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The Two Clocks of Carbon-Market Governance: National Approval Synchronisation and International Registry Visibility in the CDM-to-PACM Transition

Iñigo de Loyola Arraiza Rivero

iarraiza001@gmail.com

Universidad de Burgos

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Abstract

International carbon-crediting mechanisms combine project-initiated applications with nationally signed acts and centrally published registers. The resulting event dates need not coincide. We construct a project-level audit of the transition from the Clean Development Mechanism (CDM) to the Paris Agreement Crediting Mechanism (PACM), comparing a frozen 8 October 2026 UNFCCC export with a separately acquired 9 November export. Among 285 approved Project Activities (PAs) from 20 host countries with at least five approved activities, the mean country-specific share concentrated on the most common approval date is 89.4%, compared with 38.0% for the original transition-request dates of those same projects (difference 51.3 percentage points; country-cluster bootstrap 95% interval 38.2–63.5). In exploratory, week-constrained permutations preserving country-week composition and the global within-week date distribution, no allocation among 1,800 simulations reaches the observed concentration (Monte Carlo p=0.00056). A separate programme-level audit finds that 24 of 33 distinct host-country-by-date approval events for Programmes of Activities (PoAs) coincide with a same-country PA approval date (week-constrained p=0.0072). Two official exports differ in 145 cells across 37 common records; two newly visible approvals were dated before the national deadline, while one historically irregular activity disappears from the later export without demonstrated withdrawal. The dated national act and its public appearance therefore encode different observables. These results document cross-activity temporal synchronisation and registry-version sensitivity, not collective governmental deliberation, causal approval preferences, or independent UNFCCC receipt timestamps. We propose event-centred reporting that preserves country, activity type, signed date, publication date and snapshot provenance.

Keywords: Article 6.4; Paris Agreement Crediting Mechanism; Clean Development Mechanism; Host Party approval; temporal synchronisation; registry transparency

1. Introduction

Market mechanisms under the Paris Agreement sit at the intersection of nationally exercised authority and internationally coordinated procedures. A carbon-crediting project may initiate its own application, yet later steps depend on national declarations, documentation, a shared registry and central review. It is consequently possible for several projects to carry the same national approval date even when they submitted requests months or years apart; it is equally possible for a public registry to display several documents together despite different dates on the underlying instruments. These are analytically distinct forms of synchronisation. Treating them as a single project-by-project temporal process obscures how climate-market governance is actually observed.

The transition of registered CDM activities to the PACM offers a bounded test. Under the decisions governing Article 6.4, participants requested transition and host countries provided approvals by a deadline extended to 30 June 2026; final transition, registration and issuance require further stages (UNFCCC, 2021, 2025, 2026a). The export contains project identifiers, request dates, approval dates and publication dates. It also contains two types of entities—stand-alone Project Activities (PAs) and

Programmes of Activities (PoAs), the latter sometimes involving more than one host Party. This structure is unusually suitable for examining how dates cluster within jurisdictions and across activity types, provided that dates, units and legal decisions are not conflated.

The basic fact that national approval can be undertaken in batches is not new. Lo Re and Ellis (2021) explicitly examined aggregated and individual approval approaches in the early operational design of Article 6.4. Earlier studies of CDM project timing addressed duration and institutional variation (Magnusson, 2014; Liu et al., 2018), while governance scholarship studied fragmentation, intermediaries and transparency in carbon markets and multilateral climate institutions (Ahonen et al., 2022; Herman, 2024; Bergsvik et al., 2024). More recent PACM reporting highlights the substantial reduction of the legacy pipeline following national approval requirements (Jain, 2026). None of those sources by itself identifies how strongly actual dates on transition approvals cluster within countries, whether that clustering crosses PA/PoA boundaries, or how two official snapshots change the measured history.

The institutional division is also visible in scholarship published in International Environmental Agreements: Politics, Law and Economics. Pattberg and Stripple (2008) describe a plurality of public, hybrid and private authority in transnational climate governance, whereas Gehring and Spielmann (2023) distinguish the decision-making capacity and organisational autonomy of the UNFCCC/Paris treaty-management architecture. These accounts clarify why an individual host-country approval instrument and a centrally managed public listing should not be treated as the same administrative act. Neither account documents the country-day distribution of CDM-to-PACM approvals; that is the empirical object of this study.

We therefore pose a narrower and more falsifiable research question: to what extent are the recorded dates of host-country approval documents synchronised within jurisdictions beyond the concentration expected from the dates of applications and the shared calendar, and what happens when researchers measure that process through versioned, centrally published records? We distinguish three related but non-equivalent empirical objects: (i) the date written on a host-country approval instrument; (ii) the submission date as recorded by the transition-list export; and (iii) the date the approval becomes publicly visible. We make no claim that the export's identically populated approval-date and submission-date fields constitute two independent clocks.

The contribution has three components. First, we quantify country-day synchronisation for projects eventually approved and benchmark it against request-date concentration for the *same projects*, using country-level aggregation, cluster resampling and calendar-conditioned randomisation. Second, we examine distinct PoA country-date events, with careful treatment of multinational programmes, as a cross-type—not independent-source—validation. Third, we compare two official register exports and the corresponding dated documents to reveal a measurable gap between dated approval and later public visibility. The paper contributes a transparent measurement framework and an empirical audit of administrative time, not a new theory that batching is possible or a causal estimate of governmental behaviour.

2. Institutional framework and empirical propositions

2.1. Three administrative timestamps

A host Party approval is a national administrative instrument concerning transition of a particular CDM activity. A designated national authority or other notified representative signs the prescribed form. The approval is not itself an Article 6.4 registration, credit authorisation for transfer, or issuance of emission-reduction units (UNFCCC, 2026a). For some subsequent methodological documentation, the date of

publication of the approval—not merely its signature—enters the applicable timetable (UNFCCC, 2026a, 2026c). Hence the semantic content of each date is consequential, regardless of the number of days separating two entries.

The UNFCCC transition-list export provides Host Party Approval Date, Host Party Approval Submission Date and Host Party Approval Publication Date. Among the 335 PAs approved in the frozen upstream population, the first two fields are exactly equal, record by record. This equality is a property of the export; it should not be read as evidence that physical signing and technical receipt always happened simultaneously. We refer to the first two as the *recorded national date* unless a primary form independently corroborates signing. The third field measures public visibility in the exported list. Individual host approval forms, inspected across several jurisdictions, confirm country-specific signatories and groups of separate activities bearing the same date.

2.2. Testable hypotheses and rival mechanisms

H1 (within-country concentration): for approved projects, dates recorded on national approval documents are more concentrated within countries than the transition-request dates for the same activities, beyond the concentration produced by shared annual, monthly or weekly calendars. A country may instead exhibit no greater date concentration than requests; randomised reassignments within comparable calendar blocks may then reproduce the statistic, falsifying the claim.

H2 (cross-activity synchronisation): dates associated with PoA host-country approval events coincide with PA approval events in the same country more often than expected after preserving the calendar-week composition of PoA events. If cross-type coincidence disappears on deduplicating country-date pairs, or under calendar-conditioned nulls, the cross-activity interpretation fails. A common administrative form or representative could generate the same outcome without joint substantive assessments; H2 does not identify a shared decision procedure.

H3 (registry observability): an official snapshot of the public list is not an immutable chronicle of administrative actions. Later exports may add documents whose national dates lie in earlier periods, change processing states, or remove rows. If no date/status changes are observed, and no discrepancy exists between cumulative dated acts and their appearance, this descriptive proposition fails. H3 is not a claim that the UNFCCC receives or processes documents late: its submission timestamps cannot be independently verified from the export.

2.3. Literature review: governance levels, participation and administrative events

The governance literature distinguishes authority, participation and observable administrative outputs, but studies them at different analytical levels. Pattberg and Stripple (2008) map authority across public, public–private and non-state arenas using a conceptual and illustrative analysis of transnational climate governance. Gehring and Spielmann (2023) develop an institutional framework of organisational action capability and autonomy and examine official UNFCCC/Paris documents; their result concerns the agency of treaty-management bodies, not how national approvals are dated or released. Tegas et al. (2026) construct a longitudinal descriptive dataset on six forms of state participation across 198 Parties and 58 UN climate negotiation sessions, finding that activity extends beyond negotiation settings and varies considerably among Parties. Unlike counts of attendance or participation in diplomatic forums, our outcome is the country-day frequency of signed approval forms attached to identifiable mitigation activities.

Böhmelt (2026) uses treaty-level cross-sectional data and regression models to examine how lower-income membership and trade dependence are associated with the capacity of multilateral environmental agreements to acquire new commitments. Its unit is the agreement, not the project, and its outcome is treaty dynamism, not host-authority approval. This literature therefore motivates careful separation of the national, international and project-level units, but does not justify inferring national selection preferences, a shared merits appraisal or causal effects from coincident form dates. More proximate work on the CDM-to-PACM transition is Lo Re and Ellis (2021), which explicitly considered grouped national approval, and historical CDM duration studies (Magnusson, 2014; Liu et al., 2018). We evaluate the realised *documentary timing* of the former policy option, rather than claiming to originate it; the differences in temporal outcome and identification prevent interpreting our estimates as CDM registration hazards.

3. Data, definitions and methods

3.1. Two independent official extracts and an upstream join

We use the two UNFCCC source files frozen for the original study: the workbook of activities eligible for transition and the transition-list CSV exported on 8 October 2026. The existing full-from-raw reproduction code rebuilds the frozen upstream PA population of 3,329, of which 1,388 requested transition, 823 met a status-based operational classification and 335 had an approval date. The status-based readiness category is not used as a measure of national capacity or as an explanatory variable in the present study: its correspondence with national status labels makes such an interpretation partly mechanical. The original analysis is reproduced from the raw workbook and CSV, not from its distributed derived table, before any R1 statistics are computed.

A second, unfiltered Qlik export was obtained from the official UNFCCC transition-list display on 9 November 2026. Provenance documentation, screenshots, original bytes and SHA-256 checksums accompany that acquisition. The older export contains 1,511 entries and the newer 1,510, both with 58 columns; references are unique within each. The same schema and unaltered text data permit direct comparisons by CDM reference. Importantly, a record missing from the later display is treated as absent from that *extract*, not presumed to have been withdrawn, rejected or revoked. These two machine-readable exports are the versioned official list analysed here (UNFCCC, 2026d).

3.2. Analysis populations

The principal H1 population comprises PAs in the regenerated 8 October upstream population with an approval date and a non-missing request submission date; the irregular CDM reference 8099 is excluded a priori from the principal paired-date comparison because the request date is missing and because it disappears from the November export. There are 334 such approved PAs with both dates; restricting to host-country portfolios with at least five approved dated PAs produces 285 observations distributed across 20 countries. This lower portfolio bound avoids interpreting one-activity country cells as evidence of clustering, while still allowing explicit sensitivity to the bound. Threshold choice is part of the exploratory design, not preregistered.

H2 covers 82 PoAs with at least one recorded host approval in the original export. Where an approval-date string lists different host countries and dates, we decompose a PoA into host-country-specific events. A multinational PoA with an undifferentiated date and no country annotation is excluded from the country-specific test rather than assigned speculatively. After retaining only country-date records whose host is also observed among approved PAs, we deduplicate to unique country-date PoA events. Neither

component project activities (CPAs) nor duplicate PoAs signed the same day are counted as independent country-date decisions.

H3 compares all 58 fields of all references common to both exports. It also examines the gap between the recorded national date and the approval publication date among PAs for which this chronology is non-negative. One documented year error (PA 2638) is corrected in the analytical timing series with original and corrected values both recorded. Two other entries (4466 and 8491) present publication dates earlier than the approval date and are excluded only from lag calculations. The national document date and the publication date are both retained in the unmodified source files.

3.3. Concentration estimands

For host country c and event type e (request R or approval A), let n_c be the number of projects in the relevant within-country paired set, and n_ced the number dated on day d. The modal-day share is M_ce = max_d(n_ced/n_c). The main estimand is Δ = (1/C) Σ_c (M_cA − M_cR), an equally weighted mean across the C included countries. An activity-weighted counterpart is reported to reveal large-country influence. As a non-modal concentration check we compute H_ce = Σ_d(n_ced/n_c)^2, the Herfindahl index of national event dates, and its reciprocal as the effective number of event dates. These describe the distribution of administrative dates; they are not estimates of latent government preferences or efficiency.

Within-country differences are paired at the level of the same approved projects. To represent jurisdictional dependence, a percentile interval for Δ resamples *countries* with replacement, not individual PAs. We also report an exact one-sided sign test on positive versus negative country differences, excluding ties, as a descriptive robustness check. With only 20 clusters, neither of these steps eliminates all uncertainty about the selected population (Cameron and Miller, 2015). The country shares are reported in full to make outlier influence inspectable.

3.4. Constrained permutation inference

For H1 we hold fixed every PA's country, request date and membership of a calendar block, and reallocate its approval date among PAs whose observed approval occurred in that block. This preserves country-by-block portfolio sizes and the block's empirical day frequencies. The six specified null schemes use global, year, month, week, month-by-methodology-family and week-by-methodology-family blocks. The test statistic is the country-average approval modal share. This null asks whether the realised allocation of calendar days *within* a shared block is unusually aligned with country; it does not randomise the observed concentration of projects into weeks or months, which remains a possible governmental or deadline-related mechanism. We use 1,800 Monte Carlo draws per primary specification and calculate upper-tail probabilities as (b+1)/(B+1), preventing an invalid report of p=0 (Phipson and Smyth, 2010). All draws use a fixed pseudorandom seed.

For H2 the tested units are unique PoA country-day events, not individual programme documents. Approval days are permuted across eligible PoA country-day units within the same calendar week, while national labels and weekly counts remain fixed. Coincidence is the share of those PoA country-days for which at least one PA has an approval dated identically in the same country. This is a conservative descriptive counterfactual for week-specific clustering; dependence among events from one multinational programme may nevertheless remain, so p-values are interpreted as exploratory rather than source-independent confirmation.

3.5. Status of inference

The research question and specification emerged during adversarial examination of an earlier descriptive study. Thus neither H1 nor H2 was preregistered, and their confidence intervals and permutation p-values are exploratory evidence of a strong observed pattern under declared nulls—not claims that all relevant rival models have been ruled out. The 2025 and 2026 partitions of the same frozen export do not constitute independent prospective cohorts. The newer November export documents revisions to the public record rather than a new cohort of post-deadline national acts. A separate 27-activity PACM global-stakeholder-consultation listing is used only as a negative control on international publication-date clustering, because it does not contain the necessary national approvals. Updated transition procedure v08.0 and standard v06.0 were published after the 8 October source freeze and are not applied retrospectively to the historical observations (UNFCCC Article 6.4 Supervisory Body, 2026b, 2026c).

Generative AI methods disclosure: OpenAI ChatGPT assisted with statistical-code development, literature discovery, exploratory drafting and document production. No AI system is an author. The sole human author retains responsibility for the study design, source interpretation, all calculations and the final text; the author must independently inspect and approve the generated manuscript before journal submission.

4. Results

4.1. Concentration in the same projects: H1

Table 1 sets out the primary paired results. The mean country modal share of approval dates is 0.8936, versus 0.3804 for request dates, a difference of 0.5132. Eighteen of the 20 countries have greater approval-date concentration, two tie and none has lower concentration. The sign test conditional on 18 non-tied countries yields $p=3.81\times10^{-6}$. Country-cluster bootstrap resampling yields a 95% percentile interval for Δ of 0.382–0.635. This is a large difference in date distributions, not an estimate of the proportion of approvals that were substantively evaluated together.

Table 1. Within-country temporal concentration, approved and paired PAs.

Statistic	Requests	Host approvals
PAs / countries	285 / 20	285 / 20
Mean within-country modal-day share	0.3804	0.8936
Activity-weighted modal-day share	0.2596	0.8877
Mean country day-HHI	0.2744	0.8585
Mean effective dates (1/HHI)	6.23	1.43

Difference in country-average modal share = 0.5132; 95% country-bootstrap interval 0.3816–0.6351. Event-date counts are not legal decision counts.

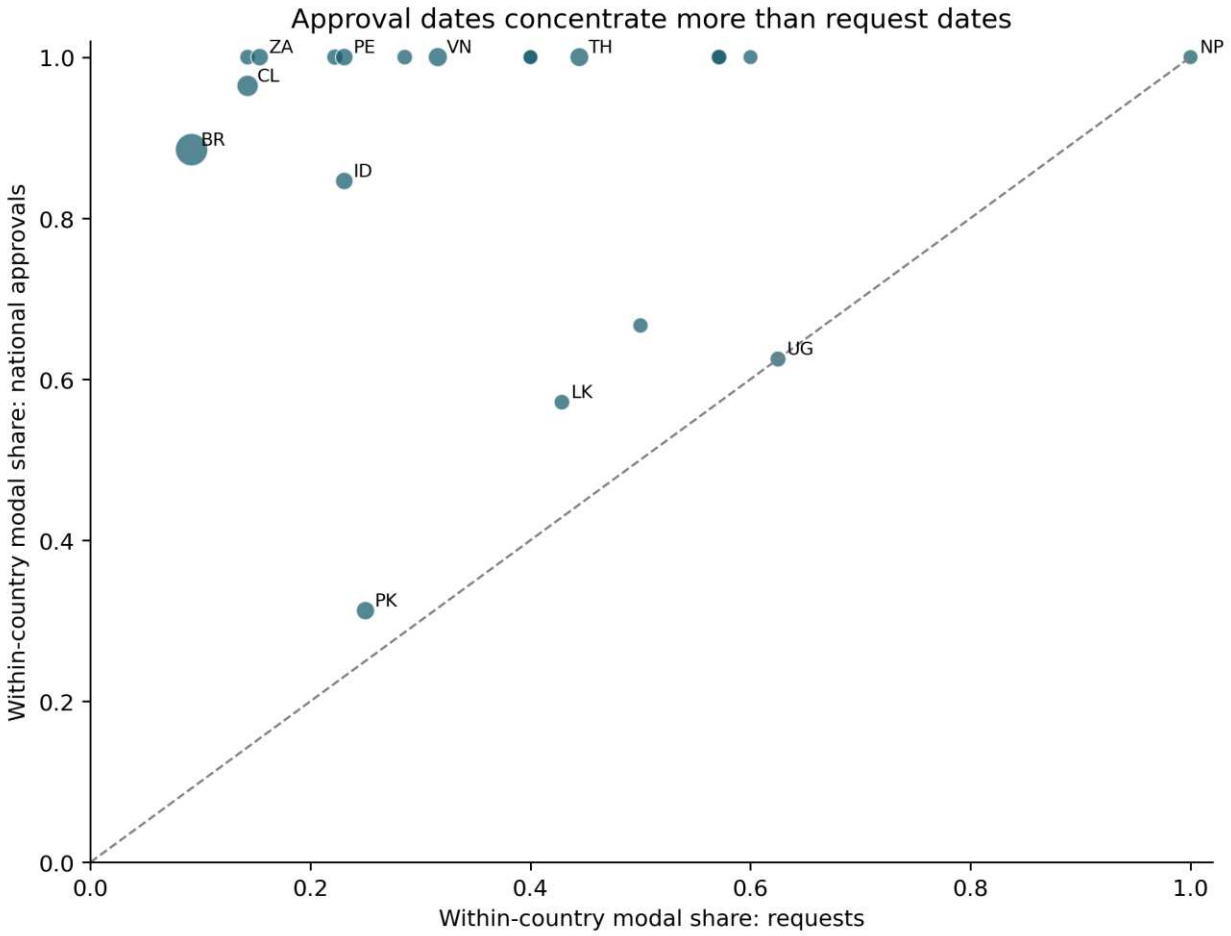


Figure 1. Paired request-date and approval-date concentration by host country. Marker area increases with approved PA portfolio size.

The parallel date-Herfindahl comparison moves from a mean of 0.2744 for requests to 0.8585 for approvals; the corresponding mean effective number of dates falls from 6.23 to 1.44. This non-modal result reduces reliance on the arbitrary choice of a single 'most frequent' day. In Brazil, 87 approved PAs have requests spread over 46 distinct dates but approvals concentrated across three dates. In Chile, 28 PAs have 16 request dates and two approval dates. Both dominate the absolute number of projects, making a country-equal estimator and their exclusion important.

4.2. Calendar and composition rivals

The null-distribution analysis explicitly tests whether the result could emerge merely because many activities fall in the same global period. Table 2 shows that controlling month and week strongly increases the expected country modal share, confirming that the calendar explains a non-trivial fraction of concentration. Yet the observed 0.8936 remains well above the average week-conditioned null of 0.7172 and above the week-by-methodology null of 0.7541. Under the 1,800 simulated allocations in each of these schemes, none attains the observed share (estimated upper-tail Monte Carlo probability 0.00056). This finding is conditional on the constructed nulls; it does not prove the national agency itself created the clustering.

Table 2. Permutation tests for approval-date concentration (1,800 draws per null).

Null restriction	Mean null	95% null range	Upper-tail p

Null restriction	Mean null	95% null range	Upper-tail p
global	0.313	0.278–0.350	0.00056
month	0.546	0.520–0.576	0.00056
week	0.717	0.696–0.741	0.00056
month_method	0.554	0.527–0.585	0.00056
week_method	0.754	0.733–0.777	0.00056

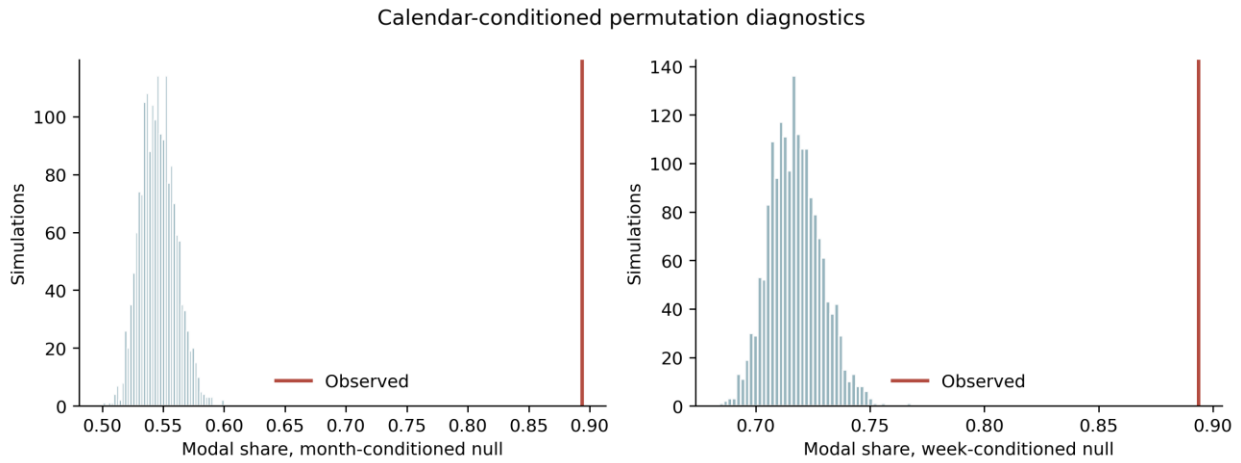


Figure 2. Empirical country-average approval-date concentration versus monthly and weekly constrained null distributions. All displayed p-values are exploratory.

Excluding Brazil and Chile leaves 170 PAs in 18 countries; the country-average paired difference remains 0.4805. Excluding the entire approval month of June 2026 leaves 198 PAs in 13 qualifying countries and Δ=0.4717. Dropping both December 2025 and June 2026, the main deadline-neighbourhood months, leaves 152 PAs in nine countries and Δ=0.4412. The latter restricted sample retains a more concentrated weekly null and still exceeds all 850 weekly simulations conducted for that sensitivity. This smaller, post hoc robustness test is reported as such rather than as a new confirmatory result. Table S3 lists every specification and its changing support.

4.3. Cross-type synchronisation: H2

A second dataset within the frozen export contains 82 approved PoAs. Their host-specific fields can yield multiple national approval events from a single multinational programme. The parsing audit obtains 116 PoA country-date records, 88 in countries with approved PAs, and finally 33 unique PoA country-date events in the comparable population. Of those 33 events, 24 (72.7%) coincide with a PA approval date in the same jurisdiction. Their observed coincidence exceeds a mean of 59.1% under 1,800 week-constrained permutations (p=0.0072). Because PoA events share the same upstream register and some derive from the same programme, this is evidence of cross-type temporal synchronisation, not a geographically or institutionally independent replication.

Primary-document spot checks illustrate what the register dates represent. On 21 May 2026, Brazilian PA and PoA forms for references 8, 52 and 6573 record the same date and designated authority representative, Aloisio Lopes Pereira de Melo. Thai PA forms 1026 and 2970 and PoA 6222 are dated 4 June 2026 with the same representative, Phirun Saiyasitpanich. These are individual activity instruments; the coincidence of dates and signatories is consistent with an administrative signing or dispatch cycle. It

does not show a common merits assessment, shared substantive criteria or a single collective decision. The Supplement lists forms and document URLs for verification.

4.4. Two registry snapshots and the international visibility clock: H3

The October and November UNFCCC exports share 1,510 identifiers. Exactly 37 of those rows change across 145 field values, including 33 revised transition statuses. There are no added activity identifiers, while reference 8099 is absent from November. Two activities acquire populated national approval fields in the later export: PA 10138 (Lao PDR, approval dated 30 June 2026, published 22 October 2026) and PoA 10667 (Brazil, dated 21 May 2026, published 23 October 2026). Their appearance in November therefore changes what a contemporary analyst can see; it does not establish that a national approval decision was taken after 8 October.

Activity 8099 provides an instructive missing-record case. Its earlier export row lacks type, title, request dates and CDM link, despite carrying a national approval date. The later snapshot omits it altogether. Its legacy CDM record, earlier transition consultation and Chilean approval form remain identifiable, and the withdrawal of a project participant is not a demonstrated withdrawal of the transition request. Neither an administrative data clean-up nor a formal withdrawal of the transition request can be established as the cause without official case-level clarification. We therefore classify 8099 as *absent from the later extract, legal status unresolved*. The paired H1 statistic is unaffected because the record lacks a request date in the first place.

For chronologically consistent approved PAs other than 8099, after applying the documentary correction to PA 2638 and excluding negative intervals for PAs 4466 and 8491, 332 activities have both a dated approval and publication date. The median document-to-publication interval is 18 days (interquartile range 7–29.25). The maximum retrospective cumulative date-field gap is 103 projects on 4 June 2026: 259 have national approval dates on or before that date versus 156 with publication dates on or before it. The gap is a retrospective *date-field observability gap* reconstructed from the frozen register, not a verified series of what users could see on every historical day. It is not evidence of how long the Secretariat physically held submitted forms. The median lag from request submission to request publication is 20 days in the corresponding eligible comparison, and a paired Wilcoxon test does not establish a distinctively longer approval-publication interval ($p \approx 0.467$). Accordingly we reject the narrower claim that host-approval documents uniquely experience exceptional publication delays.

Table 3. Two UNFCCC public-register exports and their comparability.

Item	8 Oct 2026	9 Nov 2026
Activity records	1,511	1,510
Fields	58	58
New/removed references	—	0 new / 8099 absent
Changed common identifiers	—	37
Changed cell values	—	145
Literal Project approvals	335	336
Newly published approval dates	—	10138, 10667 (both pre-July acts)

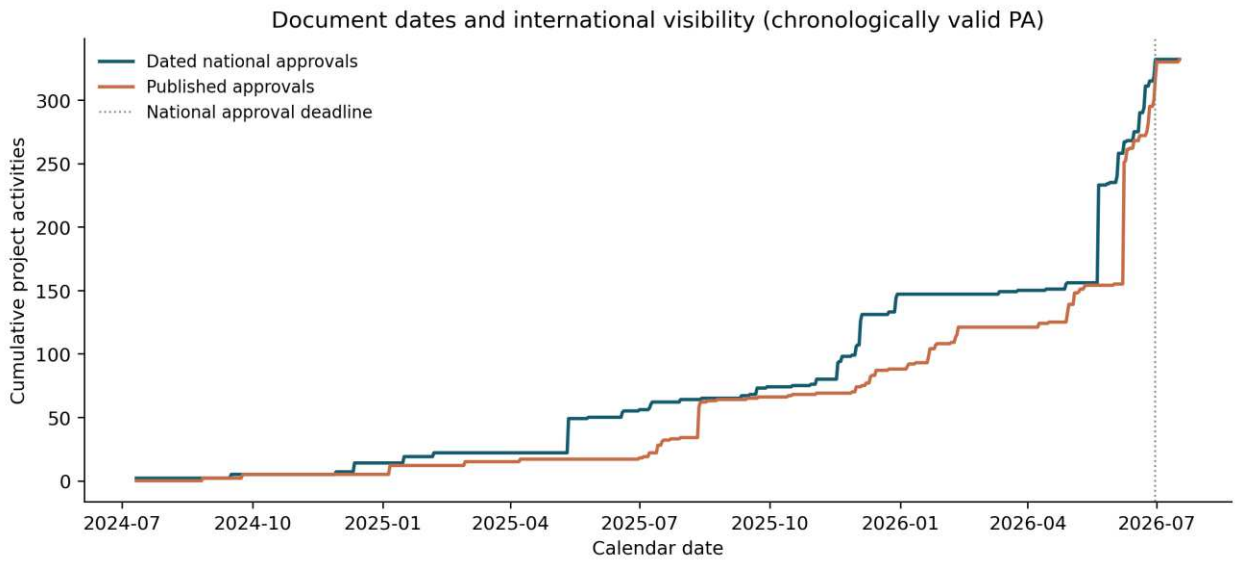


Figure 3. Retrospectively reconstructed cumulative national approval dates and publication dates among 332 PAs with chronologically consistent records. The curves are not archived daily register snapshots or an observed Secretariat receipt-delay series.

4.5. Independent negative control on publication bunching

A separate UNFCCC listing of 27 proposed *new* PACM activities provides a deliberately limited negative control. One opened global stakeholder consultation in September 2026 and 26 appear with the same GSC publication date, 3 November 2026. Their underlying PDD and GSC documents contain dates across October, rather than 26 co-dated national approvals. None of the 27 records in the acquired list provides a host-approval date usable in H1. Thus the sample demonstrates that central publication can be batched independently of the underlying document dates, but it does not validate or falsify national approval synchronisation. Combining those activities with CDM transition PAs would change the legal process and measurement unit, so we do not pool them. The new-activity consultation list is a distinct official population (UNFCCC, 2026e).

5. Interpretation and contribution

Three distinct findings survive explicit rival tests. First, among activities that were eventually approved, approval-document dates show much stronger national daily concentration than their earlier project requests; this is visible under both a modal-day estimator and a distribution-wide HHI, is not driven solely by Brazil and Chile, and exceeds several calendar-constrained null distributions. Second, PoA country-day events co-occur with PA approval days at rates above a weekly calendar benchmark, with selected primary forms showing the same national signatory across activity types. Third, public registry revision materially changes the observable status of an ostensibly historical project population, without creating new post-deadline decisions. Together, these results identify an event-centred structure in the *documentation and observability* of transnational carbon-market governance.

This is not evidence that centralised government offices systematically selected technologically superior projects, that each national cluster emerged from a single committee meeting, or that the PACM changes project economics by a measurable causal amount. Co-dated forms can be generated by routine signing sessions, consolidated administrative uploads, templating, staff workflow, statutory deadlines or dates supplied by the same national focal point. Week-by-methodology permuted benchmarks reduce two

simple compositional alternatives, but many unobserved national administrative practices remain plausible. Consequently, the discovery is empirical rather than mechanistic: the *degree* and *cross-type prevalence* of same-country temporal clustering are measured; the precise institutional production function is not identified.

The results revise, rather than replace, existing literature. Lo Re and Ellis (2021) specified grouped approval among available policy options; our contribution is to measure the realised degree of country-day synchronisation in a defined transition population with verifiable forms, not to claim first discovery of batching. Compared with CDM registration-duration studies (Magnusson, 2014; Liu et al., 2018), this paper treats a calendar event distribution and document provenance as the dependent empirical object rather than time-to-market. Governance studies emphasising transparency and the intermediary role of shared data infrastructures (Ahonen et al., 2022; Herman, 2024; Bergsvik et al., 2024) help explain why distinguishable time stamps are important to users, without supporting stronger causal claims about state preferences.

The journal's preceding research provides a useful interpretive boundary. Gehring and Spielmann (2023) identify organisational agency within treaty-management structures, but this does not establish that the UNFCCC Secretariat caused the clustering of national approval-document dates. Tegas et al. (2026) distinguish observable forms of participation from mere presence in diplomatic venues; analogously, a recorded approval-form date is an observable administrative attribute, not a direct observation of an authority's deliberation. Pattberg and Stripple (2008) remind us that institutional authority cannot be reduced to a single public/private tier, while Böhmelt (2026) shows why differences among participants in environmental agreements warrant explicit attention to the analytical unit. Accordingly, neither the large H1 contrast nor the cross-type H2 overlap establishes the substantive process by which host Parties assessed projects.

There is a practical information-design implication. Real-time assessments of PACM transition supply should specify whether their denominator is eligible activities, submitted requests, dated host approvals, published host approvals, completed transitions, registrations or issuances. For each snapshot the reporting system should preserve a stable CDM ID, activity type, host country, the date printed on the national instrument, a demonstrable receipt timestamp where available, the public publication timestamp, and the version of the exported register. A project that disappears from an export should be labelled *not observed in this version* until a legal withdrawal or rejection is documented. These are auditable disclosure requirements rather than claims that the Secretariat breached an obligation.

6. Limitations and research agenda

The population is a census of a historically selected set of approved CDM PAs; it is not a random sample of all eligible projects, all non-approved requests, or future Article 6.4 projects. By conditioning on eventual approval, comparisons of request and approval dates may be exposed to selection on project and jurisdictional characteristics. The five-project country threshold is pragmatic and chosen after exploring the data. The country-bootstrap interval characterises variation among the observed jurisdictions under its sampling convention, not a population-based confidence interval for all host Parties. Likewise, calendar-permutation p-values are conditional on null schemes selected during development. The estimand describes historical administrative date distributions and does not identify a governmental treatment effect.

The export equates the Host Party Approval Date with the Host Party Approval Submission Date for all 335 approved PAs in the historical primary population. This limits any attempt to infer actual transmission or receipt delay. Form dates have been compared against a stratified set of primary examples, but not every

approval form is independently dated and cryptographically verified. Two chronologically inconsistent records and the PA 2638 year error show why document-level audit matters. The unresolved institutional cause of 8099's disappearance is reported but not used to explain the main effect. The 27 proposed new PACM activities have no approval outcomes in the acquired file; they cannot be called an independent confirmatory cohort.

Future research could obtain a centrally verified export history with raw receipt timestamps, national signatory metadata, meeting records or administrative processing logs. Prospective measurement of newly approved PACM activities would then permit a pre-specified country-day test across a different regulatory process. The distinction between national document events and international publication events is also applicable to other environmental and infrastructure registries, but generalisation must be demonstrated rather than assumed.

7. Conclusion

The CDM-to-PACM transition exhibits strong country-day synchronisation in dates recorded on national approval instruments, including across stand-alone projects and programmes. This pattern remains after controlling for major country portfolios, regulatory deadline months and fine calendar blocks, while the public registration of those acts follows a distinguishable and revisable information timeline. The evidence supports a specific finding about documented administrative synchronisation and its observability—not a causal interpretation of sovereign preference, joint project evaluation or registry receipt delay. For climate-market governance, precise event units and versioned timestamps are an empirical necessity, not merely a data-cleaning preference.

Supplementary information: Online Resource 1 contains supplementary methods, Tables S1–S8 and Figure S1. Online Resource 2 contains machine-readable data and executable reproduction code.

AI-use statement: AI assistance is disclosed in Section 3.5. The human author is responsible for verification and final approval.

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