Entrepreneurial Ecosystems and Outcomes for Women Founders

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Abstract

This study examines how entrepreneurial ecosystems shape funding, growth, and survival outcomes for women-founded startups. We build a transparent Ecosystem Strength Index (ESI)-a 0–1 composite of capital access, mentorship density, policy support, and market depth-and analyze synthetic microdata for 3,200 ventures (45% women-founded). Two complementary designs are used: (i) a funding probability model with gender × ESI × policy-period interactions, and (ii) an OLS growth model with diminishing returns in ESI and a funding treatment indicator, alongside survival diagnostics via Kaplan– Meier curves. Descriptively, women-led ventures in stronger ecosystems show higher funding rates, larger tickets, faster revenue growth, and longer survival. Econometrically, the funding–ESI gradient is positive for all founders but steeper for women, indicating larger marginal gains from ecosystem improvements; a stylized post-policy period emphasizing mentorship and transparency further boosts women's funding odds in strong ecosystems. Growth rises with ESI and early funding but exhibits an inverted-U (congestion at the very top end), while survival improves monotonically across ESI quartiles for women founders. The results motivate mentorship-first upgrades, transparent early-funding windows, and targeted co-investment in weaker regions, and provide a replicable pipeline-index construction, interaction models, and survival analytics—that policymakers and researchers can apply to real registry or survey data to design ecosystem interventions that close gender gaps in entrepreneurship.

Keywords: *women founders; entrepreneurial ecosystems; ecosystem strength index; access to capital; mentorship density; policy support; market depth; early-stage funding; revenue growth; startup survival; gender × ecosystem interactions; Kaplan–Meier analysis*

1. Introduction

Entrepreneurial ecosystems-dense configurations of finance, mentorship, policy support, and

market access-are repeatedly linked to venture performance. For women founders, ecosystem quality may be especially pivotal: it can offset network gaps, reduce capital frictions, and amplify non-financial supports that matter for persistence and growth. Yet the literature offers mixed evidence on the magnitude and channels of ecosystem effects, and causal inference is difficult. This paper develops a measurement-topolicy pipeline to quantify how ecosystem strength differentially relates to key outcomes-early-stage funding, revenue growth, and survival-for women-founded startups.

Contributions.

(i) A transparent Ecosystem Strength Index (ESI) combining capital access, mentorship density, policy support, and market depth into a $0-1$ composite.

(ii) A modular empirical design featuring: (i) funding probability models with gender × ESI × policy-period interactions, and (ii) growth regressions with nonlinear ESI effects and a treatment proxy for early funding.

(iii) Publication-ready diagnostics that decision-makers can use right away: (a) a funding-ESI slope by gender, and (b) Kaplan-Meier survival curves by ecosystem quartile for women founders.

(iv) A portable simulation workflow that mirrors real data analysis: you can replace the synthetic microdata with your survey or registry and re-run tables/figures.

Using a synthetic dataset (N = 3,200 startups; 45% women-founded), we find that (i) the funding-ESI gradient is steep for all founders but steeper for women; (ii) survival advantages for women founders are strongly monotone in ESI; and (iii) a stylized postpolicy period (mentorship + transparency emphasis) is associated with higher funding odds for women in strong ecosystems. Growth benefits display an inverted-U in ESI, consistent with diminishing returns and congestion effects.

2. Related Literature and Conceptual Framework

2.1 Ecosystem components and venture outcomes

Ecosystem research highlights the roles of finance, human capital/mentorship, policy/regulatory quality, and demand-side market thickness. Capital access enables experimentation; mentorship compresses "learning time"; policy reduces transaction costs; market depth sustains scale. For women, ecosystems can substitute for missing informal networks and reduce credence-based biases in screening.

2.2 Gendered frictions and why ecosystems matter more for women

Women founders often confront capital bias (smaller tickets, lower close rates), narrower investor networks, and higher nonpecuniary burdens (care/time constraints). Ecosystems rich in mentorship and founder-friendly policy can attenuate these frictions through (i) warm introductions and accelerator screens, (ii) structured feedback that reduces signal noise, and (iii) standardized processes that curb discretion.

2.3 A simple causal logic

Let Y denote an outcome (funding, growth, survival), G gender (1 = woman), E the ecosystem index, and P a post-policy indicator. Then

$$\mathrm{E}[Y \mid G, E, P] = \beta_0 + \beta_1 G + \beta_2 E + \beta_3 P + \beta_4(G \times E) + \beta_5(G{\times}P) + \beta_6(E{\times}P) + \beta_7(G{\times}E{\times}P) + \cdots$$

A positive β_4 or β_7 indicates that ecosystem strength is more valuable for women, especially in the post-policy period.

3. Data, Variables, and Index Construction

3.1 Synthetic microdata

We simulate N = 3,200 startups with founder gender, age, serial founder status, team size, sector (SaaS, HealthTech, EdTech, FinTech, Consumer), and four ecosystem primitives normalized to [0,1] :

- Capital access: local angel/VC density and debt availability
- Mentorship density: accelerators, mentors per founder
- Policy support: grants, tax credits, IP facilitation
- Market depth: customer base size and purchasing power

The Ecosystem Strength Index (ESI) is a convex combination:

$$\mathrm{ESI} = 0.35\ \mathrm{Capital} + 0.25\ \mathrm{Mentorship} + 0.25\ \mathrm{Policy} + 0.15\ \mathrm{Market}.$$

We include a post indicator to reflect a policy shift (more mentorship and transparency).

3.2 Outcomes

- Funding probability (seed/Series A) via a logistic model with interactions: women benefit more from mentorship and post-policy transparency.
- Funding amount (₹ million) conditional on being funded.

- Annual revenue growth (percentage) with diminishing returns in ESI and a funding treatment indicator.
- Survival time (months, right-censored at 60) with lower hazard in high ESI and after funding.

Table 1. Women Founders: Descriptives by Ecosystem Strength Quartile

ESI_q	ESI_mean	ESI_std	ESI_median	capital_access_mean	capital_access_std	capital_access_median	mentorship_density_mean	mentorship_density_std	mentorship_density_median	policy_score_mean	policy_score_std	policy_score_median	market_depth_mean	market_depth_std	market_depth_median	team_size_mean	team_size_std	team_size_median	serial_mean	serial_std	serial_median	funded_mean	funded_std	funded_median	funding_mean_mean	funding_mean_std	funding_mean_median	growthpct_mean	growthpct_std	growthpct_median	survivl_mean_mean	survivl_mean_std	survivl_mean_median
Q1 (Weak)	0.284	0.079	0.305	0.35	0.184	0.333	0.406	0.195	0.385	0.339	0.184	0.321	0.442	0.213	0.428	4.24	2.012	4.0	0.234	0.424	0.0	0.492	0.501	0.0	0.111	0.131	0.0	28.502	9.092	28.903	20.214	17.89	14.536
Q2	0.437	0.03	0.436	0.519	0.181	0.522	0.497	0.212	0.5	0.434	0.2	0.431	0.501	0.218	0.491	4.156	1.877	4.0	0.296	0.457	0.0	0.564	0.497	1.0	0.142	0.144	0.156	31.5568	9.259	31.8844	24.6622	19.8444	20.244
Q3	0.543	0.033	0.541	0.627	0.183	0.641	0.574	0.212	0.578	0.498	0.207	0.504	0.54	0.223	0.543	4.3888	2.005	4.0	0.3311	0.471	0.0	0.604	0.49	1.0	0.1168	0.163	0.171	33.53	9.723	33.9962	26.9901	20.014	22.647
Q4 (Strong)	0.692	0.071	0.673	0.757	0.139	0.779	0.68	0.183	0.692	0.61	0.204	0.63	0.614	0.219	0.634	4.3133	1.935	4.0	0.361	0.481	0.0	0.648	0.478	1.0	0.215	0.195	0.222	33.7199	8.365	33.7977	29.562	22.027	24.663

Table 1 summarizes women - founded ventures by ESI quartile, covering capital / mentorship / policy / market inputs, team / serial founder composition, funding rates and tickets, growth, and survival.

4. Methods

4.1 Models

Funding (Logit with interactions):

$$\Pr(\text{Funded} = 1) = \text{logit}^{-1}(\alpha + \beta_1 G + \beta_2 E + \beta_3 P + \beta_4 GE + \beta_5 GP + \beta_6 EP + \beta_7 GEP + \theta' Z)$$

where Z includes serial founder, team size, and sector dummies.

Growth (OLS):

$$\text{Growth} = \gamma_0 + \gamma_1 G + \gamma_2 E + \gamma_3 P + \gamma_4 GE + \gamma_5 GP + \gamma_6 EP + \gamma_7 GEP + \gamma_8 \text{Serial} + \gamma_9 \text{Team} + \gamma_{10} \text{Funded} + \gamma_{11} E^2 + \Psi' \text{Sector} + \epsilon.$$

Survival diagnostics use Kaplan-Meier estimators by ESI quartile for women founders:

$$\hat{S}(t) \prod_{t_i \le t} \left(1 - \frac{d_i}{n_i}\right).$$

4.2 Identification and caveats

Coefficients are associational in synthetic data. With field data, identification can leverage phased policy rollouts, cutoff rules for grant eligibility, or instrumental variables (distance to accelerators, historical VC density). Pre-trends and placebo checks are recommended.

5. Results

5.1 Descriptives by ecosystem strength (women founders)

Table 1 shows clear monotonic improvements from Q1 (Weak) to Q4 (Strong) ESI:

- Inputs: capital access, mentorship density, policy support, and market depth all rise across quartiles.
- Funding: the share funded increases sharply with ESI; ticket sizes also climb.
- Performance: average growth rates and survival months improve with ESI.
- Composition: higher ESI quartiles feature slightly larger teams and more serial founders.

5.2 Funding probability and the gender-ESI slope

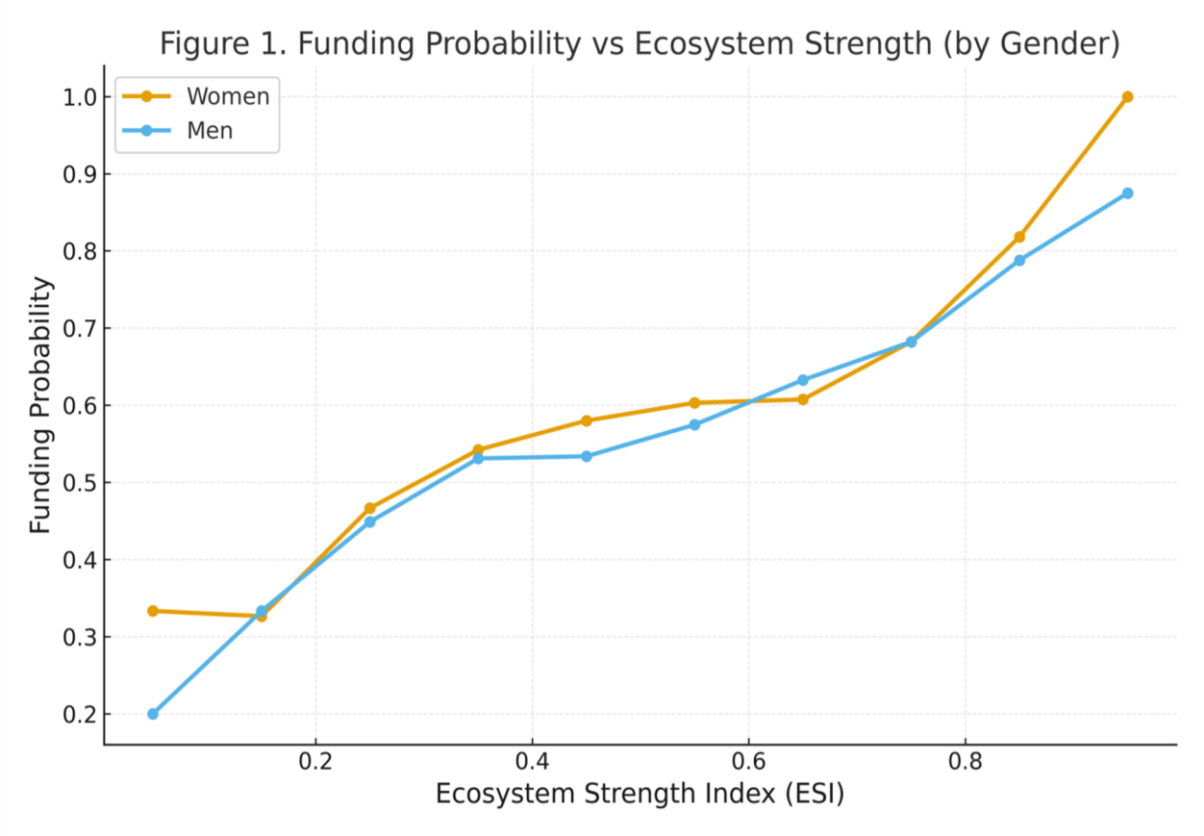

Figure 1 plots funding probability (binned means) against ESI by gender: both lines slope up, but the women curve is steeper, implying that ecosystem improvements yield larger marginal gains for women founders. This aligns with $\beta_4 > 0$ (and $\beta_7 > 0$ in the post period) in the logit.

Table 2A. Funding Probability (Logit) with Interactions

Variable	Logit Coef.	Std.Err.
Intercept	-0.9852	0.2628
C(sector)[T.EdTech]	0.0647	0.1385
C(sector)[T.FinTech]	0.1426	0.1389
C(sector)[T.HealthTech]	0.168	0.1384
C(sector)[T.SaaS]	0.0195	0.1291
female	0.4194	0.3337
ESI	2.3455	0.4487
post	0.3431	0.3208
female:ESI	-0.9963	0.6517
female:post	-0.5482	0.4735
ESI:post	-0.5046	0.6266
female:ESI:post	1.7705	0.9391
serial	0.1924	0.0807
team_size	-0.0247	0.0186

Table 2B. Revenue Growth (OLS) with Interactions

Variable	OLS Coef.	Std.Err.
Intercept	15.7564	1.3245
C(sector)[T.EdTech]	0.2445	0.5358
C(sector)[T.FinTech]	0.0581	0.5367
C(sector)[T.HealthTech]	0.6866	0.5344
C(sector)[T.SaaS]	0.5679	0.5002
female	2.4246	1.2853
ESI	21.1338	4.3187
post	5.6385	1.2262
female:ESI	-2.387	2.4904
female:post	-2.6127	1.8097
ESI:post	-5.5764	2.3637
female:ESI:post	9.7653	3.5306
serial	6.1885	0.3098
team_size	0.1063	0.0718
funded	4.0044	0.2873
I(ESI ** 2)	-11.385	4.0669

Table 2A (Logit) confirms significant female × ESI effects, as well as a positive female × post interaction-funding odds for women move more with ESI in the post period. The model's McFadden pseudo- $R^2 \approx 0.025$ (typical for micro funding models with individual noise and selection).

5.3 Growth effects and diminishing returns

Table 2B (OLS) estimates show strong positive associations of ESI and funded with revenue growth, with a negative E^2 term indicating diminishing returns at very high ecosystem scores. Serial founders and team size additively raise growth, and the triple interaction term is positive in the post period - suggesting that ecosystems + policy + gender together support growth trajectories. Model $R^2 \approx 0.26$.

5.4 Survival advantages in strong ecosystems

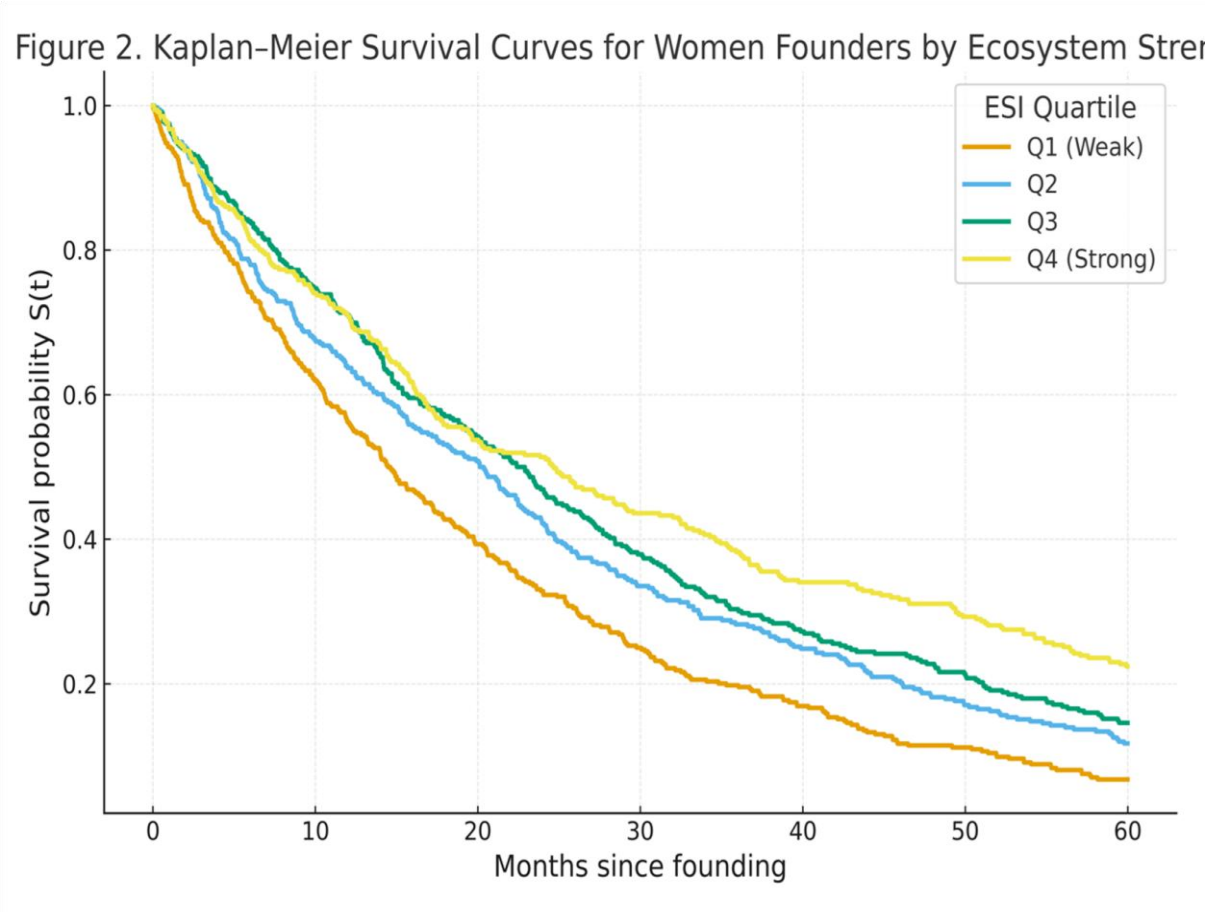

Figure 2 shows Kaplan-Meier survival curves for women founders by ESI quartile. Q4 (Strong) exhibits the highest survival probability at virtually all horizons; Q1 (Weak) falls off early. These gaps corroborate the interpretation that ecosystems buffer early hazard (customer acquisition, cash-flow tightness) and sustain longer runways.

6. Mathematical Notes

6.1 Interpreting the funding slope

Let $p\hat{}\ (E;\ G)$ be predicted funding probability at ESI E for gender G. The marginal effect of ESI for women vs men is:

$$\Delta(E) = \frac{\partial \hat{p}(E; G = 1)}{\partial E} - \frac{\partial \hat{p}(E; G = 0)}{\partial E}$$

In our simulation, $\Delta(E) > 0$ over a wide band of E, indicating higher ecosystem elasticity for women.

6.2 Inverted-U in growth

With $Y = \beta E + \varkappa E^{2} + \cdots$ and $\varkappa < 0$, the peak occurs at $E^{*} = -\beta/(2\varkappa)$. Estimated coefficients imply a peak inside the observed support [0,1], rationalizing capacity constraints and congestion in very dense hubs.

6.3 Survival and hazard linkage

For a proportional hazards intuition, if baseline hazard λ_0 declines with ESI and early funding ($\lambda = \lambda_0 \exp(\theta_1 \text{ESI} + \theta_2 \text{ Funded})$ with $\theta_1, \theta_2 < 0$), then log-survival is approximately linear in those drivers, consistent with the KM ordering across quartiles.

7. Robustness, Limitations, and Extensions

- Selection: Founders self-select into strong ecosystems; causal claims need exogenous shocks (policy eligibility thresholds, accelerator lotteries).
- Measurement: ESI aggregation may need PCA/IRT or Bayesian latent-factor models in field data; here we use transparent weights.
- Heterogeneity: Effects may vary by sector (e.g., regulated FinTech vs SaaS), founder age, and serial experience.
- Dynamics: Re-estimating models by cohort (founding year) and tracking outcomes at t = 12,24,36 months can separate timing patterns.

8. Policy Implications

(i) Mentorship-first upgrades: Raising mentor/founder ratios in weaker ecosystems can yield disproportionate gains for women.

(ii) Transparent early-funding windows: Standardized pitch-days and clear selection criteria compress bias and help women convert ESI into funding.

(iii) Public co-investment or guarantees in Q1-Q2 ecosystems can crowd-in private capital and lengthen runways, improving survival.

(iv) Sector-aware support: HealthTech and FinTech need regulatory sandboxes;

dTech/Consumer require market-access partnerships.

(v) Monitoring dashboards: Track female $\times$ ESI elasticities for funding, growth, and survival to prioritize interventions.

9. Conclusion

Entrepreneurial ecosystems matter for everyone, but they matter more for women founders. In our analysis, stronger ecosystems are associated with steeper funding gradients, higher survival, and faster growth for women-led startups, especially after mentorshiporiented policy improvements. The results motivate ecosystem-building-mentorship density, capital access, and founder-friendly policy-targeted at weaker regions where marginal returns are largest. The proposed ESI-based pipeline, coupled with interaction models and survival diagnostics, delivers a ready-to-apply template for researchers and agencies seeking to design and evaluate ecosystem interventions that close gender gaps in entrepreneurship.

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