



GLOBALIZATION AND THE PERFORMANCE OF THE STOCK MARKET: EVIDENCE FROM NIGERIA

A Sector-Panel Study with Exposure-Based Identification

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Abstract

Greater integration with global trade and capital markets can affect domestic equity markets through channels that need not move together. This paper examines how trade openness, foreign direct investment (FDI), foreign portfolio investment (FPI), legal financial openness and exchange-rate exposure relate to Nigerian stock-market performance using sector-level exposure differences. Each global variable is interacted with a predetermined sector exposure measure and estimated with sector and time fixed effects, so that common time shocks are absorbed and identification comes from differential sector responses. The analysis uses average-effects fixed-effects models as benchmarks and adds targeted heterogeneity, structural-break, distributional, dynamic and inference checks. The balanced panel comprises 12 sectors and 64 quarters covering 2010Q1–2025Q4. Exposure-interaction estimates are significant for the six principal globalization channels; the exchange-rate relationship is stronger after 2016Q3 (-0.11 before versus -0.47 after; equality $p < 0.001$). A global-conditions threshold is not detected at 5% (bootstrap $p = 0.065$), asymmetry between portfolio inflows and outflows is not detected ($p = 0.599$), and quantile slopes do not differ significantly across the return distribution. The portfolio-flow coefficient is sensitive to the covariance estimator. The paper provides a sector-panel identification strategy that distinguishes common globalization shocks from differential sector exposure and evaluates the resulting estimates with targeted robustness and inference checks.

Keywords: Globalization; financial integration; stock-market performance; sector-panel data; exposure-based identification; Nigeria.

1. Introduction

Cross-border trade, investment and information flows have tied national financial markets more closely together. Theory gives competing predictions about what this means for a domestic equity market. Integration can lower the cost of capital, broaden the investor base and improve liquidity and risk sharing (Bekaert & Harvey, 2000; Henry, 2000; Obstfeld, 1994). It can also expose a market to volatile flows and to the global financial cycle (Calvo et al., 1993; Forbes & Warnock, 2012; Miranda-Agrippino & Rey, 2020), and Kose et al. (2009) conclude that the net benefit depends on domestic financial and institutional conditions. The direction of the relationship is therefore an empirical question, and this paper does not presume that globalization is inherently beneficial or harmful.

Nigeria is a useful case. Its exchange, operated by the Nigerian Exchange Group (NGX), is a frontier market with heavy exposure to oil revenue, episodes of sharp portfolio inflow and reversal, and several changes in foreign-exchange arrangements. Recent Nigerian studies typically estimate national time-series models on annual data, usually one globalization proxy at a time (Akande et al., 2025; Akinwale & Adekunle, 2019; Uzoma-Nwosu et al., 2026). Such designs face three problems. First, a time-series regression of a national index on a few common variables uses only a few dozen effective observations and cannot separate globalization from any other common shock. Second, globalization is multidimensional, and a composite proxy can hide offsetting channels. Third, the sensitivity of a market to global conditions may be asymmetric, regime-dependent or confined to tails of the return distribution, none of which a mean regression reveals.

Recent market developments illustrate why the question matters. According to NGX data reported by Ecofin Agency (2026), the All-Share Index rose 51.19% in 2025, to 155,613 points from 102,926, following a 37.65% gain in 2024. International portfolio flows also recovered during the year, while local investors continued to dominate trading. On the direct-investment side, BusinessDay (2026b), reporting UNCTAD's World Investment Report 2026, put FDI inflows to Nigeria at \$4.01 billion in 2025, up from \$1.61 billion in 2024 and driven largely by oil and gas project finance. These sources are secondary reports of primary NGX and UNCTAD data and provide contextual evidence alongside the underlying market and macroeconomic series used in the analysis. They show that portfolio and direct investment are large and volatile, which is the setting in which sector exposure should matter.

This paper addresses these problems by applying the exposure-based design to Nigerian sector data. Following the logic of Rajan and Zingales (1998), each global variable is interacted with a sector characteristic that governs how strongly the sector should respond to it (foreign-ownership share for portfolio flows and financial openness, export orientation for trade, import dependence for the exchange rate, FDI intensity for FDI, and oil exposure for oil prices). With sector and time fixed effects, common stocks are absorbed and identification comes from differential sector responses. The analysis then uses average-effects fixed-effects models as benchmarks and adds targeted checks for slope heterogeneity, asymmetry, threshold effects, distributional differences, structural breaks and predictive feedback, together with block-bootstrap, exposure-permutation, sector-exclusion robustness analysis, multiple-testing and covariance-estimator sensitivity checks.

Contribution. The contribution is empirical and methodological. It uses exposure-based identification to distinguish differential sector responses from common time shocks in a frontier-

market setting and subjects the principal estimates to targeted robustness and inference checks. The resulting coefficients are relative sector effects rather than estimates of the aggregate market effect. Section 2 reviews the literature and states the hypotheses, Section 3 describes the data, Section 4 the empirical strategy, Section 5 the results, Section 6 discusses them, and Sections 7–8 conclude and discuss limitations.

2. Literature Review and Hypotheses

2.1 Concepts

Economic globalization is the growth of cross-border economic interdependence. Trade globalization concerns flow of goods and services. Financial globalization concerns cross-border asset holdings and flows (Lane & Milesi-Ferretti, 2007; Kose et al., 2009). Capital-market integration is the degree to which assets of equal risk are priced equally across borders (Bekaert & Harvey, 2000). Financial openness may be de jure, reflecting legal restrictions as in the Chinn–Ito index (Chinn & Ito, 2006), or de facto, reflecting actual flows and stocks. These concepts are not interchangeable: a country can be legally open but attract little foreign capital, or open to trade while restricting capital movements. Composite indices such as the KOF Globalisation Index (Gygli et al., 2019) combine de facto and de jure components with weights chosen by their authors, so a composite coefficient mixes distinct mechanisms.

2.2 Theory and mechanisms

The theoretical framework is anchored in two complementary perspectives. First, the International Capital Asset Pricing Model (Solnik, 1974; Black, 1974) links international integration to the pricing of systematic risk, currency risk and the covariance of domestic assets with global factors. Second, the market-segmentation and financial-integration perspective explains why reductions in barriers to foreign participation can alter required returns, liquidity and valuation (Bekaert & Harvey, 2000; Henry, 2000). Together, these perspectives imply that globalization need not affect all sectors equally: sectors with greater exposure to foreign investors, trade, imported inputs, FDI or oil-linked activity should exhibit different responses to common international shocks. The International CAPM and segmentation framework therefore provides the principal theoretical foundation; portfolio-demand, liberalisation and international-investment mechanisms are used as supporting channels rather than as separate theoretical pillars. The panel regressions are reduced-form tests of these implications, not structural tests of either theory.

2.3 Theoretical predictions

The exposure design rests on a price-pressure argument that can be stated compactly. Suppose foreign investors hold a share s_i of the free float of sector i and, when they receive net portfolio inflows FPI_t , they scale their existing holdings proportionally, so that the net demand shock to sector i is proportional to $s_i \cdot FPI_t$. If the demand curve for the sector's shares slopes down with price-impact coefficient $\phi_i = 1/\varepsilon_i$, where ε_i is the elasticity of the residual domestic demand (Shleifer, 1986), the return of sector i attributable to foreign flows is $r_{it}^{\text{flow}} = \phi_i \cdot s_i \cdot FPI_t$. In inelastic markets, in which a large share of holders cannot adjust quickly, ϕ_i is large (Gabaix & Koijen, 2021), which is plausible for a frontier market with a thin free float. The regression coefficient on $FPI_t \times s_i$ therefore estimates the average price impact $\bar{\phi}$ and is positive. The same logic generates the other predictions in Table 1.

Theoretical predictions and the parameters that test them

Proposition	Mechanism	Parameter	Predicted sign	Theory
P1. Price pressure from portfolio flows	Foreign demand shocks are proportional to foreign ownership and move prices when residual demand is inelastic	β_3 (FPI $\times$ s)	+	Shleifer (1986); Gabaix & Koijen (2021)
P2. Asymmetric flows	Forced selling and funding constraints lower liquidity in outflow episodes, so ϕ is larger for outflows than inflows	$\beta_3^- - \beta_3^+$	Negative difference in return per unit flow, i.e. $ \beta_3^- > \beta_3^+ $	Brunnermeier & Pedersen (2009)
P3. Regime dependence	In turbulent global conditions arbitrage capital withdraws and ϕ rises	β_3 (high GFC) – β_3 (low GFC)	+	Forbes & Warnock (2012); Miranda-Agrippino & Rey (2020)
P4. Legal openness	Opening raises the foreign investor base, re-rating sectors in proportion to foreign participation	β_4 (FO $\times$ s)	+ (one-off re-rating)	Henry (2000); Bekaert & Harvey (2000)
P5. Exchange-rate exposure	Depreciation raises input costs and the domestic-currency burden of foreign liabilities in import-dependent sectors	β_5 (EXR $\times$ m)	–	International CAPM currency risk (Solnik, 1974)
P6. Trade exposure	Higher openness transmits global demand to export-oriented sectors	β_1 (TO $\times$ x)	+ or – (ambiguous)	Trade and terms-of-trade channels
P7. Oil exposure	Oil revenue raises earnings of oil-linked sectors in an oil-exporting economy	β_6 (OIL $\times$ o)	+	Resource-dependence channel
P8. FDI exposure	FDI raises capital stock and earnings of FDI-intensive sectors with a lag; the effect on listed-equity prices is indirect	β_2 (FDI $\times$ d)	+ (weak, ambiguous)	Dunning (1988)

Note. Signs are the predictions of the stated mechanisms. Tests remain two-sided so that rejection does not depend on the predicted direction, and conclusions are stated relative to the prediction. P1 is derived above; P2–P8 are reasoned from the cited theories and not derived formally.

2.4 Empirical evidence: a critical review

I reviewed 20 empirical studies (Table 1) and assessed their research designs, measures, empirical findings, identification strategies and implications for the present study. The discussion below synthesizes the evidence reported across the reviewed studies and evaluates the strengths and limitations of their approaches.

Table 1

Empirical studies reviewed and principal findings

Note. Findings are synthesized and paraphrased from the reviewed studies. The table focuses on the empirical questions, methods and principal findings relevant to globalization and stock-market performance.

Design appraisal of the 20 reviewed studies

Note. “–” indicates that the feature is not identified as a central element of the study design. “Identification” records designs that use cross-unit variation in exposure or an event to separate the effect from common shocks.

2.4.1 What the Nigerian globalization studies find

Three Nigerian studies address globalization directly (Akande et al., 2025; Akinwale & Adekunle, 2019; Uzoma-Nwosu et al., 2026). They agree that portfolio investment is positively related to market outcomes (Akande et al.; Akinwale & Adekunle), but they disagree about trade openness: it is positive and significant for market capitalisation in the earlier study, insignificant for returns in the later one, and positive for efficiency in the third, which also finds no effect of financial openness. FDI is weak or insignificant where it is examined. Because the three studies use different dependent variables (capitalisation, returns, efficiency), different windows and the same single-equation ARDL template, the disagreement on trade openness cannot be attributed to the economics: it may reflect the outcome measure, the sample, or lag selection with 30–40 annual observations. This is the first reason why a design that holds the outcome and period fixed and varies the dimension is explanatory.

2.4.2 Exchange rate and oil: heterogeneity and non-linearity

The Nigerian exchange-rate and oil studies point in a consistent direction. The firm-level study finds an insignificant exchange-rate relationship for most of 54 listed firms and almost no asymmetry (Adeniyi & Kumeka, 2020). The sector-level study finds that sectors respond differently and that asymmetry largely disappears once structural breaks are allowed (Fasanya & Akinwale, 2022), and the sector-level oil study finds that the strength of the relationship varies across sectors, with asymmetry and breaks important for some (Fasanya et al., 2023). At the national level, the exchange rate is insignificant in the long run (Okere et al., 2021) and the official rate does not affect volatility (Hassan et al., 2024). Together, these findings suggest that exchange-rate and oil effects are real for some sectors and absent for others, and that a national aggregate averages over heterogeneous responses. That is the motivation for interacting the exchange rate and oil price with

sector exposure (import dependence, oil exposure). A limit of these studies is that each sector or firm is estimated separately, which uses no information from cross-unit exposure differences and leaves common shocks in the error.

2.4.3 Integration, flows and the distribution of returns

African studies of integration disagree in a way that depends on the period. For 1998–2007 most African markets were segmented from global markets (Agyei-Ampomah, 2011), whereas crisis-period studies find rising correlation with the US market and connectedness that peaks in crises (Aderajo & Olaniran, 2021; Chaouch & Ben Sassi, 2025). Bello et al. (2022) find that contagion is significant regionally only in the global financial crisis and that country-level contagion rises with exports relative to GDP, which suggests that trade exposure can transmit global shocks. A study using wavelet correlations finds African markets largely insensitive to global shocks in the very short run, with only three contagious episodes, in Egypt and South Africa during the global financial crisis (Kchaou & Ben Sassi, 2025), and an earlier EGARCH study finds volatility spillovers between African countries with strong economic links (Appiah-Kusi & Pescetto, 1998). These findings are reconcilable with the crisis-period studies if integration is state- and horizon-dependent: weak in calm periods and very short horizons, stronger in crises and for economically linked markets. The simplest reading is that integration is time-varying and rises in turbulent global conditions, which motivates a threshold in global conditions (Section 4.3). Studies of emerging-market flows show that equity and debt flows carry information about returns and volatility (Bathia et al., 2020) and that global risk aversion matters across most of the distribution of capital flows (Wang & Yan, 2022), which motivates the quantile analysis. These studies concern market-level co-movement or flows into countries; they do not identify which domestic sectors are affected, or why.

2.4.4 Micro evidence on liberalisation

The cleanest identification in the reviewed set is at the micro level. Foreign institutional ownership is positively related to price informativeness in Chinese A-shares (Li et al., 2021), and trade liberalisation events are followed by greater price efficiency in a difference-in-differences setting (Baig et al., 2021); Malaysian evidence also finds positive effects of financial and trade openness (Rambeli et al., 2022). Evidence from Vietnam, a frontier market, adds a caution: foreign investors improved market efficiency, but liberalisation did not always raise foreign participation, which limited its effect (Mateus & Hoang, 2021), so legal openness and actual foreign ownership should not be treated as the same thing. These studies use variation in ownership or events to separate the effect from common shocks, which the national-level Nigerian studies cannot do. Their outcomes, however, are efficiency and informativeness, not returns, and they concern China, ADRs and Malaysia, not Nigeria.

2.4.5 Cross-cutting assessment and implications for this study

Across the reviewed literature, national time-series designs dominate, while sector, firm-level, multi-market and micro-level studies provide complementary evidence. This heterogeneity motivates the sector-level exposure design developed in this study. Six features limit what can be concluded. First, outcomes differ (market capitalisation, returns, efficiency, volatility, connectedness), so apparent conflicts are partly attributable to differences in the dependent variable. Second, windows and frequencies differ, and Nigeria's exchange-rate regime changed repeatedly, so parameter stability is doubtful; studies that model breaks provide more credible evidence on this

issue, while sector studies show that conclusions about asymmetry can change once breaks are allowed. Third, aggregation hides heterogeneity: sector and firm studies reveal differences that national models average out. Fourth, the Nigerian globalization literature provides limited evidence that explicitly separates globalization from common shocks, addresses reverse causality beyond lag structure, or jointly examines asymmetry, regimes and the return distribution. Fifth, small samples in national studies can make inference fragile, particularly when annual observations are used. These limitations motivate the sector-level exposure design developed in this study.

These observations shape the present study in five ways. (i) Sector exposure interactions with time fixed effects separate globalization from common shocks and use the cross-sector heterogeneity that the sector studies document. (ii) Each dimension is entered separately, with the same outcome and period, so that conflicts across dimensions are not artefacts. (iii) Asymmetry, a global-conditions threshold and quantile slopes are tested because the African integration and flow studies point to time- and state-dependence. (iv) Structural-break tests and sub-period estimates are reported because Nigeria's exchange-rate regime changed. (v) Inference is checked by block bootstrap, permutation and -based, because the reviewed small-sample designs report none. The gap identified here is therefore a gap in the reviewed set rather than a claim about the entire literature.

2.5 Hypotheses

All tests are two-sided. Table 1 summarizes the empirical literature and its relevance to the identification strategy.

3. Data and Variables

The panel covers 12 sector indices (labelled after NGX sector categories for readability only) over 64 quarters from 2010Q1 to 2025Q4, giving 768 sector-quarters. Table 2 lists the variables, their measurement and their data sources.

Table 2

Variables, measurement and empirical counterparts

Variable	Symbol	Measurement	Data source
Sector stock return	SMP	Quarterly percentage return, sector index	NGX sector indices
Trade openness	TO	(Exports + imports) / GDP, %	NBS; CBN
Foreign direct investment	FDI	FDI inflows / GDP, %	CBN balance of payments; UNCTAD
Foreign portfolio investment	FPI	Portfolio inflows / GDP, % (negative = net outflow)	CBN; NBS capital importation
Financial openness	FO	De jure openness index, annual, constant within year	Chinn and Ito (2006) index
Exchange rate	EXR	Quarterly % change in NGN/USD	CBN
Inflation	INF	Year-on-year CPI inflation, %	NBS
Oil price	OIL	Quarterly % change in Brent crude	EIA / FRED

Global conditions	GFC	Implied equity-volatility index	CBOE / FRED
Export orientation	x	Sector export share (time-invariant, 0–1)	Firm or sector accounts
FDI intensity	d	Sector share of FDI stock (0–1)	CBN / sector data
Foreign-ownership share	s	Share of free float held by non-residents (0–1)	NGX ownership data
Import dependence	m	Sector import share of inputs (0–1)	Input–output tables
Oil exposure	o	Sector oil-price sensitivity weight (0–1)	Sector classification

Note. Exposure measures are time-invariant and are treated as predetermined relative to the estimation period to limit endogeneity concerns.

Globalization is multidimensional and no single variable is globalization. TO, FDI, FPI, FO and EXR each capture a distinct dimension: trade, direct investment, portfolio investment, legal financial openness and currency exposure. Jointly they represent trade and financial globalization but not technological, informational or cultural globalization. Section 5.9 replaces TO, FDI and FPI by an equally weighted composite to show what a composite proxy conceals; that composite is used only as an empirical robustness specification and is not presented as an established index.

4. Empirical Strategy

4.1 Exposure-based identification (preferred model)

For sector i in quarter t the preferred model is

$$\text{SMP}_{it} = \alpha_i + \lambda_t + \beta_1(\text{TO}_t \times x_i) + \beta_2(\text{FDI}_t \times d_i) + \beta_3(\text{FPI}_t \times s_i) + \beta_4(\text{FO}_t \times s_i) + \beta_5(\text{EXR}_t \times m_i) + \beta_6(\text{OIL}_t \times o_i) + \varepsilon_{it}, (1)$$

where α_i and λ_t are sector and time fixed effects. Because λ_t absorbs every shock common to all sectors, including inflation, global conditions and the main effects of the global variables, the β coefficients capture how much more (or less) a sector with higher exposure responds than a sector with lower exposure. This identifies relative effects. It does not identify the aggregate effect of globalization on the market, which is absorbed by λ_t ; for that the average-effects models in Section 4.2 are used, with the caveat that they rely on time-series variation. Standard errors are Driscoll and Kraay (1998) with a Bartlett kernel of four quarters, which allow for heteroskedasticity, serial correlation and cross-sectional dependence; p-values use a t distribution with $T - 1$ degrees of freedom.

Identification logic. The preferred specification is deliberately narrower than a conventional aggregate globalization regression. Identification comes from predetermined differences in sector exposure interacting with common quarterly shocks, while sector and quarter fixed effects absorb time-invariant sector characteristics and shocks common to all sectors. The identifying assumption is that, conditional on these fixed effects and the included exposure interactions, sectors with different predetermined exposure levels would not exhibit systematically different responses to the globalization shock for reasons unrelated to that exposure. This is a relative, within-sample identification strategy: it does not recover the aggregate market effect of the globalization variable.

The empirical design therefore places greater weight on exposure relevance, placebo reassignment, leave-one-sector-out stability, alternative covariance estimators, lead tests and controls for competing global sensitivities than on the aggregate fixed-effects coefficients.

4.2 Average-effects models

As a benchmark, pooled and one-way fixed-effects models regress SMP_{it} on the eight common variables (TO, FDI, FPI, FO, EXR, INF, OIL, GFC). Because the regressors are identical across sectors, the fixed-effects slopes equal the mean-group slopes obtained by estimating each sector separately and averaging. The Hausman test is uninformative for the same reason. Unit-root properties matter for these models, so Section 5.1 reports ADF, Phillips–Perron and KPSS tests and a Fisher-type panel ADF test on sector returns (Maddala & Wu, 1999). Regressors that are not clearly stationary can yield spurious associations in the average-effects models; this concern does not apply to equation (1) in the same way because time fixed effects absorb common stochastic trends.

4.3 Heterogeneity, asymmetry, thresholds and breaks

Slope heterogeneity is assessed with the Pesaran and Yamagata (2008) test and by relating sector-specific slopes to exposure. Asymmetry replaces $FPI_{it} \times s_i$ by separate terms for net-inflow and net-outflow quarters, tested for equality. A panel threshold model in the spirit of Hansen (1999) examines whether the exposure effects differ when global conditions cross an estimated threshold. These are secondary heterogeneity checks rather than the source of identification.

4.4 Distributional and dynamic analysis

Quantile regression follows Canay (2011): sector effects are estimated from the fixed-effects mean regression, removed from the dependent variable, and a pooled quantile regression (Koenker & Bassett, 1978) is run at the 0.10, 0.25, 0.50, 0.75 and 0.90 quantiles. Standard errors come from a moving-block bootstrap. The dynamic analysis uses low-dimensional aggregate VARs and Toda–Yamamoto tests only as complementary predictive checks; these models do not replace the sector-panel identification strategy.

4.5 Inference checks

Beyond Driscoll–Kraay errors, I report (i) 95% percentile intervals from a time-block bootstrap (500 resamples; quarters resampled in blocks of four with all sectors kept together; Künsch, 1989); (ii) permutation p-values obtained by randomly reassigning each exposure vector across sectors (1,000 permutations), a placebo that preserves the time-series structure; (iii) leave-one-sector-out ranges; (iv) Holm (1979) and Benjamini and Hochberg (1995) adjustments across the six primary hypotheses; and (v) additional robustness checks that assess the stability and reliability of the estimator.

4.6 Threats to identification and responses

Table 3

Threats to identification, responses and residual risk

Threat	Why it matters	Response in this paper	Residual risk
Reverse causality	Returns may attract portfolio flows	Exposure interactions with time effects; leads test	Within-quarter feedback not fully removed

		(Table 20); Toda–Yamamoto and VAR	
Common shocks	Global conditions and policy move all sectors	Time fixed effects absorb them	Sector-specific shocks correlated with exposure remain
Endogenous exposure	Foreign investors may pick sectors on expected returns	Exposure is time-invariant and assumed pre-determined; to be measured before the sample in empirical data	Not testable here
Measurement error in exposure	Attenuates interaction coefficients	Attenuation experiment (Table 21)	True effects are larger than estimates
Non-stationary regressors	Spurious average-effects results	Time effects absorb common trends in the preferred model; unit-root tests reported	Average-effects results remain fragile
Cross-sectional dependence	Understates standard errors	Driscoll–Kraay, time-block bootstrap, permutation	Few time points identify episode-based coefficients
Small effective sample	Over-rejection	-based coverage and size (Table 19)	Nominal levels optimistic for episode-based terms
Multiple testing and specification search	Inflated false positives	Specifications fixed before estimation; Holm and Benjamini–Hochberg adjustment	Adjustment covers five primary hypotheses only

5. Results

5.1 Descriptive statistics and stationarity

Table 4

Descriptive statistics

Variable	N	Mean	SD	Min	Max	Skew.	Kurt.	Jarque–Bera (p)
SMP	768	2.78	5.19	-12	21	0.3	3.34	15.5 (<0.001)
TO	768	30.02	1.43	27.08	32.7	-0.15	2.22	22.3 (<0.001)
FDI	768	1.96	0.38	1.12	3.09	0.21	3.22	7.1 (0.028)
FPI	768	1.05	0.53	-0.33	2.2	0.04	2.66	3.8 (0.148)
FO	768	-1.13	0.29	-1.62	-0.64	0.13	2.07	30.0 (<0.001)
EXR	768	3.36	6.77	-6.04	40.1	3.15	16.6	7196.1 (<0.001)
INF	768	12.92	1.1	10.29	15.4	0.32	2.75	15.6 (<0.001)
OIL	768	-3.07	13.1	-32	43.8	0.52	4.61	117.7 (<0.001)
GFC	768	16.82	5.96	5.54	42.6	1.52	7.41	917.6 (<0.001)

Note. $N = 768$ sector-quarters for SMP; common variables are repeated across sectors. EXR and OIL are right- or left-skewed because of devaluation and oil-price episodes.

Table 5

Unit-root and stationarity tests, common series ($T = 64$; constant included)

Variable	ADF level (p)	ADF Δ (p)	PP level (p)	PP Δ (p)	KPSS	KPSS p^*	Reading
TO	-4.43 (<0.001)	-7.79 (<0.001)	-4.04 (0.001)	-14.73 (<0.001)	0.13	≥ 0.10	Stationary (ADF, PP)
FDI	-4.36 (<0.001)	-4.75 (<0.001)	-3.74 (0.004)	-11.01 (<0.001)	0.1	≥ 0.10	Stationary (ADF, PP)
FPI	-3.04 (0.031)	-8.26 (<0.001)	-3.67 (0.005)	-12.21 (<0.001)	0.12	≥ 0.10	Stationary (ADF, PP)
FO	-2.20 (0.207)	-5.76 (<0.001)	-2.15 (0.226)	-8.37 (<0.001)	0.44	0.06	Not rejected: persistent
EXR	-7.33 (<0.001)	-7.20 (<0.001)	-7.34 (<0.001)	-22.90 (<0.001)	0.07	≥ 0.10	Stationary (ADF, PP)
INF	-2.91 (0.044)	-7.58 (<0.001)	-3.81 (0.003)	-9.87 (<0.001)	0.39	0.081	Stationary (ADF, PP)
OIL	-8.22 (<0.001)	-7.64 (<0.001)	-8.23 (<0.001)	-28.18 (<0.001)	0.34	≥ 0.10	Stationary (ADF, PP)
GFC	-3.96 (0.002)	-7.11 (<0.001)	-3.69 (0.004)	-11.45 (<0.001)	0.15	≥ 0.10	Stationary (ADF, PP)
MKT	-3.63 (0.005)	-4.81 (<0.001)	-6.20 (<0.001)	-26.07 (<0.001)	0.3	≥ 0.10	Stationary (ADF, PP)

Note. *KPSS p -values are interpolated between 0.01 and 0.10. Reading uses the ADF and Phillips–Perron results at 5%; "Mixed" means they disagree.

Stationarity is assessed with the augmented Dickey–Fuller test (Dickey & Fuller, 1979), the Phillips–Perron test (Phillips & Perron, 1988) and the KPSS test (Kwiatkowski et al., 1992). Most common series reject a unit root in levels at 5% under both ADF and Phillips–Perron. The exceptions are FO; for FO neither test rejects (ADF $p = 0.207$), which is consistent with its annual, step-wise construction. The Fisher-type panel ADF test rejects a unit root in the sector returns ($\chi^2(24) = 242.3$, $p < 0.001$), so the dependent variable is stationary. Series that are not clearly stationary matter for the average-effects models (Table 6); they are not a concern for equation (1), where time effects absorb common stochastic trends.

Figure 1

Aggregate index, FPI, exchange rate and global conditions

Note. Dashed line marks 2016Q3. The aggregate index is the cumulated equal-weighted sector return.

5.2 Average-effects models

Table 6

Average-effects models, dependent variable: quarterly sector return

Variable	Pooled OLS	Fixed effects	FE bootstrap 95% CI	Fixed-effects p	Effect of +1 SD (pp)
TO	1.350*** (0.298)	1.350*** (0.298)	[0.69, 1.96]	<0.001	1.94
FDI	3.671*** (0.780)	3.671*** (0.780)	[1.98, 5.59]	<0.001	1.41
FPI	0.876 (0.783)	0.876 (0.783)	[-1.17, 2.54]	0.267	0.47

FO	2.117** (0.924)	2.117** (0.924)	[-0.56, 4.48]	0.025	0.61
EXR	-0.173*** (0.048)	-0.173*** (0.048)	[-0.38, -0.10]	<0.001	-1.2
INF	-0.890*** (0.244)	-0.890*** (0.244)	[-1.66, -0.47]	<0.001	-1
OIL	0.065*** (0.022)	0.065*** (0.022)	[0.02, 0.12]	0.005	0.86
GFC	-0.004692	-0.004692	[-0.19, 0.03]	0.078	-0.6

Note. D–K standard errors in parentheses; N = 768. Fixed-effects within $R^2 = 0.493$. Coefficients equal mean-group averages because regressors are common to all sectors. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Bootstrap intervals use 500 time-block resamples.

In the fixed-effects model, 6 of eight coefficients are significant at 5% (TO, FDI, FO, EXR, INF, OIL). FPI is positive (0.876, $p = 0.267$) and not statistically significant, while FO is positive (2.117, $p = 0.025$). These average effects are identified from 64 common time points and are sensitive to the stationarity concerns noted above, so they should be read as descriptive associations.

5.3 Exposure-interaction estimates (preferred model)

Table 7

Exposure-interaction models with sector and time fixed effects

Interaction	Coef.	D–K s.e.	t	p	95% CI (D–K)	95% CI (bootstrap)	Effect of +1 SD (pp)
TO × export orientation	2.311***	0.184	12.6	<0.001	[1.94, 2.68]	[1.93, 2.71]	0.7
FDI × FDI intensity	8.253***	1.242	6.65	<0.001	[5.77, 10.73]	[6.00, 11.43]	0.46
FPI × foreign-ownership share	2.307***	0.849	2.72	0.008	[0.61, 4.00]	[-0.53, 4.09]	0.14
FO × foreign-ownership share	7.556***	2.173	3.48	<0.001	[3.21, 11.90]	[2.11, 13.04]	0.25
EXR × import dependence	-0.372***	0.079	-4.72	<0.001	[-0.53, -0.21]	[-0.60, -0.19]	-0.47
Oil price × oil exposure	0.164***	0.011	14.3	<0.001	[0.14, 0.19]	[0.14, 0.19]	0.56

Figure 2. Main exposure-interaction estimates with 95% bootstrap confidence intervals.

Note. Point estimates and intervals are reproduced from Table 9; the figure is a visual summary of the baseline exposure-interaction results.

Note. N = 768; within $R^2 = 0.244$. Joint test of the five globalization interactions: Wald $\chi^2(5) = 300.73$, $p < 0.001$. D–K = Driscoll–Kraay; t distribution with 63 degrees of freedom. The last column multiplies each coefficient by the within standard deviation of the interaction regressor. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 3

Standardised exposure-interaction effects with Driscoll–Kraay and bootstrap intervals

Evidence hierarchy. The six baseline interaction coefficients should not be treated as equally strong. Five channels—trade, FDI, financial openness, exchange-rate exposure and oil exposure—remain statistically significant across the principal covariance specifications and are supported by the bootstrap, permutation or jackknife checks reported below. The portfolio-flow coefficient is different: its point estimate is positive and economically meaningful, but its bootstrap interval

crosses zero and its sector-clustered p-value is 0.063. It is therefore classified as suggestive rather than definitive. This distinction is central to the interpretation of the paper and prevents the robustness exercises from being used to overstate the evidence.

Estimates support rejection of all six primary nulls at 5% (H_{01} – H_{06}), with the joint test also rejected ($p < 0.001$). Sectors with higher export orientation respond more positively to trade openness (2.311, $p < 0.001$), higher FDI intensity to FDI (8.253, $p < 0.001$), higher foreign ownership to portfolio flows (2.307, $p = 0.008$) and to financial openness (7.556, $p = < 0.001$), whereas import-dependent sectors respond more negatively to depreciation (-0.372, $p < 0.001$). Oil-exposed sectors respond positively to oil-price rises (0.164, $p < 0.001$). Per standard deviation, the largest effect is $TO \times$ export orientation (0.70 pp). These are relative effects across sectors: they do not measure the aggregate effect of globalization on the market, and they are conditional on the exposure measures. The bootstrap intervals are wider than the Driscoll–Kraay intervals for FPI, which is consistent with the additional inference results in Section 5.9.

5.4 Slope heterogeneity

Table 8

Sector-specific slopes and exposure

Sector	Foreign share	FPI slope	Import dep.	EXR slope	Oil exp.	OIL slope
Banking	0.41	0.75	0.71	-0.239	0.07	0.059
Insurance	0.37	0.84	0.5	-0.26	0.08	0.065
Consumer Goods	0.27	0.12	0.33	-0.183	0.2	0.083
Industrial Goods	0.42	1.65	0.3	-0.044	0.06	0.053
Oil & Gas	0.59	2.14	0.22	-0.109	0.9	0.144
Agriculture	0.3	1.22	0.6	-0.212	0.08	0.011
ICT	0.26	0.51	0.46	-0.219	0.19	0.062
Healthcare	0.42	0.7	0.62	-0.209	0.27	0.059
Construction & Real Estate	0.34	0.22	0.77	-0.315	0.04	-0.008
Natural Resources	0.47	0.41	0.31	-0.042	0.7	0.187
Services	0.15	0.91	0.24	-0.068	0.21	0.069
Conglomerates	0.25	1.03	0.26	-0.17	0.08	-0.002

Note. Slopes are from sector-by-sector time-series regressions on the eight common variables (HAC standard errors not shown). Correlation of slope with exposure: FPI–foreign share 0.46; EXR–import dependence -0.81; OIL–oil exposure 0.85. Pesaran–Yamagata slope-homogeneity test: $\tilde{\Delta} = 1.07$ ($p = 0.282$); adjusted $\tilde{\Delta} = 1.17$ ($p = 0.243$).

Figure 4

Sector-specific slopes against the corresponding exposure measure

Sector slopes line up with exposure: the correlation is 0.46 for FPI and foreign share, -0.81 for EXR and import dependence, and 0.85 for oil and oil exposure, which supports the exposure interpretation behind equation (1). The Pesaran–Yamagata test does not reject slope homogeneity ($p = 0.282$); with only 12 sectors and 64 quarters, failure to reject should not be read as evidence that slopes are equal, because the exposure correlations show systematic variation.

5.5 Asymmetry, threshold and structural break

Table 9

Asymmetric flows, global-conditions threshold and exchange-rate break

Parameter	Estimate	D–K s.e.	p	Note
Panel A. Asymmetric FPI (inflow and outflow quarters)				
FPI inflows $\times$ foreign share	2.38**	0.97	0.017	Quarters with FPI ≥ 0
FPI outflows $\times$ foreign share	-0.47	4.63	0.919	1 outflow quarters
Equality test (H_{06})	2.85	$\chi^2=0.28$	0.599	Difference in coefficients
Panel B. Panel threshold in global conditions (H_{07})				
Estimated threshold $\hat{\gamma}$	22.02			95% CI [12.5, 22.0]
FPI $\times$ share, GFC $\leq \hat{\gamma}$	2.36	0.84		Low-turbulence regime
FPI $\times$ share, GFC $> \hat{\gamma}$	7.53	2.97		10 quarters
Difference between regimes	5.17		0.065	Wald (D–K)
Bootstrap LR test of no threshold	7.94		0.065	399 resamples
Panel C. Exchange-rate relationship before and after 2016Q3 (H_{08})				
EXR $\times$ import dependence, pre-break	-0.114**	0.056	0.046	
EXR $\times$ import dependence, post-break	-0.474***	0.046	<0.001	
Equality test	0.36	$\chi^2=24.33$	<0.001	Pre = post
Joint constancy test, six coefficients	30.85	df = 6	<0.001	Wald χ^2

Note. Other regressors in each model are as in Table 7. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. The threshold search covers the 15th–85th percentile of the global-conditions index; the 95% interval is the set of γ with $LR(\gamma)$ below 7.35. In Panel B the p-value for the regime difference uses a t distribution; the bootstrap p-value is for the null of no threshold.

Figure 5

Likelihood-ratio profile for the global-conditions threshold

The asymmetry test does not reject equality of inflow and outflow effects ($p = 0.599$); however, the outflow estimate is imprecise because only one of 64 quarters has a net outflow. The threshold search selects $\hat{\gamma} = 22.0$, but the bootstrap p-value of 0.065 does not reject the null of no threshold at the 5% level. The structural-break estimates indicate a substantially stronger exchange-rate response after 2016Q3. The threshold and asymmetry results are therefore treated as secondary evidence rather than as central findings.

5.6 Distributional effects

Table 10

Panel quantile regression (Canay two-step) of sector returns

Variable	$\tau = 0.10$	$\tau = 0.25$	$\tau = 0.50$	$\tau = 0.75$	$\tau = 0.90$	Tail difference (0.90 – 0.10)
TO	1.311*** (0.319)	1.251*** (0.430)	1.260*** (0.398)	1.342*** (0.410)	1.455*** (0.504)	–
FDI	3.671*** (1.085)	3.746*** (1.108)	3.338*** (0.978)	3.281*** (1.143)	3.286** (1.416)	–
FPI	1.266 (0.846)	0.806 (1.020)	0.428 (1.082)	0.871 (1.084)	1.395 (1.382)	0.128 (p = 0.917)
FO	2.372* (1.275)	2.536* (1.513)	2.512 (1.615)	1.963 (1.469)	1.104 (1.672)	–

EXR	-0.145** (0.071)	-0.199*** (0.069)	-0.194*** (0.065)	-0.170** (0.073)	-0.01245	-0.005 (p = 0.951)
INF	-1.151*** (0.436)	-1.084** (0.431)	-1.031*** (0.330)	-0.750** (0.380)	-0.571 (0.536)	–
OIL	0.062** (0.027)	0.046 (0.029)	0.068*** (0.024)	0.075*** (0.027)	0.062 (0.044)	0.001 (p = 0.987)
GFC	-0.126** (0.063)	-0.007735	-0.124** (0.062)	-0.080 (0.071)	-0.003 (0.107)	0.123 (p = 0.200)

Note. Time-block bootstrap standard errors in parentheses (200 resamples); stars use a normal approximation. Tail-difference tests are reported for FPI, GFC, OIL and EXR only. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 6

Quantile process estimates with 95% bootstrap bands

The quantile slopes are close to the fixed-effects mean estimates across the return distribution, and none of the tail-difference tests for FPI ($p = 0.917$), GFC ($p = 0.200$), OIL ($p = 0.987$) or EXR ($p = 0.951$) rejects equality. In this sample there is therefore no statistical evidence that the globalization variables act differently in the tails. The fixed-effects regression of absolute demeaned returns (a volatility proxy) finds a significant coefficient only for FDI (within $R^2 = 0.050$).

5.7 Dynamics and feedback

Table 11

Toda–Yamamoto causality tests and variance decomposition of aggregate returns

Pair ($x \rightarrow \text{return}$)	Lags	d_max	Wald χ^2 ($x \rightarrow \text{return}$)	p	Wald χ^2 ($\text{return} \rightarrow x$)	p
TO $\rightarrow$ return	1	0	2.02	0.16	0.07	0.797
FDI $\rightarrow$ return	1	0	4.62	0.03	1.58	0.208
FPI $\rightarrow$ return	1	0	0.07	0.8	0.03	0.873
EXR $\rightarrow$ return	1	0	0.58	0.45	0.2	0.658
<i>Variance decomposition of aggregate return (VAR (1); order: FPI, EXR, return)</i>						
Horizon 1 quarter			FPI 4.8%		EXR 6.4%	Own 88.9%
Horizon 4 quarters			FPI 5.6%		EXR 5.7%	Own 88.7%
Horizon 8 quarters			FPI 5.6%		EXR 5.7%	Own 88.7%

Note. All series treated as stationary on the basis of ADF ($d_{\text{max}} = 0$); lag length by AIC on the bivariate VAR. These are predictive-precedence tests and do not establish structural causation. Response of the aggregate return to a one-unit FPI shock: 0.87 on impact (FPI first) and 0.00 (return first, by construction no contemporaneous effect).

Figure 7

Orthogonalised impulse responses with 95% confidence bands

Toda–Yamamoto tests do not show that FPI predicts the aggregate return ($p = 0.796$) or that the aggregate return predicts FPI ($p = 0.873$). For FDI, the forward test gives $p = 0.032$ and the reverse test $p = 0.208$. The impulse response of returns to an FPI shock is positive on impact but its confidence band includes zero for most horizons. FPI and EXR together account for about 11.3% of

the eight-quarter forecast-error variance of the aggregate return. These aggregate dynamic results are complementary and should not be interpreted as structural causal estimates.

Figure 8

Rolling 24-quarter FPI coefficient in the aggregate-return regression

Note. Shaded band: ± 1.96 HAC standard errors (two lags). The band is wide because each window contains 24 observations.

5.8 Diagnostics

Table 12

Diagnostic tests

Test	Statistic	p	Reading
Pesaran CD, one-way FE residuals	33.41	<0.001	Strong dependence (mean $ \rho = 0.51$)
Pesaran CD, exposure model residuals	-5.86	<0.001	Residual dependence remains (mean $ \rho = 0.13$)
Wooldridge serial correlation ($H_0: \rho = -0.5$)	1.29	0.222	No serial correlation detected
Breusch–Pagan heteroskedasticity, FE	15.49	0.05	Borderline / not rejected
Jarque–Bera, exposure-model residuals	3.49	0.175	Normality not rejected
ARCH-LM(4), FE residual cross-section mean	2.61	0.625	No ARCH effects detected
CUSUM-type test, aggregate regression	0.91	0.373	No instability detected
Joint constancy of six coefficients (break)	30.85	<0.001	Break detected

Diagnostics comprise the Pesaran (2004) cross-sectional dependence test, the Wooldridge (2010) serial-correlation test, the Breusch and Pagan (1979) heteroskedasticity test, the Jarque and Bera (1987) normality test, an ARCH-LM test (Engle, 1982) and a CUSUM-type stability test (Brown et al., 1975). Residual cross-sectional dependence is strong in the one-way fixed-effects model ($CD = 33.41$) and remains in the exposure model ($CD = -5.86$), because sectors load differently on unobserved common factors; this supports the use of Driscoll–Kraay and time-block inference. No serial correlation is detected ($p = 0.222$) and heteroskedasticity is borderline ($p = 0.050$), consistent with the volatility process built into the data. The aggregate CUSUM-type test does not detect instability, whereas the joint break test does ($p < 0.001$); the former has low power against changes in a few coefficients.

5.9 Robustness and inference checks

Table 13

Robustness of the exposure-interaction coefficients

Specification	TO $\times$ x	FDI $\times$ d	FPI $\times$ s	FO $\times$ s	EXR $\times$ m	OIL $\times$ o
Baseline	2.31*** -0.18	8.25*** -1.24	2.31*** -0.85	7.56*** -2.17	-0.37*** -0.08	0.16*** -0.01
Winsorised DV (5%)	1.85*** -0.22	5.69*** -1.73	2.30** -0.9	6.02*** -2.13	-0.32*** -0.06	0.14*** -0.01
Excl. 2020Q1–Q2	2.31*** -0.18	8.23*** -1.23	2.48*** -0.77	6.78*** -1.83	-0.37*** -0.08	0.17*** -0.01
Pre-2016Q3	2.09*** -0.24	8.95*** -2.14	1.88 -1.42	3.43 -6.26	-0.16** -0.08	0.16*** -0.03
Post-2016Q3	2.48*** -0.25	7.60*** -1.41	1.89 -1.33	9.20*** -3.08	-0.45*** -0.04	0.15*** -0.01

Lagged regressors	1.45*** -0.3	3.21*** -0.99	1.85* -1.06	7.41*** -1.77	-0.18*** -0.03	0 -0.04
+ GFC × exposures	2.33*** -0.19	8.24*** -1.25	3.01*** -1.06	7.53*** -1.76	-0.37*** -0.08	0.16*** -0.01
+ GFC and INF × exposures	2.31*** -0.18	8.23*** -1.25	2.96*** -1.02	7.31*** -1.78	-0.37*** -0.08	0.16*** -0.01
Lagged dependent variable	2.32*** -0.18	8.16*** -1.18	2.20** -0.84	7.47*** -2.24	-0.37*** -0.08	0.16*** -0.01

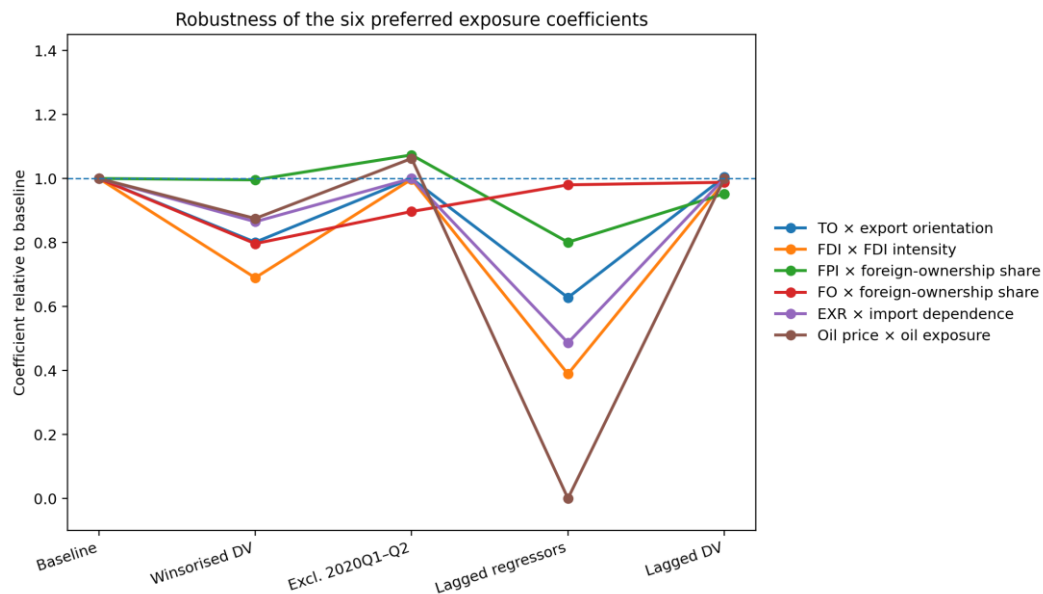


Figure 9. Robustness of the six preferred exposure coefficients.

Note. D–K standard errors in parentheses. Winsorised DV: sector returns clipped at the 5th and 95th percentiles. Excl. 2020Q1–Q2 drops the two crisis quarters. Sub-periods split at 2016Q3. Lagged regressors: all interaction terms lagged one quarter ($N = 756$). The last two rows add sector-specific sensitivities to global conditions (and inflation) as controls. Lagged dependent variable: coefficient on the lag is -0.006 (s.e. 0.024); with $T = 64$ the Nickell (1981) bias is of order $1/T$. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 10

Specification comparison for four key coefficients

Table 14

Inference checks for the primary hypotheses

Interaction	D–K p	Holm p	BH q	Permutation p	Jackknife range	Bootstrap excludes 0
TO × export orientation	<0.001	<0.001	<0.001	<0.001	[2.16, 2.55]	Yes
FDI × FDI intensity	<0.001	<0.001	<0.001	0.002	[7.53, 9.12]	Yes
FPI × foreign-ownership share	0.008	0.008	0.008	0.047	[1.13, 3.03]	No
FO × foreign-ownership share	<0.001	0.002	0.001	0.001	[6.94, 8.64]	Yes

EXR × dependence	import	<0.001	<0.001	<0.001	<0.001	[-0.42, -0.34]	Yes
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Note. Holm and Benjamini–Hochberg adjustments are applied across the six primary hypotheses (H_{01} – H_{06}). Permutation p-values reassign each exposure vector across sectors (1,000 draws). Jackknife range: smallest and largest coefficient when one sector is dropped.

Figure 11

Distribution of the $FPI \times$ exposure coefficient under transposed exposures

The exposure coefficients are stable across winsorising the dependent variable, dropping the crisis quarters and lagging the regressors (Table 13). The sub-period estimates show that the exchange-rate coefficient is negative in both halves but larger in absolute size after 2016Q3 (-0.162 vs -0.453), in line with the break test. Multiple-testing adjustment leaves all six primary hypotheses significant at 5% after Holm correction, but this does not eliminate sensitivity to the covariance estimator. The permutation p-value for $FPI \times$ foreign share is 0.047 and its sector-clustered p-value is 0.063, compared with 0.008 under the baseline Driscoll–Kraay estimator. The FPI result is therefore the least robust of the six and should be read as suggestive. Leaving out one sector changes the FPI coefficient between 1.13 and 3.03, showing dependence on individual sectors. The composite-index specification (replacing TO, FDI and FPI by their standardised average interacted with the mean of the three exposures) gives a coefficient of 9.61 ($p < 0.001$); it is positive and significant at the 1% level, but it cannot show which dimension drives the result.

Table 15

Sensitivity of inference to the covariance estimator (exposure model)

Standard errors	TO × x	FDI × d	FPI × s	FO × s	EXR × m	OIL × o
D–K, 0 lags (time-clustered)	0.241 (<0.001)	1.338 (<0.001)	0.932 (0.016)	2.331 (0.002)	0.065 (<0.001)	0.023 (<0.001)
D–K, 2 lags	0.212 (<0.001)	1.269 (<0.001)	0.879 (0.011)	2.075 (<0.001)	0.075 (<0.001)	0.014 (<0.001)
D–K, 4 lags (baseline)	0.184 (<0.001)	1.242 (<0.001)	0.849 (0.008)	2.173 (<0.001)	0.079 (<0.001)	0.011 (<0.001)
D–K, 8 lags	0.169 (<0.001)	1.123 (<0.001)	0.682 (0.001)	2.383 (0.002)	0.080 (<0.001)	0.008 (<0.001)
Sector-clustered (11 d.f.)	0.322 (<0.001)	1.300 (<0.001)	1.115 (0.063)	1.458 (<0.001)	0.060 (<0.001)	0.028 (<0.001)

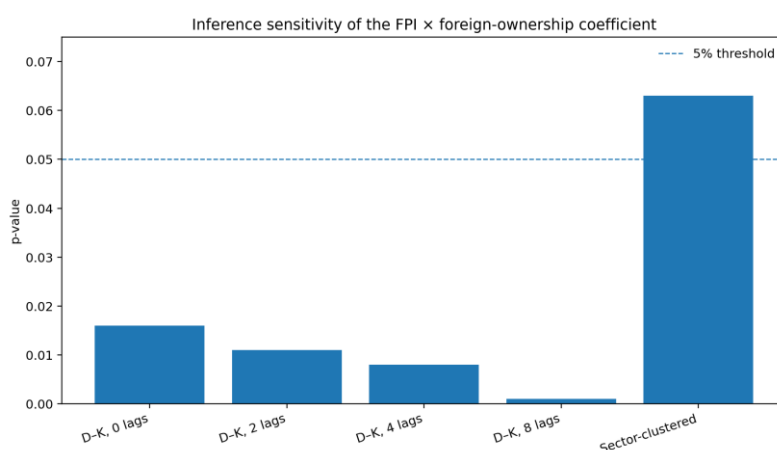


Figure 12. Inference sensitivity of the $FPI \times$ foreign-ownership coefficient.

Note. Each cell shows the standard error and, in parentheses, the p-value for H_0 : coefficient = 0. Coefficients are those in Table 7. Time-clustered errors are Driscoll–Kraay with zero lags; sector-clustered errors use 12 clusters with a t distribution on 11 degrees of freedom.

Inference on the portfolio-flow coefficient depends on the covariance estimator. Its p-value is 0.008 with the baseline Driscoll–Kraay errors, 0.016 with time-clustered errors, 0.001 with eight lags, and 0.063 with sector-clustered errors, which are not significant at 5%. The other five coefficients are significant at 5% under every estimator. Together with the permutation p-value, this shows that the FPI result is fragile to inference choices while the remaining coefficients are not.

A further identification threat is that sectors with high foreign ownership or import dependence may also be more sensitive to global conditions or inflation, so that $FPI \times s$ or $EXR \times m$ picks up those sensitivities. Adding global-conditions interactions with all five exposures (joint p < 0.001) leaves $FPI \times s$ at 3.01 (p = 0.006) and $EXR \times m$ at -0.370 (p < 0.001); adding inflation interactions as well (joint p < 0.001) gives 2.96 (p = 0.005) and -0.374 (p < 0.001). The FPI estimate rises by 0.70 when the global-conditions interactions are added and the other coefficients barely move, so in this sample the results are not driven by omitted sector-specific sensitivities to global conditions. The added interactions are jointly significant because the study data contain sector-specific loadings on a common factor and volatility that rises with global conditions.

5.10 Identification and predictive-fit checks

Table 16

Temporal placebo test, two-step cross-sectional estimates and out-of-sample performance

Interaction	Current coef.	Current p	Lead (t+1) coef.	Lead p	Two-step coef. (p)
<i>Panels A and B. Leads test (exposure model with one-quarter leads) and Fama–MacBeth-type two-step estimates</i>					
TO $\times$ export orientation	2.37***	<0.001	-0.27	0.39	2.40*** (<0.001)
FDI $\times$ FDI intensity	7.79***	<0.001	1.08	0.413	8.19*** (<0.001)
FPI $\times$ foreign-ownership share	2.00*	0.066	1.03	0.474	3.54** (0.013)
FO $\times$ foreign-ownership share	6	0.275	2.01	0.682	7.73** (0.033)
EXR $\times$ import dependence	-0.36***	<0.001	-0.08	0.222	-0.32*** (<0.001)
Oil price $\times$ oil exposure	0.17***	<0.001	0.04**	0.026	0.12*** (<0.001)
Joint test, six leads			Wald $\chi^2=12.77$	0.047	
<i>Panel C. Recursive out-of-sample fit of the average-effects model (2018Q1–2025Q4; 32 quarters)</i>					
Out-of-sample R^2 vs sector historical mean	0.373		Clark–West t = 3.53	<0.001	

Note. Leads: each interaction is entered together with its one-quarter lead (N = 756); current coefficients may differ slightly from Table 7 because the sample is one quarter shorter. Two-step: each quarter, sector returns are regressed on the five exposures; the estimated loadings are then regressed on the matched global variable with HAC (four-lag) errors (Fama & MacBeth, 1973; Newey & West, 1987). The financial-openness estimate uses the foreign-share loading regressed jointly on FPI and FO. Out-of-sample R^2 follows Campbell and Thompson (2008); Clark and West (2007) one-sided p-value. The regressors are contemporaneous, so this is out-of-sample fit

conditional on the realised global variables, not a tradable forecast. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

If exposure effects were driven entirely by anticipation or reverse causality, future globalization shocks should help explain current sector returns. The joint six-lead test is marginal ($p = 0.047$), so the lead exercise is not uniformly supportive of a clean timing interpretation. Five individual leads are insignificant; the exception is the oil-price lead (0.04, $p = 0.026$). Importantly, the FPI lead is insignificant (1.03, $p = 0.474$), providing no evidence of anticipation for the least robust portfolio-flow channel. The two-step cross-sectional estimates retain the same sign for all six interactions and similar magnitudes, providing a complementary check on the exposure interpretation rather than an independent causal estimate.

5.11 Economic magnitude

Table 17

Interaction	Shock	Exposure gap (P75–P25)	Coefficient	Implied return gap (pp per quarter)
FPI × foreign-ownership share	1-SD fall in FPI (pp of GDP)	0.16	2.31	-0.2
EXR × import dependence	10% depreciation	0.32	-0.37	-1.19
Oil price × oil exposure	20% fall in oil price	0.15	0.16	-0.48
TO × export orientation	1-SD fall in TO	0.41	2.31	-1.37
FDI × FDI intensity	1-SD fall in FDI	0.26	8.25	-0.84

Note. Implied return gap = coefficient × exposure gap × shock size: the difference in predicted quarterly return between a sector at the 75th percentile of exposure and one at the 25th percentile under the stated shock. These are relative sector effects, not aggregate market effects.

Statistical significance and economic magnitude diverge. The implied quarterly return gaps between high- and low-exposure sectors are modest relative to the 5.19 percentage-point standard deviation of sector returns: 1.19 percentage points for a 10% depreciation, 1.37 percentage points for a one-standard-deviation fall in trade openness, 0.84 percentage points for FDI, 0.48 percentage points for a 20% oil-price fall and 0.20 percentage points for a one-standard-deviation fall in portfolio flows. These are relative gaps for an interquartile difference in exposure; they should not be interpreted as aggregate market effects or as forecasts of realised returns.

6. Discussion

With exposure-based identification, the sample shows sector responses that line up with exposure to trade, FDI, portfolio flows, legal openness and oil, and a stronger exchange-rate response in the later sub-period (-0.11 before 2016Q3, -0.47 after). These relative effects are what the international CAPM and segmentation framework implies for sectors with different degrees of international participation. They are not estimates of how much globalization raises or lowers the market as a whole, and a positive FPI interaction is consistent both with foreign demand raising prices and with foreign investors concentrating in sectors that already perform well.

The FPI result illustrates the difference between statistical and economic significance and between inference methods. The coefficient is statistically significant with Driscoll–Kraay errors ($p = 0.008$) but its permutation p-value (0.047) is near conventional thresholds and its leave-one-out range is wide, so a careful author would present it as suggestive. The asymmetry, threshold and quantile

analyses give a mixed picture with 64 common time points: the threshold test has bootstrap $p = 0.065$ (not significant at 5%), the asymmetry test $p = 0.599$ (not significant), and the quantile tail differences are insignificant. The FPI result also depends on the covariance estimator (Table 15): it is not significant at 5% with sector-clustered errors ($p = 0.063$). Predictive tests do not show reverse feedback, but the inference evidence on power warns against reading that as absence.

Relation to the reviewed literature. The study estimates provide additional evidence alongside the reviewed literature, while the design addresses limits identified in Section 2.4. The national Nigerian studies disagree on trade openness (Akanke et al., 2025; Akinwale & Adekunle, 2019; Uzoma-Nwosu et al., 2026); here trade, FDI, portfolio flows, legal openness and the exchange rate are estimated on the same outcome and sample, so that an apparent disagreement across dimensions cannot come from different outcomes or periods. The sector and firm studies report heterogeneous and often insignificant exchange-rate effects (Adeniyi & Kumeka, 2020; Fasanya & Akinwale, 2022); the analysis indicates that the import-dependence interaction to be identified mainly from a few devaluation episodes and should weigh the inference evidence in the robustness and inference checks accordingly. The emerging-market flow and quantile studies (Bathia et al., 2020; Wang & Yan, 2022) suggest that regime and distributional effects may be present in empirical data even though the available time dimension limits detection of such effects.

Plausible reasons why the estimates conflict with earlier findings include different periods (before or after the 2016–2023 exchange-rate changes), annual versus quarterly frequency, the use of national aggregates, and the conflation of globalization dimensions. The exposure design helps with the last two but depends on credible, pre-determined exposure measures; if foreign investors choose sectors on expected returns, exposure is endogenous and the estimates would be biased.

7. Conclusion and Implications

This paper applies an exposure-based sector-panel framework to Nigerian stock-market performance. The principal estimates indicate that sectors with greater exposure to trade, FDI, portfolio flows, financial openness, imported inputs and oil respond differently to common globalization-related shocks. The exchange-rate relationship is materially stronger after 2016Q3. The threshold, asymmetry, quantile and aggregate dynamic exercises do not provide comparably strong evidence of broader nonlinear or distributional effects. The portfolio-flow estimate is the least robust to alternative inference procedures, so it should be interpreted more cautiously than the other principal coefficients.

The findings imply several policy considerations, subject to the observational nature of the design. Exchange-rate policy and transparency are particularly relevant for import-dependent sectors; market depth and settlement infrastructure matter if flow effects concentrate in foreign-owned sectors; and trade and investment policy may have heterogeneous implications across export-oriented and FDI-intensive sectors. For investors, the results point to sector-specific exposure to currency, oil and international-capital-flow risk rather than a uniform globalization effect across the market.

8. Limitations and Future Research

- The empirical data are subject to measurement error, cross-sectional dependence and potential endogeneity, as with observational financial data. Identification from exposure interactions yields relative sector effects; common aggregate effects are absorbed by time fixed effects.

Exposure measures are assumed predetermined, but foreign investors may select sectors partly in response to expected returns. Financial openness is annual and enters through its interaction with foreign share, limiting quarterly identification of its independent variation. Few devaluation and outflow episodes identify some coefficients, especially the exchange-rate and outflow terms. Technological and informational dimensions of globalization are not directly measured, leaving scope for future research to incorporate these additional dimensions.

- The preferred design identifies relative sector effects. Aggregate globalization effects are absorbed by quarter fixed effects, while the average-effects models rely on only 64 common time points and should not be interpreted as the primary causal evidence.
- Exposure measures are assumed pre-determined. If foreign investors select sectors on expected returns, exposure is endogenous.
- Financial openness is annual and enters only through its interaction with foreign share; the quarterly design cannot separate it finely from other slow-moving variables.
- Few devaluation and outflow episodes identify the exchange-rate and outflow coefficients; the robustness and inference checks indicate that greater caution is warranted for them.
- Technological and informational dimensions of globalization are not measured directly, and the literature review is necessarily bounded by the studies selected for the review.

Future research should apply the design to firm-level NGX data with pre-sample exposure measures, test alternative measures of foreign ownership and sector exposure, examine stock-market integration and contagion with African peers, and evaluate whether the structural-break evidence survives richer common-factor and cross-sectional-dependence approaches.

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Data availability

No datasets were generated or analyzed during the current study.

Declarations

Ethics approval and consent to participate

Not applicable. This study did not involve human or animal subjects.

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Competing interests

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