Quantifying Westernization: Measuring Its Impact and Influences

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1 Introduction

The concept of Westernization has long been a subject of academic inquiry, representing the extent to which countries align with socio-political and economic norms often associated with liberal democratic principles, individual freedoms, and market-driven economies. However, defining and measuring Westernization remains a challenge due to its inherently multidimensional nature. This report addresses this challenge by developing a Westernization metric, a data-driven approach to quantify the degree of alignment with Western norms.

The metric is derived from cultural and societal survey data, processed to identify underlying differences in cultural dimensions between different countries, and by grouping countries into different clusters according to their socio-cultural resemblance. By employing multidimensional scaling (MDS) and clustering algorithms, the report not only provides a robust measure of the cultural dimensions behind Westernization but also investigates its evolution over time and its socio-economic impacts.

The analysis integrates data from the World Values Survey (WVS, 2020) and complementary sources, enabling the creation of a panel dataset for 52 countries over multiple decades. This dataset allows for the exploration of Westernization's relationship with economic performance, democratic governance, and other key indicators. By examining trends and relationships, the study contributes to our understanding of the cultural, political, and economic trajectories of countries within the context of global development.

This report focuses on three key components: the development of the Westernization metric, the clustering of countries based on cultural dimensions, and the application of the metric in econometric regressions. These components collectively shed light on the role of Westernization in shaping socio-economic and political outcomes, offering a comprehensive framework for future research.

2 Goals

This project aims to achieve the following objectives:

2.1 Clustering and Classification of Countries

- Analyze and group countries based on six cultural dimensions derived from 35 selected survey questions, representing aspects such as values, political systems, and economic attitudes.
- Identify groups of countries with shared cultural characteristics, and more particularly a "Western cluster" to serve as a reference point for the Westernization metric and assess the stability and robustness of clusters.

2.2 Development of a Quantitative Metric for Westernization

- Create a robust, multi-dimensional indicator of Westernization derived from cultural and societal data.
- Define a Westernization metric based on the distance of countries to a "Western cluster," capturing changes over time.

2.3 Application of the Metric in Econometric Analysis

- Investigate the relationship between Westernization and key socio-economic variables such as GDP growth, crime rates, unemployment, and education.
- Explore the influence of democratic governance on Westernization by regressing the Westernization metric on lagged democracy index values.
- Evaluate the impact of Westernization on economic outcomes using two-way fixed effects regressions with robust standard errors.

2.4 Innovative Solutions for Cross-Country Comparisons

- Address challenges related to country-specific fixed effects by developing cluster-level fixed effects based on cultural dimensions rather than geographical groupings.
- Demonstrate how these refined clusters can improve the precision of cross-country analyses, particularly when traditional econometric methods face limitations.

By achieving these goals, the project not only contributes to the quantification of Westernization but also provides insights into its implications for global development, fostering a deeper understanding of the cultural, political, and economic transformations shaping the modern world.

3 Methodology and Data

3.1 Datasets

The data used can be split into (1) the data used to find the Westernization metric, and (2) the data used to test and use the metric in regression analysis.

The first dataset comes from the World Values Survey (WVS), covering all seven waves to maximize observations. Initially, the data contained individual-level numeric responses from survey participants in each country, indicating degrees of agreement or disagreement with cultural and societal questions (e.g., 1 for strong agreement, 4 for strong disagreement). Since our purpose was to create a country-level metric, we decided to compute the weighted average response for each question by country such that each row represented a country at a certain wave, and each column a question. For questions with missing values, we imputed them using the mean. We also tested imputation using the median but observed negligible differences in results, so we proceeded with the mean.

The WVS dataset contains numerous questions. We selected 35 questions across 6 cultural dimensions that we considered relevant for describing traits of the degree of Westernization: important in life (6 questions), men versus women (3 questions), justifiable actions (9 questions), political system (4 questions), future changes and political actions (8 questions), and economic inclinations (5 questions).

For the regression, we used panel data from six datasets, five from the World Bank data[1] and another one extracted from an article by Skaaning et al. (2015) with data containing the electoral democracy index. The countries included are only 52 out of the 105 countries of the WVS dataset. The reason is that to perform two-way fixed effect regressions, we wanted to keep countries for which we had data for at least three periods (i.e., three waves). Since our regressions include the developed metric, which is obtained from the WVS, we filtered how many countries in the WVS were present in more than 2 waves, and we found out there were only 52.

The first five regression variables and their World Bank proxies are: crime rate (international homicides per 100,000 people), unemployment rate (unemployment, total % of labor force), education (School life expectancy, primary and secondary, both sexes (years)), GDP growth rate (GDP growth (annual %)), and GDP per capita (GDP per capita, PPP, current international $). To align with the wave structure, we computed the mean of the variables across the years of each wave, resulting in a dataset with rows representing countries at specific waves and columns for each variable. In case of missing values for certain years, the mean was computed taking only into account the years for which the information was available.

3.2 Obtaining the Metric

3.2.1 Dimensionality Reduction

Our original dataset contains 35 variables, so our first goal was to reduce dimensionality in an effort to reduce redundancies between variables. Given that our data conveyed cultural

[1] Which spanned from 1995 to 2022 (we excluded the first two waves due to data limitations)

information, which might not be linearly related, we decided to use multidimensional scaling (MDS) instead of principal component analysis. As our data was continuous and numeric (weighted averages), we decided to apply classical MDS. However, when computing the stress values, we noticed they were quite high, so we tried using non-metric MDS (NMDS), for which we obtained better results.

Before that, we constructed the distance matrix. As stated, the number of questions per dimension is unbalanced. To give equal importance to each dimension, we computed six separate distance matrices (one for each of the dimensions) and then aggregated them to obtain the overall distance matrix.

We performed MDS on three distance matrices (Euclidean, Manhattan, and Mahalanobis). We decided to choose the Manhattan distance matrix because it was the one that minimized the stress value for both classical and non-metric MDS. In the case of two dimensions:

- Classical MDS stress: Manhattan = 0.41; Mahalanobis = 0.58; Euclidean = 0.45
- Kruskal stress for NMDS: Manhattan = 0.18; Mahalanobis = 0.25; Euclidean = 0.19

We decided that the number of dimensions would be 2 based on a scree plot of the stress values and the elbow method criteria, which allowed us to plot the MDS result on a 2D plot.

3.2.2 Clustering

Since our goal is to find a Westernization metric, the next step was to group countries to see if one of the groups could be thought of as the Western cluster (i.e., if countries that nowadays are considered westernized are grouped together because they have similar scores for the chosen dimensions).

We decided to group them using the k-means algorithm. Based on a scree plot with the number of clusters on the x-axis and the total within sum of squares on the y-axis, we applied the elbow method for minimizing the within sum of squares, and noticed that the optimal number of clusters should be three. We also looked at the Calinski-Harabasz Index, which suggested $k = 2$. We proceeded with $k = 3$ because it was more intuitive according to the countries.

The robustness of our clusters was tested in two ways. Firstly, we applied bootstrapping and obtained stability scores for each of the clusters (0.8481764, 0.9227153, 0.8741454). All of them were above 80%, meaning that the clusters are quite stable. The purpose of the second approach was to test if the clusters were stable given different initializations of the centroids (we wanted to account for randomness). We did that by computing k-means multiple times and storing the cluster assignment of all observations. Then we compared, using the Rand Index (GeeksforGeeks, 2024a), the similarity between the first classification and all of the others (pairwise comparisons). The index was higher than 0.8 for most iterations, confirming again the stability of the clusters.

3.2.3 Distance to the Western Cluster

After identifying a robust Western-labeled cluster, we could proceed with the metric computation. This metric is defined as the difference between two distances:

1. The distance of a country in its earliest wave to the western cluster.

2. The distance of the same country in its latest wave to the western cluster.

Countries with a positive metric have become more westernized, whereas countries with a negative metric have 'anti-westernized.'

To compute the distance, we first defined the 'western cluster perimeter' as the smallest convex set that encloses all the points of the western cluster. This is achieved by using the convex hull algorithm (GeeksforGeeks, 2024b). The distance from a country at a certain wave (observation) to the western cluster was computed as the minimum distance between the observation and the convex hull boundary.

3.3 Obtaining the Regressions

Regressions were computed using the two-way fixed effects method, with robust standard errors to account for heteroskedasticity. Observations with missing values were excluded. Three main types of regressions were conducted:

1. We regressed the distance to the western cluster on lagged values of the democracy index. For example, in the case of the USA in wave 7 (USA7), the corresponding period range spans from 2017 to 2022. In this case, we used the first available democracy index value from the relevant lag. Assuming lag=10, the lagged period would consist of 2007–2022. If data on the democracy index were available for 2022, that would be the value assigned.

2. We regressed the crime rate on the other World Bank variables, the distance to the western cluster, and the same distance squared.

    - Case 1: regression for all observations in the dataset (countries at different waves)
    - Case 2: only for the last observation of a country (countries in the last wave)

3. We regressed GDP growth on the distance to the western cluster and the same distance squared, the clustering assignment ('Cluster'), GDP per capita, the unemployment rate, and education.

4 Results

Using Multidimensional Scaling (MDS), we successfully visualized and analyzed the similarities and differences between countries over time in selected socio-cultural dimensions. By projecting high-dimensional data into a two-dimensional space, the scatterplot allows us to observe that countries closer to one another on the plot are more similar in the analyzed socio-cultural aspects (Figure 1).

We further categorized the countries into three distinct clusters based on their socio-cultural characteristics as seen in the 2D MDS Plot with Clusters, with the assumption that countries within the same cluster share inherent social and cultural traits (Figure 2). Notably, Cluster 1 (depicted as orange dots) emerged as the Western cluster, comprising countries

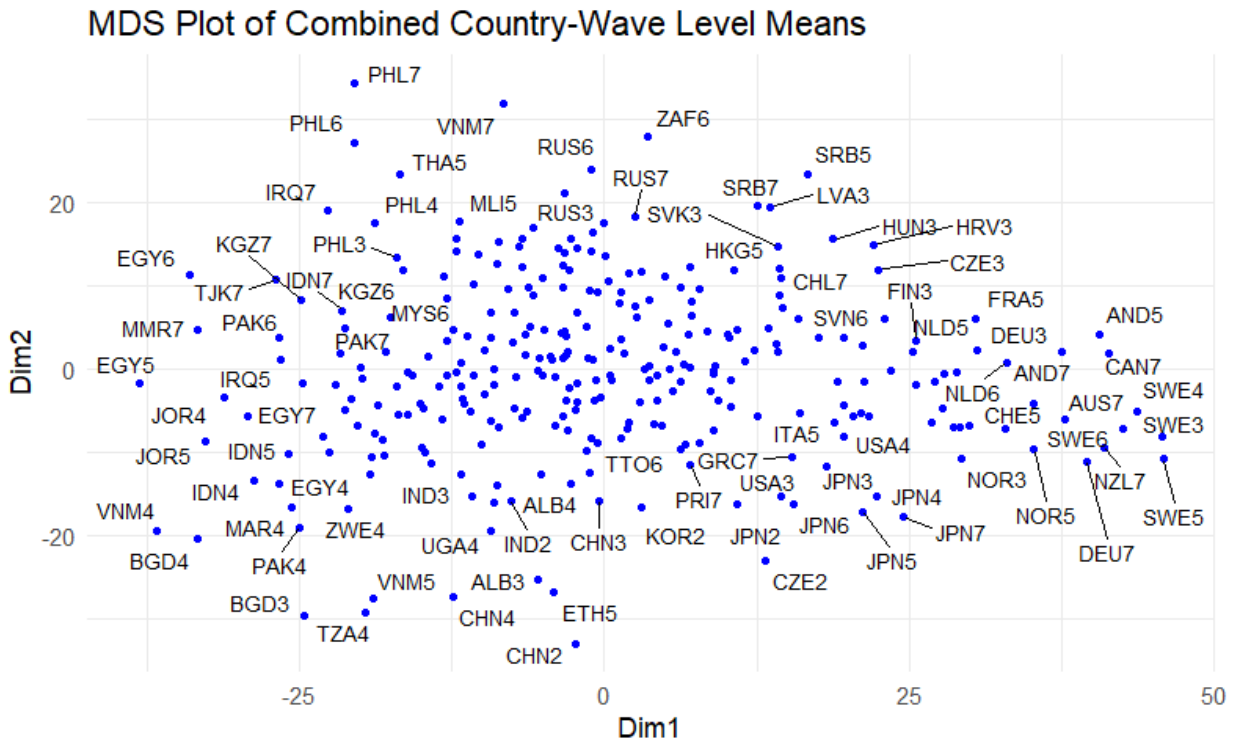

Figure 1: Countries Representation According to WVS

closely associated with liberal democratic principles, individual freedoms, and market-driven economies. Examples of countries in this cluster include modern-day Canada, Germany, Japan, Sweden, and New Zealand. The identification of this cluster enabled us on one hand to quantify the dissimilarity of any country relative to the Western core by calculating the distance of said country to the border of Cluster 1, and on the other hand to study how this dissimilarity evolved over time.

4.1 Shifts in Westernization

Analyzing changes in the distance to the cluster over time, we observed that the countries which shifted the most toward Western values were Chile, Guatemala, Vietnam, Taiwan, and Puerto Rico (Figure 3 & 4). These countries showed increasing alignment over time with the socio-cultural and economic norms of the Western cluster. Conversely, the countries that exhibited the greatest movement away from Westernization were Kyrgyzstan, Nigeria, the Philippines, Romania, and Pakistan (Figure 5 & 6). These countries experienced increasing dissimilarity from Western values across the analyzed period.

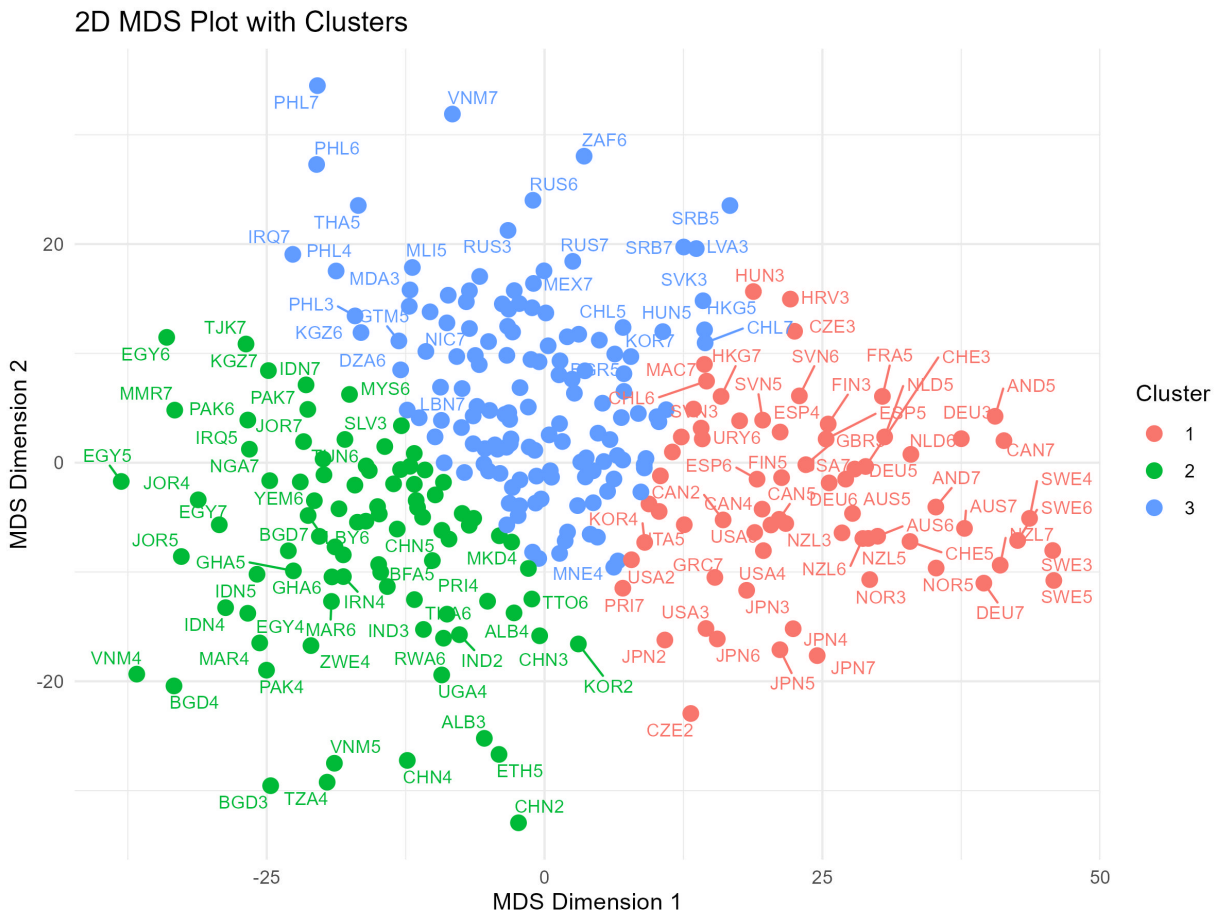

Figure 2: Clustered Countries

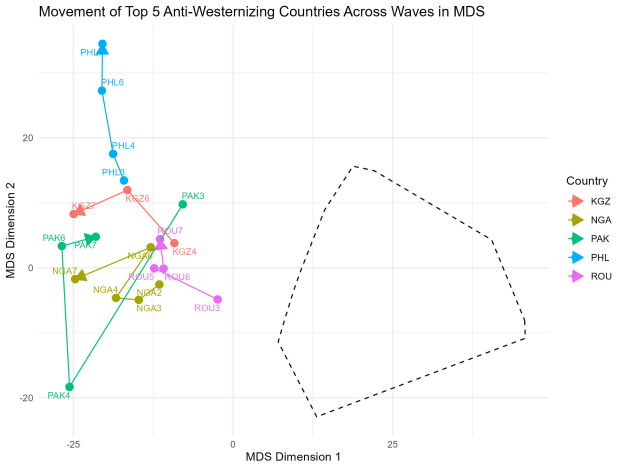

Figure 3: Top-5 Countries' Movement that Anti-Westernized the Most

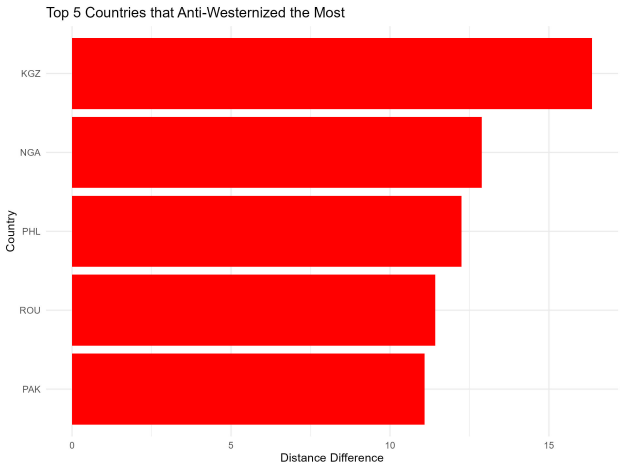

Figure 4: Top-5 Countries that Anti-Westernized the Most

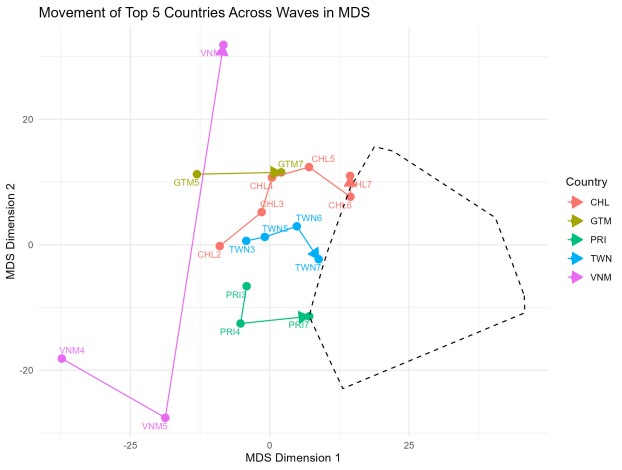

Figure 5: Top-5 Countries' Movement that Westernized the Most

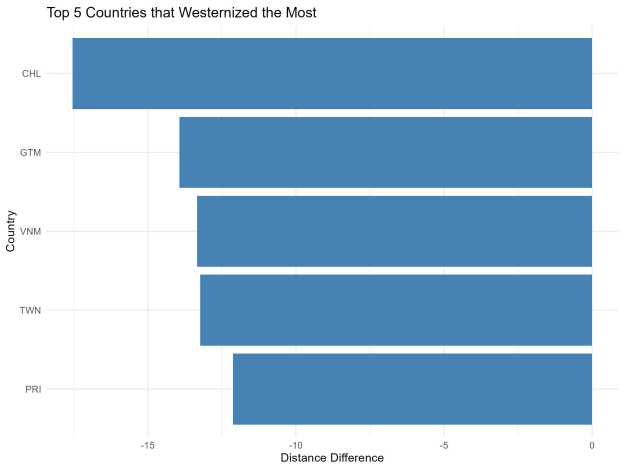

Figure 6: Top-5 Countries that Westernized the Most

4.2 Electoral Democracy and Westernization

Our analysis of the regression model demonstrates a clear and robust relationship between electoral democracy and Westernization over the long term (Table 1 & Figure 7). The regression results provide strong evidence of a delayed but significant impact of democracy on alignment with Western norms. Specifically, democracy measured 20 years earlier has a significant negative coefficient of -3.822, meaning that countries with stronger democratic systems two decades ago are now more closely aligned with Western socio-cultural and economic norms. The statistical significance of this relationship, combined with the model's strong fit, highlights the cumulative and persistent influence of democratic institutions.

Table 1:

	Dependent variable:
	Distance to Cluster 1
Electoral Democracy 20 years ago	-3.822^{**}
	(1.837)
Constant	17.138^{***}
	(0.949)
Observations	286
R^2	0.918
Adjusted R^2	0.869
Residual Std. Error	4.026 (df = 179)
F Statistic	18.860^{***} (df = 106; 179)
Note:	*p<0.1; **p<0.05; ***p<0.01

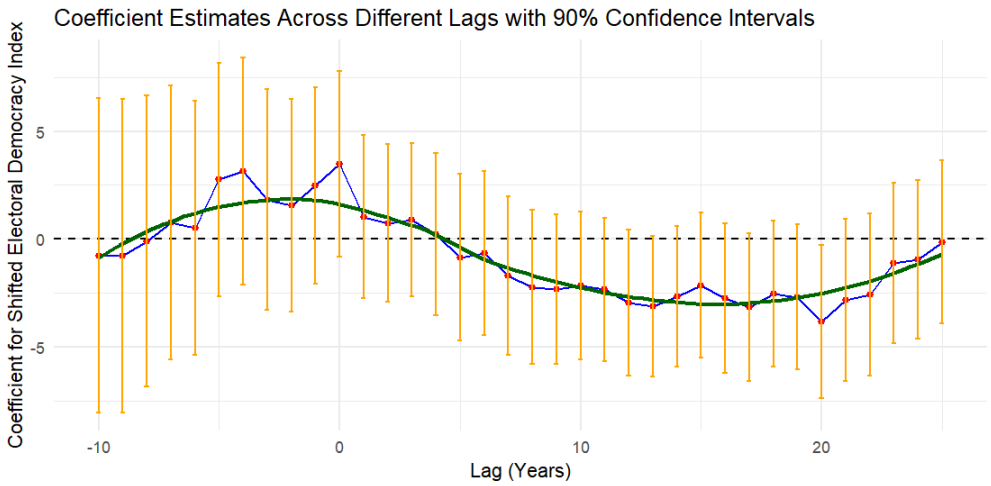

Figure 7: Electoral Democracy X years ago effect on Distance to the Western cluster

This effect can be understood if we take into account that changes in a country's core institutions take time to affect the rest of its indicators. The results indicate that higher levels of democracy in the past are associated with a smaller distance to the Western cluster today. Our findings highlight the long-term positive impact of electoral democracy on Westernization. While the effects of democracy take time to fully materialize—peaking around 10 to 15 years later—they are both substantial and persistent. However, the diminishing influence beyond this period suggests that other factors likely play an increasingly important role in shaping countries' alignment with the Western cluster over longer horizons.

4.3 Distance to the Western Cluster and Crime Rates

To further understand the implications of Westernization, we examined the relationship between distance to Cluster 1 (the Western cluster) and crime rates using regression analysis (Table 2). The results reveal a positive and significant relationship between distance to the Western cluster and crime rates on our first model with 105 countries, indicating that countries further away from Western socio-cultural norms tend to experience higher crime rates. However, the inclusion of a quadratic term suggests a non-linear relationship: while increasing distance initially correlates with higher crime, the rate of increase slows at larger distances (and the correlation becomes almost 0 for countries that are far away from the Western cluster).

Nonetheless, the findings in the second model were not statistically significant, meaning that the robustness of the insights might depend on the specific sample of countries and waves included. The reduction in statistical significance when analyzing a smaller subset of countries (52 instead of 105) highlights the sensitivity of the results to data availability and coverage. It is possible that the smaller sample lacks sufficient variation in distance to the Western cluster or crime rates, reducing the precision of the estimates.

Figure 8 visually confirms the distribution of countries in terms of their distance to Cluster 1:

- Countries within or close to the Western cluster, such as Sweden (SWE), Germany

Table 2:

	Dependent variable:	
	Crime_Rate	
	(1)	(2)
GDP_growth	-1.128^{***}	-0.973
	(0.396)	(0.931)
log_GDP_pc	-1.905^{**}	-2.178
	(0.934)	(1.578)
Unemp_Rate	0.706^{***}	0.193
	(0.244)	(0.390)
Education	-0.139	0.769
	(0.564)	(1.288)
Distance_to_Cluster_1	0.833^{***}	0.640
	(0.217)	(0.534)
Distance_to_Cluster_1_sq	-0.024^{***}	-0.018
	(0.006)	(0.013)
Constant	22.849^{*}	18.183
	(11.918)	(22.002)
Observations	146	42
R^2	0.316	0.193
Adjusted R^2	0.287	0.055
Residual Std. Error	8.712 (df = 139)	7.821 (df = 35)
F Statistic	10.722^{***} (df = 6; 139)	1.398 (df = 6; 35)
Note:		*p<0.1; **p<0.05; ***p<0.01

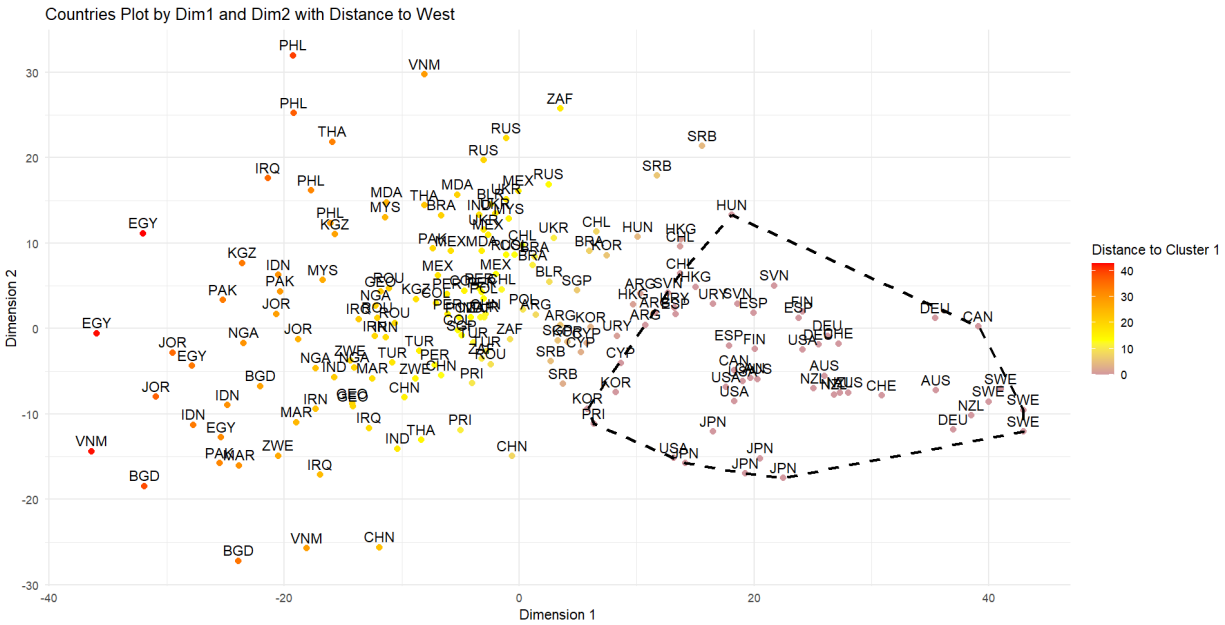

Figure 8: Countries distance to the Western cluster

(DEU), USA, Canada (CAN), and New Zealand (NZL), are aligned closely with Western socio-cultural and economic norms. These countries exhibit low distance values (as indicated by lighter colors) and are generally associated with higher levels of development and stability.

- Countries further from the Western cluster, such as Egypt (EGY), Bangladesh (BGD), Vietnam (VNM), and Pakistan (PAK), exhibit larger distances (indicated by red and orange colors) and may face more socio-economic challenges, including higher crime rates.

The quadratic term in the regression suggests that while increasing distance initially correlates with higher crime rates, the relationship eventually flattens. This can be observed visually in the plot, where countries far from the Western cluster (e.g., Egypt, Bangladesh, Vietnam) are more scattered and do not all follow a clear upward trend in crime. This flattening could be partially explained by the fact that countries extremely misaligned with Western values and institutions may lack the capacity to properly detect, record, and punish crime. In such contexts, weak governance, inadequate infrastructure, and unreliable data collection systems may result in crime going unreported or underreported, leading to artificially lower recorded crime rates despite underlying socio-economic instability.

The combination of regression results and MDS visualization highlights the role of Westernization as not just a measure of cultural alignment but also a reflection of institutional and economic development. Countries closer to the Western cluster tend to benefit from stronger institutional frameworks, governance, and socio-economic stability, which contribute to lower crime rates. In contrast, countries further from the cluster often experience structural challenges that exacerbate crime. The diminishing impact of distance at extreme levels suggests that, beyond a certain point, other factors become more critical in explaining variations in

crime rates.

5 Discussion

The findings of this study underscore the value of quantifying Westernization as a multidimensional construct that captures cultural, political, and economic alignment with Western norms. The identification of a Western cluster enables a systematic assessment of countries' trajectories, revealing both progress toward Westernization and instances of anti-Westernization. This nuanced perspective enhances the discourse on globalization and socio-political development.

5.1 Implications for Policy and Research

The study's demonstration of the long-term effects of democracy on Westernization offers valuable insights for policymakers. Strengthening democratic institutions can have a delayed but lasting impact on aligning countries with the principles of liberal democracy, individual freedoms, and market-driven economies. These findings reinforce the importance of sustained governance reforms and highlight the need for patience in achieving long-term development goals.

Furthermore, the observed relationship between proximity to the Western cluster and crime rates suggests that Westernization is associated with socio-economic stability. Policymakers should consider how strengthening institutional frameworks and fostering alignment with Western norms can mitigate crime.

5.2 Limitations and Future Research

Despite its contributions, this study has several limitations. First, the reliance on existing survey data (e.g., World Values Survey) and crime statistics introduces potential biases related to data collection, underreporting, and measurement error, particularly in countries with weaker institutional frameworks. Expanding the dataset to include additional countries and years could improve the precision and generalizability of the findings.

Second, while the Westernization metric effectively captures socio-cultural alignment, it may not fully account for regional or historical variations in the interpretation of Western norms. Future research could explore region-specific adaptations of the metric to better reflect cultural and political heterogeneity.

6 Conclusion

This study provides a comprehensive framework for quantifying Westernization and analyzing its socio-economic implications. By leveraging Multidimensional Scaling (MDS), clustering algorithms, and econometric regressions, we developed a robust metric to assess the alignment of countries with Western socio-cultural, political, and economic norms. The analysis identifies significant heterogeneity in how countries have converged with or diverged from these norms over time.

The study demonstrates a clear and robust relationship between electoral democracy and Westernization, particularly over the long term. It's interesting to note the delayed and long-term effect of institutional changes in the distance to the western cluster: if a country has had an institutional reform in the past, specially 10 to 20 years prior, that increased its alignment to western core values and liberal democracy, the effect will be reflected a lower present distance to the western cluster. This can be intuitively deduced. While institutional changes do have an immediate impact on all the aspects of a country, the shift to democratization and Westernization is gradual and progressive, not instantaneous. However, in order to better understand the lagged effect, we believe that more country level data across many more years would need to be available in order to robustly determine the confidence intervals of the effect.

Key findings highlight the critical role of democracy in driving long-term alignment with Western values. Countries with strong democratic institutions two decades ago exhibit closer alignment with Western socio-cultural and economic norms today, reflecting the enduring influence of democratic governance. Furthermore, the study reveals that countries closer to the Western cluster tend to experience lower crime rates, underscoring the interconnectedness of institutional strength and cultural alignment.

However, the relationship between Westernization and socio-economic outcomes is non-linear, as evidenced by diminishing returns at extreme distances from the Western cluster. This nuanced finding suggests that the challenges faced by countries further removed from Western norms may stem from complex structural factors that require tailored interventions.

Overall, this research advances our understanding of the cultural, political, and economic trajectories of nations and provides a foundation for evaluating the implications of Westernization within the broader context of global development.

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Appendix

A Elaboration on Countries Which Changed More Than Others

A.1 Countries That Westernized the Most

- **Chile:** Economic modernization and democratic stability post-1990 have made Chile one of Latin America's most stable and open economies, closely aligning it with Western liberal democratic principles.
- **Guatemala:** Post-conflict governance reforms and economic policies since the 1990s have contributed to Guatemala's closer alignment with Western norms.
- **Vietnam:** Through Doi Moi economic reforms, global trade integration, and infrastructure development, Vietnam has moved significantly towards Western socio-economic standards.
- **Taiwan:** Its robust democratic system, individual freedoms, and global economic integration since the late 20th century firmly align Taiwan with Western ideals.
- **Puerto Rico:** As a U.S. territory, Puerto Rico's governance and economic structures are inherently influenced by Western norms, solidifying its alignment.

A.2 Countries That Anti-Westernized the Most

- **Kyrgyzstan:** Political instability, corruption, and increasing influence from non-Western powers like Russia and China have distanced Kyrgyzstan from Western norms.
- **Nigeria:** Persistent challenges such as corruption, inequality, and regional conflicts (e.g., Boko Haram insurgency) have hindered its alignment with Western values.
- **Philippines:** Rising populism and strained relations with the West have contributed to its divergence from liberal democratic principles.
- **Romania:** Despite EU membership, political instability, democratic backsliding, and governance challenges have caused Romania to shift away from Western ideals.
- **Pakistan:** Geopolitical shifts, closer ties with China, persistent economic and political instability, and conservative socio-political dynamics have further distanced Pakistan from Western norms.

B Westernization and Crime Rates

Future research could explore the following avenues to enhance the robustness of these findings:

Figure 9: Cluster Stability

Wave	Survey years
1	1981-1983
2	1990-1992
3	1995-1998
4	2000-2004
5	2005-2008
6	2010-2014
7	2017-2022

Figure 10: WVS Waves

- **Expanding Data Coverage:** Acquiring additional country-level data in the future to ensure a larger and more balanced dataset, which could improve the precision of the estimates and allow for a more robust analysis. Our second model was constrained due to the lack of data availability in past WVS.
- **Exploring Regional Variations:** Conducting regional analyses to determine whether the relationship between Westernization and crime rates varies across different geographic or cultural contexts. For instance, the effects might differ between regions like Latin America, Sub-Saharan Africa, or Southeast Asia.
- **Examining Measurement Limitations:** Assessing the reliability of crime data, particularly in countries far from Western norms, where weak institutional frameworks may result in underreporting or misreporting of crime rates.

C Additional Figures

Here are additional figures we used (Figure 9 & 10)