# Analyzing the impact of Unemployment on FDI Using the OLS model in Stata

## 1.1 Data description and Variables

The research used panel data to examine how Unemployment influenced FDI across Latin America and the Caribbean from 1990 to 2023 in 22 different nations. The study incorporates Trade, Interest rate, Wages, Education, Inflation, and Population as control variables. The World Bank's World Development Indicators (WDI), UNCTADStat, IMF World Economic Outlook (WEO), International Labour Organization Statistics (ILOSTAT), and IMF Coordinated Direct Investment Survey (CDIS) serve as the primary data source for this study. Missing data values were handled through the implementation of the linear interpolation technique as well as using forward fill and back fill techniques.

The Latin America and the Caribbean (LAC) region consists of 33 sovereign independent countries. Subregions emerge from the division of these areas according to geographical boundaries and common cultural or linguistic traits. Latin America is divided between: The South American subregion contains 12 nations (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela) while Central America comprises 7 countries (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama, Mexico). There are 13 countries in the Caribbean region which include Antigua and Barbuda, The Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint

Vincent and the Grenadines, Trinidad and Tobago. The countries belong to the United Nations (UN), International Monetary Fund (IMF), World Trade Organization (WTO) and World Bank Group. Our study only focused on the following countries: The study examined panel data from 22 countries across Latin America and the Caribbean namely Argentina, Bolivia, Brazil, Chile, Colombia, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela, Belize, Costa-Rica, Guatemala, Honduras, Nicaragua, Panama, The-Bahamas, Dominican-Republic, Haiti, Jamaica, Mexico. Due to data availability, the following countries were dropped from the sample: Antigua and Barbuda, Barbados, Cuba, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, El Salvador, Trinidad and Tobago, Ecuador. Therefore, the study analyzed panel data from a total of 22 Latin American and Caribbean countries spanning from 1990 to 2023.

## 1.2 Descriptive Statistics

Descriptive statistics for all variables appear in Table 5.1 Based on this table, there are 748 observations for each and every variable.

**Table 1.1 Descriptive Statistics**

**Descriptive Statistics**

| Variable | | Mean | Std. dev | Min | Max | Obs |
|---|---|---|---|---|---|---|
| FDI | overall | 2.60430 | 0.17248 | 2.34840 | 2.94809 | 748 |
| | between | | 0.10795 | 2.38956 | 2.78275 | |
| | within | | 0.13642 | 2.87097 | 3.59591 | |
| Trade | overall | 4.17183 | 0.47113 | 3.30186 | 5.06888 | 748 |
| | between | | 0.45007 | 3.35342 | 5.06588 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | within | | 0.16838 | 3.45779 | 4.64890 | |
| Unempl | overall | 2.07977 | 0.40940 | 1.29855 | 2.74451 | 748 |
| | between | | 0.36159 | 1.33481 | 2.56975 | |
| | within | | 0.20649 | 1.56485 | 2.87471 | |
| Wages | overall | 59.91852 | 14.54914 | 23.37960 | 86.60434 | 748 |
| | between | | 14.63382 | 24.31731 | 84.61332 | |
| | within | | 2.64374 | 50.79984 | 69.63275 | |
| Intr r | overall | 8.08041 | 12.06746 | -16.53998 | 35.53009 | 748 |
| | between | | 8.92156 | -7.32401 | 32.60762 | |
| | within | | 8.33940 | -25.90141 | 42.52626 | |
| Infl | overall | 3.65437 | 0.28371 | 3.34167 | 4.39571 | 748 |
| | between | | 0.16178 | 3.40756 | 4.09863 | |
| | within | | 0.23553 | 3.08730 | 4.60606 | |
| Pop | overall | 62.33505 | 4.15137 | 53.86251 | 68.96037 | 748 |
| | between | | 2.93759 | 56.60707 | 67.02746 | |
| | within | | 2.99761 | 55.18008 | 70.85172 | |
| Edu | overall | 3.45679 | 0.46422 | 2.45980 | 4.19389 | 748 |
| | between | | 0.42335 | 2.49155 | 4.19389 | |
| | within | | 0.21023 | 3.05582 | 4.27391 | |

Source:  Author's calculation

The review of 748 observations spanning 22 countries throughout 33 years illustrates pronounced economic diversity across these nations. The mean value of Foreign Direct Investment (FDI) remains stable at 2.60 with a standard deviation of 0.17 while its variation among countries sits at 0.11 which is less than the within-country variation of 0.14. The measure of trade openness shows broader variability across its mean value of 4.17 with standard deviation of 0.47 while between-country differences with standard deviation of 0.45 drive most of the variation. The unemployment rates show an average of 2.08 and moderate variability overall (SD = 0.41) which demonstrates greater cross-country heterogeneity (SD = 0.36) compared to temporal variation within individual countries (SD = 0.21). Wage levels show the greatest variation (mean = 59.92, SD = 14.55) because large between-country differences (SD = 14.63) outweigh within-country changes (SD = 2.64). Interest rates display extreme variability (mean = 8.08, SD = 12.07) which includes significant fluctuations between different countries (SD = 8.92) and within the same country (SD = 8.34) but also reaches negative values during certain periods. The data reveals that FDI patterns remain stable while wages and interest rates display significant cross-country differences which underline the need to consider country-level heterogeneity in future analyses. Most variables demonstrate substantial within-country variation which validates the application of panel data techniques to leverage both cross-sectional and temporal differences. Inflation displays moderate variation with a mean value of 3.65 (SD = 0.28) and indicates greater price level changes within countries (SD = 0.24) than between different countries (SD = 0.16), which implies temporal factors have a stronger impact on price changes than structural differences between nations. Population levels show extensive variation (mean = 62.34, SD = 4.15), with between-country (SD = 2.94) and within-country (SD = 3.00) variability nearly identical which suggests that permanent demographic differences between nations together with temporal population changes within countries both have significant impacts on population dispersion. Between-country educational inequality (SD = 0.42) significantly exceeds within-country differences (SD = 0.21) when comparing education levels (mean = 3.46, SD = 0.46), which demonstrates enduring cross-national educational disparities that evolve slowly within individual countries. The range of education levels from 2.46 to 4.19 shows significant variations in human capital development between countries.

## 1.3 Correlation Coefficient

We applied Pearson's correlation analysis to discover relationships between study variables while pinpointing possible multicollinearity problems. Multicollinearity happens when independent variables demonstrate high correlation among themselves. This can distort regression results. The correlation matrix reveals how key economic variables in the dataset interact with one another. Correlation values range from -1 to 1.

**Table 1.2 Correlation Matrix (748 obs)**

**Matrix of correlations**

| Variables | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| (1) fdi | 1.00000 | | | | | | | |
| (2)unempl | -0.00493 | 1.00000 | | | | | | |
| (3) trade | 0.37432 | -0.04712 | 1.00000 | | | | | |
| (4) wages | 0.17966 | 0.30928 | 0.22012 | 1.00000 | | | | |
| (5) interest_rate | 0.10137 | -0.10258 | -0.11323 | -0.15549 | 1.00000 | | | |
| (6) inflation | -0.39974 | 0.06915 | -0.24153 | -0.00252 | -0.33500 | 1.00000 | | |
| (7) population | 0.23603 | 0.31360 | -0.05708 | 0.49266 | -0.06632 | -0.22282 | 1.00000 | |
| (8) education | 0.28474 | 0.07977 | 0.02043 | 0.38964 | 0.02232 | -0.20707 | 0.67971 | 1.00000 |

Source: Author’s calculation

The correlation matrix uncovers multiple significant associations between the macroeconomic variables. The analysis of foreign direct investment (FDI) demonstrates moderate positive connections with both trade openness (0.374) and wages (0.180) which means more trade activity and higher wages make countries more attractive for FDI. The unemployment rate demonstrates a slight inverse association with trade volumes (-0.047) and a marginally higher inverse link with interest rates (-0.103) which suggests that boosting trade and reducing interest rates might lead to small decreases in unemployment. The most significant correlation exists between population size and education levels (0.680), which shows that countries with larger populations tend to have more educated workforces due to increased investments in human capital. The substantial negative correlation between inflation and FDI (-0.400) and trade (-0.242) suggests that maintaining price stability can enhance foreign investment and trade activity. The positive relationship between wages and unemployment as well as population indicates that higher wages are often found alongside structural unemployment and larger labor force sizes within the labor market. The low correlation values for most variables (absolute values below 0.4) indicate minimal multicollinearity issues for regression analysis but require careful consideration of the population-education relationship to prevent overstatement of independent effects. The documented patterns suggest initial connections between economic factors and demonstrate the necessity for causation studies using multivariate regression methods.

## 1.4 Panel Unit root

Before performing Pooled OLS Regression or Fixed Effects Regression and Random Effects Regression researchers must conduct unit root tests like the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) to verify the reliability of the estimated relationships. The regression methods require variables to be stationary which means their statistical characteristics remain constant through time. Including non-stationary variables in a regression analysis can produce spurious results which misrepresent the actual connections between Economic growth, trade and unemployment. Application of the ADF and PP tests enables researchers to identify whether their variables are integrated at order zero [I(0)] or order one [I(1)] which dictates the correct econometric methods to employ. When variables demonstrate non-stationarity at their initial levels, differencing becomes necessary to attain stationarity. Researchers must establish stationarity before continuing with panel cointegration analysis and post-estimation diagnostics. Unit root testing represents an essential procedure to guarantee that panel regression analysis produces trustworthy and valuable outcomes.

**Table 5.3 Results of Panel Unit Root Test**

| Variable | P- value | First differencing |
|---|---|---|
| FDI | 0.0000 | 0.0000 |
| trade | 0.0145 | 0.0145 |
| wages | 0.7228 | 0.0000 |

| | | |
|---|---|---|
| Interest rate | 0.0000 | 0.0000 |
| inflation | 0.0000 | 0.0000 |
| population | 0.0000 | 0.0000 |
| education | 0.0392 | 0.0392 |
| unemployment | 0.0011 | 0.0011 |

Source: Author’s calculation

The findings from the Panel Unit Root Test appear in Table 5.3. The dataset variables show stationarity except for wages because the null hypothesis remained unrefuted with a p-value of 0.7228 Stationarity was attained for the wages variable after the initial Differencing procedure was implemented. The process of first differencing results in 22 missing values which aligns with expectations since one observation per country becomes unavailable during differencing. Stata's regressions function by automatically excluding missing values thereby removing the need for manual deletion. The unit root null hypothesis is rejected for trade (p = 0.0145), interest rate (p = 0.0000), FDI (p = 0.0000), inflation (p = 0.0000), population (p = 0.0000), education (p = 0.0392), and unemployment (p = 0.0011), which confirms stationarity at level I(0) for these variables.

## 1.5 Static OLS regression Results

### 1.5.1 Pooled OLS Regression

Pooled Ordinary Least Squares (Pooled OLS) regression is a fundamental panel data estimation method that treats all cross-sectional units as having identical characteristics. Pooled OLS treats panel data as one large pooled sample without controlling for unobserved heterogeneity, whereas fixed effects and random effects models do account for individual differences between entities. The Pooled OLS estimator assumes identical intercepts and slope coefficients for all cross-sections, indicating a uniform relationship between dependent and independent variables across all entities. Pooled OLS provides straightforward and effective estimation given that its assumptions of no omitted variable bias and constant variance across errors remain satisfied. The presence of individual effects that correlate with explanatory variables causes Pooled OLS to produce biased and inconsistent estimates. Pooled OLS is typically applied in situations where cross-sectional heterogeneity is absent or the dataset demonstrates relative homogeneity.

**Table 5.4 results of Pooled OLS Regression**

**Linear regression**

| fdi | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] |
|---|---|---|---|---|---|---|
| unemployment | .00026 | .02957 | 0.01 | .99316 | -.06123 | .06175 |
| trade | .12087 | .02706 | 4.47 | .00021 | .06459 | .17715 |
| wages | .00694 | .00382 | 1.82 | .08379 | -.00101 | .01489 |
| interest_rate | .00086 | .00124 | 0.70 | .49448 | -.00171 | .00343 |
| inflation | -.14666 | .0375 | -3.91 | .0008 | -.22464 | -.06868 |
| population | .00336 | .00429 | 0.78 | .44251 | -.00556 | .01227 |
| education | .0652 | .04247 | 1.54 | .13971 | -.02313 | .15353 |
| Constant | 2.19517 | .28433 | 7.72 | 0 | 1.60388 | 2.78646 |

| | | | |
|---|---|---|---|
| Mean dependent var | 2.6091 | SD dependent var | 0.1722 |
| R-squared | 0.2876 | Number of obs | 726 |
| F-test | 11.3763 | Prob > F | 0.0000 |
| Akaike crit. (AIC) | -724.8956 | Bayesian crit. (BIC) | -688.1952 |

*** *p*<.01, ** *p*<.05, * *p*<.1

Source:  Author’s calculation

The application of OLS regression analysis to study FDI determinants shows multiple statistically and economically meaningful relationships. The study demonstrates that trade openness stands out as the strongest predictive factor ($\beta = 0.121$, $p < 0.01$) since each unit increase in trade leads to a 0.121-unit growth in FDI inflows which illustrates how trade liberalization supports foreign investment activities. A one-unit increase in inflation leads to a 0.147-unit decrease in FDI indicating that price stability plays an essential role in attracting foreign investment. Higher wage levels correlate slightly with increased FDI presence which indicates foreign investors value skilled labor markets. The data indicates that unemployment rates alongside interest rates population size and education levels lack statistical significance with p-values above 0.10 but education presents a positive coefficient of beta equals 0.065 which requires further analysis. The statistical model accounts for 28.76% of the variation in FDI as demonstrated by $R^2 = 0.2876$ alongside robust overall significance confirmed by an F-test of 11.38 with $p < 0.01$. Policy implications suggest that governments seeking to attract FDI should prioritize Governing bodies aiming to attract FDI must focus on trade liberalization through tariff reduction and export support together with stable monetary policy for inflation control and develop human capital considering education's marginal importance. Unemployment and interest rates do not significantly affect FDI location decisions which makes them less critical considerations for such decisions. The research findings match the "eclectic paradigm" of FDI which identifies market size (determined through trade measurement) and stable macroeconomic conditions as primary factors for investment decisions. Subsequent studies should investigate nonlinear relationships or utilize instrumental variables methods to resolve potential endogeneity issues between trade and FDI.

### 1.5.2 Checking the endogeneity problem

The issue of endogeneity occurs in OLS regressions when an explanatory variable displays correlation with the error term which results in biased and inconsistent estimation outcomes. Bascle (2008) identifies three main origins from which endogeneity develops. Omitted variables bias manifests when a relevant factor influencing the dependent variable remains excluded from the regression model and shows correlation with one or more explanatory variables (Wooldridge, 2002, 2006). simultaneity, which occurs when explanatory variables are jointly determined with the dependent variable Simultaneity occurs when the causality runs in both directions: Simultaneity emerges due to bidirectional causation between the dependent variable and the regressors. The relationship between diversification and performance creates a feedback loop because diversification leads to performance changes but performance also influences diversification choices and refocusing decisions. Performance influences decisions related to diversification and refocusing strategies (e.g. Measurement error emerges because of inaccuracies during variable recording. The errors-in-variables issue emerges because researchers cannot observe the true value of the regressor $X_I$. Measurement error problems remain one of econometrics' longest standing yet most vibrant research subjects. Despite being a long-standing research topic in econometrics since the works of Adcock (1877) and Pearson (1901), most empirical studies fail to address measurement error problems (Bound et al., 2001; Griliches and Hausman, 1986; Wansbeek, 2001). Researchers utilize Instrumental Variables (IV) estimation to handle endogeneity and Two-Stage Least Squares (2SLS) stands out as the most common method. The first-stage regression determines the endogenous variable by utilizing instruments which show correlation with the endogenous regressor while remaining uncorrelated to the error term to identify exogenous variation. During the second stage the predicted values from the first-stage regression substitute the endogenous variable in the primary regression analysis which provides consistent causal effect estimates. The quality of a strong instrument depends on its relevance to the endogenous variable and its exogeneity with respect to the error term while both conditions can be tested through first-stage F-statistics and overidentification tests. Two-stage least squares (2SLS) addresses endogeneity which strengthens regression results and leads to more dependable econometric conclusions. The study requires instrumental variables to address the issue of endogeneity. The study utilized unemployment as an endogenous variable. The study used lagged unemployment and lagged wages as instrumental variables.

**Table 5.5 The 2-stage least squares estimation**

**2-stage least squares estimation**

| fdi | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] |
|---|---|---|---|---|---|---|
| unemployment | .01146 | .0154 | 0.74 | .45672 | -.01872 | .04164 |
| trade | .12498 | .01251 | 9.99 | 0 | .10047 | .1495 |
| wages | .00705 | .00435 | 1.62 | .10507 | -.00148 | .01557 |
| interest_rate | .00093 | .00053 | 1.77 | .07616 | -.0001 | .00197 |
| inflation | -.14448 | .02455 | -5.89 | 0 | -.19259 | -.09637 |
| population | .00243 | .00206 | 1.18 | .2373 | -.0016 | .00647 |
| education | .07078 | .01674 | 4.23 | .00002 | .03798 | .10358 |
| Constant | 2.18647 | .1673 | 13.07 | 0 | 1.85857 | 2.51436 |

| | | | |
|---|---|---|---|
| Mean dependent var | 2.61397 | SD dependent var | 0.17205 |
| R-squared | 0.28175 | Number of obs | 704 |
| Chi-square | 276.79105 | Prob > chi2 | 0.00000 |

**** p<.01, ** p<.05, * p<.1*

The two-stage least squares (2SLS) regression analysis uncovers fundamental insights about FDI determinants while mitigating endogeneity issues. The statistical model demonstrates robust explanatory strength with a chi-square value of 276.79 and a p-value less than 0.01 while it explains 28.18% of the variance in FDI as shown by an $R^2$ value of 0.2818. Trade openness stands out as the strongest predictor ($\beta = 0.125$, $p < 0.01$) which demonstrates that each unit increase in trade results in a 0.125-unit rise in FDI revealing how trade liberalization supports investment flows. Data analysis shows inflation has a powerful negative impact ($\beta = -0.144$, $p < 0.01$) which means that maintaining stable prices is essential for FDI attraction since each one-unit rise in inflation leads to a 0.144-unit FDI decrease. The positive relation between education ($\beta = 0.071$, $p < 0.01$) demonstrates human capital as a significant factor in drawing foreign investment.

**Table 5.6 First stage regression**

**First stage regression**

| Variable | R-sq | Adjusted R-sq | Partial R-sq | F(2,695) | Prob > F |
|---|---|---|---|---|---|
| unemployment | 0.9089 | 0.9078 | 0.8922 | 2876.97 | 0.0000 |

Source: Author’s calculation

The first-stage regression results demonstrate exceptionally strong instrument relevance for addressing potential endogeneity in the unemployment variable. With an adjusted $R^2$ of 0.9089 and partial $R^2$ of 0.9078, the instruments (likely including lagged unemployment and other predictors) explain approximately 90.8% of the variation in unemployment, indicating near-perfect predictive power. The extraordinarily high F-statistic of 2876.97 ($p < 0.001$) far exceeds the Staiger-Stock threshold of 10, providing overwhelming evidence against weak instruments and ensuring reliable two-stage least squares (2SLS) estimation.

**Table 5.7 Overidentification check**

**Overidentification check**

| | Coef. | P-value |
|---|---|---|
| Sargan (score) chi2(1) | 2.15528 | (p =0.1421) |
| Basmann chi2(1) | 2.13426 | (p =0.1440) |

Source: Author's calculation

The results from the overidentification tests such as the Sargan and Basmann tests evaluate the effectiveness of instrumental variables by checking for their lack of correlation with the error term which is essential for IV estimation. The null hypothesis for these tests claims that the instruments maintain validity by remaining exogenous and free from additional estimation bias. The Sargan test generated a chi-squared statistic of 2.15528 and p-value of 0.1421 while the Basmann test resulted in a chi-squared statistic of 2.13426 with a p-value of 0.1440. Since both p-values exceed common significance thresholds such as 0.05 or 0.10 there is insufficient statistical evidence to reject the null hypothesis. The estimation process instruments demonstrate validity and lack overidentification issues according to these results.

**Table 5.8 endogeneity test**

**Endogeneity test**

| | Coef. | P-value |
|---|---|---|
| Durbin (score) chi2(1) | 1.64974 | (p = 0.1990) |
| Wu-Hausman F(1,695) | 1.63248 | (p = 0.2018) |

Source: Author’s calculation

The Durbin-Wu-Hausman test results analyze whether unemployment is an endogenous variable within the regression model. The null hypothesis assumes that the variable is exogenous because it does not show correlation with the error term which allows OLS estimation to produce unbiased and consistent estimates. According to the Durbin test the chi-squared statistic is 1.64974 with a p-value of 0.1990 whereas the Wu-Hausman test returns an F-statistic of 1.63248 and a p-value of 0.2018. This suggests that ordinary least squares (OLS) estimates are likely consistent, as there is no statistical evidence of correlation between unemployment and the error term in the FDI model.

### 1.6 Fixed effects model

The Fixed Effects (FE) model remains the standard approach for panel data estimation which addresses unobserved differences across cross-sectional units under the assumption of time-constant effects. The Fixed Effects (FE) model manages unobserved heterogeneity between cross-sectional units under the assumption that these effects remain constant over time. Researchers developed fixed-effects models for panel data to address omitted variable bias in nonexperimental contexts (Allison 2009; Wooldridge 2010). Traditional statistical methods that estimate variation between units intensify the potential for heterogeneity and omitted variable bias. Fixed-effects models limit variation to within individual units to prevent unobserved heterogeneity and omitted variable bias. The FE model manages to control for time-invariant country-level factors including geography and cultural attributes unlike Pooled OLS which overlooks individual-specific differences. The

FE model reduces omitted variable bias by eliminating unobserved heterogeneity across entities which results in more reliable coefficient estimates. This specification excludes year dummies because adding them would complicate the model without enhancing its explanatory abilities. The statistical insignificance of year fixed effects shows that time-specific shocks have no significant effect on trade after accounting for country-specific characteristics indicating that trade patterns result mainly from structural and policy-related differences between nations rather than global temporal variations. By removing year dummies from the model, the efficiency increases since degrees of freedom are preserved which results in more precise estimates. The FE model operates under the assumption that unobserved variables affecting trade do not change through time across countries but this assumption does not always apply to dynamic economic conditions. The FE model stands as a strong selection when country-specific heterogeneity control is necessary for achieving unbiased and consistent estimates.

**Table 5.9 Fixed effects model results**

**Fixed Effects Model**

| fdi | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] |
|---|---|---|---|---|---|---|
| unemployment | -.06042 | .02423 | -2.49 | .01288 | -.10799 | -.01285 |
| trade | .13743 | .02927 | 4.69 | 0 | .07996 | .1949 |
| wages | .00674 | .00384 | 1.75 | .07977 | -.0008 | .01428 |
| interest_rate | .00011 | .00067 | 0.16 | .87325 | -.00121 | .00142 |
| inflation | -.1483 | .02568 | -5.77 | 0 | -.19872 | -.09788 |
| population | .00824 | .00274 | 3.00 | .00277 | .00285 | .01362 |
| education | -.10132 | .03603 | -2.81 | .00506 | -.17206 | -.03058 |
| Constant | 2.53614 | .23477 | 10.80 | 0 | 2.07519 | 2.99709 |

| | | | |
|---|---|---|---|
| Mean dependent var | 2.60913 | SD dependent var | 0.17223 |
| R-squared | 0.13396 | Number of obs | 726 |
| F-test | 15.40127 | Prob > F | 0.00000 |
| Akaike crit. (AIC) | -945.36858 | Bayesian crit. (BIC) | -908.66818 |

**** p<.01, ** p<.05, * p<.1*

Source: Author's calculation

Fixed effects (FE) regression analysis delivers reliable factor estimates for foreign direct investment (FDI) through adjustment for unobserved time-invariant variances between countries. The model demonstrates significant explanatory power for FDI variation as indicated by an F-test p-value below 0.01 and reveals multiple important insights. The FE regression reveals that unemployment negatively impacts FDI with a coefficient of -0.060 and a significance level below 0.05, showing that each unit increase in unemployment reduces FDI by 0.060 units because investors tend to avoid economies with poor labor market performance. The highest positive linkage exists between trade openness and FDI ($\beta = 0.137$, $p < 0.01$) because countries with higher levels of trade integration tend to attract more FDI according to the "complementarity hypothesis" which connects trade and investment activities. The negative relation between inflation and investor confidence ($\beta = -0.148$, $p < 0.01$) underscores the need for stable prices to maintain investor trust. The unexpected negative coefficient for education ($\beta = -0.101$, $p < 0.01$) may indicate measurement errors or imply that higher education levels first change domestic investment patterns before later attracting FDI. Larger markets draw foreign investors as evidenced by the positive population size effect ($\beta = 0.008$, $p < 0.01$) and labor skill signals emerge through marginally higher wages shown by a slight positive trend in wage differentials ($\beta = 0.007$, $p < 0.10$). Here the implications suggest that reducing unemployment with labor market interventions improves economic perceptions which indirectly boosts FDI. Further research on the education paradox is necessary because the negative coefficient may reveal model limitations while indicating the need to review education policy effects over time on investment. The FE model offers robust control of country-specific fixed effects yet the negative education coefficient combined with modest $R^2$ values implies that important variables like institutional quality might be missing from future studies. Research results support comprehensive economic strategies which must target labor markets alongside trade and macroeconomic stability to enhance foreign direct investment inflows.

### 1.6.1 F- test and it's results (Between pooled OLS and the fixed effects model)

Researchers utilize the F-test for Fixed Effects to establish if unobserved differences between entities require the adoption of a Fixed Effects model instead of a Pooled Ordinary Least Squares (OLS) model. Pooled OLS operates under the assumption that entities have identical intercepts which indicates no systematic differences between groups whereas the FE model accounts for time-invariant entity-specific effects to correct for omitted variable bias. The F-test assesses the joint significance of entity-specific fixed effects through a comparison between the Pooled OLS model and the unrestricted FE model. Researchers evaluate fixed effects significance in Stata FE regression output by inspecting the F-statistic and its corresponding p-value (Prob > F). The rejection of the null hypothesis—which asserts that fixed effects are redundant—becomes necessary when Prob > F is statistically significant (usually under 0.05) thus supporting the Fixed Effects model. A large p-value suggests that Pooled OLS should be chosen because it fails to show enough support for entity-specific heterogeneity.

**Table 5.10 F-test results**

**F- Test**

| | Coef. |
|---|---|
| F statistic | 15.41 |
| Prob > F | 0.0000 |

Source:  Author's calculation

$H_0$: The empirical evidence shows all country fixed effects equal zero (Pooled OLS suffices). $H_1$: The presence of at least one non-zero country fixed effect requires a fixed effects model. An F-test evaluated whether the fixed effects model was more suitable than pooled OLS by testing the combined significance of country-specific fixed effects. The fixed effects regression analysis encompassing 726 observations from 22 countries produced an F-statistic of 15.40 and its related p-value stood at 0.0000. Because the p-value fell below the typical significance benchmark of 0.05 it became necessary to reject the null hypothesis that all country-specific fixed effects are jointly non-significant. The statistical evidence confirmed the alternative hypothesis that one or more country-specific fixed effects differ significantly from zero. The fixed effects model demonstrates a statistically better data fit because it accounts for unobserved time-invariant country-specific differences while the pooled OLS model does not.

## 1.7 Random effects model

The Random Effects (RE) model functions as an essential panel data estimation method which handles unobserved heterogeneity by assuming individual-specific effects follow a random distribution that shows no correlation with the explanatory variables. The random effects model assumes that individual-specific effects remain uncorrelated with predictor variables according to Schmidheiny (2013). The RE model maintains time-invariant characteristics and both within-country and between-country variation for more efficient estimation in situations where individual effects do not correlate with regressors unlike the FE model which removes these characteristics through differencing. The RE model is beneficial when cross-country variation appears random and independent of the independent variables because it permits the analysis to incorporate time-invariant characteristics such as geography and cultural factors. The model uses clustered standard errors at the country level vce(cluster country) to enhance inference reliability through adjustments for heteroskedasticity and serial correlation within clusters which leads to stronger standard error estimates. Panel data sets require this correction because repeated country observations create correlated residuals inside panels. The RE model achieves efficiency through random effects while robust variance estimators defend statistical inference credibility by protecting against typical classical assumption violations. The RE model maintains more degrees of freedom compared to the FE model because it applies fewer restrictions which results in improved estimate precision. Researchers select between using the RE model and the FE model based on the Hausman test results that determine the correlation between individual effects and regressors since a significant outcome indicates the FE model as the better choice. The random effects (RE) model becomes the preferred choice when it fits the scenario because it yields computational benefits and enables broader conclusions across different entities under conditions where individual effects remain uncorrelated with explanatory variables.

## Table 5.11 Random effects model results

**Random Effects Regression**

| fdi | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] |
|---|---|---|---|---|---|---|
| unemployment | -.04 | .02187 | -1.83 | .06745 | -.08287 | .00287 |
| trade | .13199 | .02414 | 5.47 | 0 | .08468 | .17929 |
| wages | .0069 | .00385 | 1.79 | .07325 | -.00065 | .01444 |
| interest_rate | .00032 | .00064 | 0.50 | .61631 | -.00094 | .00158 |
| inflation | -.14254 | .02503 | -5.69 | 0 | -.1916 | -.09348 |
| population | .00603 | .00255 | 2.37 | .01789 | .00104 | .01102 |
| education | -.03888 | .03042 | -1.28 | .20128 | -.0985 | .02075 |
| Constant | 2.41527 | .21742 | 11.11 | 0 | 1.98915 | 2.8414 |

| | | | |
|---|---|---|---|
| Mean dependent var | 2.60913 | SD dependent var | 0.17223 |
| Overall r-squared | 0.21769 | Number of obs | 726 |
| Chi-square | 115.74726 | Prob > chi2 | 0.00000 |
| R-squared within | 0.12933 | R-squared between | 0.35529 |

**** p<.01, ** p<.05, * p<.1*

Source: Author’s calculation

Random effects (RE) regression results analyze foreign direct investment (FDI) determinants while considering both intra-country variation and inter-country variation. The random effects model captures 21.77% of FDI variance (overall $R^2 = 0.218$) showing better explanatory power between countries ($R^2 = 0.355$) compared to within-country effects ($R^2 = 0.129$) which emphasizes cross-national variations as important factors in investment attraction. The strongest predictor of FDI is trade openness ($\beta = 0.132$, $p < 0.01$), which demonstrates that each trade unit increase generates a 0.132-unit rise in FDI and solidifies the connection between trade liberalization and investment activity. Robust data reveals inflation negatively impacts Foreign Direct Investment ($\beta = -0.143$, $p < 0.01$), proving price stability essential for FDI since each unit increase in inflation reduces investment by 0.143 units. The analysis shows that larger populations tend to attract greater FDI ($\beta = 0.006$, $p < 0.05$) yet a marginal negative trend exists for unemployment ($\beta = -0.040$, $p = 0.067$) which suggests that investor decisions might be negatively impacted by weak labor markets. The positive yet borderline result of wage differentials ($\beta = 0.007$, $p = 0.073$) suggests higher wages may indicate skilled labor availability. Statistical analysis reveals that education and interest rates do not show significance ($p > 0.10$) but the negative coefficient of education ($\beta = -0.039$) requires additional research.

**Table 5.11 Random effects model results**

**Random Effects Regression**

| fdi | Coef. | St.Err. | t-value | p-value | [95% Conf | Interval] |
|---|---|---|---|---|---|---|
| unemployment | -.04 | .02187 | -1.83 | .06745 | -.08287 | .00287 |
| trade | .13199 | .02414 | 5.47 | 0 | .08468 | .17929 |
| wages | .0069 | .00385 | 1.79 | .07325 | -.00065 | .01444 |
| interest_rate | .00032 | .00064 | 0.50 | .61631 | -.00094 | .00158 |
| inflation | -.14254 | .02503 | -5.69 | 0 | -.1916 | -.09348 |
| population | .00603 | .00255 | 2.37 | .01789 | .00104 | .01102 |
| education | -.03888 | .03042 | -1.28 | .20128 | -.0985 | .02075 |
| Constant | 2.41527 | .21742 | 11.11 | 0 | 1.98915 | 2.8414 |

| | | | |
|---|---|---|---|
| Mean dependent var | 2.60913 | SD dependent var | 0.17223 |
| Overall r-squared | 0.21769 | Number of obs | 726 |
| Chi-square | 115.74726 | Prob > chi2 | 0.00000 |
| R-squared within | 0.12933 | R-squared between | 0.35529 |

**** p<.01, ** p<.05, * p<.1*

Source: Author's calculation

Random effects (RE) regression results analyze foreign direct investment (FDI) determinants while considering both intra-country variation and inter-country variation. The random effects model captures 21.77% of FDI variance (overall $R^2 = 0.218$) showing better explanatory power between countries ($R^2 = 0.355$) compared to within-country effects ($R^2 = 0.129$) which emphasizes cross-national variations as important factors in investment attraction. The strongest predictor of FDI is trade openness ($\beta = 0.132$, $p < 0.01$), which demonstrates that each trade unit increase generates a 0.132-unit rise in FDI and solidifies the connection between trade liberalization and investment activity. Robust data reveals inflation negatively impacts Foreign Direct Investment ($\beta = -0.143$, $p < 0.01$), proving price stability essential for FDI since each unit increase in inflation reduces investment by 0.143 units. The analysis shows that larger populations tend to attract greater FDI ($\beta = 0.006$, $p < 0.05$) yet a marginal negative trend exists for unemployment ($\beta$ = -

0.040, $p = 0.067$) which suggests that investor decisions might be negatively impacted by weak labor markets. The positive yet borderline result of wage differentials ($\beta = 0.007$, $p = 0.073$) suggests higher wages may indicate skilled labor availability. Statistical analysis reveals that education and interest rates do not show significance ($p > 0.10$) but the negative coefficient of education ($\beta = -0.039$) requires additional research.

### 1.7.1 Breusch and Pagan Lagrangian Multiplier (LM)

The Breusch and Pagan LM test provides statistical evidence to assess if unobserved heterogeneity requires the application of a Random Effects model instead of a Pooled Ordinary Least Squares model. Pooled OLS operates under the assumption that all entities share identical intercepts while disregarding individual-specific variations as insignificant but the RE model incorporates unobserved heterogeneity by permitting the distribution of entity-specific effects to be random. The LM test determines if the variance of random effects differs significantly from zero by comparing a restricted Pooled OLS model with an unrestricted RE model. Researchers evaluate the suitability of the RE model by analyzing both the LM statistic and its associated p-value. When a p-value falls below 0.05 it shows statistical significance, which leads to the rejection of the null hypothesis that suggests random effects are redundant in favor of adopting the RE model. When the test does not reject the null hypothesis, we should use Pooled OLS because it lacks sufficient evidence to justify individual-specific random effects. The Breusch and Pagan LM test evaluates random effects requirements to guarantee that the selected estimation technique captures data heterogeneity and achieves maximum efficiency in panel data analysis.

**Table 5.12 Breusch and Pagan Langrangian Multiplier results**

**Breusch-Pagan LM Test**

| | Coef. |
|---|---|
| Var(u) | 0.00666 |
| Prob > chi2 | 0.0000 |

Source: Author's calculation

The Breusch-Pagan LM test for random effects determines if panel data models contain unobserved country-specific heterogeneity by contrasting random effects (RE) specifications with pooled ordinary least squares (POLS) models. The analysis demonstrates a statistically significant country-specific random effects coefficient variance of 0.00666 with a p-value of 0.000 which strongly rejects the null hypothesis. The model's inefficiency stems from POLS's inability to capture country-specific heterogeneity which exists as unobserved effects. The random effects model earns preference over POLS in this research context because it models unobserved differences directly and yields more precise standard errors.

## 1.8 Post Estimation Diagnostics tests

### 1.8.1 Hausman Specification Test

The Hausman Specification Test serves as a statistical method to identify the more suitable model between Fixed Effects and Random Effects for panel data analysis. The RE model operates under the assumption that unobserved heterogeneity between entities does not correlate with explanatory variables which permits more precise estimation while the

FE model allows for correlation between entity-specific effects and explanatory variables to address omitted variable bias. The Hausman test examines if systematic differences exist between FE and RE model coefficients through a comparison between the efficiency of the RE estimator and the consistency of the FE estimator. The suitability of the RE model is determined through researchers' analysis of both the test statistic and its p-value. When a p-value falls below 0.05 researchers reject the null hypothesis that the RE model gives consistent estimates and choose the FE model instead. When the statistical test does not reject the null hypothesis, researchers choose the RE model because it operates more efficiently.

**Table 5.13 Hausman specification test**

**Hausman specification test**

| | Coef. |
|---|---|
| Chi-square test value | 12.80 |
| P-value | 0.0772 |

Source: Author's calculation

The Hausman test results (Chi-square test value = 12.80, p = 0.077) necessitate cautious analysis to choose the correct model between fixed effects and random effects. While the p-value does not reach the conventional threshold of 5% it stays under the 10% significance level implying potential connections between country-specific elements such as institutional quality and historical policies with explanatory variables which challenges the RE assumption of exogeneity.

Theoretical considerations further support FE: The Fixed Effects (FE) method should be selected when country-level heterogeneity such as stable institutional differences plausibly influences both independent variables like trade or inflation and FDI because FE eliminates the impact of these time-invariant confounders for consistent estimates. The choice of estimation method becomes crucial when there is a significant discrepancy between the FE and RE coefficients for policy-relevant variables because FE's estimate of education's effect (−0.101) exceeds RE's (−0.039) by 2.6 times which indicates that RE underestimates human capital's impact on FDI attraction.

Consistency takes precedence over efficiency in this analysis since the Fixed Effects model's resistance to omitted variable bias surpasses the Random Effects model's statistical efficiency when the Hausman test approaches significance. When inflation or trade openness shows significance in FE analyses but may relate to hidden country-specific policies FE becomes essential to eliminate this confounding heterogeneity.

Although the Hausman test does not reject RE at a 5% significance level the combination of marginal significance together with theoretical expectations of correlated effects and substantial coefficient differences leads to the recommendation of using FE for reliable causal inference.

### 1.8.2 Multicollinearity test (VIF)

The VIF Multicollinearity test functions as a common diagnostic tool in regression analysis to identify multicollinearity among independent variables which helps prevent excessive correlations that might affect coefficient estimates. Two or more explanatory variables exhibit high correlation during multicollinearity which results in inflated standard errors and unreliable statistical inferences. The VIF test determines multicollinearity levels by analyzing the inflation in the variance of estimated coefficients resulting from their correlation with other predictors. According to Jamal (2017), when VIF values go beyond 5 or 10 this indicates that multicollinearity leads to poor estimation of regression coefficients. When the VIF value exceeds 10 most practitioners identify severe multicollinearity which demands corrective measures like choosing new variables or transforming and combining existing ones. After performing an Ordinary Least Squares (OLS) regression researchers use Stata to execute the VIF test which calculates the multicollinearity scores for each predictor variable. The VIF test improves regression model reliability by identifying and correcting multicollinearity which results in more accurate coefficient calculations and dependable statistical analysis in empirical studies.

**Table 5.14 Variance inflation factor (VIF)**

**Multicollinearity test variance inflation factor (VIF)**

| | VIF | 1/VIF |
|---|---|---|
| population | 2.29 | 0.437 |
| education | 1.97 | 0.508 |
| inflation | 1.35 | 0.740 |
| trade | 1.15 | 0.871 |
| unemployment | 1.18 | 0.847 |
| interest rate | 1.24 | 0.808 |
| wages | 1.01 | 0.993 |
| Mean VIF | 1.45 | . |

Source: Author’s calculation

VIF = 1: No multicollinearity. 1 < VIF < 5: Moderate multicollinearity. VIF ⩾ 5 or 10: High multicollinearity, indicating potential problems. 1/VIF: This is the tolerance. It indicates how much of a variable's variation remains unexplained by other independent variables. Table 5.10 displays findings from the Variance Inflation Factor (VIF) analysis used to test multicollinearity between independent variables in our regression model. The analysis indicated no significant multicollinearity issues. The average VIF value stood at 1.45 while all individual VIF measurements remained under 5 and most approached 1. Our coefficient estimates demonstrate reliability and stability which eliminates the need for corrective measures.

### 1.8.3 Test for Autocorrelation

The Wooldridge test for autocorrelation serves as a popular statistical tool which identifies first-order serial correlation within panel data models. The error terms in a regression model show autocorrelation when they become temporally correlated which breaches the assumption of independent errors and may result in biased and inefficient standard errors. This test examines the residuals from a regression model for serial correlation by assessing the null hypothesis which states there is no first-order autocorrelation against the alternative hypothesis which suggests the presence of serial correlation. When autocorrelation is present researchers must implement corrective measures including econometric techniques like robust (cluster-robust) version to ensure robust inference.

**Table 5.15 Autocorrelation test**

**Wooldridge test for autocorrelation in panel data**

| | Coef. |
|---|---|
| F(1, 21) | 33.120 |
| Prob > F | 0.0000 |

Source: Author's calculation

The Wooldridge test represents a popular diagnostic approach that evaluates if first-order serial correlation exists within the residuals of panel regression models. Serial correlation emerges when error terms show correlation across different time periods within the same panel and this correlation creates inefficient estimates with biased standard errors that affect statistical inference. The Wooldridge test statistic reveals an F-statistic of 33.120 and a p-value of 0.0000 which falls significantly under the typical 0.05 significance level. The outcome provides substantial statistical proof against the null hypothesis that there is no first-order autocorrelation and establishes serial correlation within the panel dataset. Autocorrelation means that the error terms of the model depend on each other over time and this dependence can lead to incorrect conclusions unless it is properly corrected. This discovery leads us to contemplate using the robust standard error version of the Fixed Effect model as a corrective measure to achieve robust and reliable estimation.

### 1.8.4 Panel Groupwise Heteroscedasticity test

Fixed effects regression models use the Modified Wald test for groupwise heteroskedasticity to determine if error variances differ among various groups such as countries or firms in panel data. This test examines panel data structure to detect distinct error variances within groups which classical heteroskedasticity tests neglect due to their cross-sectional independence assumption and which result in inefficient estimates and biased standard errors in fixed effects models when present. The chi-square distribution describes the test statistic under the homoskedasticity null hypothesis and rejecting this null hypothesis signals groupwise heteroskedasticity. Upon detecting heteroskedasticity researchers should use robust standard errors techniques to maintain valid statistical inference. Macroeconomic and microeconomic research greatly benefits from the Modified Wald test since unobserved group-specific influences like institutional disparities or regional shocks create different levels of error term volatility. Researchers need to implement this approach to keep fixed effects estimators dependable as they control unobserved time-invariant differences in panel data analysis.

**Table 5.16 Heteroscedasticity test**

**Modified Wald Test for groupwise Heteroscedasticity in fixed effects models**

| | Coef. | | P-value |
|---|---|---|---|
| Modified Wald Test | 819,87 | Prob > Chi2(22) | 0.0000 |

Source: Author’s calculation

The Modified Wald Test for groupwise Heteroscedasticity helps diagnose when error term variances differ between panels which breaks homoscedasticity assumptions resulting in inefficient estimators and flawed inference. The Modified Wald Test generates statistical evidence to detect heteroscedasticity through an assessment of the consistency of error variances across different entities. The test returns very high Wald test statistics of 819.87

with exact p-values of 0.0000 which prove statistical significance well beyond common thresholds like 0.05 or 0.01. The statistical findings refute the null hypothesis of homoscedasticity which verifies heteroscedasticity as present within the panel dataset. Heteroscedasticity exists when standard errors become biased which undermines the reliability of hypothesis testing and produces inefficient coefficient estimates. Researchers need to adopt econometric techniques like econometric techniques like robust (cluster-robust) version to tackle this statistical problem.

### 1.8.5 Fixed Effects Regression results and Robustness

The Hausman test results indicated that the fixed effect regression model served as the best choice for this study. For the robustness of this model, the further diagnostic checking was also applied. The model underwent diagnostic checks for Autocorrelation and heteroscedasticity which identified both issues in the regression model. The robust standard errors approach served as the solution for dealing with both autocorrelation and heteroscedasticity problems in the research model. The table below presents the outcomes for the random effect model as well as the random effect model with robust standard errors.

**Table 5.17 Fixed effects regression and robust standard error comparison**

**Robust SEs and Fixed effects (FE) comparison**

| | (RSE)<br>fdi | (FE)<br>fdi |
|---|---|---|
| unemployment | -.06042 | -.06042** |
| | (.04911) | (.02423) |
| trade | .13743** | .13743*** |
| | (.05347) | (.02927) |
| wages | .00674** | .00674* |
| | (.00269) | (.00384) |
| interest_rate | .00011 | .00011 |
| | (.00161) | (.00067) |
| inflation | -.1483*** | -.1483*** |
| | (.03216) | (.02568) |

| | | |
|---|---|---|
| population | .00824** | .00824*** |
| | (.00368) | (.00274) |
| education | -.10132 | -.10132*** |
| | (.06142) | (.03603) |
| _cons | 2.53614*** | 2.53614*** |
| | (.35418) | (.23477) |
| Observations | 726 | 726 |
| R-squared | .13396 | .13396 |

*Standard errors are in parentheses*

**** p<.01, ** p<.05, * p<.1*

Source: Author's calculation

This table shows how fixed effects (FE) regression compares with robust standard errors (RSE) models when researching the determinants of foreign direct investment (FDI). The FE estimator addresses unobserved time-invariant heterogeneity through entity-specific intercepts which enables the focus on within-group variation and minimizes omitted variable bias. The coefficient estimates for variables such as unemployment (−0.06042) and trade (0.13743) stay the same across both model specifications yet their standard errors show significant differences. The standard error for unemployment drops from 0.04911 (RSE) to 0.02423 (FE) and for trade it goes down from 0.05347 to 0.02927. The enhanced precision in the FE model demonstrates its capability to effectively handle panel structure. The fixed effects regression approach fails to address heteroskedasticity which indicates non-constant error variance and autocorrelation which shows serial dependence in errors. The clustering of robust standard errors at the entity level resolves these statistical issues by relaxing the constant variance assumption and incorporating the correlation within groups over time. Demeaning in the FE model reduces certain autocorrelation effects but valid inference requires using clustered RSE. The statistical significance of wages_diff increases from $p<0.05$ with robust standard errors to $p<0.01$ with the fixed effects model while education achieves statistical significance only within the fixed effects model

(0.00824, $p<0.01$). Adjusting for panel-specific errors is crucial because ignoring them can hide real relationships. The increased precision of the FE model provides greater confidence in the established relationships. The statistical significance of the negative unemployment coefficient (−0.06042 at $p<0.05$ in FE) demonstrates that increased unemployment rates discourage FDI likely because of investor perceptions of economic instability. Implementing labor market reforms should be a primary focus of policymakers who wish to draw in investment. The statistical significance of trade's positive effect (0.13743, $p<0.01$) supports the idea that open trade policies attract FDI inflows thereby reinforcing the argument for trade liberalization. Since both models show inflation to hold little significance it appears that investors might not prioritize inflation control which enables policymakers to focus less on inflation when developing FDI strategies. The FE findings support the implementation of strategies that target domestic conditions such as wage differentials and education levels because these issues establish a stronger connection to FDI once unobserved heterogeneity is taken into account. Human capital development emerges as a crucial factor for investment attraction thanks to the consistent positive impact of education (0.00824, $p<0.01$).

## 1.9 Conclusion, Recommendations and Limitations

### 1.9.1 Conclusion

This study sought to evaluate how unemployment affects FDI in Latin America and the Caribbean from 1990 to 2023 across 22 nations with panel data analysis. FDI serves as the dependent variable while Unemployment represents the independent variable in this analysis. The study includes Interest rate, Wages, Education, FDI, Inflation, and Population as control variables. This study used the Pooled Ordinary Least Squares (OLS) which operates under the assumption of homogeneous characteristics throughout cross-sectional units and combines panel data into a single pooled sample without recognizing individual entity differences. The research team implemented the Fixed Effects (FE) model and then performed the F-test for Fixed Effects to determine if the FE model exceeds the performance of the Pooled Ordinary Least Squares (OLS) model. Fixed Effects (FE) model demonstrated better performance. The study included an analysis of the Random Effects (RE) model. The Breusch and Pagan Lagrangian Multiplier (LM) test for Random Effects determined whether the Random Effects (RE) model was more suitable than the Pooled Ordinary Least Squares (OLS) model. The analysis demonstrated that the Random Effects (RE) model became the preferred choice. The research team deployed the Hausman Specification Test to determine if a Fixed Effects or Random Effects model would be the appropriate choice. The analysis results demonstrated that the Fixed Effects (E) model should be chosen as the preferred option. The Variance Inflation Factor (VIF) Multicollinearity test functioned as a diagnostic tool after estimation to identify multicollinearity within regression models. The research team developed an estimation diagnostic tool that revealed endogeneity when an explanatory variable showed correlation with the error term leading to biased and inconsistent Ordinary Least Squares (OLS) regression results. We handle endogeneity through Instrumental Variables (IV) estimation supported by Two-Stage Least Squares (2SLS) methods while conducting first stage regression and overidentification checks. The Wooldridge test for autocorrelation. The dataset shows evidence of both Autocorrelation and Heteroscedasticity according to the heteroscedasticity test results. For this study we selected the fixed effects robust standard errors (RSE) model method because it possesses strong estimation properties that manage heteroskedasticity and serial correlation within panel data models.

The study uses fixed effects regression with clustered standard errors to explore how unemployment and main macroeconomic indicators affect FDI across 22 nations (N=726). The fixed effects model accounts for unobserved country-specific heterogeneity which explains 40.4% of the variance (rho = 0.404) demonstrating why institutional and contextual factors beyond measured variables are important. The results reveal that trade openness (coef. = 0.137, p=0.018) and wage differentials (coef. FDI attracts investment through both trade openness and wage differentials (coef.=0.0067, p=0.021), but higher interest rates act as a strong deterrent to investment (coef.=). = -0.148, p<0.001). Unemployment reveals a negative link with FDI yet its statistical insignificance (p=0.232) indicates labor market conditions likely influence investment by affecting overall economic stability perceptions. The marginal significance of education (p=0.114) together with population (p=0.036) suggests that both human capital and market size might influence investment in complex ways. The non-significant impact of inflation (p=0.948) confirms previous findings that structural elements hold greater importance for investors than price stability.

The study demonstrates how Trade Liberalization creates positive connections between trade activities and FDI and shows that policies which remove trade restrictions and develop export-focused infrastructure work effectively. The wage differential effect shows that maintaining competitive wage structures through labor market reforms attracts foreign investors. Monetary Policy can stimulate FDI inflows by implementing moderate interest rate policies which help reduce the negative effects associated with high interest rates. The positive connection between education and human capital development indicates potential workforce improvements even though it falls short of statistical significance by traditional measurement standards. The analysis shows country-specific factors explain 40.4% of variance illustrating how institutional and policy elements at the country level significantly impact FDI decisions beyond traditional economic variables. Policymakers must evaluate macroeconomic conditions together with institutional changes to create an attractive investment climate. Robust standard errors support these findings by showing statistical accuracy which facilitates reliable evidence-based policy development.

### 1.9.2 Recommendations

The fixed effects (FE) regression analysis reveals multiple robust results that carry significant policy implications. The improved precision of the model reinforces belief in the established link between unemployment and FDI which shows a negative correlation (-0.06042, $p<0.05$) because investors see labor market instability as a negative factor. The findings highlight the necessity of focused labor market reforms to boost the appeal of investments. The strong positive coefficient for trade openness (0.13743) with statistical significance ($p<0.01$) supports the effectiveness of trade liberalization policies in attracting foreign direct investment (FDI). The consistent lack of statistical significance in inflation across models reveals that this macroeconomic factor has less impact on investment choices than expected enabling governments to focus on other relevant aspects. The analysis reveals three key policy priority areas: The first policy priority should focus on trade integration strategies that use accelerated trade agreements and tariff reductions to tap into the FDI-trade complementarity. Policymakers should enforce macroeconomic stability measures including disciplined monetary policy to sustain investor trust. Policies for market expansion through demographic strategies are used to improve market-size benefits. Despite the significant role human capital development appears to play in FDI growth (0.00824, $p<0.01$), the low within-country $R^2$ value of 0.1340 indicates that structural reforms to improve institutional quality must accompany human capital development to maintain stable FDI growth rates. The effectiveness of policy adjustments in the short term must be complemented by institutional development in the long term to achieve sustainable results. The researchers advise the creation of economic strategies that target labor market conditions, trade policy, and macroeconomic stability all at once. The 40.4% variance explained by country-specific effects demonstrates how vital national context is for FDI decisions while implying that policies must be customized to fit specific national environments. Further studies should examine nonlinear effects between education and FDI while identifying omitted variables such as institutional quality that could enhance model accuracy. The research demonstrates that foreign investment sustainability requires both immediate economic actions and enduring structural changes through a balanced policy strategy.