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Punctuated Equilibrium in Latin American Budgets: Mapping Cross-National and Cross-Sectoral Patterns

Rodrigo M. Cordara
FLACSO Mexico, Mexico

Abstract

This article applies Punctuated Equilibrium Theory (PET) to analyze the dynamics of budget change in Latin America. Using functional data on central government expenditures from 14 countries over more than two decades, the study provides a descriptive assessment of whether annual budget changes follow the leptokurtic distribution predicted by PET—marked by stability interspersed with infrequent but large shifts. The methodological strategy combines descriptive statistics, formal tests of normality, and logistic regression models to examine both distributional patterns and the probability of punctuation. The findings provide robust empirical support for PET. Across all countries, budget changes deviate from a normal distribution, exhibiting high kurtosis and fat tails. Moreover, the likelihood of punctuation varies systematically across policy sectors and national contexts. Volatility is concentrated in areas such as housing and economic affairs, while functions like education and public safety are more stable. Countries with stronger institutional frameworks display lower punctuation frequencies, suggesting a link between budget dynamics and broader governance characteristics. By applying PET to a diverse set of Latin American cases, the study contributes to the global validation of policy process theories and highlights the framework's flexibility in capturing fiscal dynamics under conditions of institutional heterogeneity and political complexity.

Keywords

Punctuated Equilibrium Theory, public budgeting, policy dynamics, Latin America, comparative public policy

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Introduction

The dynamics of public budgeting are central to understanding governance and policy stability in democratic systems. Budgets not only express governmental priorities but also reflect the capacity of political and administrative institutions to respond to shifting societal demands. In Latin America, where political and economic volatility has historically conditioned policymaking, the temporal patterns of budget change remain underexplored. Most existing research focuses on episodic reforms or long-term spending trends, leaving unanswered the question of how budget allocations evolve annually across policy sectors and national contexts.

These questions are particularly relevant in Latin America given the relatively slow pace of institutional consolidation and state capacity building, combined with recurrent instability in public action (Franco & Scartascini, 2014; Luna & Toro, 2014). Scholars have documented that policies often change with each government turnover, creating fragmented and unpredictable environments (Cingolani, 2010; Stein et al., 2006). Only eight of the region's 26 countries score "high" on policy stability indicators, making Latin American policies far less stable than those in developed countries (Franco & Scartascini, 2014). This volatility undermines cooperation, weakens long-term commitments, and contributes to cycles of reforms and counter-reforms that erode credibility and continuity. Understanding the temporal dynamics of budget change thus provides insights into broader governance challenges in the region. This study poses a central question: Do budgetary changes in Latin America conform to the punctuated equilibrium model? If so, how do these patterns vary across countries and policy sectors?

Recent advances in policy studies emphasize that public spending does not typically evolve in a linear or gradual fashion. Instead, change often unfolds through punctuated dynamics—periods of stability interrupted by sudden, significant shifts (Baumgartner & Jones, 1993; Jones & Baumgartner, 2005). This perspective underpins Punctuated Equilibrium Theory (PET), which posits that institutional friction, bounded rationality, and selective attention generate disproportionate policy adjustments over time. A core empirical expectation of PET is that budget changes follow a leptokurtic distribution: most annual variations are small but are occasionally punctuated by sharp increases or cuts that exceed what a normal distribution would predict.

While PET has yielded valuable insights into budgetary dynamics in other regions of the world, its application in Latin America is still in its early stages. The region presents a distinct set of institutional challenges—including weak bureaucratic autonomy, fragmented policymaking, and frequent episodes of instability—that may produce unique budgetary patterns (Cingolani, 2010; Levitsky & Murillo, 2013). Yet, empirical investigations of such patterns remain scarce. Existing work has primarily addressed agenda-setting and policy attention rather than expenditure dynamics, and the few studies that employ budgetary data have focused on single-country cases (e.g., Brasil et al., 2025; Machado, Brasil et al., 2024). Although PET's core premises are theoretically relevant to Latin American settings, no systematic analyses of budget data through this lens have been undertaken to date.

This article addresses that gap by offering the first comparative assessment of PET in Latin American public budgets. The analysis draws on data from 14 countries and employs the United Nations' Classification of the Functions of Government (COFOG) to enable comparison. This sectoral and cross-national design allows us to identify general regularities as well as country- or sector-specific deviations.

The study advances three main empirical expectations. First, that budget changes in Latin America will exhibit a leptokurtic distribution, consistent with PET's predictions. Second, that punctuation will not be uniform across policy sectors. Certain areas may be more prone to

abrupt shifts due to institutional structure, political salience, or exposure to shocks. Third, it is expected that country-level variation in punctuation frequency and intensity will reflect broader differences in fiscal institutions, democratic quality, and macroeconomic stability.

The selected countries capture a broad spectrum of institutional configurations. Some display relatively higher levels of democratic consolidation and fiscal discipline, while others face persistent governance challenges. This heterogeneity offers a valuable testing ground for evaluating the empirical reach of PET beyond its conventional applications, and particularly in the Global South.

Given the novelty of this research agenda in the region, the study adopts an exploratory design. Rather than testing causal mechanisms, it establishes baseline empirical patterns regarding the size and distribution of budgetary changes. This mapping exercise provides the groundwork for future research that can incorporate institutional variables, external shocks, and dynamic causal models. It also responds to recent calls to expand policy process theories beyond their Global North origins and adapt them to underrepresented contexts marked by different governance realities (Bentancur, 2023; Sainz-Santamaria, 2023).

Methodologically, the analysis relies on tools commonly used in PET studies, including measures of kurtosis and skewness, normality tests such as Shapiro–Wilk and Kolmogorov–Smirnov, quantile-quantile (Q-Q) plots, and multilevel logistic regression models. These methods allow us to identify leptokurtic patterns, assess deviations from normality, and estimate the probability of punctuation across sectors and countries while accounting for temporal effects.

The article proceeds as follows. The next section outlines the theoretical framework of PET and its empirical applications. The methodology section details the data sources and analytical strategy. This is followed by the presentation of results, focusing on the distribution of annual budget changes and their variation across policy areas and national contexts. The final sections discuss the implications for theory and practice and suggest directions for future research on budgetary dynamics in Latin America.

By providing the first systematic analysis of budget punctuations in the region, this article contributes to a more global and empirically grounded understanding of policy dynamics. It also lays the foundation for developing more robust comparative frameworks capable of capturing the diversity of public budgeting beyond the Global North.

Theoretical Framework

Understanding the dynamics of policy change remains a central concern in public policy research. Despite decades of theorizing, the field continues to grapple with conceptual ambiguity and limited cumulative knowledge. This is due, in part, to fragmented definitions, diverse typologies, and a lack of shared metrics (Béland & Powell, 2016; Clasen et al., 2007; Green-Pedersen, 2004; Knill & Tosun, 2022). In response, recent scholarship has shifted from cataloging discrete episodes of change to identifying systematic patterns of policy evolution over time. Among the frameworks developed to capture these dynamics, PET has become one of the most influential and empirically validated.

Originally formulated by Baumgartner and Jones (1993), PET challenges incrementalist views of policymaking, which posit that policy change is typically marginal and continuous (Davis et al., 1966a, 1966b; Lindblom, 1959). Drawing on analogies from evolutionary biology, PET proposes that political systems exhibit extended periods of stability, marked by minor adjustments and punctuated by abrupt and disproportionate shifts. These punctuations are not ran-

dom anomalies or purely exogenous shocks. Instead, they result from the interaction between bounded rationality, institutional friction, and the limited capacity of political systems to process information and reallocate attention (Jones & Baumgartner, 2005).

From a measurement perspective, PET predicts a distinct statistical signature: a leptokurtic distribution of annual policy changes. In the domain of public budgeting, this implies that most changes are small, but are occasionally disrupted by large, infrequent reallocations. This contrasts with the normal distribution expected by incrementalism. Leptokurtosis reflects a system in which institutional constraints and cognitive limitations suppress most changes, but periodic realignments of attention and authority unleash significant shifts (Baumgartner et al., 2023).

Three core mechanisms underpin this dynamic. First, bounded rationality leads policymakers to focus on a narrow subset of issues, neglecting others until crises force reevaluation (Jones, 2001; Workman et al., 2009). Second, institutional friction—caused by veto points, procedural rigidity, and administrative routines—creates inertia, which accentuates the alternation between stasis and punctuation (Baumgartner et al., 2009). Third, feedback effects from previous policy decisions shape the parameters of current decision-making, reinforcing cycles of stability and disruption (Howlett et al., 2020).

Empirical research has broadly validated these expectations across multiple countries, institutional regimes, and policy instruments. In the United States, PET research has illuminated patterns of stability and disruption in federal and state budgets (Baumgartner et al., 2009; Breunig & Koski, 2006; Jones et al., 2003; Robinson et al., 2007; True, 2000; Workman et al., 2009). European scholars have built on this work by analyzing national and subnational budgets across the UK, France, Denmark, Hungary, Poland, and Italy, among others (Alexandrova et al., 2012; Baumgartner et al., 2006; Cavalieri, 2023; Citi, 2013; Jensen, 2009; John & Margetts, 2003; Mortensen, 2005; Sebók & Berki, 2017, 2018; Wordliczek, 2021). More recently, PET has been applied to Asian contexts, including China, Hong Kong, Macao, Nepal, and Myanmar, providing evidence that even in authoritarian or hybrid regimes, budgeting can follow punctuated patterns (Chan & Zhao, 2016; Guragain & Lim, 2019; Lam & Chan, 2015; M. Li, 2025; Q. Li et al., 2022; Myaing & Lim, 2023). PET has also been applied to the Middle East (Alshoubaki & Harris, 2022).

Despite this extensive research agenda, Latin America remains underrepresented in the PET literature. While the region has been central to studies of policy reform, institutional development, and state capacity (Franco & Scartascini, 2014; Levitsky & Murillo, 2013; Stein et al., 2006), analyses of the dynamic patterns of public policy—captured through budgetary change—remain scarce. Applications of PET have mainly concentrated on agenda-setting and issue attention, particularly in presidential discourse and legislative agendas (Andrade et al., 2022; Brasil et al., 2023a; Vieira & Del Cid, 2020). More recently, budgetary analysis has been incorporated to examine agenda formation (Machado et al., 2024a), trace the evolution of governmental priorities (Brasil et al., 2023b), and assess coordination of these priorities across levels of government (Machado et al., 2024b). These studies employ budget data primarily as indicators of policy priorities rather than as distributions to be tested against PET's statistical expectations. To date, the only work that explicitly uses budgetary data to analyze policy dynamics in this sense is Brasil et al. (2025), which investigates the execution of federal expenditure in Brazil. Beyond this contribution, however, no comparative analysis extending beyond a single national case has been conducted in the region, despite its clear theoretical relevance.[1]

1 — For an overview of the state of Punctuated Equilibrium Theory in Latin America, see Bonafont et al. (2025).

This omission is significant for two reasons. First, the structural features of many Latin American countries—such as fragmented policymaking arenas, politicized bureaucracies, and episodes of macroeconomic instability (Cingolani, 2010; Tommasi, 2006)—suggest conditions conducive to punctuated dynamics. The region's relatively slow process of institutional consolidation, coupled with frequent policy reversals and weak party systems, further undermines policy stability (Luna & Toro, 2014; Stein et al., 2006). Second, the region also includes relatively institutionalized democracies, such as Chile, Costa Rica, and Uruguay, which offer valuable contrasts. This heterogeneity makes Latin America an ideal setting to test PET's empirical reach and to assess whether budget punctuations conform to patterns observed in the Global North or diverge in meaningful ways.

This study addresses that gap through a comparative, exploratory analysis of budget dynamics across multiple Latin American countries and policy sectors. It builds on three testable hypotheses:

- H_0 – Incrementalism (Null Hypothesis): Annual changes in budget allocations follow a normal distribution, reflecting marginal, continuous adjustments.
- H_1 – PET Distributional Pattern: Annual changes in budget allocations exhibit leptokurtosis—most changes are small, but a nontrivial proportion are large—indicating the presence of punctuated dynamics.
- H_2 – Sectoral Variation: The degree of punctuation varies across policy sectors due to differences in political salience, institutional structure, and exposure to exogenous shocks.
- H_3 – Cross-National Patterns: Despite country-specific institutions, some sectors display consistent punctuation profiles across countries, revealing transnational regularities shaped by the functional characteristics of policy domains.

The second hypothesis draws on a growing body of literature that highlights the meso-level logic of policy stability and change. Research shows that volatility in public spending is not evenly distributed across all functions. Some policy domains—such as agriculture or defense—exhibit frequent punctuations, while others—like education or health—tend to display greater stability (Breunig et al., 2010). This variation is explained not only by the intensity and concentration of sectoral interests, which shape the capacity for sustained lobbying, policy learning, and resistance to change (Fernández-i-Marín et al., 2022; Hacker, 2004; Jensen, 2009), but also by the economic nature of expenditure and the rigidity of institutional rules. Studies of budgets in the United Kingdom and Brazil show that capital-intensive policies, such as housing or infrastructure, are more prone to discretionary fluctuation, while current-expenditure policies and legally protected social sectors, such as health and education, follow more incremental trajectories (John & Margetts, 2003; Peres, 2021).

Beyond these structural features, external shocks and issue salience also play a crucial role. Episodes of exogenous crisis can disrupt established equilibria and trigger substantial reallocations in affected domains (Cavalieri, 2023), while highly visible focusing events generate public attention and political pressure that increase the likelihood of disruptive change (Henstra, 2011). Moreover, concentrated attention has been shown to drive programmatic shifts located in the tails of budget distributions, reinforcing the link between salience and punctuation (Breunig, 2011).

More broadly, sectoral dynamics are shaped by the functions policies perform, the organization of interests around them, and the presence of statutory earmarks or entitlement rules, all of which reinforce or constrain change (Cavalieri, 2023; Mortensen, 2005, 2007).

Cross-national evidence further suggests that similar sectors tend to exhibit comparable punctuation patterns across different countries, regardless of broader institutional differences. For example, Breunig et al. (2010) find that in both Denmark and the United States, agriculture and defense are among the most punctuated domains, while education and international affairs show relative stability. This suggests that the functional characteristics of policy domains may exert a stronger influence on their temporal dynamics than the national context in which they are embedded.

Nonetheless, country-level institutions can shape both the frequency and magnitude of budget punctuations. The PET literature has increasingly explored how macro-institutional arrangements—such as regime type, government structure, decentralization, the number and cohesion of veto players, and bureaucratic capacity—influence the adaptability of policy systems. Authoritarian regimes may inhibit change until pressures accumulate, producing abrupt shifts, while democracies are more likely to process adjustments incrementally. Similarly, strong checks and balances and professionalized bureaucracies tend to reduce volatility, whereas institutional fragmentation and excessive executive discretion are associated with more erratic patterns of change (Baumgartner et al., 2017; Breunig, 2011; Chan & Zhao, 2016; Epp & Baumgartner, 2017; Fagan et al., 2017; Flink, 2017; Lam & Chan, 2015; Park & Sapotichne, 2020; Robinson et al., 2007; Robinson & Caver, 2006; Sebók & Berki, 2018).

Taken together, these insights suggest that both sectoral characteristics and institutional configurations shape the likelihood and magnitude of budget punctuations. The interplay between meso- and macro-level variables is thus central to understanding the dynamics of public budgeting in Latin America.

Rather than testing competing causal mechanisms, the aim of this study is to identify distributional patterns and assess their consistency with PET expectations. This exploratory design is appropriate given the paucity of prior research in the region and the descriptive value of mapping empirical regularities. It also provides a foundation for future work that may examine how institutional variables interact with sectoral features to produce stability or change.

In sum, this framework integrates the core theoretical insights of PET with a broader agenda of comparative policy analysis. By applying PET to the budgetary processes of Latin American countries, the study contributes to a more inclusive understanding of policy dynamics—one that bridges empirical gaps and invites further theoretical refinement.

Data and Methods

This study examines the dynamics of budgetary policy in Latin America by analyzing annual changes in central government expenditure across policy functions. The methodological strategy is grounded in the empirical tradition of PET, which posits that policy change tends to follow a leptokurtic distribution, characterized by extended periods of incremental adjustment interrupted by occasional, large-scale shifts. The aim is to assess whether these distributional patterns are observable in Latin American budget data and to explore their variation across countries and sectors.

The analysis uses official data from CEPALstat, the statistical platform of the Economic Commission for Latin America and the Caribbean (ECLAC). The dataset reports annual expenditures classified under the Classification of the Functions of Government (COFOG), a standardized taxonomy developed by the OECD and adopted by the United Nations Statistics Division. COFOG distinguishes ten functional categories: General Public Services, Defense, Public Order

and Safety, Economic Affairs, Environmental Protection, Housing and Community Amenities, Health, Recreation, Culture and Religion, Education, and Social Protection.

While much of the PET literature relies on the Comparative Agendas Project (CAP) framework to classify policy topics, this option is not feasible for Latin America, as no country in the region reports budget data under CAP. Relying on COFOG may therefore limit direct comparability with countries participating in CAP, yet it provides a viable alternative that has been adopted in other PET studies (Baumgartner et al., 2009; Fagan et al., 2017; Guragain & Lim, 2019; Hegelich, 2016; Sebók & Berki, 2017). In this sense, COFOG ensures cross-national consistency in measuring budgetary dynamics in a continent where CAP-based budget data are not available.

The dataset comprises time series for multiple Latin American countries, covering between 25 and 30 years depending on data availability and consistency. To ensure cross-country comparability, only central government expenditure is considered. While this choice excludes subnational dynamics, it allows for a consistent measure of policy orientation at the national level, reducing potential distortions from differences in fiscal decentralization.

Expenditures are adjusted for inflation using national Consumer Price Index (CPI) data from the World Bank.[2] CPI series for each country are normalized to a base year (100), and deflators are applied to convert nominal values into constant local currency units. This procedure avoids the smoothing effects of expressing expenditure as a share of GDP, which can obscure the distributional features central to PET analyses (Fagan et al., 2017).

The core indicator of policy change is the annual percentage variation in real expenditure for each country-function-year unit:

$$\%\Delta B_{c,\,f,\,t} = \frac{B_{c,\,f,\,t} - B_{c,\,f,\,t-1}}{B_{c,\,f,\,t-1}} \times 100$$

where $B_{c,\,f,\,t}$ is the real expenditure for country c, policy function f, and year t. This transformation captures the relative variation in spending levels over time and is applied uniformly across all policy areas and countries.

To minimize the influence of extreme anomalies, observations exceeding +1000% are winsorized. This threshold helps control for spurious volatility arising from accounting reclassifications, crisis-related adjustments, or reporting inconsistencies, without excluding meaningful variation.

The analysis proceeds in two stages. First, it characterizes the distributional shape of annual budget changes through visual and statistical diagnostics. Histograms and quantile-quantile (Q–Q) plots are used to examine symmetry, central peaks, and tail behavior. PET predicts a leptokurtic distribution: a pronounced concentration of small changes around the mean, with a non-trivial frequency of extreme deviations.

Second, summary statistics are computed to quantify these patterns. Kurtosis is used to measure tail thickness and peakedness, with values above 3 indicating departure from normality. Although skewness is not central to PET, it is reported as a supplementary indicator of asymmetry, particularly the relative frequency of expansions versus contractions.

2 — For Argentina and Nicaragua, data were obtained from CEPALstat, as the World Bank database does not include these countries.

To improve robustness, the analysis also incorporates L-moments—specifically L-kurtosis and L-skewness—which are less sensitive to outliers and small samples. Under a normal distribution, L-kurtosis is approximately 0.123. Values substantially above this threshold support PET's expectation of fat-tailed distributions.

Formal normality tests are applied to validate the visual and descriptive findings. The Shapiro–Wilk test evaluates the null hypothesis of normality and is particularly powerful for small and medium samples. In parallel, the Kolmogorov–Smirnov test assesses the empirical distribution's goodness-of-fit relative to a Gaussian benchmark. Rejection of normality in either test, combined with high kurtosis and visual evidence of fat tails, constitutes strong support for the presence of punctuated dynamics.

In addition to continuous indicators, the study constructs a binary measure of punctuation to facilitate categorical analysis. Following standard practice (e.g., Baumgartner & Jones, 1993), annual changes within the –25% to +25% range are coded as incremental, while those exceeding this threshold are treated as punctuations:

$$punct_{c,\,f,\,t} = 1 \text{ if } \left| \left(B_{c,\,f,\,t} - B_{c,\,f,\,t-1}\right) / B_{c,\,f,\,t-1} \times 100 \right| > 25, \text{ 0 otherwise}$$

This dichotomization allows for cross-tabulation and regression modeling, enabling the estimation of probabilities associated with punctuation events.

The unit of analysis is the country–function–year triplet, resulting in an unbalanced panel structure with repeated observations across both time and policy domains. This design permits the exploration of variation across countries and sectors, as well as the identification of broader regional patterns.

To analyze the determinants of punctuation, the study estimates two types of logistic regression models. The first is a pooled logistic model that regresses the binary punctuation indicator on country and sector dummies. This specification tests whether some functions—such as education, defense, or economic affairs—are systematically more prone to punctuation than others.

The second is a multilevel (hierarchical) logistic model that accounts for the nested structure of the data. In this model, country–sector units are treated as clusters, and random intercepts are specified for both countries and policy functions. This approach improves statistical efficiency and allows for the decomposition of variance across levels. The model takes the form:

$$\text{logit}(\Pr(punct_{c,\,f,\,t} = 1)) = \beta_0 + \beta_1 X_f + \beta_2 X_c + u_c + v_f + \varepsilon_{cft}$$

where Xf and Xc are fixed effects for functions and countries, and uc, vf are random effects capturing unobserved heterogeneity at each level.

This dual modeling strategy—combining distributional analysis and multilevel regression—offers a comprehensive view of budget dynamics. It enables both the identification of general empirical regularities and the detection of context-specific deviations. The methodology provides a strong empirical foundation for evaluating the applicability of PET in Latin America and for future work linking macro-institutional variables to patterns of punctuation.

The next section presents the results, focusing on the shape of budget change distributions and the variation in punctuation frequency across functional categories and national contexts.

Results

Descriptive Overview of Budget Changes

Table 1 summarizes the basic characteristics of annual budget changes across 14 Latin American countries. Temporal coverage varies from 22 to 34 years, with most series spanning nearly three decades. Interruptions in time series—such as those observed in Paraguay (1994–1999) and Nicaragua (1995–1997)—were treated conservatively: year-on-year changes were computed only for consecutive years to avoid artificial inflation of variation caused by missing values.

Descriptive statistics reveal notable variation across countries. The most extreme annual reductions approach –98% (e.g., in Paraguay and El Salvador), while maximum increases, winsorized at 1000%, reflect rare but significant fiscal shocks. Mean real growth in central government expenditure is positive in all cases, although with substantial heterogeneity: Paraguay and Nicaragua average over 20% growth annually, whereas Uruguay and Mexico exhibit more modest increases of around 5%.

Volatility, measured by standard deviations, also varies. Chile and Mexico show relatively stable trajectories (SDs < 20%), while countries like Paraguay, El Salvador, and Nicaragua exhibit pronounced instability (SDs > 70%). These differences provide an empirical foundation for examining the distributional properties predicted by PET.

Table 1. Descriptive statistics of annual percentage changes in central government budgets of Latin America.

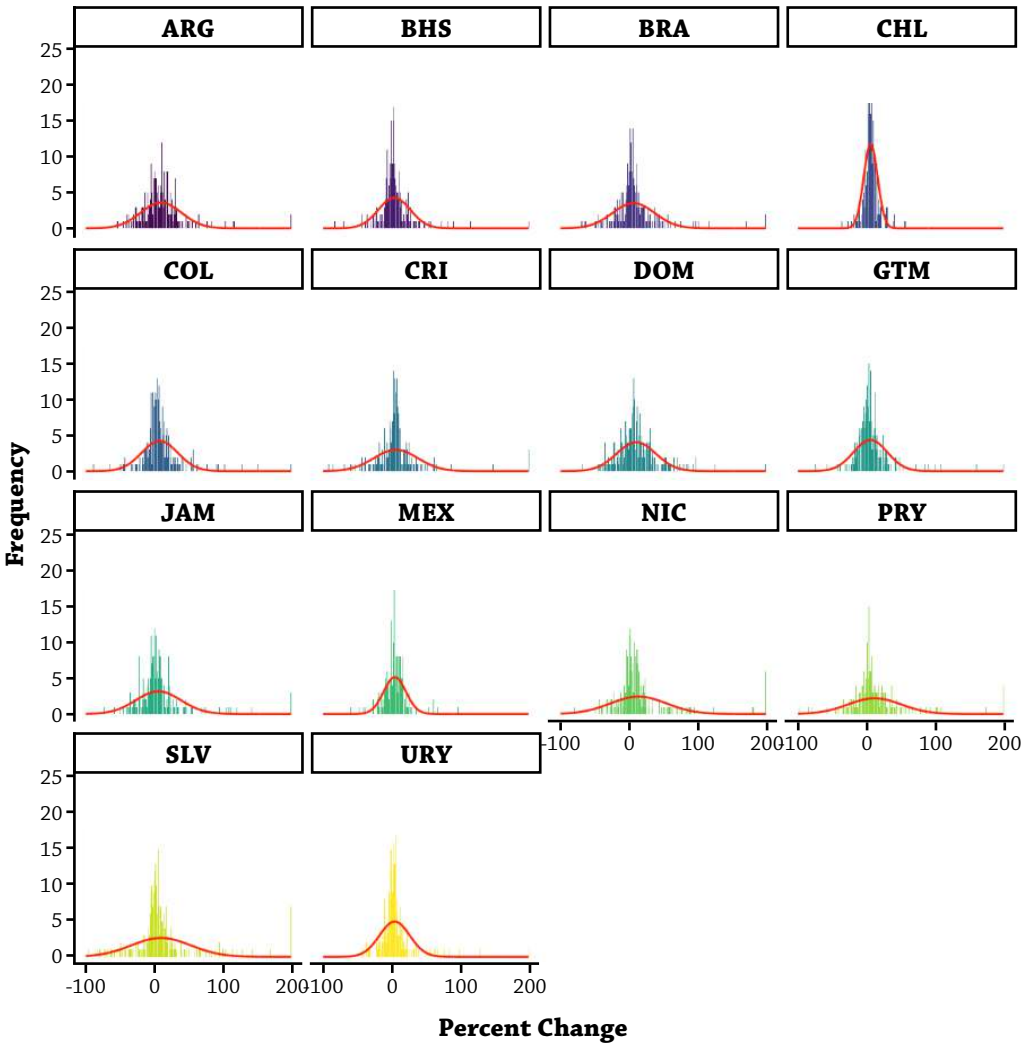
Country	n	First year	Last year	Available years	Min	Mean	Median	SD	Max
ARG	269	1990	2020	31	-54.20	13.70	7.52	67.26	1000
BHS	250	1990	2020	31	-82.01	5.11	2.47	29.19	342.13
BRA	272	1990	2020	31	-69.74	8.80	4.20	45.69	572.07
CHL	300	1990	2020	31	-35.57	6.81	6.50	10.17	57.21
COL	280	1990	2019	30	-88.50	9.15	4.94	31.88	360.86
CRI	241	1993	2020	28	-91.76	10.73	5.12	72.97	1000
DOM	289	1990	2020	31	-68.71	11.21	7.64	29.12	224.12
GTM	270	1991	2020	30	-73.74	6.51	3.56	25.31	219.03
JAM	262	1992	2020	29	-72.82	9.08	1.71	53.18	622.59
MEX	210	1999	2020	22	-59.62	5.24	4.70	16.29	97.61
NIC	250	1990	2020	28*	-79.11	22.56	5.83	98.62	1000
PRY	214	1990	2020	25*	-98.74	22.89	5.92	112.81	1000
SLV	288	1990	2020	31	-96.92	16.42	3.33	77.37	646.68
URY	273	1990	2020	31	-43.65	5.48	2.58	28.14	352.13

Source: Author's calculations, based on CEPALstat and World Bank

Testing the Distributional Pattern (H_0 vs. H_1)

Figure 1 displays histograms of year-on-year percentage changes in central government spending. Across all countries, distributions exhibit sharp central peaks, steep flanks, and heavy tails—hallmarks of leptokurtosis. The overlaid normal curves highlight the contrast with a Gaussian benchmark. To avoid visual distortion from extreme values, the x-axis is truncated at –100% and capped at 200%, with values beyond this grouped in a final bin.

Figure 1. Histograms of Annual Percentage Changes in Central Government Budgets in Latin America.



Source: Author's calculations, based on CEPALstat and World Bank.

While histograms offer initial insight, formal distributional statistics reported in Table 2 reinforce these impressions. Under a normal distribution, we would expect kurtosis near 3, skewness near 0, and L-kurtosis and L-skewness values of 0.123 and 0, respectively. Yet across all countries, empirical values depart sharply from these benchmarks.

The most pronounced cases include Argentina, Costa Rica, and Paraguay, with kurtosis exceeding 140 in the first two and L-kurtosis above 0.55 in the latter two. These values indicate distributions dominated by small changes and infrequent, outsized shifts. Skewness and L-skewness further reveal directional asymmetry, with some countries showing a disproportionate number of increases or cuts.

At the other end of the spectrum, Chile and Mexico display the least leptokurtic patterns, though still inconsistent with normality. For example, Chile's kurtosis (5.50) and L-kurtosis (0.30) remain above Gaussian expectations, suggesting relative—but not absolute—stability.

Table 2. Kurtosis, Skewness, L-kurtosis, and L-skewness of Annual Percentage Changes in Central Government Budgets in Latin America.

Country	Kurtosis	Skewness	L-kurtosis	L-skewness
ARG	174.31	12.08	0.40	0.30
BHS	72.36	6.48	0.42	0.20
BRA	88.60	7.78	0.45	0.25
CHL	5.50	0.80	0.30	0.07
COL	54.98	5.46	0.40	0.23
CRI	143.35	10.93	0.55	0.32
DOM	10.49	1.96	0.26	0.16
GTM	24.88	3.64	0.36	0.23
JAM	75.22	7.50	0.47	0.36
MEX	7.93	0.91	0.30	0.03
NIC	67.82	7.65	0.59	0.55
PRY	59.82	7.46	0.60	0.52
SLV	35.37	5.40	0.57	0.43
URY	86.36	7.55	0.44	0.26

Source: Author's calculations, based on CEPALstat and World Bank.

Statistical tests confirm the departure from normality. The Shapiro–Wilk and Kolmogorov–Smirnov tests (Table 3) reject the null hypothesis of normality ($p < 0.001$ in all countries). Shapiro–Wilk statistics range from 0.29 to 0.90, while Kolmogorov–Smirnov values range from 0.11 to 0.35. These results reinforce the presence of fat tails and concentrated distributions, as predicted by PET.

Table 3. Shapiro–Wilk and Kolmogorov–Smirnov Tests of Normality for Annual Percentage Changes in Central Government Budgets in Latin America.

Country	n	Shapiro–Wilk		Kolmogorov–Smirnov	
		statistic	p-value	statistic	p-value
ARG	269	0.31	1.31×10^{-30} ***	0.28	1.92×10^{-18} ***
BHS	250	0.56	1.30×10^{-24} ***	0.21	2.10×10^{-10} ***
BRA	272	0.48	2.23×10^{-27} ***	0.24	2.08×10^{-14} ***
CHL	300	0.90	6.72×10^{-13} ***	0.11	8.76×10^{-4} ***
COL	280	0.62	1.73×10^{-24} ***	0.20	8.26×10^{-10} ***
CRI	241	0.29	1.65×10^{-29} ***	0.31	1.69×10^{-20} ***
DOM	289	0.88	2.37×10^{-14} ***	0.13	2.34×10^{-4} ***
GTM	270	0.70	1.37×10^{-21} ***	0.19	1.20×10^{-8} ***
JAM	262	0.44	6.38×10^{-28} ***	0.28	1.08×10^{-17} ***
MEX	210	0.87	1.91×10^{-12} ***	0.12	3.89×10^{-3} **
NIC	250	0.32	1.69×10^{-29} ***	0.35	1.00×10^{-26} ***
PRY	214	0.29	5.01×10^{-28} ***	0.34	5.16×10^{-22} ***
SLV	288	0.45	8.12×10^{-29} ***	0.32	7.29×10^{-26} ***
URY	273	0.50	4.94×10^{-27} ***	0.23	1.92×10^{-13} ***

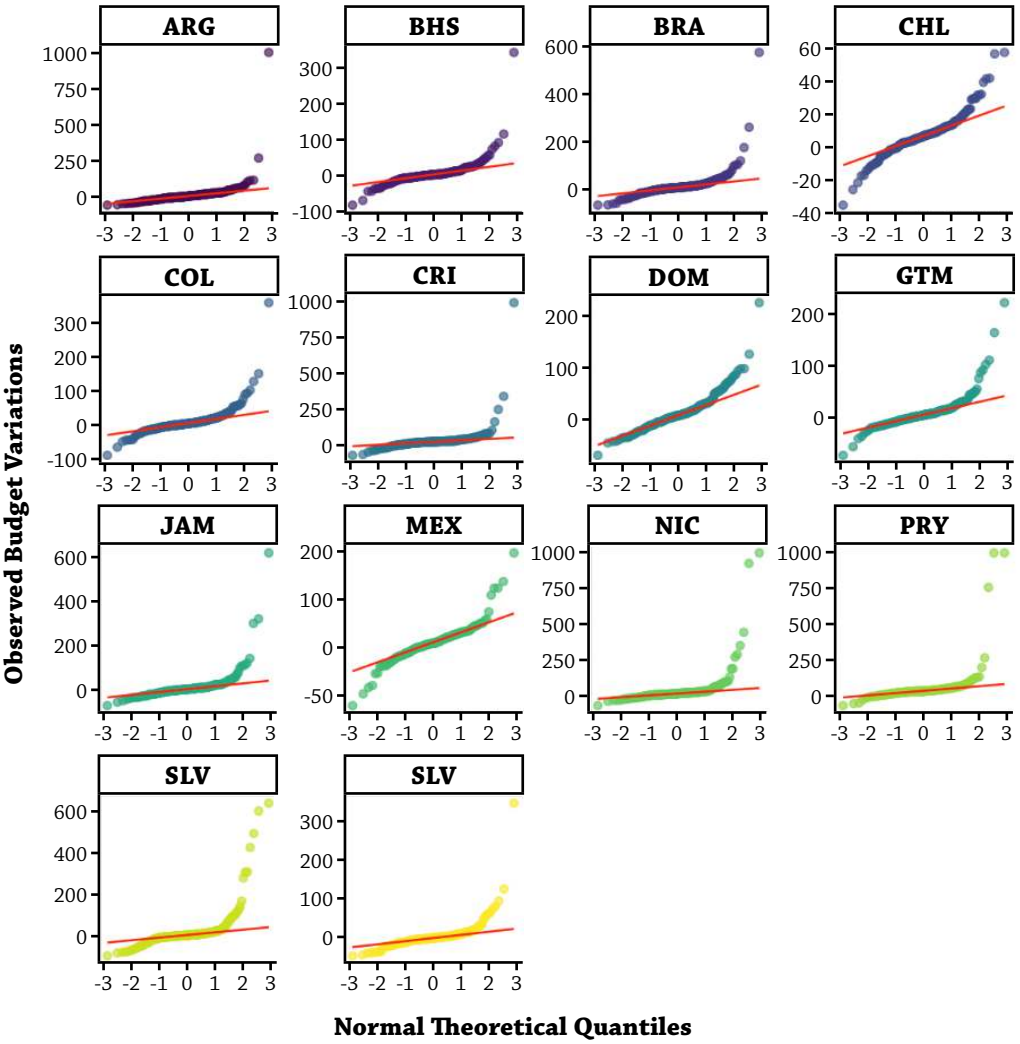
No asterisk denotes $p \geq 0.05$.

Note: Asterisks indicate levels of statistical significance: $p < 0.05$ (*), $p < 0.01$ (**), and $p < 0.001$ (***).

Source: Author's calculations, based on CEPALstat and World Bank.

Quantile–quantile plots in Figure 2 offer additional visual confirmation. All plots deviate substantially from the 45-degree line, especially in the tails, reflecting the high frequency of small adjustments punctuated by large deviations. Several countries exhibit pronounced "S-shaped" curves, indicative of asymmetric distributions. Together, histograms, statistical tests, and Q–Q plots offer robust and convergent evidence in support of PET's core expectation: budgetary changes do not follow a normal, incrementalist pattern.

Figure 2. Q-Q Plots of Annual Percentage Changes in Central Government Budgets in Latin America.



Source: Author's calculations, based on CEPALstat and World Bank.

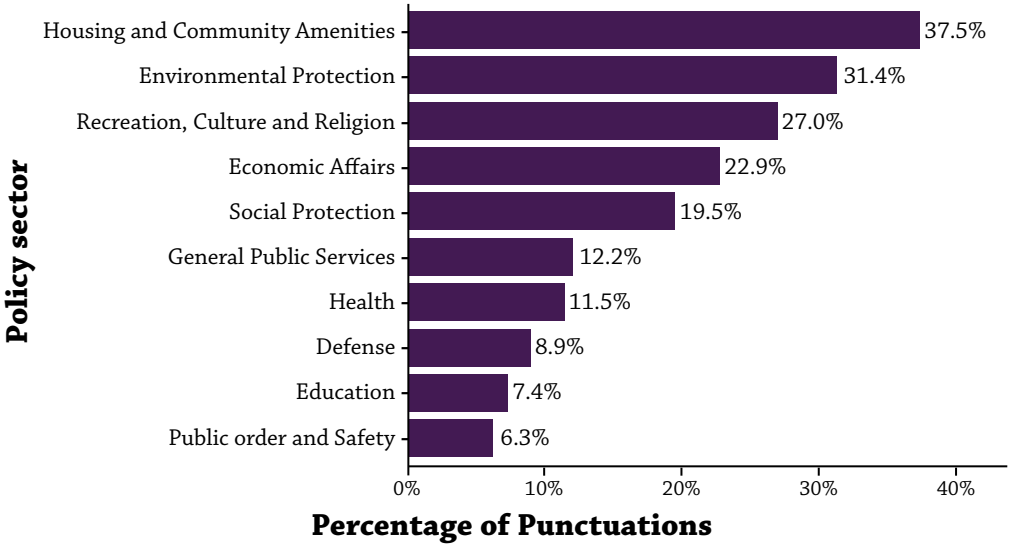
Sectoral Variation in Punctuation (H_2)

The frequency of punctuation varies not only across countries but also across policy sectors. Figure 3 shows the percentage of disruptive changes (defined as annual shifts exceeding ±25%) by COFOG functional category.

Certain functions exhibit marked stability. Public Order and Safety (GF03), Education (GF09), and Defense (GF02) have punctuation rates below 9%, while Health (GF07) and General Public Services (GF01) also fall below the overall average. These patterns suggest constrained variation in politically salient or legally mandated spending areas.

In contrast, Housing and Community Amenities (GF06) stands out for its volatility: 37.5% of annual changes in this category qualify as punctuations. Other high-volatility sectors include Economic Affairs (GF04), Environmental Protection (GF05), and Recreation, Culture, and Religion (GF08), with punctuation rates between 23% and 31%. These areas may be more exposed to economic cycles, discretionary reallocation, or project-based spending, which heightens their susceptibility to abrupt shifts.

Figure 3. Percentage of Disruptive Changes by Policy Sector in Latin America.



Source: Author's calculations, based on CEPALstat and World Bank.

Table 4 reports estimates from a logistic regression model predicting the probability of punctuation as a function of policy sector. Using General Public Services as the reference, several sectors emerge as statistically distinct. Housing and Community Amenities (GF06) is over four times more likely to experience punctuations (OR = 4.32, $p < 0.001$), while Economic Affairs (OR = 3.29, $p < 0.001$) and Recreation, Culture, and Religion (OR = 2.66, $p < 0.001$) also show significantly elevated odds.

Conversely, Education (OR = 0.57, $p < 0.05$) and Public Order and Safety (OR = 0.49, $p < 0.01$) are significantly less likely to exhibit large shifts. These results align with theoretical expectations: sectors with greater political or institutional insulation exhibit lower volatility, while those exposed to economic or policy shocks tend to be more unstable.

Table 4. Logistic Regression Predicting the Probability of Budget Punctuation by Policy Sector in Latin America

Term	estimate	std error	z-value	p-value	OR	OR-low	OR-high
(Intercept)	-1.972	0.154	-12.803	$< 2.00 \times 10^{-16}$ ***	0.139	0.103	0.188
Defense (GF02)	-0.355	0.241	-1.473	0.14	0.701	0.437	1.124
Public Order and Safety (GF03)	-0.722	0.261	-2.763	5.72×10^{-3} **	0.486	0.291	0.811
Economic Affairs (GF04)	1.192	0.201	5.938	2.88×10^{-9} ***	3.294	2.223	4.883
Environmental Protection (GF05)	0.758	0.195	3.883	1.03×10^{-4} ***	2.135	1.456	3.131
Housing and Community Amenities (GF06)	1.463	0.187	7.828	4.96×10^{-15} ***	4.319	2.994	6.229
Health (GF07)	-0.073	0.221	-0.331	0.74	0.929	0.603	1.433
Recreation, Culture, and Religion (GF08)	0.980	0.201	4883	1.05×10^{-6} ***	2.663	1.797	3.946
Education (GF09)	-0.558	0.247	-2.258	2.39×10^{-2} *	0.573	0.353	0.929
Social Protection (GF10)	0.557	0.200	2.781	5.41×10^{-3} **	1.745	1.179	2.584
Observations: 3,668	McFadden's pseudo R^2: 0.075		AIC: 3,211.6				

Note: OR = Odds Ratio. OR-low and OR-high indicate the lower and upper bounds of the 95% confidence interval. Asterisks indicate levels of statistical significance: $p < 0.05$ (*), $p < 0.01$ (**), and $p < 0.001$ (***). No asterisk denotes $p \geq 0.05$.

Source: Author's calculations, based on CEPALstat and World Bank.

To account for hierarchical dependencies, Table 5 introduces a multilevel logistic model with random intercepts for countries and years. This specification improves model fit substantially (LR test: $\chi^2(2) = 227.6$, $p < 0.001$) and confirms the robustness of sectoral effects.

Housing and Community Amenities remains the most volatile category (OR = 5.35, $p < 0.001$), followed by Economic Affairs (OR = 4.89, $p < 0.001$), Recreation and Culture (OR = 3.32, $p < 0.001$), and Environmental Protection (OR = 2.31, $p < 0.001$). Education and Public Order again show significantly lower odds, reinforcing their relative insulation from abrupt realloca-

tions. Defense and Health display lower odds ratios but are not statistically significant in this specification.

The model's marginal R^2 (0.145) indicates that sectoral composition explains a substantial portion of variation. The conditional R^2 (0.322), which incorporates both fixed and random effects, shows that accounting for country- and year-level clustering further enhances explanatory power. Random-effect variances (country = 0.63; year = 0.68) confirm the relevance of cross-national and temporal factors in shaping punctuation dynamics.

Table 5. Multilevel Logistic Regression Predicting the Probability of Budget Punctuation by Policy Sector in Latin America, with Random Intercepts for Country and Year.

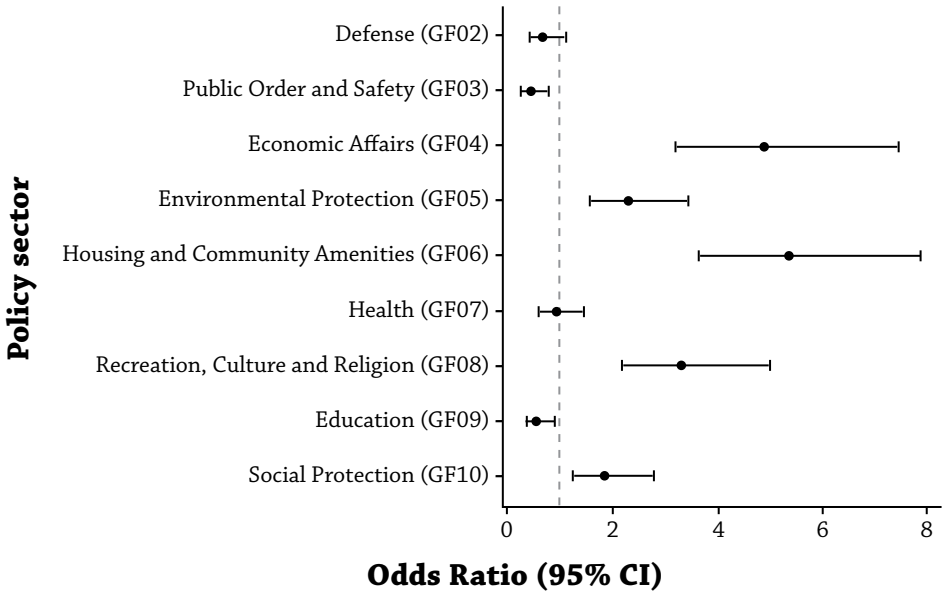
Term	**estimate**	**std error**	***z*-value**	**p-value**	**OR**	**OR-low**	**OR-high**
(Intercept)	-2.225	0.265	-8.411	4.08×10^{-17} ***	0.108	0.064	0.181
Defense (GF02)	-0.384	0.248	-1.545	0.12	0.681	0.419	1.109
Public Order and Safety (GF03)	-0.766	0.267	-2.866	4.15×10^{-3} **	0.465	0.275	0.785
Economic Affairs (GF04)	1.588	0.214	7.424	1.13×10^{-13} ***	4.892	3.217	7.439
Environmental Protection (GF05)	0.839	0.204	4.114	3.89×10^{-5} ***	2.313	1.551	3.450
Housing and Community Amenities (GF06)	1.678	0.197	8.504	1.83×10^{-17} ***	5.354	3.637	7.881
Health (GF07)	-0.079	0.228	-0.347	0.73	0.924	0.591	1.445
Recreation, Culture, and Religion (GF08)	1.199	0.212	5.650	1.60×10^{-8} ***	3.316	2.188	5.026
Education (GF09)	-0.596	0.253	-2.353	1.86×10^{-2} *	0.551	0.335	0.905
Social Protection (GF10)	0.617	0.209	2.959	3.09×10^{-3} **	1.854	1.232	2.790
Observations: 3,668 Marginal R^2: 0.145 Conditional R^2: 0.322 Random intercept variances: country = 0.62916, year = 0.67825 AIC: 2,984.0							

Source: Author's calculations, based on CEPALstat and World Bank. See notes in Table 4.

Figure 4 presents odds ratios and confidence intervals graphically, underscoring the unequal distribution of punctuation across policy sectors. These findings offer strong and consistent

support for H_2: certain functional areas are systematically more prone to disruptive change, in ways that are not attributable to random variation.

Figure 4. Odds Ratios by Policy Sector in Latin America (Multilevel Logistic Model with Random Intercepts for Country and Year).



Source: Author's calculations, based on CEPALstat and World Bank.

Cross-National Patterns and Regularities (H_3)

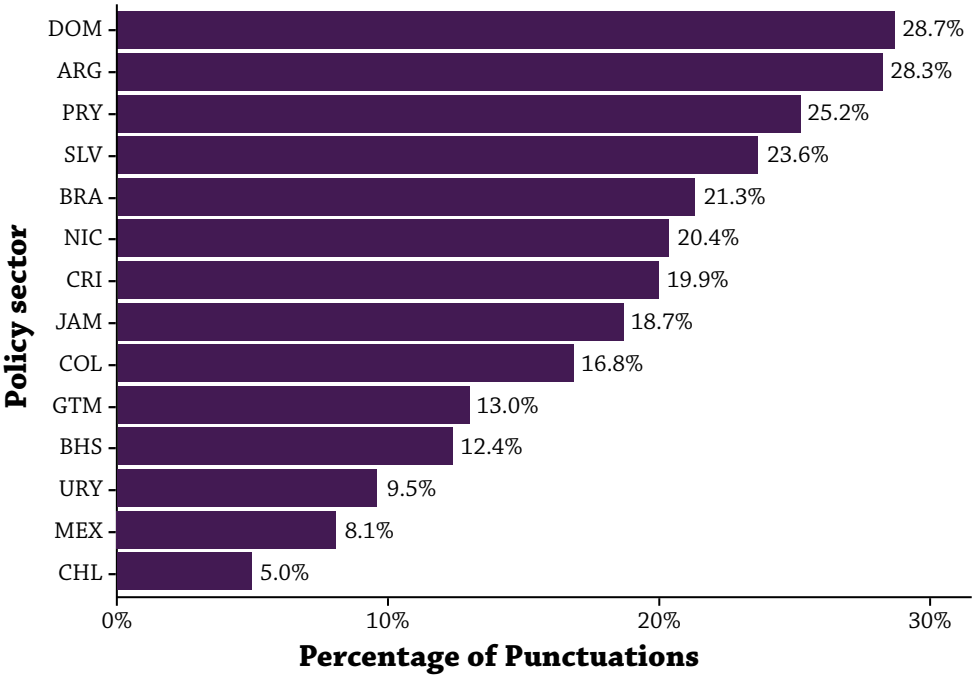
Finally, Figure 5 presents cross-national comparisons in the incidence of punctuation. Countries with the highest shares of disruptive changes include the Dominican Republic (28.7%), Argentina (28.3%), and Paraguay (25.2%). At the other end of the spectrum, Chile (5.0%), Mexico (8.1%), and Uruguay (9.5%) show the lowest punctuation rates.

These results reflect important institutional contrasts. Countries with historically stable macroeconomic and fiscal frameworks—Chile and Uruguay, in particular—exhibit smoother budget trajectories. By contrast, countries with recent experiences of fiscal crisis, weak rule-based budgeting, or fragmented institutions—such as Argentina and the Dominican Republic—display heightened volatility.

While these descriptive results do not control for sectoral composition or specific contextual factors, they nonetheless suggest that institutional configurations shape the frequency and magnitude of punctuation. In particular, systems with strong fiscal institutions and consistent policy enforcement appear less prone to abrupt change.

These findings provide initial support for H_3, highlighting systematic national-level variation in punctuation frequency. Although further analysis is needed to unpack the role of contextual variables—such as electoral cycles, economic crises, or institutional reforms—the observed patterns underscore the importance of considering country-level institutional environments in comparative analyses of policy dynamics.

Figure 5. Percentage of Disruptive Changes by Country in Latin America.



Source: Author's calculations, based on CEPALstat and World Bank.

Discussion

The findings offer strong and consistent support for the core empirical proposition of Punctuated Equilibrium Theory (PET): annual changes in central government expenditure across Latin America display leptokurtic distributions, marked by frequent small adjustments and occasional large shifts. This pattern appears robust across countries with divergent political and administrative profiles, reinforcing PET's descriptive validity beyond its original empirical settings.

Visualizations (histograms and Q–Q plots), descriptive statistics, and formal normality tests all reject the assumption of normally distributed changes posited by incrementalist models. Even countries with relatively moderate kurtosis and skewness values, such as Chile and Mexico, exhibit distributions significantly different from Gaussian benchmarks. That such patterns persist across diverse contexts—including both consolidated democracies and more volatile regimes—suggests that punctuated dynamics are a general property of budget processes, not an anomaly restricted to crisis-prone systems.

This regularity is striking given the region's institutional heterogeneity. Countries vary in their fiscal frameworks, degrees of bureaucratic autonomy, and political volatility. Yet the empirical signature of PET remains consistent. These findings lend weight to recent efforts advocating for a more global application of policy process theories and underscore the value of PET as a unifying lens for examining public budgeting under institutional diversity.

The results also reveal marked cross-sectoral contrasts that align closely with existing research. Housing and Community Amenities emerges as the most volatile domain, followed by Eco-

nomic Affairs, Environmental Protection, and Recreation, Culture, and Religion. This pattern resonates with studies showing that capital-intensive and project-based policies are especially prone to fluctuation because they rely on discretionary allocations (John & Margetts, 2003; Peres, 2021). By contrast, Education and Public Order and Safety display the lowest odds of punctuation, while Health and Defense also exhibit relative stability. These findings are consistent with evidence that policies anchored in recurrent spending, protected by legal earmarks, or tied to essential services evolve incrementally and resist abrupt shifts (Hacker, 2004; Jensen, 2009; Peres, 2021).

Taken together, the Latin American evidence supports the broader claim that policy dynamics vary systematically across functional domains. Sectoral properties—such as the type of expenditure, degree of legal protection, and structure of organized interests—appear to matter as much as institutional context in shaping volatility. In this sense, the results reinforce the meso-level perspective of PET, highlighting the importance of functional characteristics in explaining patterns of stability and change.

It is important, however, to interpret these findings cautiously. COFOG categories aggregate diverse activities, and sector size is not controlled for in the models. Volatility in smaller sectors may reflect base effects rather than substantive instability. Moreover, variation in reporting practices or data quality could affect measured frequencies. Despite these caveats, the consistency of sectoral differences across countries and model specifications lends credibility to the patterns observed.

These sectoral dynamics open promising avenues for further inquiry. Future research could test whether variables such as political salience, institutional rigidity, or donor influence explain the observed heterogeneity. Interactions between sector size and volatility, or between sectoral governance structures and responsiveness to shocks, could refine our understanding of fiscal dynamics. Comparative analyses beyond Latin America would also help determine whether these sectoral regularities hold in other regions.

At the cross-national level, the analysis reveals a clear hierarchy in the incidence of punctuation. Chile, Mexico, and Uruguay present the lowest proportions of disruptive changes, consistent with more rule-bound and institutionally stable budgeting systems. Conversely, countries such as the Dominican Republic, Argentina, and Paraguay exhibit high punctuation frequencies, pointing to more erratic fiscal patterns. These contrasts echo the broader literature on fiscal governance and institutional capacity in Latin America.

Although the present study does not include country-level explanatory variables, the descriptive patterns suggest that macro-institutional factors—such as the strength of fiscal rules, the maturity of budgetary institutions, and exposure to economic shocks—may condition the prevalence of punctuation. Countries with countercyclical frameworks, professionalized bureaucracies, and credible fiscal commitments appear less prone to abrupt reallocations. By contrast, countries facing chronic fiscal stress, political turnover, or volatile revenues tend to experience higher volatility.

These patterns remain suggestive rather than conclusive. The multilevel models control for unobserved country-level heterogeneity but do not identify specific mechanisms. Moreover, national averages may mask within-country variation—particularly in federal systems where subnational dynamics diverge sharply from central government trends. Thus, while the findings reinforce PET's descriptive power, they leave open questions about the causal architecture underlying punctuated budget change.

This stresses the need for future research to engage more directly with explanatory variables. Comparative studies could incorporate institutional indicators (e.g., veto players, budgetary rules, audit institutions), political variables (e.g., electoral cycles, cabinet turnover), and macroeconomic shocks (e.g., recessions, commodity price collapses). Dynamic models that explicitly account for temporal dependencies or external shocks would be particularly valuable in disentangling structural versus conjunctural sources of punctuation.

By applying PET to budgetary data from 14 Latin American countries over three decades, this study makes a substantive contribution to both the empirical and theoretical literature. It extends the reach of PET into a region underrepresented in the comparative politics of policy change and provides one of the first large-N, cross-sectoral tests of the theory in the Global South. The results reinforce PET's claim that policy change is not continuous but clustered—subject to long periods of stability interrupted by abrupt shifts.

More broadly, the study contributes to the growing call to decenter policy process theory. As scholars increasingly recognize, frameworks developed in the United States or Europe often rest on assumptions that may not hold in other contexts. Latin American policy processes are frequently shaped by hybrid institutions, fragmented authority, and cyclical instability—features that challenge incrementalist premises but also invite theoretical adaptation. PET, with its emphasis on information bottlenecks, institutional friction, and nonlinear dynamics, offers conceptual tools well suited to these environments.

Nonetheless, moving from description to explanation requires greater engagement with the mechanisms that trigger punctuations. This includes not only institutional arrangements but also the interaction of political interests, administrative capacities, and contextual shocks. As Bentancur (2023) and Sainz-Santamaría (2023) argue, applying Northern frameworks to Latin America should involve critical adaptation rather than mechanical transfer. The empirical regularities identified here lay the groundwork for such efforts but do not substitute for them.

Three limitations deserve emphasis. First, the analysis focuses solely on central government expenditure, potentially underestimating volatility in federal or decentralized systems. In countries like Argentina, Brazil, or Mexico, subnational governments manage significant fiscal responsibilities, and their dynamics may differ from those at the national level. Expanding the analysis to include subnational data would provide a more complete picture of budgetary change.

Second, while the study documents variation across countries and sectors, it does not model the determinants of this variation directly. The reliance on random intercepts captures unobserved heterogeneity but leaves causal relationships untested. Future work should incorporate explicit covariates—political, institutional, and economic—to identify the drivers of punctuation and assess the conditions under which PET's predictions hold.

Third, the classification of expenditures relies on COFOG rather than the Comparative Agendas Project (CAP) coding scheme, which remains the standard in most of the PET literature. This choice reflects the fact that no Latin American country reports budget data to CAP, as well as the challenges associated with coding such extensive datasets (Workman et al., 2022). Looking ahead, a valuable task for the research community will be to promote the incorporation of Latin American cases into CAP, which would enable more direct comparability and integration with ongoing international research agendas.

Conclusion

This study offers the first systematic application of PET to the analysis of budgetary dynamics in Latin America. Drawing on disaggregated data on central government expenditures across 14 countries, the findings reveal consistent leptokurtic patterns in annual budget changes—characterized by high concentrations of small adjustments and a non-negligible incidence of large shifts. These results, supported by a battery of distributional statistics and formal normality tests, provide strong evidence against the incrementalist model and affirm PET's core empirical expectations.

Beyond this general confirmation, the analysis uncovers two significant sources of variation. First, sectoral differences are marked: areas such as housing, economic affairs, and culture exhibit greater volatility, while education, health, and public order display relative stability. These patterns suggest that budget dynamics are shaped not only by national institutional contexts but also by intrinsic features of policy sectors, including their political salience, exposure to shocks, and degree of institutionalization.

Second, the frequency of punctuation varies substantially across countries. Chile, Uruguay, and Mexico present more stable fiscal trajectories, while Argentina, Paraguay, and the Dominican Republic exhibit greater volatility. These contrasts point to the potential influence of macroeconomic conditions, institutional quality, and fiscal governance frameworks. While this study does not model these factors explicitly, the results provide a strong empirical basis for future causal investigations.

The principal contribution of this article lies in extending PET to a diverse and underexplored regional context, thus responding to recent calls to globalize policy process theories. PET's focus on institutional friction and non-linear change proves analytically valuable for capturing fiscal dynamics in contexts marked by structural heterogeneity and political complexity.

At the same time, the study highlights the need for explanatory designs that move beyond descriptive regularities. Future research should integrate subnational data, dynamic covariates, and sector-specific attributes to better understand when, where, and why punctuation occurs. In doing so, PET can serve not only as a descriptive framework but as a foundation for more context-sensitive, comparative, and theoretically generative analyses of policy change.

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Appendices

A. Robustness Checks with Alternative Winsorization Thresholds

To assess whether the main findings depend on the chosen winsorization rule (capping extreme values at +1000%), we replicated the analysis under alternative thresholds of +500%, +300%, and +100%. For each specification, kurtosis, skewness, L-kurtosis, and L-skewness were recalculated. As shown in Table A1, all countries consistently exhibit kurtosis and L-kurtosis values well above the benchmarks of a normal distribution (3 and 0.123, respectively), regardless of the threshold applied.

Table A1. Kurtosis, Skewness, L-kurtosis, and L-skewness of Annual Percentage Changes in Central Government Budgets in Latin America, replicating winsorization at 500%, 300%, and 100%.

Country	Winsorization 500%				Winsorization 300%				Winsorization 100%			
	Kur	Ske	L-kur	L-ske	Kur	Ske	L-kur	L-ske	Kur	Ske	L-kur	L-ske
ARG	72.00	6.83	0.33	0.22	29.31	4.02	0.30	0.18	2.16	0.81	0.23	0.09
BHS	72.36	6.48	0.42	0.20	56.14	5.43	0.41	0.18	7.12	1.06	0.36	0.11
BRA	70.37	6.76	0.44	0.24	28.29	4.02	0.41	0.20	3.85	0.94	0.34	0.10
CHL	5.50	0.80	0.30	0.07	5.50	0.80	0.30	0.07	5.50	0.80	0.30	0.07
COL	54.98	5.46	0.40	0.23	36.29	4.21	0.39	0.22	5.30	1.05	0.33	0.15
CRI	58.65	6.47	0.49	0.23	30.94	4.43	0.46	0.18	4.58	0.40	0.36	0.03
DOM	10.49	1.96	0.26	0.16	10.49	1.96	0.26	0.16	1.69	0.83	0.23	0.13
GTM	24.88	3.64	0.36	0.23	24.88	3.64	0.36	0.23	7.27	1.64	0.31	0.17
JAM	53.14	6.28	0.45	0.34	29.89	4.66	0.42	0.30	4.45	1.47	0.32	0.17
MEX	7.93	0.91	0.30	0.03	7.93	0.91	0.30	0.03	7.93	0.91	0.30	0.03
NIC	30.52	5.12	0.53	0.48	17.66	3.89	0.47	0.42	2.86	1.33	0.33	0.22
PRY	37.91	5.62	0.51	0.39	19.59	3.72	0.44	0.30	3.16	0.68	0.32	0.14
SLV	27.76	4.80	0.55	0.41	15.68	3.49	0.51	0.34	2.82	0.78	0.38	0.13
URY	86.36	7.55	0.44	0.26	64.32	6.30	0.43	0.24	8.90	2.10	0.37	0.17

Note: Ku = Kurtosis, Sk = Skewness, L-Ku = L-kurtosis, L-Sk = L-skewness.

Source: Author's calculations, based on CEPALstat and World Bank.

We also repeated the Shapiro–Wilk and Kolmogorov–Smirnov tests of normality for each country under these alternative thresholds. Results, reported in Table A2, uniformly reject the null hypothesis of normality. The only partial exception arises in Argentina, where the Kolmogorov–Smirnov test does not reject normality under the most restrictive 100% threshold—a specification that substantially distorts the underlying data. Even in this case, however, the Shapiro–Wilk test rejects normality. Since both tests strongly reject normality under the 1000%, 500%, and 300% thresholds, and at least one test rejects it even under the 100% threshold, we conclude with high confidence that the distribution of annual budget changes departs from normality in all countries, including Argentina.

Table A2. Shapiro–Wilk and Kolmogorov–Smirnov Tests of Normality for Annual Percentage Changes in Central Government Budgets in Latin America, replicating winsorization at 500%, 300%, and 100%.

Winsorization threshold	Country	n	S-W		K-S	
			stat	p	stat	p
500%	ARG	269	0.56	1.60×10^{-25} ***	0.20	1.95×10^{-9} ***
	BHS	250	0.56	1.30×10^{-24} ***	0.21	2.10×10^{-10} ***
	BRA	272	0.53	2.46×10^{-26} ***	0.23	3.43×10^{-13} ***
	CHL	300	0.90	6.72×10^{-13} ***	0.11	8.76×10^{-4} ***
	COL	280	0.62	1.73×10^{-24} ***	0.20	8.26×10^{-10} ***
	CRI	241	0.48	5.04×10^{-26} ***	0.25	5.18×10^{-14} ***
	DOM	289	0.88	2.37×10^{-14} ***	0.13	2.34×10^{-4} ***
	GTM	270	0.70	1.37×10^{-21} ***	0.19	1.20×10^{-8} ***
	JAM	262	0.49	8.69×10^{-27} ***	0.26	7.44×10^{-16} ***
	MEX	210	0.87	1.91×10^{-12} ***	0.12	3.89×10^{-3} **
	NIC	250	0.46	6.68×10^{-27} ***	0.32	1.13×10^{-22} ***
	PRY	214	0.46	3.91×10^{-25} ***	0.27	2.38×10^{-14} ***
	SLV	288	0.49	4.79×10^{-28} ***	0.31	2.53×10^{-24} ***
	URY	273	0.50	4.94×10^{-27} ***	0.23	1.92×10^{-13} ***
300%	ARG	269	0.72	4.39×10^{-21} ***	0.15	8.98×10^{-6} ***
	BHS	250	0.61	2.43×10^{-23} ***	0.20	1.87×10^{-9} ***
	BRA	272	0.67	1.24×10^{-22} ***	0.21	1.07×10^{-10} ***
	CHL	300	0.90	6.72×10^{-13} ***	0.11	8.76×10^{-4} ***
	COL	280	0.68	1.06×10^{-22} ***	0.19	6.22×10^{-9} ***
	CRI	241	0.59	1.93×10^{-23} ***	0.24	3.64×10^{-12} ***

	DOM	289	0.88	2.37×10^{-14} ***	0.13	2.34×10^{-4} ***
	GTM	270	0.70	1.37×10^{-21} ***	0.19	1.20×10^{-8} ***
	JAM	262	0.59	1.32×10^{-24} ***	0.23	1.40×10^{-12} ***
	MEX	210	0.87	1.91×10^{-12} ***	0.12	3.89×10^{-3} **
	NIC	250	0.56	1.16×10^{-24} ***	0.29	5.38×10^{-19} ***
	PRY	214	0.63	2.22×10^{-21} ***	0.22	1.12×10^{-9} ***
	SLV	288	0.60	2.25×10^{-25} ***	0.28	6.91×10^{-20} ***
	URY	273	0.56	1.07×10^{-25} ***	0.22	3.90×10^{-12} ***
100%	ARG	269	0.95	4.29×10^{-8} ***	0.08	6.40×10^{-2}
	BHS	250	0.85	4.22×10^{-15} ***	0.15	2.51×10^{-5} ***
	BRA	272	0.89	2.31×10^{-13} ***	0.16	4.05×10^{-6} ***
	CHL	300	0.90	6.72×10^{-13} ***	0.11	8.76×10^{-4} ***
	COL	280	0.86	4.95×10^{-15} ***	0.15	8.26×10^{-6} ***
	CRI	241	0.88	7.09×10^{-13} ***	0.17	1.81×10^{-6} ***
	DOM	289	0.95	1.16×10^{-8} ***	0.11	2.35×10^{-3} **
	GTM	270	0.84	3.08×10^{-16} ***	0.15	1.12×10^{-5} ***
	JAM	262	0.86	8.31×10^{-15} ***	0.16	1.87×10^{-6} ***
	MEX	210	0.87	1.91×10^{-12} ***	0.12	3.89×10^{-3} **
	NIC	250	0.85	4.55×10^{-15} ***	0.19	1.87×10^{-8} ***
	PRY	214	0.89	1.44×10^{-11} ***	0.15	1.70×10^{-4} ***
	SLV	288	0.84	1.59×10^{-16} ***	0.19	3.44×10^{-9} ***
	URY	273	0.79	2.25×10^{-18} ***	0.18	3.98×10^{-8} ***

Source: Author's calculations, based on CEPALstat and World Bank. See notes in Table 4.

B. Robustness Checks with Alternative Deflator

To examine whether annual variations in government spending are sensitive to the choice of deflator, the full analysis was replicated using the World Bank GDP implicit deflator (linked series) instead of the Consumer Price Index (CPI). The GDP deflator provides a broader indicator of price dynamics, as it reflects not only consumption but also investment, government expenditure, and trade. The linked series further ensures temporal comparability across different base years, avoiding distortions caused by national accounts' rebasing practices.

Table A3 replicates the descriptive statistics reported in Table 1, this time using the GDP deflator. The results are highly consistent with those based on the CPI: differences between both exercises are substantively negligible, reinforcing the robustness of the main findings.

Table A3. Descriptive statistics of annual percentage changes in central government budgets of Latin America, deflated using the World Bank GDP deflator.

Country	n	Min	Mean	Median	SD	Max
ARG	269	-50.53	9.33	3.88	67.02	1000.00
BHS	250	-81.88	5.46	2.62	29.51	349.55
BRA	272	-73.35	6.76	2.59	44.89	581.22
CHL	300	-35.48	6.06	5.21	10.93	59.99
COL	280	-88.69	9.47	5.75	32.13	363.69
CRI	241	-91.91	10.36	4.68	73.17	1000.00
DOM	289	-67.35	10.56	6.99	29.00	218.98
GTM	270	-74.44	7.06	4.20	25.52	229.41
JAM	262	-73.19	8.02	2.37	50.05	612.64
MEX	210	-59.52	4.27	3.45	16.06	98.12
NIC	250	-79.50	13.94	5.03	74.63	932.74
PRY	214	-98.72	22.00	5.81	111.62	1000.00
SLV	288	-96.91	17.29	3.92	77.98	652.00
URY	273	-41.37	5.86	2.80	28.23	355.98

Source: Author's calculations, based on CEPALstat and World Bank.

Table A4 reports kurtosis, skewness, L-kurtosis, and L-skewness calculated with the GDP deflator. As in the original analysis, all countries exhibit values well above the benchmarks of a normal distribution (3 and 0.123, respectively). While country-specific values vary slightly—some increasing, others decreasing—these differences show no systematic bias, indicating that results are robust under both deflation methods.

Table A4. Kurtosis, Skewness, L-kurtosis, and L-skewness of Annual Percentage Changes in Central Government Budgets in Latin America, deflated using the World Bank GDP deflator.

Country	n	Kur	Ske	L-kur	L-ske
ARG	269	180.81	12.50	0.47	0.34
BHS	250	75.23	6.65	0.43	0.20
BRA	272	100.77	8.32	0.46	0.25
CHL	300	4.74	0.90	0.26	0.09
COL	280	54.93	5.47	0.39	0.23
CRI	241	142.17	10.89	0.55	0.33
DOM	289	9.62	1.84	0.25	0.15
GTM	270	27.34	3.82	0.36	0.22
JAM	262	87.68	8.07	0.46	0.32
MEX	210	8.49	0.95	0.30	0.03
NIC	250	98.72	8.92	0.55	0.41
PRY	214	60.77	7.49	0.59	0.51
SLV	288	35.46	5.40	0.56	0.43
URY	273	88.42	7.65	0.44	0.27

Source: Author's calculations, based on CEPALstat and World Bank.

Shapiro–Wilk and Kolmogorov–Smirnov tests were also replicated under the GDP deflator. As shown in Table A5, the null hypothesis of normality is rejected in all cases, confirming at the 95% confidence level that distributions deviate significantly from Gaussian expectations.

Table A5. Shapiro–Wilk and Kolmogorov–Smirnov Tests of Normality for Annual Percentage Changes in Central Government Budgets in Latin America, deflated using the World Bank GDP deflator.

Country	n	Shapiro–Wilk		Kolmogorov–Smirnov	
		statistic	p-value	statistic	p-value
ARG	269	0.26	2.15×10^{-31} ***	0.31	2.59×10^{-22} ***
BHS	250	0.55	6.83×10^{-25} ***	0.22	3.49×10^{-11} ***
BRA	272	0.47	9.29×10^{-28} ***	0.26	6.31×10^{-16} ***
CHL	300	0.92	2.30×10^{-11} ***	0.09	1.24×10^{-2} *
COL	280	0.62	1.57×10^{-24} ***	0.19	1.79×10^{-9} ***
CRI	241	0.29	1.61×10^{-29} ***	0.31	1.84×10^{-20} ***
DOM	289	0.89	1.24×10^{-13} ***	0.12	4.65×10^{-4} ***
GTM	270	0.69	6.23×10^{-22} ***	0.18	2.45×10^{-8} ***
JAM	262	0.43	4.95×10^{-28} ***	0.26	1.08×10^{-15} ***
MEX	210	0.87	1.33×10^{-12} ***	0.11	1.24×10^{-2} *
NIC	250	0.33	2.69×10^{-29} ***	0.32	3.18×10^{-22} ***
PRY	214	0.29	6.07×10^{-28} ***	0.33	6.04×10^{-21} ***
SLV	288	0.45	9.82×10^{-29} ***	0.31	6.83×10^{-25} ***
URY	273	0.50	4.68×10^{-27} ***	0.24	8.61×10^{-14} ***

Source: Author's calculations, based on CEPALstat and World Bank. See notes in Table 4.

Table A6 presents the percentage of punctuations by policy sector, along with the differences relative to CPI-based calculations (see Figure 3). In all cases, sectoral rates vary by less than 2 percentage points, and the relative ranking of sectors remains unchanged.

Table A6. Percentage of Disruptive Changes by Policy Sector in Latin America, deflated using the World Bank GDP deflator.

Policy Sector	**n**	**Punctuations**	**% of Punctuations**	**Difference from CPI (%)**
Housing and Community Amenities	381	137	36.0%	-1.5%
Environmental Protection	280	90	32.1%	0.7%
Recreation, Culture, and Religion	307	84	27.4%	0.4%
Economic Affairs	393	85	21.6%	-1.3%
Social Protection	389	70	18.0%	-1.5%
General Public Services	393	47	12.0%	-0.2%
Health	393	39	9.9%	-1.6%
Defense	360	32	8.9%	0.0%
Education	393	24	6.1%	-1.3%
Public Order and Safety	379	22	5.8%	-0.5%

Source: Author's calculations, based on CEPALstat and World Bank.

Tables A7 and A8 report the logistic regression models estimated with the GDP deflator, corresponding to the analyses in Tables 4 and 5 of the main text. In both the pooled and multilevel models, the sign and significance of sectoral coefficients remain stable. Minor shifts in significance levels (e.g., from ** to * or vice versa) do not alter the substantive conclusions.

Table A7. Logistic Regression Predicting the Probability of Budget Punctuation by Policy Sector in Latin America, deflated using the World Bank GDP deflator.

Term	estimate	std error	z-value	p-value	OR	OR-low	OR-high
(Intercept)	-1.996	0.155	-12.841	$< 2.00 \times 10^{-16}$ ***	0.136	0.100	0.184
Defense (GF02)	-0.331	0.242	-1.369	0.17	0.718	0.447	1.154
Public Order and Safety (GF03)	-0.79	0.269	-2.937	3.31×10^{-3} **	0.454	0.268	0.769
Economic Affairs (GF04)	1	0.201	6.204	5.52×10^{-10} ***	3.487	2.350	5.174
Environmental Protection (GF05)	0.709	0.198	3.581	3.42×10^{-4} ***	2.032	1.378	2.995
Housing and Community Amenities (GF06)	1	0.189	7.525	5.27×10^{-14} ***	4.133	2.856	5.982
Health (GF07)	-0.209	0.229	-0.913	0.36	0.811	0.517	1.272
Recreation, Culture, and Religion (GF08)	1.02	0.201	5.065	4.09×10^{-7} ***	2.773	1.869	4.115
Education (GF09)	-0.736	0.262	-2.813	4.91×10^{-3} **	0.479	0.287	0.800
Social Protection (GF10)	0.48	0.204	2.352	1.87×10^{-2} *	1.615	1.083	2.409
Observations: 3,668	McFadden's pseudo R^2: 0.081	AIC: 3,113.4					

Source: Author's calculations, based on CEPALstat and World Bank. See notes in Table 4.

Table A8. Multilevel Logistic Regression Predicting the Probability of Budget Punctuation by Policy Sector in Latin America, with Random Intercepts for Country and Year, deflated using the World Bank GDP deflator.

Term	estimate	std error	z-value	p-value	OR	OR-low	OR-high
(Intercept)	-2.238	0.261	-8.579	9.54×10^{-18} ***	0.107	0.064	0.178
Defense (GF02)	-0.359	0.249	-1.442	0.15	0.698	0.428	1.138
Public Order and Safety (GF03)	-0.832	0.275	-3.026	2.48×10^{-3} **	0.435	0.254	0.746
Economic Affairs (GF04)	1.685	0.214	7.860	3.83×10^{-15} ***	5.391	3.542	8.205
Environmental Protection (GF05)	0.781	0.206	3.787	1.53×10^{-4} ***	2.183	1.457	3.270
Housing and Community Amenities (GF06)	1.623	0.199	8.172	3.03×10^{-16} ***	5.067	3.433	7.478
Health (GF07)	-0.225	0.236	-0.954	0.34	0.798	0.502	1.268
Recreation, Culture, and Religion (GF08)	1.206	0.213	5.666	1.46×10^{-8} ***	3.338	2.200	5.066
Education (GF09)	-0.783	0.268	-2.927	3.42×10^{-3} **	0.457	0.270	0.772
Social Protection (GF10)	0.532	0.212	2.509	1.21×10^{-2} *	1.702	1.123	2.578
Observations: 3,668 Marginal R^2: 0.157 Conditional R^2: 0.327 Random intercept variances: country = 0.3549, year = 0.4781 AIC: 2,904.2							

Source: Author's calculations, based on CEPALstat and World Bank. See notes in Table 4.

Finally, Table A9 replicates the cross-national share of punctuations (Figure 5 in the main text). Variations relative to the CPI-based results remain below 2% in all countries, except in Argentina, where the GDP deflator produces an 8.6% lower rate. This discrepancy likely reflects the country's episodes of high inflation and recurrent rebasing of national accounts, which affect

CPI and GDP deflators differently. While the CPI tracks consumer price changes, the GDP deflator captures broader dynamics of investment, public expenditure, and trade, which can either amplify or dampen fluctuations in highly volatile contexts.

Table A9 | Percentage of Disruptive Changes by Country in Latin America, deflated using the World Bank GDP deflator.

Country	n	punctuations	% of Punctuations	Difference from CPI (%)
DOM	289	87	30.1%	1.4%
PRY	214	52	24.3%	-0.9%
SLV	288	68	23.6%	0.0%
ARG	269	53	19.7%	-8.6%
NIC	250	49	19.6%	-0.8%
BRA	272	53	19.5%	-1.8%
JAM	262	51	19.5%	0.8%
CRI	241	45	18.7%	-1.2%
COL	280	46	16.4%	-0.4%
GTM	270	36	13.3%	0.3%
BHS	250	31	12.4%	0.0%
URY	273	28	10.3%	0.8%
MEX	210	16	7.6%	-0.5%
CHL	300	15	5.0%	0.0%

Source: Author's calculations, based on CEPALstat and World Bank.

C. Macro controls in Regression Models

To test whether macroeconomic volatility drives the results, multilevel logit models were re-estimated including GDP growth and inflation (World Bank data) as covariates. Sectoral effects remain stable in sign, magnitude, and significance, and the overall fit of the models improves only modestly. This indicates that macroeconomic conditions explain part of the variance but do not alter the sectoral patterns observed.

Table A10 presents the models with macroeconomic controls. Compared to the baseline specification (Table 5), all sectoral coefficients retain their direction and statistical significance at the 95% level. Magnitudes change only marginally, reinforcing the robustness of the findings when these additional covariates are included.

The controls themselves show limited explanatory power: GDP growth is not statistically significant, while inflation has a small positive effect with marginal significance ($p < 0.05$). Overall, this suggests that the observed sectoral differences in punctuation are not artifacts of short-term macroeconomic fluctuations, but instead reflect more structural patterns in budget allocation.

Table A10. Multilevel Logistic Regression Predicting the Probability of Budget Punctuation by Policy Sector in Latin America, with Random Intercepts for Country and Year, including World Bank GDP Growth and CPI as controls.

Term	**estimate**	**std error**	**z-value**	**p-value**	**OR**	**OR-low**	**OR-high**
(Intercept)	-2.244	0.257	-8.722	2.72×10^{-18} ***	0.106	0.064	0.176
Defense (GF02)	-0.364	0.250	-1.459	0.15	0.695	0.426	1.133
Public Order and Safety (GF03)	-0.837	0.276	-3.039	2.38×10^{-3} **	0.433	0.252	0.743
Economic Affairs (GF04)	0.784	0.207	3.793	1.49×10^{-4} ***	2.189	1.460	3.282
Environmental Protection (GF05)	1.689	0.215	7.873	3.46×10^{-15} ***	5.415	3.556	8.247
Housing and Community Amenities (GF06)	1.626	0.199	8.177	2.90×10^{-16} ***	5.086	3.444	7.511
Health (GF07)	-0.226	0.237	-0.956	0.34	0.797	0.501	1.268
Recreation, Culture, and Religion (GF08)	1.207	0.213	5.666	1.46×10^{-8} ***	3.344	2.203	5.078
Education (GF09)	-0.787	0.268	-2.933	3.35×10^{-3} **	0.455	0.269	0.770
Social Protection (GF10)	0.533	0.212	2.508	1.21×10^{-2} *	1.703	1.123	2.582
GDP Growth	0.095	0.065	1.476	1.40×10^{-1}	1.100	0.969	1.248
CPI	0.100	0.041	2.453	1.42×10^{-2} *	1.105	1.020	1.197
Observations: 3,668 Marginal R^2: 0.162 Conditional R^2: 0.323 Random intercept variances: country = 0.59106, year = 0.65613 AIC: 2,900.2							

Source: Author's calculations, based on CEPALstat and World Bank. See notes in Table 4.

D. Excluding Extreme Cases (Nicaragua and Paraguay)

To address the possibility that extreme volatility in specific countries biases the results, Nicaragua and Paraguay were excluded from the regression analyses. Both countries displayed unusually high variability and extreme values in the descriptive statistics.

Table A11 replicates the simple logistic regression (Table 4) without these cases. The results remain stable: coefficients retain the same signs, and all sectors that were statistically significant in the baseline specification remain significant. Odds ratios for the most volatile sectors—Housing and Community Amenities, Economic Affairs, Environmental Protection, and Recreation, Culture, and Religion—are nearly identical to the original estimates, as are those for more stable sectors such as Education and Public Order.

Table A11. Logistic Regression Predicting the Probability of Budget Punctuation by Policy Sector in Latin America, excluding Nicaragua and Paraguay.

Term	estimate	std error	z-value	p-value	OR	OR-low	OR-high
(Intercept)	-2.057	0.170	-12.094	2.00×10^{-16} ***	0.128	0.092	0.178
Defense (GF02)	-0.180	0.257	-0.703	0.48	0.835	0.505	1.380
Public Order and Safety (GF03)	-0.684	0.287	-2.387	1.70×10^{-2} *	0.505	0.288	0.885
Economic Affairs (GF04)	0.879	0.212	4.141	3.46×10^{-5} ***	2.409	1.589	3.651
Environmental Protection (GF05)	1.188	0.220	5.403	6.57×10^{-8} ***	3.281	2.132	5.049
Housing and Community Amenities (GF06)	1.511	0.204	7.403	1.33×10^{-13} ***	4.532	3.037	6.760
Health (GF07)	-0.059	0.243	-0.243	0.81	0.943	0.585	1.519
Recreation, Culture, and Religion (GF08)	0.968	0.222	4.367	1.26×10^{-5} ***	2.633	1.705	4.067
Education (GF09)	-0.579	0.275	-2.108	3.51×10^{-2} *	0.560	0.327	0.960
Social Protection (GF10)	0.516	0.222	2.329	1.99×10^{-2} *	1.676	1.085	2.588
Observations: 3,204	McFadden's pseudo R^2: 0.075		AIC: 2747.5				

Source: Author's calculations, based on CEPALstat and World Bank. See notes in Table 4.

Table A12 presents the multilevel logistic regression model excluding Nicaragua and Paraguay. Again, results are consistent with those in Table 5: all coefficients retain their signs, all previously significant effects remain so, and effect sizes vary only marginally.

Table A12. Multilevel Logistic Regression Predicting the Probability of Budget Punctuation by Policy Sector in Latin America, with Random Intercepts for Country and Year, excluding Nicaragua and Paraguay.

Term	estimate	std error	z-value	p-value	OR	OR-low	OR-high
(Intercept)	-2.336	0.285	-8.189	2.63×10^{-16} ***	0.097	0.055	0.169
Defense (GF02)	-0.188	0.264	-0.712	0.47	0.828	0.494	1.391
Public Order and Safety (GF03)	-0.725	0.292	-2.480	1.31×10^{-2} *	0.484	0.273	0.859
Economic Affairs (GF04)	0.969	0.221	4.384	1.16×10^{-5} ***	2.634	1.709	4.062
Environmental Protection (GF05)	1.532	0.233	6.566	5.18×10^{-11} ***	4.626	2.928	7.307
Housing and Community Amenities (GF06)	1.708	0.214	7.966	1.64×10^{-15} ***	5.519	3.625	8.403
Health (GF07)	-0.064	0.250	-0.254	0.80	0.938	0.575	1.533
Recreation, Culture, and Religion (GF08)	1.187	0.234	5.081	3.75×10^{-7} ***	3.278	2.074	5.182
Education (GF09)	-0.615	0.281	-2.192	2.84×10^{-2} *	0.540	0.312	0.937
Social Protection (GF10)	0.569	0.230	2.477	1.32×10^{-2} *	1.767	1.126	2.773
Observations: 3,204 Marginal R^2: 0.141 Conditional R^2: 0.319 Random intercept variances: country = 0.64598, year = 0.66209 AIC: 2,558.5							

Source: Author's calculations, based on CEPALstat and World Bank. See notes in Table 4.

Overall, this robustness check confirms that the sectoral patterns observed are not driven by the inclusion of countries with atypical fiscal trajectories, but instead reflect systematic regional regularities.