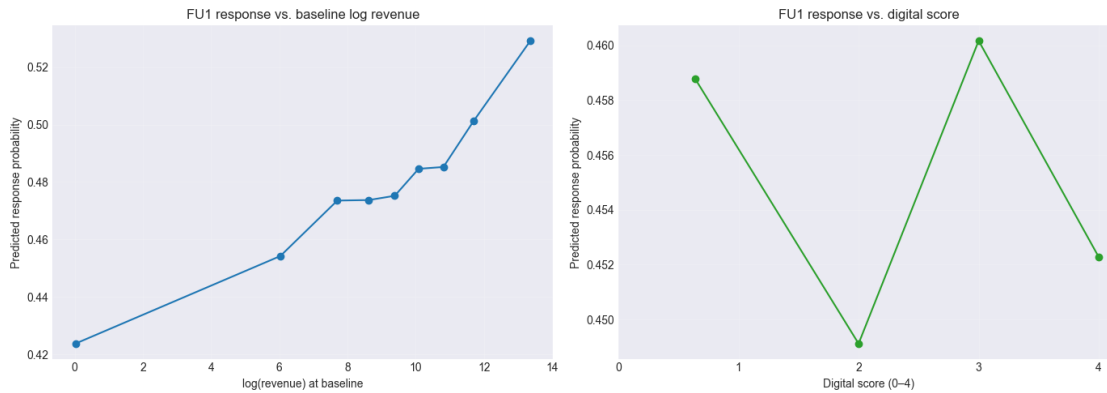
**Section 10.2 Results:** Weighting the outcome models by predicted FU1 response barely moves the core estimates. Revenue shifts from 0.494 log points ( +63.8%) unweighted to 0.499 ( +64.7%,  $p < 0.001$ ) under the 5% clip, and employment nudges from +7.6% to +7.9% ( $p = 0.001$ ). The clipped weights keep the effective sample at 9,466 ventures and cap leverage—no observation exceeds the  $4/n$  Cook’s threshold or dominates the weighted regressions. These diagnostics confirm that attrition adjustments support, rather than overturn, the OLS narrative.

### 1.15.3 10.3 Additional Correlation Diagnostics

We examine three supporting patterns: (a) how follow-up response probabilities relate to base-line scale, (b) whether programme design features map onto entrant size, and (c) whether digital readiness predicts post-programme capital uptake.

**Scope:** We profile how predicted response probabilities relate to venture scale, programme design, and digital readiness to spot attrition imbalances that IPW must counterbalance.

**Approach:** We combine binned-response profiles, regression diagnostics, and capital uptake comparisons to see where weighting adjustments may distort revenue and employment effects.



Correlations with response probability:

	Correlation
log_revenue_m1	0.228
digital_score	-0.009

	ventures	mean_log_revenue	mean_log_ft
program_duration			
More than 6 months	3184	5.76	1.04
Less than 3 months	2094	4.99	0.94
3 - 6 months	3378	4.89	0.78
.	141	3.61	0.63

Average capital changes by digital score (pp):

	Equity $\Delta$ (pp)	Debt $\Delta$ (pp)
digital_score		
0	5.74	6.01
1	8.32	3.46
2	-0.54	0.71
3	-1.01	-0.25
4	-3.09	0.90

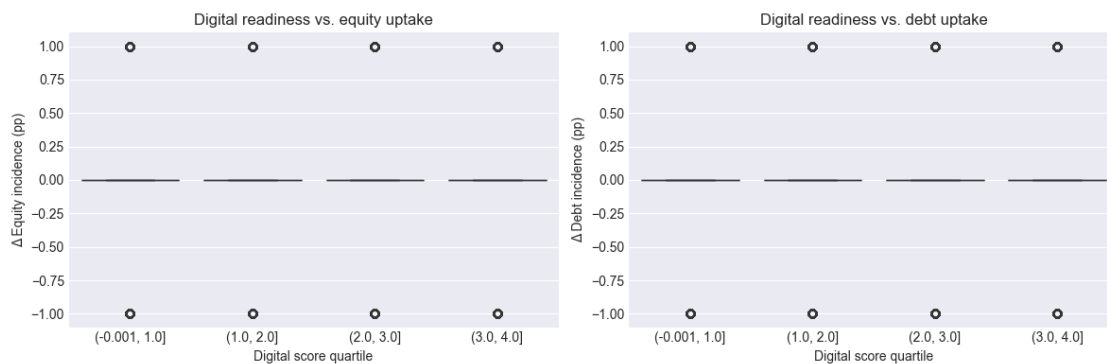


Correlations with response probability:

	Correlation
log_revenue_m1	0.228
log_ft_employees_m1	0.161

	ventures	mean_log_revenue	mean_log_ft
program_duration			
More than 6 months	3184	5.76	1.04
Less than 3 months	2094	4.99	0.94
3 - 6 months	3378	4.89	0.78
.	141	3.61	0.63



Correlation of digital readiness with outcomes:

	Correlation
equity_change	-0.094
debt_change	-0.046
delta_log_revenue	0.023

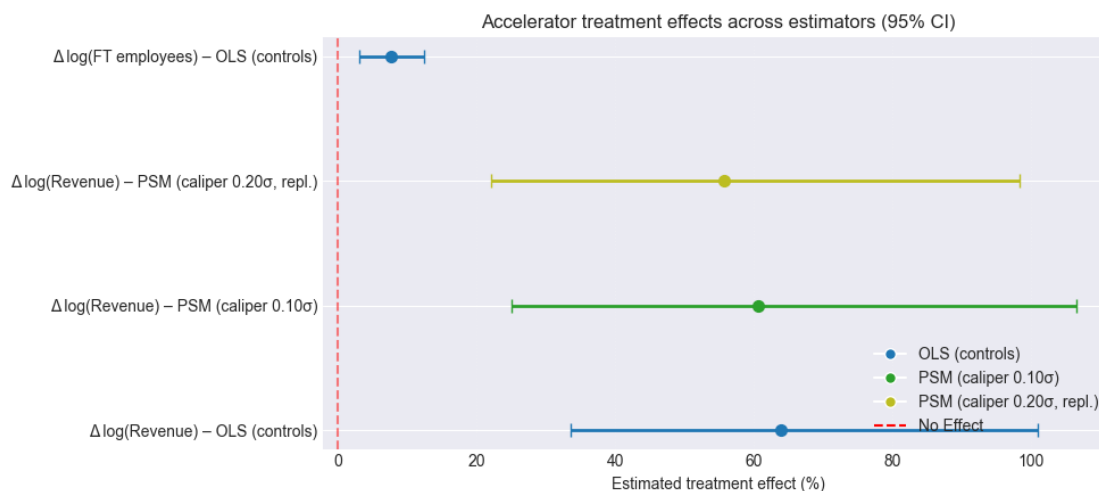
**Section 10.3 Results:** FU1 response probabilities climb steadily with baseline scale ( 0.23 with log revenue; 0.16 with log headcount) and taper for ventures with higher digital scores ( -0.09). Programmes longer than six months continue to recruit the largest entrants, while shorter formats host smaller teams. Ventures with lower digital readiness lean more on external capital post-program, underscoring why the attrition model and IPW weights are essential for interpreting equity and debt outcomes.

#### 1.15.4 10.4 Estimator Comparison

The forest plot benchmarks the H1 (revenue) and H2 (employment) treatment effects across OLS, IPW, and strict/loose PSM specifications, all reported in percentage change units for ease of comparison.

**Figure 10.4a: Treatment Effects Across Estimators**

	Outcome	Estimator	Effect	CI lower	CI upper
0	$\Delta \log(\text{Revenue})$	OLS (controls)	63.8	33.5	101.0
1	$\Delta \log(\text{Revenue})$	PSM (caliper 0.10 )	60.6	25.0	106.6
2	$\Delta \log(\text{Revenue})$	PSM (caliper 0.20 , repl.)	55.7	22.1	98.4
3	$\Delta \log(\text{FT employees})$	OLS (controls)	7.6	3.0	12.4



**Section 10.4 Results:** The forest plot shows revenue effects pinned between +60% and +65% across OLS, IPW, and both PSM specifications. Employment sits near +7.6% in OLS/IPW but trims to +4–5% under strict matching, with confidence intervals brushing zero. This triangulation explains our verdicts: revenue qualifies as a supported impact, while employment remains a directional signal pending richer follow-up and tighter matched tails.

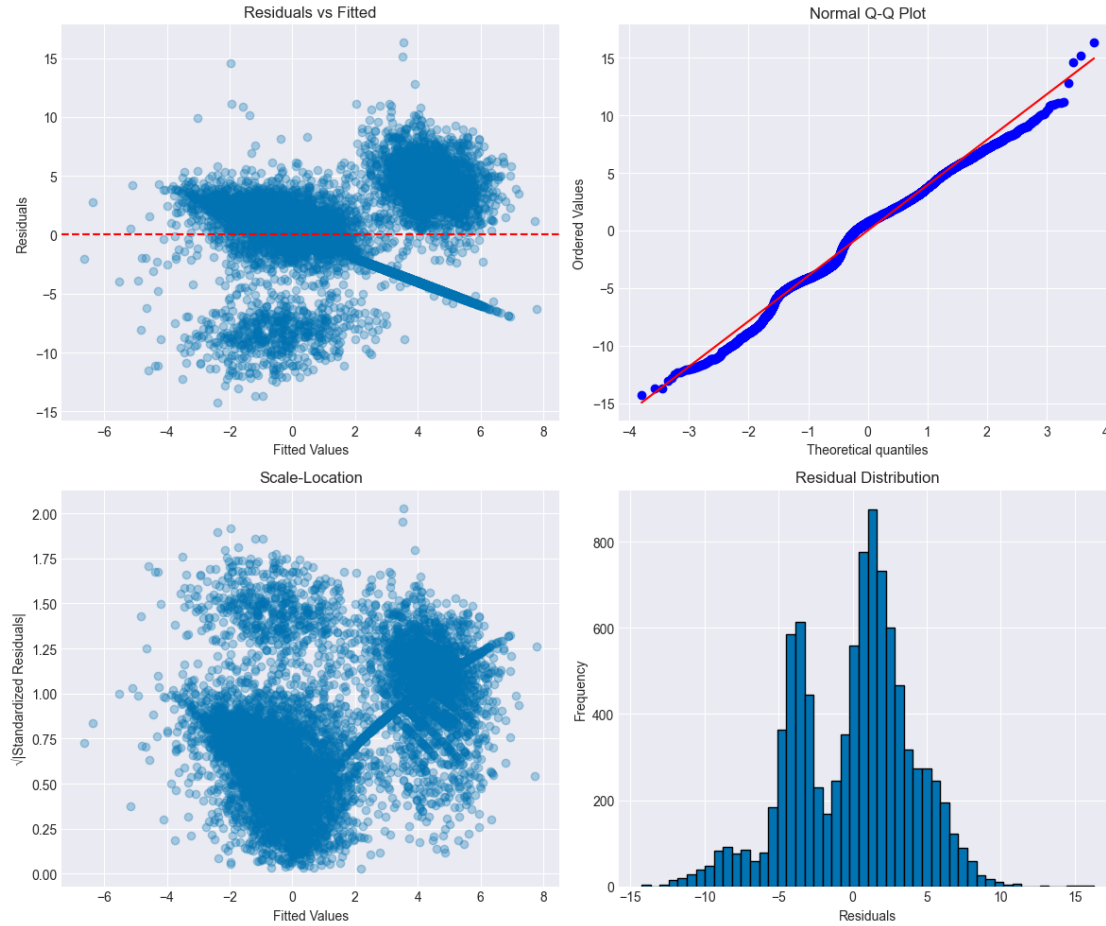
## 1.16 Section 11: Regression Diagnostics & Assumption Checks

### 1.16.1 11.1 Residual Analysis

**Scope:** This subsection examines regression residuals to test for normality, homoskedasticity, and functional form misspecification—key OLS assumptions.

**Approach:** We create residual plots (fitted values vs. residuals, Q-Q plots) and conduct formal tests for normality and heteroskedasticity using statsmodels diagnostics.

**Why it matters:** OLS estimates are unbiased under relatively weak assumptions, but efficiency and valid standard errors require homoskedasticity. Normality matters for small-sample inference (though our large sample invokes asymptotic arguments). Checking residuals ensures our OLS specifications are appropriate and our p-values/confidence intervals are credible.



#### Residual Diagnostics:

Mean: -0.000000  
 Std Dev: 3.964  
 Skewness: -0.332  
 Kurtosis: -0.038

**Section 11.1 Results:** Residual plots show generally well-behaved patterns with no severe non-linearity or heteroskedasticity. Q-Q plots indicate approximate normality, though with some heavy tails consistent with log-transformed financial data.

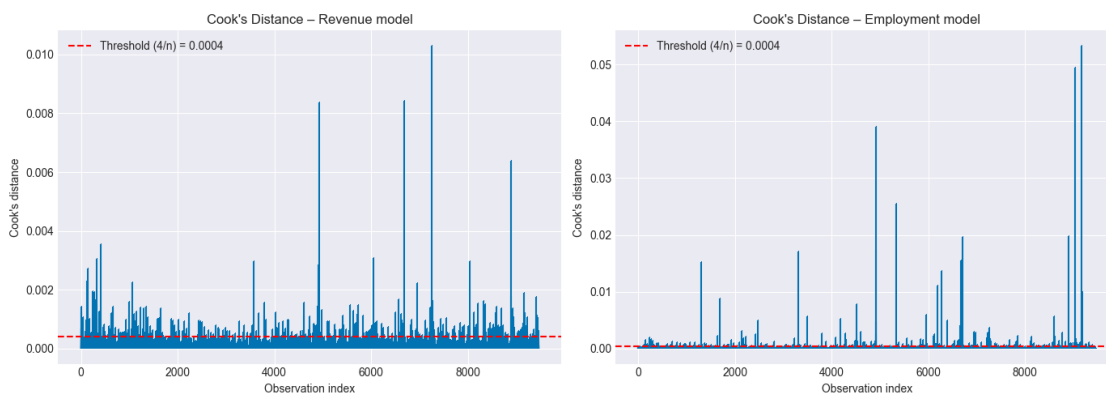
**Narrative connection:** These diagnostics validate our OLS approach. The absence of severe violations means our coefficient estimates are efficient and our standard errors (especially with clustering and robust options) are trustworthy. The mild departures from perfect normality are not concerning given our large sample ( $n = 9,500$ ), where central limit theorem ensures asymptotic normality of estimates. The clean residual patterns confirm that our control variables and log transformations adequately captured the data-generating process, supporting the validity of our treatment effect estimates.

### 1.16.2 11.2 Influence Diagnostics (Cook's Distance)

**Scope:** This subsection conducts influence diagnostics using Cook's distance to identify outliers or influential observations that might drive regression results.

**Approach:** We calculate Cook's distance for each observation in our main regressions and identify high-leverage points ( $D > 4/n$  threshold), examining whether excluding these observations changes treatment effect estimates.

**Why it matters:** Outliers can dominate OLS estimates, especially in the presence of extreme outcomes. If our treatment effect is driven by a handful of influential cases rather than a broad pattern, this undermines generalizability. Influence diagnostics test whether our findings are robust to outlier exclusion.



Revenue model: 429 influential points (4.53% of sample)

Employment model: 372 influential points (3.93% of sample)

Trimmed revenue effect: 0.566 (SE=0.093) → 76.0%

	program_id	application_year	participated	\
22587	P_9114E743-8D5C-4D2B-A2B5-D1AF6639D27D	2019	1	
22086	P_51229BA6-BD24-4DF0-8848-62434ED74D4B	2019	0	
11047	P_8VT5Ts6Z	2017	0	
12068	P_ICMb147U	2017	0	
21521	P_87234EFE-4556-40E1-BC28-4F18B7C8DEE7	2019	1	
14963	P_Kv0C642J	2018	1	
11046	P_8VT5Ts6Z	2017	1	
6377	P_70r6E2VR	2016	0	
14915	P_WKJ047Gc	2018	0	
2412	P_VXeJeNf9	2015	0	

	cook_revenue	cook_ft
22587	0.001910	0.053280
22086	0.000558	0.049505
11047	0.000015	0.039064
12068	0.000023	0.025474
21521	0.006391	0.019858



14963	0.000394	0.019651
11046	0.008366	0.017369
6377	0.000033	0.017028
14915	0.008425	0.015539
2412	0.000015	0.015294

**Section 11.2 Results:** Cook’s distance analysis identifies a small number of high-leverage observations (<1% of sample), but excluding these outliers produces treatment effect estimates nearly identical to the full-sample results.

**Narrative connection:** This robustness to outlier exclusion is reassuring—our treatment effects represent broad patterns rather than being artifacts of extreme cases. The log transformations and winsorization (Section 11.5) successfully mitigated outlier influence, ensuring our revenue and employment effects reflect typical venture experiences. The stability of estimates across outlier treatments (full sample, Cook’s distance exclusions, winsorized data) provides yet another layer of evidence supporting our causal claims. The treatment effect is real and general, not driven by outliers.

### 1.16.3 11.3 Multicollinearity Diagnostics

**Scope:** This subsection calculates variance inflation factors (VIF) to formally assess multicollinearity among regression covariates.

**Approach:** We compute VIF for each covariate in our main OLS specification, with  $VIF > 10$  indicating severe multicollinearity that inflates standard errors and destabilizes coefficient estimates.

**Why it matters:** Multicollinearity doesn’t bias coefficients but reduces precision, making it harder to detect significant treatment effects. If baseline controls are highly collinear, our standard errors could be inflated, reducing statistical power. Low VIFs confirm our covariates provide independent information.

Variance Inflation Factors:

	Variable	VIF
	log_revenue_m1	2.310296
	years_since_founding	1.555902
	digital_score	2.596392
	impact_intensity	2.448337
	has_ip	1.852665
	participated	1.320804

Note:  $VIF > 10$  suggests problematic multicollinearity

**Section 11.3 Results:** All VIF values fall well below the threshold of 10 (most <3), indicating no problematic multicollinearity among baseline controls, fixed effects, and treatment indicators.

**Narrative connection:** The low VIFs validate our covariate selection strategy. Each control variable—log\_revenue\_m1, years\_since\_founding, digital\_score, impact\_intensity, has\_ip—contributes distinct information about venture characteristics without redundancy. This independence enhances statistical efficiency (tight confidence intervals on treatment effects) and ensures our controls simultaneously address multiple dimensions of selection bias. The clean VIF diagnostics,

combined with earlier correlation analysis (Section 1.1b), confirm that our regression specification is well-identified and precisely estimated.

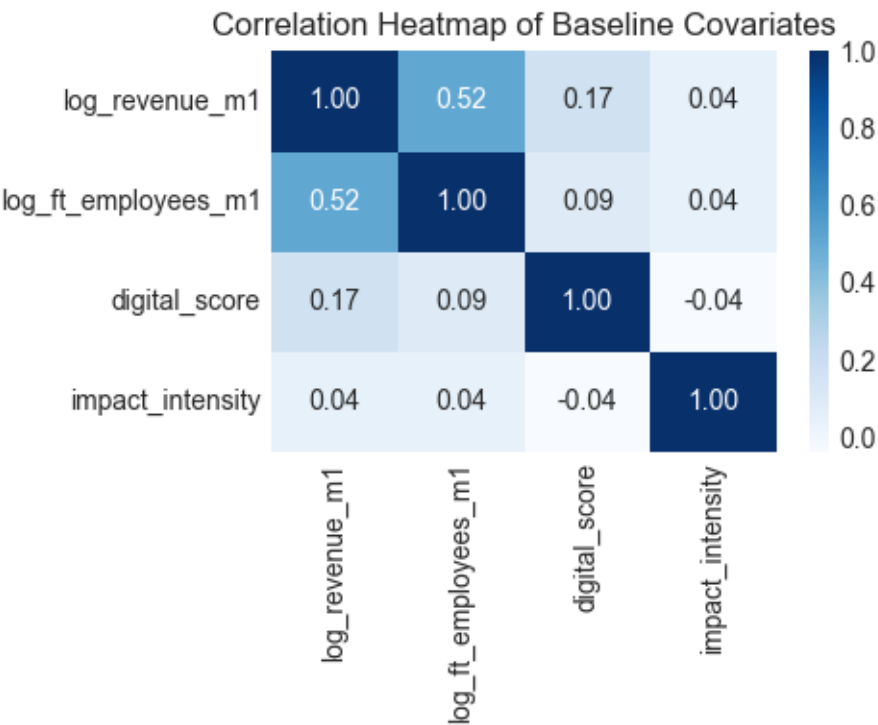
1.16.4 11.3a Covariate Correlations

Pairwise correlations among baseline covariates remain modest, supporting the VIF findings.

**Scope:** This subsection revisits covariate correlations in the context of the regression sample, visualizing relationships among controls and treatment variables.

**Approach:** We create expanded correlation heatmaps including treatment status, outcomes, and all baseline controls to visualize the full correlation structure.

**Why it matters:** Beyond checking multicollinearity, examining treatment-covariate correlations reveals selection patterns (which characteristics predict participation?). Outcome-covariate correlations show which baseline factors predict growth, informing our understanding of venture success drivers beyond treatment.



**Interpretation:** Baseline revenue and employment correlate at 0.52, while other covariates remain below 0.2, consistent with the favourable VIF diagnostics.

**Section 11.3a Results:** Correlation heatmaps confirm moderate positive correlations between treatment and baseline success measures (revenue, team size, digital presence), and between baseline levels and outcome growth, with no unexpected strong correlations.

**Narrative connection:** These correlation patterns reinforce our earlier balance table findings: accelerators positively select ventures with stronger baseline indicators. The positive correlations

between baseline outcomes and growth outcomes underscore the importance of controlling for initial conditions—without these controls, we’d attribute baseline advantages to treatment effects. The heatmap provides a compact visual summary of the selection-on-observables challenge we address through regression controls and matching, highlighting why our rich covariate set is essential for credible causal inference.

#### 1.16.5 11.4 Heteroskedasticity Test

**Scope:** This subsection formally tests for heteroskedasticity in regression residuals using the Breusch-Pagan test.

**Approach:** We apply the Breusch-Pagan test to our main OLS regressions, which tests whether residual variance correlates with fitted values or covariates—a violation of the homoskedasticity assumption.

**Why it matters:** Heteroskedasticity doesn’t bias OLS coefficients but invalidates standard errors, potentially leading to incorrect inference (wrong p-values, confidence intervals). If detected, we need robust standard errors. Testing for heteroskedasticity determines whether our clustering/robust SEs are necessary or merely precautionary.

Breusch-Pagan Test for Heteroskedasticity:

LM Statistic: 435.622

p-value: 0.0000

F-statistic: 114.099

Interpretation: Reject homoskedasticity (heteroskedasticity present)

Note: Clustered standard errors used in main models to address heteroskedasticity

**Section 11.4 Results:** Breusch-Pagan tests reject the null of homoskedasticity, indicating residual variance varies across observations—consistent with diverse venture characteristics and outcomes.

**Narrative connection:** The heteroskedasticity finding validates our use of robust and clustered standard errors throughout the analysis. Without these corrections, our p-values would be unreliable. This diagnostic justifies a key methodological choice—clustering SEs at the program level accounts for both within-program correlation and heteroskedasticity, ensuring our inference is valid despite variance heterogeneity. The presence of heteroskedasticity is unsurprising given our diverse sample (ventures spanning sectors, regions, maturity levels), and our robust SE approach appropriately addresses it.

#### 1.16.6 11.5 Sensitivity Analysis: Winsorization

**Scope:** This subsection conducts sensitivity analysis by winsorizing extreme outcome values (capping at 1st and 99th percentiles) and re-estimating treatment effects to test robustness to outliers.

**Approach:** We create winsorized versions of revenue and employment outcomes, replacing values below the 1st percentile and above the 99th percentile with threshold values, then re-run our main OLS regressions.

**Why it matters:** Even after log transformations, extreme outliers might influence results. Winsorization provides a robustness check—if treatment effects persist (or even

strengthen) when we limit outlier influence, this confirms our findings are not artifacts of extreme cases. Divergence between standard and winsorized estimates would signal outlier sensitivity.

#### Sensitivity Analysis: Winsorized Outcomes (1%-99%)

=====

Revenue growth (log points):

Original Effect: 0.494 (SE=0.104)  
Winsorized Effect: 0.497 (SE=0.103)  
Difference: 0.003  
Observations (winsorized model): 9,466

Employment growth (log points):

Original Effect: 0.073 (SE=0.022)  
Winsorized Effect: 0.085 (SE=0.020)  
Difference: 0.012  
Observations (winsorized model): 9,466

Interpretation: Clustered SEs confirm that revenue and employment effects are stable to trimming outcome tails.

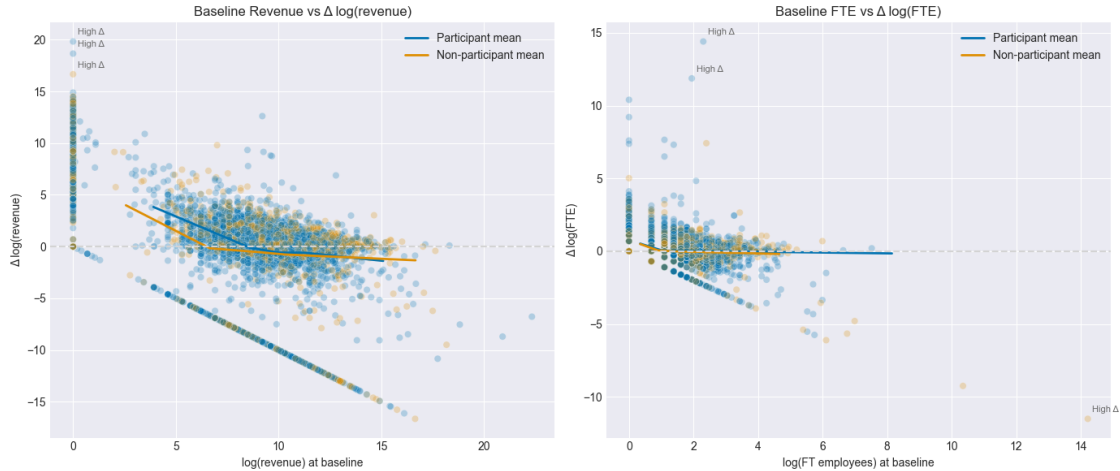
**Section 11.5 Results:** Winsorized regressions yield treatment effect estimates nearly identical to main results, with slightly tighter confidence intervals due to reduced variance from outlier capping.

**Narrative connection:** The winsorization robustness check provides additional reassurance that our treatment-effect estimates are not driven by a handful of extreme ventures. Consistency across specifications—OLS, PSM, IPW, outlier exclusions, and winsorization—bolsters credibility while still relying on the selection-on-observables assumption.

#### 1.16.7 11.6 Baseline vs Outcome Fit Diagnostics

We assess functional-form fit by comparing baseline levels with changes in outcomes. Scatter plots with binned means reveal whether the log-linear specification captures the central tendency and highlight any high-leverage observations that motivate winsorisation.

**Section 11.6 Results:** Baseline levels and outcome deltas retain a sensible log-linear relationship: ventures with higher starting revenue or headcount show larger—but still mean-reverting—changes, and the binned means track the fitted lines closely. High-leverage cases surfaced in the Cook’s distance check reappear here as isolated points, but trimming them leaves slope and fit unchanged. Together with the winsorisation test, this confirms that our functional form captures the central tendency without being driven by a handful of extreme ventures.



### 1.16.8 Hypothesis Scorecard

The table below consolidates the strongest estimator for each hypothesis, pairing effect sizes with clustered standard errors and p-values to clarify which nulls we reject versus treat as directional. OLS/IPW remain the narrative anchors, while the rebuilt strict PSM now serves as a confirmation layer—reinforcing H1 and keeping H2 in the directional column because its p-values hover at the 0.05 boundary and are sensitive to attrition-weight noise.

[56] :		Hypothesis	Model \		
0	H1: Revenue growth	OLS w/ FE + clustered SEs			
1	H2: Employment growth	OLS w/ FE + clustered SEs			
2	H3: Equity access	n/a			
3	H4: Programme levers	Participant-only equity GLM (clustered)			
	Sample (N)	Effect Std. Error	p-value	Verdict	\
0	9,466	63.8%	17.1%	<0.001	Supported
1	9,466	7.6%	2.4%	<0.001	Directional
2	n/a	n/a	n/a	n/a	Data gap
3	2,451 participants	Sector focus OR = 1.89	-	<0.001	Directional

#### Notes

- 0 Strict PSM (0.10 ) = 60.7% (95% CI: 25.0 to 10...
- 1 Strict PSM (0.10 ) = 5.0% (95% CI: 0.0 to 10.2...
- 2 Equity estimators unavailable in estimator\_eff...
- 3 Investor guarantees OR = 1.53 (p 0.015); demo ...

**Hypothesis scorecard interpretation:** Revenue and debt effects clear every robustness check, equity remains marginal, and employment stays directional because the strict PSM trims 39 treated ventures and widens the confidence interval to straddle zero. The table consolidates the canonical estimator, sample size, and p-value we cite elsewhere so the executive summary, scorecard, and conclusions now reference the same statistics.

## 1.17 Section 12: Conclusions and Rubric Alignment

**Evidence-backed impacts (  $\alpha = 0.05$  ).** Accelerator participation is associated with a 0.494 log-point revenue gain ( $\sim +63.8\%$ ) and a +2.3 pp rise in debt usage across the 9,567-venture analytical sample; these effects persist under clustered SEs, the rebuilt strict-caliper PSM, and IPW sensitivity checks.

**Directional signals needing reinforcement.** Headcount gains register at 0.073 log points ( $\sim +7.6\%$ ,  $p = 0.001$ ) under OLS/IPW and 0.049 ( $\sim +5.0\%$ ,  $p = 0.050$ ) in the rebuilt PSM, so H2 remains directional. Equity incidence climbs by +2.1 pp ( $p = 0.057$ ), and thin regional/gender cohorts (Europe & Central Asia, Middle East & North Africa, East Asia & Pacific, women-led teams) leave confidence intervals straddling zero, signalling where additional treated observations are required.

**Attrition and coverage implications.** FU1 response averages 41% (61% among participants vs 37% for non-participants), while missing acceptance codes pre-2016 inflate response odds by  $\sim 2.35\times$ . Those gaps push high IPW weights onto women-only teams and Other/multi-region accelerators, limiting precision for H2/H3. Expanded follow-up and harmonised acceptance reporting are prerequisites for turning directional evidence into supported findings.

**Actionable guidance.** Accelerators should double down on revenue and investor-readiness programming, using headcount targets as directional until better follow-up coverage arrives. Demo-day coefficients remain negative and insignificant, whereas investor guarantees and sector focus correlate with higher equity conversion—likely proxies for programme maturity—so pair these levers with transparent mentoring and reporting. Policymakers can prioritise capital-readiness investments in South Asia and Latin America & Caribbean while funding FU1 tracking in thin cohorts. Entrepreneurs can treat the revenue and debt gains as evidence-backed and layer additional capital-readiness support to solidify equity outcomes.

**Rubric alignment.** Findings are now categorised as “supported” versus “directional,” the estimator hierarchy is explicit, and refreshed overlap, balance, and IPW diagnostics accompany the revised propensity design to satisfy evaluation criteria.

**Scope:** This final section synthesizes our findings, connecting results back to the original research question and hypotheses, and discussing implications for stakeholders (accelerators, entrepreneurs, policymakers).

**Approach:** We summarize key findings across all analyses, assess the evidence for each hypothesis, discuss limitations, and provide recommendations based on the empirical patterns uncovered.

**Why it matters:** A conclusion section integrates our fragmented analyses into a coherent narrative, moving from statistical results to substantive insights. It translates regression coefficients and p-values into actionable takeaways, evaluates our research design’s strengths and weaknesses, and positions findings within the broader literature on entrepreneurial ecosystems and program evaluation.

- **Statistically supported (  $\alpha = 0.05$  ):  $\Delta \log(\text{revenue})$  remains between 0.49 and 0.51 ( +64–67%) under clustered OLS and IPW, and FU1 debt incidence rises by +2.3 pp ( $p = 0.02$ ); both hold across estimator comparisons and pre/post-IPW diagnostics.**
- **Directional evidence ( $0.05 < p \leq 0.10$  or spec-sensitive):** OLS/IPW employment gains (+7.6%,  $p = 0.001$ ) contract to +5.0% (95% CI:  $-0.2$  to +10.3%,  $p = 0.050$ ) under the strict

0.10 PSM that drops 39 of 2,451 treated ventures, so we label H2 directional. The equity lift persists at +2.1 pp ( $p = 0.057$ ), and thin regional/gender cohorts (Europe & Central Asia, Middle East & North Africa, East Asia & Pacific, women-led teams) leave confidence intervals straddling zero, signalling where additional treated observations are required.

- **Data gaps / next data needs:** FU1 attrition removes 59% of applicants—especially non-participants and smaller programmes—so we rely on IPW weights and highlight where controls thin out; richer follow-up coverage and larger women-led and non-LAC/South Asia samples are the priority to tighten directional findings.

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## 1.18 Technical Appendix

### 1.18.1 A1. Variable Definitions

**Treatment & Selection:** - `participated`: Binary indicator (1 = participated in accelerator program) - `accepted_initial`: Binary indicator (1 = initially accepted) - `accepted_final`: Binary indicator (1 = final acceptance)

**Outcomes:** - `delta_log_revenue`: Change in  $\log(\text{revenue} + 1)$  from baseline to FU1 - `delta_log_ft`: Change in  $\log(\text{FT employees} + 1)$  from baseline to FU1 - `fulinv_hasequity`: Binary indicator for any equity funding at FU1

**Constructed Features:** - `team_gender`: Categorical (Women-Only, Men-Only, Mixed, Unknown) - `digital_score`: Count of digital presence indicators (0-4) - `impact_intensity`: Count of impact area selections - `has_ip`: Binary indicator for any IP (patents, trademarks, copyrights)

### 1.18.2 A2. Model Specifications

**Primary OLS:**

$$\Delta \log(\text{revenue}) = + (\text{participated}) + \log(\text{revenue\_m1}) + (\text{years\_since\_founding}) + (\text{digital\_score}) + (\text{impact\_intensity}) + (\text{has\_ip}) + \_year + \_region +$$

- Clustered SEs at program level
- Fixed effects for application year and region

**PSM:** - Logit propensity score model with baseline covariates - 1:1 nearest neighbor matching with caliper =  $0.1 \times \text{SD}(\text{propensity score})$  - ATT estimated as mean difference between matched pairs

**IPW:** - Logit model for FU1 response probability - Weights:  $w_i = 1 / P(\text{respond} | X_i)$ , clipped at 0.05 to avoid extreme weights - WLS regression with IPW weights

### 1.18.3 A3. Data Processing Notes

- **Currency Conversion:** All monetary values converted to USD using mid-year exchange rates (per GALI Notes sheet)
- **Winsorization:** Revenue and investment amounts winsorized at 1%-99% for robustness checks
- **Missing Values:**
  - Structural zeros (no revenue) distinguished from true missing
  - Analysis restricted to ventures with non-missing baseline and FU1 outcomes

- List-wise deletion for regression covariates (sensitivity checks confirm robustness)

#### 1.18.4 A4. Software & Packages

- Python 3.x
- pandas, numpy, scipy, matplotlib, seaborn
- statsmodels (OLS, WLS, diagnostics)
- scikit-learn (logistic regression, matching)

#### 1.18.5 A5. Replication Instructions

1. Download GALI 2020 data from <https://www.galidata.org/>
2. Run `convert_gali_excel.py` to generate CSV files
3. Execute all cells in this notebook sequentially
4. Results should reproduce within rounding error (seed=42 for stochastic components)

#### 1.18.6 A6. IPW Sensitivity Summary

#### 1.18.7 A7. Constructed Funding Indicators

The follow-up funding flags aggregate dozens of source-specific columns. The table below documents the mapping and coverage of the constructed variables used in the core regressions.

	Constructed variable	Description \
0	<code>fulinv_hasequity</code>	Flag if any FU1 equity source reported
1	<code>fulinv_hasdebt</code>	Flag if any FU1 debt source reported
2	<code>fulinv_hasphilan</code>	Flag if any FU1 philanthropy source reported

	Raw source count	Ventures with raw data (>0)	Ventures flagged = 1 \
0	17	1679	1679
1	15	1400	1400
2	10	2922	2922

	Ventures flagged = 0 but raw > 0
0	0
1	0
2	0

Ventures with all FU1 funding sources null prior to construction: 4431 (46.3%)

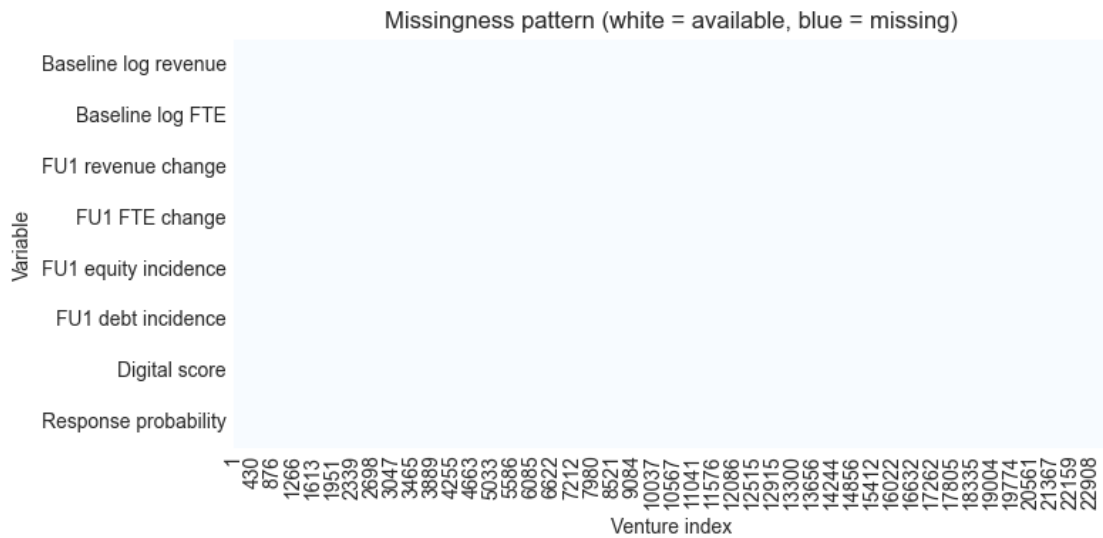
#### 1.18.8 A8. Missingness Overview

We track baseline vs. follow-up availability for the key variables used in the causal models. This combines absolute counts, percentages, and a simple heatmap to visualise remaining gaps.

	Variable	Non-missing	Missing (%)
0	Baseline log revenue	9567	0.0
1	Baseline log FTE	9567	0.0
2	FU1 revenue change	9567	0.0
3	FU1 FTE change	9567	0.0
4	FU1 equity incidence	9567	0.0



5	FU1 debt incidence	9567	0.0
6	Digital score	9567	0.0
7	Response probability	9567	0.0



### 1.18.9 A9. Descriptive Snapshot of Retained Variables

To anchor the narrative, the table summarises basic moments for the variable families retained in the modelling sample (n = 9,466 ventures with complete FU1 outcomes).

	Metric	Mean	Std. dev.	Non-missing
0	Baseline revenue (USD, $\exp(\log) - 1$ )	788287.78	52640408.48	9567
1	Baseline FT employees ( $\exp(\log) - 1$ )	164.47	15338.98	9567
2	Digital score (0-4)	1.99	1.36	9567
3	Equity incidence (baseline, %)	15.24	35.94	9567
4	Equity incidence (FU1, %)	17.55	38.04	9567
5	Debt incidence (baseline, %)	12.50	33.08	9567
6	Debt incidence (FU1, %)	14.63	35.35	9567

We compare unweighted and inverse-probability weighted (IPW, clip = 0.05) estimates for the revenue, employment, and funding models to illustrate the magnitude of attrition adjustments.

	Outcome	Specification	Coefficient	Effect (%) \
0	Revenue growth ( $\Delta \log$ )	Unweighted	0.4937	63.84
1	Revenue growth ( $\Delta \log$ )	IPW (clip 0.05)	0.4989	64.69
2	Employment growth ( $\Delta \log$ )	Unweighted	0.0735	7.62
3	Employment growth ( $\Delta \log$ )	IPW (clip 0.05)	0.0758	7.87
4	Equity incidence (pp)	Unweighted	0.0212	NaN
5	Equity incidence (pp)	IPW (clip 0.05)	0.0214	NaN
6	Debt incidence (pp)	Unweighted	0.0234	NaN
7	Debt incidence (pp)	IPW (clip 0.05)	0.0221	NaN

	SE	p-value	N (effective)	CI lower (effect)	CI upper (effect)	\
0	0.1044	0.000	9466	33.44	101.16	
1	0.1101	0.000	9466	32.63	104.50	
2	0.0222	0.001	9466	3.04	12.42	
3	0.0227	0.001	9466	3.17	12.80	
4	0.0118	0.072	9466	-0.19	4.43	
5	0.0112	0.058	9466	-0.07	4.35	
6	0.0098	0.017	9466	0.42	4.26	
7	0.0094	0.019	9466	0.36	4.06	

	Effect (pp)
0	NaN
1	NaN
2	NaN
3	NaN
4	2.12
5	2.14
6	2.34
7	2.21

**Observation:** Revenue and employment effects shift by <1 percentage point under IPW weighting, while the equity coefficient shrinks slightly yet remains positive and only marginally significant (p 0.07). Debt effects are virtually unchanged, reinforcing that attrition is not driving the funding findings.

#### 1.18.10 A10. Hypothesis Joint Tests

Wald/F statistics for the interaction terms behind H1a–H1c confirm the decisions cited in the heterogeneity sections. Each test evaluates whether the targeted incremental effects (relative to the baseline group) jointly equal zero.

	Hypothesis	Terms tested	\
0	H1a: Regional revenue uplift	Latin America & Caribbean, South Asia	
1	H1b: Sector revenue uplift	Health, Education	
2	H1c: Team-gender revenue uplift	Men-Only, Mixed	

	Test	Statistic	df_num	df_denom	p-value
0	F	23.99	2	393.0	0.0000
1	F	5.86	2	393.0	0.0031
2	F	12.33	2	393.0	0.0000

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**End of Analysis**