

Trademarks and trade concentration: evidence from the Madrid System (1995–2022)

Ismaeel Tharwat, Shahd Abou El Leil and Dina Abdel Fattah

*Department of Economics, Onsi Sawiris School of Business,
The American University in Cairo, New Cairo, Egypt*

Abstract

Purpose – This study aims to identify whether increases in trademark activity reshape countries' trade structure, specifically whether they raise or lower concentration across products and markets, and determine through which side of the bilateral relationship (origin vs destination) these effects operate.

Design/methodology/approach – We assemble a bilateral country-pair panel (1995–2022) linking trademark activity (domestic and Madrid System filings) to trade concentration measures (Herfindahl–Hirschman Index (HHI); Theil indices decomposed into product and market components). To address endogeneity, we instrument trademarks using exogenous variation from the Madrid System's expansion and fee structure; specifications include origin, destination and year fixed effects with clustered standard errors.

Findings – Inbound (destination-side) trademark activity causally increases trade concentration, with robust effects on market concentration (imports and exports) in non-high-income destinations. Instrumental variables (IV) estimates are larger than ordinary least squares (OLS), indicating OLS understates the true effect. Product-level diversification effects under OLS attenuate under IV, suggesting that trademarks reallocate market shares rather than expand product variety. Origin-side effects are generally weak or insignificant.

Research limitations/implications – Instrument strength varies across income subsamples; while robust overall and for developing destinations, some high-income estimates have weaker first stages. Future work could integrate product-level brand intensity and firm-level outcomes to refine mechanisms.

Originality/value – This study provides the first causal evidence that trademarks rather than patents systematically increase trade concentration via demand-side (destination) channels, leveraging the Madrid System as an instrument and decomposed Theil measures to pinpoint mechanisms.

Keywords Trademarks, Trade diversification, Trade concentration, IPR, Madrid System, Herfindahl–Hirschman Index, Theil index, Developing countries

Paper type Research article

1. Introduction

International trade plays a vital role in economic growth and development. On the one hand, imports increase competition and variety domestically, enhancing consumer welfare, while exports enlarge production, benefiting businesses (Schneider, 2005). Exposure to international markets promotes efficiency, innovation and learning effects, supporting growth (Schneider, 2005; Atkin *et al.*, 2017). Trade diversification is also linked to economic growth, with export diversification driving growth through technology spillovers. Imbs and Wacziarg (2003) show a U-shaped linkage between income per capita and the degree of product concentration. Further studies view diversification of exports as a steppingstone for development (Klinger and Lederman, 2006; Parteka, 2007). Identifying the policies and institutions shaping trade concentration is therefore central to development and trade policy, as illustrated by the empirical relationship between growth and trade concentration in Figure 1.



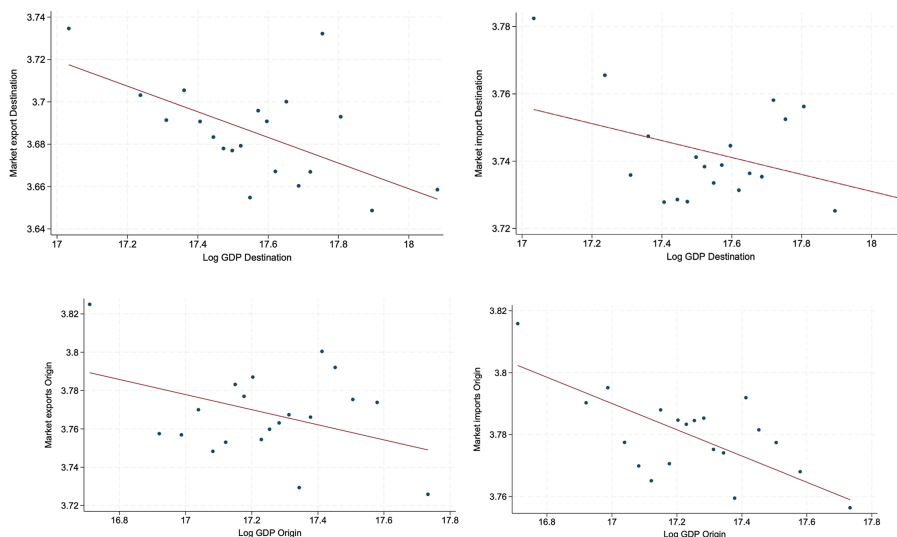


Figure 1. Export and import market concentration and GDP at trademark origins and destinations. Panel A: Export market concentration. Panel B: Import market concentration. Notes: All figures show that higher GDP is associated with lower market concentration for exports and imports on the origin and destination sides

Trademarks are the most widely used form of intellectual property (IP) worldwide, particularly in developing economies. In 2023, 11.6 million trademark applications were filed globally, compared to 3.55 million patent applications (WIPO, 2024). In least-developed countries (LDCs), trademark applications averaged around 2,200 annually between 2017 and 2021, while patent applications averaged just 55 annually (UNCTAD, 2024). As economies become increasingly intangible, trademarks have evolved from simple identifiers of origin to strategic assets shaping market entry, brand positioning and the appropriation of returns to quality and reputation. Intangible assets are central to firm and macroeconomic competitiveness (D'Agostino and Schiavo, 2024; Hazan *et al.*, 2021), particularly in import-competing industries where trademarks signal quality and differentiation (D'Agostino and Schiavo, 2024). Their accumulation is linked to growth and diversification, mitigating vulnerability associated with high trade concentration (Olohunlana *et al.*, 2022; Ali and Anwar, 2021; Nitkiewicz *et al.*, 2014; Hamdan, 2018; Isola *et al.*, 2020; Al-Roubaie, 2025). As trade drives structural transformation through technology transfer and economies of scale (Arya *et al.*, 2024), trademarks provide a channel through which knowledge-based assets shape trade concentration.

Existing research examines patents or broad intellectual property rights (IPR) measures and their effects on trade flows, specialization and export diversification across income levels and sectors (Maskus and Penubarti, 1995; Gnangnon and Moser, 2014; Campi and Dueñas, 2019), while trademark literature studies trademarks as indicators of variety, quality, branding, competition and firm performance (Economides, 1988; Landes and Posner, 1987; Luini and Mangani, 2004; Mangani, 2007; Heath and Mace, 2019). Causal evidence on how trademark activity affects the structure of trade across products versus partner markets and via origin-side supply versus destination-side demand mechanisms remains limited.

This gap is addressed by examining how trademarking reconstructs countries' trade concentration across products and markets while distinguishing between origin versus destination channels. Our conceptual model is developed from three roles of trademarks: (1) reducing information and search asymmetries, (2) maintaining reputation and perceived

quality and (3) serving market-power functions to derive two mechanisms. On the demand side, trademarks registered in destination markets shift demand toward branded varieties, potentially increasing concentration across destination markets for each product. On the supply side, registered trademarks abroad can decrease brand appropriation risks and facilitate entry into new markets, with unclear implications on concentration depending on whether extensive-margin diversification or intensive-margin scaling dominates. These mechanisms yield hypotheses about (1) the relative strength of destination- versus origin-side effects, (2) differences between market versus product concentration and (3) heterogeneity by destination income level.

Empirically, we assemble a bilateral country-pair panel for 1995–2022, linking domestic and Madrid System trademark filings to trade concentration measures, the Herfindahl–Hirschman Index (HHI) and decomposed Theil indices into product and market components for exports and imports. This strategy differentiates between whether trademarks affect the variety of products traded (product concentration) or the distribution of trade across partners (market concentration). The origin-destination structure separates the effects of trademarks filed in origin countries, the “supply side”, from trademarks registered in destination markets, the “demand side,” and explores heterogeneity by income levels.

The Madrid System for international trademark registration, which enables applicants to seek trademark protection in multiple jurisdictions via a single international application, is a key institutional feature underlying the identification strategy. We exploit the staggered timing of accessions and institutional changes as sources of variation that shift trademarking intensity over time. Our identification assumption is that, conditional on fixed effects and controls, Madrid-related institutional changes affect trade concentration primarily through their impact on trademarking costs and intensity rather than through direct changes to tariffs or other trade policies.

Our analysis provided four main findings. First, we provide, to our knowledge, the first causal evidence that trademarks systematically affect trade concentration, operating predominantly through destination-side (demand) channels. Instrumental variable (IV) regressions show inbound trademark activity in destination markets significantly increases import and export market concentration, especially in non-high-income destinations, consistent with our model’s prediction that the demand-side channel is the dominant strategy. Second, trademark effects are most robust for market concentration, while product-level effects are weaker. Trademarks mainly reallocate market shares toward branded suppliers within existing product categories and across trading partners rather than expanding the range of products traded.

Third, origin-side, or supply, effects appeared weaker and more heterogeneous. Trademark effects are generally insignificant for high- and low-income origins and smaller than destination-side impacts, suggesting that branding and trademark protection in receiving markets are the main factors through which IP-based reputation influences trade structure.

Fourth, our results reveal strong heterogeneity by development level. The most robust effects appear in non-high-income destinations where trademarks raise import and export market concentration, whereas effects in high-income destinations are smaller or imprecise, and origin-side effects are insignificant overall, consistent with the idea that information frictions, weaker consumer-protection institutions and less stringent competition enforcement can boost market-power implications of branding. Findings suggest that trademark reforms and accession to systems such as Madrid may unintentionally increase trade concentration in developing economies unless accompanied by policies protecting competition, market entry and product variety.

By centering trademarks and the Madrid System in the analysis of trade concentration, the paper contributes to three strands of literature. Conceptually, it develops a framework in which trademarks may diversify or concentrate trade through demand- and supply-side channels, showing that the demand-side mechanism dominates. We use a rich bilateral panel and an institutional cost shock to empirically identify how branding-related IP protection reshapes

trade structure. We methodologically combine decomposed Theil indices and IV strategies based on Madrid membership to distinguish between the mechanisms through which a non-tariff, intangible policy tool reshapes trade patterns.

While the trade and IPR literatures show that innovation-related policies can shape trade outcomes, it remains unclear whether trademarks, a prevalent form of IP in developing economies, systematically diversify trade (by supporting entry into new products or markets) or instead concentrate trade (by reallocating demand toward branded incumbents). This study addresses that gap by focusing on trade concentration across markets and products and by distinguishing destination- versus origin-side trademarking channels. We address three research questions: (1) Do trademarks affect trade concentration more strongly across partner markets or across products? (2) Are effects driven mainly by destination-side trademark protection (demand-side mechanisms) or origin-side trademarking (supply-side mechanisms)? (3) Do effects vary systematically by countries' development level? This study contributes by (1) developing a bilateral framework linking trademarks to market- and product-level concentration via search costs, reputation and strategic market-power functions; (2) assembling a bilateral panel that separates origin-side from destination-side trademarking and uses decomposed Theil indices alongside HHI-based measures; (3) leveraging Madrid System-related institutional variation to strengthen causal inference and (4) translating the findings into policy-relevant implications for development, trade resilience and the governance of market access.

The paper's organized as follows. [Section 2](#) reviews the literature. [Section 3](#) presents the conceptual model and testable implications. [Section 4](#) describes the data and empirical strategy. [Section 5](#) reports the results and discusses mechanisms and heterogeneity. [Section 6](#) concludes with policy implications.

2. Literature review

2.1 Theoretical foundations of trademarks

Modern economic theory views trademarks as institutions that reduce information frictions and search costs, facilitating exchange and incentivizing quality provision ([Landes and Posner, 1987](#)). In markets with asymmetric information, illustrated by [Akerlof's \(1970\)](#) "lemons" problem, reputational devices prevent low-quality goods from displacing high-quality goods. Trademarks play this role by linking current purchases to past experiences and incentivizing firms to invest in and protect reputational capital.

[Economides \(1988\)](#) emphasizes that trademarks support differentiated varieties and quality combinations demanded in modern economies. Recent empirical work extends these classic foundations by linking trademark protection to information frictions, firm growth and competition ([Alfaro et al., 2022](#)). For this paper, the key implication is that trademarks can shape trade composition by influencing which varieties gain traction and how quickly firms scale across markets.

However, overprotection may increase the power of dominant firms and restrict entry for new competitors ([Dogan and Lemley, 2007](#)). Hence, trademarks benefit information symmetries but must not prevent competitiveness. [Barnes \(2006\)](#) further argues that trademarks exhibit public goods characteristics – they contribute to a shared pool of information, requiring incentives for their production, and hence, they should be justified only to the extent necessary to keep their public informational function.

2.2 Trademark filing motives

Empirical evidence identifies multiple trademark filing motives. [Castaldi et al. \(2020\)](#) identify appropriation of innovation rents, securing market positions and attracting resources, especially for young firms. Using firm-level evidence, [Block et al. \(2015\)](#) identified protection (securing exclusive rights and preventing competitor imitation), marketing (strengthening

company image, customer loyalty, brand building, and product differentiation) and exchange (improving negotiating positions and attracting investors). Recent research reveals strategic practices. [Castaldi \(2023\)](#) identifies “trademark cluttering” (filing without intention to use) as a problematic practice while also acknowledging potential efficiency benefits of trademark protection.

2.3 Trademark effects on market structure and competition

After identifying the motives behind trademark activity, it's important to clarify how trademark protection affects market structure and competition. Trademarks may enhance competition by reducing search costs and enabling firms to credibly signal quality, yet they can also strengthen market power when brands create switching costs or are deployed strategically to deter entry ([Landes and Posner, 1987](#); [Economides, 1988](#); [Castaldi, 2023](#)). This ambiguity motivates treating trade concentration as a structural outcome that captures whether market access and gains from trade diffuse broadly or become concentrated.

Building on this foundation, [Heath and Mace \(2019\)](#) discuss competing effects: enhanced efficiency through incentives to invest in product quality versus increased concentration through barriers to entry. Using the 1996 Federal Trademark Dilution Act, they provide evidence consistent with reduced entry and exit in affected markets when protection strengthens, highlighting the plausibility of concentration-enhancing mechanisms. Related recent work examines the “bright” and “dark” sides of corporate trademark practices ([Castaldi, 2023](#)) and suggests that strategic trademarking may have non-trivial implications for market structure ([Castaldi et al., 2020](#); [Castaldi, 2023](#); [Heath and Mace, 2019](#); [D’Agostino and Schiavo, 2024](#)).

2.4 International trademark protection and trade patterns

[Baroncelli et al. \(2005\)](#) present stylized facts on the global trademark distribution, showing foreign residents account for 81% of trademark registrations in low-income countries compared to 34% in high-income countries, with a strong positive correlation between gross domestic product (GDP) and international trademark registrations. The higher the level of development, the greater the number of reputational assets generated, leading to more dominance of domestic brands in local markets and higher presence and competitiveness abroad. Additionally, the paper emphasized the role of the Madrid System in facilitating trademarking by reducing administrative burdens and transaction costs.

Trademark patterns also closely mirror trade flows, particularly in research and development (R&D)-intensive and branded sectors ([Baroncelli et al., 2005](#)), suggesting trademarks both precede and facilitate market entry. Broader IPR evidence shows cross-border patents increase bilateral exports, especially in high-demand elasticity and downstream sectors ([Brunel and Zylkin, 2022](#)), showing how IPR generally affects trade patterns.

2.5 IPR protection and trade diversification

The relationship between IPR protection and trade is theoretically ambiguous and development-dependent. [Campi and Dueñas \(2019\)](#) find that trade agreements containing IPR provisions generate smaller immediate trade gains than those without. The study also finds that countries’ development levels and IP intensity of products influence the relationship. In other words, effects are uneven between developed and developing countries, with clearer positive effects for developed countries.

Theoretically, stronger IPRs incentivize and promote innovation, economic growth and development. [Helpman \(1993\)](#) identified four channels in which IPR protection affects trade diversification, including terms of trade effects, inter-regional manufacturing allocations, product availability and R&D investment patterns. However, [Maskus and Penubarti \(1995\)](#) argue that IPR has uncertain effects on international trade. On one hand, stronger IPRs can

increase firms' market power and encourage monopolistic behavior, raising prices and reducing sales. On the other hand, IPRs can incentivize exports of patentable goods to countries with robust IP protection, since imitation risks are lower, creating a complex theoretical framework where net effects depend on which mechanism dominates. Their empirical findings show that stronger patent protection in destination markets increases manufactured imports for small and large developing economies and that IP stimulates trade flows rather than restricts them.

A key empirical finding is the non-linear relationship between IPR protection and trade diversification, which varies depending on a country's development level or less developed countries (real per capita income under USD 1,458.60), and weaker IPR protection encourages services export diversification (Gnangnon, 2024). In relatively advanced developing countries (income exceeding USD 3,356.80), stronger IPR laws encourage greater services export diversification. The relationship exhibits threshold effects, with IPR protection having no significant effect on diversification for countries with protection levels between 1.35 and 1.85, positive effects below 1.35 and negative effects above 1.85 (Gnangnon, 2022).

Additionally, Luini and Mangani (2004) show that trademark filings tend to mirror the underlying structure of national economies. They show that higher trademark activity reflects greater differentiation within sectors, using trademarks as proxies for product differentiation. Moreover, sectors with more competitive economic activity tend to have stronger trademarking activity. The study also found that trademarks are associated with export specialization, where countries protect brands more in sectors where they are economically competitive.

Built upon predictions that larger and richer economies tend to export more high-quality products, Mangani (2007) used trademarks as a proxy to measure both product variety and quality. The study differentiates between variety across product classes (the extensive margin), variety within classes (the intensive margin) and a quality margin, which is captured by the extent to which trademarks span multiple classes. Findings show that the extensive margin explains almost 40% of the higher volume of trademark filings in larger and wealthier economies, whereas quality differences account for about 10% of national differences in trademark application.

2.6 Economic complexity and export upgrading

Beyond diversification, IPR protection relates to economic complexity. Sweet and Maggio (2015) find that stronger IPR systems are associated with greater economic complexity, while innovation contributes to export product diversification at both extensive (number of products) and intensive margins (export value per product) (Chen, 2013), creating potential linkages between trademark protection innovation incentives and export diversification outcomes.

2.7 Research gaps and future directions

Despite growing attention to trademark research and being the most widely used form of IP protection (WIPO, 2024), significant gaps remain in understanding how trademarks shape international trade structure. Most IP trade research concentrates on patents or broad IPR indices, while trademark-focused studies are fewer and often descriptive. Moreover, the trade structure dimension is underexplored: existing work rarely distinguishes concentration across partner markets from concentration across products, and it seldom separates destination-side demand mechanisms from origin-side supply mechanisms in a causal framework.

At the same time, the literature on trademarks and competition suggests that stronger protection can either facilitate entry and quality signaling or entrench incumbents and raise barriers to entry, with potentially large implications for trade diversification and resilience. This paper bridges these strands by providing causal evidence on how trademark activity relates to trade concentration across markets and products, explicitly distinguishing

3. Conceptual model: trademarks and trade concentration

This paper studies how trademark activity reshapes countries' trade structure, focusing on the implications for concentration across products and markets, and whether effects operate through the supply (origin) or demand (destination) side of bilateral trade. The model builds on three roles of trademarks: (1) reducing information and search frictions, (2) sustaining reputation and perceived quality and (3) serving strategic market-power functions. These roles imply two channels through which trademarking can impact trade concentration.

3.1 Demand-side (destination) channel

When foreign firms register trademarks in destination country j , they protect brand identity and reduce uncertainty about product attributes. This shifts demand toward trademarked varieties and can increase market shares of recognized brands. In aggregate trade data, this implies higher market and/or partner concentration if branded suppliers capture disproportionate shares within product-market pairs. The channel should be stronger in lower-income destinations where informational frictions and weaker consumer-protection systems heighten the value of branding. Product concentration effects are ambiguous *ex ante*, as brands may deepen dominance in existing categories (raising product concentration) or facilitate differentiation and new variety introduction (lowering it).

3.2 Supply-side (origin) channel

Trademarking in foreign markets can enable entry and scaling abroad by safeguarding brand capital. For low- and middle-income countries, this may foster extensive margin expansion (new markets and products), lowering concentration. For high-income countries with incumbent multinationals, trademarks may instead reinforce "superstar exporters," raising concentration through intensive-margin scaling. Hence, supply-side effects are predicted to be weaker and more heterogeneous.

3.3 Testable concentration implications

The Madrid System is a key institutional feature shaping trademarking intensity over time, as it reduces the fixed cost of protection abroad through procedural and fee harmonization. In this framework, it doesn't introduce a new mechanism for concentration independently but amplifies trademarking and thereby strengthens whichever of the two channels dominates in a given setting. This raises trademarking intensity via a policy-driven shock rather than contemporaneous trade structure changes. Conceptually, Madrid affects trade concentration only through its first-stage impact on trademarking, supporting our IV strategy.

The model yields four predictions guiding the empirics: (1) destination-side trademarks should dominate origin-side effects; (2) market concentration should respond more clearly than product concentration; (3) effects should be larger in non-high-income destinations and (4) origin-side impacts should vary by income level. We test these implications using bilateral trademarks, HHI and decomposed Theil indices in ordinary least squares (OLS) and IV specifications.

4. Data and empirical strategy

4.1 Data sources and construction

The empirical analysis employs a bilateral country-pair panel dataset consisting of trademark registrations and trade concentration indices. Raw observations extend from 1985 to 2023, but the final estimation sample covers 1995–2022, representing consistently available trademark,

merchandise trade and control variables required for identification and enabling systematic analysis of how trademark activity and trade structures evolve over time.

4.1.1 Trademark data. The source of trademark registrations is the WIPO IP Statistics Center capturing the full scope of trademark activity in each country, which includes domestic registrations filed by residents in their home country and foreign registrations filed by non-residents in a different country. The dataset identifies the applicant country (origin) and the country where protection is sought (destination), capturing outbound and inbound trademark flows and country-level heterogeneity in trademarking behavior. We use both counts of trademark registrations and $\ln(1+\text{count})$ transformations to reduce skewness and accommodate zeros.

4.1.2 Trade concentration measures. Next, we construct multiple dependent variables to capture the multidimensions of trade concentration. First, the HHI is calculated as the sum of squared shares of each product in total exports. For exports, the HHI is defined as

$$HHI = \sum_{i=1}^n s_i^2 \quad (1)$$

Where s_i = the market share percentage of firm n expressed as a whole number.

Second, the Theil concentration index measures export and import concentration across products (excluding services) and markets of an economy or group of economies, which are derived from the UNCTAD Merchandise Trade Matrix and are decomposed additively into a product concentration measure and a market (per product) concentration measure.

Product concentration captures diversity of exported or imported products within each country's trade basket, while market concentration measures how exports or imports of each product are distributed across destination or origin markets. This decomposition identifies whether trademark activity influences the variety of products traded, geographic distribution of trade or both.

We construct four Theil-based measures. First, product export concentration measures the degree of diversification in a country's export basket across products. Second, product import concentration measures the diversity of products in a country's imports. Third, market export concentration captures the geographic distribution of each product's exports across destination markets, and fourth, market import concentration captures the geographic distribution of each product's imports across source markets.

The panel is structured at the country-pair-year level, with each observation representing the bilateral trademark relationship between an origin and a destination for a given year.

4.2 Madrid system data

We incorporate international filings through the Madrid System, provided by WIPO, to capture the entire international dimension of trademarking. The system enables applicants to seek protection in multiple jurisdictions through a single application, lowering costs and administrative burdens. By 2024, it covered 115 members representing 131 countries, with a basic fee of 653 Swiss francs and a 90% reduction for LDCs. The system expanded rapidly during the sample period, enabling us to utilize this institutional design to identify variation in trademark filing incentives across countries and over time.

Madrid variables include (1) Madrid System membership indicator (time-varying), (2) accession date, (3) bilateral and/or party indicators used to capture origin-only, destination-only or bilateral Madrid coverage and (4) variables used to identify origin or destination membership effects where appropriate. To avoid selection bias from restricting to early joiners only, we retain late-accession members and treat the panel as unbalanced.

4.3 Gravity variables and controls

To mitigate confounding influences affecting trademarking and trade concentration, we incorporate standard gravity and country-level controls for origin and destination countries.

Bilateral gravity variables, including geographic distance and cultural and historical ties, are taken from the Centre d'Études Prospectives et d'Informations Internationales GeoDist database. Country-level controls (GDP, GDP per capita and population) are sourced from the World Bank's World Development Indicators to capture differences in market size and development levels. The World Bank updates thresholds annually on July 1 using gross national income (GNI) per capita from the previous calendar year so countries may transition between groups over time. Policy-related variables include participation in regional trade agreements (RTA), drawn from the World Trade Organization's RTA database. A diplomatic disagreement or conflict measure is included in the sample. Lastly, bilateral trade flow controls are included that capture the Base pour l'Analyse du Commerce International bilateral merchandise trade flow and bilateral and domestic market indicators.

4.4 Sample construction and data quality

The panel is structured at the country-pair-year level. The baseline sample includes dyad-year observations for which the key dependent variables (trade concentration indices) and the corresponding trademark measures are observed. The final sample spans 1995–2022, 28-year period, for 118 country pairs. Country pairs enter the estimation sample when bilateral merchandise trade, origin- and destination-side trademark measures and the baseline gravity controls are jointly observed; therefore, the panel is unbalanced and reflects data coverage rather than *ex ante* restriction to a specific region or income group.

The study period is anchored in data availability and institutional relevance. The start year reflects the first year in which the trademark measures, trade concentration indices and gravity controls can be consistently combined at scale in a bilateral panel. The end year reflects the most recent year with complete coverage across the main data sources at the time of compilation. The period also spans substantial changes in international trademark institutions, including the expansion of the Madrid System, which strengthens identification by providing time variation in trademarking costs.

Countries covered include Organisation for Economic Co-operation and Development and emerging and developing economies across all regions, classified into World Bank income groups (low, lower-middle, upper-middle and high) based on the Atlas-method GNI per capita. Any missing data reflect unavailable trademark or index measures. The number of dyad-year observations differs across regressions due to (1) unbalanced membership timing across countries, (2) missingness in time-varying covariates and (3) specification-specific requirements. Logarithmic transformations were applied to skewed continuous variables, including trademarks, GDP, population, trade flows and HHI.

4.5 Empirical design and identification strategy

For our empirical approach, we considered several methodological concerns. Since firms may file trademarks in markets they are planning to enter, trademark filing strategies can be endogenous to trade outcomes, creating a simultaneity bias. To address this, we used the Madrid System as an IV to capture exogenous variations in the firms' trademarking strategies, since it accounts for institutional and cost-based factors.

To control for unobserved heterogeneity, we estimate panel regressions with origin, destination and year fixed effects where appropriate to address potential omitted variable bias arising from unobserved country characteristics, bilateral relationships or common time trends. Standard errors are clustered depending on the specification, typically at the origin and destination country level, accounting for potential correlation within country pairs or countries over time.

5. Empirical results: trademarks and concentration

To connect theoretical mechanisms with the empirical analysis, we model bilateral trade concentration as a function of origin-side and destination-side trademark intensity. Let $C_{ij,t}$ denote a generic trade concentration measure (for example, the HHI, the product Theil index or the market Theil index) for origin country i and destination country j in year t . Our conceptual empirical specification can be written as:

$$C_{ij,t} = \beta^O TM_{i,t}^O + \beta^D TM_{j,t}^D + X'_{ij,t} \theta + \mu_{ij} + \tau_t + \varepsilon_{ij,t} \quad (2)$$

where $TM_{i,t}^O$ is the intensity of trademark activity by origin country i (outbound filings), $TM_{j,t}^D$ is the intensity of trademark activity in destination country j (inbound filings) and $X'_{ij,t}$ is a vector of bilateral gravity variables and country-level controls. The term μ_{ij} denotes country-pair fixed effects (or, in alternative specifications, separate origin and destination fixed effects) that capture time-invariant bilateral relationships and structural differences; τ_t denotes year fixed effects that capture common global shocks and $\varepsilon_{ij,t}$ is an error term.

Within this framework, β^O and β^D correspond directly to the supply-side and demand-side channels. Heterogeneous effects by income group are tested by interacting $TM_{i,t}^O$ and $TM_{j,t}^D$ with income-group dummies for origins and destinations. The four conceptual predictions map into sign and magnitude expectations for β^O and β^D across different outcomes (HHI, product Theil and market Theil) and income groups.

5.1 Market-level concentration analysis

Market-level concentration captures how exports or imports of each product are distributed across destination or origin markets. Higher values indicate that trade for a given product is concentrated in fewer partner markets, reflecting the scaling of successful brands (intensive margin) or the dominance of a small number of trading relationships. This outcome is relevant for development because higher partner concentration can increase exposure to shocks and reduce resilience, even when total trade grows.

5.1.1 Export market versus import market concentration. For destination countries, we estimate positive and statistically significant associations between destination-side trademark activity and both import and export market concentration (Table 1). Import-market concentration is significantly positive in the overall sample and non-high-income destinations (Table 1, Columns 1 and 3). Interpreting these coefficients in index units, the results imply that greater trademarking intensity in destination markets is associated with more

Table 1. Effect of trademarks on import and export market concentration (destination country, by income group)

Variables	(1) Overall	(2) High income	(3) Non-high income	(4) Low income
<i>Import market concentration</i>				
Ln trademarks (destination country)	0.00443* (2.28)	0.00133 (0.45)	0.00463* (2.38)	−0.00715 (−0.74)
Observations	450,134	52,276	397,857	13,218
<i>Export market concentration</i>				
Ln trademarks (destination country)	0.00780* (2.05)	0.0210* (2.24)	0.00744 (1.90)	−0.00449 (−0.43)
Observations	450,134	52,276	397,857	13,218

Note(s): t -statistics in parentheses. Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

concentrated trade across partner markets, consistent with a demand-side mechanism in which trademarks shift demand toward branded varieties and strengthen incumbents' relative market positions (Landes and Posner, 1987; Akerlof, 1970).

Export market concentration shows a similar pattern (Table 1). Destination-side trademark activity is significantly positive for the overall sample and high-income destinations (Table 1, Columns 1–2). These import and export results suggest that destination-side trademark protection can be associated with partner concentration on both sides of the trade account, consistent with trademarks functioning as reputational and informational devices that can enable market-power effects when successful brands scale (Heath and Mace, 2019; Castaldi, 2023).

Origin-side effects are heterogeneous across development levels (Table 2). Trademark filings by high-income origins are positively and significantly associated with import-market concentration ($\beta = 0.00736$; Table 2, Col. 2), whereas filings by low-income origins are negatively and significantly associated with concentration ($\beta = -0.00392$; Table 2, Col. 4), consistent with modest diversification as some exporters expand across partners while building brand protection abroad. This pattern aligns with the view that supply-side trademark effects are inherently context-dependent: trademarks can either facilitate entry and product expansion (Luini and Mangani, 2004; Mangani, 2007) or strengthen incumbent advantages, with the net impact varying by country development and IP intensity (Maskus and Penubarti, 1995; Campi and Dueñas, 2019).

5.2 Instrumental variables estimation: Madrid System

Trademark intensity is not predetermined: firms may file trademarks in markets where they anticipate entry or expansion, making trademarking endogenous to current and expected trade outcomes. To strengthen causal inference, we exploit the Madrid System as a source of institutional variation that changes the cost and administrative burden of obtaining foreign trademark protection. Accession and membership can shift incentives to file internationally without directly altering tariffs or imposing product market regulations, though the exclusion restriction requires careful consideration (discussed in Section 4.5 and Section 6).

In the empirical implementation, this identification logic is operationalized through a first-stage relationship of the form:

$$TM_{c,t}^k = \gamma_1^k \times MadridMember_{c,t} + \gamma_2^k Z_{c,t} + \lambda_c + \tau_t + v_{c,t}^k \tag{3}$$

where $TM_{c,t}^k$ denotes trademark intensity for country c in role $k \in \{O, D\}$ (origin or destination), $MadridMember_{c,t}$ is an indicator for whether country c is a member of the Madrid

Table 2. Effect of trademarks on import and export market concentration (origin country, by income group)

Variables	(1) Overall	(2) High income	(3) Non-high income	(4) Low income
<i>Import market concentration</i>				
Ln trademarks (origin country)	−0.000544 (−0.54)	0.00736* (2.54)	−0.00107 (−1.07)	−0.00392* (−2.56)
Observations	442,816	74,538	368,278	4,229
<i>Export market concentration</i>				
Ln trademarks (origin country)	−0.000962 (−0.60)	0.00441 (0.64)	−0.00119 (−0.76)	0.000668 (0.24)
Observations	442,816	74,538	368,278	4,229

Note(s): *t*-statistics in parentheses. Significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

System in year t and $Z_{c,t}$ captures additional country-level covariates (such as GDP per capita or other IP-related reforms) where appropriate. Country-fixed effects λ_c absorb time-invariant differences in institutions and preferences, while year-fixed effects τ_t absorb global shocks.

First-stage results indicate adequate instrument strength. F-statistics range from 2.11 to 13.64, with most specifications exceeding conventional thresholds for strong instrument identification. Although identification is weaker in some high-income subsamples, the overall evidence suggests the instruments are sufficiently relevant for inference.

5.2.1 Market concentration analysis: robust IV evidence. For a destination country, trademarking has statistically significant positive effects on the overall sample for export market concentration (Table 3, Column 1) and for non-high-income destinations (Table 3, Column 3).

Similar to export market concentration, both the overall sample and non-high-income countries for import market concentration are significant with coefficients $\beta = 0.009$ ($p < 0.10$) (Table 3, Column 1) and $\beta = 0.014$ ($p < 0.05$) (Table 3, Column 3), respectively, indicating increased import market concentration associated with trademark activity. Stronger trademark protection can act as a barrier to entry, reinforcing incumbent dominance and limiting competition, while destination market filings strengthen branded firms' market positions through demand-side mechanisms (Heath and Mace, 2019; Castaldi *et al.*, 2020; Block *et al.*, 2015).

Origin country trademarks' effects on market concentration are more limited yet important. Non-high-income origins have significant positive effects on export market concentration ($\beta = 0.020$) and import market concentration ($\beta = 0.011$) at the 10% level (see [supplementary material](#)). This suggests that trademark-induced market concentration at the origin level operates mainly through the non-high-income country mechanisms.

5.3 Synthesis of empirical results

Combining OLS and IV results yields several patterns aligned with the conceptual model. First, destination-side effects are consistently stronger than origin-side effects, supporting a demand-driven mechanism where trademark protection in importing markets shifts consumer demand and reallocates market shares toward branded varieties. Second, effects are more robust for market concentration than product concentration, consistent with trademarks operating through partner reallocation and scaling rather than systematic expansion of product

Table 3. Effect of trademark activity on export and import market concentration for destination country

Variables	(1) Overall	(2) High income	(3) Non-high income	(4) Low income
<i>Export market concentration</i>				
Ln trademarks (destination country)	0.014 ^b (0.007)	0.005 (0.007)	0.026 ^b (0.012)	0.000 (0.001)
First-stage F	9.29	2.69	9.09	12.06
Origin FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	509,000	62,415	446,000	14,648
<i>Import market concentration</i>				
Ln trademarks (destination country)	0.009 ^c (0.005)	0.006 (0.006)	0.014 ^b (0.007)	0.003 (0.002)
First-stage F	9.29	2.69	9.09	12.06
Origin FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	509,000	62,415	446,000	14,648
Note(s): Standard errors in parentheses. Significance levels: ^c $p < 0.10$, ^b $p < 0.05$, ^a $p < 0.01$				

variety. Third, heterogeneity by development level suggests that trademark-driven concentration pressures are salient in non-high-income destinations, where information frictions and institutional constraints are more binding. These patterns are consistent with the dual role of trademarks in reducing information frictions and, potentially, reinforcing market power (Landes and Posner, 1987; Heath and Mace, 2019; Castaldi, 2023).

IV estimates were consistently larger than OLS coefficients, especially for destination country HHI in non-high-income countries and across market concentration measures (see [supplementary material](#)), indicating that OLS likely underestimated true causal effects. In contrast, product import concentration results significant under OLS disappear under IV (see [supplementary material](#)), indicating possible reverse causality or omitted-variable bias. Market concentration effects became more robust under IV, especially for origin-country measures.

Overall, the statistical significance, direction and consistency of findings across measures indicate that trademark protection has economically significant effects in developing countries on trade concentration, predominantly demand-driven effects.

5.4 Discussion

The IV analysis reveals that trademark activity causally increases trade concentration, observed mostly among developing destinations and market concentration channels. This supports the conceptual model's hypothesis that demand-side mechanisms will dominate.

The empirical findings show that trademarking acts as a determinant of market structure in international trade. Branding shapes how firms compete and affects economic welfare by enabling consumers to rely on reputation when product quality is unobservable (WIPO, 2013). Similarly, the results suggest that trademarking strengthens producers' market power, enabling them to capture larger market shares and raise concentration levels. This finding matches empirical evidence showing firms who inherit consumer goodwill and loyalty when acquiring a brand can price above marginal costs (Kost *et al.*, 2020). Meanwhile, trademarked brands become sources of competitive advantage because consumers may find it harder to switch from established brands to competitors due to search costs and reputation effects, resulting in higher market concentration.

The stronger destination-side effects are consistent with a demand-side interpretation in which trademark protection operates primarily by reducing information frictions and strengthening reputation-based demand in the importing market, thereby reallocating market shares across partners rather than expanding product scope. This reading aligns with the view that trademarks intensify competition on perceived quality and can simultaneously entrench brand-based market power (WIPO, 2013; Castaldi, 2023). The weaker and less robust product-concentration effects suggest that trademarking is more closely associated with scaling and partner selection than with systematic increases in product variety, consistent with the synthesis presented in [Section 5.3](#).

In developed markets, trademark activity is positively associated with concentration, as firms use branding to maintain market dominance and existing distribution networks. By contrast, the negative relationship observed in import market concentration suggests that trademarking can lower information barriers and facilitate entry, increasing supplier diversity and competition. Overall, the effects are concentrated on destination countries, indicating that trademarks shape trade patterns primarily through demand-side mechanisms in receiving markets rather than supply-side effects in origin countries.

6. Conclusion

This paper examined how trademarks reshape international trade structure, focusing on concentration across partner markets and products while distinguishing destination-side (demand) from origin-side (supply) channels. Motivated by evidence linking trade

diversification and resilience to economic development, the analysis finds that destination-side trademark activity is associated with more concentrated trade across partner markets, with the most robust patterns in non-high-income destinations and for market-level concentration measures.

Supporting the conceptual model, the main result is that trademarking in destination markets tends to increase trade concentration, consistent with demand-side mechanisms through which trademarks reduce uncertainty and reallocate demand toward branded varieties. Origin-side effects are weaker and more heterogeneous, consistent with the supply-side ambiguity between diversification through new market entry and concentration through scaling. Product-concentration effects are less robust than market-concentration effects, indicating that trademarks are more closely tied to where trade occurs than to the breadth of products traded.

6.1 Policy implications

For developing and middle-income countries considering trademark institution reforms or Madrid System engagement, the results underscore a trade-off. On the one hand, stronger trademarking activity can support quality signaling, variety creation and global participation. On the other hand, it may contribute to partner concentration, potentially increasing vulnerability to shocks and limiting broad diffusion of gains from trade. Policy design should therefore combine trademark facilitation with complementary measures that protect competition and broaden market access, such as transparent enforcement, support for small and medium-sized enterprise branding capability, and competition-policy safeguards. These considerations align with inclusive growth and decent work [Sustainable Development Goal (SDG) 8] and with institution-building and fair market governance (SDG 16).

Multiple limitations highlight the need for further research. First, we cannot fully separate market-power effects from quality-signaling channels due to limited measures on firm-level branding, product-level advertising or investments. Second, incorporating pass-through to prices, entry and exit dynamics, and consumer surplus would provide a more inclusive welfare assessment. Addressing these gaps would integrate trademark policies with inclusive growth.

Overall, the results show that trademarks, while being identifiers of origin, are also strategic assets that shape international trade patterns. Therefore, it's essential to understand the asymmetric and market-oriented channels that influence trade patterns, a key driver of economic growth.

Supplementary material

The supplementary material for this article can be found online.

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Corresponding author

Shahd Abou El Leil can be contacted at: shahdahmed@aucegypt.edu