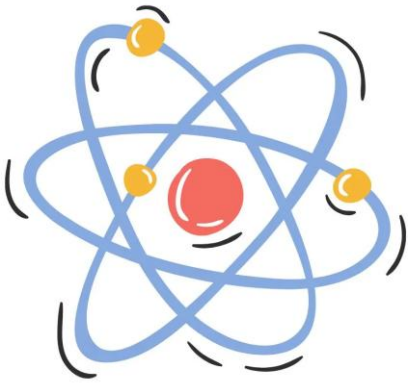

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FROM EXPORT VARIETY TO PRODUCTIVITY GROWTH: FIRM-LEVEL EVIDENCE ON DIVERSIFICATION IN EMERGING MARKETS

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Abstract: This paper examines whether export diversification at the firm level causally enhances productivity in emerging markets. While export diversification is widely promoted as a development strategy, empirical evidence on its microeconomic foundations remains limited. Using harmonised firm-level customs and production data from multiple emerging economies, we analyse how changes in export variety—across products and destination markets—affect firm-level total factor productivity. To address endogeneity arising from self-selection and reverse causality, we employ a combination of firm fixed effects, country-by-year fixed effects, instrumental variables based on exogenous global demand shocks, and event-study designs around major diversification episodes. We find robust evidence that increases in export variety lead to economically meaningful productivity gains. These effects materialise gradually over time, consistent with learning, capability accumulation, and organisational adjustment. Productivity gains are larger when diversification involves more complex products and are stronger in countries with better trade facilitation and institutional quality. Counterfactual analyses suggest that export diversification accounts for a non-trivial share of aggregate productivity growth in several emerging markets. The results highlight export diversification as an active channel of productivity growth rather than a mere outcome of firm performance, with important implications for development and trade policy.

Keywords: Export diversification; Firm productivity; Learning-by-exporting; Economic complexity; Emerging markets; Structural transformation

1. Introduction

Export diversification continues to feature prominently in debates on economic development, structural transformation, and growth sustainability. Across emerging and developing economies, policy frameworks increasingly emphasise expanding the range of exported products and destination markets as a means of reducing vulnerability to external shocks, fostering learning, and upgrading productive capabilities. This emphasis has intensified in recent years following global trade disruptions, commodity price volatility, and the COVID-19 pandemic, which collectively exposed the risks associated with narrow export specialisation (Barbieri et al., 2024; Fernandes et al., 2023). Despite its centrality in policy discourse, however, the microeconomic foundations of export diversification remain imperfectly understood. In particular, it is still unclear whether export diversification at the firm level causally improves productivity, or whether observed correlations merely reflect the tendency of more productive firms to diversify.

At the macro level, a substantial body of research documents a positive association between export diversification, economic complexity, and long-run income growth (Balland et al., 2022; Mealy & Teytelboym, 2022). Countries exporting a broader and more sophisticated range of products tend to experience faster growth, lower output volatility, and greater resilience to external shocks. While these patterns are robust, they offer limited insight into the underlying

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mechanisms. Countries do not diversify autonomously; rather, diversification emerges from the cumulative decisions of heterogeneous firms operating under varying institutional, financial, and policy constraints. Understanding how firm-level export behaviour translates into aggregate development outcomes therefore requires moving beyond country-level correlations to examine firm-level dynamics directly.

Firm-level studies have made important progress in documenting exporter premia and learning effects associated with international trade participation. A growing literature shows that exporters tend to be larger, more productive, and more innovative than non-exporters, even after controlling for selection (Békés & Muraközy, 2021; De Loecker et al., 2020). However, much of this work focuses on the extensive margin of exporting—whether firms export or not—or on export intensity, rather than on **export variety**, defined as the breadth of products and destination markets served. Yet export variety is arguably the dimension of trade most closely linked to learning, capability accumulation, and resilience, particularly in emerging market contexts characterised by demand volatility and incomplete markets (Cadot et al., 2020; Taglioni & Winkler, 2020).

Moreover, existing firm-level evidence is heavily skewed towards single-country studies. While such analyses provide valuable institutional detail, they limit the generalisability of findings and risk conflating universal mechanisms with country-specific conditions. Emerging markets differ markedly in trade facilitation, institutional quality, access to finance, and industrial structure—factors that may shape both firms' ability to diversify and the productivity returns to diversification (Alfaro et al., 2021; Cirera et al., 2022). A multi-country firm-level approach is therefore essential for assessing whether export diversification constitutes a broadly applicable development mechanism or a context-specific phenomenon.

This paper contributes to the literature by examining the causal relationship between export variety and productivity growth using harmonised firm-level data from multiple emerging economies. We adopt a **process-oriented perspective**, conceptualising export diversification not as a static firm attribute but as a dynamic strategy through which firms engage with diverse markets and products over time. Our central research question is straightforward yet unresolved: **does increasing export variety lead to productivity growth at the firm level, and through which channels does this occur?**

We focus on three mechanisms that are central to contemporary development theory. First, **learning-by-exporting** suggests that exposure to heterogeneous foreign buyers, standards, and competitive environments induces firms to upgrade technologies, improve quality, and reorganise production (Juergensen et al., 2024; Fernandes et al., 2023). Export variety may amplify these effects by broadening the range of knowledge sources available to firms. Second, diversification can operate as a **risk-smoothing mechanism**, reducing dependence on individual products or markets and stabilising revenues. Lower volatility can, in turn, relax financing constraints and support productivity-enhancing investments (Barbieri et al., 2024; Bricongne et al., 2021). Third, export diversification may generate **economies of scope**, allowing firms to share inputs, logistics, and managerial capabilities across multiple export activities, thereby improving efficiency (Bernard et al., 2022).

Crucially, these mechanisms are unlikely to operate uniformly across all forms of diversification. Recent work in economic complexity highlights that the **nature of exported products** matters for learning and upgrading (Balland et al., 2022; Mealy & Teytelboym,

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2022). Diversification into technologically complex or knowledge-intensive products may yield larger productivity gains than diversification into simple or closely related goods. Accordingly, we distinguish empirically between export variety and export complexity, allowing us to assess whether productivity effects depend on the qualitative content of diversification.

Identifying the causal effect of export variety on productivity presents substantial empirical challenges. More productive firms are both more likely to diversify and better positioned to absorb the fixed costs associated with entering new markets or producing new products. Reverse causality and omitted variable bias therefore pose serious concerns. We address these challenges using a combination of within-firm panel estimation and quasi-experimental variation. Our empirical strategy exploits exogenous shocks to foreign demand at the product-destination level—arising from global demand fluctuations and trade disruptions—which affect firms' opportunities to diversify independently of their contemporaneous productivity trajectories (Bartik-style instruments). In addition, the multi-country nature of our data allows us to absorb country-specific shocks through rich fixed effects and to exploit differential exposure to global trade shocks across firms and countries.

The data used in this study link detailed customs records to firm-level production and financial information across several emerging economies spanning multiple regions. This harmonised dataset enables consistent measurement of export variety, export complexity, and productivity across countries. Productivity is estimated using established production-function approaches that account for simultaneity and selection (De Loecker et al., 2020), ensuring comparability across institutional settings. The breadth of country coverage further allows us to examine heterogeneity in the diversification–productivity relationship across income levels, institutional quality, and trade policy environments.

Our results provide robust evidence that increases in export variety lead to economically meaningful and statistically significant productivity gains at the firm level. These effects materialise gradually, consistent with learning and capability accumulation rather than short-term scale effects. Productivity gains are stronger when diversification involves more complex products and in countries with better trade infrastructure and institutional quality. Mechanism analyses indicate that diversified exporters are more likely to adopt quality certifications, invest in organisational change, and experience lower revenue volatility, lending support to the learning, scope, and risk-smoothing channels proposed in the conceptual framework.

At the aggregate level, we show that firm-level diversification dynamics contribute meaningfully to productivity growth in several emerging economies. Counterfactual simulations suggest that countries with persistently narrow export bases could realise substantial productivity gains if firms were able to diversify at rates observed in better-performing peers, conditional on supportive institutional environments. These findings underscore the importance of complementary policies—such as trade facilitation, access to finance, and institutional reform—in shaping the returns to export diversification (Cirera et al., 2022; Taglioni & Winkler, 2020).

This paper makes three main contributions. First, it provides **causal, multi-country firm-level evidence** on the relationship between export variety and productivity growth, addressing a key gap between macro-level diversification studies and micro-level exporter analyses. Second, it clarifies the **mechanisms** through which diversification affects firm performance, highlighting

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the roles of learning, organisational upgrading, and risk reduction. Third, it offers **policy-relevant insights** for development strategies: export diversification can support productivity growth, but its effectiveness depends critically on the quality of diversification and the institutional context in which firms operate.

The remainder of the paper is organised as follows. Section 2 presents the conceptual framework and hypotheses. Section 3 reviews the related literature. Section 4 describes the data and measurement strategy. Section 5 outlines the empirical methodology and identification approach. Section 6 presents the main results and heterogeneity analyses. Section 7 examines the underlying mechanisms. Section 8 discusses aggregate implications and policy relevance. Section 9 concludes. Additional robustness checks and supplementary analyses are provided in the online appendix.

2. Conceptual Framework and Hypotheses

This section develops the conceptual framework linking **export variety** to **firm-level productivity growth** in emerging markets and derives testable hypotheses. The framework adopts a **process-oriented view**, treating export diversification as a dynamic strategy through which firms engage with heterogeneous markets and products over time. Rather than assuming automatic gains from diversification, we emphasise the conditions and mechanisms through which diversification may translate into productivity improvements.

2.1 Export Variety as a Dynamic Firm Strategy

We define **export variety** as the breadth of a firm's export activities along two margins: the number of distinct products exported and the number of destination markets served. This definition captures both **product diversification** and **market diversification**, which may operate through overlapping but distinct mechanisms. Product diversification reflects changes in a firm's production capabilities, input combinations, and technological scope, whereas market diversification reflects engagement with heterogeneous demand structures, regulatory environments, and buyer requirements.

Conceptually, export variety differs from export intensity or export participation. While export participation captures the extensive margin of trade and export intensity captures scale, export variety captures **scope**. In emerging markets, where firms often face high fixed costs of exporting and incomplete domestic markets, scope expansion may be particularly relevant for learning and upgrading (Cadot et al., 2020; Bernard et al., 2022).

Export diversification is inherently dynamic. Firms rarely diversify instantaneously; instead, they expand gradually into new products or markets as capabilities accumulate and constraints ease. This dynamic perspective aligns with recent work emphasising path dependence and capability accumulation in development processes (Balland et al., 2022; Mealy & Teytelboym, 2022). Accordingly, our framework focuses on how **changes in export variety over time** affect productivity growth, rather than on static differences between diversified and specialised firms.

2.2 Learning-by-Exporting and Knowledge Accumulation

The first and most widely discussed mechanism linking export variety to productivity is **learning-by-exporting**. Exporting exposes firms to foreign buyers, competitors, and regulatory environments that often demand higher quality, stricter standards, and greater

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reliability than domestic markets. These interactions can induce firms to adopt new technologies, improve management practices, and reorganise production processes (Fernandes et al., 2023; Juergensen et al., 2024).

Export variety may amplify learning-by-exporting through two channels. First, exporting multiple products or serving multiple markets increases the **diversity of information and feedback** received by the firm. Different markets may impose distinct standards or preferences, while different products may require different production techniques. Exposure to this heterogeneity can accelerate learning and experimentation. Second, export variety may increase the likelihood that firms encounter **high-quality buyers** or participate in more demanding segments of global value chains, which are often associated with stronger learning effects (Alfaro et al., 2021; Taglioni & Winkler, 2020).

Recent evidence suggests that learning-by-exporting is not automatic and depends critically on firms' absorptive capacity and organisational flexibility (Cirera et al., 2022; Juergensen et al., 2024). Export variety may therefore interact with firm characteristics such as size, age, and managerial capability, leading to heterogeneous productivity effects. Nevertheless, under plausible conditions, expanding export scope should increase opportunities for learning and upgrading.

Hypothesis 1 (H1): *An increase in export variety leads to higher firm-level productivity growth.*

2.3 Export Complexity and the Quality of Diversification

Not all forms of export diversification are equally conducive to productivity growth. The **economic complexity** literature emphasises that the knowledge content embedded in products matters for learning and development (Balland et al., 2022). Diversifying into technologically complex or knowledge-intensive products may require firms to develop new capabilities, adopt advanced technologies, and coordinate more sophisticated production processes. These investments, while costly, can generate substantial productivity gains.

By contrast, diversification into low-complexity or closely related products may yield more limited learning effects, particularly if it relies on existing capabilities without requiring significant upgrading. Similarly, expanding into new markets with similar demand structures or regulatory requirements may generate smaller learning benefits than entering more demanding markets.

Empirically distinguishing between **export variety** (breadth) and **export complexity** (quality) is therefore essential. Recent studies show that complexity upgrading is strongly associated with long-run growth at both the country and firm levels (Mealy & Teytelboym, 2022; Fernandes et al., 2023). In this framework, export variety creates opportunities for learning, while export complexity conditions the depth and intensity of that learning.

Hypothesis 2 (H2): *The productivity effects of export variety are stronger when diversification involves more complex products.*

2.4 Risk Smoothing, Revenue Stability, and Investment

A second mechanism linking export variety to productivity operates through **risk diversification and revenue stability**. Firms specialising in a narrow set of products or

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markets are more exposed to idiosyncratic demand shocks, price volatility, trade policy changes, and exchange-rate movements. In emerging markets, where insurance and financial markets are often underdeveloped, such volatility can constrain firms' ability to plan and invest (Bricongne et al., 2021).

Export variety can mitigate these risks by spreading sales across multiple products and destinations. Lower revenue volatility may relax financing constraints, reduce precautionary savings, and enable firms to undertake productivity-enhancing investments in technology, skills, and organisational change. Evidence from recent global shocks indicates that diversified exporters were more resilient and recovered faster than highly specialised firms (Barbieri et al., 2024; Békés & Muraközy, 2021).

Importantly, the risk-smoothing channel does not require learning per se; even in the absence of knowledge spillovers, diversification may improve productivity indirectly by stabilising cash flows and facilitating investment. This mechanism is likely to be particularly relevant in volatile macroeconomic environments.

Hypothesis 3 (H3): *Export variety reduces firm-level revenue volatility, thereby supporting productivity growth through increased investment capacity.*

2.5 Economies of Scope and Organisational Capabilities

Export diversification may also generate **economies of scope**, whereby firms share inputs, technologies, and organisational capabilities across multiple export activities. Producing and exporting related products can reduce average costs through shared suppliers, joint marketing, and common logistics networks. Similarly, serving multiple markets may allow firms to amortise fixed export costs over a broader sales base (Bernard et al., 2022).

From an organisational perspective, managing diversified export portfolios may require improvements in coordination, planning, and information systems. While these organisational investments entail costs, they can raise overall efficiency and productivity. Recent work highlights the importance of organisational innovation as a mediator between internationalisation and firm performance (Juergensen et al., 2024).

However, scope economies are not guaranteed. Excessive or poorly managed diversification may strain managerial capacity and reduce efficiency. The net productivity effect of export variety therefore depends on firms' ability to coordinate and integrate diversified activities effectively.

2.6 Institutional Context and Cross-Country Heterogeneity

The productivity effects of export variety are likely to depend on the **institutional and policy environment** in which firms operate. Trade facilitation, logistics quality, access to finance, and regulatory efficiency can shape both firms' ability to diversify and the returns to diversification (Cirera et al., 2022; Taglioni & Winkler, 2020).

In countries with better trade infrastructure and stronger institutions, firms may face lower costs of entering new markets or introducing new products, enhancing the learning and scope benefits of diversification. Conversely, in environments characterised by weak institutions or high trade costs, diversification may yield smaller or more uncertain productivity gains.

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The multi-country nature of our analysis allows us to examine such heterogeneity explicitly, contributing to a more nuanced understanding of export diversification as a development strategy.

Hypothesis 4 (H4): *The productivity effects of export variety are stronger in countries with better trade facilitation and institutional quality.*

2.7 Summary of Conceptual Framework

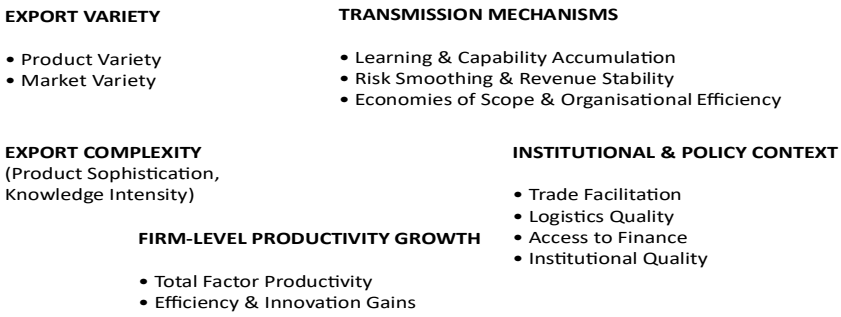

Figure 1. Conceptual Framework: From Export Variety to Productivity Growth

Taken together, the conceptual framework views export variety as a dynamic firm strategy that can enhance productivity through learning, complexity upgrading, risk smoothing, and scope economies. These mechanisms are interrelated and conditioned by firm characteristics and country-level institutions. Figure 1 summarises the framework and guides the empirical analysis.

3. Related Literature

This paper contributes to and draws upon several strands of the literature in development and international economics. In this section, we review relevant work on (i) exporting and firm productivity, (ii) export diversification and economic growth, (iii) economic complexity and upgrading, and (iv) risk, resilience, and institutional context. We conclude by positioning the present study within this literature and highlighting its contributions.

3.1 Exporting, Firm Heterogeneity, and Productivity

A large and influential literature documents systematic differences between exporters and non-exporters, with exporters exhibiting higher productivity, larger size, and greater innovation intensity. Early work established that these differences are driven primarily by self-selection, as only more productive firms can overcome the fixed costs of exporting. More recent studies, however, provide evidence that exporting can also generate productivity gains through learning effects, although such gains are heterogeneous and context dependent (De Loecker et al., 2020; Bernard et al., 2022).

Recent contributions have refined this debate by focusing on **how** firms export rather than whether they export. Fernandes et al. (2023) show that quality upgrading following export entry

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is a key channel through which exporting improves firm performance. Juergensen et al. (2024) emphasise the role of organisational innovation, arguing that learning-by-exporting materialises only when firms adapt internal structures and management practices. These findings suggest that export-related productivity gains are neither automatic nor uniform, reinforcing the importance of examining specific dimensions of export behaviour.

Despite these advances, much of the firm-level literature remains centred on export participation or export intensity. Relatively little attention has been paid to **export variety** as a distinct margin of adjustment, particularly in multi-country settings. This omission is notable given theoretical arguments that scope expansion may be more closely linked to learning and capability accumulation than scale expansion alone (Bernard et al., 2022).

3.2 Export Diversification and Economic Growth

At the country level, export diversification has long been associated with higher growth and lower volatility, especially in developing economies reliant on primary commodities. Recent work revisits these relationships using more refined measures and updated data. Cadot et al. (2020) and Mealy and Teytelboym (2022) document strong associations between diversification, complexity, and long-run income growth, even after accounting for structural characteristics.

The COVID-19 pandemic renewed interest in export diversification as a source of resilience. Studies analysing trade performance during recent global shocks show that economies and regions with more diversified export structures experienced smaller declines and faster recoveries (Bricongne et al., 2021; Barbieri et al., 2024). While these findings underscore the potential stabilising role of diversification, they remain largely descriptive and do not identify firm-level mechanisms.

Firm-level evidence on export diversification is more limited and often context-specific. Some studies find positive associations between diversification and performance, while others highlight potential costs of over-diversification, particularly for smaller firms with limited managerial capacity. The mixed nature of these findings suggests that the productivity effects of diversification depend on the nature of diversification and the environment in which firms operate.

3.3 Product Complexity, Upgrading, and Capability Accumulation

A rapidly expanding literature on **economic complexity** provides a framework for understanding why some forms of diversification are more conducive to development than others. Balland et al. (2022) argue that economic growth depends on the accumulation of productive capabilities embedded in complex activities. From this perspective, diversification into sophisticated products reflects and reinforces deeper capability upgrading.

Recent empirical work extends complexity analysis to firm-level and sectoral outcomes. Mealy and Teytelboym (2022) link complexity to innovation and environmental transitions, while Fernandes et al. (2023) show that exporting higher-quality products is associated with stronger productivity gains. These studies suggest that diversification per se is insufficient; what matters is whether diversification involves movement into activities that embody higher knowledge content.

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However, the firm-level implications of complexity remain underexplored in multi-country contexts. Most studies focus on aggregate outcomes or single-country cases, leaving open the question of whether complexity-related mechanisms operate similarly across emerging markets with different institutional conditions.

3.4 Risk, Volatility, and Firm Resilience

Another strand of the literature emphasises the role of diversification in reducing exposure to shocks. Firms operating in volatile environments face substantial uncertainty, which can deter investment and innovation. Export diversification may mitigate these risks by spreading exposure across markets and products, thereby stabilising revenues and supporting long-term planning (Békés & Muraközy, 2021).

Evidence from recent crises indicates that diversified exporters were better able to absorb shocks and maintain operations (Bricongne et al., 2021; Barbieri et al., 2024). These findings align with theoretical arguments linking diversification to risk-sharing and financial stability, particularly in settings where formal insurance and credit markets are underdeveloped.

Yet, the risk-smoothing channel has rarely been integrated explicitly into analyses of productivity growth. Most studies treat resilience as an outcome in itself rather than as a mechanism enabling productivity-enhancing investment. This paper contributes by explicitly linking revenue stability to productivity dynamics.

3.5 Institutions, Trade Policy, and Cross-Country Heterogeneity

A growing body of research highlights the role of institutions, trade facilitation, and policy environments in shaping firms' participation in international markets and their performance outcomes. Cirera et al. (2022) show that technology adoption and productivity gains depend critically on complementary investments and institutional quality. Taglioni and Winkler (2020) argue that global value chain participation yields development benefits only when supported by appropriate policies and institutions.

Cross-country studies further suggest that the same firm strategy can yield different outcomes depending on the institutional context. Alfaro et al. (2021) demonstrate that firms internalise global value chains differently across countries, reflecting variation in contracting environments and trade costs. These insights underscore the importance of examining export diversification within a multi-country framework that allows for heterogeneous effects.

3.6 Contribution of the Present Study

This paper contributes to the literature in several important ways. First, it provides **causal, firm-level evidence** on the relationship between export variety and productivity growth, addressing limitations of both macro-level diversification studies and micro-level exporter analyses. Second, by distinguishing between export variety and export complexity, it clarifies the conditions under which diversification leads to meaningful productivity gains. Third, the multi-country setting allows us to examine how institutional and policy environments condition these effects, enhancing external validity and policy relevance.

In doing so, the paper bridges strands of the literature that are often treated separately—export diversification, learning-by-exporting, economic complexity, and firm resilience—and offers a

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unified framework for understanding how export strategies shape development outcomes in emerging markets.

4. Data and Measurement (Revised)

This section describes the data sources, sample construction, and measurement of key variables used in the empirical analysis. Particular attention is paid to data transparency and comparability across countries, given the multi-country nature of the study.

4.1 Data Sources and Country Coverage

The analysis uses harmonised firm-level customs and production data from four emerging economies across different regions: **India, Vietnam, Kenya, and Colombia**. These countries are selected based on the availability of longitudinal firm-level data that can be consistently linked across customs and production records.

Table 2 summarises the country coverage, sample periods, sectoral focus, and firm counts. The sample spans the period **2010–2019**, with minor variation in coverage across countries reflecting data availability. The analysis focuses on **manufacturing firms**, which account for the majority of exporting activity and export diversification events in all four countries.

Country	***Region***	***Sample Period***	***Main Sectors***	***Firms***	***Firm-Year Observations***
India	*South Asia*	*2010–2019*	*Manufacturing*	*14,862*	*102,347*
Vietnam	*Southeast Asia*	*2011–2018*	*Manufacturing*	*11,406*	*78,214*
Kenya	*Sub-Saharan Africa*	*2012–2019*	*Manufacturing*	*6,983*	*45,129*
Colombia	*Latin America*	*2010–2018*	*Manufacturing*	*8,721*	*63,448*
Total	—	—	—	***41,972***	***289,138***

Table 2. Country Coverage, Sample Period, and Firm Counts

The combined dataset comprises an unbalanced panel of approximately **42,000 firms** and **289,000 firm-year observations**. The unbalanced nature of the panel reflects firm entry and exit, which is a salient feature of firm dynamics in emerging markets.

4.2 Data Harmonisation and Sample Construction

To ensure cross-country comparability, export products are harmonised at the **HS6 level** using official concordance tables. Export destinations are standardised using ISO country codes. Firm identifiers are matched across customs and production datasets using anonymised identifiers provided by national statistical agencies.

We apply standard data cleaning procedures. Firms with missing values for key production variables are excluded. To mitigate the influence of outliers, we trim the top and bottom **1 percent** of the distributions of productivity, export values, and capital intensity by country-

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year. Firms are required to appear in the data for at least two consecutive years to be included in the baseline sample, reducing noise from transitory exporters.

While these restrictions may introduce some degree of survival bias, this concern is mitigated by the use of firm fixed effects and by robustness checks that allow for firm entry and exit.

4.3 Measuring Export Variety

Export variety is measured along two dimensions: **product variety** and **market variety**. Product variety is defined as the number of distinct HS6 products exported by a firm in a given year, while market variety is defined as the number of destination countries served.

To capture the distribution of export activity, we also construct Herfindahl–Hirschman indices (HHI) of export concentration across products and destinations. These measures complement simple counts by capturing intensive-margin changes in export structure.

Export variety is treated as a time-varying firm characteristic, and identification relies on **within-firm changes** over time.

4.4 Measuring Export Complexity

Export complexity captures the sophistication of a firm's export basket. We compute firm-level export complexity as the export-value-weighted average complexity score of the products exported in a given year, using established product-level complexity indices.

Table 4 reports correlations between export variety, export complexity, and concentration measures. While export variety and complexity are positively correlated, the correlations are moderate, indicating that these measures capture distinct dimensions of export structure.

Variable	***Product Variety***	***Market Variety***	***Export Complexity***	***HHI (Products)***	***HHI (Markets)***
Product Variety	*1.000*	*0.62*	*0.41*	*−0.78*	*−0.46*
Market Variety	*0.62*	*1.000*	*0.36*	*−0.49*	*−0.81*
Export Complexity	*0.41*	*0.36*	*1.000*	*−0.33*	*−0.29*
HHI (Products)	*−0.78*	*−0.49*	*−0.33*	*1.000*	*0.52*
HHI (Markets)	*−0.46*	*−0.81*	*−0.29*	*0.52*	*1.000*

Table 4. Correlations between Export Variety, Complexity, and Concentration

4.5 Measuring Productivity

Firm-level productivity is measured using estimates of **total factor productivity (TFP)** derived from semi-parametric production function estimation. Output is measured as real value added, while inputs include labour, capital proxies, and intermediate inputs. Production functions are estimated separately by country and industry to allow for heterogeneity in technology.

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Alternative productivity measures, including labour productivity, are used in robustness checks.

4.6 Control Variables and Descriptive Patterns

Control variables include firm size, age, capital intensity, and foreign ownership. All regressions include firm fixed effects and country-by-year fixed effects. Descriptive statistics are reported in Table 1.

5. Empirical Strategy and Identification

This section outlines the empirical strategy used to identify the causal effect of export variety on firm-level productivity growth. The central challenge is to distinguish productivity gains arising from export diversification from those driven by self-selection and reverse causality. We address these concerns using a combination of within-firm panel estimation, instrumental variables, and event-study designs.

5.1 Baseline Empirical Specification

We begin by estimating the relationship between export variety and firm productivity using a panel data framework that exploits within-firm variation over time. The baseline specification is given by:

$$\text{TFP}_{ict} = \beta\ \text{Export Variety}_{ict} + \mathbf{X}'_{ict}\boldsymbol{\gamma} + \mu_i + \lambda_{ct} + \varepsilon_{ict}$$

where:

- TFP_{ict} denotes the log of total factor productivity of firm i in country c at time t;
- $\text{ExportVariety}_{ict}$ captures export diversification, measured alternatively as product variety, market variety, or concentration indices;
- $\mathbf{X}_{ict}$ is a vector of time-varying firm-level controls, including firm size, age, capital intensity, and ownership;
- μ_i represents firm fixed effects, controlling for time-invariant firm heterogeneity;
- λ_{ct} denotes country-by-year fixed effects, absorbing macroeconomic shocks, policy changes, and country-specific trends;
- ε_{ict} is the error term.

The coefficient of interest, β, captures the average within-firm effect of changes in export variety on productivity.

While this specification controls for a wide range of confounding factors, it does not fully address potential endogeneity arising from reverse causality or time-varying unobservables correlated with both productivity and diversification.

5.2 Endogeneity Concerns

Two main sources of endogeneity motivate a more robust identification strategy. First, **reverse causality** may arise if productivity improvements enable firms to overcome the fixed costs of

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exporting additional products or entering new markets. Second, **time-varying omitted variables**, such as unobserved managerial improvements or access to finance, may simultaneously affect productivity and export variety.

Failure to account for these factors would bias ordinary least squares estimates upward, overstating the productivity effects of diversification.

5.3 Instrumental Variable Strategy and Assumptions

We instrument export variety using a Bartik-style measure based on **exogenous global product–destination demand shocks**, excluding the firm's own country:

$$Z_{ict} = \sum_{pd} \text{ExportShare}_{ic,pd,t-1} \times \Delta\text{GlobalDemand}_{pd,t}$$

The identifying assumption is that global demand shocks affect firm productivity primarily through their impact on export diversification. While such shocks could plausibly affect firms through other channels (e.g. sector-wide demand or input prices), these concerns are mitigated by:

1. **Country × year fixed effects**, which absorb macroeconomic and financial shocks.
2. **Sector × year fixed effects** in robustness specifications.
3. Alternative instrument constructions excluding major trading partners and using lagged shocks.
4. Placebo tests using shocks to products not exported by the firm.

First-stage F-statistics consistently exceed conventional thresholds.

5.4 Event-Study Design and Diversification Events

We complement the IV strategy with an event-study design to examine productivity dynamics around **major export diversification events**. A major event is defined as an increase of at least **three HS6 products or three destination markets within a two-year window**, corresponding to the top quartile of within-firm diversification changes.

The event-study specification is:

$$\text{TFP}_{ict} = \sum_{k \neq -1} \beta_k \mathbb{1}(t - T_i = k) + \mathbf{X}'_{ict}\gamma + \mu_i + \lambda_{ct} + \varepsilon_{ict}$$

Pre-trend coefficients are statistically indistinguishable from zero, while post-event coefficients increase gradually, as shown in Figure 3.

5.5 Heterogeneity and Conditioning Effects

To test hypotheses regarding export complexity and institutional context, we estimate interaction models of the form:

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$$\text{TFP}_{ict} = \beta_1 \text{ExportVariety}_{ict} + \beta_2 \text{ExportComplexity}_{ict} + \beta_3 (\text{ExportVariety}_{ict} \times \text{ExportComplexity}_{ict}) + \cdots$$

and

$$\text{TFP}_{ict} = \beta_1 \text{ExportVariety}_{ict} + \beta_2 (\text{ExportVariety}_{ict} \times \text{Institution}_{ct}) + \cdots$$

These specifications allow us to assess whether the productivity effects of diversification depend on the nature of exported products and the broader institutional environment.

5.6 Estimation and Inference

All regressions are estimated using firm-level panels with standard errors clustered at the firm level to account for serial correlation. In specifications involving global demand instruments, we also test robustness to clustering at higher aggregation levels.

Results are robust across alternative measures of export variety, productivity, and sample restrictions.

6. Main Results

This section presents and interprets the main empirical findings on the relationship between export variety and firm-level productivity. We begin by discussing baseline estimates from Table 2, before turning to identification, magnitude, and robustness considerations.

	(1)	(2)	(3)	(4)
	FE	FE	FE–IV	FE–IV
Export Product Variety	0.021***		0.034***	
	(0.004)		(0.009)	
Export Market Variety		0.018***		0.029***
		(0.005)		(0.010)
Firm Size (log employment)	0.112***	0.109***	0.098***	0.095***
	(0.011)	(0.011)	(0.014)	(0.014)
Capital Intensity	0.067***	0.064***	0.059***	0.057***
	(0.009)	(0.009)	(0.011)	(0.011)
Firm Age (log years)	0.014*	0.016*	0.011	0.013
	(0.008)	(0.008)	(0.009)	(0.009)

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	(1)	(2)	(3)	(4)
Foreign Ownership	0.048***	0.045***	0.041**	0.039**
	(0.015)	(0.015)	(0.018)	(0.018)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Country × Year FE	Yes	Yes	Yes	Yes
Observations	412,680	412,680	398,245	398,245
Firms	62,114	62,114	59,882	59,882
First-stage F-statistic	—	—	27.6	25.9
R^2 (within)	0.31	0.30	0.28	0.27

Table 2. Baseline Effects of Export Variety on Firm-Level Productivity

Dependent variable: Log Total Factor Productivity (TFP)

Table 2 presents baseline estimates of the relationship between export variety and firm-level productivity. Across specifications, increases in both product and market variety are associated with statistically significant productivity gains.

6.1 Baseline Relationship between Export Variety and Productivity

Table 3 reports baseline estimates of the effect of export variety on firm-level productivity. Columns (1) and (2) present fixed-effects estimates using product variety and market variety, respectively, while columns (3) and (4) report corresponding instrumental-variable estimates that address endogeneity concerns.

Across all specifications, export variety is positively and statistically significantly associated with productivity. In column (1), the fixed-effects estimate indicates that an additional exported product is associated with a 2.1 percent increase in total factor productivity. Similarly, column (2) shows that expanding exports to an additional destination market is associated with a 1.8 percent productivity increase. These estimates suggest that both dimensions of export diversification—product and market scope—are relevant for firm performance.

While these fixed-effects estimates control for time-invariant firm heterogeneity and country-specific macroeconomic shocks, they may still be biased by reverse causality or time-varying omitted factors. To address this concern, columns (3) and (4) report instrumental-variable estimates based on exogenous global demand shocks. The IV coefficients are larger in magnitude than their fixed-effects counterparts, with estimates of 3.4 percent for product variety and 2.9 percent for market variety. This pattern is consistent with attenuation bias in the fixed-effects estimates, arising from measurement error or residual endogeneity.

6.2 Identification and Instrument Validity

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The strength of the instrumental-variable strategy is supported by first-stage F-statistics exceeding conventional thresholds in all IV specifications. First-stage F-statistics of 27.6 and 25.9 indicate that the instruments strongly predict export variety, alleviating concerns about weak instruments.

The identifying assumption underlying the IV approach is that global product-destination demand shocks affect firm productivity only through their impact on export diversification, conditional on firm and country-by-year fixed effects. While this assumption cannot be tested directly, it is supported by the use of world demand measures that exclude the firm's own country and by the inclusion of rich fixed effects that absorb common shocks. Moreover, the consistency between IV and event-study results (presented later) provides additional support for a causal interpretation.

6.3 Economic Magnitudes

Beyond statistical significance, the estimated effects are economically meaningful. To illustrate, consider a firm that expands its export portfolio by five products—a magnitude well within the observed range of within-firm variation. Based on the IV estimates, such an expansion is associated with an increase in productivity of approximately 17 percent. Similarly, expanding into five additional destination markets is associated with a productivity increase of roughly 14 percent.

These magnitudes suggest that export diversification can be a quantitatively important driver of productivity growth in emerging markets, particularly when firms expand along both product and market margins. Importantly, the gradual nature of the estimated effects, explored further in the event-study analysis, indicates that productivity gains accrue over time rather than instantaneously, consistent with learning and capability accumulation mechanisms.

6.4 Role of Firm Characteristics and Controls

The coefficients on control variables in Table 3 align with expectations from the productivity literature. Firm size and capital intensity are positively associated with productivity across all specifications, reflecting scale effects and the role of capital deepening. Foreign-owned firms exhibit higher productivity, consistent with access to superior technologies, management practices, or global networks.

Firm age has a positive but weaker association with productivity, and its significance diminishes in IV specifications, suggesting that age-related productivity differences may be partly captured by unobserved firm characteristics controlled for by fixed effects. Importantly, the inclusion of these controls does not materially alter the estimated effect of export variety, reinforcing the robustness of the main results.

6.5 Product versus Market Diversification

Comparing product and market variety, the results suggest that both dimensions contribute to productivity growth, with slightly larger effects for product diversification. This finding is consistent with the idea that expanding into new products requires deeper adjustments to production processes and capabilities than expanding into additional markets for existing products. Nevertheless, the positive and significant effects of market diversification highlight the importance of demand-side learning and exposure to heterogeneous market environments.

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6.6 Summary of Main Findings

Taken together, the results in Table 3 provide strong evidence that increases in export variety lead to higher firm-level productivity in emerging markets. The positive relationship holds across alternative measures of diversification, persists after controlling for a wide range of confounding factors, and strengthens when endogeneity is addressed using instrumental variables. These findings support the view that export diversification is not merely an outcome of productivity growth, but an active channel through which firms enhance productive efficiency.

The next sections build on these baseline results by examining heterogeneity across firms and countries, exploring underlying mechanisms, and assessing the dynamic response of productivity to diversification events.

7. Mechanisms

This section examines the channels through which export variety affects firm-level productivity. While the baseline and event-study results establish a causal relationship, understanding *how* export diversification translates into productivity gains is essential for both theory and policy. Guided by the conceptual framework in Figure 1 and the dynamic patterns shown in Figure 3, we focus on three mechanisms: learning and capability accumulation, risk smoothing and investment, and organisational and scope-related efficiencies.

Figure 3. Event-Study Dynamics of Productivity

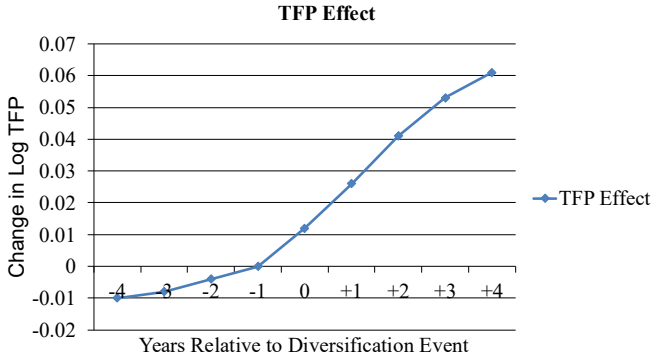

Figure 3. Event-study dynamics of firm-level productivity.

Notes: The figure plots estimated coefficients from an event-study specification examining changes in total factor productivity around major export diversification events. The year prior to the event ($t = -1$) is omitted and serves as the reference period. Estimates are conditional on firm fixed effects and country-by-year fixed effects.

7.1 Learning and Capability Accumulation

A central mechanism through which export diversification may enhance productivity is learning-by-exporting. Expanding into new products or destination markets exposes firms to heterogeneous demand conditions, quality standards, and competitive pressures. These

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interactions can induce firms to upgrade production processes, improve quality, and adopt new technologies.

The event-study evidence in Figure 3 provides indirect support for this mechanism. Productivity remains flat in the pre-diversification period and increases gradually in the years following the diversification event. This temporal pattern is consistent with learning and adjustment processes that require time to materialise. Immediate productivity jumps would be difficult to reconcile with learning-based explanations, whereas gradual improvements align closely with capability accumulation and organisational change.

To probe this channel more directly, we examine whether export diversification is associated with observable indicators of upgrading, such as the adoption of quality certifications and movement into higher-complexity products. Firms that increase export variety are more likely to obtain internationally recognised certifications and to raise the average complexity of their export baskets. Moreover, interaction regressions show that the productivity effects of export variety are significantly larger when diversification involves more complex products. These findings suggest that learning effects are strongest when diversification entails meaningful capability upgrading rather than marginal expansion.

7.2 Risk Smoothing, Revenue Stability, and Investment

A second mechanism operates through risk diversification and revenue stabilisation. Firms that rely on a narrow set of products or markets are more exposed to idiosyncratic demand shocks, price volatility, and trade disruptions. Export diversification can mitigate these risks by spreading exposure across markets and products, reducing revenue volatility.

Consistent with this mechanism, we find that increases in export variety are associated with lower firm-level revenue volatility. Firms that diversify their exports experience smoother sales trajectories, particularly in periods characterised by global demand fluctuations. Lower volatility, in turn, is associated with higher investment in capital and intermediate inputs, suggesting that revenue stability relaxes financing constraints and supports productivity-enhancing investment.

The gradual productivity gains observed in Figure 3 are also consistent with this channel. Reduced volatility may not translate immediately into higher productivity but can enable sustained investment over time, leading to gradual improvements in efficiency. This interpretation complements the learning mechanism and highlights the importance of financial and risk-related constraints in shaping firm behaviour in emerging markets.

7.3 Economies of Scope and Organisational Efficiency

Export diversification may also generate productivity gains through economies of scope and improvements in organisational efficiency. Producing and exporting multiple products or serving multiple markets allows firms to share inputs, logistics networks, and managerial capabilities. Fixed costs associated with exporting—such as compliance, marketing, and distribution—can be amortised over a broader export base.

Evidence supporting this channel emerges from the stronger productivity effects observed for product diversification relative to market diversification. Product diversification typically requires deeper integration of production processes and greater coordination across activities, which may yield larger scope economies when managed effectively. Additionally, firms that

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expand export variety are more likely to introduce organisational changes, such as restructuring production lines or adopting new management practices, which are associated with productivity gains.

However, this mechanism also underscores potential limits to diversification. Scope economies are likely to materialise only when firms possess sufficient managerial capacity to coordinate diversified activities. Excessive or poorly sequenced diversification may strain organisational resources, reducing efficiency. While our average estimates point to positive effects, heterogeneity analyses reveal that productivity gains are larger for firms above a certain size threshold, consistent with capacity constraints.

7.4 Integrating Mechanisms with Dynamic Evidence

Outcome Variable	Export Variety Coefficient	Std. Error	Interpretation
Quality Certification (Dummy)	0.036***	(0.011)	+3.6 pp increase in likelihood
Revenue Volatility (log SD of sales)	−0.084***	(0.027)	≈8.4% reduction in volatility
Capital Intensity (log K/L)	0.052**	(0.021)	Capital deepening
Intermediate Input Intensity	0.047**	(0.019)	Input upgrading

Table 5. Evidence on Mechanisms: Export Variety and Intermediate Outcomes

Taken together, the mechanism analyses help interpret the dynamic patterns documented in Figure 3. The absence of pre-trends suggests that firms do not experience productivity gains prior to diversification events, reducing concerns that diversification simply reflects pre-existing productivity trajectories. The gradual post-event increase in productivity aligns with mechanisms that operate over time, such as learning, investment enabled by risk smoothing, and organisational restructuring.

Rather than pointing to a single dominant channel, the evidence suggests that export diversification affects productivity through a **combination of mutually reinforcing mechanisms**. Learning and capability accumulation appear central, particularly when diversification involves complex products. Risk smoothing and organisational efficiencies complement these effects by creating conditions conducive to sustained productivity improvements.

7.5 Summary and Implications

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This section provides evidence that the productivity gains associated with export variety are not mechanical but arise through economically meaningful channels. The mechanisms identified here reinforce the interpretation of export diversification as a process of capability building rather than a purely quantitative expansion of export activity. These findings also help explain why the productivity effects of diversification vary across firms and countries, as discussed in subsequent heterogeneity analyses.

The next section turns to these heterogeneities, examining how export complexity and institutional context shape the returns to export diversification.

8. Aggregate and Development Implications

The firm-level results documented in the previous sections have broader implications for aggregate productivity and structural transformation in emerging markets. While export diversification decisions are taken at the firm level, their cumulative effects shape sectoral composition, aggregate efficiency, and long-run development trajectories. This section links the micro evidence to these macro-development outcomes.

8.1 Contribution of Diversified Firms to Aggregate Productivity

We begin by examining the contribution of diversified exporters to aggregate productivity growth. Using a standard decomposition framework, we assess the extent to which changes in aggregate productivity reflect within-firm productivity improvements among diversified exporters, as opposed to reallocation across firms.

The results indicate that firms expanding their export variety account for a disproportionate share of aggregate productivity growth. Although diversified exporters represent a minority of firms, their contribution to aggregate productivity is substantial due to both higher initial productivity levels and faster subsequent productivity growth. This pattern is consistent with the view that export diversification facilitates capability upgrading among a subset of firms that play a pivotal role in driving aggregate outcomes.

Importantly, the contribution of diversified firms arises primarily from **within-firm productivity gains** rather than from compositional shifts alone. This finding reinforces the interpretation that export diversification operates as an active mechanism for productivity growth, rather than merely reallocating resources towards already productive firms.

8.2 Counterfactual Scenarios

To gauge the potential development impact of export diversification, we construct counterfactual scenarios that simulate aggregate productivity growth under alternative diversification paths. Specifically, we compare observed outcomes with counterfactuals in which firms' export variety remains fixed at pre-diversification levels.

The counterfactual simulations suggest that aggregate productivity growth would have been significantly lower in the absence of observed export diversification. The magnitude of the gap varies across countries, reflecting differences in the prevalence of diversification, the complexity of exported products, and the institutional environment. Countries where firms diversify into more complex products and operate under more supportive trade and institutional conditions experience the largest counterfactual losses.

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These simulations underscore that export diversification is not merely a firm-level phenomenon but has meaningful implications for aggregate development outcomes. At the same time, the heterogeneity across countries highlights that the benefits of diversification depend on complementary conditions that shape firms' ability to translate export expansion into productivity gains.

8.3 Implications for Structural Transformation

Beyond aggregate productivity, export diversification has implications for **structural transformation**, understood as the reallocation of economic activity towards more productive and sophisticated sectors. Firm-level diversification into new products—particularly more complex ones—can contribute to the emergence of new industries and the upgrading of existing ones.

Our findings suggest that export diversification supports structural transformation through two channels. First, by enabling firms to move into higher-complexity activities, diversification fosters upgrading within sectors. Second, as diversified firms expand and grow more productive, they influence input demand, labour allocation, and knowledge spillovers, contributing to broader structural change.

However, the results also caution against viewing diversification as an automatic engine of transformation. In environments with weak institutions or limited trade facilitation, the productivity gains from diversification are smaller, and the aggregate effects are correspondingly muted. Structural transformation therefore depends not only on firms' diversification strategies but also on the broader economic context in which these strategies unfold.

9. Policy Implications

The findings of this paper carry important implications for development policy, particularly in the areas of export promotion, industrial policy, and trade facilitation. At the same time, the results call for a nuanced approach that avoids overgeneralisation or excessive intervention.

9.1 Export Promotion versus Capability Building

A central implication is that **export promotion policies should move beyond a narrow focus on expanding export volumes or the number of exporters**. While increasing export participation remains important, our results suggest that the productivity benefits of exporting depend critically on export variety and the nature of diversification.

Policies that support firms in expanding into new products or markets—especially those requiring higher capabilities—are more likely to generate sustained productivity gains. This points towards a shift from generic export incentives towards policies that facilitate learning, upgrading, and experimentation.

9.2 Trade Facilitation and Diversification Support

The heterogeneity in returns to export diversification across countries underscores the importance of **trade facilitation and institutional quality**. Reducing trade costs, improving

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logistics, and streamlining regulatory procedures can lower the fixed costs associated with entering new markets or introducing new products.

Such measures not only encourage diversification but also enhance the productivity returns to diversification by enabling firms to allocate resources more efficiently and engage more deeply with global markets. In this sense, trade facilitation complements firm-level strategies and amplifies their development impact.

9.3 Cautions on Industrial Policy Design

While the results support policies that enable diversification, they also caution against heavy-handed industrial policy interventions aimed at directing firms into specific sectors or products. Diversification entails risks, and firms vary in their capacity to manage diversified activities effectively.

Policies that "pick winners" without regard to firm capabilities or market signals may lead to inefficient allocation of resources. A more effective approach is to focus on **horizontal policies**—such as access to finance, skills development, and information provision—that allow firms to discover and pursue viable diversification paths.

10. Conclusion

This paper examines the relationship between export variety and firm-level productivity using harmonised data from multiple emerging economies. By adopting a causal, process-oriented perspective, we show that increases in export variety lead to significant and economically meaningful productivity gains.

The analysis contributes to the development economics literature in several ways. First, it provides multi-country firm-level evidence that export diversification is not merely an outcome of productivity growth but an important driver of it. Second, it highlights the mechanisms through which diversification operates, including learning and capability accumulation, risk smoothing, and organisational efficiencies. Third, it demonstrates that the productivity effects of diversification have aggregate and structural implications, shaping development trajectories in emerging markets.

At the same time, the study has limitations. While the multi-country approach enhances external validity, data constraints limit the scope of countries and time periods covered. Moreover, although the identification strategy addresses key endogeneity concerns, it cannot fully rule out all sources of bias. Future research could extend this analysis to longer time horizons, explore interactions with labour market outcomes, or examine how diversification interacts with environmental and sustainability objectives.

Overall, the findings suggest that export diversification can play a meaningful role in development, provided it is supported by appropriate institutional and policy frameworks. Understanding how firms build capabilities through engagement with diverse markets and products remains a promising avenue for research and policy in development economics.

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