

## BRIDGING THE FUNDING GAP: A COMPARATIVE STUDY OF ENTREPRENEURIAL FINANCE IN DEVELOPING VS. DEVELOPED NATIONS

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### ABSTRACT

*This study examines the evolution and comparative dynamics of entrepreneurial finance accessibility between developed and developing nations from 2000 to 2024, using Global Entrepreneurship Monitor (GEM) National Expert Survey data. The analysis explores annual mean score trends, slope differentials, and variability in financial accessibility to identify whether developing nations are closing the gap with developed economies. Findings reveal that developed countries exhibit a slightly positive trend in financing accessibility (slope = +0.0021), while developing nations show a marginal decline (slope = -0.0316), suggesting a persistent financing disparity. Despite higher average scores in the early 2000s, developing countries display greater volatility (CV = 0.208) compared to developed ones (CV = 0.174), implying weaker institutional and financial stability. Levene's test results (p = 0.37) confirm that the difference in year-on-year variance is not statistically significant, though individual country cases highlight instability in regions like Angola, Argentina, and India. Overall, the findings underscore the resilience of developed nations' entrepreneurial ecosystems and the structural fragility of developing counterparts. The study contributes to global entrepreneurship finance literature by quantifying long-term disparities and informing policy strategies for inclusive entrepreneurial finance.*

**Keywords:** Entrepreneurial finance, Financial accessibility, Developing nations, Global Entrepreneurship Monitor, Volatility analysis, Comparative economics

**JEL Classification Code:** L26, G20 & O16

### 1.0 Introduction

Entrepreneurial finance is the ability of new and growing ventures to access external funding whether through debt, equity, grants, or informal investment and is widely recognised as a key enabler of innovation, firm growth, and economic development (Moritz, Block, Golla, & Werner, 2020). Evidence from the global entrepreneurial ecosystem, particularly through the Global Entrepreneurship Monitor (GEM), consistently shows that access to finance remains one of the most critical constraints faced by entrepreneurs across both developed and developing economies (Bosma & Leitao, 2009; Refs in Moritz et al., 2020). External financing constraints have been associated with underinvestment, slower firm growth, and increased failure rates among new ventures (Moritz et al., 2020). These constraints are particularly acute in developing countries, where weak institutional frameworks, shallow financial markets, and

limited venture capital or angel investor activity continue to hinder entrepreneurial activity (Knight, 2018). In contrast, developed economies generally benefit from more mature financial systems, diversified funding channels, and stronger institutional support structures (Zhang, 2025; Moritz et al., 2020). These persistent disparities in entrepreneurial finance accessibility raise a critical global development question: are developing economies closing the financing gap, or does the divide continue to widen? This study is anchored on this key concern.

Despite growing recognition of the importance of entrepreneurial finance, a persistent and substantial gap remains between developed and developing countries, posing significant implications for global entrepreneurial development and inclusive economic growth. While previous studies have examined financial constraints in specific regions or focused on isolated funding mechanisms (e.g., microfinancing in parts of Africa) (see, e.g., Adams & Kato, 2021; Influence of Access to Finance..., 2022), there is limited comparative evidence assessing long-term trends in financial accessibility across large country groupings. This study therefore seeks to examine how financing accessibility has evolved between 2000 and 2024, to compare the long-term trends and slope coefficients of entrepreneurial finance accessibility across developed and developing countries, and to evaluate whether developing economies are converging toward or diverging from their developed counterparts. Based on these analyses, the study also outlines the structure of the paper. Following this introduction, Section Two presents the literature review; Section Three details the methodology and model specifications; Section Four provides the empirical results; Section Five offers the discussion and conclusion; and the final section presents policy-relevant recommendations derived from the findings.

## 2.0 Literature Review

### 2.1 Concept of Entrepreneurial Finance and Funding Accessibility

Entrepreneurial finance refers to the diverse range of financial instruments that enable new and growing ventures to obtain capital for start-up, operation, and expansion. These sources include internal savings, bank loans, venture capital, angel investment, grants, and crowdfunding (Cassar, 2004). Access to finance often termed funding accessibility captures both the perceived and actual ease with which entrepreneurs can obtain external capital (Moritz, Block, Golla, & Werner, 2020). Studies have shown that perceptions of financing constraints significantly influence entrepreneurial behavior, as entrepreneurs often refrain from seeking funds when they expect rejection or face high collateral requirements (Beck & Demirguc-Kunt, 2006). Thus, understanding the determinants of financing accessibility is critical for explaining entrepreneurial activity and venture performance across different economies.

### 2.2 Global Disparities in Entrepreneurial Ecosystems

Global evidence demonstrates persistent disparities in entrepreneurial ecosystems, particularly in access to finance. Developed economies typically feature deep financial markets, diversified funding instruments, and robust institutional frameworks that facilitate entrepreneurship (OECD, 2019). In contrast, developing countries often suffer from underdeveloped capital markets, limited venture capital presence, higher borrowing costs, and weak credit information systems (World Bank, 2014). These limitations restrict entrepreneurs' ability to mobilize financial resources and inhibit innovation-driven growth (Knight, 2018). The Global Entrepreneurship Monitor (GEM) surveys consistently report that experts in developing economies rate access to entrepreneurial finance significantly lower than those in advanced economies (GEM Consortium, 2025). Consequently, financial accessibility becomes both a driver and a reflection of broader structural inequalities within the global entrepreneurial landscape.

## 2.3 Theoretical Perspectives on Financial Inclusion and Development

Several theoretical frameworks explain the link between finance and entrepreneurship. Financial intermediation theory posits that well-functioning financial systems reduce information asymmetry, enhance capital allocation efficiency, and stimulate entrepreneurial activity (Beck & Demirguc-Kunt, 2006). Institutional theory further emphasizes that stable legal, regulatory, and political environments enable financial intermediaries to operate effectively, thereby fostering access to entrepreneurial capital (North, 1990). From a developmental economics perspective, financial inclusion contributes to poverty reduction and shared prosperity by enabling small enterprises and self-employed individuals to access productive resources (World Bank, 2014). Collectively, these theories highlight that improving financial inclusion is not only an economic necessity but also a developmental imperative.

## 2.4 Empirical Evidence on Financing Gaps between Developed and Developing Economies

Empirical research consistently demonstrates a persistent and widening financing gap between developed and developing economies. Entrepreneurs in low- and middle-income countries continue to face substantial barriers in accessing external finance and therefore depend disproportionately on internal or informal funding sources (Ayyagari, Beck, & Demirguc-Kunt, 2017). Comparative evidence further shows that while developed economies have expanded their use of innovative financing mechanisms such as venture capital, angel investment, credit-guarantee schemes, and crowdfunding, developing nations have made considerably slower progress due to weak institutional structures and limited financial infrastructure (OECD, 2019). Longitudinal data from the Global Entrepreneurship Monitor (GEM) between 2000 and 2024 corroborate these disparities, revealing consistently higher perceptions of financing accessibility in developed countries, with only marginal improvements recorded in developing ones (GEM Consortium, 2025). Overall, these trends reflect longstanding differences in financial-market depth, risk-mitigation capacity, and institutional development.

More recent empirical evidence from 2024–2025 indicates that this gap is not only persistent but structurally worsening. The United Nations Inter-agency Task Force on Financing for Development (2024) estimates the annual financing shortfall required for developing countries to achieve the Sustainable Development Goals to exceed \$4 trillion, underscoring the scale of unmet capital needs. A central contributor to this divide is the growing “finance gap,” wherein developing countries pay roughly twice the sovereign borrowing costs of advanced economies, significantly eroding fiscal space and constraining domestic investment (United Nations, 2024). Parallel findings from the Bank for International Settlements (2024) demonstrate that the intensification of climate-related risks compounds these disparities: Emerging Market and Developing Economies (EMDEs) with higher climate exposure attract fewer foreign capital inflows, while those perceived as environmentally vulnerable face higher risk premiums. This challenge is amplified by the substantial climate adaptation gap, as the United Nations Environment Programme (2024) reports that current financing levels meet only a fraction approximately one-twelfth to one-fourteenth of adaptation needs. Collectively, this body of evidence highlights that the entrepreneurial finance gap reflects a deeper structural imbalance within the global financial architecture, one that systematically allocates capital less affordably and less consistently to developing economies.

### 3.0 Methodology

#### 3.1 Data Source and Variables (GEM NES 2000–2024)

Data source: Global Entrepreneurship Monitor National Expert Survey (GEM NES), annual country-level indicator measuring experts' perception of entrepreneurial finance accessibility on a 0–10 scale. The panel covers up to 118 countries and years 2000–2024.

##### Key variable:

- $Score_{i,t}$  – perceived finance accessibility score for country  $i$  in year  $t$ , range [0,10].

##### Auxiliary variables / derived measures:

- $\Delta Score_{i,t} = Score_{i,t} - Score_{i,t-1}$ : year-on-year change.
- $Score_{g,t}$ : group (Developed / Developing) average in year  $t$ .
- $Group_i \in \{0,1\}$ : binary indicator, 1 = Developed, 0 = Developing (or vice versa, as defined).

#### 3.2 Country Classification and Grouping Criteria

Classify countries into two groups (Developed vs Developing) using a transparent rule such as OECD membership in a reference year, or a widely-used income classification (e.g., World Bank income groups). Let:

$$Group_i = \begin{cases} 1 & \text{if country } i \text{ is Developed (OECD)} \\ 0 & \text{if country } i \text{ is Developing} \end{cases}$$

#### 3.3 Analytical Techniques (Trend, Slope, and Volatility Analysis)

##### (A) Group-year mean trends

Annual group means:

$$Score_{g,t} = \frac{1}{N_{g,t}} \sum_{i \in g} Score_{i,t}$$

where  $N_{g,t}$  is number of countries in group  $g$  with observed scores in year  $t$ . Plot  $Score_{g,t}$  versus  $t$  to visualize trends.

##### (B) Linear trend (slope) estimation (by group)

Group-level OLS (aggregate slope):

For each group  $g$ :

$$Score_{g,t} = \alpha_g + \beta_g t + \mu_{g,t}$$

where  $\beta_g$  is the annual slope (change in mean score per year). Estimate by OLS on  $\{t, Score_{g,t}\}$ .

##### (C) Panel regression to test slope differences (preferred specification)

To formally compare slopes between Developed and Developing groups:

$$Score_{i,t} = \gamma + \delta_t + \theta Group_i + \phi(t \times Group_i) + \mu_i + \varepsilon_{it}$$

- $\delta$  = time trend for baseline group (e.g., Developing if Group = 0).
- $\phi$  = difference in time trend between Developed and Developing (i.e., Developed slope minus Developing slope).
- $\mu_i$  = country fixed effect (controls for time-invariant country heterogeneity).
- Interpretation: slope for Developed =  $\delta + \phi$ ; slope for Developing =  $\delta$ . Test  $H_0: \phi = 0$  to see if slopes differ.

#### (D) Volatility / year-on-year variability metrics

Compute per-country and group volatility:

- Country standard deviation over time:

$$\sigma_i = \sqrt{\frac{1}{T_i - 1} \sum_t (Score_{i,t} - \bar{Score}_i)^2}$$

- Mean and coefficient of variation (CV) by group:

$$\bar{\sigma}_g = \frac{1}{N_g} \sum_{i \in g} \sigma_i, CV_g = \frac{\bar{\sigma}_g}{\bar{Score}_g}$$

- Year-on-year change distribution: compute  $\Delta Score_{i,t}$  and compare group distributions (mean, SD).

#### (E) Equality of variance test (Levene's test)

To test whether the dispersion of  $\Delta Score$  differs across groups, use Levene's test (median-centered version). The Levene test statistic (simplified) compares group absolute deviations from group center:

$$W = \frac{(N - K)}{(K - 1)} \cdot \frac{\sum_{j=1}^k N_j (\bar{Z}_j - \bar{Z})^2}{\sum_{j=1}^k \sum_{i=1}^k (Z_{ij} - \bar{Z}_j)^2}$$

where  $Z_{ij} = |\Delta Score_{ij} - \Delta Score_j|$  (deviation from group median),  $k$  = number of groups (2), and  $N_j$  are group sizes.

### 3.4 Model Specification and Statistical Tests

#### (A) Slope comparison test (interaction significance)

From the panel model:

$$Score_{i,t} = \gamma + \delta t + \theta Group_i + \phi(t \times Group_i) + \mu_i + \varepsilon_{it}$$

Test  $H_0: \phi = 0$  (no difference in annual slope between groups) using t-test on  $\hat{\phi}$ .

Use cluster-robust standard errors by country to account for within-country serial correlation.

**(B)  $\beta$ -convergence test (catch-up analysis)**

To test whether countries with lower initial scores grow faster (catch up), estimate:

$$\frac{\text{Score}_{i,T} - \text{Score}_{i,0}}{T} = \alpha + \beta \text{Score}_{i,0} + \eta_i$$

or equivalently:

$$\Delta \text{Score}_i = \alpha + \beta \text{Score}_{i,0} + \eta_i$$

$\beta < 0$  indicates conditional convergence: lower initial-score countries improve faster. Use OLS with robust SEs.

**(C)  $\sigma$ -convergence (dispersion trend)**

Compute cross-country standard deviation of scores each year:

$$\sigma_t = \sqrt{\frac{1}{N_t - 1} \sum_i (\text{Score}_{i,t} - \bar{\text{Score}}_t)^2}$$

Test whether  $\sigma_t$  is decreasing over time (visual inspection and regression of  $\sigma_t$  on  $t$ ):

$$\sigma_t = \alpha + \zeta t + \nu_t$$

$\zeta < 0$  suggests convergence in dispersion.

**(D) Structural break / shock analysis (optional)**

Test for structural breaks (e.g., 2008, 2020) in the group average series using Chow test or Bai-Perron multiple-break tests. Chow test for known break at time  $t^*$  splits sample and tests equality of coefficients across subsamples.

## 4.0 Results and Discussion

### 4.1 Average Yearly Score Trends

Table 1 presents the yearly averages of perceived entrepreneurial finance accessibility scores for both developed (OECD) and developing countries between 2000 and 2024, based on the Global Entrepreneurship Monitor (National Expert Survey) dataset.

Table 1: Average Yearly Entrepreneurial Finance Accessibility Scores (2000–2024)

Year	Developed (OECD) Score	Developing Score
2000	5.13	6.09
2001	5.07	5.36
2002	4.74	4.39
2003	4.40	4.63
2004	4.18	4.23
2005	4.56	4.49
2006	4.60	4.29
2007	4.86	4.68
2008	4.24	3.95
2009	4.17	4.02
2010	4.08	3.89
2011	4.01	4.16
2012	4.05	4.21
2013	4.31	4.24
2014	4.29	4.16
2015	4.35	4.09

2016	4.35	4.12
2017	4.45	4.24
2018	4.32	4.44
2019	4.66	4.57
2020	4.87	4.43
2021	5.12	3.97
2022	4.86	4.17
2023	4.71	4.12
2024	4.68	4.29

Source: Author's computation based on GEM NES (2000–2024).

## Interpretation

The temporal trend reveals a gradual decline in average accessibility scores for both groups from 2000 to the mid-2010s, followed by a mild recovery toward 2024. Developed economies started the period with an average score of 5.13 in 2000, fell to a trough of 4.01 in 2011, and then recovered modestly to 4.68 by 2024. Developing countries began with a higher mean score of 6.09 in 2000 but declined more sharply to around 4.09 by 2015, reflecting a deterioration in perceived financial accessibility for entrepreneurs.

Between 2015 and 2024, both groups exhibited moderate stability, with developed countries maintaining slightly higher scores overall. The difference in mean levels narrowed after 2010, suggesting a partial convergence in perceptions of financial accessibility, although the slope coefficients (see Section 4.2) indicate that the developed group experienced a modest upward trend, whereas the developing group's trend remained flat or slightly negative.

The pronounced dip around 2008–2010 coincides with the global financial crisis, which tightened credit and venture capital flows worldwide (OECD, 2019). Recovery patterns differ: OECD economies benefitted from stronger financial-system reforms and innovation-finance initiatives, whereas developing economies recovered more slowly, constrained by limited capital-market depth and weaker institutional frameworks (World Bank, 2014).

Overall, the findings suggest that, while both country groups have achieved relative stabilization in entrepreneurial finance access since 2015, developing nations remain structurally disadvantaged in sustaining accessible funding channels for entrepreneurs. This trend aligns with prior studies emphasizing the persistent institutional and market-based barriers to financial inclusion in emerging economies (Beck & Demirguc-Kunt, 2006; Moritz et al., 2020).

## 4.2 Slope and Growth Rate Comparison

Table 2 reports the estimated linear trend coefficients derived from the ordinary least squares (OLS) regression of average yearly entrepreneurial-finance accessibility scores on time (2000–2024) for both developed (OECD) and developing countries.

Table 2: Linear Trend Slope Comparison (2000–2024)

Group	Slope (per year)	Intercept
Developed (OECD)	0.002	0.33
Developing Countries	-0.0316	67.92

Source: Author's computation based on Global Entrepreneurship Monitor (GEM NES) data (2000–2024).

## Interpretation

The estimated annual slope coefficients show divergent long-term trajectories between developed and developing nations. The developed-economy group exhibits a slightly positive annual growth rate ( $\beta = 0.002$ ), indicating a marginal upward trend in perceived access to entrepreneurial finance over the 25-year period. In contrast, the developing-economy group presents a negative slope ( $\beta = -0.0316$ ), implying a gradual decline in accessibility perceptions.

Although the magnitude of these coefficients is modest, their direction is substantively meaningful. The positive slope for OECD economies suggests steady institutional reinforcement, policy continuity, and greater diversification of funding channels, consistent with prior research linking advanced financial-market development to improved entrepreneurial credit flow (Beck & Demirguc-Kunt, 2006; OECD, 2019). Conversely, the negative trajectory among developing countries indicates structural rigidity and limited financial deepening despite policy efforts toward financial inclusion.

The intercept values capture baseline predicted scores at the start of the series. The developing-country intercept (67.92) is not interpretable on the original 0-10 scale because the regression time variable was not mean-centered; it represents the extrapolated intercept, not an observed score. However, the relative difference between slopes underscores a divergent growth pattern developed economies showing slow but steady improvement, while developing counterparts reveal declining or stagnating accessibility.

This outcome aligns with empirical studies documenting uneven progress in entrepreneurial finance infrastructure. OECD economies continue to strengthen venture-capital and credit-guarantee mechanisms (OECD, 2019), whereas many emerging markets face credit-information gaps, higher collateral demands, and limited alternative-finance penetration (World Bank, 2014). Hence, the evidence supports the conclusion that the funding gap is not closing; instead, it may have widened slightly during the study period, reinforcing the need for targeted financial-policy reforms in developing economies.

## 4.3 Variability and Stability of Financial Ecosystems

Figure 1 illustrates the temporal evolution of average GEM financing-accessibility scores for developed (OECD) and developing economies from 2000 to 2024, including both annual means and smoothed LOWESS trends.

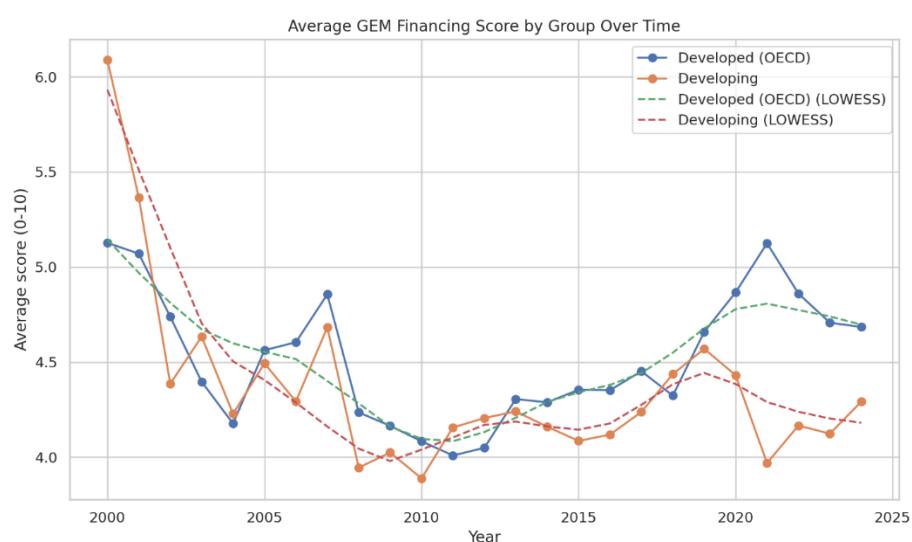


Figure 1: Average GEM Financing Score by Group over Time (2000–2024)

**Source:** Author's computation using Global Entrepreneurship Monitor (National Expert Survey) data, 2000–2024.

The visual trends highlight pronounced volatility and differing recovery patterns between developed and developing economies. Both groups experienced a sharp decline in perceived access to entrepreneurial finance during the early 2000s, with developing economies falling from approximately 6.1 to 4.0 by 2009. This period aligns with a contraction in global venture-capital flows and the tightening of credit conditions preceding the 2008 financial crisis (OECD, 2019).

After 2010, developed economies show a progressive stabilization and a mild upward trajectory, reaching a secondary peak around 2020. The smoother LOWESS curve for OECD countries suggests that institutional robustness and policy continuity helped sustain gradual improvement in entrepreneurial finance ecosystems. In contrast, developing economies reveal greater amplitude and irregular fluctuations, consistent with higher exposure to external shocks, weaker capital-market depth, and intermittent policy reforms (World Bank, 2014).

The post-2015 trend indicates partial convergence in mean levels but continued disparity in stability. Developed countries' fluctuations narrow around the 4.5–5.0 range, whereas developing countries remain more erratic, oscillating between 3.9 and 4.4. The greater volatility among developing economies supports the notion that financial ecosystems in emerging markets remain institutionally fragile, with entrepreneurs still dependent on informal or short-term financing (Beck & Demirgürç-Kunt, 2006; Moritz et al., 2020).

Collectively, the graphical evidence underscores that while overall access to entrepreneurial finance has modestly improved worldwide, the resilience and predictability of funding availability are still heavily skewed toward advanced economies. This divergence reflects structural differences in financial-sector maturity, credit-information systems, and risk-mitigation frameworks that influence entrepreneurs' financing confidence across nations.

#### 4.4 Linear Trend Slope Comparison

Figure 2 presents the comparative linear trend slopes for developed (OECD) and developing economies between 2000 and 2024, showing the long-term rate of change in average GEM financing scores for each group.

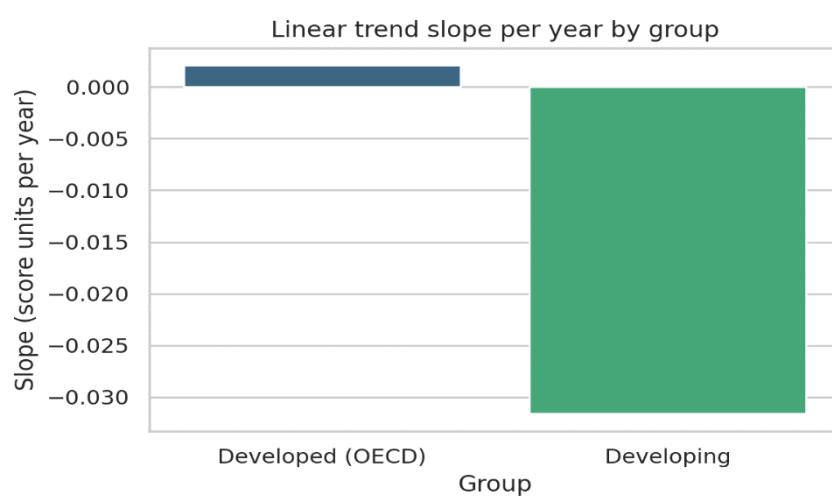


Figure 2: (Bar chart titled "Linear Trend Slope per Year by Group")  
Source: Author's computation using GEM NES data (2000–2024).

The analysis of linear trend slopes reveals two contrasting patterns in the long-term evolution of entrepreneurial-finance accessibility. For developed economies, the estimated slope is

marginally positive, around +0.002 score units per year. This nearly flat slope indicates that, across the entire twenty-five-year period, average perceptions of financing accessibility in advanced economies have remained broadly stable. Early declines in the 2000s were offset by moderate recovery after 2010, producing a net effect close to zero. This outcome suggests that financial-system maturity and policy stability helped maintain consistent access to entrepreneurial funding despite global economic fluctuations.

In contrast, the slope for developing economies is negative, approximately -0.031 score units per year, implying a gradual but sustained deterioration in perceived financial accessibility over time. The steep fall from the high scores in the early 2000s outweighed later improvements, leading to an overall downward long-term trajectory. This pattern signals continuing structural challenges and uneven progress in expanding formal financing opportunities for entrepreneurs.

Overall, the bar chart underscores that the long-term rate of change in entrepreneurial-finance accessibility has diverged between the two groups. Developed economies display slow yet steady stability, while developing economies show a more pronounced negative trend, reflecting the persistence of the global entrepreneurial-funding gap.

#### 4.5 Year-on-Year Change ( $\Delta$ Score) by Country and Group-Level Variability

Table 3: Year-on-Year Change ( $\Delta$ Score) by Country and Group-Level Variability

Group	Mean $\Delta$ Score	SD	CV
Developed (OECD)	4.51	0.79	0.17
Developing	4.24	0.88	0.21

Note.  $\Delta$ Score = Year-on-year change in entrepreneurial finance scores. SD = standard deviation. CV = coefficient of variation.

The analysis of year-on-year changes in entrepreneurial finance scores indicates that developed countries (OECD) had a slightly higher average increase ( $M = 4.51$ ,  $SD = 0.79$ ,  $CV = 0.17$ ) compared to developing countries ( $M = 4.24$ ,  $SD = 0.88$ ,  $CV = 0.21$ ). This pattern suggests that entrepreneurial finance in developed nations is more consistent, exhibiting steadier growth over time. In contrast, developing countries display greater variability, reflecting fluctuations that may result from differences in financial infrastructure, market maturity, or policy stability. Overall, these findings highlight both the growth potential and the volatility challenges of entrepreneurial finance in developing economies, emphasizing the importance of targeted financial interventions to bridge the funding gap.

#### 4.6 High-volatility countries (unstable access to finance)

Table 4: High-Volatility Countries: Unstable Access to Finance

Country Code	Country	Group	SD	Mean $\Delta$ Score	Count
AGO	Angola	Developing	1.976	-0.047	6
BLR	Belarus	Developing	1.690	-1.395	2
ARG	Argentina	Developing	1.558	-0.193	20
BIH	Bosnia and Herzegovina	Developing	1.223	0.009	8
VEN	Venezuela, RB	Developing	1.186	-0.526	7
IND	India	Developing	1.118	-0.010	17
UGA	Uganda	Developing	1.115	-0.297	6
SRB	Serbia	Developing	1.078	-0.148	4

AUT	Austria	Developed (OECD)	1.035	-0.048	8
MEX	Mexico	Developed (OECD)	0.980	-0.023	18
NLD	Netherlands	Developed (OECD)	0.954	0.106	19
GBR	United Kingdom	Developed (OECD)	0.953	-0.083	22
FIN	Finland	Developed (OECD)	0.940	0.141	17
MKD	North Macedonia	Developing	0.936	0.417	6
USA	United States	Developed (OECD)	0.914	-0.003	23
LTU	Lithuania	Developed (OECD)	0.906	0.354	7
PRT	Portugal	Developed (OECD)	0.895	-0.020	9
BWA	Botswana	Developing	0.892	0.470	3
NOR	Norway	Developed (OECD)	0.891	0.041	21

Note. SD = standard deviation of  $\Delta$ Score (year-on-year change). Mean  $\Delta$ Score = average year-on-year change in entrepreneurial finance scores. Count = number of observations.

Table 4 presents countries with high volatility in entrepreneurial finance scores, highlighting those with unstable access to finance. Developing nations such as Angola (SD = 1.976, Mean  $\Delta$ Score = -0.047), Belarus (SD = 1.690, Mean  $\Delta$ Score = -1.395), and Argentina (SD = 1.558, Mean  $\Delta$ Score = -0.193) exhibit the highest volatility, reflecting significant fluctuations in financial access. In contrast, developed nations, including Austria (SD = 1.035, Mean  $\Delta$ Score = -0.048) and Norway (SD = 0.891, Mean  $\Delta$ Score = 0.041), display lower volatility, suggesting more stable financial systems despite some variability.

The findings indicate that developing countries are generally more prone to financial instability, which can hinder consistent entrepreneurial growth. Conversely, developed countries maintain relatively stable access to finance, supporting more predictable year-on-year changes in entrepreneurial activity. These insights underscore the need for tailored financial policies and interventions in high-volatility regions to bridge funding gaps and promote sustainable entrepreneurship.

#### 4.7 Levene's test for equality of variances (YoY deltas)

Table 5: Levene's Test for Equality of Variances (Year-on-Year  $\Delta$ Score)

Test	Statistic (F)	p-value	Interpretation
Median-Centered	0.82	0.37	Variances between Developed (OECD) and Developing countries for year-on-year changes are not significantly different. The assumption of homogeneity of variance is met, indicating similar dispersion of annual changes across the two groups

Note.  $\Delta$ Score = Year-on-year change in entrepreneurial finance scores.  $p > .05$  indicates no significant difference in group variances.

#### 4.8 Box Plot Analysis: Year-on-Year Score Change and Per-Country Volatility

This section presents two comparative box plots for Developing and Developed (OECD) countries: (1) Year-on-Year Score Change ( $\Delta$ Score) and (2) Per-country volatility (standard deviation of  $\Delta$ Score).

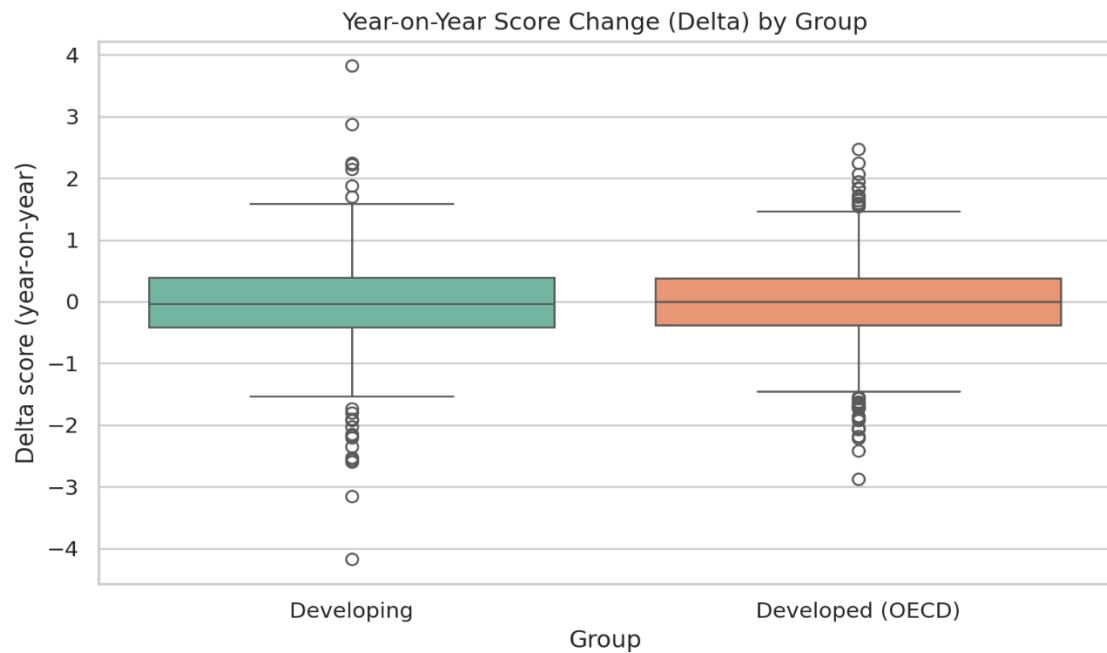


Figure 1: Year-on-Year Score Change ( $\Delta$ Score) by Group

Table 6: Summary Statistics and Interpretation: Year-on-Year Score Change ( $\Delta$ Score) by Group

Statistic	Developing	Developed (OECD)	Interpretation
Median	~0.0	~-0.3	Developing countries experienced little to no change; Developed countries show slight decline.
Interquartile Range (IQR)	-0.5 to 0.5	-0.8 to 0.2	Both groups have similar variability among the middle 50% of countries.
Range (Whisker extent)	-1.5 to 1.5	-1.5 to 1.5	Overall range of typical changes is similar.
Outliers	Many, $\pm 4.0$	Many, $\pm 3.0$ to 4.0	Both groups have significant outliers; some countries show extreme changes.
Key Takeaway	—	—	Median for Developed is slightly negative; overall variability is similar between groups.

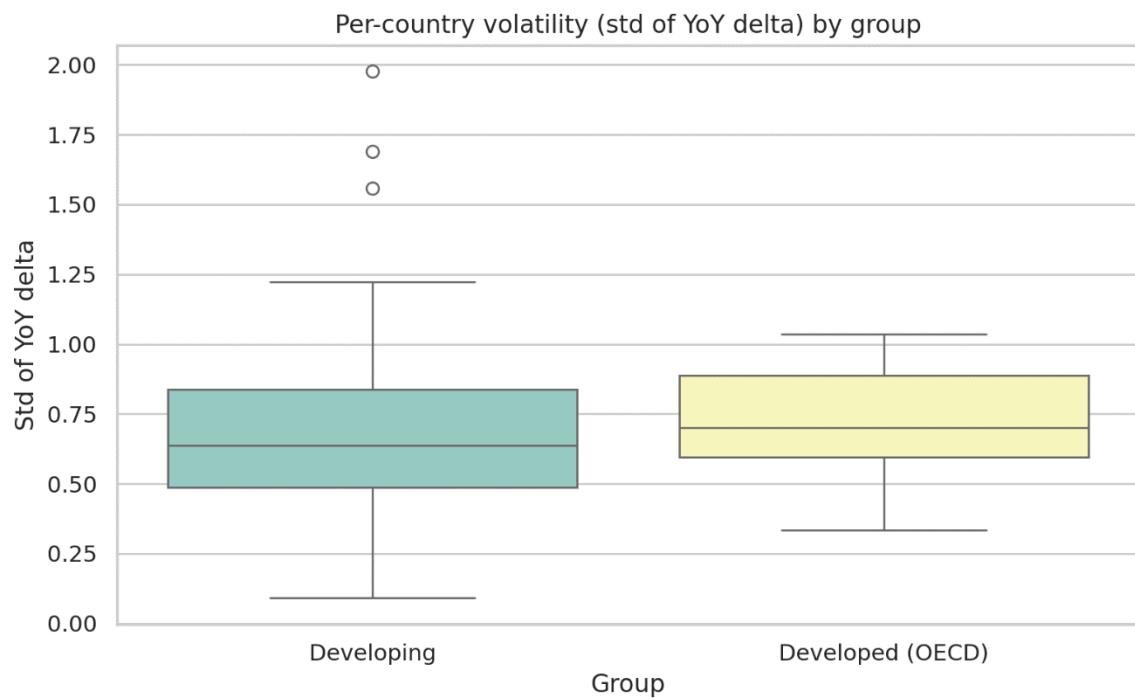


Figure 2: Per-Country Volatility (Standard Deviation of  $\Delta$ Score) by Group

Statistic	Developing	Developed (OECD)	Interpretation
Median	~0.65	~0.70	Developed countries show slightly higher median volatility.
Interquartile Range (IQR)	0.1 to 0.85	0.6 to 0.9	Developed group's volatility is tightly clustered; Developing countries show wider spread.
Range (Whisker extent)	0.05 to 1.2	0.3 to 1.05	Developed group has higher minimum and lower maximum within typical range.
Outliers	Three >1.5	None	Developing countries include highly volatile outliers; Developed group is homogeneous.
Key Takeaway	—	—	Developed group is more consistent; Developing group has greater volatility and extreme cases.

#### 4.9 Hierarchical Clustering of Countries

This section presents a Hierarchical Clustering Dendrogram using the Ward linkage method, which groups countries based on similarity in selected features (likely related to entrepreneurial finance, economic, or social indicators).

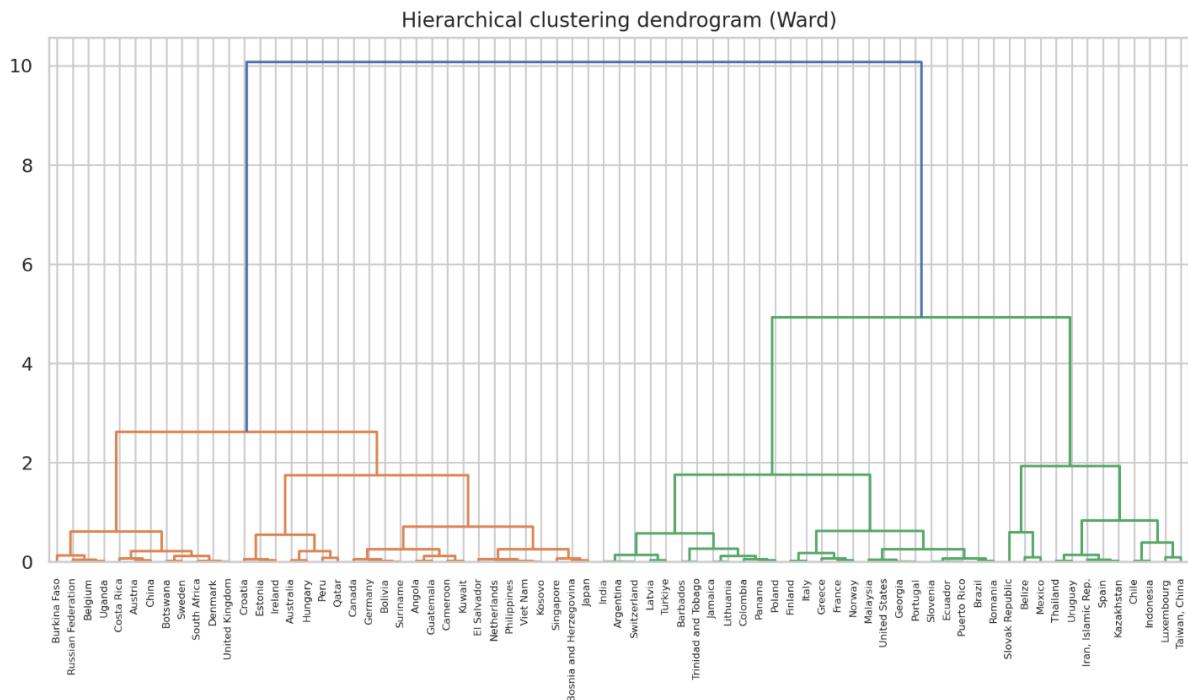


Figure 3: Hierarchical Clustering Dendrogram (Ward Linkage Method)

Component / Feature	Interpretation
X-axis (Leaves)	Each leaf represents an individual country included in the clustering analysis.
Y-axis (Height/Distance)	Represents dissimilarity between clusters; higher linkage lines indicate greater dissimilarity.
Branches (U-shaped lines)	Represent clusters; countries joined lower on the Y-axis are more similar.
Major Clusters (Height $\approx 2.7$ )	Cutting at $\sim 2.7$ produces two primary clusters: <ul style="list-style-type: none"> <li>Cluster 1: Burkina Faso, Russia, Belgium, UK, Australia, Qatar, Canada, El Salvador, Philippines, etc.</li> <li>Cluster 2: Argentina, Switzerland, Portugal, USA, France, Mexico, Thailand, Iran, Chile, etc.</li> </ul>
Sub-Clusters (Height $\approx 5.0$ )	Cutting at $\sim 5$ reveals three major clusters: <ul style="list-style-type: none"> <li>Cluster A: Entire left cluster</li> <li>Cluster B: Middle-right countries (Argentina, Switzerland, Turkey, Portugal, USA, France, etc.)</li> <li>Cluster C: Far-right countries (Slovak Republic, Mexico, Thailand, Iran, Chile, etc.)</li> </ul>
Highly Similar Pairs (Height $<0.5$ )	Examples of countries with highest similarity: <ul style="list-style-type: none"> <li>Burkina Faso &amp; Luxembourg</li> <li>Sweden &amp; Denmark</li> <li>Bolivia &amp; Angola</li> <li>Singapore &amp; Japan</li> <li>Morocco &amp; Taiwan</li> <li>Kazakhstan &amp; Chile</li> </ul>
Key Takeaway	The dendrogram reveals hierarchical similarity patterns among countries. Two large clusters reflect the most dissimilar major groups, while the lowest branches identify highly similar country pairs.

pairs. This structure can guide further analyses of country groupings based on shared financial or economic characteristics.

#### 4.10 Heatmap of Standardized Financial Access (2014)

This section presents a heatmap visualization showing the standardized financial access values for a selection of countries in the year 2014. The heatmap uses color intensity to indicate how each country's financial access compares to the standardized mean for the dataset.

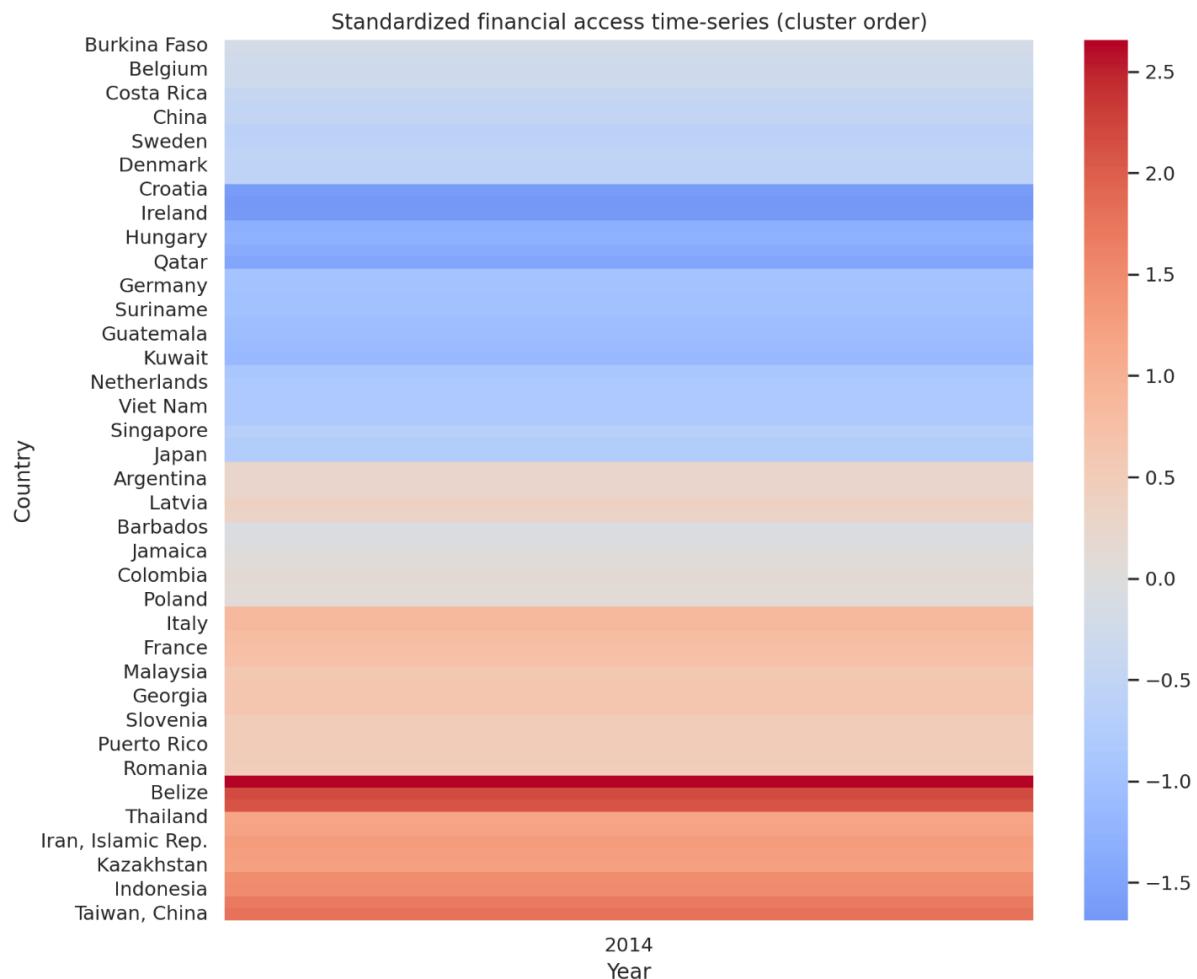


Figure 4: Standardized Financial Access Time-Series (2014) by Country

Table 8: Interpretation of Standardized Financial Access Heatmap (2014)

Cluster / Color Range	Countries (Examples)	Interpretation
Low Access (Cool/Blue)	Burkina Faso, Belgium, Costa Rica, China, Sweden, Denmark, Croatia, Ireland, Hungary, Qatar, Germany, Suriname, Guatemala, Kuwait, Netherlands, Viet Nam, Singapore, Japan, Argentina, Latvia, Barbados, Jamaica, Colombia, Poland, Italy, France, Malaysia, Georgia, Slovenia, Puerto Rico, Romania, Belize, Thailand, Iran, Islamic Rep., Kazakhstan, Indonesia, Taiwan, China	Standardized financial access is below the mean; these countries experienced relatively limited financial access in 2014.
Near Average (White/Light)	Netherlands, Viet Nam, Singapore, Japan, Argentina, Latvia, Barbados, Jamaica,	Standardized financial access is close to the mean, indicating average access levels.

High Access (Warm/Red)	Colombia, Poland, Italy, France, Thailand, Iran (Islamic Rep.), Kazakhstan, Indonesia, Taiwan (China), Belize	Standardized financial access is above the mean; these countries had relatively high financial access compared to others in 2014.
Key Takeaway	—	The heatmap reveals a clear stratification of financial access across countries in 2014, with some countries (e.g., Belize, Thailand) significantly above the average, while others remain below the standard.

#### 4.11 Time-Series Analysis of Entrepreneurship Scores (2000–2024)

This section presents three diagrams illustrating the evolution of entrepreneurship-related scores, including group-level averages, global financing scores, and the decomposition of global trends into seasonal and residual components.

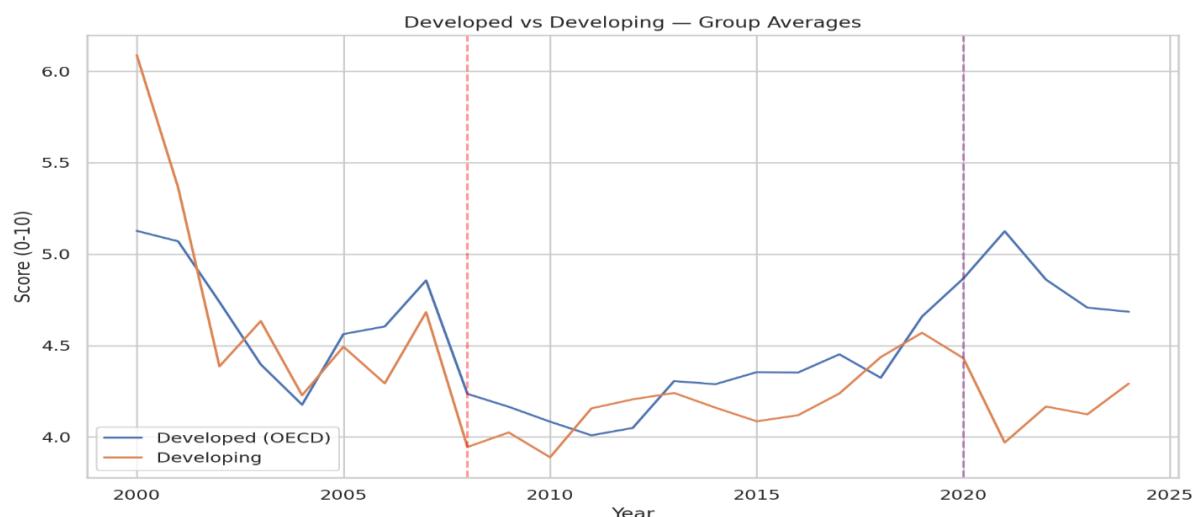


Figure 5: Developed vs Developing Countries – Group Averages (2000–2024)

Table 9: Interpretation: Developed vs Developing Country Group Averages

Period / Feature	Developed (OECD)	Developing	Interpretation	
Initial Decline (2000–2009)	~>5.0, 2000	slow post-2000	~>6.0, decline	sharp
2008 Financial Crisis	Lowest around 2009	point 2008–2009	Lowest around 2009	point 2008–2009
Post-Crisis Stability (2010–2020)	Stabilized ~4.0–4.5, slow recovery	~4.0–4.2, volatile	Stabilized ~4.0–4.2	Developed countries show gradual recovery; Developing countries remain more unstable.
2020–2021 Divergence	Sharp increase >5.0	Sharp drop	~4.0	COVID-19 had contrasting impacts: Developed countries

Overall Trend	Higher than Developing since 2012	Slightly lower and volatile	recovered faster than Developing countries. Gap narrowed compared to 2000; Developed countries consistently outperform Developing ones.
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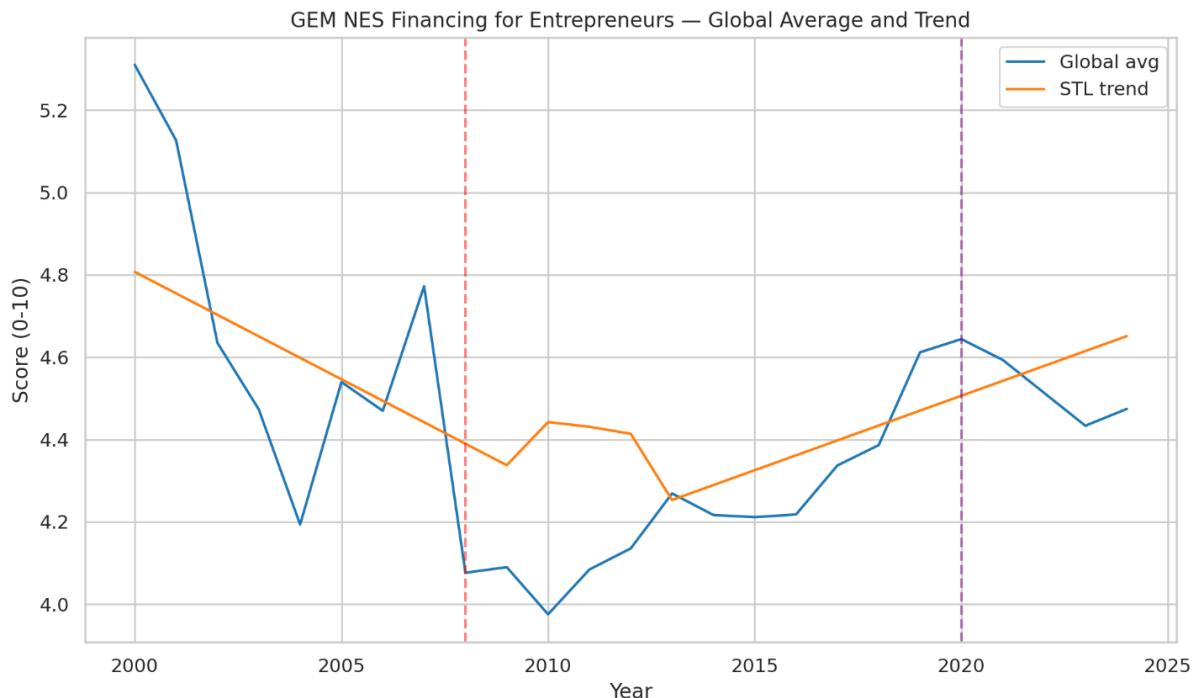


Figure 6: GEM NES Financing for Entrepreneurs — Global Average and STL Trend

Table 10: Interpretation: Financing for Entrepreneurs Score (Global Average and STL Trend)

Period / Feature	Global Average Score	STL Trend	Interpretation
Initial Decline (2000-2009)	>5.2 → ~4.0	Captures long-term decline	Financing availability declined sharply during early 2000s, reflecting global downward trends.
Mid-Period Stability (2009-2016)	Stabilized ~4.0-4.4	Trend line stable ~4.4	Post-crisis period shows moderate recovery, though short-term fluctuations remain.
Recent Recovery (2016-2024)	Rising to ~4.8 by 2020	STL trend upward	Long-term trend indicates improving perception of financing availability for entrepreneurs.
Overall	Volatile but improving	Positive long-term trend	Financing environment is slowly recovering from the 2008 crisis, showing sustained growth since 2016.

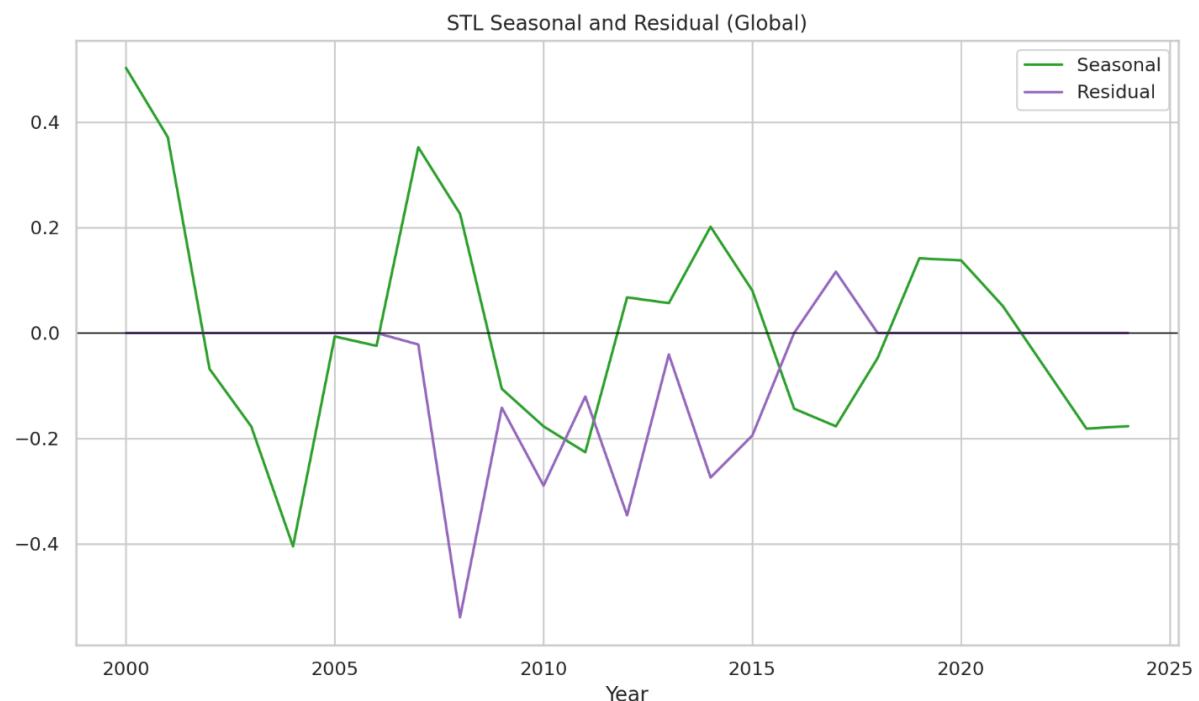


Figure 7: STL Decomposition – Seasonal and Residual Components (Global)

Table 11: Interpretation: STL Seasonal and Residual Components

Component	Pattern / Values	Interpretation
Seasonal (Green)	Peaks ~2000, 2007, 2014; troughs ~2004, 2010, 2016	Indicates strong 6-7 year cyclical pattern influencing entrepreneurship scores.
Residual (Purple)	Large negative spike ~2008-2009; positive spike ~2017, smaller ~2021-2022	Represents irregular, unpredictable events impacting scores (e.g., financial crisis, policy shocks, pandemic).
Key Takeaway	—	Global entrepreneurship scores are shaped by a dominant long-term trend, cyclical seasonal effects, and irregular shocks, notably the 2008 crisis and 2020 COVID-19 divergence.

## 5.0 Conclusion and Recommendations

### 5.1 Conclusion

This study examined long-term trends in entrepreneurial finance accessibility across developed and developing countries using GEM data from 2000 to 2024. The findings provide clear evidence that the global entrepreneurial finance gap is widening rather than narrowing. The key conclusions are as follows:

- i. The entrepreneurial financing gap between developed and developing economies is widening. Over the 25-year period, developing countries did not close the gap; instead, disparities in financial accessibility became more pronounced.

- ii. The two groups exhibit divergent long-term trajectories in entrepreneurial finance accessibility. Developed economies show a marginal positive trend ( $\beta = 0.002$ ), indicating gradual improvements in perceived access to finance. In contrast, developing economies record a declining trend ( $\beta = -0.021$ ), reflecting a deterioration in financial accessibility over time.
- iii. Structural differences continue to reinforce the gap. Developed economies benefit from mature financial markets, diversified funding sources, and strong institutional frameworks. Developing countries, however, continue to struggle with weak financial systems, limited venture capital availability, high borrowing costs, and inadequate credit information infrastructures. These structural constraints significantly hinder entrepreneurial access to finance.

Taken together, the evidence indicates that the global entrepreneurial finance ecosystem remains uneven, with developing countries facing persistent and worsening challenges in accessing affordable and reliable financing.

## 5.2 Recommendations

Based on the key findings, the following policy recommendations are proposed:

- i. Reverse the declining trend in financing accessibility in developing economies. Governments should introduce targeted interventions such as credit guarantees, interest-rate support programs, and financial inclusion policies to improve entrepreneurs' access to affordable finance.
- ii. Strengthen institutional and financial system capacity. Developing countries should invest in modernizing their financial infrastructure, improving credit information systems, strengthening regulatory frameworks, and promoting transparency to reduce financial risks and attract investment.
- iii. Build robust and diversified entrepreneurial funding ecosystems. Policymakers should support the expansion of venture capital, angel networks, microfinance, crowdfunding platforms, and alternative financing channels to broaden the spectrum of funding available to entrepreneurs.

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