Journal of
Global Entrepreneurial Management
ISSN: 3068-174X
ScitechJournals
Open Access

Financial Resilience Under Territorial Pressure: Firm-Level Evidence from Barranquilla and Cartagena

Abstract

This study examines whether formal firms in Barranquilla exhibit higher financial resilience than comparable firms in Cartagena. Using a firm-year dataset aligned with open Colombian corporate financial sources, the analysis builds a sector-year standardized index combining operating margin, equity strength, inverse debt pressure, and asset turnover. Two verification procedures assess accounting consistency and multivariate outliers, while three tests evaluate one hypothesis through fixed-effects regression, quantile regression, and matching. Results show a stable Barranquilla premium, but the article interprets it as an adjusted association rather than a causal urban advantage. The study contributes to territorial corporate finance debates.

Keywords: Financial resilience; Firm finance; Caribbean Colombia; Open data.

Research Article

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Received: 02 February, 2026; **Accepted:** 01 June, 2026; **Published:** 06 June, 2026.

Introduction

Financial resilience has become a central concept for understanding business performance in emerging regional economies because firms do not experience financial pressure only as isolated balance-sheet units. They operate inside local productive systems where infrastructure, sector composition, credit practices, institutional coordination, and market density shape the way assets become revenue and liabilities become risk. In this sense, resilience is not simply the opposite of failure. It is the capacity to preserve operating continuity while maintaining a financial structure that does not collapse when demand, costs, or financing conditions move against the firm. This distinction is important for the Colombian Caribbean, where large urban economies share coastal advantages but differ in productive specialization. Barranquilla and Cartagena are close enough to sustain a meaningful comparison, yet different enough to make that comparison analytically useful rather than merely descriptive.

The study asks whether formal firms located in Barranquilla show higher financial resilience than firms located in Cartagena after controlling for size, sector, asset structure, baseline indebtedness, revenue growth, firm age, and year effects. The hypothesis is intentionally modest: it does not claim that the city itself mechanically causes stronger financial performance. Instead, it evaluates whether a territorial financial premium remains after observable firm characteristics are taken into account. This framing follows the corporate finance literature showing that liquidity, solvency, and access to financing become especially relevant when firms confront instability. Almeida [1] emphasizes the importance of liquidity management during the pandemic; Didier et al. [2] show that firms can enter a kind of financial hibernation when viable activities face sudden financing constraints; and Ebeke et al. [3] demonstrate that liquidity and solvency stress must be examined together rather than as separate

problems.

The empirical contribution is based on the uploaded workbook, which contains 1,261 firm-year observations for 260 firms between 2019-2023. The dataset is structured around open-data categories used in Colombian corporate financial information and includes synthetic firm identifiers, city, year, CIIU sector, firm size, incorporation year, balance sheet variables, income statement variables, and financial ratios. The article builds a composite financial resilience index from operating margin, equity ratio, inverted debt pressure, and asset turnover. It then applies two verification procedures and three tests of a single hypothesis. The value of this design is that it does not stop at city averages. It asks whether the observed territorial difference survives accounting verification, robust outlier screening, average regression adjustment, distributional testing, and matched comparison among similar firms.

Literature Review

Financial resilience beyond profitability

Financial resilience is often confused with profitability, but the two concepts are not identical. Profitability describes the capacity to generate surplus from operations, whereas resilience refers to the capacity to remain financially viable when the firm faces pressure. A profitable firm may still be fragile if it depends on excessive leverage, if current obligations mature too quickly, or if assets are not productive enough to sustain revenue during weaker periods. Conversely, a firm with moderate margins may be resilient if it combines an adequate equity base, prudent debt exposure, and stable asset turnover. The concept therefore requires a multidimensional reading of corporate accounts.

This study operationalizes resilience as a composite rather than a single ratio. Operating margin captures the internal conversion of revenue into operating profit; equity ratio captures patrimonial capacity to absorb losses; inverse debt pressure captures lower exposure to liabilities; and asset turnover captures the productive use of assets. The combination is theoretically important because financial fragility often appears in the interaction among these dimensions. A firm with high asset turnover but weak equity may expand quickly while remaining vulnerable. A firm with high equity but poor turnover may be safe but inefficient. Resilience is found in the balance among these forces.

The crisis-finance literature supports this integrated interpretation. Almeida [1] shows that liquidity management became decisive during COVID-19 because firms could be operationally viable but financially constrained. Didier et al. [2] argue that many firms required financing while economic activity was temporarily suspended or reduced. Brown et al. [4] add that government lending can alter crisis outcomes by reshaping access to credit. These contributions justify a framework in which resilience is not treated as a decorative label for profitability but as a measurable financial condition involving liquidity, solvency, operating strength, and asset productivity.

The distinction also has methodological consequences. If resilience is defined only as profit, the analysis favors firms that produce short-run margins even when those margins are supported by fragile liabilities or by underinvestment in productive assets. If resilience is defined only as low leverage, the analysis favors conservative firms that may be financially safe but commercially stagnant. A deeper measure must recognize the tension between return and protection. Resilience emerges when a firm can generate operating results without relying on a liability structure that makes future adjustment impossible.

This is why the study uses a composite index rather than a hierarchy of isolated ratios. The index is not presented as a perfect measure of resilience. It is a disciplined approximation that forces the empirical analysis to treat profitability, solvency, debt pressure, and asset productivity as interdependent. The conceptual claim is that financial resilience is a relational condition inside the balance sheet: one ratio changes meaning depending on the behavior of the others.

Territorial embeddedness of corporate finance

Corporate finance is usually modeled through firm-level accounts, but firms do not operate in abstract space. They are embedded in local business systems

that influence suppliers, clients, transport costs, labor markets, institutional support, and financial relationships. This territorial embeddedness matters because the same balance-sheet structure may have different implications depending on the local economy. A high fixed-asset share may be risky in a weak demand environment but productive in a port-industrial ecosystem with stable contracts. A low debt ratio may indicate prudence in one city and underinvestment in another.

Barranquilla and Cartagena provide a relevant setting for this territorial interpretation. Barranquilla has a diversified industrial, logistics, commercial, and service base. Cartagena has strong port, tourism, petrochemical, construction, and commercial activities. Both cities are strategic Caribbean economies, but their sectoral exposures differ. The study therefore does not compare them as if one were simply a better or worse business environment. It asks whether the financial structure of firms differs after controls are applied and whether that difference remains consistent across models.

Puerta-Guardo et al. [5] show, in the case of SMEs in Cartagena, that financial structure matters for liquidity risk. Their contribution is useful because it connects local business finance with the internal composition of assets, liabilities, and project formulation. The present study extends this type of reasoning by comparing two urban systems and by using an index that combines several financial dimensions. The theoretical point is that territorial finance should not be reduced to aggregate GDP, municipal competitiveness, or business counts. It should also be examined through the microstructure of firm accounts.

Territory also matters because firms are exposed to different forms of uncertainty. A firm in a diversified logistics and commercial environment may experience demand fluctuations differently from a firm connected to tourism, port cycles, construction, or petrochemical activity. These exposures can influence how much debt is tolerable, how quickly assets can generate revenue, and how vulnerable operating margins are to sector-specific shocks. The city coefficient in this article is therefore interpreted as a signal of embedded financial structure, not as a simple location label.

This reading is especially important in the Colombian Caribbean because regional development debates often focus on infrastructure, employment, informality, or public investment, while the internal financial capacity of firms receives less attention. A territory can attract firms and still contain financially fragile business units. Conversely, a territory with moderate growth may contain firms with stronger balance sheets. Corporate finance therefore provides a micro-level window into territorial economic quality.

Open data as empirical infrastructure and analytical risk

Open administrative data create an important opportunity for corporate finance research in Colombia. Supersociedades, Datos Abiertos Colombia, RUES, Confecámaras, and DANE provide public sources that allow researchers to construct firm-level or firm-context datasets without relying exclusively on surveys. This is especially valuable for regional studies because primary data collection is costly and often produces small samples. Open data can improve transparency, reproducibility, and institutional relevance when the researcher carefully documents variable construction and cleaning rules.

However, open data are not automatically reliable simply because they are public. Administrative datasets may include reporting errors, missing accounts, changes in accounting classification, duplicated records, and extreme observations. In firm finance, these problems are particularly serious because ratios can become unstable when denominators are small or when accounting components are inconsistent. A small number of firms with extreme values can shift averages and produce misleading results. For that reason, this article treats data verification as part of the research design rather than as a technical appendix.

The use of data verification also responds to the methodological caution found in policy-relevant firm research. Galindo et al. [6] show that evidence on firm performance during the pandemic must be linked to the institutional context and to the quality of observable variables. Mendoza-Mendoza [7] demonstrate that Colombian firm performance can be ranked through multidimensional procedures, but such procedures

require careful interpretation. The present study follows that logic by building an index, testing accounting consistency, screening multivariate outliers, and interpreting results as adjusted associations rather than causal effects.

The critical issue is that open data can produce an illusion of objectivity. Because the source is official, researchers may assume that the resulting database is already analytically valid. This assumption is risky. Official records are designed primarily for reporting, regulation, or administrative disclosure, not necessarily for causal or comparative research. The researcher must therefore transform administrative information into analytical evidence through explicit rules of consistency checking, variable construction, and sensitivity analysis.

For this reason, the article treats the open-data infrastructure as both an advantage and a constraint. It is an advantage because it permits reproducible research on firms without imposing additional reporting burdens. It is a constraint because the available variables define what can and cannot be said. The dataset does not observe managerial quality, credit terms, ownership concentration, or local supplier relationships. The discussion therefore avoids overclaiming and uses the empirical results to formulate a cautious interpretation of territorial financial resilience.

Hypothesis development and analytical expectation

The hypothesis is that formal firms in Barranquilla present higher financial resilience than comparable firms in Cartagena after adjusting for observable characteristics. This expectation is grounded in the possibility that a more diversified business ecosystem may support more stable asset turnover, lower debt pressure, and stronger operating margins among firms with similar size and sector profiles. The hypothesis does not assume that Barranquilla is always financially superior. It only proposes that the city coefficient may remain positive after controlling for compositional differences.

The hypothesis also recognizes that firm outcomes may be shaped by organizational and ownership structures. González [8] show that family firms and growth processes in emerging markets involve financial trade-offs, indicating that performance differences are often embedded in broader institutional and organizational settings. Although this study does not observe ownership structure directly, it includes controls for size, age, baseline debt, asset structure, sector, and year. These controls reduce, but do not eliminate, the risk that the territorial coefficient captures unobserved firm organization.

The hypothesis requires three complementary tests because no single model is sufficient. A fixed-effects regression estimates the adjusted average association. Quantile regression evaluates whether the association appears among weaker, median, and stronger firms. Matching compares firms with similar baseline profiles, reducing the likelihood that the result is only an artifact of size or sector imbalance. Evidence is strongest when the Barranquilla coefficient remains positive across these procedures. If the coefficient weakens or disappears, the finding would still be useful because it would suggest that apparent territorial differences are mainly compositional.

The analytical expectation is therefore conditional rather than absolute. The study does not expect every Barranquilla firm to outperform every Cartagena firm. It expects the average conditional difference to remain positive when comparable firms are examined. This wording is important because it protects the article from a deterministic view of territory. Local context matters, but it operates through firm structures, sectors, financing patterns, and institutional relationships rather than through a single geographic effect.

Research Method

Data source, sample, and analytical unit

The analytical unit is the firm-year observation. The workbook contains 1,261 observations for 260 firms observed from 2019-2023. The city distribution is nearly balanced, with 633 observations in Barranquilla and 628 in Cartagena. The dataset includes sector, firm size, incorporation year, assets, liabilities, equity, operating revenue, operating profit, current assets, current liabilities, fixed assets, and derived financial ratios. Because the identifiers are synthetic, the analysis should be read as a research-ready application based on open-data structures rather than

as disclosure of identifiable firms.

The sources associated with the design include Supersociedades financial statement files, SIIS SuperSociedades, Datos Abiertos Colombia, RUES reports, Confecámaras business datasets, and the DANE business directory. These sources are appropriate because they reflect the administrative infrastructure through which formal corporate information is made visible in Colombia. The study uses them to motivate the empirical structure and to make the design transparent. At the same time, the article recognizes that open administrative data require verification before inference.

Construction of the financial resilience index

The dependent variable is a sector-year standardized financial resilience index. Four components are used: operating margin, equity ratio, inverse debt pressure, and asset turnover. Operating margin measures operating profitability. Equity ratio measures the share of assets financed by equity. Inverse debt pressure is defined so that lower indebtedness produces a stronger resilience signal. Asset turnover measures the ability to convert assets into revenue. These dimensions are standardized within sector-year cells and then averaged.

The sector-year standardization is conceptually important. A raw comparison across all firms would treat asset-intensive manufacturing, logistics, tourism, trade, and professional services as if they had the same financial technology. Standardizing within sector and year makes the index a relative measure: it asks whether a firm is financially stronger than comparable firms in the same sectoral and temporal context. This does not remove every source of heterogeneity, but it reduces the risk of mistaking sector structure for resilience.

The index also has a critical purpose. It prevents the analysis from accepting the most visible financial ratio as the most important one. In many firm-level studies, profitability receives most of the attention because it is easy to interpret. Yet profitability without equity strength can be fragile, and equity strength without asset turnover can indicate underuse of resources. The composite index forces the analysis to ask whether firms are simultaneously profitable, solvent, less debt-pressured, and productive in their use of assets.

The equal-weight structure is a transparent choice, but not the only possible one. A future version could test principal component analysis, factor analysis, or data envelopment analysis. The present choice is useful because it remains interpretable for readers and reviewers. Each component can be explained in financial terms, and the index can be decomposed if needed. This balance between transparency and multidimensionality is particularly important for applied research intended for journals that value empirical clarity.

Verification procedures

The first verification procedure examines accounting identity consistency. The relative error is calculated as the absolute value of assets minus liabilities minus equity, divided by assets. Observations above the five percent threshold are flagged. This procedure is not merely mechanical. If the balance-sheet identity is not coherent, any ratio derived from assets, liabilities, or equity may transmit error into the dependent variable and the explanatory controls.

The second verification procedure uses robust multivariate distance. The distance is computed over operating margin, equity ratio, inverse debt pressure, asset turnover, and log assets. The top one percent of robust distances is flagged as potentially influential. This screening is preferable to univariate trimming because firm-level financial anomalies may appear through unusual combinations rather than through a single extreme variable. The main models are then compared with a sensitivity model excluding accounting flags and robust outliers.

The verification sequence also functions as a credibility device. Instead of moving directly from a spreadsheet to regression coefficients, the study first asks whether the accounting structure is coherent and whether influential financial profiles could distort the results. This is essential in a field where large firms, temporary losses, debt restructuring, or very small denominators can generate extreme ratios. The methodological message is that data cleaning is not a preliminary chore; it is part of the argument.

Hypothesis testing strategy

The first test is an ordinary least squares regression with sector and year fixed effects and firm-clustered standard errors. The dependent variable is the financial resilience index and the main explanatory variable is the Barranquilla dummy. Controls include log assets, initial debt ratio, fixed-asset share, firm age, and revenue growth. The coefficient is interpreted as an adjusted association rather than a causal effect.

The second test uses quantile regression at the 25th, 50th, and 75th percentiles. This identifies whether the territorial association exists only among stronger firms or is present across the distribution. The third test uses nearest-neighbor matching at the firm level using 2019 covariates and sector indicators. Matching compares Barranquilla firms with similar Cartagena firms. Together, the three procedures provide average, distributional, and comparable-profile evidence for the same hypothesis.

The three statistical procedures are deliberately complementary. The fixed-effects model answers the question of adjusted average association. The quantile model answers the question of distributional stability. The matching model answers the question of comparability. If all three point in the same direction, the evidence becomes more persuasive than any isolated coefficient. If they diverge, the divergence itself would be analytically useful because it would reveal where the territorial association is strongest or weakest.

Results

Data verification and empirical reliability

The first result concerns the reliability of the dataset before any substantive claim is made. The accounting verification shows that the balance-sheet structure is largely coherent. The average accounting identity error is close to zero and only two observations exceed the five percent threshold. This matter because the financial resilience index includes equity and debt pressure, both of which depend directly on the internal consistency of assets, liabilities, and equity. The result does not prove that every record is perfect, but it reduces the likelihood that the main findings are produced by systematic accounting inconsistency.

The robust outlier screening identifies thirteen observations above the 99th percentile of the robust multivariate distance. This is a small share of the sample, but it is still analytically relevant because firm-level finance data are often skewed. The distribution of outlier flags is balanced across the two cities, with six in Barranquilla and seven in Cartagena. Therefore, the outlier structure does not appear to mechanically favor one city. The sensitivity model excludes these observations and the two accounting flags to check whether the hypothesis depends on unusual cases.

Table I summarizes the verification procedures. The most important point is that the dataset is suitable for inference only after these checks are made explicit. Without verification, the article would risk presenting statistical significance as if administrative data were automatically clean. With verification, the findings can be interpreted with more confidence, while still acknowledging the limits of secondary data.

Procedure	Statistic	Value	Interpretation
Accounting identity error	Mean relative error	0.0003	Very low average inconsistency
Accounting identity error	Maximum relative error	0.0539	Largest detected accounting deviation
Accounting flag	Observations above 5%	2	Flagged for sensitivity analysis
Robust multivariate distance	P99 threshold	13.82	Cutoff for unusual financial profiles
Robust outlier flag	Observations above P99	13	Excluded in sensitivity model
Sample structure	Firm-year observations	1,261	Main analytical sample
Sample structure	Unique firms	260	Firm-level clustering unit

Table 1. Data verification procedures

Note: The accounting error is |assets - liabilities - equity| / assets. Robust multivariate distance is calculated using operating margin, equity ratio, inverse debt pressure, asset turnover, and log assets. P99 refers to the 99th percentile threshold.

Territorial financial structure before adjustment

The descriptive comparison shows a visible gap in the resilience index. Barranquilla firms have a positive mean index, whereas Cartagena firms have

a negative mean. The difference is not just a matter of the composite index. Barranquilla also shows higher average equity ratio, higher inverse debt pressure, and higher asset turnover. These raw patterns suggest that Barranquilla firms combine stronger patrimonial structure with more productive asset use. However, the descriptive difference should not yet be interpreted as a territorial effect because city composition may differ by size, sector, age, and baseline indebtedness.

The raw gap is still meaningful as a diagnostic. It indicates that the two city systems are not financially identical in the dataset. The t-test for the index difference is statistically significant, which confirms that the observed mean gap is unlikely to be due to random sampling variation alone. Yet statistical significance at this stage is not the main contribution. The more important question is whether the gap survives after adjusting for firm characteristics. A descriptive mean can identify an empirical pattern, but it cannot explain whether the pattern is structural, compositional, or driven by influential cases.

Table II presents the city-level descriptive structure. The table should be read as the starting point for deeper analysis rather than as a final conclusion. Barranquilla appears stronger in the composite index and in several components, but the later models are necessary to determine whether this difference remains once the firms are compared more rigorously.

City	Obs.	Firms	Index mean	Index SD	Margin	Equity	Inv. debt	Turnover	Log assets
Barranquilla	633	130	0.107	0.608	0.102	0.500	0.500	1.439	8.226
Cartagena	628	130	-0.109	0.591	0.079	0.433	0.432	1.224	7.863
Mean difference			0.216						
Welch t-test p-value			2.367e-10						

Table 2. City-level financial structure

Note: All financial ratios are firm-year averages. The mean difference is Barranquilla minus Cartagena. Inv. debt means inverted debt pressure, so higher values represent lower debt pressure.

Adjusted regression evidence

The fixed-effects regression provides the first direct test of the hypothesis. The Barranquilla coefficient remains positive across the raw model, the controlled model, the sector-year fixed-effects model, and the sensitivity model. In the preferred fixed-effects specification, the coefficient is 0.264 standard-index units. Because the index is standardized within sector-year components, this coefficient suggests a meaningful adjusted difference rather than a purely descriptive city gap. The estimate is statistically significant with firm-clustered standard errors.

The sensitivity model is particularly important. After excluding observations with accounting identity flags and robust multivariate outliers, the Barranquilla coefficient remains positive and very similar in magnitude. This indicates that the finding is not driven by a small number of anomalous firms. The model does not prove causality, but it strengthens the claim that the city association is stable after several layers of adjustment. Firm age is also positively associated with resilience, suggesting that accumulated organizational experience may contribute to financial stability.

Table III reports the regression evidence. The conceptual interpretation is that the Barranquilla premium is not fully explained by observed size, sector, debt baseline, asset structure, age, or revenue growth. The result should be read carefully: the coefficient may still capture unobserved differences in management quality, ownership, credit relationships, supplier networks, or local institutional support. Nevertheless, it is strong enough to justify a discussion of territorial financial embeddedness.

Model	Coefficient	Clustered SE	p-value	Obs.	R-squared
Raw city difference	0.222	0.040	2.054e-08***	976	0.033
Controls only	0.223	0.042	8.825e-08***	976	0.051

Sector and year fixed effects	0.264	0.044	1.897e-09***	976	0.061
Sensitivity without flags/outliers	0.270	0.044	7.282e-10***	967	0.062

Table 3. Regression tests of the Barranquilla coefficient

Note: The dependent variable is the financial resilience index. Standard errors are clustered by firm. The sensitivity model excludes observations with accounting identity error above five percent and robust multivariate outliers. *** p < .001, ** p < .01, * p < .05, † p < .10.

Distributional and matched-profile evidence

The quantile regressions show that the Barranquilla coefficient is positive at the 25th, 50th, and 75th percentiles. This is analytically important because a positive average coefficient could be hiding an effect that appears only among already strong firms. Instead, the estimates suggest that the territorial gap appears among relatively weaker firms, median firms, and stronger firms. The similarity of the coefficients across quantiles indicates that the difference is not limited to the top of the distribution.

The matching results provide a second robustness perspective. Using 2019 firm-level covariates and sector indicators, the matching procedure pairs Barranquilla firms with similar Cartagena firms. The matched average difference in mean resilience is positive and statistically significant. Balance diagnostics show that standardized mean differences for log assets, baseline debt, and asset structure fall substantially after matching. Firm age balance is not perfect, which is acknowledged as a limitation, but the matched design still reduces the most important compositional differences.

Table IV integrates the distributional and matching results. The evidence supports the hypothesis, but it also clarifies the type of claim that can be made. The study can argue that Barranquilla firms exhibit a stable adjusted financial resilience premium in this dataset. It cannot claim that relocating a firm to Barranquilla would cause resilience to increase. The results are best interpreted as evidence that the local business system and firm composition together produce a measurable financial pattern.

Procedure	Estimate	SE	Test statistic	p-value
Quantile 0.25	0.277	0.056	4.963	8.213e-07***
Quantile 0.50	0.267	0.052	5.193	2.527e-07***
Quantile 0.75	0.276	0.052	5.341	1.154e-07***
Matched ATT	0.195	0.034	5.745	6.268e-08***
Matched pairs	130			
Mean matching distance	1.050			

Table 4. Quantile regression and matching evidence

Note: Quantile estimates use the same controls as the preferred model. Matched ATT is the average treated difference for Barranquilla firms compared with nearest Cartagena matches based on 2019 covariates and sector indicators. *** p < .001.

Discussion

What the Barranquilla premium means

The evidence suggests that Barranquilla firms have higher adjusted financial resilience than Cartagena firms in the dataset. The most careful interpretation is not that Barranquilla is categorically superior, but that the financial profiles of its firms are more favorable after accounting for observable characteristics. This distinction matters because territorial comparisons can easily become simplistic rankings. The analysis instead points to a more precise claim: in this firm-year sample, the interaction between city location, firm structure, and sector-year context produces a stable positive association for Barranquilla.

One possible explanation is that Barranquilla firms may benefit from a more diversified business ecosystem that supports asset turnover and lowers exposure to concentrated shocks. Diversification can make revenue less dependent on a narrow set of sectors, especially when compared with economies more exposed to tourism or specific industrial clusters. This interpretation is compatible with the broader literature on firm resilience during shocks, where liquidity, financing access, and sectoral vulnerability interact in complex ways [1-3].

A second explanation is compositional even after controls. Some unobserved characteristics may remain: managerial practices, supplier contracts, credit histories, ownership forms, banking relationships,

or export linkages. The positive coefficient should therefore be treated as an invitation to deeper inquiry rather than as a definitive causal statement. The finding is strong enough to be meaningful, but the mechanism remains partially open.

The finding can also be read as evidence of financial thickness. A local business system has financial thickness when firms are not only numerous but also capable of sustaining operations through balanced internal structures. The Barranquilla premium may indicate that firms in that environment combine asset use, lower debt pressure, and patrimonial support in a more favorable way. This does not mean that Cartagena lacks strong firms. It means that the average adjusted financial profile in the dataset is weaker for Cartagena after the same controls are applied.

Why the result is more than a descriptive comparison

The study moves beyond description in three ways. First, it constructs an index that combines profitability, patrimonial strength, debt pressure, and asset productivity. Second, it verifies the data before modeling. Third, it tests the same hypothesis through average, distributional, and matched-profile procedures. These choices reduce the risk that the article merely reports that one city has higher averages than another. The contribution is the demonstration that the gap remains visible after several methodological filters.

This approach is especially relevant for open-data research. Public administrative datasets are often used to generate fast descriptive profiles, but they can support more analytical work if the researcher explicitly addresses quality, construction, and inference. The present article shows that open data can be used to build a deeper corporate finance argument when combined with verification and robustness procedures. This is consistent with recent Colombian firm-performance research that uses public or policy-relevant data to examine firm outcomes [6,7].

The result also has practical implications. Chambers of commerce, local governments, and development agencies should not only count firms or promote entrepreneurship in general terms. They should examine whether local firms have enough equity strength, manageable debt pressure, and asset productivity to withstand shocks. A city with many firms may still have a fragile business system if those firms operate with weak patrimonial buffers or inefficient asset use.

The article is also critical of a common weakness in regional business research: the tendency to describe local economies through counts, shares, and rankings without testing whether observed differences survive adjustment. A city may have more firms, more sales, or larger assets, but those indicators do not necessarily reveal resilience. The present study asks a more demanding question: whether a territorial difference remains after financial ratios are standardized, records are verified, and firms are compared with controls and matching.

The empirical strategy also changes the meaning of the policy conversation. If the article only reported that one city has a higher mean index, the implication would be vague. The adjusted results suggest a more useful question: which institutional or market conditions allow firms to combine profitability, equity strength, lower debt pressure, and asset productivity? This question can guide local business policy toward financial strengthening rather than general promotion.

For example, local development agencies could use similar indicators to identify sectors where firms grow in revenue but deteriorate in equity strength, or where firms maintain assets but fail to convert them into sales. This type of diagnostic is more actionable than a simple count of active firms. It connects territorial development with corporate balance-sheet quality and makes visible the financial foundations of local competitiveness.

Limitations and Future Research

The first limitation is that the analysis is observational. The models control for several variables, but unobserved firm characteristics remain. Therefore, the Barranquilla premium should not be interpreted as causal. A stronger causal design would require a policy shock, a change in local financing conditions, or a longitudinal event that differentially affected one city. The present study offers adjusted evidence, not causal proof.

The second limitation concerns measurement. The

resilience index is theoretically grounded, but it is still a constructed measure. Different weights, alternative ratios, or the inclusion of cash-flow variables could modify the results. The study partially addresses this issue through sector-year standardization and robustness checks, but future research could compare multiple index constructions or use data envelopment analysis. Mendoza-Mendoza [7] provide a useful reference point for multidimensional performance ranking in Colombian firms.

The third limitation is that the study does not directly observe credit access, ownership structure, management quality, or supply-chain position. González [8] show that firm performance in emerging markets can depend on ownership and growth dynamics. Future work could merge financial statements with survey data, credit registry information, export records, or procurement data. That would make it possible to identify mechanisms more clearly and to distinguish territorial context from firm organization.

The limitation of causal inference should be seen as a strength of the article rather than only as a weakness. By refusing to overstate causality, the study offers a credible empirical contribution. It shows that there is a robust pattern worth explaining, but it leaves the mechanisms open for future research. A subsequent study could examine whether credit access, procurement networks, export intensity, sectoral shocks, or municipal business policies explain the premium detected here.

Future research could also extend the comparison to Santa Marta, Sincelejo, Monteria, or Valledupar to determine whether the Barranquilla-Cartagena contrast is specific to these two cities or part of a broader hierarchy of financial resilience in the Colombian Caribbean. Another extension would be to compare pre-pandemic, pandemic, and post-pandemic periods separately. That would help identify whether the premium is stable or whether it widened during periods of economic stress.

Another limitation is that the study does not model firm entry and exit. The dataset observes reporting firms, but it does not fully capture firms that disappeared, stopped reporting, merged, or remained outside formal reporting channels. If weaker firms exited before or during the observation period, the observed sample may overrepresent surviving firms. This means that the results describe resilience among observed formal firms rather than the total universe of business vulnerability in each city.

Future studies could also estimate dynamic models with lagged resilience, survival models for firm continuation, or difference-in-differences designs around local shocks. These extensions would allow researchers to distinguish persistent firm quality from short-term adjustment. They would also help determine whether the Barranquilla premium reflects structural resilience or temporary differences in the 2019-2023 period.

The article therefore opens a research agenda rather than closing it. Its main value is not the claim that Barranquilla is permanently more resilient. Its value is the demonstration that territorial corporate finance can be measured, verified, and tested with open data. This is a useful starting point for more causal designs, richer datasets, and policy conversations about how Caribbean Colombian cities can strengthen the financial foundations of their formal business sectors.

Conclusion

This article examined whether formal firms in Barranquilla exhibit higher financial resilience than comparable firms in Cartagena using a firm-year dataset structured around open Colombian corporate financial information. The study constructed a sector-year standardized resilience index combining operating margin, equity strength, inverse debt pressure, and asset turnover. It then applied accounting verification, robust outlier screening, fixed-effects regression, quantile regression, and matching. The results consistently show a positive Barranquilla premium, but the interpretation remains cautious: the evidence supports an adjusted association, not a causal urban effect. The main contribution is to show that territorial corporate finance in the Colombian Caribbean can be studied through a deeper framework that connects firm accounts, local productive structure, data verification, and robustness testing rather than relying on descriptive city comparisons.

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Citation: Mauro, Maury Campo, Noriega A.M, Pérez P.M, Fernando L, Arias O, Pascuales A.A.M. “Financial Resilience Under Territorial Pressure: Firm-Level Evidence from Barranquilla and Cartagena.” J Glob Entrep Manage (2026): 154. . DOI: 10.59462/3068-174X.4.4.154.