

**IREF Working Paper**

No. 2026-WP01

April 2026

# **The Geography of Central Bank Research**

A Gravity Model of Citations

**Tom Bugdalle**

Leipzig University | Flossbach von Storch Research Institute

**Moritz Pfeifer**

Leipzig University



INSTITUTE FOR  
RESEARCH IN ECONOMIC  
& FISCAL ISSUES

# The Geography of Central Bank Research: A Gravity Model of Citations\*

Tom Bugdalle  
Moritz Pfeifer

February 28, 2026

## Abstract

Central banks influence economic debate through research and citations. This paper studies whether citation patterns reflect past colonial ties or present currency hierarchies. Using a bibliometric dataset of 334,750 economics articles, we track how central bank research circulates across countries. Domestic citations exceed foreign ones by about 70% percent, and articles with central bank authors receive more citations than similar work. Former colonial relationships do not raise citation flows. Instead, research from the United States attracts citations, especially from central banks in former colonies. The exchange of ideas follows currency hierarchies rather than imperial history.

---

\*Bugdalle: Institute for Economic Policy, Department of Economics, University of Leipzig, [bugdalle@wifa.uni-leipzig.de](mailto:bugdalle@wifa.uni-leipzig.de).  
Pfeifer: Institute for Economic Policy, Department of Economics, University of Leipzig, [pfeifer@wifa.uni-leipzig.de](mailto:pfeifer@wifa.uni-leipzig.de).

# 1 Introduction

Under the West African Currency Board, Nigeria could issue money only if an equal amount of British pounds sat in a London bank. Every Nigerian note stood on deposits held overseas. Colonial law also restricted legal tender and required taxes to be paid in imperial currency, which redirected labor and trade toward export sectors and away from domestic production. Nigerian independence from colonial rule replaced the Currency Board with the Central Bank of Nigeria (CBN) in 1958-59, yet external reserves and the foreign exchange position remained in place. Roy Pentelow Fenton, appointed to serve as the CBN's first governor, arrived on secondment from the Bank of England. For the opening of the central bank, the governor of the Bank of England, Cameron Cobbold, came to visit Nigeria and the bank's founding statute did not fail to mention that it was modelled on the Bank of England. Even as formal empire disappeared, the channels through which monetary authority was formed did not. To date, one out of every two CBN governors held a degree from a British university.

This paper asks whether similar patterns appear in the global production of central bank research. Central banks now shape policy through publications and citation networks, and their academic standing affects which ideas travel, which models become standard, and whose policy experience counts in international debate. Among the top-five most cited scholars of the African continent, sits one scholar from the Central Bank of Nigeria. Yet, only two of roughly 300 papers by this author were published in journals that scholars at the Bank of International Settlement consider most relevant for central bankers (Auer et al., 2025). If colonial rule built central banks to serve imperial priorities, its legacy may also persist in the hierarchy of central bank research.

To answer this question, we build a bibliometric panel dataset that links 334,750 articles in 200 economic journals to author affiliations, central bank employment, and citation flows to origin and citing countries. We map this data to historical colonizer–colony relations and gravity covariates and test whether knowledge flows follow colonial patterns and currency hierarchies in a Poisson pseudo maximum likelihood (PPML) estimation. Our results show strong geographic concentration and a pronounced domestic preference in citation behavior. Conditional on journal, origin, destination, and year fixed effects, domestic citations are around 70% higher than cross-border citations. Central-bank-affiliated articles receive an additional citation premium of roughly 17% relative to other articles published in the same journal and year, and citation flows rise with the share of citing work that comes from central bank affiliates. Historical colonial ties do not generate a general citation premium. Citations from former colonizers to lower- and middle-income former colonies are lower than comparable non-colonial dyads, and the reverse direction is small. A different pattern emerges around the United States: former colonies cite US-origin research more than other origins. This pattern is even stronger with central bank involvement on the citing side. The citation map of central bank research therefore tracks present monetary and institutional hierarchies more than bilateral colonial links.

The rest of this paper is structured as follows. Section 2 reviews related work on central banks as research producers and on colonial legacies in the international monetary system, and places our contribution at the intersection of these two strands of literature. Section 3 describes the data, the construction of publication and citation measures, and descriptive patterns in output and citation networks. Section 4 presents our gravity model of citation flows, the PPML specifications, and the main estimates, including robustness exercises and the US-focused tests. Section 5 concludes.

## 2 Global Hierarchies of Money and Knowledge Creation

This paper brings together two strands of literature that are usually treated apart: research on central banks as producers of economic knowledge and research on the colonial legacies of the global financial system. Our first contribution is to quantify central banks' participation in academic publishing and citation networks, at a global scale. Our second contribution is to link those patterns of academic visibility to historical colonizer–colony relationships. This section examines these two bodies of scholarship and situates our contribution at their intersection.

The literature on the research practices of central banks has evolved from a niche endeavor into a growing interdisciplinary area of research. Martin Marcussen (2009) coined the term 'scientization' to describe how central banking has come to rest more heavily on academic knowledge production. There has been a recent push to construct a coherent framework for the study of central banks at the intersection of science and politics (Samman, 2025). Goutsmedt and Sergi (2025) expand on the 'scientisation' framework to understand the central bank as a 'boundary organization' between science and politics (Gieryn, 1983; Guston, 1999). The authors divide the phenomenon of scientisation into policymaking, contributory and legitimising scientisation.

Policymaking scientisation operates backstage and centers on the use of scientific knowledge to meet policy objectives (Goutsmedt and Sergi, 2025). The term captures the use of models, statistical tools, and other forms of macroeconomic knowledge in the formulation of policy. Contributory scientisation takes place on the frontstage. It concerns the participation of central banks in academic networks and research activities. Legitimising scientisation also unfolds on the frontstage and addresses the quest for public legitimacy through the authority of science. Here, technical rationality enters public communication as a means of justifying policy decisions and insulating them from political contestation.

Arguing within this framework, this paper contributes to analyzing central bank research as a form of contributory scientisation by providing a large-scale quantitative assessment of central banks' participation in, and position within, the global economic publication and citation network. The push towards quantifying central banker's research output started with White (2005), who compiled data on Federal Reserve research staff and publication output, compared the size of the Fed's economist

workforce to that of leading U.S. economics departments, and argued that the Fed had become a dominant institutional presence in monetary research. Claveau and Dion (2018), also focusing on the Fed, were first in using bibliometric data to track research articles published between 1976 and 2015 in the *Journal of Monetary Economics*, the *Journal of Money, Credit and Banking*, and the *International Journal of Central Banking*, showing that the share of articles with at least one central bank author rose from about 15% in the late 1970s to over 50% by 2015.

More recently, Malovaná et al. (2024) have compiled a large dataset covering more than 20,000 research papers produced by European and U.S. central banks between 2000 and 2019, using publication records, authorship data, impact factors, and collaboration networks to trace shifts in research topics, co-authorship patterns, and the concentration of output within the central banking community. Thiemann and Priester (2024) analyze nearly 70,000 macroeconomics and finance articles to document the rise of macro-finance after the financial crisis and to show how central bank economists contributed to reconnecting macroeconomics and finance within academic discourse. Ibrocevic (2025) examines 75,000 central bank working papers through network analysis and finds that the content of research remains clustered along institutional lines, with the Federal Reserve occupying a central position in relation to top economics journals. Closest to our research question are Rybacki and Serwa (2021), who analyze publication and citation data for economists employed at central banks worldwide and show that researchers from U.S. and Western European central banks are cited significantly more often than those from emerging and developing economies, even after controlling for observable characteristics.

A large literature also exists on the hierarchical organization of the international monetary system, where core currencies like the dollar or the euro generate durable forms of financial subordination (Alami et al., 2023; Cohen, 1998; Cohen, 2017). Scholarship from international political economy documents how currency hierarchy shapes exchange rate regimes, sovereign borrowing costs, and the limits of monetary sovereignty (Fritz et al., 2018; Koddenbrock, 2020; Murau et al., 2023; Palludeto and Abouchedid, 2016). Economic studies have analyzed these hierarchies in the persistence of the “original sin,” the inability of many countries to borrow internationally in their own currency (Eichengreen and Hausmann, 1999; Eichengreen et al., 2005; Rodrik, 2006) and in the transmission of US monetary shocks through the global financial cycle (Miranda-Agrippino and Rey, 2020).

Historical and institutional perspectives show that present-day currency hierarchies were shaped by colonial and postcolonial monetary systems (Bernards, 2025; Coburger, 2025; Vasudevan, 2024). These studies trace hierarchies to colonial currency boards, the forced replacement of local monies, and reserve systems tied to the metropolises of imperial rule, and show how these institutions endured even after formal independence. Some of this literature acknowledges the importance of narratives or knowledge transfers (Krampf, 2012). Plotnikova and Rake (2014) study former colonizer–colony pairs in pharmaceutical publications and find that they show slightly higher scientific collaboration, but the effect is weak and less consistent than factors like geographic distance or prior collaboration.

Little attention has been paid to how these hierarchies are reproduced through the global circulation of economic research produced by central banks.

Colonial legacies may affect present-day academic relations between central banks through several mechanisms. First, differences in institutional capacity influence research output and methodological limitations. Second, educational and professional networks shape access to editorial and conference networks. Third, research topics central to postcolonial economies may be perceived as “regional” rather than “general,” limiting their visibility in top journals. While these mechanisms are theoretically plausible, they have not, to the best of our knowledge, been systematically tested using bibliometric data and network analysis. This paper addresses this gap by examining whether the structure of citation flows follows currency hierarchies and by assessing the extent to which those hierarchies reflect colonial histories.

### **3 Data and Descriptives**

#### **3.1 Data Preparation**

We use the IDEAS/RePEc database, OpenAlex, and Crossref to collect published research papers in the top 200 highest-ranked journals based on the Bank of International Settlement (BIS) central bank citation-based ranking by Auer et al. (2025). The initial dataset comprises 334,750 articles and covers a period from 1886 up to 2026. Articles are authored by a median of two scholars, with around 43.4% of articles being single-authored. Of the BIS-ranked journals, 105 are also included in the Top 200 of the IDEAS/RePEc aggregate rankings for journals. The BIS ranking thus provides a representative sample of high-impact economic research in addition to their specific relevance for central banks. Each article in our dataset includes a unique RePEc handle, bibliographic metadata (title, authors, journal, year), author affiliation, and a structured bibliography. An internal citation link is defined whenever a cited handle in one article matches the handle of another article within the dataset. A descriptive overview of our dataset is provided in Table 1.

#### **3.2 Identifying Central Bank and Country-Specific Affiliations**

We classify the location of author affiliations with OpenAI’s gpt-4o-mini (Achiam et al., 2023) since information on the location of, e.g. Cairo University, cannot be directly retrieved from the database. The vast majority of articles (79.3%) are affiliated with a single country, while 17.6% involve two countries, and only a very small fraction exhibit broader multinational affiliations. To identify central bank–affiliated articles, we use a list of 139 central banks, including alias variants to capture naming differences. Author affiliation strings are matched against this list and identify 13,776 articles with

Table 1: Summary Statistics of the Raw Dataset

<b>Statistic</b>	<b>Value</b>
Total Articles	334,750
Central Bank Subset	13,776
Year Range	1886–2026
Unique Journals	200
Unique Authors	346,791
Mean Authors per Paper	1.88
Median Authors per Paper	2.00
Share Single-Authored	0.434

*Note:* Summary statistics of a dataset containing published research articles in the 200 top-ranking economics journals according to Bank of International Settlement ranking (Auer et al., 2025). Central Bank Subset refers to articles where at least one author records a central bank affiliation. Sources: RePEc, OpenAlex, Crossref.

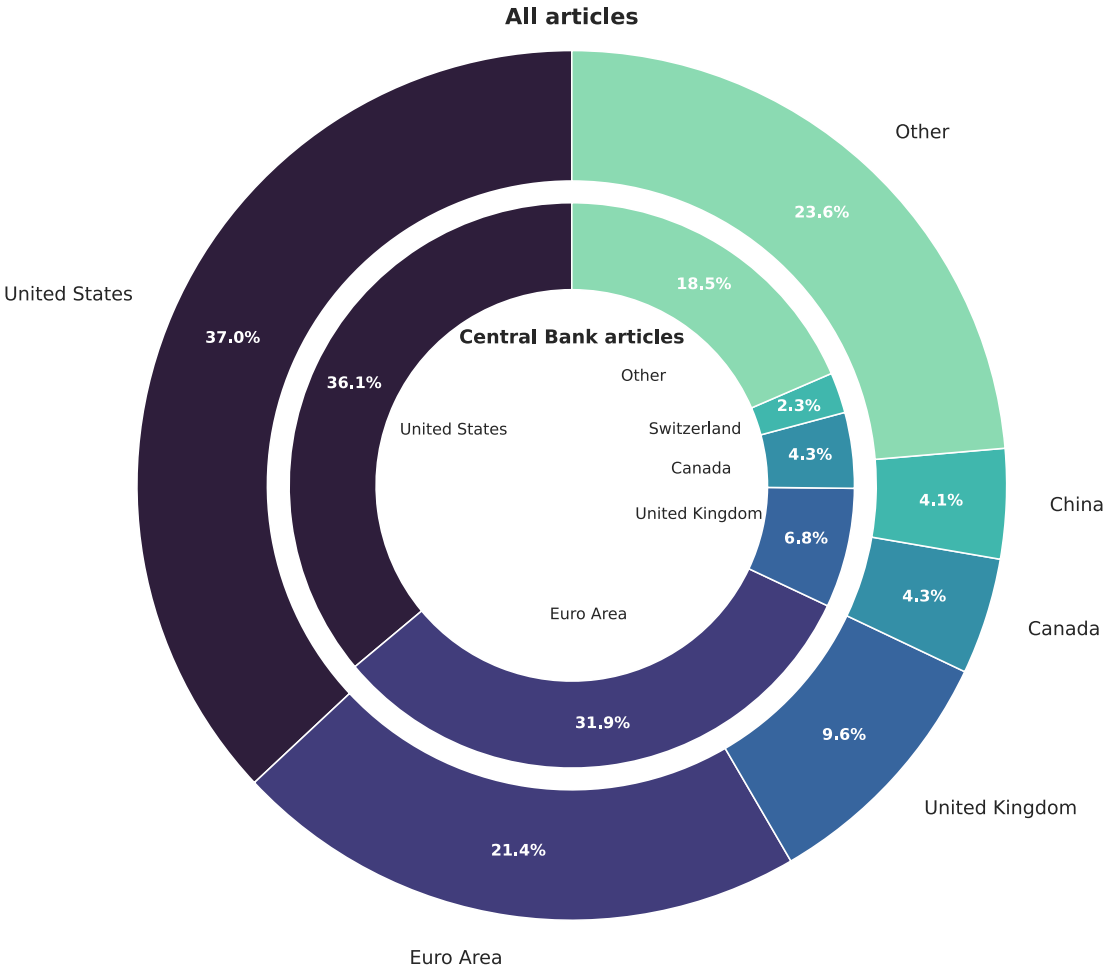
at least one central bank affiliation.

The resulting geographic distribution shows a strong concentration of research output in major advanced economies. The Federal Reserve System accounts for 5,520 affiliated articles, followed by the European Central Bank with 1,306. The national banks of Italy (890), France (630), the United Kingdom (620), Canada (583), and Germany (548) also contribute substantially. Overall, 24 geographic entities record at least 100 central bank affiliated articles, indicating a concentration of central bank research output in a relatively small number of countries.

Compared with the full sample, articles authored by central bank affiliates are more concentrated in a small number of advanced economies. While the United States remains the largest contributor in both samples (around 37% in the full sample and 36% among central bank–affiliated articles), the euro area’s share rises substantially from roughly 21% to nearly 32% within the central bank subset (see Figure 1). We observe a strong and sustained increase in the absolute volume of central bank research across all regions, an expansion that is also reflected in rising publication shares (Figures 2a and 2b).

Over the full period 1990–2024, the fitted average annual growth rate of the global share of articles with at least one central bank–affiliated author amounts to 2.41%. The increase is particularly pronounced between 2000 and 2010, when the average annual growth rate accelerates to 4.45%, following a more moderate rate of 2.41% during the 1990s. In contrast, the period 2010–2024 exhibits stagnation, with a slight average annual decline of  $-0.34\%$ . These findings are broadly consistent with Claveau and Dion (2018), who report an average annual growth rate of 3.8% between 1975 and 2015 based on three specialized monetary economics journals. Using a broader sample of journals

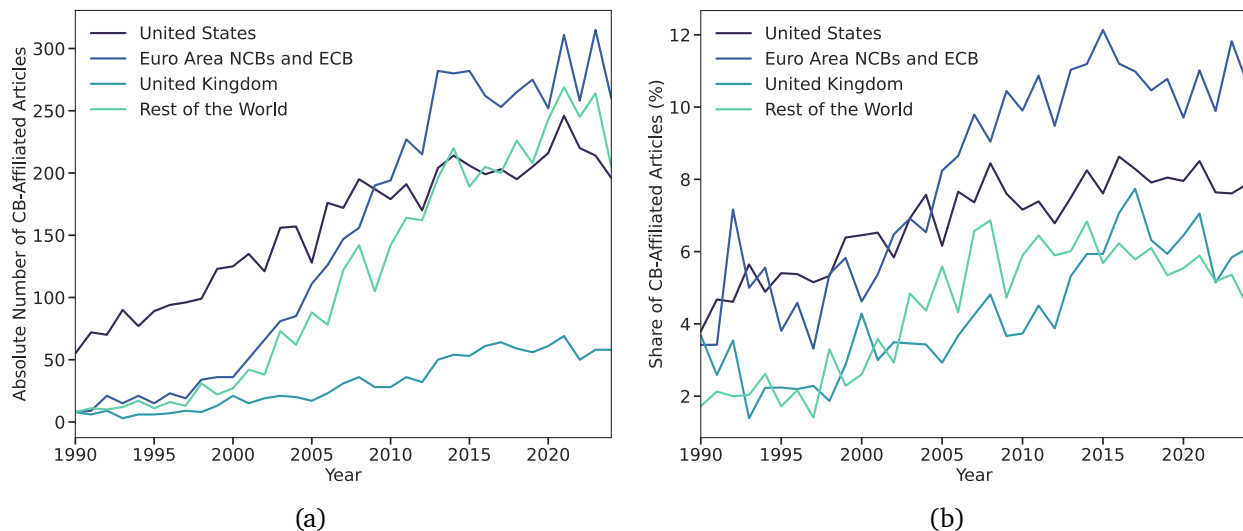
Figure 1: Global Distribution of All Articles and Central Bank Affiliated Articles



*Note:* Distribution of articles in general (outer donut) and central bank affiliated articles (inner donut) by geographic entities where only authors of exclusively one central bank were involved. It does not include articles with a combination of authors from more than one central bank. With a combined share of 58.4% (all articles) and 67.1% (central bank articles), the euro area and the US are the main contributors.

over the same horizon, we obtain a slightly lower but comparable estimate of 3.05%, suggesting that the long-run expansion of central bank research extends beyond a narrow selection of publications.

Figure 2: Absolute Counts and Publication Shares of Central Bank–Affiliated Publications (1990–2024)



*Note:* Panel (a) displays the annual number of articles authored by researchers affiliated with central banks. Panel (b) reports the corresponding share of central bank–affiliated articles as a percentage of total national publications. The data cover the three major geographic entities—United States, euro area national central banks (NCBs) and the European Central Bank (ECB), and United Kingdom—as well as the rest of the world, over the period 1990–2024.

Regionally, the United States exhibits a gradual increase in publication share, rising from roughly 4–5% in the early 1990s to around 7–8% in recent years. The euro area shows the most pronounced relative expansion, particularly after the establishment of the ECB in 1998, with shares exceeding 10% at peak levels. The United Kingdom also follows an upward path, increasing from approximately 2–3% to around 6–7%. Taken together, both panels indicate that central bank affiliated research has become more prominent within the academic publication landscape since the 1990s, even if the pace of growth has stagnated in the most recent decade.

### 3.3 Citation Identification and Gross National Income (GNI)

We aggregate citation flows to the country level to examine the geographic structure of citations to central bank–affiliated research. Each article is assigned to one or more countries based on the institutional affiliations of its authors. Incoming citation counts to central bank–affiliated articles are then aggregated at the country level (see Figure 3). Citation inflows for central bank affiliated articles are highly concentrated in a small number of countries, most prominently in North America and Western Europe, as well as in parts of East Asia and Oceania. In contrast, large parts of Africa, Latin

America, and several lower-middle and lower-income regions display comparatively weak citation flows. This geographic concentration is even stronger than the global distribution of overall citation flows shown in the total citation map (see Figure 6 in Appendix A), but does not by itself indicate whether citation behavior differs systematically across countries.

Countries are classified into three income groups using World Bank data on GNP per capita (current USD) for 2024. The World Bank’s 2024 income group thresholds are defined as low income (USD 1,135 or less), lower-middle income (USD 1,136–4,495), upper-middle income (USD 4,496–13,935), and high income (more than USD 13,935). Each country in the dataset is matched to its corresponding 2024 GNP per capita value and assigned to the appropriate income group accordingly.

We ask whether citation flows across income groups reflect publication volume alone, or whether some groups cite each other more or less than publication shares would imply. For each citing income group  $g$  and cited income group  $h$ , let  $C_{gh}$  be the observed number of citations from articles in  $g$  to articles in  $h$ . To form a comparison, we keep fixed the total number of citations made by group  $g$ , denoted  $T_g$ , and treat the destination of each citation as random, with probabilities equal to each cited group’s share of total articles. If  $p_h$  is the share of articles in group  $h$ , then the expected number of citations from  $g$  to  $h$  is  $\mathbb{E}[C_{gh}] = p_h T_g$ . Each matrix entry reports the ratio  $C_{gh}/\mathbb{E}[C_{gh}]$ . A value above 1 means that group  $g$  cites group  $h$  more often than publication shares alone would imply, and a value below 1 means fewer citations than that (see Table 2). The matrix is constructed using only articles with affiliations in exactly one country.

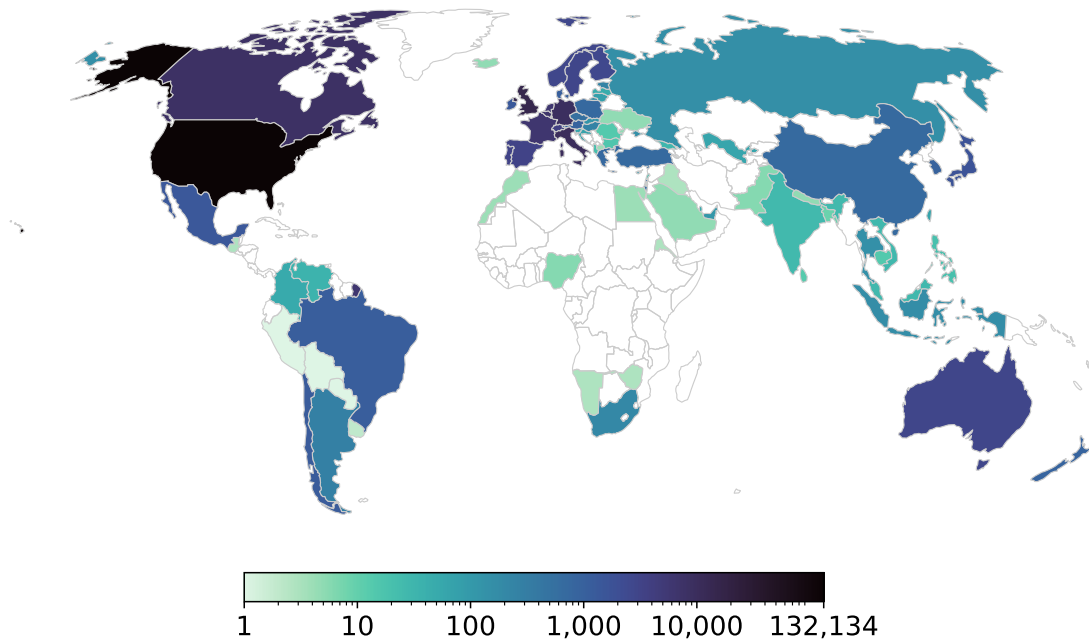
Table 2: Actual vs. Expected Citation Ratio Matrix

	High	Upper middle	Low & Lower middle
High income	0.98 (1.00)	1.26 (1.03)	0.94 (0.67)
Upper middle income	0.68 (0.63)	5.21 (12.40)	1.38 (2.64)
Low & Lower middle income	0.77 (0.43)	1.90 (2.73)	11.66 (117.74) <sup>‡</sup>

*Notes:* Each cell reports the ratio of actual citations from the row income group to the column income group relative to the number of citations expected under size-proportionality. Values in parentheses refer to the same ratio computed using only central bank–affiliated articles. Values greater than 1 indicate over-citation relative to proportionality; values below 1 indicate under-citation. <sup>‡</sup> The large value (117.74) reflects very small expected counts in the central-bank-only subsample. Low & lower middle income countries account for only 49 central-bank-affiliated articles (compared to 11,138 in high income and 352 in upper middle income groups) and 12 outgoing central-bank citations in total, with an expected within-group count of just 0.051. The observed 6 self-citations therefore generate a mechanically large ratio.

The matrix shows within-group citation concentration. Upper middle income countries cite within their own group at more than five times the expected rate (5.21), and low and lower middle income countries display an even stronger within-group citation pattern (11.66). In contrast, high income countries cite within their own group at a level close to proportionality (0.98). Cross-income flows are asymmetric. Upper middle income countries under-cite high income countries (0.68), while

Figure 3: Global Distribution of Citations of Central Bank Affiliated Articles



*Note:* Total number of incoming citations for central bank affiliated articles by country over the entire sample period. Darker shades indicate higher citation counts. The color scale is logarithmic to account for the skewness in the distribution. Countries without data are shown in white.

low and lower middle income countries over-cite upper middle income countries (1.90). Our central bank subset follows this pattern. For example, central bank affiliated authors in upper middle-income countries have a strongly insular citation pattern, citing their own group more than the expected rate (12.40).

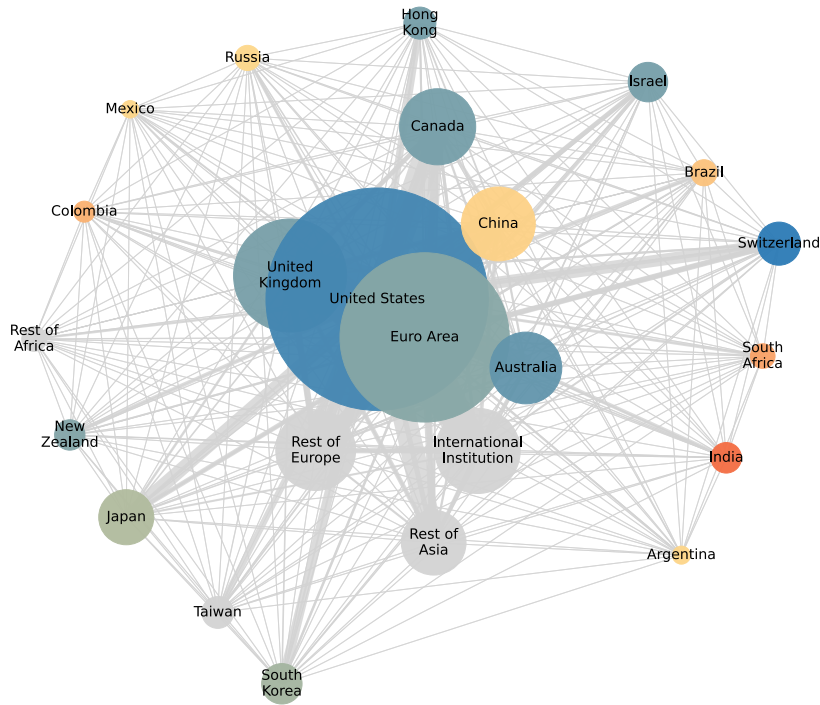
### 3.4 Structural Patterns in the Citation Networks

Two country-level citation networks are constructed, one for the full sample of articles and another one for the subset of central bank affiliated articles (see Figure 4a and Figure 4b). The spatial position of the nodes is determined using a weighted force-directed layout algorithm following Fruchterman and Reingold (1991). In this spring–electrical model, nodes repel each other while citation links act as attractive forces proportional to their weights. Through iterative energy minimization, strongly connected countries are drawn closer together, whereas weakly connected or isolated nodes are pushed toward the periphery. Spatial proximity in the graph therefore reflects structural connectivity within the citation network rather than geographic distance.

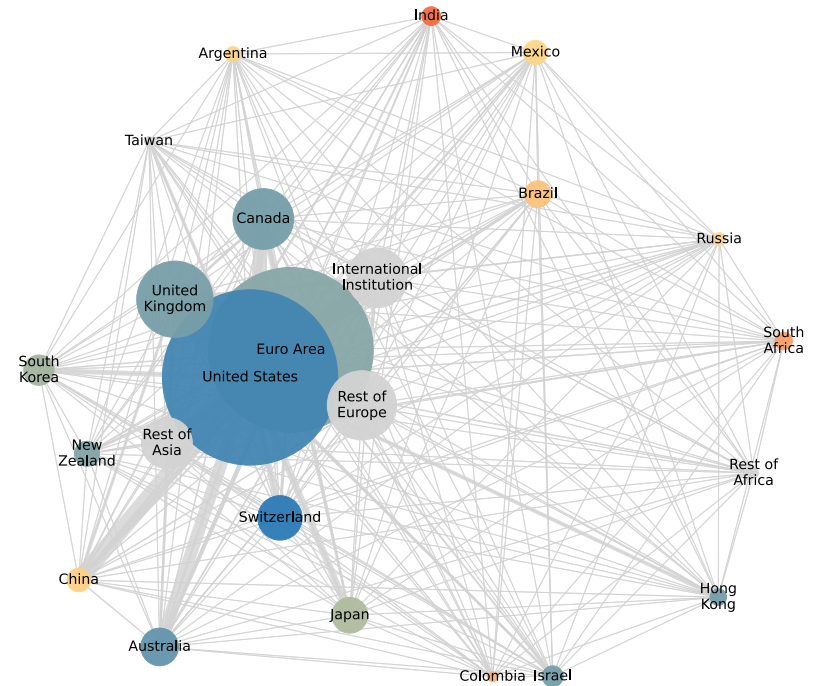
We observe a highly centralized citation network. The United States and the euro exhibit the thickest incoming and outgoing citation flows within the global research network. High-income countries more generally form a dense core characterized by strong mutual citation links. Countries such as the United Kingdom, Canada, Switzerland, and Australia are closely connected to the United States and the euro area, indicating comparatively intense intellectual exchange within advanced economies. In contrast, upper-middle- and lower-middle-income countries appear more peripheral, with fewer and thinner connections to the core. The network thus exhibits a pronounced core–periphery structure. High-income economies dominate citation flows, while lower-income countries are located at the periphery.

For central bank affiliated articles we observe an even more concentrated and tightly clustered structure (Figure 4b). The United States and the euro area remain central, and citation flows among high-income core entities are particularly dense. Relative to the full network, peripheral nodes exhibit lower integration and weaker connectivity. Central bank research thus appears more strongly embedded within the high-income core of the global citation system. These patterns are consistent with a hierarchical knowledge structure in which research hubs in advanced economies dominate intellectual exchange (Chen and Guan, 2016; Gui et al., 2019; Ramirez and Petersen, 2026).

Figure 4: Citation Networks



(a) All articles



(b) Central bank affiliated articles

*Note:* Global research landscape in general (a) and among central bank (b) affiliated authors. Each node represents either an aggregated regional entity (e.g., 'Euro Area', 'Eastern Europe') or the country of a prominent individual central bank ('USA', 'Japan'). Node size is proportional to the total number of articles associated with the entity. In the central bank network, node size is proportional to the number of central bank–affiliated articles. Node color encodes GNP per capita (World Bank, 2024). Cooler colors indicate higher income levels, warmer colors indicate lower income levels, and nodes displayed in gray indicate entities for which no GNP per capita data was assigned. Directed edges represent citation links between entities, where the thickness of the arrow is logarithmically scaled by the aggregate citation count.

### 3.5 Historical Colonial Data

Historical colonial relationships are assigned using the Colonial Dates Dataset (COLDAT), compiled by Becker (2019) and made publicly available via the Harvard Dataverse. COLDAT aggregates information from multiple secondary sources on the reach, timing, and duration of European overseas empires. It documents which contemporary countries were colonized, by which colonizer, and over what periods.

For our analysis, we rely on the observed colonial status as of 1946, capturing the last effective colonial relationship before the large-scale wave of post-war decolonization. Based on these data, we construct directional indicators capturing historical colonial ties between the country of the cited article (former colony or colonizer) and the country of the citing article. This allows us to examine whether historical colonial linkages are associated with systematic differences in citation behavior, beyond what would be predicted by publication volume or income-group effects alone.

Table 3: Actual vs. Expected Citation Ratio Matrix by Colonial Category

	<b>Former Colonizer</b>	<b>Former Colony</b>	<b>Neither</b>
Former Colonizer	2.14 (1.91)	0.69 (0.48)	0.86 (1.23)
Former Colony	1.24 (0.90)	1.14 (1.10)	0.82 (0.91)
Neither	1.40 (1.32)	0.95 (0.55)	0.90 (1.51)

*Notes:* Each cell reports the ratio of actual citations from the row category to the column category relative to the number of citations expected under size-proportionality. Values in brackets refer to the same ratio computed using only central bank-affiliated articles. Values greater than 1 indicate over-citation relative to proportionality; values below 1 indicate under-citation.

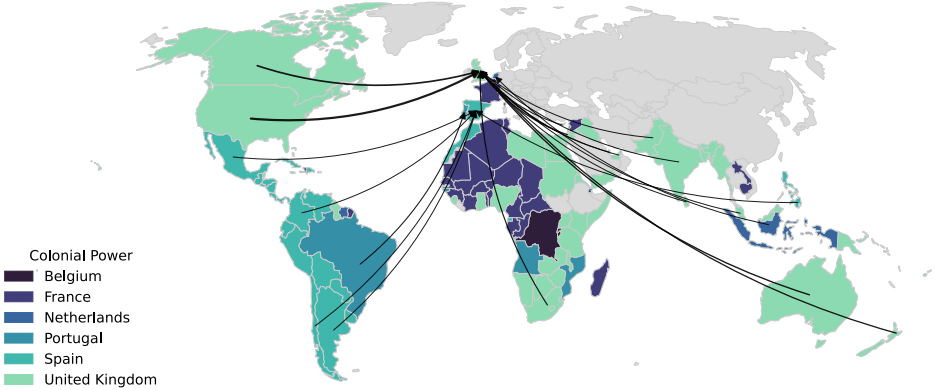
We observe systematic differences in citation patterns across colonial categories (Table 3). Articles originating from former colonizers cite other former colonizers more than twice as often as expected given their relative representation (2.14), indicating strong within-group concentration. They cite former colonies substantially less than proportionally (0.69). Former colonies exhibit moderate within-group citation (1.14) and cite former colonizers somewhat more than expected (1.24). Countries classified as “Neither” slightly over-cite former colonizers (1.40) while under-citing both former colonies (0.95) and their own group (0.90). Overall, the full sample displays structured and asymmetric citation flows consistent with historical colonial hierarchies.

The central bank affiliated subset (values in parentheses) shows a more differentiated pattern. While former colonizers continue to cite each other disproportionately (1.91), the tendency of former colonies to cite former colonizers weakens markedly (0.90 instead of 1.24), indicating no over-citation in central bank research. Taken together, central bank-affiliated citation flows appear less aligned with traditional colonial hierarchies.

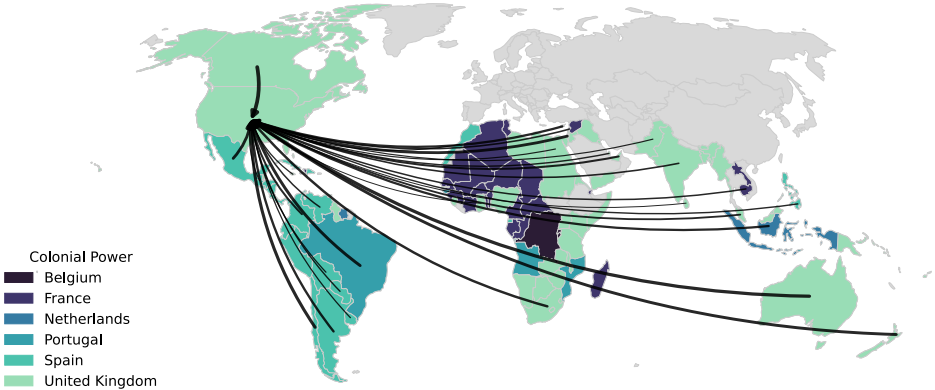
While citation flows of central bank affiliated articles from former colonies to their respective

former colonial powers are present, they are comparatively sparse and modest in magnitude (see Figure 5a). By contrast, citation flows from central bank affiliates in former colonies to central bank affiliates in the United States are markedly stronger and more geographically extensive (Figure 5b). Central bank affiliates in the United States attract citations from a broad set of central bank affiliates in former colonies across different imperial lineages, suggesting that US dominance may outweigh direct historical colonial ties in the field of central banking research. In the next section we provide more robust estimates for this observation.

Figure 5: Central Bank Affiliated Citation Flows



(a) Citation flows from former colonies to former colonial powers



(b) Citation flows from former colonies to the United States

*Note:* Panel (a) displays citation flows from former colonies to their respective former colonial powers. Panel (b) shows citation flows from former colonies to the United States. Arrows indicate citation direction and are scaled proportionally to the logarithm of citation counts. Countries are colored according to colonial group affiliation.

## 4 Empirical Methodology and Results

### 4.1 Fractional Counting

Each article in our dataset is associated with a unique handle, publication year, and journal. We restrict our analysis to internal citation links between articles where both the citing and cited handles exist within our corpus. To identify international flows, we merge these links with author affiliations at the country level. A feature of our dataset is that some articles have multiple country affiliations due to international co-authorship. If each citation were counted in full for every affiliated country, cross-country citation flows would be mechanically inflated, as the same underlying citation would be recorded multiple times. To avoid this, we adopt fractional counting, which assigns each citation a weight equal to the inverse of the number of affiliated countries, so that jointly authored papers split a single citation across countries (Gauffriau, 2021; Perianes-Rodríguez et al., 2016).

Formally, let  $C_d(i)$  denote the set of countries affiliated with the *citing* article  $i$ , and  $|C_d(i)|$  be its cardinality. For each citation from article  $i$  to article  $j$ , we allocate citation mass equally across the citing countries:

$$w_{i \rightarrow j, d} = \frac{1}{|C_d(i)|} \quad \text{for each } d \in C_d(i).$$

This “one-unit” normalization preserves total citation mass. If an article is affiliated with two countries, each receives half of the citation mass generated by that article. On the receiving side, the cited article  $j$  may also be affiliated with multiple origin countries, denoted by the set  $C_o(j)$ . We expand the cited article to the country level by assigning the citation flow to each origin country  $o \in C_o(j)$ . While this does not create additional citation mass, it allows us to treat each origin affiliation as a distinct node to estimate bilateral patterns and origin-country effects.<sup>1</sup>

After these transformations, the unit of observation is the triple  $(j, o, d)$ , where  $j$  is the cited article,  $o$  is one of its affiliated *origin* countries, and  $d$  is a *citing* country. The dependent variable is the total (fractionally counted) number of citations that article  $j$  receives from country  $d$ :

$$citation_{j, o, d} = \sum_{i \in \mathcal{A}(d)} \mathbb{1}\{i \rightarrow j\} \frac{1}{|C_d(i)|},$$

where  $\mathbb{1}\{i \rightarrow j\}$  indicates that  $i$  cites  $j$ , and  $\mathcal{A}(d)$  is the set of citing articles affiliated with country  $d$ . In the final dataset, we obtain approximately 1.3 million dyadic observations.

---

<sup>1</sup>Alternative rules, such as assigning citations only to the first-author’s country, are possible but would artificially compress international collaborations into a single-country label.

## 4.2 The Gravity Model of Citations

To estimate the determinants of citation flows, we employ a Poisson Pseudo-Maximum Likelihood (PPML) estimation. Following the work of Santos Silva and Tenreyro (2006), PPML is preferred over log-linearized OLS for three reasons. First, it provides consistent estimates in the presence of heteroskedasticity, which is pervasive in skewed citation data. Second, it naturally handles the large number of zero-citation dyads in our sample without requiring arbitrary transformations of the dependent variable. Finally, as shown by Head and Mayer (2014), PPML is the workhorse for gravity models because its coefficients can be interpreted as elasticities while the model remains robust to different error structures. Our empirical strategy focuses on isolating the bilateral frictions and historical ties that facilitate or impede the flow of knowledge between a cited article’s origin country  $o$  and the citing country  $d$ .

**Home Bias** A recurring finding in the geography of knowledge is that researchers are disproportionately likely to cite work from their own country (Jaffe et al., 1993; Peri, 2005). This may be due to local knowledge spillovers, domestic networking, or national research agendas. To capture this, we define a  $home_{o,d}$  indicator:

$$home_{o,d} = \mathbb{1}\{o = d\}.$$

This dummy captures whether citations are domestic (origin and citing country coincide). A positive coefficient indicates a domestic preference in citation behavior.

**Colonial Ties and Historical Networks** Historical colonial relationships may leave persistent academic footprints. These linkages facilitate a path-dependent flow of knowledge that can outlive formal colonial ties. Using the colonizer–colony mapping from Becker (2019), we construct two directional indicators that differentiate between “upward” and “downward” citation flows to capture the asymmetric nature of these legacies.

First, we define a  $colony_{o,d}^{LMIC}$  indicator to capture citations from a former colonizer to a cited article from its former colony, provided the colony remains a low- or middle-income economy (LMIC):

$$colony_{o,d}^{LMIC} = colony_{o,d} \mathbb{1}\{GNIpc_o < \bar{g}\}.$$

Following the World Bank’s 2024 classification, we set the threshold  $\bar{g}$  at \$13,845 (GNI per capita) to identify low- and middle-income economies. This restriction is consistent with the core-periphery structure of the global citation network we observe (Figure 4a and 4b). In high-income former colonies (e.g., Australia, Canada, or the USA), the research infrastructure has reached a level of global integration and maturity. For these “core” nodes, the historical colonial label is a poor proxy for modern intellectual dependency. For low- and middle-income economies situated at the periphery

of the network, colonial histories may remain a structural determinant of international visibility. For these economies, the former colonizer may still function as a primary “gatekeeper” due to persistent educational pipelines or shared legal standards. The income filter limits the sample so that the estimates of colonial bias reflect historical path dependency rather than the presence of high-income countries.

Second, we capture the reverse flow, citations from a former colony to its former colonizer, with the  $colonizer_{o,d}$  indicator:

$$colonizer_{o,d} = \mathbb{1}\{colonizer(d) = o\}.$$

In this case, the origin country  $o$  is the former colonizer. Together, these dummy variables allow us to test whether historical colonial ties continue to govern the direction and intensity of academic exchange.

**Common Language** Language serves as a barrier to the international diffusion of knowledge. While our dataset is restricted to English-language articles, shared linguistic roots may remain relevant as a proxy for cultural and institutional proximity. To capture this, we use the common official language variable of the CEPII gravity dataset developed by Melitz and Toubal (2014) to define:

$$language_{o,d} = \mathbb{1}\{\text{origin and citing countries share an official language}\}.$$

**Central Bank Affiliation** Research produced within or in collaboration with central banks may differ systematically from purely academic output in its focus, dissemination, and network of influence. Central-bank-affiliated researchers often operate within a “policy-research community,” where work is distributed through specialized networks—such as the BIS, the Eurosystem, or specific central bank working paper series—long before appearing in peer-reviewed journals (Goutsmedt & Sergi, 2025). These institutional linkages may create distinct citation patterns, either by increasing visibility within policy circles or by signaling a specific field of expertise. To capture these effects, we define an article-level indicator ( $CB_j^{Home}$ ):

$$CB_j^{Home} = \mathbb{1}\{\text{article } j \text{ has at least one central bank affiliation}\}.$$

This variable allows us to test whether central bank affiliation acts as a “quality signal” or a networking facilitator that alters citation intensity. Furthermore, by interacting this with citing-country characteristics, we can assess whether this influence is concentrated within the central banking community or spills over into broader academic discourse.

**Central Bank Citation Share** We construct a dyadic measure capturing the intensity with which central-bank-affiliated articles cite a given origin country. For each article–origin–citing-country

observation  $(j, o, d, t)$ , we define:

$$CB_{j,o,d,t}^{Foreign} = \frac{\#citations_{j,o,d,t}^{CB}}{\#citations_{j,o,d,t}},$$

where  $\#citations_{j,o,d,t}^{CB}$  denotes the fractionally counted number of citations that article  $j$  (origin country  $o$ ) receives from central-bank-affiliated articles in citing country  $d$  in year  $t$ , and  $\#citations_{j,o,d,t}$  denotes the total number of citations that article  $j$  receives from country  $d$  in year  $t$ . The central bank citation share thus measures the proportion of citations to a given origin–destination dyad that originate from central-bank-affiliated citing articles. Unlike a purely country-level measure, this variable varies at the article–origin–citing-country level. It assess whether citations flowing from country  $d$  to origin country  $o$  are disproportionately driven by central bank affiliated research, and whether such patterns differentially affect the citation performance of central-bank-affiliated articles.

**Baseline PPML specification** We estimate the following conditional mean function:

$$\begin{aligned} \mathbb{E}[citation_{j,o,d}] = & \exp\left(\beta_1 home_{o,d} + \beta_2 colony_{o,d}^{LMIC} + \beta_3 colonizer_{o,d} \right. \\ & + \beta_4 language_{o,d} + \beta_5 CB_j^{Home} + \beta_6 CB_{j,o,d,t}^{Foreign} \\ & + \beta_7 (CB_j^{Home} \times CB_{j,o,d,t}^{Foreign}) \\ & \left. + \alpha_{journal(j)} + \gamma_o + \delta_d + \tau_{year(j)}\right). \end{aligned}$$

*Journal fixed effects*  $\alpha_{journal(j)}$  compare citation outcomes *within the same journal*. This absorbs persistent differences in journal quality and citation practices (e.g., top journals vs. field journals).

*Origin-country fixed effects*  $\gamma_o$  absorb average citation intensity of research affiliated with origin country  $o$  (e.g., overall research capacity, baseline visibility, institutional infrastructure, and the average size of the domestic research community).

*Citing-country fixed effects*  $\delta_d$  absorb baseline citation propensity of country  $d$  (e.g., how much the country publishes, how citation-intensive its academic output is, or how strongly it cites the internal corpus).

*Year fixed effects*  $\tau_{year(j)}$  absorb global time trends in citations (e.g., growth of the literature and changes in citation norms), and ensure that identification comes from comparisons among articles published in the same year.

With both  $\gamma_o$  and  $\delta_d$  included, the coefficients on bilateral variables such as  $home_{o,d}$ , colonial ties, and common language are identified from *within-origin and within-destination* variation across country pairs. Informally, we compare whether country  $d$  cites origin  $o$  more than it cites other origins, and whether origin  $o$  is cited more by  $d$  than by other citing countries, net of each side’s

overall citation intensity.

### 4.3 Results

The estimation results for the bilateral citation flows are presented across four specifications, progressively incorporating interaction terms (Table 4). All specifications include journal, origin-country, citing-country, and year fixed effects, thereby absorbing time-invariant country characteristics and journal-specific citation patterns. Coefficients can be interpreted as semi-elasticities, i.e.  $\exp(\beta) - 1$  percent effects.

**Home Bias** The coefficient on  $home_{o,d}$  is positive and highly statistically significant across all specifications. The point estimate of approximately 0.53 implies that domestic citation flows are about  $e^{0.53} - 1 \approx 70\%$  higher than international flows, conditional on journal, origin-country, citing-country, and year fixed effects. This confirms a strong and persistent home bias in global knowledge diffusion that substantially exceeds the magnitude of any colonial effect documented below.

**Colonial Relationships** The coefficient on  $colony_{o,d}^{LMIC}$  is negative and statistically significant in the fully interacted specification. The estimate of roughly  $-0.13$  to  $-0.14$  corresponds to about a 13% reduction in citation flows when the citing country  $d$  is the former colonizer of origin country  $o$  (restricted to low- and middle-income origins), relative to comparable non-colonial dyads. In contrast, the reverse-direction effect captured by  $colonizer_{o,d}$  is small (around  $-1\%$ ) and statistically insignificant.

**Central Bank Affiliation** The central bank dummy  $CB_i^{Home}$  is positive and highly significant across specifications. The coefficient of approximately 0.16 implies that central-bank-affiliated articles receive about  $e^{0.16} - 1 \approx 17\%$  more citations than non-central-bank-affiliated articles published in the same journal and year.

**Central Bank Citation Intensity** The dyadic central bank citation share ( $CB_{j,o,d,t}^{Foreign}$ ) is likewise positive and statistically significant. The coefficient of about 0.14 implies that a one-unit increase in the share of citations that originate from central-bank-affiliated citing articles is associated with roughly a 15% increase in total citation flows. Since  $CB^{Foreign} \in [0, 1]$ , smaller increases in central bank intensity translate proportionally into higher bilateral citation volumes. This variable captures the extent to which a specific citation flow is driven by central-bank-affiliated articles on the citing side.

Table 4: PPML Estimates: Citation Count

	(1)	(2)	(3)	(4)
home	0.530969*** (0.006000)	0.530985*** (0.006000)	0.530974*** (0.006000)	0.530990*** (0.006000)
colony <sup>LMIC</sup>	-0.142600*** (0.035342)	-0.142579*** (0.035342)	-0.131537*** (0.037042)	-0.131528*** (0.037042)
colonizer	-0.010181 (0.012862)	-0.011820 (0.013920)	-0.010191 (0.012863)	-0.011826 (0.013920)
language	0.127382*** (0.005163)	0.127343*** (0.005158)	0.127392*** (0.005164)	0.127353*** (0.005158)
CB <sup>Home</sup>	0.158514*** (0.018029)	0.158649*** (0.018030)	0.158599*** (0.018031)	0.158735*** (0.018032)
CB <sup>Foreign</sup>	0.141383*** (0.012009)	0.140892*** (0.012110)	0.141402*** (0.012013)	0.140911*** (0.012114)
CB <sup>Home</sup> × CB <sup>Foreign</sup>	-0.142912*** (0.022907)	-0.143299*** (0.023116)	-0.143011*** (0.022910)	-0.143400*** (0.023120)
colonizer × CB <sup>Home</sup>		-0.009834 (0.067543)		-0.009918 (0.067543)
colonizer × CB <sup>Foreign</sup>		0.020474 (0.044754)		0.020459 (0.044754)
colonizer × CB <sup>Home</sup> × CB <sup>Foreign</sup>		0.033277 (0.084027)		0.033381 (0.084027)
colony <sup>LMIC</sup> × CB <sup>Home</sup>			-0.316022** (0.152289)	-0.316175** (0.152291)
colony <sup>LMIC</sup> × CB <sup>Foreign</sup>			-0.031938 (0.146857)	-0.031477 (0.146856)
colony <sup>LMIC</sup> × CB <sup>Home</sup> × CB <sup>Foreign</sup>			0.196175 (0.382585)	0.196639 (0.382599)
Observations	1,324,592	1,324,592	1,324,592	1,324,592
Journal FE	Yes	Yes	Yes	Yes
Citing Country FE	Yes	Yes	Yes	Yes
Origin Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Clustered SE	Article	Article	Article	Article
Adj. Pseudo R <sup>2</sup>	0.204342	0.204341	0.204342	0.204341

Notes: Poisson pseudo-maximum likelihood (PPML) estimates with the fractionally counted citation count as dependent variable (article  $j$  with origin  $o$  cited by country  $d$ ). All columns include journal, origin-country, citing-country, and year fixed effects; standard errors clustered at the article level (in parentheses). Coefficients can be read as  $\exp(\beta) - 1$  percent effects. Column (1) reports the baseline model. Column (2) adds interactions between *colonizer* and the central bank variables ( $CB^{Home}$ ,  $CB^{Foreign}$ , and their interaction). Column (3) instead adds the corresponding interaction terms for colony<sup>LMIC</sup>. Column (4) includes both sets of interaction terms simultaneously. *home* equals 1 if the citing country  $d$  and the origin country  $o$  are the same. *colony* equals 1 if the citing country  $d$  is the former colonizer of origin country  $o$ , restricting  $o$  to low- and middle-income economies; *colonizer* equals 1 if the origin country  $o$  is the former colonizer of citing country  $d$ ; *language* equals 1 if  $o$  and  $d$  share an official language;  $CB^{Home}$  equals 1 if the cited article has at least one central bank affiliation.  $CB^{Foreign} \in [0, 1]$  measures the share of citations in the  $(o, d)$  pair that originate from central-bank-affiliated citing articles.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

**Interaction Effects** The interaction term  $CB_i^{Home} \times CB_{j,o,d,t}^{Foreign}$  is negative and statistically significant, with an estimate of approximately  $-0.14$ . This corresponds to about a 13% reduction in the marginal citation premium of central-bank-affiliated articles in dyads where central-bank citing activity is already high. Thus, while central bank affiliation on either side independently raises citation intensity, their joint presence does not generate an additive effect. Institutional similarity appears to exhibit diminishing marginal returns rather than complementarity.

Turning to colonial interactions, the term  $colony_{o,d}^{LMIC} \times CB_i^{Home}$  is negative and statistically significant, with a coefficient around  $-0.32$ , corresponding to roughly a 27% reduction in citation flows for central-bank-affiliated articles within former colonial relationships. This indicates that colonial linkages do not reinforce the institutional citation premium associated with central bank research, but reduce it. By contrast, the triple interaction terms involving colonial indicators and central bank citation intensity are statistically insignificant. There is therefore limited evidence that colonial ties systematically amplify or dampen the relationship between central bank participation and bilateral citation intensity. Taken together, the magnitudes suggest that colonial ties exhibit modest effects, whereas contemporary institutional and structural forces—notably home bias and central bank affiliation—dominate in explaining bilateral citation flows.

**Robustness: Colonial Status and Income Level** To assess whether the income threshold in the baseline definition of *colony* drives the negative colonial coefficient, we re-estimate the model including all former colonies—irrespective of income level—and explicitly control for income levels using the logarithm of GNP per capita (see Appendix A, Table 5).

When colonial status is defined without the income restriction (*colony*), the coefficient is initially positive (0.162), indicating higher citation flows from former colonizers to their former colonies on average. However, once interacted with economic development, the baseline colonial coefficient becomes strongly negative (-1.265), while the interaction term  $colony \times \log(\text{GNPpc capita}^{Home})$  is positive and highly significant (0.127). The implied net colonial effect therefore equals  $-1.265 + 0.127 \times \log(\text{GNPpc})$ , indicating that citation intensity within colonial dyads increases systematically with the income level of the former colony. The negative baseline effect is fully offset at approximately USD 22,000 GNP per capita. For lower-income former colonies (e.g. around USD 5,000 per capita), the implied net effect corresponds to roughly 15–20% lower citation flows relative to comparable dyads, whereas for high-income former colonies (e.g. around USD 40,000), the effect becomes modestly positive (around 8%).

These results confirm the main finding of the baseline regression from Table 4. The negative colonial effect is not an artifact of excluding high-income former colonies. Rather, once differences in income levels are accounted for, citation flows from former colonizers to their former colonies remain comparatively weaker for lower-income origins. The reduction or reversal of the colonial coefficient in the unrestricted specification reflects the disproportionate weight of high-income former colonies

(e.g. United States or Canada), not a fundamentally different underlying pattern.

**US-Centered Dynamics** To assess whether the weak colonial effects follow a different pattern centered on the United States, we estimate a complementary specification focusing on citations involving US-origin articles (see Appendix A, Table 6). This specification isolates whether former low- and lower-middle-income European colonies exhibit a citation bias toward US research and whether such a bias is amplified by central bank–affiliated articles. This would align with findings from the currency-hierarchy literature, where peripheral economies are structurally integrated into dollar-based finance (Cohen, 1998; Murau et al., 2023). Mapped onto citation networks, scholars and central bank researchers in former colonies may direct disproportionate attention toward US research as an intellectual counterpart to monetary dependence within a dollar-centered system.

In contrast to the general results on colonial ties, the US-specific regressions reveal a positive and statistically significant interaction between former colonial status and US origin. In the fully specified model (column 3), the coefficient on  $Colony \times US$  equals 0.077 ( $p < 0.01$ ). This corresponds to approximately  $e^{0.077} - 1 \approx 8\%$  higher citation flows from former European colonies to US-origin articles relative to other origin countries, conditional on fixed effects.

Moreover, the triple interaction between US origin, colonial status, and central bank citation intensity is positive and highly significant. In column 3, the coefficient on  $CB^{Foreign} \times Colony \times US$  equals 0.224 ( $p < 0.001$ ), implying that a full-unit increase in central bank citation share is associated with approximately  $e^{0.224} - 1 \approx 25\%$  higher citation flows toward US-origin research within former colonial dyads. Interpreted more conservatively, a 10-percentage-point increase in central bank citation intensity corresponds to roughly a 2.2% increase in citations to US articles. This suggests that central bank participation strengthens the US orientation of citation flows in former colonies. By contrast, the interaction between *Colonizer* and *US* is positive but smaller in the fully specified model (0.120, corresponding to about 13%), and the associated triple interaction with central bank citation share is statistically insignificant. Hence, the amplification effect appears specific to former colonies rather than to former colonial powers more broadly.

Taken together, these results indicate that colonial ties per se do not generate a uniform citation premium across historical metropolises. Instead, citation concentration is disproportionately oriented toward the United States. This asymmetry is consistent with the structural dominance of US research institutions and the central role of the US dollar in the global monetary system, particularly for low- and lower-middle-income countries. Central banks in many low and lower-middle income countries hold the bulk of their foreign-exchange reserves in US dollars and confront crises through shortages of dollar funding, which ties stabilization capacity to institutions that control dollar liquidity (Helleiner, 2008; Kirshner, 2008; Murau et al., 2023). The dollar still accounts for roughly 57–58% of global foreign-exchange reserves, far exceeding any alternative currency (Bertaut et al., 2025). Monetary policy therefore operates within a global credit money system in which domestic balance sheets

remain exposed to external funding conditions that constrain monetary sovereignty (Murau and van't Klooster, 2023). Adjustment pressures may then fall on countries whose currencies lack international liquidity, leading policymakers and researchers to rely on analytical frameworks developed in the United States, the issuer of the dominant reserve currency. For central banks in former European colonies, intellectual orientation therefore appears more closely linked to contemporary monetary hierarchies than to historical colonial relationships alone.

#### **4.4 Limitations**

Some limitations of the empirical design should be noted. First, the construction of origin-country affiliations relies on author institutional information and fractional allocation rules. While fractional counting avoids mechanical inflation of citation flows from internationally co-authored papers, it implicitly treats each affiliated country as an equally weighted origin of the cited article. This may not fully capture the relative contribution of individual authors or the primary institutional locus of the research. Second, even though we assume that our dataset is representative and comprehensive, it only captures internal citations within the constructed corpus and it does not represent total global citations. Third, the empirical framework is reduced-form in nature. The estimates identify systematic correlations between historical ties, institutional affiliation, and citation flows, but they do not establish causal mechanisms. Colonial linkages, language proximity, and institutional structures may proxy for deeper historical, educational, or network-based channels that are not directly observed in the data.

## **5 Conclusions**

This paper examined how central bank research circulates across countries and whether citation patterns follow colonial history or present monetary hierarchies. Using a large bibliometric dataset and a gravity model of citations, we measured how institutional affiliation, geography, and historical ties shape the flow of economic ideas. Colonial relationships remain visible in the historical structure of the international monetary system, yet they do not translate into stronger citation links between former colonies and former colonial powers. Instead, we observe a pronounced orientation toward the United States. Central bank researchers in former colonies cite US-based work more frequently than research from other countries, and this pattern strengthens when central bank authors are involved on the citing side.

One explanation for this may lie in the contemporary organization of global finance. In the international monetary system, the dollar functions as the central reference point for trade, finance, and reserves, placing developing economies in a position where access to external credit

and exchange-rate stability depends on continued reliance on it. Central banks operating within this policy environment may then not only be shaped by dollar funding conditions and US financial markets, but also by the analytical frameworks developed by central bank affiliated researchers in the US. In that sense, our findings provide empirical support for international political economy scholarship that views monetary dependence as sustained through the institutional and intellectual structures of the dollar-centered global financial system. Our analysis focuses on citation flows rather than research content. Future work could examine how narratives travel across central banks research. Expanding the analysis in this direction would help clarify whether and which economic ideas shape currency hierarchies.

## References

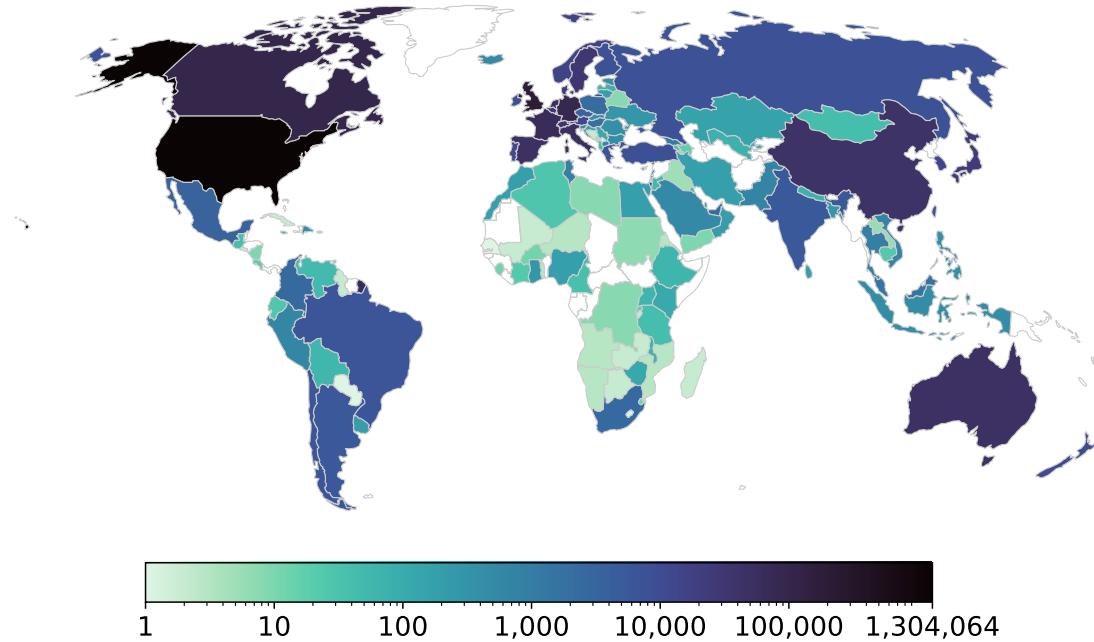
- Achiam, J., Adler, S., Agarwal, S., Ahmad, L., Akkaya, I., Aleman, F. L., Almeida, D., Altenschmidt, J., Altman, S., Anadkat, S., Avila, R., Babuschkin, I., Balaji, S., Balcom, V., Baltescu, P., Bao, H., Bavarian, M., Belgum, J., Bello, I., & ... (2023). Gpt-4 technical report [arXiv:2303.08774 [cs.CL, cs.AI]]. <https://doi.org/10.48550/arXiv.2303.08774>
- Alami, I., Alves, C., Bonizzi, B., Kaltenbrunner, A., Koddenbrock, K., Kvangraven, I., & Powell, J. (2023). International financial subordination: A critical research agenda. *Review of international political economy*, 30(4), 1360–1386.
- Auer, R., Cornelli, G., & Zimmermann, C. (2025). A journal ranking based on central bank citations. *Federal Reserve Bank of St. Louis Review*, 107(9), 1–14.
- Becker, B. (2019). *Colonial dates dataset (coldat)*. Harvard Dataverse. <https://doi.org/10.7910/DVN/T9SDEW>
- Bernards, N. (2025). Financial infrastructures and colonial history in Africa. In C. Westermeier, M. Campbell-Verduyn, & B. Brandl (Eds.), *The cambridge global handbook of financial infrastructure* (pp. 103–115). Cambridge University Press & Assessment. <https://doi.org/10.1017/9781009428118.011>
- Bertaut, C., von Beschwitz, B., & Curcuru, S. (2025). The international role of the us dollar–2025 edition. *FEDS Notes*.
- Chen, Z., & Guan, J. (2016). The core-peripheral structure of international knowledge flows: Evidence from patent citation data. *R&D Management*, 46(1), 62–79.
- Claveau, F., & Dion, J. (2018). Quantifying central banks' scientization: Why and how to do a quantified organizational history of economics [Publisher: Routledge]. *Journal of Economic Methodology*, 25(4), 349–366. <https://doi.org/10.1080/1350178X.2018.1529216>
- Coburger, C. (2025). Imperial money and the making of currency hierarchies: Evidence from nigeria. *Review of International Political Economy*, 1–33.
- Cohen, B. (2017). The IPE of money revisited. *Review of International Political Economy*, 24(4), 657–680.
- Cohen, B. J. (1998). *The Geography of Money*. Cornell University Press.
- Eichengreen, B., & Hausmann, R. (1999). Exchange rates and financial fragility. In F. R. B. of Kansas City (Ed.), *New challenges for monetary policy* (pp. 329–368). Federal Reserve Bank of Kansas City.
- Eichengreen, B., Hausmann, R., & Panizza, U. (2005). Original sin: The pain, the mystery, and the road to redemption. In B. Eichengreen & R. Hausmann (Eds.), *Other people's money: Debt denomination and financial instability in emerging market economies* (pp. 233–264). University of Chicago Press.
- Fritz, B., De Paula, L. F., & Prates, D. M. (2018). Global currency hierarchy and national policy space: A framework for peripheral economies. *European Journal of Economics and Economic Policies*, 15(2), 208–218.

- Fruchterman, T. M. J., & Reingold, E. M. (1991). Graph drawing by force-directed placement. *Software: Practice and Experience*, 21(11), 1129–1164. <https://doi.org/10.1002/spe.4380211102>
- Gauffriau, M. (2021). Counting methods introduced into the bibliometric research literature 1970–2018: A review. *Quantitative Science Studies*, 2(3), 932–975. [https://doi.org/10.1162/qss\\_a\\_00141](https://doi.org/10.1162/qss_a_00141)
- Gieryn, T. F. (1983). Boundary-work and the demarcation of science from non-science: Strains and interests in professional ideologies of scientists. *American Sociological Review*, 48(6), 781–795.
- Goutsmedt, A., & Sergi, F. (2025). Redefining scientization: Central banks between science and politics. *Finance and Society*, 11(2), 209–229.
- Gui, Q., Liu, C., & Du, D. (2019). Globalization of science and international scientific collaboration: A network perspective. *Geoforum*, 105, 1–12.
- Guston, D. (1999). Stabilizing the boundary between us politics and science: The role of the office of technology transfer as a boundary organization. *Social Studies of Science*, 29(1), 87–111.
- Head, K., & Mayer, T. (2014). Gravity equations: Workhorse, toolkit, and cookbook. *Handbook of International Economics*, 4, 131–195.
- Helleiner, E. (2008). Political determinants of international currencies: What future for the us dollar? *Review of international political economy*, 15(3), 354–378.
- Ibrocevic, E. (2025). From global diffusion to local semantics: Unpacking the scientization of central banks. *Socio-Economic Review*, 23(1), 393–417.
- Jaffe, A. B., Trajtenberg, M., & Henderson, R. (1993). Geographic localization of knowledge spillovers as evidenced by patent citations. *The Quarterly Journal of Economics*, 108(3), 577–598.
- Kirshner, J. (2008). Dollar primacy and american power: What's at stake? *Review of International Political Economy*, 15(3), 418–438.
- Koddenbrock, K. (2020). Hierarchical multiplicity in the international monetary system: From the slave trade to the Franc CFA in West Africa. *Globalizations*, 17(3), 516–531.
- Krampf, A. (2012). Translation of central banking to developing countries in the post-world war ii period: The case of the bank of israel. In J. Renn (Ed.), *The globalization of knowledge in history* (pp. 459–482, Vol. 1). Edition Open Access, Max Planck Institute for the History of Science. <https://doi.org/10.34663/9783945561232-24>
- Malovaná, S., Hodula, M., & Gricá, M. (2024). Researching research in central banking. *International Journal of Central Banking*, 20(1), 1–45.
- Marcussen, M. (2009). Scientization of central banking: The politics of a-politicization. In K. Dyson & M. Marcussen (Eds.), *Central Banks in the Age of the Euro: Europeanization, Convergence, and Power* (pp. 373–90). Oxford University Press. <https://doi.org/10.1093/oso/9780199218233.003.0017>
- Melitz, J., & Toubal, F. (2014). Native language, spoken language, translation and trade. *Journal of International Economics*, 93(2), 351–363. <https://doi.org/10.1016/j.jinteco.2014.04.004>
- Miranda-Agrippino, S., & Rey, H. (2020). U.S. monetary policy and the global financial cycle. *The Review of Economic Studies*, 87(6), 2754–2776. <https://doi.org/10.1093/restud/rdaa019>

- Murau, S., Pape, F., & Pforr, T. (2023). International monetary hierarchy through emergency US-dollar liquidity: A key currency approach. *Competition & Change*, 27(3-4), 495–515.
- Murau, S., & van't Klooster, J. (2023). Rethinking monetary sovereignty: The global credit money system and the state. *Perspectives on politics*, 21(4), 1319–1336.
- Palludeto, A. W., & Abouchedid, S. C. (2016). The currency hierarchy in center-periphery relationships. In R. Desai (Ed.), *Analytical Gains of Geopolitical Economy*.
- Peri, G. (2005). Determinants of knowledge flows and their effects on innovation. *The Review of Economics and Statistics*, 87(2), 308–322.
- Perianes-Rodríguez, A., Waltman, L., & van Eck, N. J. (2016). Constructing bibliometric networks: A comparison between full and fractional counting. *Journal of Informetrics*, 10(4), 1178–1195. <https://doi.org/10.1016/j.joi.2016.10.006>
- Plotnikova, T., & Rake, B. (2014). Collaboration in pharmaceutical research: Exploration of country-level determinants. *Scientometrics*, 98(2), 1173–1202.
- Ramirez, A. M., & Petersen, A. M. (2026). Transformation of global science core–periphery structure towards a multi-polar horizon: The rise of china and the global south from 1980–2020. *Research Policy*, 55(1), 105370.
- Rodrik, D. (2006). The social cost of foreign exchange reserves. *International economic journal*, 20(3), 253–266.
- Rybacki, J., & Serwa, D. (2021). What makes a successful scientist in a central bank? Evidence from the repec database. *Central European Journal of Economic Modelling and Econometrics*, (3).
- Samman, A. (2025). Special section: Central bank scientization. In T. S. Hawley & R. G. Hawley (Eds.), *Finance and society volume 11 - issue 2 - august 2025* (pp. 209–318). Cambridge University Press.
- Santos Silva, J. M. C., & Tenreyro, S. (2006). The log of gravity. *The Review of Economics and Statistics*, 88(4), 641–658.
- Thiemann, M., & Priester, S. (2024). Bridging the gaping hole: Central bank economists' role in the rise of macro-finance post-crisis. *European Journal of Sociology/Archives Européennes de Sociologie*, 65(1), 103–145.
- Vasudevan, R. (2024). The gold-exchange standard in colonial india: Foreshadowing the monetary hierarchy of the international state-credit standard. *Review of International Political Economy*, 31(5), 1496–1519.
- White, L. H. (2005). The Federal Reserve System's influence on research in monetary economics. *Econ Journal Watch*.

## A Additional Tables and Figures

Figure 6: Global Distribution of Incoming Citations by Country



*Note:* The figure displays the total number of incoming citations by country over the entire sample period. Darker shades indicate higher citation counts. The color scale is logarithmic to account for the skewness in the distribution. Countries without data are shown in white.

Table 5: PPML Estimates: Citation Count wit GNPpc Variable

	(1)	(2)	(3)	(4)	(5)	(6)
home	0.529*** (0.006)	0.530*** (0.006)	0.531*** (0.006)	0.529*** (0.006)	0.529*** (0.006)	0.532*** (0.006)
language	0.125*** (0.005)	0.125*** (0.005)	0.126*** (0.005)	0.088*** (0.006)	0.088*** (0.006)	0.089*** (0.006)
$CB^{Home}$		0.129*** (0.019)	0.159*** (0.018)			0.159*** (0.018)
$CB^{Foreign}$		0.108*** (0.010)	0.141*** (0.012)			0.141*** (0.012)
$CB^{Home} \times CB^{Foreign}$			-0.143*** (0.023)			-0.144*** (0.023)
colony				0.162*** (0.009)	-1.263*** (0.128)	-1.265*** (0.128)
colonizer				0.003 (0.013)	0.391* (0.168)	0.391* (0.168)
colony $\times$ $\log(\text{GNPpc}^{Home})$					0.127*** (0.012)	0.127*** (0.012)
colonizer $\times$ $\log(\text{GNPpc}^{Foreign})$					-0.036* (0.015)	-0.036* (0.015)
Observations	1,324,592	1,324,592	1,324,592	1,324,592	1,324,592	1,324,592
Adj. Pseudo $R^2$	0.203	0.204	0.204	0.204	0.204	0.205

Notes: Poisson pseudo-maximum likelihood (PPML) regressions with the fractionally counted citation count as the dependent variable (article  $j$  with origin country  $o$  cited by country  $d$ ). All specifications include journal, citing-country, origin-country, and year fixed effects. Standard errors are clustered at the article level (in parentheses). Coefficients can be interpreted as semi-elasticities, i.e.  $\exp(\beta) - 1$  percent effects. *home* equals 1 if the citing country  $d$  and the origin country  $o$  coincide. *language* equals 1 if  $o$  and  $d$  share an official language.  $CB^{Home}$  equals 1 if the cited article has at least one central bank affiliation.  $CB^{Foreign} \in [0, 1]$  measures the share of citations within the  $(o, d)$  pair that originate from central-bank-affiliated citing articles. *colony* equals 1 if the origin country  $o$  was historically colonized by the citing country  $d$ , irrespective of current income classification. *colonizer* equals 1 if the origin country  $o$  historically colonized the citing country  $d$ .  $\log(\text{GNPpc}^{Home})$  and  $\log(\text{GNPpc}^{Foreign})$  denote the logarithm of GNP per capita of the cited and citing country, respectively (or the fractional income-weighted average in case of multi-country affiliations). Interaction terms allow the colonial effect to vary with economic development. Columns (1)–(3) progressively introduce central bank variables and their interaction. Columns (4)–(6) add colonial indicators and interactions with economic development.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 6: PPML Estimates: Citation Counts with US-Origin

	(1)	(2)	(3)
home	0.517*** (0.0067)	1.042*** (0.0075)	0.523*** (0.0062)
language	0.109*** (0.0080)	0.045*** (0.0044)	0.118*** (0.0052)
$CB^{Home}$	0.127*** (0.0185)	0.111*** (0.0168)	0.127*** (0.0185)
$CB^{Foreign}$	0.063*** (0.0116)	0.017 (0.0097)	0.060*** (0.0115)
Colony $\times$ US	0.005 (0.0114)	0.338*** (0.0060)	0.077*** (0.0077)
Colonizer $\times$ US	0.037** (0.0129)	0.512*** (0.0069)	0.120*** (0.0080)
$CB^{Foreign} \times$ Colony $\times$ US	0.219*** (0.0209)	0.258*** (0.0169)	0.224*** (0.0208)
$CB^{Foreign} \times$ Colonizer $\times$ US	0.032 (0.0239)	0.019 (0.0219)	0.038 (0.0238)
Journal FE	Yes	Yes	Yes
Citing Country FE	Yes	No	Yes
Origin Country FE	No	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	1,324,592	1,324,592	1,324,592
Adj. Pseudo $R^2$	0.133	0.203	0.205

Notes: Poisson pseudo-maximum likelihood (PPML) estimates with citation count as the dependent variable (article  $j$  with origin  $o$  cited by country  $d$ ). All specifications include journal and year fixed effects. Column (1) includes citing-country fixed effects only; column (2) includes origin-country fixed effects only; column (3) includes both citing- and origin-country fixed effects.  $home$  equals 1 if  $o = d$ .  $US$  equals 1 if the cited article originates from the United States.  $Colony$  equals 1 if the citing country is a former European colony.  $Colonizer$  equals 1 if the citing country is a former European colonizing power.  $CB^{Home}$  equals 1 if the cited article has at least one central bank affiliation.  $CB^{Foreign} \in [0, 1]$  measures the share of citations within the  $(o, d)$  pair that originate from central-bank-affiliated citing articles. Standard errors clustered at the article level (in parentheses). Coefficients can be interpreted as semi-elasticities, i.e.  $\exp(\beta) - 1$  percent effects.

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ ,  $p < 0.1$ .