ASIAN THINK TANK Network Forum 2026

Resilient and Sustainable Supply Chains:
The Strategic Role of Foreign Direct Investment

"Is FDI Enough? Rethinking Sustainability in ASEAN-6 Supply under Macro-Financial and Institutional Conditions"

Date & Location:

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Q1:
WHAT ECONOMIC PROBLEM ARE WE ADDRESSING?

Economic openness is generating value, but its sustainability outcomes are increasingly conditional.

Research Question:

To what extent does supply chain integration moderate the impact of foreign direct investment on sustainability outcomes, and how do macroeconomic and structural factors shape this conditional relationship?

01 | ASEAN is deeply integrated into global production

FDI + TRADE → REGIONAL & GLOBAL VALUE CHAIN

~70% of global trade occurs through GVCs

FDI is increasingly embedded in geographically dispersed production and supply-chain networks.

Source: (World Bank, 2020; Antràs & Yeaple, 2014).

02 | Integration creates competing effects

- **Value Creation**
  - **Capital**
  - **Technology**
  - **Productivity**

↔

- **Sustainability Pressure**
  - **Resource Depletion**
  - **Environmental Damage**
  - **Long-term Welfare**

The net sustainability outcome is context-dependent.

Source: (Copeland & Taylor, 2004; Ali & Wang, 2024).

03 | The Missing Link

FDI does not operate in isolation.

FDI → PRODUCTION NETWORKS → SUPPLY-CHAIN INTEGRATION → SUSTAINABILITY OUTCOME

Yet, this conditioning role is not always explicitly modelled.

Source: (Drob et al., 2026; World Bank, 2020; Gereffi, 2018)

Q2: WHY IS THIS AN ECONOMIC PROBLEM, AND WHAT VALUE DOES THE PAPER ADD FOR POLICYMAKERS?

VALUE CREATION

ECONOMIC–SUSTAINABILITY TENSION



CONDITIONAL OUTCOMES



WHY?

LOOK BEYOND FDI VOLUME



INTEGRATE INVESTMENT & SUPPLY-CHAIN POLICY



MEASURE SUSTAINABILITY AS LONG-TERM WEALTH



WHAT VALUE?

Q3: WHAT APPROACH DOES THE PAPER TAKE TO ADDRESS THE ECONOMIC PROBLEM?

Sample:  **(2000-2024)**

FDI creates economic gains, but sustainability outcomes are conditional

CONTROL VARIABLES

- ☐ Trade Openness
- ☐ GDP Growth
- ☐ Renewable Energy

Control parameters across all estimation specifications.

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FDI + TRADE
Economic openness

Moderator **SUPPLY-CHAIN INTEGRATION**
Logistics Performance Index (LPI)

[Moderating pathway: FDI × LPI]

Dependent Variable/Outcome
ADJUSTED NET SAVINGS (ANS)
Broader sustainability / long-term wealth accumulation

MACRO-FINANCIAL & FISCAL CONDITIONS

PC1 Composite Index

- ☐ **A) Inflation rate**
- ☐ **B) Government expediture**
- ☐ **C) Domestic credit**

Additional Explanatory Layer

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Economic Opennes Layer
FDI inflows and international trade integration as baseline catalysts for productive capital stock expansion.

Supply-Chain Moderation
Logistics Performance Index (LPI) determines the structural efficiency with which green tech and inputs spill over.

Macro-Financial Anchor
Principal component (PC1) capturing inflation, fiscal expenditure, and domestic credit health.

METHODOLOGICAL PROGRESSION & ESTIMATION STAGES

Model 1 — Baseline
FDI + LPI + Controls → ANS
Direct Effect

Model 2 — Moderation
FDI + LPI + [FDI×LPI] + Controls → ANS
Core Interaction (FDI × LPI)

Model 3 — Structural
Model 2 + PC1 → ANS
Macro-Financial Layer (PC1)

ESTIMATOR: PANEL ARDL–PMG

Robustness Checks: Dynamic Fixed Effects (DFE) | Mean Group (MG) | PCSE | Alternative Lags

The Core Policy Problem

Foreign Direct Investment (FDI) accelerates capital formation and industrial throughput across ASEAN-6. However, its long-term environmental and sustainability outcomes remain highly non-linear and conditional.

Target Measure:
Adjusted Net Savings (% GNI)

Q4: WHAT ARE THE KEY FINDINGS OF THE PAPER, AND WHAT GAPS DOES IT IDENTIFY?

- **Identifying the Research Gaps** - Why This Study is Necessary?

⚠ Gap 1: Fragmented Treatment of Variables

- Existing literature often treats Foreign Direct Investment (FDI), trade openness, and sustainability as separate, additive influences.
- The Oversight: They neglect the interconnected role of Global Value Chains (GVCs) as the primary transmission mechanism linking FDI to environmental externalities.

⚠ Gap 2: Neglect of Interaction Effects

- Limited attention has been paid to how Supply Chain Integration (proxied by Logistics Performance Index/LPI) conditions or moderates the impact of FDI.
- The Consequence: Previous models implicitly assume homogeneous effects, ignoring that identical FDI levels can yield divergent sustainability outcomes depending on logistics quality.

⚠ Gap 3: Narrow Sustainability Metrics

- Most studies rely solely on emission-based indicators (e.g., CO_2), which fail to capture long-term intergenerational welfare.
- The Need: A comprehensive measure like Adjusted Net Savings (ANS) is required to account for resource depletion and capital accumulation alongside environmental damage.

- **Key Empirical Findings - PMG-ARDL Results**

1. Testing the Conditional Framework in ASEAN (2000–2024)

⚠ Finding 1: Strong Support for the "Pollution Halo" Hypothesis

- FDI has a **positive, highly significant** long-run effect on Adjusted Net Savings across all specifications.

Key Takeaway:

In ASEAN, FDI acts primarily as a source of cleaner technology and structural upgrading rather than a pollution haven.

⚠ Finding 2: Renewable Energy is the Most Robust Driver

- Renewable energy consumption **shows consistent, large, and significant positive** coefficients in every model.

Key Takeaway:

The energy transition is the single most reliable lever for improving sustainability-adjusted national wealth in the region.

⚠ Finding 3: Trade Openness is Fragile and Conditional

- The effect of trade openness is **unstable**; it is **positive in baseline** models but turns **negative when broader structural factors are controlled (PCA model).**

Key Takeaway:

Trade alone is not a dependable determinant of sustainability without complementary institutional and infrastructural support.

- **Key Empirical Findings - PMG-ARDL Results**

2. Revisiting the Role of Supply Chains and Macro Factors

⚠ Finding 4: Estimation-Sensitive Moderating Role of Supply Chains

- In the main PMG-ARDL estimates, the interaction term **(FDI × LPI)** is statistically **insignificant**.

Key Takeaway:

Supply chain integration does amplify FDI benefits, but this effect operates through within-country variation (short-run dynamics) rather than stable cross-country differences. It is a complementary enabler, not the primary driver.

However, under robustness checks (FE-PCSE), the interaction becomes **positive and significant.**

⚠ Finding 5: No Independent Role for Composite Structural Index

- The composite index (PC1) capturing macroeconomic conditions **(inflation, credit, govt spending)** is statistically **insignificant.**

Key Takeaway:

Broad macroeconomic stability does not independently drive long-term sustainability once FDI and energy variables are accounted for. However, these factors remain essential preconditions for attracting high-quality investment, even if they don't show up as direct statistical drivers in this specific model.

Q5: WHAT CONCRETE POLICY RECOMMENDATIONS DOES THE PAPER PROVIDE?

- **Strategic Policy Recommendations** - Prioritizing Quality, Transition, and Coordination

01

Prioritize Investment Quality over Quantity

- **For Lower-Capacity Countries:** Strengthen environmental screening (ESG standards) and enforce impact assessments before admitting projects.
- **For Higher-Capacity Countries:** Offer performance-based green incentives (tax breaks for verified emissions reductions) to attract frontier clean technology.

02

Accelerate the Renewable Energy Transition

- **For Lower-LPI Countries:** Utilize blended finance (concessional public capital + private investment) to de-risk early-stage renewable projects where domestic credit markets are shallow.
- **For Higher-LPI Countries:** Lead in building smart grids, large-scale storage infrastructure, and regional green finance platforms that pool projects into investable pipelines.

03

Treat Supply Chain Modernization as Complementary

- **For Lower-LPI Countries:** Prioritize basic port efficiency, customs modernization, and reliable electricity supply at industrial sites to enable participation in Global Value Chains (GVCs).
- **For Higher-LPI Countries:** Develop low-emission ports, electrified freight corridors, and sustainable warehousing to anchor the region's decarbonization efforts within high-value trade segments.

Notes:

- **Lower-Institution Capacity Countries** 
- **Higher-Institution Capacity Countries** 

- **Strategic Policy Recommendations** - Macroeconomic Foundations and Regional Coordination

04

Maintain Sound Macroeconomic Foundations

- **Action:** Ensure price stability, fiscal discipline, and deep domestic credit markets.
- **Rationale:** While not direct drivers in the model, these are essential preconditions that allow high-quality FDI to enter and renewable projects to be financed.

05

Strengthen Regional Coordination (ASEAN/RCEP)

- **Action:** Adopt a common Sustainable Investment and Energy Transition Framework.
- **Goals:** Harmonize environmental disclosure standards to prevent "carbon leakage" and establish a technical assistance facility to transfer regulatory capacity from advanced to developing member states.

"Stop competing on volume. Start competing on quality. ASEAN's sustainable future depends not on how much investment we attract, but on how effectively we channel it into clean technologies and genuine wealth creation."

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THANK YOU FOR YOUR ATTENTION

SEE YOU AGAIN !

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