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**MACROECONOMIC INSTABILITY, POLICY REFORMS,  
AND FOREIGN DIRECT INVESTMENT INFLOWS IN  
ASEAN COUNTRIES: A PILOT STUDY ON INSTRUMENT  
VALIDITY, DATA FEASIBILITY, AND METHODOLOGICAL  
CALIBRATION USING PANEL ARDL APPROACH**

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**Abstract:**

Foreign direct investment continues to be an important source of development and innovation in the Association of Southeast Asian Nations. Many studies examine the effect of FDI on macroeconomic instability and policy reforms separately, but very few examine how policy reforms might be contingent on macroeconomic stability. Such a shortcoming does not allow for a comprehensive examination of how the two interact in affecting investment flows to developing nations. The following is a pilot study examining the feasibility of conducting such research. The assessment of the developed MII takes into account high frequency indicators of macroeconomic instability, whereas the construction of the PRI index makes use of the Principal Component Analysis approach. A Panel ARDL benchmark model allows for further analyses to be conducted. A preliminary analysis using quantitative longitudinal research design and panel data includes five ASEAN economies namely Malaysia, Singapore, Thailand, Vietnam, and Indonesia and spans the period from 2000 to 2024. The data used are taken from the World Bank Development Indicators Database, cross-checked with IMF International Financial Statistics. From the pilot test, it is observed that the data quality is good and there is high consistency across data sources. Diagnostic tests confirm cross-section dependency, necessitating the use of second-generation econometrics in our complete study. Any substantive inference cannot be made out of this pilot exercise, although the methodological aspects need to be considered. Methodologically, the pilot exercise involves identification of a methodology to measure macroeconomic instability, construction

of an index for institutional reforms, and applying Panel ARDL approach to pave way for further studies.

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**Keyword:**

FDI Inflows, Macroeconomic Instability, Policy Reforms, ASEAN, Panel ARDL, Cross-Sectional Dependence, PCA



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## Introduction

Foreign Direct Investment is an important means of promoting the modernization, innovation, entrepreneurship development, and institutional change in developing Southeast Asian nations. It has been viewed as an important element in processes such as industrial upgrading, export diversification, human resource development, and linkages to global production networks processes which are inherently influenced by the policy framework within which foreign multinational firms operate (Adarov & Stehrer, 2021; Mamadiyarov et al., 2026; Martínez-Galán & Fontoura, 2019). Foreign direct investment into the ASEAN nations exceeded USD 224 billion in 2022, indicating the importance of ASEAN nations as an emerging destination for foreign investments. However, intra-ASEAN FDI history shows that foreign investments into the region have been highly cyclic, with significant contractions experienced during the Asian financial crisis (1997-1998), global financial crisis (2008-2009), and the outbreak of COVID-19 (2020-2021). Such examples highlight the susceptibility of the environment for foreign investments in the context of macroeconomic instability and show the significance of strong policy frameworks to insulate foreign investors from economic shocks (Chamorro-Futinico, 2025; Sharma et al., 2025).

There is a clear limitation in current FDI theory that still exists. Studies conducted empirically tend to view macroeconomic volatility and policies undertaken by governments as separate variables that determine foreign direct investment flows. Such an approach leads to a lack of consideration for a basic theoretical principle according to which the impact of reforms aimed at the improvement of institutions on FDI is conditional on the overall macroeconomic situation in the country. Practically, this means that good institutions do not mean good FDI inflows amid macroeconomic instability (Abdulle et al., 2026; Milala et al., 2026). The discussion becomes particularly relevant in the context of ASEAN, a forum where its members vary

widely in terms of development, from the advanced institutional environment of Singapore to the emerging institutions of Vietnam and Indonesia, thus creating an area where the relationship between instability and reforms would likely vary greatly. Another issue relates to the way macroeconomic instability has been measured in prior research. Conventional literature on FDI normally uses low frequency data or annual percentage changes in order to capture the concept of instability. These types of aggregates suffer from the smoothing effect, which does not capture the volatility of prices, fiscal policy, or exchange rate changes that can adversely affect firm decisions at pre-investment stage. Finally, using various indicators of institutional change as independent variables introduces serious multicollinearity problems (Hadipour et al., 2023; Zehra et al., 2021).

This study addresses this research gap using the Panel ARDL approach based on the estimation methods PMG, MG, and DFE, using a panel sample of ten ASEAN economies during the years 1990-2024. Before embarking on the entire analysis, there is a need for a methodological pilot study to examine and confirm the validity of the index construction process, data availability, and the appropriateness of the econometric model specification proposed. This paper presents the findings from the pilot study (Matukhno et al., 2026; Sarwar et al., 2024). Besides being used instrumentally as an approach that helps establish the empirical framework for the primary research, the paper makes a unique contribution to the existing literature on foreign direct investment through developing a Macroeconomic Instability Index (MII), based on variance, and a Policy Reform Index (PRI), using PCA analysis (Batschauer da Cruz et al., 2022; Islam & Beloucif, 2024).

### ***Research Problem and Rationale***

These three intertwined issues provide the basis for our study. First, conventional theories like the Eclectic OLI Paradigm, Transaction Cost Economics, and Institutional Economics assume macroeconomic stability to be a contextual factor and not a time-variant, crisis-conscious determinant of foreign direct investment (FDI) (Dunning, 2001; Hodgson, 1998; Williamson, 1989). Thus, such theoretical models have limited explanatory potential when analyzing FDI flows in turbulent economic times. Secondly, studies focusing on ASEAN FDI flows tend to use cross-sectional and pooled OLS methods, which make the study inappropriate to examine both short- and long-term dynamics in relation to heterogeneous countries across a region (Tun et al., 2026). Thirdly, and perhaps most importantly, no previous research has analyzed the moderating effect of macroeconomic instability on the efficacy of institutional policy changes in promoting FDI in ASEAN indeed, the exact dynamic which is central to this project's inquiry (Jaouadi et al., 2026).

### ***Objective of the Pilot Study***

The objectives in the pilot study include the following four aspects:

- Establish the feasibility of using variance as an operationalization of macroeconomic instability, based on within-year variance calculated annually using monthly data, from a pilot group of five ASEAN countries.
- Determine the construct validity, internal consistency, and sampling adequacy of the Policy Reform Index (PRI) using Principal Component Analysis (PCA) on five institutional quality indicators.

- Conduct initial tests regarding cross-sectional dependence tests and second-generation panel unit root tests (CADF & CIPS) to determine the appropriateness of the use of the Panel ARDL model with PMG estimates.
- Anticipate any data limitations, inconsistencies, or specification problems before undertaking the full study on all ten ASEAN countries.

These objectives serve to determine the feasibility and methodological considerations of the proposed approach before conducting the actual research.

## Literature Review

Considering the focus of the pilot study in methodological validation and feasibility, the review of existing literature is designed to include just those elements from theory and previous studies which can be considered pertinent to the chosen methodology. There are three main areas in consideration, namely: (i) the OLI paradigm and macroeconomic location advantage; (ii) institutional theories and policy changes as stabilizers in FDI; and (iii) Panel ARDL methodology. Explaining the conditional nature of the impact of the macroeconomic environment on the choice of regulation, the project combines the micro-theories of Real Options Theory and Institutional Economics. According to the theory, under circumstances of high macroeconomic instability, the value of options in delaying investment decisions becomes higher, thereby making MNCs reconsider FDI decisions (Bradley, 2021; Li & Rugman, 2007). In contrast, it sets out regulatory systems covering property rights, governance, and contracting, thus significantly lowering transaction and risk costs. In the event of the presence of good institutional characteristics, the threat posed by economic instability is effectively reduced for investors (Qing et al., 2021).

Reform of institutions is not an isolated process but acts as an important moderating variable between macroeconomic instability and foreign direct investment (FDI). A higher PRI indicates credible institutional arrangements, and as such lowers the option value of delaying capital investment expenditures, reducing the negative impact of macroeconomic instability, as measured by the Macro Instability Index (MII). As the theoretical framework shows, the two variables are not isolated from each other; rather, they complement each other and act as reinforcing policies (Petro et al., 2025; Thapa et al., 2025).

### *The OLI Paradigm, Macroeconomic Instability, and FDI Location Choice*

According to the Ownership, Location, Internalization (OLI) approach of Dunning, macroeconomic stability becomes an essential factor that influences the location-based decision-making for foreign direct investments (FDIs) made by multinational corporations (MNEs). Any macroeconomic instability, as exemplified by volatility in such macroeconomic parameters as inflation, exchange rate, interest rate, GDP growth, and budget balance, negatively impacts these factors by increasing investment risks, reducing the rate of expected returns on investment, and limiting planning capabilities for MNEs. Microeconomic explanation behind this issue can be found in real options theory, according to which the value of the option for deferring irreversible investments becomes greater in times of uncertainty and instability. As far as Southeast Asian countries are concerned, ranging from high macroeconomic stability in Singapore to relative instability in Myanmar and Vietnam, there is

an urgent need to conduct panel data analysis (Dixit & Pindyck, 1994; Dunning, 2001; Nazzal et al., 2026).

### ***Institutional Theories and Policy Reforms as FDI Stabilising Mechanisms of FDI***

Institutional architecture refers to the regulatory regime, property rights, governing mechanisms, and enforcement systems that define the cost-of-transactions environment for MNEs. Improvement in institutional quality will decrease regulation risks, lower compliance costs, increase contract enforceability, and increase investor confidence. The business and managerial literature considers the policy reform environment to be essential: business climate, regulation quality, and economic freedom provide the institutional foundation necessary for conducting business activities either by domestic firms or foreign investors. It is argued that policy reforms not only act as separate variables attracting foreign direct investments but also moderate the negative effect of macroeconomic instability on foreign investment flows. The moderation effect is at the heart of the interaction effect discussed in my PhD dissertation where institutional quality is considered a conditional moderator of the effect of macroeconomic instability on FDI (North, 1990; Rashid et al., 2025; Uguru et al., 2025).

### ***Panel ARDL Model Application to ASEAN FDI Studies***

Panel ARDL estimation is carried out using the Pooled Mean Group (PMG) estimator, which allows for joint estimation of heterogeneous short-run dynamics and homogeneous long-run equilibrium relationship for cross-sectional units. This method is especially applicable in the estimation of FDI in ASEAN, because regional integration creates a situation where the determinant of FDI converges over the long run, while heterogeneity in country-specific institutions creates heterogeneous adjustment paths over the short run. One major drawback of the traditional Panel ARDL method is the cross-sectional independence condition, which is not satisfied in highly integrated regions like ASEAN, due to the existence of cross-country correlations from economic linkages among countries. The Cross-sectionally Augmented ARDL (CS-ARDL) method handles this problem by providing efficient estimators when there exists cross-sectional dependence. From empirical evidence, we see a blend of heterogeneity over the short run and cointegration over the long run for ASEAN-5, which supports Panel ARDL estimation (Algoni & Ivrendi, 2026; Hidthiir et al., 2024; Pesaran et al., 1999).

**Table 1: Summary of Previous Studies and Research Gap Underpinning the Proposed Interactive Framework**

<b>Author(s) &amp; Year</b>	<b>Core Focus Area</b>	<b>Econometric Method</b>	<b>Key Contribution to Interactive Framework</b>
Asamoah et al. (2016)	Macro uncertainty & institutional interaction	Two-Step System GMM	Interactive Effect: The present section proves that macroeconomic volatility limits the flow of capital, but strong institution quality helps to counteract such an obstacle.

Pesaran et al. (1999)	Heterogeneous dynamic panel framework	PMG Panel ARDL Estimator	Basic Econometric Model: This part presents the fundamental econometric framework in which individual country short-term deviations are taken into consideration together with the pooled long-term equilibrium equation.
Chudik & Pesaran (2015)	High-integration panel dynamics	Cross-Sectionally Augmented ARDL (CS-ARDL)	Cross-Country Correction: This section introduces the solution for removing cross-country correlations and systemic shocks prevalent among regional trade blocs.
Hossain et al. (2024)	Monetary volatility & FDI risk barriers	Long-term Panel Data Analysis	Macro-Risk Structure: This aspect verifies that exchange rate volatility and inflation serve as structural barriers to the inflow of foreign capital in ASEAN networks.
Saha et al. (2022)	Institutional quality & governance thresholds	Dynamic Panel using WGI metrics	Institutional Reforms Component: Regulatory Quality is determined as the main determinant of corporate confidence of foreign firms in lower-middle income countries.
Hidhiir et al. (2024)	Regional growth modelling & integration	Panel ARDL with PMG	Regional Appropriateness: The findings have shown that the macroeconomic structures of ASEAN-5 countries exhibit the necessary degree of heterogeneity and cointegration for effective application of ARDL.

Sources: This author synthesizes the findings of past empirical literature on determinants of FDI, macroeconomic instability, and institutional reforms.

## Methodology

This chapter will define the methodology used in carrying out the pilot study including the research design, selection of samples, sources of data, composite index creation and the validity and reliability test framework among others. All the methodologies used in carrying out the pilot study have been borrowed from those in the PhD study design (Almusaed et al., 2025).

### ***Research Design and Analytical Blueprint***

The selection of Panel ARDL estimators as the preferred estimation technique in this research is based on the following advantages of this approach: i) ability to incorporate heterogeneity in integrated orders (I(0) and I(1)) panels; ii) simultaneous estimation of short-run and long-run parameters for heterogeneous and homogeneous panels, respectively; and iii) superior efficiency over static estimators in analyzing FDI dynamics across different ASEAN countries. It is important to maintain a clear demarcation line between the pilot stage of this research project and the future full-scale study. This paper is essentially diagnostic and preparatory in its character: no results of the empirical analysis or testing of the hypotheses are presented here (Bond et al., 2023; Joo & Shawl, 2023). Its objective is to systematically test data validity between countries, validate constructs for two new composite variables, estimate the baseline Panel ARDL model using a subset of five representative countries (N=5, T=25), and highlight any research methodology problems before moving forward with analysis of all ten ASEAN countries. The purpose of presenting any initial estimates included below is merely to illustrate the functionality of the model and is not intended to make substantive findings.

### ***Operational Innovation of the Macroeconomic Instability Index (MII)***

MII is different from other indicators because it uses variance in a month during the year, while other indicators use averages for macroeconomic volatility for each year when studying Foreign Direct Investment (FDI) (Liew et al., 2018). These procedures create an aggregation bias, thereby evening out sharp intra-year variability in terms of prices, exchange rates, and fiscal variables that affect the firm's planning and financing cycles before making any investments. The decision to invest at the beginning of the year is based on a full intra-year variability of the macroeconomic environment, instead of using the yearly average which would have been possible to compute only ex-post. To account for this problem, the instability component of the MII is calculated using high-frequency intra-year monthly variations. More formally, the measure of instability of macroeconomic variable  $X$  in country  $i$  in year  $t$  is:

$$MII_{it} = \frac{1}{n-1} \sum_{m=1}^n (X_{imt} - \bar{X}_{it})^2$$

Define  $X_{imt}$  as the value of macroeconomic variable  $X$  for  $i$  country in  $m$  as the month of year  $t$ , while  $\bar{X}_{it}$  is the average value of the macroeconomic variable for the  $i$  country during year in  $t$  using monthly data where  $n=12$  is the total number of monthly observations. This variance measure is calculated using six macroeconomic variables, including inflation, exchange rate volatility, output growth, interest rate, open trade policy, and fiscal balances, to reflect the macroeconomic instability experienced in any particular year within a country. The variance values are scaled using z-score. The procedure for transforming scores is used in order to make comparison possible among the various measures used, among different nations, and over time periods. A Composite Macroeconomic Instability Index (MII) will then be calculated.

### ***Resolution of Multicollinearity via Principal Component Analysis (PCA)***

The second methodological breakthrough is related to the creation of the Policy Reform Index (PRI). Using institutions as independent variables in a panel regression model causes severe multicollinearity due to high theoretical and empirical interrelationships between such

variables as regulatory quality, governance, doing business, economic freedom, and trade openness (Gwelo, 2019; Khalikchaeva et al., 2026). This increases standard errors, provides unstable coefficient estimates, and undermines statistical inference. Thus, previous research which uses these indicators independently is faced with a problem of structural estimation that has never been satisfactorily solved by ASEAN FDI research. In order to resolve this problem, principal component analysis (PCA) is applied to reduce the dimensionality of the five highly correlated indicators into linearly independent combinations. The first principal component (PC1) used, as the proxy for structural PRI, is selected based on the Kaiser's criteria where PC1 must have an eigenvalue greater than 1.0 and must explain more than 50 percent of the total variance. **Pilot Sample and Data Sources**

### *Selection of Countries and Representativeness*

Five ASEAN countries are selected to cover the complete range of diversity from a development, institutions, and structure perspective in the group of ten countries that form the panel used in the primary analysis: Malaysia, Singapore, Thailand, Vietnam, and Indonesia. The selection process includes: (i) one country that is highly advanced with strong institutions and an open economy (Singapore); (ii) two upper middle-income countries that have undergone industrialisation and have had different experience with FDI (Malaysia and Thailand); (iii) one fast-growing lower middle-income country with recent FDI potential (Vietnam); and (iv) the largest economy in the region with considerable diversity from an institution and structure perspective (Indonesia).

### *Pilot Observation Span*

The pilot period is from 2000 to 2024 (annually;  $T = 25$  per country;  $\max N \times T = 125$  periods). The pilot acts as a sub-period within the entire study's 1990 to 2024 timeline. The pilot period includes the two major global economic crises, i.e., the Global Financial Crisis of 2008 and the COVID pandemic of 2020, while ensuring proper time series coverage for the World Bank Governance Indicators to construct the PRI variables.

### *Data Sources and Quality Assurance*

For all pilot datasets, we use exclusively the data from the World Bank Development Indicators (WDI, 2025), which represents the most reliable set of international standards-based economic and institutional indicators that are appropriate for empirical cross-country studies. With the help of this single-source dataset, we ensure consistency of definitions of all indicators measured for all countries and all years of our sample (25 years). To check data quality, we cross-validate several variables from the dataset, namely foreign direct investment net inflows as a proportion of GDP, inflation rates based on consumer price index, and official exchange rates against the data provided by the IMF International Financial Statistics (IMF, 2024). The mean discrepancies were less than 3.2%, which is lower than the accepted value of 5%. To fill gaps in interest rate data for Vietnam and Indonesia before 2005, we applied linear interpolation, flagging all imputed values for the subsequent analysis.

**Table 2: Variable Definitions, Measurement Procedures, And Data Sources for The Pilot Study**

Category	Variable	Code	Measurement / Definition	Unit	Source
Dependent Variable	FDI Inflows	FDI	Net inflows of FDI as percentage of GDP	% of GDP	WDI (2025)
Macroeconomic Instability (MII)	Inflation Rate	INF	Annual CPI inflation rate; within-year variance from monthly data	Variance index	WDI (2025)
	Exchange Rate Volatility	EXR	Annual % change in official exchange rate; within-year variance from monthly series	Variance index	WDI (2025)
	GDP Growth Variance	GDP	Annual GDP growth rate variance — captures output volatility	Variance index	WDI (2025)
	Interest Rate	IR	Lending interest rate (%); within-year variance from monthly data	Variance index	WDI (2025)
	Trade Openness	TOP	(Exports + Imports)/GDP; annual variance to capture trade policy instability	Variance index	WDI (2025)
	Fiscal Deficit/Debt	FD	Central government debt as % of GDP; variance index computed	Variance index	WDI (2025)
Policy Reform Index (PRI — PCA)	Regulatory Quality	RQ	WB Governance Indicator: capacity to formulate sound private sector regulations	Index score	WDI (2025)
	Government Effectiveness	GE	WB Governance Indicator: quality of public services and policy credibility	Index score	WDI (2025)

	Ease of Doing Business	EODB	WB EODB ranking (2000-2020); B-READY post-2020	Index score	WDI (2025)
	Economic Freedom	EF	Heritage Foundation Economic Freedom Index (via WDI)	Index score	WDI (2025)
	Trade Liberalisation	TL	Tariff rate, applied, weighted mean, all products (%) — inverse	% inverse	WDI (2025)
Control Variables	Infrastructure	ID	Fixed telephone + internet subscriptions per 100 persons (composite)	Per 100 persons	WDI (2025)
	Human Capital	HC	Secondary school enrolment rate / Human Capital Index	% / Index	WDI (2025)

Sources: The author just prepared the information based on data gathered from World Bank Development Indicators (WDI), IMF, and relevant literature on the subject matter.

In order to measure the soundness of the research framework, a set of criteria were developed based on well-known measures from multivariate analysis and panel econometrics (Karabiyik et al., 2019). Since the main purpose of conducting a pilot study at this point is to examine whether research can be conducted or not and the methodological soundness, these criteria will serve as yardsticks against which data quality, construct validity, index measurement, and econometric fitness will be measured. These criteria are detailed in Table 3 below.

**Table 3: Validity and Reliability Assessment Framework**

Assessment Dimension	Assessment Procedure	Acceptance Criterion
Construct Validity (PCA)	Kaiser-Meyer-Olkin (KMO) test for sampling adequacy; Bartlett's test of sphericity	KMO $\geq$ 0.60; Bartlett's $p < 0.05$
Internal Consistency (PCA)	Factor loading values and the percentage variance explained by the first principal component.	All loadings $> 0.40$ ; PC1 explains $\geq 50\%$ of variance
Content Validity (MII)	Logical compatibility of variance-based indicators and definitions of macroeconomic instability in FDI literature.	All six dimensions supported by peer-reviewed FDI literature

Data Reliability	Verification of World Bank Development Indicators (WDI) data using International Monetary Fund International Financial Statistics (IFS).	Discrepancies < 5% for primary variables
Econometric Validity	Cross-sectional dependence test (CD); second generation unit root tests (CADF, CIPS); Hausman test.	Appropriate estimator confirmed based on diagnostic test outcomes

Sources: Adapted from recognized principles of multivariate statistics, principal components analysis, and panel econometrics.

As illustrated in Table 3 below, the following criteria set out the foundation of the assessment of the viability of adopting this framework and the econometric techniques for the actual research project. In the coming sections, these criteria will be used to evaluate the viability of the construction of the indices and also adequacy of the econometric approach adopted (Mazziotta & Pareto, 2024).

## Diagnostic Tests and Estimation Methodology

### *Cross-Sectional Dependence Test*

With ASEAN's high level of integration in terms of trade, financial, and investments, together with the common vulnerability to macroeconomic disturbances globally, cross-sectional dependence is expected from panel residuals a priori. The Pesaran (2004) CD test will be used under the assumption of cross-sectional independence:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\rho}_{ij}$$

where  $\hat{\rho}_{ij}$  is the calculated pairwise correlation coefficient of the residuals of cross-sectional entities  $i$  and  $j$ . The rejection of null hypothesis of cross-sectional independence at 5 percent significance level suggests the existence of cross-sectional dependence, which makes it imperative to apply second generation panel unit root tests like CADF and CIPS test.

### *Panel Unit Root Testing: Second-Generation Approach*

If there is a presence of cross-sectional dependence (CSD) after its verification through the test, the level of integration among all series is determined through the CADF and CIPS tests, respectively, proposed by Pesaran (2007). As compared to the first-generation tests, such as LLC and IPS, the second-generation approach uses cross-sectional average of lagged variables and first difference within the test equation to reduce any effect of common factors leading to cross-sectional dependence.

### *Pilot Panel ARDL (Pilot PMG) Estimation*

The estimation of a reduced-form panel ARDL model was done based on the pilot data with the aim of assessing the operability of the baseline model. This involves the issues of (i) convergence in the estimation process, (ii) the correct sign of the error correction mechanism,

and (iii) theoretical soundness in the sign of coefficients derived (Islam, 2026). It must be noted that the results obtained during this process are not considered substantive empirical results but are just for checking the hypothesis testing issues for the main study. The Hausman specification test was used in deciding among PMG, MG, and DFE models. The pilot baseline model is:

Assume that  $FDI_{it}$  it represents the ratio of net foreign direct investment inflows to GDP,  $MII_{it}$  represents the composite index for macroeconomic instability,  $PRI_{it}$  is the Policy Reform Index obtained through PCA analysis,  $CV_{it}$  it refers to the vector for control variables (i.e., infrastructure and human capital), and finally,  $\varepsilon_{it}$  denotes the residual error term. The presence of a negative and statistically significant coefficient on the Error Correction Term (ETC) between the limits  $-1 < ETC < 0$  suggests the existence of a cointegration relationship and, hence, validity of the suggested model specification.

### ***Pilot Study Results and Feasibility***

Preliminary results are arranged according to four feasibility factors – availability and quality of data, MII validity, PRI validity, and the ability of econometrics diagnostics. Preliminary findings should be interpreted as indicators of feasibility for the main research project rather than actual findings about interconnection between foreign investment, instability, and reforms (Khanal & Chhetri, 2024).

### ***Objective Evaluation of Data Integrity***

Upon examining the 13 variables from the five-country panel, an average data completeness of 94.3% can be derived from the period of 2000 to 2024, highlighting the extensive data coverage of the chosen ASEAN nations. The slight missing data observed in the interest rate variable for Vietnam and Indonesia before 2005 were solved using linear interpolation, which is discussed in the Methodology portion. Results of cross-referencing with the IMF International Financial Statistics (IMF, 2024) revealed inconsistencies lower than 3.2%, affirming the suitability of the WDI as the main data source for the suggested study (WDI, 2025).

However, the MII based on the variance was found to have plausible time trends that can be attributed to significant regional or global economic shocks, such as the Global Financial Crisis (2008–2009) and the COVID-19 shock (2020). The index showed greater fluctuations in exchange rates in Indonesia during times of currency shock within the region and high levels of inflation volatility in Vietnam from 2007 to 2012. In other words, these results provide initial indications of the measurement's face validity and suggest that the index can indeed pick up on important fluctuations in macroeconomic indicators. Nonetheless, the above should be considered more an indication of methodological plausibility than any substantial findings (Fen & Undavia, 2022).

In order to measure the validity and feasibility of the new Policy Reform Index (PRI) as suggested, five indicators were chosen based on the theoretical literature associating institutional strength with foreign direct investment attractiveness. In order to avoid multicollinearity, a principal component analysis (PCA) was applied (Bhujabal et al., 2024). The indicators selected for inclusion in the composite index as well as the criteria of acceptability are shown in Table 4 below.

**Table 4: Construct Validation of the Policy Reform Index (PRI)**

<b>Policy Reform Indicator</b>	<b>Theoretical Rationale</b>	<b>Acceptance Criterion</b>
Regulatory Quality (RQ)	It indicates the ability of the government to develop an effective regulatory framework that encourages business activities and investments.	Factor loading > 0.40
Government Effectiveness (GE)	Evaluates the quality of government-provided public services, effectiveness of government policies, and efficiency of government administration in terms of their effect on investors' confidence.	Factor loading > 0.40
Ease of Doing Business (EODB) / B-READY	Measures the efficiency of regulations and conditions under which businesses enter the market and impact foreign investments.	Factor loading > 0.40
Economic Freedom (EF)	Symbolizes open markets, respect for property rights, and economic flexibility.	Factor loading > 0.40
Trade Liberalisation (TL)	Shows openness towards international business and involvement in the world economy.	Factor loading > 0.40

Sources: The author has formulated the following based on the methodology of PCA and standards for construct validation.

#### **Overall PCA Acceptance Criteria**

<b>Assessment Measure</b>	<b>Criterion</b>
Eigenvalue of PC1	> 1.0
Variance Explained by PC1	≥ 50%
KMO Measure	≥ 0.60
Bartlett's Test of Sphericity	$p < 0.05$
PRI Retention Decision	PRI retained when all criteria are satisfied

A preliminary PCA was performed in order to test the viability and construct validity of the constructed Policy Reform Index (PRI). It can be seen from the results obtained that there is sufficient sampling adequacy and a high degree of statistically significant inter-correlations among the chosen institutional measures, which confirms the appropriateness of applying PCA for constructing an index. A substantial share of the common variance is accounted for by the first component, with all variables being positively loaded, which coincides with the expectation based on the underlying theory – the fact that all these indicators describe a single factor of institutional reform. However, this is preliminary evidence, as the validation will be continued in the ten countries ASEAN panel study (Akardeniz & Özocaklı, 2025; Mazziotta & Pareto, 2024).

### Econometric Diagnostics

When applying the cross-section dependence test by Pesaran (2004), the result was found to be highly significant at the level of  $p < 0.001$ . This implies that there is presence of cross-section dependence which will have implications on estimation procedures. Specifically, the use of first-generation panel data estimation techniques such as LLC, IPS and ordinary ARDL models will not be consistent when using this data. The study will therefore utilize second generation econometrics procedures such as CADF/CIPS and CS-ARDL methods.

The initial estimates of PMG resulted in the appearance of an error correction term with the correct signs and directions of influence expected according to the theory, thus providing some indication of the presence of a long-term equilibrium relationship between the variables under consideration. The detected pattern of preliminary coefficients, combined with the instability measures showing negative influence of FDI and positive influence of PRI, is consistent with the theoretical considerations. This analysis should be regarded as only a proof of model workability and specifications only (Renuse, 2024).

It is one of the objectives of a pilot study to identify any potential methodological problems that may have an impact on the validity and reliability of the full-scale study that will follow. Other than assessing the availability of data and performance of initial models, the pilot study provides an opportunity to improve upon measurement methods, estimation strategies, and operationalisation of variables (Matimbwa & Ringo, 2025). Five problems identified from the pilot study need to be addressed before conducting the full panel study involving 10 ASEAN countries. The problems and proposed adjustments to be made are outlined in Table 5.

**Table 5: Methodological Lessons and Refinements for the Full-Scale Study**

No.	Methodological Issue Identified	Planned Refinement for Full Study	Expected Benefit
1.	Missing values in chosen macroeconomic variables	Utilize other measures of volatility and undertake sensitivity analysis where required	Improvements in data integrity and reliability

2.	Cessation of the Ease of Doing Business (EODB) index after 2020	Include B-READY index in addition to governance indicators	Better institutional reform measurement continuity
3.	Cross-section dependence is present	CS-ARDL model and panel unit root tests (CADF/CIPS) are used	Higher accuracy of estimation when regional integration effects are present
4.	Differences in lag selection methods	Schwarz Bayesian Criterion (SBC) is adopted as the main criterion for lag selection	Lower likelihood of over-parametrization of models
5.	Human capital data inconsistency	The Human Capital Index (HCI) together with education indices are utilized	Higher cross-country comparability

Source: Author's initial estimates based on analysis and diagnostic tests using World Bank Development Indicators (WDI) and IMF data.

The improvements highlighted in Table 5 above point towards the significance of pilot research beyond testing for feasibility. Instead of indicating problems with research methodology, these modifications are likely to contribute to the methodological soundness of the proposed research. In particular, the application of second-generation panels, the improvement of methods for measuring reforms, and data-handling procedures can contribute to increased validity of empirical results derived from such studies. Overall, all these improvements add to the arguments showing that the research methodology is well developed to investigate the interrelations between economic instability, policy reforms, and FDI flows among ASEAN countries (Khan et al., 2025).

### **Discussion: Implications for Theory, Policy, and Entrepreneurial Management Practice**

In general, the findings from the pilot study confirm the viability of the suggested comprehensive study. The four parameters considered in the pilot study include data adequacy and reliability, validity test of the index constructed, cross-sectional dependence test, and estimation using econometrics (Matimbwa & Ringo, 2025).

### **Theoretical Implications**

The pilot results provide initial theoretical support for reinterpreting the connection between macroeconomic instability and institutional reforms as one of conditioning and interaction rather than as independent and additive factors driving FDI flows. More specifically, the pilot findings suggest that the traditional OLI model's conception of macroeconomic and institutional factors as separate location-specific advantages does not provide sufficient theoretical foundations to explain FDI behavior in complex and diverse emerging markets contexts. In light of the pilot results, an alternative framework that would incorporate the principles of Real Options Theory and Institutional Economics and consider institutional reform as a conditional modifier of the instability-FDI link, rather than an independent attractor,

should be employed. Another theoretical implication lies in the methodological domain. Pilot research provides empirical evidence of face validity of the concept of within-year variation of macroeconomic variables as an alternative operational measure of macroeconomic instability for FDI analysis, thereby mitigating issues of measurement bias associated with annualized measures of the latter variable (Ayinde et al., 2024; Nauman et al., 2024; North, 1990).

### ***Policy and Entrepreneurship Management Implications***

The policy implication from the analysis is that the effectiveness of the institutional reforms in the attraction of foreign direct investments (FDIs) is not an absolute one but conditional upon the existing state of the macroeconomic conditions. Macro and fiscal policies, which include monetary policies and exchange rate policies, act as complements to the institutional reform agenda and not as objectives that need to be achieved prior to the process of reform stabilization. The policy implication for decision-makers is that the integration of macroeconomic policies with reform strategies may produce better results regarding FDIs compared to the strategies that give priority to stability prior to reform. Examples of countries that have been able to attract high-quality FDIs through this complementation process are Singapore, Malaysia, and Vietnam. These countries have done so even when the rest of the world was exposed to high macroeconomic risks due to their integration of institutional and macroeconomic aspects (Saha et al., 2022; Trung, 2024).

In the context of IJEMP, yet another important practical implication needs to be highlighted: composite indices of institutional reforms such as those generated by this research provide practical, quantifiable indications for multinational corporations (MNEs) considering the policy settings of potential foreign investment locations; such composite indices are superior to any single governance indicator when it comes to country risk analysis.

### ***Shortcomings of the Pilot Study***

A number of drawbacks to the pilot study must also be mentioned. First of all, although the subsample was carefully chosen, it does not represent well enough the diversity of developments and institutions among all ten member states of ASEAN. This applies especially to the less developed countries of Laos PDR, Cambodia, Myanmar, and Brunei. Secondly, preliminary PMG regressions used too simple specification, which did not include any interaction terms. Consequently, these results cannot be used as proof of causality (Akinlo & Olayiwola, 2021). The third limitation arises from applying PCA to yearly cross-country data, thus ignoring within-country variation over time on different reforms (Kurita, 2021). These limitations are systematically taken care of by the following five modifications, presented in Table 5.

### **Conclusion and Research Roadmap for the Main Study**

Pilot research results provide sufficient evidence on the feasibility, initial validity, and methodological preparedness of the proposed full-scale study, thus laying the groundwork for proceeding to a detailed investigation into conditional interactive influences of macroeconomic instability and policy reforms on FDI flows for ten ASEAN countries for the period 1990-2024 (Kharisma et al., 2025). Firstly, variance-based Macroeconomic Instability Index shows good face validity in that it is based on actual economic shocks and offers more detail in comparison to traditional yearly indicators, thus making it useful as a proxy for corporate risk in the main

study. Secondly, Policy Reform Index calculated using principal components analysis indicates good construct validity and consistency in terms of the pilot data sample; composite measure of institutional changes is expected to help address multicollinearity issues in dynamic panel regressions further on. Lastly, presence of cross-sectional dependence among the variables in pilot data set justifies the need to use the next-generation techniques, namely CS-ARDL estimation model supplemented with CADF/CIPS tests for unit roots, as the main tool in the full-scale study.

The future research plan consists of the execution of the full-fledged ten-country 35-year panel ARDL model, which includes explicitly the interaction effect  $MII \times PRI$  to test the conditional moderation effect. Also, the use of all five structural changes as stated in Table 5 is included in this research plan. The pilot study successfully performed the initial task of building the empirical framework that was necessary for an effective research study on how the institutional reforms moderate the impact of macroeconomic instability on FDI in the heterogeneous ASEAN countries (Raza & Ramzan, 2025).

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