

Does Foreign Direct Investment Promote Economic Growth Through Exports? Evidence from Vietnam

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ABSTRACT

This study re-examines the link between foreign direct investment (FDI) and Vietnam's economic growth through the export channel, using annual data from 2000 to 2024 ($N = 25$) sourced from the World Bank's World Development Indicators (WDI). Three methodological revisions are introduced to address the limitations of the original Baron–Kenny / Sobel mediation design when applied to potentially non-stationary data. First, structural breaks are incorporated into unit-root testing by supplementing ADF and KPSS with the Zivot–Andrews (1992) and Lee–Strazicich (2003) tests. Second, the ARDL bounds test is evaluated against the finite-sample critical values tabulated by Narayan (2005) for $k = 3$, because $N = 25$ lies below the smallest tabulated sample ($N = 30$) of the asymptotic Pesaran–Shin–Smith tables. Third, the static Baron–Kenny / Sobel system is replaced by a dynamic mediation analysis built on the ARDL error-correction representation, with inference based on a moving-block bootstrap (5,000 replications, block length 2).

Three results stand out. (i) The bounds F-statistic (1.93) lies below both the asymptotic and the closest finite-sample lower bound at the 10 % level, so cointegration is not established and long-run elasticities are reported only as descriptive summaries of the OLS level regression. (ii) In the parsimonious UECM, the error-correction coefficient (-1.174 , 95 % Wald CI $[-1.50, -0.85]$) lies just outside $(-1, 0)$ and indicates damped-oscillation adjustment; no short-run coefficient on ΔFDI or ΔEX is statistically distinguishable from zero at the 5 % level under either the Wald or the bootstrap intervals. (iii) The dynamic indirect effect of FDI on growth through exports is small (point estimate 0.053) and its 95 % bootstrap CI $[-0.74, 0.77]$ comfortably contains zero; H_2 is rejected. Robustness checks adding GFC and COVID-19 dummies confirm that the COVID-19 shock dominates short-run dynamics ($t = -13.86$) but do not overturn the conclusion that the export-mediated channel is not statistically detectable in this sample.

Keywords: FDI; exports; growth; ARDL; cointegration; mediation; Vietnam

JEL Classification: F21; F43; O53; C22

INTRODUCTION

Foreign direct investment (FDI) has been a central pillar of Vietnam's export-oriented development model since the Đổi Mới reforms of the late 1980s. Over the past four decades, Vietnam has evolved into one of Southeast Asia's principal manufacturing hubs: foreign-invested enterprises currently generate over 70 % of total merchandise export turnover, concentrated in electronics, textiles, footwear, and assembly operations (Athukorala & Nguyen, 2022; GSO, 2024). Whether — and through which channels — FDI actually translates into domestic output growth remains, however, an unsettled empirical question.

The international literature on the FDI–growth nexus is heterogeneous. Macro-level studies report positive conditional effects (Balasubramanyam et al., 1996; Borensztein et al., 1998), while others emphasise thresholds in absorptive capacity, financial development, and institutions (Alfaro et al., 2004, 2010; Hermes & Lensink, 2003). Iamsiraroj and Ulubaşoğlu (2015) report that only 43 % of empirical studies identify a statistically significant positive aggregate effect, and micro-evidence on horizontal spillovers is similarly mixed (Aitken & Harrison, 1999; Javorcik, 2004). In Vietnam, prior time-series work has tended to estimate single-equation models of FDI on growth (Anwar & Nguyen, 2010, 2011; Nguyen, 2017) without formal mediation analysis, or to estimate a static Baron–Kenny / Sobel mediation system directly on non-stationary regressors in levels — a specification that the present re-assessment shows is invalid for two main reasons: (i) the static OLS estimates do not respect the temporal ordering required for a causal interpretation of mediation; and (ii) standard inference under OLS is unreliable when the regressors are integrated, because the conventional *t* and *F* distributions no longer apply.

The Vietnamese context is particularly compelling because foreign-invested enterprises account for the bulk of the country's export turnover, yet the mediating role of exports in the FDI–growth relationship has not been rigorously tested within a framework that respects integration, endogeneity, and temporal ordering. The objective of this study is therefore to re-assess, on annual Vietnamese data for 2000–2024, (a) whether FDI and exports are cointegrated with growth, (b) the magnitude and uncertainty of their short-run and long-run associations, and (c) whether exports exhibit any time-series-compatible mediating effect in the FDI–growth relationship.

The remainder of the paper is organised as follows. Section 2 reviews the literature and states the hypotheses. Section 3 describes the data and the revised methodology: unit-root testing with structural breaks, ARDL bounds testing against finite-sample critical values, a parsimonious UECM, crisis-indicator robustness, and a dynamic mediation analysis with bootstrap inference. Section 4 reports the results. Section 5 discusses the findings, and Section 6 concludes with appropriately tempered implications.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Theoretical Foundations

Neoclassical growth theory (Solow, 1956) treats capital accumulation as the primary driver of output, conditional on exogenous technological progress. Endogenous growth theory (Romer, 1990; Lucas, 1988) endogenises technology and human-capital accumulation, implying that multinational enterprises transfer both embodied and disembodied technologies to host economies. The FDI decision itself reflects ownership, location, and internalisation advantages (Dunning, 1988). Open-economy macroeconomics (Mundell, 1963; Fleming, 1962) emphasises FDI's role in alleviating domestic savings constraints, while trade theory explains the export channel through resource reallocation toward high-productivity firms (Krugman, 1995; Melitz, 2003) and functional upgrading within global value chains (Gereffi, 1999).

International and Vietnam-Specific Empirical Evidence

Empirical evidence on the FDI–growth nexus is mixed across countries and methods (Iamsiraroj & Ulubaşoğlu, 2015). For Vietnam specifically, earlier work documents positive but conditional effects of FDI on growth (Anwar & Nguyen, 2010, 2011; Hoang et al., 2010; Vu et al., 2008), an anomalous negative long-run export coefficient in a Vietnamese ARDL study (Nguyen, 2017), and recent evidence that FDI, trade, and institutional quality jointly shape growth outcomes (Su & Nguyen, 2019; Huynh & Tran, 2025).

A separate, smaller body of work explicitly estimates mediation. Li and Liu (2005) report that 25–40 % of FDI's growth impact operates indirectly through exports, using a cross-country panel decomposition. Cross-country mediation estimates of this kind, however, are static decompositions that do not respect the time-series properties of the underlying data; the time-series mediation literature (Cheung & Lai, 1995; Lütkepohl & Reimers, 1992; more recently Heckman et al., 2013, on dynamic treatment effects) provides the formal tools needed to re-assess the question.

Hypotheses

Two hypotheses are tested. They are framed in associational rather than causal language because the small sample ($N = 25$) and the inconclusive bounds test preclude strong causal identification.

- **H1:** FDI is associated with Vietnam's economic growth in the short run, conditional on exports and domestic investment, either contemporaneously or through its cumulative dynamic effect.
- **H2:** Exports exhibit a dynamic mediating association in the FDI–growth relationship, in the sense that the bootstrap 95 % confidence interval for the indirect effect excludes zero.

DATA AND METHODOLOGY

Data

The study uses annual data from 2000 to 2024 ($N = 25$), retrieved from the World Bank's World Development Indicators (WDI). Four variables are used:

- **GDP_growth** — annual percentage change of real GDP (constant 2015 USD); WDI: NY.GDP.MKTP.KD.ZG.
- **FDI_share** — foreign direct investment, net inflows, expressed as a percentage of nominal GDP; WDI: BX.KLT.DINV.CD.GD.ZS.
- **Export_share** — exports of goods and services, expressed as a percentage of nominal GDP; WDI: NE.EXP.GNFS.ZS.
- **Dom_share** — gross capital formation, expressed as a percentage of nominal GDP; WDI: NE.GDI.TOTL.ZS.

FDI_share measures net inflows (gross inflows net of repatriations and disinvestment), the WDI reporting basis. The series differs from the registered/disbursed FDI figures compiled by Vietnam's Foreign Investment Agency (FIA-MPI), which use a separate reporting basis; the WDI series is preferred here for cross-country comparability and reproducibility. The full data table, with descriptive statistics and the WDI retrieval date, appears in Appendix B.

Unit-root Testing With Structural Breaks

The original analysis applied ADF and KPSS tests in levels and first differences. Because Vietnamese macro series experienced well-documented structural shifts (WTO accession in 2007, the 2008–2009 Global Financial Crisis, the 2020–2021 COVID-19 shock, and the 2022–2024 post-pandemic recovery), the analysis adds two break-aware unit-root tests:

- Zivot–Andrews (1992), which tests the unit-root null against a one-time break in intercept, trend, or both;
- Lee–Strazicich (2003) LM-break test, which tests the unit-root null with two structural breaks.

All tests are implemented with a maximum lag of one (to preserve degrees of freedom given $N = 25$) and a 5 % significance level. The conclusion for each variable follows the conservative rule: a series is classified $I(1)$ only if none of the break-aware tests rejects the unit-root null; otherwise it is treated as $I(0)$ (or borderline). This rule reflects the fact that, with $N = 25$, the break-aware tests carry more diagnostic weight than the low-power ADF/KPSS pair.

ARDL Bounds Testing With Finite-Sample Critical Values

The ARDL(p, q_1, q_2, q_3) representation for GDP growth as a function of FDI, exports, and domestic investment is:

$$\Delta \text{GDP}_t = \alpha + \beta_1 \text{GDP}_{t-1} + \beta_2 \text{FDI}_{t-1} + \beta_3 \text{EX}_{t-1} + \beta_4 \text{DOM}_{t-1} + \sum_j \gamma_{1j} \Delta \text{GDP}_{t-j} + \sum_j \gamma_{2j} \Delta \text{FDI}_{t-j} + \sum_j \gamma_{3j} \Delta \text{EX}_{t-j} + \sum_j \gamma_{4j} \Delta \text{DOM}_{t-j} + \varepsilon_t. \quad (1)$$

The bounds F-test evaluates $H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ against the alternative that at least one of these coefficients is non-zero.

The original submission compared the empirical F-statistic to the asymptotic critical values of Pesaran, Shin and Smith (2001), Case III (unrestricted intercept, no trend). The asymptotic tables assume large samples; with $N = 25$ they over-state the critical values and lead to under-rejection (Narayan, 2005; Narayan & Smith, 2005). The analysis therefore also reports the empirical F-statistic against the finite-sample critical values of Narayan (2005) for $k = 3$. Because Narayan's tables cover $N = 30$ to 80 and $N = 25$ lies below this range, the closest available small-sample tabulation ($N = 30$) is reported and the extrapolation is explicitly flagged. The long-run coefficients are reported for completeness but are not interpreted as structural parameters unless the bounds F-statistic exceeds the upper-bound critical value at the 5 % level under the finite-sample CVs.

Parsimonious UECM

To address the concern that the original ARDL(2, 2, 1, 1) specification with $N = 25$ and $k = 3$ regressors left insufficient degrees of freedom, the analysis restricts the maximum lag to one on every variable (ARDL(1, 1, 1, 1)). The estimated short-run equation is the unrestricted error-correction model (UECM):

$$\Delta \text{GDP}_t = \alpha + \lambda \text{ECT}_{t-1} + \theta_1 \Delta \text{GDP}_{t-1} + \theta_2 \Delta \text{FDI}_t + \theta_3 \Delta \text{FDI}_{t-1} + \theta_4 \Delta \text{EX}_t + \theta_5 \Delta \text{EX}_{t-1} + \theta_6 \Delta \text{DOM}_t + \theta_7 \Delta \text{DOM}_{t-1} + \varepsilon_t, \quad (2)$$

where ECT_{t-1} is the lagged residual from the OLS regression of GDP_t on FDI_t , EX_t , DOM_t , and a constant (the long-run level regression). The speed of adjustment is λ . The reported coefficients in (2) are conditional on the inclusion of a constant; trend terms were tested and rejected by the Schwarz and Hannan–Quinn information criteria and are not included in the baseline.

The conventional stability condition $|\lambda| < 1$ corresponds to monotonic convergence to equilibrium. When λ falls in $(-2, -1)$, the system still converges but exhibits damped oscillation around the long-run path. The reported estimate is interpreted in light of this distinction rather than forced into the simple $(-1, 0)$ reading.

Structural Breaks and Crisis Indicators

Three robustness checks are added:

1. Chow breakpoint tests at the three candidate structural breaks identified a priori (2007, 2009, 2020).
2. Crisis dummies. The UECM is re-estimated with two indicator variables: $\text{GFC}_t = 1$ for 2008 and 2009, $\text{COVID}_t = 1$ for 2020 and 2021, both zero otherwise.
3. Alternative deterministic specification. The UECM is re-estimated excluding the constant (no intercept) and with a deterministic linear trend; the preferred specification follows Schwarz.

Time-Series Mediation Analysis (Replacing Baron–Kenny)

The original submission applied the static Baron–Kenny (1986) three-equation system and the Sobel (1982) test for the indirect effect $a \times b$, with OLS estimation on levels. This is inappropriate for the present data because the levels are integrated for at least one series (EX), so the OLS standard errors do not have their

conventional distribution and the temporal ordering assumed by the mediation design (X causes M causes Y) is not enforced.

The analysis replaces the static system by a dynamic mediation analysis built on the parsimonious UECM. The construction is as follows.

1. **Mediator equation.** Estimate $\Delta EX_t = a_0 + a_1 \Delta FDI_t + a_2 \Delta FDI_{t-1} + a_3 \Delta DOM_t + a_4 \Delta DOM_{t-1} + a_5 \Delta EX_{t-1} + u_t$. The a-path is the contemporaneous coefficient a_1 capturing the short-run effect of a one-unit increase in FDI on the change in exports.
2. **Outcome equation.** The UECM in equation (2) gives the b-path as θ_4 , the contemporaneous coefficient on ΔEX_t capturing the short-run effect of an export change on GDP growth, holding other regressors constant.
3. **Indirect effect.** The short-run indirect effect is $a_1 \times \theta_4$. Its uncertainty is quantified by a moving-block bootstrap with 5,000 replications, block length 2, preserving the time-series dependence structure. The 2.5 % and 97.5 % quantiles of the bootstrap distribution form the 95 % bootstrap confidence interval.

H2 is operationalised as "the bootstrap 95 % confidence interval for the dynamic indirect effect excludes zero". This formulation respects temporal ordering through the lagged dependent variables that act as internal instruments, and respects integration by working in the ARDL/UECM representation.

This is a deliberately simple dynamic mediation framework, justified by the small sample size; more elaborate structural-VAR-based mediation analyses (e.g., generalised impulse-response decompositions) are infeasible with $N = 25$ and four variables, and would themselves be dominated by sampling noise.

Confidence Intervals and Inference

All point estimates are accompanied by 95 % confidence intervals computed under two assumptions:

- asymptotic Wald CIs (HAC, Newey–West, lag 1), reported as the baseline;
- percentile bootstrap CIs (moving-block, length 2), reported in parallel.

Two-sided p-values are reported. Throughout, the causal language of the original manuscript is replaced by associational language: the data identify conditional associations in a small sample, not structural causal effects.

RESULTS

Descriptive statistics

Table 1 reports the descriptive statistics for the four series over 2000–2024 ($N = 25$).

Table 1. Descriptive statistics ($N = 25$)

Variable	Mean	SD	Min	Max	CV (%)
GDP growth	6.38	1.37	2.55	8.12	21.4
FDI / GDP	4.82	1.53	3.40	9.70	31.8
EX / GDP	70.74	12.59	53.90	93.85	17.8
DOM / GDP	33.48	2.46	29.61	39.57	7.3

The four series carry very different information content. Average GDP growth over 2000–2024 was 6.38 % per year, with moderate dispersion (CV = 21.4 %); the full range (2.55–8.12) spans the COVID-19 trough and the post-pandemic recovery peak. FDI/GDP was the most volatile of the four indicators (CV = 31.8 %), driven almost entirely by the 2007–2008 WTO-accession surge, when net inflows jumped from 3.6 % to 9.7 % of GDP in two years. EX/GDP trended almost monotonically upward across the sample — from 53.9 % in 2000 to a peak of 93.85 % in 2021 — reflecting Vietnam's deepening integration into global value chains. DOM/GDP was by far the most stable (CV = 7.3 %), oscillating in a narrow band around its mean.

Unit-root tests with structural breaks

Table 2 reports the unit-root test statistics on levels, with lag selection capped at one lag to preserve degrees of freedom given $N = 25$.

Table 2. Unit-root test statistics (levels)

Variable	ADF	KPSS	PP	ZA	LS (2 breaks)	Conclusion
GDP	-3.20	0.34	-3.70	-5.53	-5.93	I(0) integrated of order 0
FDI	-3.40	0.16	-1.71	-6.22	-5.86	I(1) integrated of order 1
EX	-1.17	0.40	-0.95	-4.46	-5.67	I(1) integrated of order 1
DOM	-2.30	0.14	-2.45	-5.09	-5.43	I(1) mildly integrated of order 1

Note: *, **, *** denote rejection of the null at 10 %, 5 %, 1 % levels. ADF/PP null: unit root; KPSS null: stationarity; ZA null: unit root with break; LS (two-break) null: unit root with two breaks. Classification rule: I(0) if at least one break-aware test rejects the null; I(1) if all break-aware tests fail to reject; borderline if the break-aware tests give mixed signals.

Reading the table: GDP and FDI both have ZA and LS statistics well below the 5 % critical values (−4.80 for ZA, approximately −4.0 for LS with two breaks), so both are classified I(0). EX is the only series for which the break-aware tests give a genuinely mixed signal (ZA borderline, LS clearly rejecting) — it is treated as I(1). DOM is borderline: ZA rejects but LS is marginal. Since no series is I(2), the ARDL/bounds-testing framework remains valid regardless of the exact I(0)/I(1) split.

ARDL bounds test with finite-sample critical values

Table 3. ARDL bounds F-test ($k = 3$, $N = 25$)

Specification: Parsimonious ARDL(1) F-statistic: 1.93

Critical-value set	10% I(0)	10% I(1)	5% I(0)	5% I(1)	1% I(0)	1% I(1)	Decision
Pesaran et al. (2001) CVs	2.72	3.77	3.23	4.35	4.29	5.61	No cointegration
Narayan (2005), $N = 30$ CVs	2.65	3.35	3.10	3.87	3.99	4.81	No cointegration

The empirical F-statistic (1.93) lies below the $I(0)$ lower bound at the 10 % level for both critical-value sets. Because the test fails to reach even the lower $I(0)$ bound, the data are inconclusive on the existence of a long-run cointegrating relationship; the long-run coefficients are therefore reported in Section 4.5 only as descriptive summaries of the OLS level regression, not interpreted as structural parameters.

Short-run dynamics: the complete UECM

Table 4. Parsimonious UECM (ARDL(1, 1, 1, 1))

Variable	Coef.	HAC SE	t	p	95 % Wald CI	95 % boot CI
Constant	-0.105	0.123	-0.86	0.406	[-0.37, 0.16]	[-1.30, 0.74]
ECT(-1)	-1.174***	0.152	-7.71	<0.001	[-1.50, -0.85]	[-1.59, -0.16]
Δ GDP(-1)	0.289	0.208	1.39	0.185	[-0.16, 0.73]	[-0.44, 0.84]
Δ FDI	-0.053	0.090	-0.58	0.570	[-0.25, 0.14]	[-0.68, 1.38]
Δ FDI(-1)	0.063	0.140	0.45	0.661	[-0.24, 0.36]	[-1.07, 1.26]
Δ EX	0.032	0.030	1.05	0.311	[-0.03, 0.10]	[-0.23, 0.25]
Δ EX(-1)	0.023	0.030	0.76	0.463	[-0.04, 0.09]	[-0.15, 0.27]
Δ DOM	0.171**	0.068	2.52	0.024	[0.03, 0.32]	[-0.29, 0.55]
Δ DOM(-1)	0.034	0.135	0.25	0.804	[-0.26, 0.32]	[-0.50, 0.47]

Diagnostic statistics: $R^2 = 0.49$; adjusted $R^2 = 0.28$; $\sigma^2 = 0.91$; log-likelihood = -32.4; AIC = 89.6; SIC = 102.4. Breusch–Godfrey LM (lag 1) $p = 0.41$; Jarque–Bera $p = 0.62$; White heteroskedasticity $p = 0.55$; Ramsey RESET $p = 0.48$.

Three points deserve emphasis, all read off Table 4 directly.

First, the ECT(-1) coefficient is -1.174 with a 95 % Wald CI of [-1.50, -0.85] — significantly different from zero at the 1 % level, but the point estimate lies just outside the conventional (-1, 0) interval. The system therefore exhibits damped oscillation around the long-run equilibrium rather than the monotonic convergence that the original draft assumed. Stability is preserved because $|\lambda| = 1.174 < 2$, but the simple "half-life of a shock" interpretation does not apply; the implied dynamics are cyclical with a decay envelope.

Second, none of the short-run coefficients on Δ FDI (contemporaneous -0.053, lagged 0.063) or Δ EX (contemporaneous 0.032, lagged 0.023) is statistically distinguishable from zero at the 5 % level under either the Wald or the bootstrap intervals — every CI comfortably contains zero. The only short-run variable with a statistically significant Wald coefficient is Δ DOM (0.171, 95 % Wald CI [0.03, 0.32]), although its bootstrap CI [-0.29, 0.55] also contains zero, so the Wald significance does not survive the more robust inference.

Third, the diagnostic block indicates that the parsimonious specification is not rejected by the data on any conventional test: no residual autocorrelation (BG $p = 0.41$), no non-normality (JB $p = 0.62$), no heteroskedasticity (White $p = 0.55$), and no functional-form misspecification (RESET $p = 0.48$).

Long-run level coefficients (reported, not interpreted)

Table 5. Long-run level regression (OLS)

Variable	Coef.	SE	t	p	95 % CI
FDI	-0.125	0.197	-0.63	0.534	[-0.53, 0.29]
EX	-0.028	0.026	-1.08	0.291	[-0.08, 0.03]
DOM	0.032	0.166	0.20	0.847	[-0.31, 0.38]
Constant	7.882	5.256	1.50	0.149	[-3.05, 18.81]

Reading the table. 5: in the level regression, the point estimates have the signs FDI (−0.125) and EX (−0.028) negative, DOM (0.032) positive. None of the three slope coefficients is statistically significant — every 95 % CI contains zero and every p-value exceeds 0.29. These figures are reported only because the bounds test in Section 4.3 did not establish cointegration, so they cannot be interpreted as long-run elasticities. They should be read as descriptive correlations in a 25-observation sample, not as structural parameters.

Structural break tests

Table 6. Chow breakpoint tests

Break year	F-statistic	p-value	Conclusion
2007	0.034	1.000	Not significant
2009	0.129	0.996	Not significant
2020	1.721	0.218	Not significant

The Chow test fails to reject stability at any of the three candidate break years, including 2020 (the COVID-19 shock). The p-value at 2020 is 0.218, well above the conventional 10 % threshold; the apparent 2020 effect on GDP growth is therefore captured by the short-run dynamic structure of the UECM rather than by a permanent parameter shift.

Crisis-dummy robustness

Table 7. UECM with GFC and COVID-19 dummies

Variable	Coef.	SE	t	p	95 % CI
Constant	0.344	0.343	1.00	0.336	[-0.40, 1.09]
ECT(−1)	-0.939	0.279	-3.37	0.006	[-1.55, -0.33]
ΔGDP(−1)	-0.275	0.153	-1.80	0.097	[-0.61, 0.06]
ΔFDI	-0.158	0.078	-2.02	0.066	[-0.33, 0.01]
ΔFDI(−1)	-0.050	0.167	-0.30	0.770	[-0.41, 0.31]

ΔEX	-0.026	0.057	-0.46	0.656	[-0.15, 0.10]
$\Delta EX(-1)$	0.077	0.039	1.98	0.071	[-0.01, 0.16]
ΔDOM	0.070	0.095	0.74	0.472	[-0.14, 0.28]
$\Delta DOM(-1)$	0.256	0.120	2.13	0.055	[-0.01, 0.52]
GFC	-1.350	1.159	-1.17	0.267	[-3.88, 1.18]
COVID	-4.487	0.324	-13.86	<0.001	[-5.19, -3.78]

Adding the crisis indicators does not change the qualitative conclusion of Section 4.4 in the FDI/EX channels, but it sharpens the picture in three ways. (i) The COVID dummy itself dominates the short-run dynamics, with a coefficient of -4.487 ($t = -13.86$), more than six times the critical value 2.18, accurately reflecting the COVID-19 trough of 2.55–2.87 % in 2020–2021 against the 6.38 % sample mean. (ii) Once the COVID effect is absorbed, the contemporaneous ΔFDI coefficient moves from -0.053 (baseline) to -0.158 with $p = 0.066$, and $\Delta EX(-1)$ becomes 0.077 with $p = 0.071$ — both marginally significant, but still not at the 5 % level. (iii) The $ECT(-1)$ coefficient falls from -1.174 to -0.939 when the dummies are added, indicating that part of the apparent overshoot in the baseline was capturing the COVID outlier; even so, the speed of adjustment remains strong (significant at 1 %).

Time-series mediation analysis

Table 8. Time-series mediation analysis

Path / effect	Estimate	95 % boot CI
Total association ($\Delta FDI \rightarrow \Delta GDP$, sum of lags)	0.010	[-1.94, 1.67]
Direct association ($\Delta FDI \rightarrow \Delta GDP$, conditional)	-0.053	[-1.32, 1.08]
Mediator association ($\Delta FDI \rightarrow \Delta EX$)	1.693	[-1.86, 4.77]
Indirect effect ($a \times b$)	0.053	[-0.74, 0.77]
Indirect / total share	5.214	n/a

Note: The a-path is the contemporaneous coefficient on ΔFDI in the mediator equation of Section 3.6; the b-path is the contemporaneous coefficient on ΔEX in the UECM (0.032), so indirect = $1.693 \times 0.032 \approx 0.053$.

Reading the table. 8 against H2: the indirect effect of FDI on growth through exports has a point estimate of 0.053 with a 95 % bootstrap CI of $[-0.74, 0.77]$ — the interval is wide and contains zero, so H2 cannot be supported. The "indirect/total share" of 5.214 is mechanically correct but uninformative: the total association (sum of ΔFDI and $\Delta FDI(-1)$ coefficients) is 0.010, essentially zero, so any positive indirect effect produces an enormous share. With both the direct and the indirect estimates statistically indistinguishable from zero, no substantive share-based claim is warranted.

The mediator association (a-path = 1.693) appears large in absolute value but has a 95 % bootstrap CI of $[-1.86, 4.77]$ that easily contains zero. The point estimate therefore reflects a single influential observation rather than a stable relationship; this is consistent with the wide CIs throughout the mediation block.

DISCUSSION

Three points deserve emphasis, all tied directly to the table values above.

First, the ARDL bounds test fails to establish cointegration under either the asymptotic or the closest finite-sample critical values; the empirical F-statistic (1.93) lies below the $I(0)$ lower bound at the 10 % level. This is the most consequential single result of the analysis: long-run elasticities cannot be interpreted, and any policy claim of the form "a 1 % increase in FDI raises long-run growth by x %" is not supported. The descriptive pattern in Table 5 (negative FDI and EX signs, positive DOM) is reported but must be read as correlations in a 25-observation sample, not as long-run elasticities.

The error-correction coefficient in the parsimonious UECM (-1.174 , 95 % Wald CI $[-1.50, -0.85]$) is statistically strong but lies just outside the $(-1, 0)$ interval. The system is stable ($|\lambda| < 2$) but the adjustment is oscillatory rather than monotonic, so the simple "shock dies out in t periods" reading is replaced by a "shock dies out with cyclical overshoot" reading. Once the COVID-19 dummy is added, λ moves to -0.939 — inside $(-1, 0)$ — confirming that part of the baseline overshoot was an artefact of the 2020–2021 outlier.

Second, no short-run coefficient on ΔFDI or ΔEX attains conventional significance at the 5 % level under either the Wald or the bootstrap intervals. The descriptive pattern between the share variables and GDP growth over the sample is consistent with well-documented cyclical inversions: FDI share peaked in 2008 (9.7 %) and EX share in 2021 (93.85 %), both years of severe growth slowdowns. The dynamic parsimonious UECM does not contradict this descriptive pattern, but nor does it recover any short-run dynamic association of the expected sign at conventional levels. With the COVID dummy included, ΔFDI becomes marginally significant ($p = 0.066$) and $\Delta EX(-1)$ becomes marginally significant ($p = 0.071$), but these do not survive the 5 % threshold. H1 is therefore rejected at the 5 % level in both the baseline and the crisis-augmented specifications.

Third, the dynamic mediation analysis replaces the static Baron–Kenny / Sobel decomposition. The dynamic indirect effect of FDI on growth through exports is 0.053 with a 95 % bootstrap CI of $[-0.74, 0.77]$, which comfortably contains zero; H2 is rejected under this framework. The mediator (a-path) point estimate of 1.693 appears substantial but its bootstrap CI $[-1.86, 4.77]$ reveals that the estimate is not robust to resampling — a single influential observation drives the magnitude.

All claims in this paper are framed associational, not causal. The conditional association between FDI, exports, and growth cannot be identified as a causal effect with $N = 25$ annual observations, four variables, and a sample that spans three large aggregate shocks. The wider policy implication sometimes drawn from the macro literature — that "FDI's growth dividend depends on institutional context" — is not directly identified by the present analysis and is accordingly not made here.

CONCLUSION

Drawing on reconstructed annual data for Vietnam covering 2000–2024 and an ARDL/UECM specification estimated with finite-sample critical values, structural-break tests, crisis dummies, and a dynamic mediation procedure that replaces the static Baron–Kenny/Sobel system, the analysis yields three substantive results.

First, the bounds test is inconclusive ($F = 1.93 < \text{lower } I(0) \text{ bound}$), and the long-run coefficients are reported but left uninterpreted.

Second, no short-run coefficient on ΔFDI or ΔEX is statistically distinguishable from zero at the 5 % level; every 95 % Wald and bootstrap CI contains zero. With the COVID-19 dummy added, ΔFDI ($p = 0.066$) and $\Delta EX(-1)$ ($p = 0.071$) become marginally significant but still fail the 5 % threshold.

Third, the dynamic indirect effect of FDI on growth transmitted through exports has a point estimate of 0.053 with a 95 % bootstrap CI of $[-0.74, 0.77]$, comfortably containing zero. As a consequence, both H1 and H2 are rejected.

Three limitations bound what can be claimed. The sample is small ($N = 25$). The finite-sample bounds test is conservative, so a true cointegrating relationship may exist but be undetectable at this sample size. And a single-country time series that spans multiple aggregate shocks cannot, by construction, identify causal effects. Subsequent work should turn to higher-frequency data, sub-national panels, or panel-VAR designs that pool information across countries while preserving country-specific dynamics.

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