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From Traditional Markets to Digital Platforms: Marketplace Ecosystems and International Digital Integration in Developing Economies

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Abstract: *Digital marketplaces are increasingly embedded in the transition from geographically bounded commerce to platform based exchange, yet stronger domestic platform readiness does not necessarily translate into deeper international digital integration. This study examines that distinction using a balanced panel of 50 developing and emerging economies from 2015 to 2024, comprising 500 country year observations. A Digital Marketplace Development index is constructed by principal component analysis from internet use, fixed broadband subscriptions, account ownership, and digital payment use. The first component explains 67.17 percent of total variance, with a Kaiser Meyer Olkin statistic of 0.623 and a significant Bartlett test. International digital integration is proxied by a principal component index combining ICT goods export intensity and trade openness. Country and year fixed effects models with standard errors clustered by country show that marketplace readiness is positively related to integration in pooled patterns, but its within country effect is small and statistically insignificant after controls. The interaction with digital infrastructure is also insignificant. Robustness checks using a lagged marketplace index and an equal weight alternative lead to the same conclusion. Uzbekistan illustrates the resulting conversion gap: in 2024 it ranked 18th of 50 economies on marketplace readiness, above the sample median, while its international digital integration score remained below the median. The findings suggest that connectivity and payment readiness are necessary foundations, but complementary cross border capabilities are required to convert domestic marketplace development into international digital integration.*

Keywords—digital marketplaces; platform economy; digital transformation; e-commerce; digital integration; developing economies; panel data

1. INTRODUCTION

Digital technologies are changing not only the channels through which goods and services are sold, but also the institutional architecture of markets. Traditional commerce depends heavily on physical proximity, local information networks, and established distribution relationships. Digital platforms relax several of these constraints by matching buyers and sellers, organizing information, integrating payment functions, and coordinating complementary services. This transformation is consistent with the broader literature on digital transformation, which emphasizes changes in value creation, organizational structures, and market relationships rather than the adoption of information technology alone [1], [2].

Transaction-cost economics provides an important starting point for understanding this shift. Coase argued that market exchange involves costs of search, coordination, negotiation, and enforcement [3], while Williamson showed how alternative governance arrangements emerge when they economize on such costs [4]. Digital marketplaces can lower some of these frictions through search tools, ratings, standardized transactions, and digital payments. Platform theory adds a second mechanism: marketplaces coordinate multiple user groups and generate network effects as participation expands [5]. The contemporary platform ecosystem therefore differs from a conventional online shop because its economic value depends on interactions among independent sellers, consumers, payment providers, logistics operators, and other complementors [6].

For developing economies, these characteristics are potentially important. Digital platforms may allow small firms to reach customers without equivalent investment in physical outlets, and digital entrepreneurship research highlights how digital technologies can reduce spatial and organizational boundaries [7], [8]. However, the existence of domestic marketplace infrastructure does not guarantee international participation. Firms also require export capabilities, cross-border payment arrangements, customs and logistics systems, and external market linkages. This distinction between domestic digital readiness and international digital integration remains comparatively underexamined.

This paper addresses that gap by separating marketplace ecosystem readiness from international digital integration. It asks whether improvements in digital marketplace development are associated with higher international digital integration after controlling for time-invariant country characteristics, and whether digital infrastructure strengthens that relationship. Rather than using platform revenue data, which are not consistently available across developing economies, the paper constructs a comparable ecosystem-readiness index from connectivity and financial-use indicators and tests its relationship with an international-integration proxy over a ten-year panel.

2. LITERATURE REVIEW AND HYPOTHESES

2.1 From traditional markets to platform ecosystems

Traditional market organization is constrained by information, distance, and coordination costs. Digital marketplaces alter those constraints by reducing search costs and increasing the visibility of prices, products, and counterparties. This is compatible with transaction-cost reasoning [3], [4]. At the same time, two-sided-market theory explains why marketplace value may rise with participation on both sides of the platform [5]. More recent platform research describes digital platforms and ecosystems as characteristic organizational forms of the digital age, emphasizing their ability to coordinate distributed value creation while centralizing some elements of governance [6].

2.2 Digital transformation and internationalization

Digital-transformation research stresses that technology changes business models and strategic behavior rather than simply automating existing processes [1], [2]. Digital entrepreneurship likewise emphasizes less bounded entrepreneurial processes and new forms of opportunity discovery [7], while entrepreneurial-ecosystem research shows that digital affordances can weaken spatial constraints [8]. These arguments suggest a pathway from marketplace development to wider market participation. Yet internationalization requires additional capabilities: connectivity can reduce information frictions in cross-border exchange [9], but trade outcomes still depend on production structure, institutions, logistics, and access to external markets.

2.3 Hypotheses

H1: Digital marketplace development has a positive effect on international digital integration.

H2: Digital infrastructure positively moderates the relationship between digital marketplace development and international digital integration.

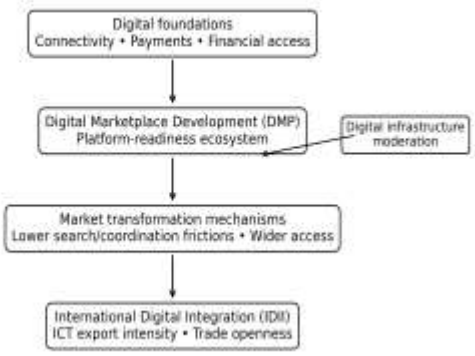

Fig. 1.*Conceptual framework.*

3. DATA AND METHODOLOGY

3.1 Sample and data

The dataset is a balanced panel of 50 developing and emerging economies observed from 2015 to 2024, yielding 500 country-year observations. Annual macroeconomic and ICT indicators were taken from the World Development Indicators files supplied for the study [10]. Financial-inclusion indicators were taken from the Global Findex database [11]. Global Findex is survey-based rather than annual. Account ownership and the share of adults making or receiving digital payments were therefore linearly interpolated between the available 2014, 2017, 2021, and 2024 survey waves within each country. These interpolated values should be interpreted as constructed annual estimates rather than direct annual observations.

TABLE I. VARIABLE DEFINITIONS.

Variable	Construction / unit	Role
DMP	PCA: internet, broadband, account ownership, digital payments	Main explanatory
DI	PCA: internet and fixed broadband	Moderator
IDII	PCA: ICT-goods export intensity and trade openness	Dependent proxy
ln GDPpc	Natural log of GDP per capita	Control
HCI+	Human capital index plus, overall score (0–325)	Control

3.2 Composite indices

Principal component analysis (PCA) is used to combine correlated indicators into composite measures [12]. Each component is standardized before estimation, the first principal-component score is retained, and the score is rescaled to the interval from zero to one. DMP combines internet use, fixed broadband subscriptions, account ownership, and digital-payment use. DI combines internet and broadband. IDII combines ICT goods exports as a percentage of total goods exports with trade openness, defined as exports plus imports as a percentage of GDP. IDII is therefore a parsimonious proxy for the intersection of digital-export specialization and international market exposure rather than a complete measure of cross-border digital trade.

3.3 Econometric approach

The main specification is a two-way fixed-effects model with country and year effects. Country effects absorb time-invariant national characteristics, while year effects absorb common shocks. Standard errors are clustered at the country level. The controls are log GDP per capita and HCI+. Trade

openness is not added as a control because it is already part of IDII. The moderation specification adds DI and the centered interaction between DMP and DI. The estimates should be interpreted as within-country associations rather than causal effects.

4. RESULTS AND DISCUSSION

4.1 Descriptive evidence

TABLE II. DESCRIPTIVE STATISTICS (N = 500).

Variable	Mean	Std.	Min	Max
IDII	0.219	0.196	0.000	1.000
DMP	0.469	0.212	0.000	1.000
DI	0.415	0.222	0.000	1.000
Internet users (%)	60.684	24.026	5.700	100.000
Broadband /100	11.897	9.938	0.008	47.193
Account ownership (%)	59.827	19.858	15.789	98.455
Digital payments (%)	50.241	20.279	12.012	97.409
ICT goods exports (%)	4.174	9.427	0.000	49.770
Trade openness (%)	73.969	37.355	22.486	199.045

The sample exhibits substantial heterogeneity in both digital readiness and international integration. At the pooled level, IDII is positively correlated with DMP (r = 0.306), DI (r = 0.351), log GDP per capita (r = 0.289), and HCI+ (r = 0.436). These associations describe cross-country patterns but do not isolate within-country change.

4.2 PCA diagnostics

The DMP index performs satisfactorily as a compact four-indicator construct. The Kaiser-Meyer-Olkin statistic is 0.623, and Bartlett's test of sphericity is significant (chi-square = 1422.454, df = 6, $p < 0.001$). The first principal component explains 67.17 percent of total variance. Digital payments have the largest loading (0.539), followed by account ownership (0.517), fixed broadband (0.487), and internet use (0.453).

For IDII, the first component explains 65.38 percent of the variance in ICT-goods export intensity and trade openness, with equal loadings of 0.707. Bartlett's test is significant (chi-square = 49.480, $p < 0.001$). Because IDII contains only two indicators, its KMO statistic is 0.500 and the index should be treated as a deliberately parsimonious proxy.

TABLE III. PCA LOADINGS.

Index / indicator	Loading	PC1 variance
DMP: Internet	0.453	67.17%
DMP: Broadband	0.487	
DMP: Account ownership	0.517	
DMP: Digital payments	0.539	
IDII: ICT goods exports	0.707	65.38%
IDII: Trade openness	0.707	

4.3 Fixed-effects estimates

The fixed-effects results materially qualify the positive pooled correlation. In Model 1, DMP has a coefficient of 0.033 with p = 0.736. After adding log GDP per capita and HCI+, the coefficient is 0.036 (p = 0.674). Adding DI reduces the DMP estimate to 0.021 (p = 0.856), while DI itself is also insignificant (0.022, p = 0.833). H1 is therefore not supported by the within-country evidence.

TABLE IV. TWO-WAY FIXED-EFFECTS ESTIMATES.

Variable	M1	M2	M3
DMP	0.033 (0.099)	0.036 (0.085)	0.021 (0.119)
DI			0.022 (0.106)
ln GDPpc		-0.009 (0.030)	-0.009 (0.030)
HCI+		0.00076 (0.00089)	0.00076 (0.00090)
Country FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Within R-squared	0.001	0.008	0.008
Observations	500	500	500

Notes: Country-clustered standard errors are in parentheses. No reported coefficient is significant at the 10 percent level.

The moderation model also fails to support H2. The centered DMP-by-DI interaction is -0.023 (SE = 0.103, p = 0.826). A one-year lag of DMP is likewise insignificant (-0.021, p = 0.782), and an equal-weight alternative to the PCA-based DMP index remains insignificant (0.009, p = 0.688). The null result is therefore robust to timing and index weighting.

TABLE V. MODERATION AND ROBUSTNESS CHECKS.

Specification	Coef.	SE	p
DMP x DI	-0.023	0.103	0.826
Lagged DMP	-0.021	0.077	0.782
Equal-weight DMP	0.009	0.024	0.688

4.4 Uzbekistan: the conversion gap

Uzbekistan illustrates a clear gap between domestic marketplace readiness and international integration. In 2024, its DMP score was 0.682, ranking 18th among the 50 economies and exceeding the sample median of 0.592. Internet use reached 89.51 percent and fixed broadband 34.74

subscriptions per 100 people. By contrast, account ownership was 59.66 percent and digital-payment use 49.88 percent, both below the sample medians.

Uzbekistan's 2024 IDII score was 0.116, below the sample median of 0.151. ICT goods accounted for only 0.35 percent of goods exports, while trade openness was 57.53 percent. The coexistence of above-median DMP readiness and below-median international integration is consistent with the fixed-effects evidence: building domestic digital infrastructure and payment readiness does not automatically create cross-border digital specialization.

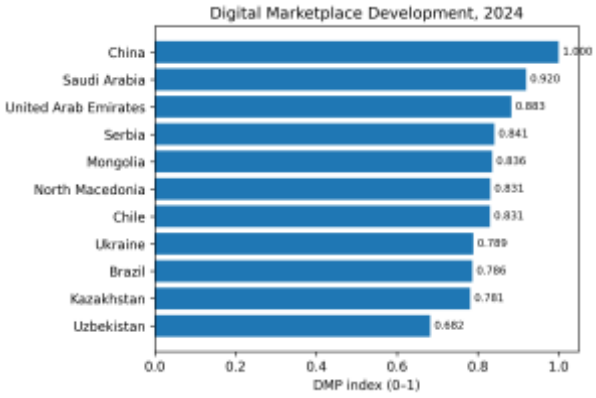

Fig. 2. *Selected DMP scores in 2024.*

4.5 Discussion and policy implications

The results refine the transaction-cost and platform arguments rather than overturn them. Marketplaces can reduce domestic information and coordination frictions, but internationalization imposes additional costs and institutional requirements that platform readiness alone cannot remove. Cross-border payments, customs procedures, product standards, export logistics, foreign-market knowledge, and access to international platform networks can determine whether domestic digitalization translates into international participation.

The difference between pooled and fixed-effects results is central. Countries with stronger DMP scores tend to display higher IDII scores, but within-country improvements in DMP over 2015–2024 are not significantly associated with contemporaneous improvements in IDII after fixed effects. This is consistent with a conversion-gap interpretation: digital foundations are necessary but not sufficient.

For policy, the implication is to move beyond connectivity-only strategies. Governments should combine digital infrastructure and payment development with SME export onboarding, cross-border platform access, interoperable payment systems, customs simplification, international fulfillment and logistics, and support for ICT-goods and digitally deliverable-services exports. For Uzbekistan, the evidence points particularly to the need to convert relatively strong domestic connectivity into export-oriented digital activity.

5. CONCLUSION

Using 500 observations from 50 developing and emerging economies, this study finds that digital marketplace readiness is a coherent multidimensional construct but does not have a statistically significant within-country effect on the selected international digital-integration proxy. The first DMP principal component explains 67.17 percent of variation across connectivity and financial-use indicators, yet fixed-effects, lagged, interaction, and equal-weight specifications all produce statistically insignificant marketplace coefficients.

The central conclusion is therefore not that digital marketplaces are unimportant, but that marketplace readiness and international integration are distinct stages of digital transformation. Domestic connectivity, broadband, account access, and digital payments may create the foundation for platform commerce; complementary trade institutions and export capabilities determine whether that foundation produces international digital participation.

The analysis has limitations. Comparable platform-transaction and cross-border e-commerce data are unavailable for the full panel, Findex observations are interpolated between survey waves, and IDII uses only ICT-goods export intensity and trade openness. Future work should incorporate digitally deliverable services, marketplace seller exports, platform transaction values, logistics quality, and regulatory interoperability, and should apply stronger causal identification strategies.

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