

Digitalization, Institutional Quality and Export Diversification: A Synthesis of Evidence from Emerging Economies

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Abstract. *This paper examines whether digitalization promotes export diversification in emerging economies and whether institutional quality conditions that effect. It develops a transaction-cost framework in which digital infrastructure lowers the fixed costs of entering new export lines — buyer search, documentation and border compliance — while institutions determine the share of returns an exporter can appropriate. Three testable propositions are derived from the framework and confronted with a structured synthesis of the empirical literature, assembled through systematic searches of RePEc, Scopus-indexed journals and the working-paper series of the International Monetary Fund and the World Bank. The evidence supports complementarity rather than substitution: digitalization broadens export baskets and raises their technological sophistication, but weak governance blunts and can reverse these returns. Firm-level evidence indicates that home-country corruption steepens the curvilinear relationship between digitalization and export propensity, amplifying both the gains of digital leaders and the losses of the over-extended. The substitution view survives only as a process-level claim about narrow verification functions such as customs processing and documentary compliance, not as an economy-wide alternative to contract enforcement. The paper specifies a replicable panel design for twenty-four emerging economies over 2000–2023 using openly available data, and derives sequencing implications for diversification policy: customs efficiency and regulatory predictability are preconditions for, rather than complements to, digital investment.*

Keywords: export diversification, digitization, institutional quality, governance, emerging economies, transaction costs

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Received: 24 February 2026; Accepted: 1 June 2026; Published online: 28 September 2026

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Rəqəmsallaşma, institusional keyfiyyət və ixracın diversifikasiyası: inkişaf etməkdə olan iqtisadiyyatlar üzrə dəlillərin sintezi

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Xülasə. *Məqalədə rəqəmsallaşmanın inkişaf etdirilməsi olan iqtisadiyyatlarda ixracın diversifikasiyasına təsiri və institusional keyfiyyətin bu təsirləri müəyyən edilir. Tədqiqatın nəzəri əsaslarını tranzaksiya idarəetmə yanaşması təşkil edir: rəqəmsal infrastruktur yeni mənbələrə daxil olmaq üçün sabitləşməni — xarici alıcıların axtarışı, sənədləşdirmə və sərhədlərinə uyğunluq dəstəyini —, institutlar əldə etmək üçün əldə edilən gəlirin tədarükçüdə qalan investorları azaldır.*

Bu çərçivədə üç yoxlanıla bilən müddəa irəli sürülür və empirik ədəbiyyatın strukturlaşdırılmış birləşməsinə uyğunlaşdırılır. Mənbələr RePEc, Scopus indeksli jurnallar, Beynəlxalq Valyuta Fondu və Dünya Bankının işçi sənədləri üzrə sistemli axtarışlar toplanmışdır. Nəticələr əvəzedicilik deyil, tamamlayıcılıq fərziyyəsini təyin etmək: rəqəmsallaşma ixrac səbətini artırır və onun texnoloji mürəkkəbliyini artırır, lakin zəif idarəetmə bu gəlirliliyi azaldır və nəticə etibarilə dəyişdirilə bilər. Firma səviyyəsindəki dəllər göstərir ki, ölkəxili korrupsiya rəqəmsal olaraq ixrac meyilliliyi ilə bağlı ayrışatlı əlaqələri və həm qazancları, həm də itkilərini gücləndirir. Əvəzedicilik baxışı yalnız gömrük yoxlaması və sənəd dövriyyəsi kimi dar yoxlama funksiyaları güclü qüvvədədir. Məqalədə 2000–2023-cü illərdə olan iqtisadiyyat üzrə 2000–2023-cü illərdə açıqlanan məlumatlara söykənən təkrar istehsal olunan panel tədqiqat dizaynı təqdim edilir və diversifikasiya strategiyası üçün təhlükəsizlik tədbirləri həyata keçirilir.

Açar sözlər: ixracın diversifikasiyası, rəqəmsallaşma, institusional keyfiyyət, idarəetmə keyfiyyəti, inkişaf etməkdə olan iqtisadiyyatlar, transzaksiya idarə

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Daxil oldu: 24 Fevral 2026; Qəbul edildi: 1 İyun 2026; Onlayn dərc edildi: 28 Sentyabr 2026

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Introduction

Why do some emerging economies broaden their export baskets while others remain locked into a handful of products? The question is not new, but it has acquired fresh urgency. Commodity price cycles since the early 2000s, the disruption of global supply chains after 2020, and the accelerating digitalization of trade itself have all sharpened the costs of concentration. A country that ships mostly crude oil, copper or a narrow band of garments absorbs terms-of-trade shocks with little cushion, and the growth literature has long associated such concentration with higher output volatility and weaker long-run performance (International Monetary Fund, 2014).

Two candidate drivers of diversification dominate recent policy debates. The first is digitization. Digital infrastructure reduces the cost of discovering foreign buyers, complying with documentation requirements, and coordinating production across borders; it therefore lowers precisely the fixed entry costs that heterogeneous-firm trade theory identifies as the barrier keeping marginal firms and marginal products out of export markets (Melitz, 2003; Freund & Weinhold, 2004). The second driver is institutional quality. Trade in differentiated and complex products is contract-intensive, and countries with weak enforcement systematically specialize away from such products (Nunn, 2007; Levchenko, 2007). Poor institutions act, in Anderson and Marcouiller's (2002) phrase, as a hidden tax on trade.

What remains contested is how these two forces interact. One view treats digitization as an institutional bypass: electronic platforms, escrow-style payment systems and, more recently, distributed-ledger applications embed trust in technology and thereby substitute for weak courts. A competing view holds that digital tools amplify whatever institutional environment they land in, so that connectivity investment without governance reform will disappoint. Adjudicating between these views matters directly for how diversification budgets are spent.

This paper contributes in three ways. First, it grounds the debate in a unified transaction-cost framework rather than treating digitalization and institutions as separate control variables, as much of the earlier driver literature does (Agosin et al., 2012; Giri et al., 2019), and derives three testable

propositions from it. Second, it conducts a structured synthesis of the empirical evidence — from the classic diversification studies through the most recent firm-level work on digitalization in emerging economies – and weighs that evidence against the two competing views. Third, it translates the framework into a complete and immediately implementable macro-panel research design for twenty-four emerging economies over 2000–2023, built entirely on openly available data, with the estimation protocol released as an open replication package. The synthesis speaks in particular to resource-dependent economies of the kind found in the Caspian region and Central Asia, where diversification programs increasingly combine digital corridors, customs modernization and logistics upgrading.

1.1. Conceptual framework and propositions

The framework treats entry into a new export line as an investment with a fixed cost F and an institution-dependent expropriation and enforcement risk. Digitization lowers F through cheaper search, marketing and compliance. Institutions determine the expected share of returns the exporter keeps. When enforcement is weak, lowering F changes little, because the binding constraint is appropriability, not entry cost; when enforcement is adequate, a lower F draws marginal products into the export basket. On this logic digitization and institutions are complements: the diversification payoff of a given improvement in connectivity rises with governance quality. The substitution view predicts the opposite pattern – technology-embedded trust should matter most precisely where courts are weakest. Three propositions follow.

P1. Digitization is associated with lower export concentration in emerging economies.

P2. Institutional quality is associated with lower export concentration.

P3. The diversification effect of digitalization strengthens with institutional quality (complementarity), rather than weakening (substitution).

Methods

2.1. Evidence synthesis method

The evidence base was assembled through structured searches of the major bibliographic sources for economics (RePEc, Scopus-indexed journals and working-paper series of the IMF and World Bank), combining the terms export diversification, export concentration, export sophistication, institutional quality, governance, digitalization, ICT and internet, with no lower date bound and coverage through early 2026. Studies were retained when they were empirical, peer-reviewed or issued by an international financial institution, and directly informative about at least one leg of the framework: the diversification–development path, the institutional determinants of trade composition, the digitalization–export nexus, or their interaction. Purely theoretical contributions were retained only where they supply the identifying mechanism. The synthesis is narrative and structured rather than meta-analytic, because the outcome variables across the literature (concentration indices, sophistication measures, export propensity) are not commensurable enough for formal effect-size pooling. Table 1 summarizes the core evidence set; Section 3 weighs it.

Table 1

Core empirical evidence on diversification, institutions and digitalization

Study	Sample and method	Finding relevant to this synthesis
Imbs & Wacziarg (2003)	Sectoral data, large country panel; non-parametric and parametric estimation	Hump-shaped relationship between concentration and income: economies diversify as they grow and re-concentrate only at high income levels.

Study	Sample and method	Finding relevant to this synthesis
Cadot, Carrère & Strauss-Kahn (2011)	156 countries, 19 years, HS6 product-level export data (4,991 lines)	Confirms the hump for exports; diversification in low and middle-income countries occurs mostly along the extensive margin (new export lines).
Agosin, Alvarez & Bravo-Ortega (2012)	Cross-country panel, 1962–2000; system GMM	Trade openness alone does not diversify exports; real exchange rate overvaluation and terms-of-trade volatility discourage new export products.
Giri, Quayyum & Yin (2019)	Large cross-country panel; Bayesian model averaging over a wide driver set	Infrastructure, human capital, institutional quality and financial development are among the most robust predictors; resource-rich developing economies face the steepest challenge.
Anderson & Marcouiller (2002)	Bilateral trade, gravity framework with survey-based insecurity measures	Corruption and weak contract enforcement depress trade like a hidden tax on the traded good.
Nunn (2007)	Industry-level trade data interacted with judicial quality across countries	Countries with better contract enforcement hold comparative advantage in relationship-specific, contract-intensive goods.
Levchenko (2007)	Trade flows; institutional differences modelled as a source of comparative advantage	Institutional weakness pushes specialisation toward simple, homogeneous products — i.e., toward a concentrated export basket.
Freund & Weinhold (2004)	Country panel, late 1990s; gravity-style export growth regressions	Growth in internet penetration is associated with faster export growth, consistent with lower market-entry and search costs.
Atasoy (2021)	61 countries; three export sophistication measures; GMM	Digitalization raises export sophistication; institutional quality and access to credit act as complementary drivers.
Kurul (2023)	Developing and least developed countries; panel estimation	Both hard (infrastructure) and soft (procedures, institutions) dimensions of trade facilitation raise export diversification.
Capelleras, Martin-Sanchez & Zhang (2025)	35 emerging economies, 17,265 firm-level observations; multilevel analysis	Inverted U-shaped effect of digitalization on export propensity; home-country corruption steepens the curve, amplifying both benefits and downsides.

Note. Full bibliographic details in the reference list. Sample descriptions follow the studies' own reporting.

2.2. Empirical research design implied by the framework

The propositions are directly testable with openly available data, and the framework implies a specific design. The unit of analysis is an unbalanced panel of twenty-four emerging economies over 2000–2023: Argentina, Azerbaijan, Brazil, Chile, China, Colombia, Egypt, Hungary, India, Indonesia, Kazakhstan, Malaysia, Mexico, Morocco, Peru, the Philippines, Poland, Romania, South Africa, Thailand, Türkiye, Ukraine, Uzbekistan and Vietnam – a list that deliberately mixes resource-

dependent exporters with manufacturing-oriented ones so that the institutional and digital gradients in the data are wide. The dependent variable is the normalized Herfindahl–Hirschman index of export product concentration from UNCTADstat, compiled annually through 2023; the Theil index from the IMF Export Diversification Database, the standard alternative (Cadot et al., 2011; International Monetary Fund, 2014), ends in 2014 and serves as a robustness measure on the earlier sub-sample. Digitalization is the first principal component of internet use, mobile subscriptions and fixed broadband penetration, following the practice of compressing correlated ICT indicators into a single index (Atasoy, 2021); institutional quality is the average of the six Worldwide Governance Indicators (Kaufmann et al., 2011); controls follow the robust drivers identified by Giri et al. (2019) and Agosin et al. (2012): log income and its square, natural resource rents, FDI, trade openness, private credit and human capital.

The estimating equation regresses concentration on its lag, digitization, institutions, their interaction and the controls, with country and year effects. Because concentration is persistent and connectivity is plausibly endogenous to trade structure, estimation should combine two-way fixed effects with two-step system GMM (Blundell & Bond, 1998), collapsing the instrument matrix and validating the specification with the AR(2) and Hansen tests; and because a 24-year annual panel is long relative to a 24-country cross-section, the GMM step belongs on non-overlapping three-year averages, the standard remedy in the dynamic cross-country literature. Under P3 the interaction coefficient is negative – a given improvement in connectivity reduces concentration by more where governance is stronger – and the single most policy-relevant output of the model is the institutional threshold below which the marginal effect of digitalization loses significance. The full estimation protocol, including data acquisition from the World Bank, UNCTAD and Penn World Table sources, is released as an open replication package accompanying this paper, so the design can be executed and audited without further discretionary choices.

Results

3.1. Diversification along the development path

The stylized facts are well established. Imbs and Wacziarg (2003) documented a hump-shaped relationship between sectoral concentration and income: economies diversify as they grow and re-concentrate only at high income levels. Cadot et al. (2011) extended the finding to exports using highly disaggregated product data for 156 countries, showing that diversification occurs mostly along the extensive margin – the addition of new export lines – before re-concentration sets in among rich countries. For the income range occupied by emerging economies, the empirically relevant portion of the curve is unambiguous: development and export diversification move together, and the policy question is what shifts a country along that path faster.

Cross-country work on the drivers points to a consistent set of correlates. Agosin et al. (2012) find that trade openness by itself is not sufficient and that real exchange rate overvaluation and terms-of-trade volatility discourage the emergence of new export products. Using Bayesian model averaging over a large set of candidate variables, Giri et al. (2019) identify infrastructure, human capital, institutional quality and financial development among the most robust predictors, with resource-rich developing economies facing the steepest diversification challenge – a class that includes the hydrocarbon exporters of the Caspian basin. Trade facilitation matters as well: improvements in both physical border infrastructure and the soft quality of customs procedures raise export diversification in developing and least developed countries (Kurul, 2023).

3.2. Institutions and the composition of trade

The institutional literature supplies the deeper mechanism, and applied to trade composition the argument is specific rather than general. Complex and differentiated goods require relationship-

specific investments and are traded under incomplete contracts, so countries with better contract enforcement hold a comparative advantage in exactly those goods (Nunn, 2007). Levchenko (2007) formalizes the point: institutional differences are themselves a source of comparative advantage, and institutional weakness pushes specialization toward simple, homogeneous products – the definition of a concentrated export basket. Anderson and Marcouiller (2002) show that insecurity and corruption depress trade volumes as effectively as tariffs. Taken together, this body of work makes P2 the best-supported leg of the framework: no study in the evidence set finds that weaker governance broadens export baskets.

3.3. Digitization and export outcomes

Early evidence on the internet and trade found that connectivity growth in developing countries was associated with faster export growth (Freund & Weinhold, 2004). Subsequent research has moved from volumes to composition. Atasoy (2021) shows for a panel of 61 countries that digitization raises export sophistication, with institutional quality, access to credit and research intensity acting as complementary drivers. This supports P1: better connectivity is associated with broader and more sophisticated export baskets.

The digitalization channel, however, is not unconditionally positive. At the firm level the relationship with export propensity turns concave, suggesting over-investment beyond an optimal point (Capelleras et al., 2025). This finding cautions against reading any digitization coefficient as a pure technology dividend.

Discussion

4.1. Weighing the interaction: complementarity versus substitution

The decisive question for policy is P3, and here the evidence, while thinner, points consistently in one direction. Three strands support complementarity. First, in the cross-country sophistication results the institutional and financial variables do not wash out once digitization enters; they operate alongside it, which is what a complementary technology implies (Atasoy, 2021). Second, the driver literature finds institutions and infrastructure jointly robust rather than mutually redundant (Giri et al., 2019), and the trade facilitation results show that the soft, institutional dimension of border management carries diversification effects over and above physical infrastructure (Kurul, 2023). Third, and most directly, the firm-level evidence shows that home-country corruption reshapes the digitalization–export relationship itself: it steepens the inverted U, amplifying the gains of the digital leaders but also the losses of the over-extended, so that the same digital investment produces more dispersed and riskier outcomes in worse-governed environments (Capelleras et al., 2025). None of these results is what the substitution view predicts, namely a larger and more uniform digital dividend precisely where formal institutions are weakest.

The substitution view retains a defensible niche rather than a general claim. Technology-embedded trust demonstrably works within narrow, well-specified transaction environments – documentary compliance, customs processing, traceability – where distributed-ledger systems can substitute for specific verification functions of weak bureaucracies. But these are process-level substitutions inside a single transaction, not economy-level substitutes for contract enforcement over the life of an export relationship. The synthesis conclusion is therefore that digital infrastructure and governance reform are complements at the margin that matters for diversification: the appropriate reading of the evidence is that connectivity spending buys the most new export lines where courts, regulators and customs already function tolerably well.

4.2. Policy implications

The political implications are sharpest for resource-dependent economies. Diversification programs in such countries increasingly bundle transport corridors, customs digitalization and logistics investment, as in the Trans-Caspian Middle Corridor initiatives. The synthesis implies that the sequencing of such programs matters: customs efficiency and regulatory predictability are not complements to be added later but preconditions for the digital components to generate new export lines rather than merely cheapening existing ones (Kurul, 2023). Financing is a parallel constraint: mobilizing private capital for structural transformation requires exactly the institutional credibility that the interaction measures.

4.3. Limitations and directions for further research

Two limitations qualify the contribution and point to further work. A narrative synthesis cannot replace estimation, which is why the paper closes with a complete, openly replicable design rather than with a verdict claimed on its behalf; executing that design is the immediate next step. And the evidence base for the interaction, while consistent, remains thin at the macro level and largely silent on services exports, where digital delivery changes the economics of diversification more radically than for goods. Both extensions are feasible and, given the fiscal weight now attached to digital-corridor strategies across Eurasia, worth undertaking.

Conclusion

This paper asked whether digitization diversifies the exports of emerging economies and whether institutions govern the size of that effect. The transaction-cost framework predicts complementarity: digital infrastructure lowers the fixed costs of entering new export lines, but weak enforcement caps the expected return to entry, so connectivity pays off most where governance is sound. The structured synthesis of the empirical literature supports that prediction. Institutional quality is the best-attested determinant of trade composition in the evidence set; digitalization broadens and upgrades export baskets across levels of aggregation; and where the two are studied together, governance conditions return to digital investment rather than being displaced by it. The substitution view survives only as a process-level claim about specific verification functions, not as a strategy for structural transformation.

For policy, the operative conclusion is one of sequencing rather than of choice between instruments: connectivity spending and governance reform are not competing claims on a diversification budget, and the former yields its largest return where the latter has already been undertaken. The panel design set out in Section 2.2 makes this claim falsifiable, and its execution — together with an extension to services exports — defines the agenda that follows from this synthesis.

Statement on the use of artificial intelligence tools

In accordance with the journal's policy on authorship and artificial intelligence, the author discloses that the AI-based language assistant Grammarly was used in the preparation of this manuscript for language editing purposes only. All sources were verified by the author, the analytical framework and conclusions were reviewed and approved by the author, and the author takes full responsibility for the entire content of the article.

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