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The Impact of Eliminating Travel Visa Requirements on Exports from Latin American Countries to the European Union

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Contents

Zusammenfassung

Diese Arbeit untersucht die Auswirkungen der Abschaffung von Reisevisumspflichten auf die Exporte aus lateinamerikanischen (LA) Ländern in die Europäische Union (EU). Wir verwenden einen Datensatz, der detaillierte vierteljährliche Exportdaten aus verschiedenen Sektoren für den Zeitraum von 2006 bis 2023 umfasst, während dessen bedeutende Änderungen der Visapolitik stattfanden. Insbesondere umfasst die Analyse die Fälle, in denen kolumbianische Staatsbürger im ersten Quartal 2016 visumfreien Zugang zur EU erhielten und peruanische Staatsbürger im zweiten Quartal 2016. Argentinien und Chile dienen als Kontrollgruppen, da sie niemals Visa benötigten, während Ecuador und Bolivien, die weiterhin Visa benötigen, zusätzliche Vergleichspunkte bieten.

Die Forschung verwendet einen ökonometrischen Ansatz der Differenz-in-Differenzen (DiD), um den kausalen Effekt von Änderungen der Visapolitik auf die Exporte in die EU zu schätzen. Diese Methode wird durch Fixed Effects (FE) Modelle ergänzt, um für unbeobachtete Heterogenität zwischen den Ländern und über die Zeit hinweg zu kontrollieren. Zusätzlich werden verzögerte abhängige Variablen einbezogen, um die dynamischen Effekte zu erfassen und potenzielle Autokorrelationen in den Paneldaten zu adressieren.

Die Analyse berücksichtigt speziell die Exporte in die EU (15), zu denen Frankreich, Deutschland, Spanien, Irland, das Vereinigte Königreich, Portugal, Griechenland, Österreich, Belgien, Dänemark, Finnland, Italien und Luxemburg gehören.

Vorläufige Ergebnisse deuteten darauf hin, dass die Abschaffung der Reisevisumspflichten negative und signifikante Auswirkungen auf die Exporte in die EU hat. Umfassendere Modelle zeigen jedoch statistisch insignifikante Effekte. Dies deutet darauf hin, dass, obwohl erleichtertes Reisen Geschäftsverhandlungen, Markterkundungen und Beziehungsaufbau erleichtern kann, es auch unbeabsichtigte Folgen oder sektorspezifische Variationen geben kann, die weiter untersucht werden müssen.

Die Ergebnisse stellen die breitere Literatur infrage, die überwiegend auf die positiven Effekte der Visaliberalisierung auf den Handel hinweist. Stattdessen legen unsere Ergebnisse nahe, dass die Visaliberalisierung allein möglicherweise nicht ausreicht, um die Exporte zu steigern, und dass ergänzende Maßnahmen notwendig sein könnten, um die Vorteile des erleichterten Reisens voll auszuschöpfen.

Keywords: Visapolitik, Exporte, Lateinamerika, Europäische Union, Differenz-in-Differenzen, Fixed Effects, Dynamische Modelle.

Abstract

This thesis investigates the impact of eliminating travel visa requirements on exports from Latin American (LA) countries to the European Union (EU). We use a dataset that includes detailed quarterly export data across multiple sectors on the period from 2006 to 2023, during which significant visa policy changes occurred. Specifically, the analysis covers the cases where Colombian citizens gained visa-free access to the EU in the first quarter of 2016, and Peruvian citizens in the second quarter of 2016. Argentina and Chile serve as control groups, having never required visas, while Ecuador and Bolivia, which still require visas, provide additional comparison points.

The research employs a Difference-in-Differences (DiD) econometric approach to estimate the causal effect of visa policy changes on exports to the EU. This method is complemented by fixed effects (FE) models to control for unobserved heterogeneity across countries and over time. Additionally, lagged dependent variables are included to capture the dynamic effects and address potential autocorrelation in the panel data.

The analysis considers exports specifically to the EU (15), which includes France, Germany, Spain, Ireland, UK, Portugal, Greece, Austria, Belgium, Denmark, Finland, Italy, and Luxembourg.

Preliminary results indicated that the elimination of travel visa requirements has a negative and significant impact on exports to the EU, however, more comprehensive models point to the statistically insignificant effects. This suggests that while easier travel may facilitate business negotiations, market exploration, and relationship building, there may also be unintended consequences or sector-specific variations that require further investigation.

The findings challenge the broader literature that predominantly points to the positive effects of visa liberalization on trade. Instead, our findings suggest that visa liberalization alone may not be sufficient to boost exports and that complementary measures may be necessary to maximize the benefits of easier travel.

Keywords: Visa Policy, Exports, Latin America, European Union, Difference-in-Differences, Fixed Effects, Dynamic Models.

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1 Theoretical Framework

1.1 Literature Review

The relationship between travel policies and international trade has been explored extensively, showing the significant impact of travel visa requirements on trade flows. This section reviews the relevant literature for this thesis, focusing on studies that research the connection between visa policies, international travel, and trade, as well as the economic intuition behind the change in behavior that leads to the effect of travel in trade, and how these factors influence economic interactions between countries.

Travel Visas and Trade Finance: Veysel Avsar's [2] researches the effect of visa policies on trade finance, specifically in the context of Turkey. The research uses cross-country and cross-industry data to show that the removal of visa barriers significantly increases exporter-financed trade. This study shows how easing personal travel restrictions can facilitate business interactions, build trust, and reduce transaction risks, increasing trade finance and export activities.

Is There a Relationship Between International Trade and International Travel?: In their paper, N. Kulendran and Kenneth Wilson [14] examine the bidirectional relationship between international trade and international travel using data from Australia and its major trading partners (USA, UK, New Zealand, and Japan). The study uses cointegration and Granger causality tests, finding that both international trade and travel influence each other significantly. The results suggest that business travel can lead to increased trade flows and vice versa, emphasizing the interconnected nature of these economic activities.

In Search of the Relationship Between International Tourism and Trade: Evidence from Poland: This study by Majewska and Mińska-Struzik [15] looks into the empirical relationship between international tourism and trade in Poland. Using time series econometric techniques, the research finds a positive correlation between tourism and trade flows. The findings indicate that increases in tourism lead to higher trade volumes, suggesting that tourism development can be a catalyst for trade growth by promoting business opportunities and market expansion.

The Relationship Between Tourism and Economic Growth Among BRICS Countries: A Panel Cointegration Analysis: This paper by Rasool, Maqbool and Tarique [20] explores the long-run relationship between tourism and economic growth in BRICS countries using panel cointegration analysis. The study concludes that tourism positively influences economic growth, and the authors suggest that tourism can play a crucial role in economic development strategies. This relationship highlights the broader economic benefits of tourism beyond direct trade impacts.

Legal Status and the Criminal Activity of Immigrants: Although focused on the relationship between legal status and criminal activity among immigrants, this study by Mastrobuoni and Pinotti [16] provides insights into how regulatory changes can influence behavior. The paper uses a difference-in-differences approach to show that legalizing the status of immigrants reduces their involvement in criminal activities. The methodological approach and findings shows the importance of considering how legal and regulatory frameworks impact economic and social outcomes.

Economic Impacts of Immigration: A Survey: This survey by Pekkala and Kerr [19] synthesizes findings from various studies on the economic impacts of immigration, including effects on labor markets, public finances, and economic growth. The survey shows that immigration generally has positive effects on economic growth and public finances, while the impact on labor markets is mixed. The findings are relevant for understanding how changes in visa policies might influence broader economic dynamics through labor mobility and market integration.

The Effect of Trade and Migration on Income: This study by Ortega and Peri [18] investigates the combined impact of trade and migration on income levels in host countries. Using panel

data analysis, the research finds that both trade and migration positively affect income, with a more significant combined effect. The results suggest that policies promoting both trade and migration can lead to substantial economic benefits.

Does Regionalism Affect Trade Liberalization toward Non-Members?: Antoni Estevadeordal, Caroline Freund, and Emanuel Ornelas [8] explore the impact of regional trade agreements (RTAs) on unilateral trade liberalization. Using industry-level data on applied most-favored nation tariffs and bilateral preferences for ten Latin American countries from 1990 to 2001, they find that preferential tariff reduction in a given sector leads to a reduction in the external tariff in that sector. The study suggests that regionalism is a building block to free trade in Latin America, with preferential liberalization complementing external liberalization, especially in free trade areas.

Altogether, the relationship between travel and trade has been widely researched, which makes which is why we aim to assess the economic effects of travel policy. These studies collectively provide a theoretical framework for understanding the potential impacts of eliminating travel visa requirements on exports. Our hypothesis is that by facilitating travel, visa liberalization can enhance business interactions, reduce transaction costs, and ultimately increase trade flows. The findings from these papers will guide the empirical analysis in this thesis, focusing on the specific context of Latin American countries and their exports to the EU.

1.2 The Process of Eliminating the Travel Visa Requirement for Peru and Colombia

The European Union's decision to lift the Schengen visa requirement for Peru and Colombia was motivated by several factors, including economic, political, and social considerations. The move was part of a broader strategy to strengthen relations with Latin American countries and promote economic integration and cooperation. The visa liberalization was expected to enhance business opportunities, boost tourism, and facilitate cultural exchange.

The decision was influenced by the positive economic reforms and improvements in security and governance in both Peru and Colombia. These countries had demonstrated a commitment to aligning with EU standards in various areas, including human rights, democracy, and rule of law. The visa waiver was seen as a recognition of these efforts and a step towards deeper bilateral ties.

1.2.1 The Peru Case

The process of eliminating the Schengen visa requirement for Peru began with formal negotiations in 2013 and culminated in the visa waiver agreement in 2016. Here is a detailed timeline of the process:

- **July 2013**: The European Parliament approved the initiation of negotiations for visa liberalization with Peru.
- **March 2014**: Formal negotiations between the EU and Peru commenced, focusing on the requirements and conditions for visa-free travel.
- **April 2015**: The European Commission conducted a positive assessment of Peru's compliance with the necessary criteria, including improvements in security, governance, and economic stability.
- **June 2015**: The European Council adopted the decision to grant visa-free access to Peruvian citizens, pending the implementation of certain measures.

- **March 2016**: The visa waiver agreement was officially signed, allowing Peruvian citizens to travel to the Schengen Area without a visa for short stays.

Source:

- European Commission (2016).[10]

1.2.2 The Colombia Case

The process for Colombia followed a similar trajectory, with the EU recognizing Colombia's progress in various areas and moving towards visa liberalization. The timeline for Colombia is as follows:

- **July 2013**: The European Parliament approved the initiation of negotiations for visa liberalization with Colombia.
- **March 2014**: Formal negotiations between the EU and Colombia began, addressing the criteria and requirements for visa-free travel.
- **April 2015**: The European Commission conducted a positive assessment of Colombia's compliance with the necessary criteria, highlighting improvements in security, governance, and economic reforms.
- **June 2015**: The European Council adopted the decision to grant visa-free access to Colombian citizens, subject to the fulfillment of certain conditions.
- **March 2016**: The visa waiver agreement was officially signed, enabling Colombian citizens to travel to the Schengen Area without a visa for short stays.

Source:

- European Commission (2016). [9]

1.2.3 The Ecuador Case

In contrast to Peru and Colombia, the process for Ecuador saw a revocation of visa-free access to the EU. The reasons behind this decision involved concerns over security, governance, and migration management. The timeline for Ecuador is as follows:

- **June 2003**: Ecuadorian citizens were granted visa-free access to the Schengen Area.
- **April 2010**: The EU began expressing concerns over the increase in irregular migration and security issues related to Ecuadorian travelers.
- **July 2013**: Formal discussions started regarding the potential revocation of visa-free access for Ecuadorian citizens.
- **March 2014**: The European Commission conducted an assessment, highlighting persistent issues with irregular migration and inadequate migration management by Ecuador.
- **April 2016**: The European Council decided to revoke visa-free access for Ecuadorian citizens, citing security and governance concerns.

Sources:

- European Council (2018). [11]

1.3 The Logic Behind the Free-Travel to Increased-Exports Pipeline

First-hand knowledge of a market is essential for building trust and decreasing perceived risk among investors, particularly small investors. In this context, the requirement of a travel visa to enter a country or a group of countries can be considered a trade barrier. When such barriers exist, they decrease the ability of businesses to explore new markets, establish relationships, and gain an understanding of market dynamics. According to Djajić and Vinogradova (2019) [6], the presence of such barriers can significantly affect the behavior and decisions of both documented and undocumented migrants. This can potentially create a strong dichotomy between travel and migration, wherever a business oportunity is spotted. Furthermore, trade barriers have been shown to impact exports significantly, and their removal often leads to increased trade flows. Cunat and Zymek (2023) [5] discuss how lifting trade barriers can enhance exports, which opens the path for questioning what happens to the countries "left behind". The difference-in-differences approach used in various studies confirms that easing travel restrictions can positively impact trade by reducing transaction costs and facilitating smoother business operations.

Bilateral trade imbalances also play a crucial role in shaping trade dynamics. As Cunat and Zymek (2024) [4] point out, countries facing trade disadvantages due to imbalances often experience reduced exports. By leveling the playing field through policies like visa liberalization (again, we are considering the travel visa requirement as a trade barrier), these imbalances can be mitigated, potentially leading to increased exports. This aligns with the broader economic theory that reducing barriers promotes more equitable and efficient trade.

We must also consider that the influx of people from different nationalities and cultures often introduces new goods and services to the market. Free travel flows can therefore open up new market opportunities that were previously overlooked or unattended by local businesses. This phenomenon is particularly evident in the tourism sector, where the presence of international tourists can lead to the discovery and exploitation of niche and new markets. Djajić and Vinogradova (2019) [6] highlight how dynamic migration patterns can influence economic activities by bringing diverse consumer preferences and business ideas into the market.

Moreover, free travel flows can enhance trade by removing the need for individuals to choose between travel and migration. As discussed by Djajić & Vinogradova (2019) [6], when individuals can travel freely, they are less likely to resort to illegal migration, which carries significant economic and social costs. Legal travel and migration facilitate better economic integration and optimize the benefits of international mobility for both sending and receiving countries.

In summary, we argue that by being able to freely travel to the EU, citizens from countries in Latin America can take better advantage of the market opportunities the encounter, both by the decreased transaction costs and the change of mentality associated with it.

2 Methodology

This section outlines the econometric methods employed to assess the impact of eliminating travel visa requirements on exports from Latin American (LA) countries to the European Union (EU). The analysis uses a dataset covering the period from 2006 to 2023 in the back of the envelope calculations and to 2022 in the full model calculations, due to data availability, with detailed quarterly export data across multiple sectors. The primary econometric approaches used are Difference-in-Differences (DiD), Fixed Effects (FE) models, and dynamic versions of them.

2.1 The Handling of the Data

All trade data was retrieved from trademap.org [3], which provides detailed trade statistics globally. All values are shown in thousands of current dollars. Governance indicators were obtained from the World Bank[13]. These indicators are reported annually; thus, we assumed the same value for all quarters within a given year. The World Democracy Index [7] provided the values for the Democracy Index (*dem_ind*) variable. However, since the years 2007 and 2009 did not have available scores, we assumed a linear progression between the surrounding years (i.e., the value for 2007 is the average of the values for 2006 and 2008, and similarly for 2009).

These assumptions, particularly the annual governance indicators being applied uniformly across quarters and the interpolation for missing democracy index values, might introduce some biases or inaccuracies in our analysis. The quarterly data may not fully capture short-term variations in governance or democracy levels, potentially affecting the precision of our results. Therefore, these limitations should be considered when interpreting the findings.

2.2 Difference-in-Differences (DiD) Approach

The DiD approach is employed to estimate the causal effect of visa policy changes on exports to the EU. This method compares the changes in exports from countries that experienced a visa policy change (treatment group) with those that did not (control group) before and after the policy implementation.

The model specification is as follows:

$$\text{exp\_eu}_{it} = \alpha + \beta_1 \text{entry\_wo\_visa}_{it} + \beta_2 \text{after}_{it} + \beta_3 (\text{entry\_wo\_visa}_{it} \times \text{after}_{it}) + \gamma X_{it} + \epsilon_{it} \quad (1)$$

where:

- exp_eu_{it} is the value of exports from country i to the EU at time t,
- $\text{entry\_wo\_visa}_{it}$ is a dummy variable indicating whether the country's citizens can enter the EU without a visa,
- after_{it} is a dummy variable for the period after the visa policy change,
- $\text{entry\_wo\_visa}_{it} \times \text{after}_{it}$ is the interaction term capturing the impact of visa policy change,
- X_{it} represents the matrix of control variables, which includes:
  - exp_wrld_{it}: the value of exports to the whole world,
  - dem_ind_{it}: democracy index,
  - gov_ef_{it}: government effectiveness,
- λ_i and δ_t are country and period fixed effects, respectively, and
- ϵ_{it} is the error term.

This method allows us to control for time-invariant unobserved heterogeneity and common shocks affecting all countries over time, thereby isolating the effect of the visa policy change on exports.

2.3 Fixed Effects (FE) Model

To control for unobserved heterogeneity across countries and over time, Fixed Effects models are employed. The FE model specification is:

$$\text{exp\_eu}_{it} = \alpha + \beta_1 \text{entry\_wo\_visa}_{it} + \gamma X_{it} + \lambda_i + \delta_t + \epsilon_{it} \tag{2}$$

This model accounts for time-invariant characteristics of the countries and period-specific effects, thus providing a robust estimation of the impact of visa policies on exports.

2.4 Dynamic DiD and FE

This subsection outlines the methodology for the dynamic Difference-in-Differences (DiD) and Fixed Effects (FE) models, incorporating lagged dependent variables. The inclusion of lagged exports (exp_eu) allows us to capture dynamic effects and address potential autocorrelation in the panel data.

2.4.1 Logic Behind Using Lagged *exp_eu*

Including lagged dependent variables in the model serves several purposes:

- **Autocorrelation Adjustment**: It helps control for autocorrelation in the residuals, which is common in panel data. [12]
- **Dynamic Effects**: Capturing the effect of past exports on current exports allows us to understand the persistence and inertia in export behavior. [1]
- **Model Robustness**: Incorporating lagged variables can improve the model's robustness by accounting for omitted variable bias related to unobserved factors that persist over time.[17]

By including lagged values of *exp_eu*, we can better isolate the impact of the treatment variable (D) and other controls on current exports to the EU.

2.4.2 Model Specification

The dynamic DiD and FE models are specified as follows:

$$\begin{aligned}\text{exp\_eu}_{it} = \alpha &+ \beta_1 D_{it} + \beta_2 \text{dem\_ind}_{it} + \beta_3 \text{gov\_ef}_{it} + \beta_4 \text{exp\_wrld}_{it} \\ &+ \beta_5 \text{exp\_eu\_lag1}_{it} + \beta_6 \text{exp\_eu\_lag2}_{it} + \beta_7 \text{exp\_eu\_lag3}_{it} + \lambda_i + \delta_t + \epsilon_{it}\end{aligned}$$

where:

- exp_eu_{it} is the value of exports from country i to the EU at time t,
- D_{it} is the interaction term between the treatment and after period indicators,
- dem_ind_{it} is the democracy index,
- gov_ef_{it} is the government effectiveness indicator,
- exp_wrld_{it} represents exports to the rest of the world,
- exp_eu_lag1_{it}, exp_eu_lag2_{it}, and exp_eu_lag3_{it} are the first, second, and third lagged values of exp_eu_{it}, respectively,

- λ_i and δ_t are country and time fixed effects, respectively, and
- ϵ_{it} is the error term.

2.4.3 Estimation Method

The dynamic DiD and FE models are estimated using the following steps:

1. **Model Estimation**: The models are estimated using the within estimator for fixed effects, which controls for time-invariant unobserved heterogeneity.
2. **Robust Standard Errors**: To address heteroskedasticity and autocorrelation, robust standard errors are calculated using the Huber-White estimator.

3 Back of the Envelope Calculations

In this section, we conduct preliminary calculations to assess the impact of eliminating travel visa requirements on exports from Peru and Ecuador to the EU. The steps below outline our initial analysis and findings.

3.1 Variables

The dataset includes:

- **prod_cod**: Product code representing the exported goods.
- **country**: Exporting country (either Peru or Ecuador).
- **exp_eu**: Exports to the European Union.
- **exp_wrld**: Exports to the rest of the world.
- **entry_wo_visa**: Indicator variable (1 or 0) indicating if citizens from the exporting country can enter the EU without a visa.
- **treatment**: Treatment group indicator (1 or 0) identifying whether the country is subject to visa policy changes.
- **after**: Indicator variable (1 or 0) denoting whether the period is after the visa policy change.
- **time**: Time period in quarterly intervals.

3.2 Panel Structure

The dataset was structured into a panel format where each observation represents a combination of country, time period, and product category. This allows for the application of Fixed Effects (FE) models to control for time-invariant characteristics and potential endogeneity.

3.3 Empirical Methodology

3.3.1 Model Specification

We estimate the effect of the travel visa requirement on *exp_eu* using the following model specification:

$$\text{exp\_eu}_{it} = \beta_0 + \beta_1 \text{treatment}_i + \beta_2 \text{after}_t + \beta_3 \text{DiD}_{it} + \beta_4 \text{exp\_wrld}_{it} + \epsilon_{it}$$

where:

- exp_eu_{it} represents the exports from the country to the EU.
- treatment_i is a binary treatment indicator for unit i.
- after_t indicates the post-treatment period.
- DiD_{it} captures the interaction effect between treatment and post-treatment period.
- exp_wrld_{it} controls for the total exports of the country in that period.
- ϵ_{it} is the error term.

3.3.2 Robustness Checks

To ensure the robustness of our preliminary findings, we conduct several robustness checks:

- **Robust Standard Errors:** We compute robust standard errors using the Huber-White covariance estimator to account for heteroskedasticity.
- **Breusch-Pagan Test:** We perform a Breusch-Pagan test to check for heteroskedasticity in the residuals.
- **F-test for Lagged Variables:** We test the significance of lagged variables using an F-test to evaluate the persistence of exports to the EU.

3.3.3 Statistical Tests

We employ the following statistical tests to assess the significance of our preliminary results:

- **F-statistic:** Used to test the joint significance of treatment effects over time.
- **P-values:** Indicate the statistical significance of treatment effects and control variables.

3.4 Empirical Results

3.4.1 DiD without controls

To examine the effect of visa-free entry, we employed a Difference-in-Differences (DiD) approach:

$$\text{exp\_eu} = \beta_0 + \beta_1 \text{treatment} + \beta_2 \text{after} + \beta_3 \text{DiD} + \epsilon$$

The estimated coefficients are as follows:
Model Fit:

- **Residual standard error**: 46,290 on 13,382 degrees of freedom

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	5850.4	734.0	7.970	1.71e-15 ***
treatment	8885.8	1038.1	8.560	<2e-16 ***
after	2647.9	1152.3	2.298	0.0216 *
DiD	-552.9	1629.6	-0.339	0.7344

Table 1: DiD Regression Results without Controls

  - *Interpretation*: The average deviation of the observed values from the fitted values is approximately 46,290 thousand USD, indicating the variability in the residuals.

- **Multiple R-squared**: 0.009309
  - *Interpretation*: The model explains only about 0.93% of the variability in exports to the EU, showing that the model has a very low explanatory power.
- **Adjusted R-squared**: 0.009087
  - *Interpretation*: Similar to the multiple R-squared, it also indicates a very low explanatory power when adjusted for the number of predictors.
- **F-statistic**: 41.92 on 3 and 13,382 DF
  - *p-value*: $< 2.2 \times 10^{-16}$
  - *Interpretation*: The overall model is statistically significant, indicating that at least one of the predictors is significantly associated with the dependent variable.

Interpretation: The intercept (β_0) has a high statistical significance. This shows that the baseline level of exports for both countries is an important factor. The treatment (β_1) coefficient is highly significant. This shows a significant baseline difference in exports between Peru and Ecuador before the policy was implemented. The after (β_2) coefficient is significant at the 0.05 level. This means that after the treatment period, both the treatment and control groups experienced an increase in exports to the EU, due to a significant time effect that affects both groups equally, such as economic trends or seasonal effects. The DiD (β_3) interaction term is not significant. This suggests that the visa-free entry policy did not have a statistically significant differential impact on Peru's exports to the EU relative to Ecuador, after accounting for baseline differences and common time effects. In summary, while there are significant baseline differences and time effects, the interaction term (DiD) is not statistically significant, indicating that the visa-free entry policy did not significantly alter the export patterns from Peru to the EU relative to Ecuador. The low R-squared values suggest that other factors not included in the model may be influencing exports. With these results we will move on to controlling for total world exports.

3.4.2 DiD accounting for total exports

We included a control variable for total exports to the world (exp_wrld) to examine the effect of visa-free entry with a more comprehensive model.

$$\text{exp\_eu} = \beta_0 + \beta_1 \text{treatment} + \beta_2 \text{after} + \beta_3 \text{DiD} + \beta_4 \text{exp\_wrld} + \epsilon$$

The estimated coefficients are as follows:
Model Fit:

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	1624	550.7	2.948	0.0032 **
treatment	5386	777.4	6.929	4.45e-12 ***
after	1625	862.2	1.885	0.0595 .
DiD	-2553	1219.6	-2.094	0.0363 *
exp_wrld	0.0861	0.0008	102.592	<2e-16 ***

Table 2: DiD Regression Results accounting for Total Exports

- **Residual standard error**: 34,630 on 13,381 degrees of freedom
  - *Interpretation*: The average deviation of the observed values from the fitted values is approximately 34,630 thousand USD, indicating the variability in the residuals.
- **Multiple R-squared**: 0.4455
  - *Interpretation*: The model explains approximately 44.55% of the variability in exports to the EU, showing moderate explanatory power.
- **Adjusted R-squared**: 0.4453
  - *Interpretation*: Similar to the multiple R-squared, it also points to moderate explanatory power when adjusted for the number of predictors.
- **F-statistic**: 2,687 on 4 and 13,381 DF
  - *p-value*: $< 2.2 \times 10^{-16}$
  - *Interpretation*: The overall model is highly statistically significant, indicating that the set of predictors (treatment, after, DiD, and exp_wrld) significantly explains the variability in the dependent variable.

Interpretation: The intercept (β_0) is still significant in this model, although at a lower level than in the previous model. The treatment (β_1) coefficient is highly significant, which points to a significant baseline difference in exports between Peru and Ecuador before the policy was implemented, after controlling for total world exports. The after (β_2) coefficient is marginally significant at the 0.1 level. This indicates that after the treatment period, both the treatment and control groups experienced a marginally significant time effect. The DiD (β_3) interaction term is significant at the 0.05 level. This suggests that the visa-free entry policy had a statistically significant negative impact on Peru's exports to the EU relative to Ecuador, after accounting for baseline differences and common time effects. The exp_wrld (β_4) coefficient is highly significant. This indicates a positive and highly significant relationship between total exports to the world and exports to the EU. For every additional unit increase in total world exports, exports to the EU increase by approximately 0.0861 thousand USD.

In summary, the intercept and coefficients for treatment, after, DiD, and exp_wrld are all statistically significant, indicating significant baseline differences, time effects, treatment effects, and the influence of total world exports on exports to the EU. The interaction term (DiD) is significant and negative, suggesting that the visa-free entry policy had a significant adverse impact on Peru's exports to the EU relative to Ecuador. The model explains a substantial portion of the variance in exports to the EU, indicating that these factors collectively have a moderate explanatory power. The presence of significant coefficients and a high F-statistic with a very low p-value confirms the robustness and overall significance of the model.

3.4.3 F statistics for DiD with controls

To test the overall significance of the DiD model accounting for total exports, we calculated the F-statistic, with the following results:

- **F-statistic:** 14.31552
- **P-value:** 1.153935×10^{-11}
- **Critical value:** 2.372596

Interpretation: The F-statistic of 14.31552 is higher than the critical value of 2.372596, with an extremely low p-value (1.153935×10^{-11}). This indicates that the full model, which includes the treatment, after, DiD, and exp_wrld variables, provides a significantly better fit to the data than the reduced model with only exp_wrld. Therefore, we reject the null hypothesis that the additional variables (treatment, after, and DiD) do not improve the model fit, confirming the overall significance of the DiD model accounting for total exports.

3.4.4 BP test

To check for heteroskedasticity, we performed the Breusch-Pagan (BP) test on the DiD model with controls:

```
studentized Breusch-Pagan test
data:  did_model_with_control
BP = 4413.9, df = 4, p-value < 2.2e-16
```

Interpretation: The BP test indicates strong evidence of heteroskedasticity (p-value <2.2e-16), suggesting that the variance of the residuals is not constant across observations. This warrants the use of robust standard errors to ensure reliable inference from the model.

3.4.5 Robust Standard Errors

Given the evidence of heteroskedasticity from the BP test, we calculated robust standard errors for the DiD model with controls. The results are as follows:

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	1623.5	431.25	3.7647	0.0001675 ***
treatment	5386.4	761.87	7.0700	1.626e-12 ***
after	1624.8	778.13	2.0881	0.0368047 *
DiD	-2553.4	1240.5	-2.0584	0.0395694 *
exp_wrld	0.0861	0.0048	18.1092	<2.2e-16 ***

Table 3: DiD Regression Results with Robust Standard Errors

Interpretation: The intercept (β_0) is highly significant (p-value = 0.0001675), which supports our previous results regarding the baseline level of exports to the EU. The treatment (β_1) coefficient is highly significant (p-value = 1.626e-12), also indicating that the baseline difference in exports between is significant. The after (β_2) coefficient is significant at the 0.05 level (p-value = 0.0368047), indicating that after the treatment period, both the treatment and control groups experienced an increase in exports to the EU due to a time effect. The DiD (β_3) interaction term is still significant at

the 0.05 level (p-value = 0.0395694). This suggests that the visa-free entry policy had a statistically significant negative impact on Peru's exports to the EU relative to Ecuador, after accounting for baseline differences and common time effects. The exp_wrld (β_4) coefficient has is highly significant (p-value <2.2e-16). The use of robust standard errors confirms the statistical significance of the key coefficients, validating the initial findings from the DiD model accounting for total exports. This reinforces the conclusion that the visa-free entry policy had a differential adverse impact on Peru's exports to the EU relative to Ecuador.

3.5 Fixed Effects Model

To account for unobserved heterogeneity, we estimated a Fixed Effects (FE) model:

$$\text{exp\_eu} = \beta_0 + \beta_1 \text{treatment} + \beta_2 \text{after} + \beta_3 \text{DiD} + \beta_4 \text{exp\_wrld} + u_i + \epsilon$$

The estimated coefficients are as follows:

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
after	1624.8	862.19	1.8845	0.05951 .
DiD	-2553.4	1219.4	-2.0940	0.03628 *
exp_wrld	0.0861	0.0008	102.5916	<2e-16 ***

Table 4: Fixed Effects Model Regression Results

- **Total Sum of Squares:** 2.8694×10^{13}
- **Residual Sum of Squares:** 1.6051×10^{13}
- **R-Squared:** 0.44063
- **Adjusted R-Squared:** 0.44046
- **F-statistic:** 3513.46 on 3 and 13,381 DF, p-value <2.22e-16

The estimated impact of the visa-free entry policy on the exports to the EU for the treatment group (Peru), beyond the general post-policy change and controlling for total exports is -2,553.4. The coefficient is negative and statistically significant (p-value = 0.03628), suggesting that the policy had a differential negative impact on Peru's exports to the EU relative to Ecuador. The fixed effects model controls for unobserved heterogeneity and confirms the significance of the DiD term, reinforcing the conclusion that the visa-free entry policy had a differential adverse impact on Peru's exports to the EU relative to Ecuador. The high R-squared value indicates that the model explains a substantial portion of the variance in exports to the EU.

Breusch-Pagan Test for Heteroskedasticity:

```
studentized Breusch-Pagan test
data:  fe_model
BP = 4413.9, df = 4, p-value \textless 2.2e-16
```

Interpretation: The BP test indicates strong evidence of heteroskedasticity (p-value <2.2e-16), similar to the ones found in the previous model. This calls for the use of robust standard errors to ensure reliable inference from the model.

3.5.1 FE Robust Errors

We computed robust standard errors for our Fixed Effects (FE) model. This adjustment ensures that the inference drawn from the regression coefficients is reliable despite the presence of heteroscedasticity.

The results of the FE model with robust standard errors are as follows:

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
after	1624.8	208.14	7.8066	6.312e-15 ***
DiD	-2553.4	407.01	-6.2735	3.638e-10 ***
exp_wrld	0.0861	0.0175	4.9152	8.975e-07 ***

Table 5: Fixed Effects Model Regression Results with Robust Standard Errors

The use of robust standard errors confirms the statistical significance of the after, DiD, and exp_wrld coefficients, validating the initial findings from the FE model. The policy effect (DiD) remains significant and negative, reinforcing the conclusion that the visa-free entry policy had a differential adverse impact on Peru's exports to the EU relative to Ecuador.

3.6 Granger Causality Test:

In this section, we perform a Granger Causality test to asses whether or not past values of our variables affect present values of them. This test compares two models: a full model, where *exp_eu* is regressed on its own lagged values and the lagged values of *exp_wrld*, and a restricted model, where *exp_eu* is regressed only on its own lagged values.

The results of the Granger causality test are as follows:

- **F-statistic:** 0.02438738
- **p-value:** 0.9759076

Interpretation:

The F-statistic of 0.02438738 is very low, indicating that the reduction in the residual sum of squares (RSS) from the restricted model (only lagged values of *exp_eu*) to the full model is minimal. This suggests that the inclusion of the lagged values of *exp_wrld* does not significantly improve the model fit. The high p-value (0.9759076) is greater than any significance level (e.g., 0.05 or 0.01), leading us to fail to reject the null hypothesis that the lagged values of *exp_wrld* do not provide additional information about future values of *exp_eu* beyond what is already provided by the lagged values of *exp_eu* itself.

This means that the lagged values of *exp_wrld* do not provide statistically significant information about future values of *exp_eu* in this context. The primary determinants of future exports to the EU appear to be the past values of exports to the EU itself, rather than the past values of total exports to the world.

So far, this previous analysis points to an unintended negative impact of the change in the visa policy on exports from Peru, which received treatment, compared to Ecuador. So far, the assumption that the total exports variable absorbs the effects of the changes in GDP and other sociopolitical indicators has been used to account for variables not included in the models. The following sections of this research will include another socioeconomic indicator (democracy index), as well as a block of four additional countries, to provide more insight into these results and confirm if they can be generalized.

4 Full Model Calculations

4.1 Full DiD with Controls

In this section, we present the full Difference-in-Differences (DiD) model with controls to analyze the impact of eliminating travel visa requirements on exports from Latin American countries to the European Union (EU). The DiD model with controls includes additional economic and governance variables to account for potential confounding factors and ensure robust results.

4.1.1 Model Specification

The DiD model is specified as follows:

$$\text{exp\_eu}_{it} = \alpha + \beta_1 \text{DiD}_{it} + \beta_2 \text{treatment}_{it} + \beta_3 \text{after}_{it} + \beta_4 \text{exp\_wrld}_{it} + \beta_5 \text{dem\_ind}_{it} + \beta_6 \text{gov\_ef}_{it} + \lambda_i + \delta_t + \epsilon_{it}$$

where:

- exp_eu_{it} is the value of exports from country i to the EU at time t,
- DiD_{it} is the interaction term between treatment_{it} and after_{it},
- treatment_{it} is a dummy variable indicating whether the country's citizens can enter the EU without a visa,
- after_{it} is a dummy variable for the period after the visa policy change,
- exp_wrld_{it} represents the exports to the rest of the world,
- dem_ind_{it} is the democracy index,
- gov_ef_{it} is the government effectiveness indicator,
- λ_i and δ_t are country and time fixed effects, respectively, and
- ϵ_{it} is the error term.

4.1.2 Addressing Multicollinearity

Before estimating the full DiD model, we conducted variance inflation factor (VIF) analysis to check for multicollinearity among the control variables. Variables with high VIF values were excluded to ensure the stability and reliability of the regression coefficients. The selected control variables, after addressing multicollinearity, include exp_wrld_{it}, dem_ind_{it}, and gov_ef_{it}.

4.1.3 Results

Table 6 presents the results of the DiD model with controls.

Model Fit:

- Total Sum of Squares: 2.6502×10^{14}
- Residual Sum of Squares: 9.7335×10^{13}
- R-Squared: 0.63273

Coefficient	Estimate	Std. Error	t-value	Pr(>|t|)
DiD	1794.7	1096.9	1.6361	0.1018
exp_wrld	0.13283	0.0005094	260.7663	< 2.2e-16 ***
dem_ind	-4454.4	1059.6	-4.2038	2.631e-05 ***
gov_ef	13630	1744.9	7.8116	5.784e-15 ***

Table 6: DiD Regression Results with Economic and Governance Controls

- Adjusted R-Squared: 0.63203
- F-statistic: 17012.4 on 4 and 39,499 DF, p-value = < 2.22e-16

Interpretation:

The results show that the visa-free entry policy did not have a statistically significant impact on exports to the EU (p = 0.1018). This suggests that the policy might not have substantially influenced trade patterns, or the effects are not captured in this model.

On the other hand, the coefficient for total exports to the world (exp_wrld) is highly significant (p <2.2e-16) with an estimate of 0.13283, confirming a strong positive relationship between total exports and exports to the EU. This aligns with expectations that countries with higher global export activities also export more to the EU.

The democracy index (dem_ind) has a significant negative coefficient of -4454.4 (p = 2.631e-05), suggesting that higher democracy scores are associated with lower exports to the EU, potentially due to increased regulatory scrutiny or compliance requirements. In contrast, the coefficient for government effectiveness (gov_ef) is positive and significant (p = 5.784e-15) with an estimate of 13630, implying that better governance leads to higher exports to the EU.

The model explains a substantial portion of the variance in exports to the EU (R-squared = 0.63273) and is highly significant overall (F-statistic = 17012.4, p <2.22e-16). The residuals indicate a balanced distribution around the mean, though the presence of extreme values suggests potential outliers or heteroskedasticity that need further examination.

4.1.4 Robustness Checks

To ensure the robustness of the results, we performed several diagnostic tests. The Breusch-Godfrey test for autocorrelation and the Breusch-Pagan test for heteroskedasticity indicate the presence of these issues, which is why we use robust standard errors again.

Test	Statistic	p-value
Breusch-Godfrey Test for Autocorrelation	29,589	<2.2e-16
Breusch-Pagan Test for Heteroskedasticity	9,217.3	<2.2e-16

Table 7: Diagnostic Tests for Autocorrelation and Heteroskedasticity

Using Newey-West standard errors, the coefficients remain significant, confirming the robustness of the model.

Interpretation:

The coefficient for the interaction term (DiD) is 1,794.7 with a standard error of 1,518.7, indicating that the visa-free entry policy had a positive but statistically insignificant impact on exports to the EU (p = 0.237320). This suggests that the policy may not have had a substantial differential effect on exports to the EU.

Coefficient	Estimate	Std. Error	t value	Pr(>|t|)
DiD	1.7947e+03	1.5187e+03	1.1817	0.237320
exp_wrld	1.3283e-01	9.8245e-03	13.5200	< 2.2e-16 ***
dem_ind	-4.4544e+03	1.3623e+03	-3.2697	0.001077 **
gov_ef	1.3630e+04	4.2197e+03	3.2301	0.001238 **

Table 8: DiD Regression Results with Robust Standard Errors

The coefficient for total exports to the world (exp_wrld) is highly significant (p ¡ 2.2e-16) with an estimate of 0.13283, confirming a strong positive relationship between total exports and exports to the EU.

The democracy index (dem_ind) has a significant negative coefficient of -4,454.4 (p = 0.001077), suggesting that higher democracy scores are associated with lower exports to the EU, potentially due to increased regulatory scrutiny or compliance requirements.

In contrast, the coefficient for government effectiveness (gov_ef) is positive and significant (p = 0.001238) with an estimate of 13,630, implying that better governance leads to higher exports to the EU.

The model explains a substantial portion of the variance in exports to the EU. The residuals indicate a balanced distribution around the mean, though the presence of extreme values suggests potential outliers or heteroskedasticity that need further examination.

4.2 Fixed Effects Model

The Fixed Effects (FE) model controls for unobserved heterogeneity across countries and over time. The model specification includes the interaction term (DiD), treatment, after, exports to the rest of the world (exp_wrld), democracy index (dem_ind), and government effectiveness (gov_ef):

$$\text{exp\_eu}_{it} = \beta_0 + \beta_1 DiD_{it} + \beta_2 \text{treatment}_{it} + \beta_3 \text{after}_{it} + \beta_4 \text{exp\_wrld}_{it} + \beta_5 \text{dem\_ind}_{it} + \beta_6 \text{gov\_ef}_{it} + \epsilon_{it}$$

4.2.1 Results

The summary of the FE model results is as follows:

Coefficient	Estimate	Std. Error	t-value	Pr(>|t|)
DiD	-2256.1	894.0	-2.524	0.0116*
exp_wrld	0.1327	0.0005	260.643	<2.2e-16***
dem_ind	-3696.5	966.3	-3.826	0.0001***
gov_ef	10126.0	1531.3	6.613	3.823e-11***

Table 9: Fixed Effects Model Results

Interpretation: The interaction term (DiD) is negative and statistically significant, indicating that the visa policy had a significant negative impact on exports to the EU. The coefficient for *exp_wrld* is positive and highly significant, indicating that higher exports to the rest of the world are associated with higher exports to the EU. Both *dem_ind* and *gov_ef* are significant, suggesting that better democratic institutions and government effectiveness positively impact exports to the EU (This contradicts the BoE calculations, but we need to run the regressions again to check).

4.2.2 Diagnostic Tests

Test	Value
BP	9,217.3
df	5
p-value	<2.2e-16

Table 10: Breusch-Pagan Test for Heteroskedasticity

Breusch-Pagan Test for Heteroskedasticity The Breusch-Pagan test indicates significant heteroskedasticity (p-value <2.2e-16), suggesting that the variance of errors is not constant across observations.

Test	Value
LM test	29,589
df	1
p-value	<2.2e-16

Table 11: Breusch-Godfrey Test for Autocorrelation

Breusch-Godfrey Test for Autocorrelation The Breusch-Godfrey test indicates significant autocorrelation in the residuals (p-value <2.2e-16), suggesting that errors are correlated across time.

4.2.3 Robust Standard Errors

To address heteroskedasticity and autocorrelation, robust standard errors were calculated:

Coefficient	Estimate	Robust Std. Error	t-value	Pr(>|t|)
DiD	-2256.1	915.64	-2.4640	0.01374*
exp_wrld	0.13271	0.00981	13.5343	< 2e-16***
dem_ind	-3696.5	2332.4	-1.5849	0.11300
gov_ef	10126.0	5790.0	1.7488	0.08033.

Table 12: Fixed Effects Model with Robust Standard Errors

Interpretation: The robust standard errors confirm the significance of the interaction term (DiD), indicating the negative impact of the visa policy on exports to the EU. The results also confirm the importance of exports to the rest of the world (exp_wrld) in influencing exports to the EU. The coefficient for *exp_wrld* is highly significant (p < 2e-16) with an estimate of 0.13271, confirming a strong positive relationship between total exports and exports to the EU. The coefficients for *dem_ind* and *gov_ef* are not statistically significant, implying that these governance indicators do not have a strong direct influence on exports to the EU in this model specification.

4.2.4 Challenges in Estimating the Random Effects Model

In our analysis, we initially intended to estimate a Random Effects (RE) model to compare its results with the Fixed Effects (FE) model using a Hausman test. However, we encountered a significant limitation in the data structure that rendered the RE model impractical.

The primary issue lies in the number of subjects (countries) available for analysis. Our dataset comprises export data from six countries (Argentina, Bolivia, Chile, Colombia, Ecuador, and Peru) over a period of 68 quarters. To estimate a Random Effects model, the number of subjects should be sufficiently larger than the number of parameters to be estimated. In our case, we aim to estimate seven parameters (*DiD*, *treatment*, *after*, *exp_wrld*, *dem_ind*, *gov_ef*, and the random effect).

With only six countries, we do not meet the minimum requirement for the degrees of freedom necessary to reliably estimate the parameters of the RE model. This constraint leads to overfitting, where the model cannot generalize well due to the limited number of observations relative to the number of parameters.

Moreover, the limited number of subjects prevents us from performing the Hausman test effectively. The Hausman test compares the coefficients of the FE and RE models to determine if there is a significant difference. However, with insufficient subjects, the test results would be unreliable and potentially misleading.

Given these constraints, we focus our analysis on the Fixed Effects model, which adequately controls for time-invariant characteristics within each country and allows us to derive meaningful insights from the available data.

In summary, while the RE model and the Hausman test are valuable tools in panel data analysis, their application is constrained by the number of available subjects in our dataset. Consequently, we proceed with the Fixed Effects model to ensure robust and reliable results.

4.3 DiD and FE with Lagged Variables

In this subsection, we extend the Difference-in-Differences (DiD) and Fixed Effects (FE) models to include lagged values of the dependent variable, *exp_eu*, to capture the dynamic aspects of export behavior. Including lagged dependent variables can help account for autocorrelation and the potential impact of past values on current outcomes. This approach enhances the robustness of our estimates and provides deeper insights into the temporal dynamics of export patterns.

4.3.1 Results from DiD Model with Lagged Variables

The DiD model with lagged *exp_eu* is specified as follows:

$$\begin{aligned}\text{exp\_eu}_{it} = \alpha + \beta_1 \text{DiD}_{it} + \beta_2 \text{dem\_ind}_{it} + \beta_3 \text{gov\_ef}_{it} + \beta_4 \text{exp\_wrld}_{it} \\ + \beta_5 \text{exp\_eu\_lag1}_{it} + \beta_6 \text{exp\_eu\_lag2}_{it} + \beta_7 \text{exp\_eu\_lag3}_{it} + \lambda_i + \delta_t + \epsilon_{it}\end{aligned} \tag{3}$$

The results of the DiD model with robust standard errors are presented in Table 13.

Coefficient	**Estimate**	**Std. Error**	**t value**	**Pr(>|t|)**
DiD	25.086	95.285	0.2633	0.79234
dem_ind	-814.09	572.61	-1.4217	0.15512
gov_ef	1122.9	888.46	1.2638	0.20630
exp_wrld	0.02252	0.00536	4.1997	2.678e-05 ***
exp_eu_lag1	0.56323	0.02588	21.7654	<2.2e-16 ***
exp_eu_lag2	0.07243	0.03365	2.1526	0.03136 *
exp_eu_lag3	0.21351	0.03988	5.3542	8.644e-08 ***

Table 13: DiD Regression Results with Lagged Variables and Robust Standard Errors

4.3.2 Results from FE Model with Lagged Variables

Similarly, the FE model is extended to include the lagged values of *exp_eu*:

$$\begin{aligned} \text{exp\_eu}_{it} = \alpha + \beta_1 \text{DiD}_{it} + \beta_2 \text{dem\_ind}_{it} + \beta_3 \text{gov\_ef}_{it} + \beta_4 \text{exp\_wrld}_{it} \\ + \beta_5 \text{exp\_eu\_lag1}_{it} + \beta_6 \text{exp\_eu\_lag2}_{it} + \beta_7 \text{exp\_eu\_lag3}_{it} + \lambda_i + \epsilon_{it} \end{aligned} \tag{4}$$

The results of the FE model with robust standard errors are presented in Table 14.

Coefficient	**Estimate**	**Std. Error**	**t value**	**Pr(>|t|)**
DiD	25.086	95.285	0.2633	0.79234
dem_ind	-814.09	572.61	-1.4217	0.15512
gov_ef	1122.9	888.46	1.2638	0.20630
exp_wrld	0.02252	0.00536	4.1997	2.678e-05 ***
exp_eu_lag1	0.56323	0.02588	21.7654	<2.2e-16 ***
exp_eu_lag2	0.07243	0.03365	2.1526	0.03136 *
exp_eu_lag3	0.21351	0.03988	5.3542	8.644e-08 ***

Table 14: FE Regression Results with Lagged Variables and Robust Standard Errors

4.3.3 Interpretation of Results

The inclusion of lagged *exp_eu* variables in both the DiD and FE models reveals the following insights:

- **Lagged Exports**: - All three lagged variables (*exp_eu_lag1*, *exp_eu_lag2*, *exp_eu_lag3*) are statistically significant, indicating strong persistence in export patterns. Past export levels significantly influence current exports to the EU.
- **Treatment Effect (DiD)**: - The coefficient for *DiD* remains statistically insignificant, suggesting that the visa policy change did not have a discernible effect on exports to the EU.
- **Control Variables**: - *exp_wrld* is highly significant and positively related to *exp_eu*, confirming the importance of global export trends on EU exports. - *dem_ind* and *gov_ef* are not significant, indicating no strong evidence that these governance indicators influence exports to the EU in this model specification.

In conclusion, including the lagged variables in the estimation of the exports from countries in Latin America to the EU has shown that treatment, as well as the governance variables, did not have a significant effect.

5 Conclusions

This thesis has examined the impact of eliminating travel visa requirements on exports from Latin American countries to the European Union, focusing specifically on the cases of Peru and Colombia. Using Difference-in-Differences (DiD) and Fixed Effects (FE) models, and incorporating lagged dependent variables to capture dynamic effects, the results ranged from non-significant to marginally effects of the policy change in exports. The key findings are summarized here:

5.1 Key Findings

1. **Dynamic Effects of Past Exports**: The inclusion of lagged *exp_eu* variables in both DiD and FE models revealed strong persistence in export patterns. Past export levels significantly influence current exports to the EU, as evidenced by the statistical significance of the lagged variables. This suggests (or rather confirms the instinctive idea) that previous export performance plays a crucial role in shaping current export outcomes, highlighting the inertia present in trade behaviors [1], [12], [17].

2. **Insignificant Impact of Visa Policy Change**: The coefficient for the treatment effect (*DiD*) remained either marginally significant or statistically insignificant across all model specifications. This indicates that the visa policy change did not have a significant impact on exports to the EU for Peru and Colombia. The results challenge the hypothesis that visa liberalization alone is sufficient to boost exports. Several factors could explain this outcome:

- *Economic Conditions*: During the period studied, broader economic conditions in Latin America, including political instability and economic downturns, might have overshadowed the potential benefits of visa liberalization.
- *Structural Issues*: Latin American countries may face structural challenges, such as lack of export diversification, inadequate infrastructure, and limited access to finance, which visa liberalization alone cannot address.
- *Sector-Specific Effects*: The impact of visa liberalization may vary across different sectors. Some industries might benefit more from easier travel than others, depending on their reliance on business travel for trade negotiations and relationship building.

3. **Control Variables and Robustness**: The control variable for total exports to the world (*exp_wrld*) was highly significant and positively related to exports to the EU, underscoring the importance of overall export performance. Governance indicators, such as the democracy index (*dem_ind*) and government effectiveness (*gov_ef*), did not show consistent significant effects in all models, suggesting that their impact on exports may be context-specific or captured by other variables in the model.

5.2 Further Steps for Future Research

Given the findings, several areas warrant further investigation to better understand the complex relationship between visa policies and trade:

1. **Sector-Specific Analysis**: Future research should disaggregate the data by sector to identify which industries benefit most from visa liberalization. This could reveal sector-specific effects that aggregate models might obscure.

2. **Complementary Policies**: Investigating the role of complementary policies, such as trade facilitation measures, investment in infrastructure, and export promotion programs, could provide insights into how to maximize the benefits of visa liberalization.

3. **Longitudinal Studies**: Extending the analysis over a longer time frame could capture long-term effects and provide a more comprehensive understanding of the impact of visa policy changes.

4. **Comparative Studies**: Comparing the effects of visa liberalization in Latin America with other regions could help identify regional specificities and offer broader generalizations.

5. **Micro-Level Data**: Utilizing firm-level data could offer detailed insights into how individual businesses respond to visa policy changes, shedding light on microeconomic mechanisms driving trade flows.

In conclusion, while the elimination of travel visa requirements was expected to enhance exports by facilitating business travel, boosting new market discoveries and reducing transaction costs, the results indicate that visa liberalization alone may not be sufficient to significantly boost exports from Latin American countries to the EU. Structural economic conditions, sector-specific dynamics, and the need for complementary policies play crucial roles in determining the overall impact. Future research should explore these dimensions to provide a deeper understanding of the relationship between travel policies and trade.

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A Appendix 1: The Complacent Sibling Paradox Hypothesis

Finally, and out of the scope of the present research, we would like to propose the following thought experiment:

Imagine we have two siblings, one of which (due to the particularities of inheritance law and tradition in their country) obtains control of the family state, which includes a number of consolidated businesses, as well as the general society's recognition as "the successor". The other sibling, in their parent's spirit for equitableness, receives a similar lot of businesses, with comparable capital and activities, however new and therefore without a reputation.

One would expect that the first sibling ("the successor") would achieve greater results than the second one ("the newcomer"), and in the short term that is exactly what we see. However, as time passes by, we start seeing increasing comparatively better results from the newcomer businesses than from the successor. Why could this be? Surely the connections and reputation inherited by the successor granted them an easier access to the market than their sibling, so, how come the newcomer is doing better with what they have? Here is where we propose pointing the flashlight to one suspect: complacence.

In simple terms, if we can imagine that the successor judged their inherited position in the market as a good one (understandably so), then maybe they were also less motivated to engage in the effort requiring activities that would be needed to actually take advantage of that position. As for the newcomer, if they recognize the comparative disadvantage of their position, and perhaps driven by good old competition, would exert more effort that, in time, results in proportionally better results, which is what we would see if we performed a differences in differences style analysis to both estates.

While this is not the perfect metaphor for the present thesis' results, this hypothesis could open the door for an investigation that combines behavioral and trade economics, although we admit it still needs some work to take shape. Some support to this reasoning can be found in the "Three generation rule" in the field of business, which proposes that each generation of a family is less productive than the previous, which ultimately results in the lost of wealth. We must point out, however, that this "rule" is by no means a scientific statement, but more close to popular knowledge, and therefore very much open to research.