

Active Transparency Beyond Aggregate Scores: Evidence from Brazilian Municipalities

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Abstract:

This study examines active transparency across all 52 municipalities in Rondônia, Brazil, assessing its association with demographic, fiscal, and territorial characteristics and identifying the requirements that most contribute to heterogeneity in compliance with the Access to Information Law (LAI). Transparency was measured using the Municipal Active Transparency Index (ITAM), comprising the Fiscal Responsibility Law (LRF) and LAI dimensions. Analyses included descriptive statistics, Spearman correlations, Benjamini-Hochberg adjustment, sensitivity analyses, robust linear regressions, and variance decomposition. The LRF showed higher performance and lower heterogeneity than the LAI. Population and gross municipal revenues were positively associated with LAI performance, although only the association with revenues remained significant after adjustment for multiple comparisons. Four requirements—government programs and actions, transfers and resource allocations, organizational structure, and the Citizen Information Service—accounted for 74.3% of LAI variance. These findings demonstrate that aggregate transparency indices may conceal substantial differences across regulatory dimensions and specific disclosure requirements. Disaggregated analysis therefore provides a more informative basis for diagnosing transparency gaps and targeting improvements in local government information disclosure.

Keywords: Access to Information, Accountability, Active Transparency, Local Governments, Public Transparency, Transparency Index.

1. Introduction

Public transparency is an important element of governance because it reduces information asymmetries between the state and society and expands opportunities to monitor and hold government action accountable. In Brazil, its institutionalization was strengthened by the Fiscal Responsibility Law (LRF) (Brazil, 2000), Complementary Law No. 131/2009 (Brazil, 2009), and

the Access to Information Law (LAI) (Brazil, 2011), which established proactive disclosure requirements for fiscal, budgetary, administrative, and institutional information.

The existence of a common regulatory framework, however, does not imply homogeneous levels of transparency across local governments. Demographic, fiscal, territorial, and institutional characteristics may be associated with the conditions under which public information is produced, organized, and disclosed. Studies of Brazilian municipalities have identified associations between transparency and characteristics related to size, financial conditions, and socioeconomic context, although findings are not uniform across studies or dimensions of transparency (Baldissera et al., 2023; Herman et al., 2022; Barbosa et al., 2023; Paula et al., 2026).

This distinction is particularly relevant because active transparency is not a unidimensional phenomenon. While the LRF focuses predominantly on fiscal, budgetary, and financial information, the LAI covers a broader range of administrative and institutional information. Aggregate indices may therefore conceal both differences between these dimensions and heterogeneity across specific disclosure requirements. Previous studies show that high overall levels of transparency can coexist with deficiencies in particular information components (Almeida & Tomaz, 2023; Borssa & Schiavi, 2023; Reinecke & Raupp, 2025).

Despite advances in the literature on municipal transparency, there remains scope to integrate two perspectives that are generally examined separately: municipal characteristics associated with differences in performance and the identification of requirements that account for index heterogeneity. Rondônia provides an appropriate setting for this analysis because its 52 municipalities are subject to the same national regulatory framework but differ substantially in population, fiscal conditions, and territorial characteristics.

Accordingly, this study examines the association between demographic, fiscal, and territorial characteristics and active transparency across all 52 municipalities in Rondônia, identifying the LAI requirements that contribute most to its heterogeneity. It compares the ITAM and its LRF and LAI dimensions, examines their associations with municipal characteristics, and decomposes LAI heterogeneity across its constituent requirements. By integrating these perspectives, the study seeks to enhance the diagnostic capacity of transparency indices by identifying not only performance differences across local governments but also where those differences are concentrated.

2 Theoretical Framework

2.1 Active transparency, information asymmetry, and accountability

Public transparency reduces information asymmetries between the state and society by expanding access to information on decisions, actions, and the use of public resources, thereby creating conditions for monitoring government action and promoting accountability. Its effectiveness, however, depends not only on making information available but also on attributes such as timeliness, accessibility, clarity, and comprehensibility.

Transparency may be passive, when the state responds to citizens' requests, or active, through the proactive disclosure of information of collective interest without a prior request. The latter expands opportunities for continuous monitoring of government action and is the focus of this study.

In Brazil, active transparency was institutionalized primarily through the Fiscal Responsibility Law (LRF), Complementary Law No. 131/2009, and the Access to Information Law (LAI). Transparency, however, is not synonymous with accountability: information disclosure creates conditions for public scrutiny, but accountability also depends on mechanisms capable of translating information into oversight and consequences.

Common legal obligations also do not ensure uniform compliance. Studies of Brazilian local governments identify differences across municipalities and across transparency requirements (Almeida & Tomaz, 2023; Borssa & Schiavi, 2023; Reinecke & Raupp, 2025). Active transparency should therefore be examined not only through the formal existence of disclosure mechanisms but also through the degree of compliance with different information requirements.

2.2 LRF and LAI as dimensions of active transparency

In Brazil, municipal active transparency is structured by complementary regulatory frameworks, particularly the Fiscal Responsibility Law (LRF), expanded by Complementary Law No. 131/2009, and the Access to Information Law (LAI). Although both establish disclosure obligations, their substantive requirements differ.

The LRF focuses predominantly on fiscal, budgetary, and financial information linked to periodic and relatively standardized planning, execution, and accountability processes. The LAI has a broader scope, covering administrative and institutional information such as organizational structure, government programs and actions, resource transfers, procurement, contracts, and mechanisms for access to information.

These differences may produce distinct implementation patterns. While a substantial share of LRF requirements is embedded in routine fiscal procedures and administrative systems, compliance with the LAI involves information produced by different departments and may require greater coordination for its organization, updating, and disclosure. High performance

in fiscal transparency therefore does not necessarily imply equivalent performance in other active transparency obligations.

Empirical studies of Brazilian local governments identify heterogeneity in compliance with different transparency requirements (Almeida & Tomaz, 2023; Borssa & Schiavi, 2023; Reinecke & Raupp, 2025). Separate analysis of the LRF and LAI dimensions can therefore reveal patterns that may remain hidden in aggregate indices and provides the basis for the subsequent decomposition of LAI requirements undertaken in this study.

2.3 Municipal characteristics and public transparency

Although subject to common legal obligations, municipalities differ in demographic, fiscal, administrative, and territorial conditions that may be associated with their ability to produce, organize, and disclose public information. Differences in active transparency may therefore reflect not only the regulatory framework but also characteristics of the context in which local governments operate.

Empirical studies have identified associations between transparency and municipal characteristics. Baldissera et al. (2023) found relationships with environmental, institutional, and political factors, including government size and financial conditions. Herman et al. (2022), analyzing 5,563 Brazilian municipalities, also identified associations between digital transparency and population, economic, and educational characteristics. In Brazil's North Region, Barbosa et al. (2023) observed positive associations of population and budget revenues with fiscal transparency, whereas GDP per capita was not significantly related.

Population and financial resources may represent aspects related to the scale of municipal administrations, while territorial area and distance from political-administrative centers reflect potentially relevant territorial conditions. These characteristics, however, are not direct measures of institutional capacity and do not support causal assumptions about transparency. They may also be correlated with one another, requiring caution when interpreting their independent effects.

Available evidence is not uniform across contexts and measures of transparency, indicating that associations may vary according to municipal characteristics and the information dimension examined (Paula et al., 2026; Teles & Carvalho, 2024). Accordingly, this study examines population, gross municipal revenues, per capita revenue, territorial area, and distance from the state capital as contextual characteristics potentially associated with the ITAM and its LRF and LAI dimensions, allowing assessment of whether these relationships differ across sets of transparency obligations.

3 Methodology

3.1 Study design, population, and data sources

This quantitative, documentary, cross-sectional study covers all 52 municipalities in Rondônia. Active transparency was assessed using information available on municipal websites, while demographic, fiscal, and territorial characteristics were obtained from official databases.

Five municipal characteristics were analyzed: population, gross municipal revenues, per capita revenue, territorial area, and road distance from the municipal seat to the state capital, Porto Velho. Population, territorial area, gross municipal revenues, and per capita revenue were obtained from the Brazilian Institute of Geography and Statistics (IBGE, n.d.), while road distances were estimated using Google Maps (Google, n.d.), considering road routes from each municipal seat to Porto Velho.

The cross-sectional design allows associations between municipal characteristics and observed transparency levels to be identified but does not support causal inference.

3.2 Measurement of active transparency

Active transparency was measured using the Municipal Active Transparency Index (ITAM), constructed from legal disclosure requirements applicable to municipalities. The index comprises two dimensions: LRF, consisting of nine requirements related to fiscal, budgetary, and financial transparency; and LAI, consisting of 11 requirements related to administrative and institutional transparency.

Each requirement was assessed according to compliance, and the results were converted into percentage scores. The overall ITAM and separate LRF and LAI dimension scores were calculated, allowing comparison of aggregate performance and identification of differences between the two sets of obligations.

3.3 Statistical analysis

The ITAM and its dimensions were described using the mean, median, standard deviation, and coefficient of variation. Associations between transparency and municipal characteristics were assessed using Spearman's rank correlation coefficient (ρ), with $\alpha = 0.05$. Because multiple tests were performed, p values were also adjusted using the Benjamini-Hochberg procedure (Benjamini & Hochberg, 1995), controlling the false discovery rate at 5%.

Correlations among the municipal characteristics themselves were also examined to identify relationships among predictors and support interpretation of the results.

3.4 Robustness analyses and decomposition of LAI heterogeneity

The robustness of the associations was assessed through sensitivity analyses excluding Porto Velho, the municipality with the largest population and fiscal scale, and through a leave-one-out procedure in which correlations were recalculated after successively excluding each municipality. In addition, linear regression models with HC3 robust standard errors were estimated to assess the stability of the identified associations.

To investigate heterogeneity in the LAI dimension, the contribution of each of its 11 requirements to the total observed variance was calculated. Relative contributions were used to identify the requirements that accounted for the largest differences in performance across municipalities.

4 Results and Discussion

4.1 Heterogeneity between the LRF and LAI dimensions

Descriptive analysis revealed distinct patterns across the dimensions that comprise the ITAM (Table 1). Although the aggregate index showed high performance, decomposition into the LRF and LAI dimensions revealed relevant differences in performance and heterogeneity across municipalities.

Table 1 - Descriptive statistics for the ITAM and the LRF and LAI dimensions

Dimension	Mean	Standard deviation	CV (%)	Minimum	Maximum	Range
ITAM	89.64	4.49	5.01	76.50	97.50	21.00
LRF	95.71	3.76	3.93	86.67	100.00	13.33
LAI	84.66	7.11	8.40	62.58	95.45	32.88

Source: Authors' elaboration.

The LRF had a higher mean and lower variability (95.71; CV = 3.93%) than the LAI (84.66; CV = 8.40%). The LAI also had a wider range (32.88 versus 13.33 points), indicating greater heterogeneity across municipalities in this dimension. The greater homogeneity of the LRF suggests more uniform compliance with fiscal, budgetary, and financial obligations, possibly related to the standardization of these requirements and the consolidation of fiscal management routines and systems. In contrast, the greater dispersion of the LAI indicates less uniform implementation of administrative and institutional transparency obligations.

These results show that the aggregate ITAM may conceal relevant differences across types of information obligations. In addition, the concentration of LRF scores near the upper limit reduces the variability available to identify associations with municipal characteristics. The greater dispersion of the LAI, in turn, provides greater discrimination across municipalities, supporting both the analysis of characteristics associated with its performance and the subsequent decomposition of its requirements.

4.2 Municipal characteristics associated with active transparency

Associations between municipal characteristics and transparency indicators showed distinct patterns across the ITAM, LRF, and LAI (Table 2).

Table 2 - Spearman correlations between municipal characteristics and active transparency

Municipal characteristic	ITAM ρ	p	LRF ρ	p	LAI ρ	p
Population	0.239	0.088	0.011	0.936	0.321	0.020
Gross municipal revenues	0.247	0.077	-0.026	0.853	0.371	0.007
Per capita revenue	-0.155	0.271	-0.057	0.690	-0.164	0.246
Territorial area	0.192	0.173	0.053	0.708	0.224	0.111
Road distance from the capital	-0.064	0.650	-0.011	0.936	-0.065	0.647

Note: ρ = Spearman's rank correlation coefficient; p = two-sided p value; N = 52.

Source: Authors' elaboration.

In the LRF dimension, no municipal characteristic showed a statistically significant association, a result consistent with the lower variability observed in this dimension. In the LAI, population ($\rho = 0.321$; $p = 0.020$) and gross municipal revenues ($\rho = 0.371$; $p = 0.007$) showed positive associations. After Benjamini-Hochberg adjustment for the five comparisons involving the LAI, the association with revenues remained significant (adjusted $p \approx 0.034$), whereas the association with population was at the conventional 5% threshold (adjusted $p \approx 0.050$).

This pattern is consistent with studies that identified associations between transparency and the size or financial conditions of local governments (Baldissera et al., 2023; Herman et al., 2022; Barbosa et al., 2023). However, population and revenues were highly correlated with each other ($\rho \approx 0.954$) and should not be interpreted as independent effects. Both may reflect aspects related to the scale of municipal administrations.

Per capita revenue, territorial area, and road distance from the capital were not significantly associated with the LAI. The finding for per capita revenue is consistent with Barbosa et al. (2023), who identified associations of transparency with population and budget revenues, but not with GDP per capita, in Brazil's North Region. Taken together, the findings indicate that associations between municipal characteristics and transparency vary according to the dimension analyzed and do not support causal inference.

In the aggregate ITAM, associations with population and revenues were positive but did not reach statistical significance. The difference relative to the LAI shows that aggregating dimensions may attenuate relationships present

in one component, particularly when it is combined with a lower-variability dimension such as the LRF.

4.3 Robustness of associations with the LAI dimension

To assess the stability of the associations observed for the LAI, sensitivity analyses were conducted excluding Porto Velho, the municipality with the largest population and fiscal scale in the state, and using a leave-one-out procedure with successive exclusion of each municipality.

After Porto Velho was excluded, the associations between the LAI and population ($\rho = 0.284$; $p = 0.043$) and between the LAI and gross municipal revenues ($\rho = 0.337$; $p = 0.015$) remained positive. Per capita revenue ($\rho = -0.138$; $p = 0.335$), territorial area ($\rho = 0.181$; $p = 0.204$), and road distance from the capital ($\rho = -0.011$; $p = 0.938$) remained statistically nonsignificant. Results for the full sample and after excluding Porto Velho are presented in Table 3.

Table 3 - Spearman correlations between municipal characteristics and LAI in the full sample and after excluding Porto Velho

Municipal characteristic	Full sample (N=52) ρ	p	Excluding Porto Velho ρ	p
Population	0.321	0.020	0.284	0.043
Gross municipal revenues	0.371	0.007	0.337	0.015
Per capita revenue	-0.164	0.246	-0.138	0.335
Territorial area	0.224	0.111	0.181	0.204
Road distance from the capital	-0.065	0.647	-0.011	0.938

Note: ρ = Spearman's rank correlation coefficient; p = two-sided p value.
Source: Authors' elaboration.

In the leave-one-out procedure, coefficients between population and LAI ranged approximately from 0.284 to 0.361, while those between gross revenues and LAI ranged from 0.337 to 0.412. The positive direction was maintained in every exclusion, indicating that the associations were not dependent on a single municipality.

As a complementary analysis, linear regression models were estimated using standardized variables and HC3 robust standard errors. Given the high correlation between population and gross municipal revenues, these variables were entered into separate models to avoid multicollinearity problems.

In the model including population, territorial area, and distance from the capital, the standardized coefficient for population was positive ($\beta = 0.313$; p

= 0.054), while area and distance were not significantly associated. The model had $R^2 = 0.124$. In the alternative model, gross municipal revenues had a positive and statistically significant coefficient ($\beta = 0.372$; $p = 0.025$), with $R^2 = 0.146$. Territorial area and distance remained nonsignificant.

When Porto Velho was excluded, the association with revenues remained positive and significant ($\beta = 0.310$; $p = 0.045$), whereas the population coefficient remained positive but did not reach the conventional significance level ($\beta = 0.263$; $p = 0.078$). Overall, the results indicate greater stability of the association between municipal fiscal scale and performance in the LAI dimension.

The combination of stable associations in the sensitivity analyses and the limited explanatory power of the models warrants emphasis. The results do not suggest chance associations produced by a single extreme municipality, because the direction of the coefficients was preserved after excluding Porto Velho and throughout the successive leave-one-out analyses. At the same time, the R^2 values show that population and revenues, although related to LAI performance, are far from explaining the observed differences across municipalities on their own.

This finding reinforces the need to distinguish statistical association from substantive explanation. Larger municipalities or those with greater revenues may have more developed administrative structures, technical teams, information systems, and management routines, but the variables used in this study do not directly measure these capacities. Likewise, larger scale may be associated with greater public visibility, demand for information, and oversight by control bodies or civil society. The available data do not allow determination of which of these mechanisms, individually or jointly, underlies the observed associations.

Population and revenues should therefore be interpreted primarily as contextual characteristics related to municipal scale rather than as direct determinants of transparency. Most of the heterogeneity in the LAI remains associated with factors not represented in the estimated models. This finding creates scope for future research incorporating variables directly related to administrative capacity, technological infrastructure, staff qualifications, institutionalization of transparency routines, and information governance.

4.4 Decomposition of heterogeneity in the LAI dimension

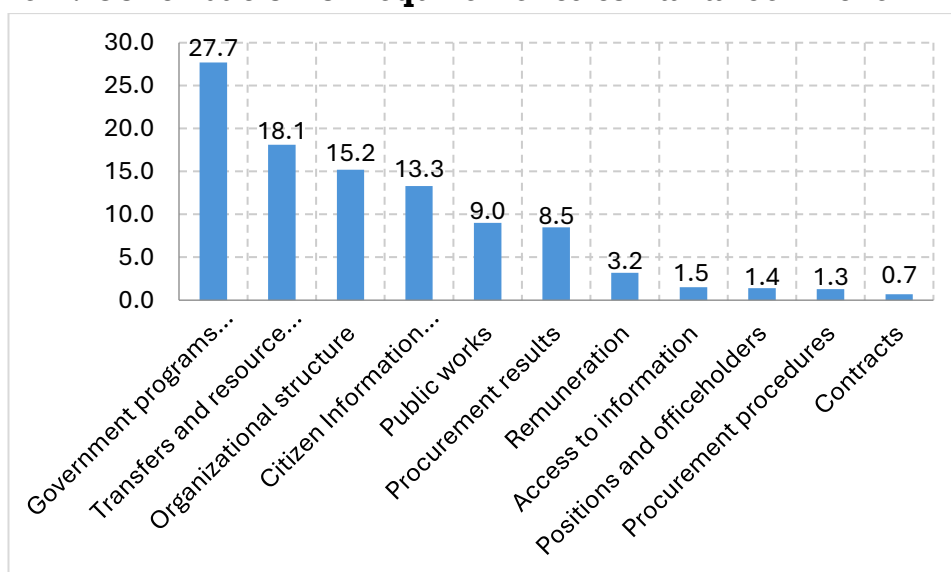
Analysis of the 11 LAI requirements showed that heterogeneity in this dimension is not evenly distributed across its components. As shown in Table 4, some requirements had high compliance and low variability, whereas others accounted for a substantial share of the differences across municipalities.

Table 4 - Performance and contribution of requirements to heterogeneity in the LAI dimension

Requirement	Mean compliance (%)	CV (%)	Maximum score (%)	Contribution to LAI variance (%)
Government programs and actions	60.4	49.0	15.4	27.7
Transfers and resource allocations	71.2	40.8	25.0	18.1
Organizational structure	78.8	27.8	44.2	15.2
Citizen Information Service (SIC)	76.5	25.7	17.3	13.3
Public works	81.4	17.0	21.2	9.0
Procurement results	77.7	26.1	36.5	8.5
Remuneration	96.6	8.9	86.5	3.2
Access to information	94.1	10.8	73.1	1.5
Positions and officeholders	97.7	7.7	90.4	1.4
Procurement procedures	97.7	6.6	88.5	1.3
Contracts	99.0	4.0	94.2	0.7

Source: Authors' elaboration.

Government programs and actions made the largest contribution to LAI variance (27.7%), followed by transfers and resource allocations (18.1%), organizational structure (15.2%), and the Citizen Information Service (SIC) (13.3%). The first two requirements jointly accounted for 45.8% of the variance contribution, and the first four accounted for 74.3%. Differences across municipalities are therefore strongly concentrated in a limited set of obligations. Figure 1 illustrates the concentration of each requirement's contribution to variance in the LAI dimension.

Figure 1. Contribution of requirements to variance in the LAI dimension

Source: Authors' elaboration.

The concentration of variability in these four requirements also shows that LAI heterogeneity does not simply result from a lower overall level of compliance in this dimension. The requirements that most differentiate municipalities concern different types of content: information on government programs and actions, transfers and resource allocations, administrative organization, and operation of the Citizen Information Service. What they share is that disclosure depends on the production, organization, or coordination of information from different administrative processes and units. This pattern contrasts with requirements such as contracts, procurement procedures, positions and officeholders, and remuneration, which had compliance levels close to universal and contributed little to LAI variance.

This distinction broadens the interpretation of the aggregate result. The lower mean LAI score does not appear to reflect a uniform deficiency in compliance with its requirements, but rather the coexistence of widely satisfied requirements with others for which substantial differences across municipalities persist. The identified heterogeneity can therefore be interpreted as concentrated rather than generalized. This finding reinforces the importance of decomposing transparency indices because municipalities with similar overall scores may have different configurations of compliance with information obligations.

This pattern is also evident in the performance indicators. Government programs and actions had the lowest mean compliance (60.4%) and the highest coefficient of variation (49.0%), with only 15.4% of municipalities achieving the maximum score. Transfers and resource allocations also showed high dispersion (CV = 40.8%). In contrast, contracts, procurement procedures, positions and officeholders, and remuneration had high mean compliance and low variability, contributing little to differentiation in municipal scores.

These results demonstrate that similar aggregate indices may arise from different combinations of compliance with transparency requirements. Indicators approaching universal compliance have less capacity to discriminate among municipalities, whereas those with more unequal compliance exert greater influence on dimensional variability. This finding reinforces the usefulness of disaggregated analyses for identifying specific areas where compliance differences persist, consistent with studies documenting heterogeneity across components of municipal transparency (Almeida & Tomaz, 2023; Borssa & Schiavi, 2023; Reinecke & Raupp, 2025).

The concentration of heterogeneity in government programs and actions, transfers and resource allocations, organizational structure, and the SIC also warrants attention because these types of information involve different areas and routines of municipal administration. The result is consistent with the possibility that compliance with broader obligations depends on organizational capacities that differ across local governments, although the cross-sectional design does not support causal inference.

Exploratory analyses between municipal characteristics and each of the 11 LAI requirements showed no statistically significant associations after Benjamini-Hochberg adjustment. This finding warrants caution in attributing heterogeneity in specific requirements to any particular municipal characteristic. The observed association between municipal scale and the overall LAI score may reflect differences distributed across several components that, when examined individually, have lower statistical power.

From an applied perspective, decomposition can direct improvement efforts toward the requirements that actually concentrate differences across municipalities. Rather than uniform interventions across all LAI components, the results identify government programs and actions, transfers and resource allocations, organizational structure, and the SIC as priority areas for diagnosing and improving active transparency.

5 Final Considerations

This study analyzed active transparency across all 52 municipalities in Rondônia, examining its association with demographic, fiscal, and territorial characteristics and identifying the requirements that contribute most to heterogeneity in the LAI dimension. The results showed higher and more homogeneous performance in the LRF dimension, whereas the LAI displayed greater variability across municipalities.

Population and gross municipal revenues were positively associated with the LAI, although after adjustment for multiple comparisons only the association with revenues remained statistically significant. Sensitivity and robustness analyses indicated overall stability of this pattern, but the results should be interpreted as contextual associations, without causal inference or direct measurement of institutional capacity.

Decomposition of the LAI showed that four requirements—government programs and actions, transfers and resource allocations, organizational structure, and the Citizen Information Service—accounted for 74.3% of the observed variance. This result demonstrates that aggregate transparency indices may conceal relevant differences across specific components of transparency and reinforces the usefulness of disaggregated analyses for identifying where the main disclosure gaps are concentrated.

As a contribution, the study combines analysis of municipal characteristics with decomposition of heterogeneity across transparency requirements, offering a diagnostic approach applicable to the assessment of local governments. The results may help public managers and oversight bodies prioritize requirements with greater variability, directing efforts toward specific dimensions rather than interventions based exclusively on aggregate performance.

Limitations include the cross-sectional design, the restriction of the analysis to municipalities in a single state, and the use of contextual characteristics that do not directly represent institutional or administrative capacities. Future studies may incorporate specific measures of state capacity, human resources, and technological infrastructure, extend the analysis to other states and periods, and investigate whether the identified patterns remain stable over time.

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