53_El_Salvador

October 26, 2025

1 How has El Salvador's control of corruption evolved between the lower and upper bounds of the 90% confidence interval from 1996 to 2022?

1.1 Abstract

Using World Bank World Development Indicators (WDI) data, this study examines the evolution of control of corruption in El Salvador between 1996 and 2022. The analysis compares the lower and upper bounds of the 90% confidence interval, capturing long-term trends, convergence patterns, and fluctuations in governance quality. Over the period, both bounds exhibited significant volatility. At the start, the upper bound was roughly four times higher than the lower bound, but this gap gradually narrowed to about twice the lower bound by the end of the period. Both measures increased substantially until around 2010, with the lower bound rising more sharply than the upper bound. After 2010, both experienced notable declines, with the upper bound decreasing more steeply. Compared to 1996, the upper bound increased slightly overall, while the lower bound showed a more pronounced net increase. Overall, both series trace slight "upside-down U" patterns, reflecting periods of improvement followed by decline in control of corruption.

1.2 1. Question

How has El Salvador's control of corruption evolved between the lower and upper bounds of the 90% confidence interval from 1996 to 2022?

- **Lower bound proxy**: Control of Corruption: Percentile Rank, Lower Bound of 90% Confidence Interval
- **Upper bound proxy**: Control of Corruption: Percentile Rank, Upper Bound of 90% Confidence Interval

1.3 2. Data

- **Source**: World Bank World Development Indicators (WDI)
- **Indicators**:
  - Control of Corruption: Percentile Rank, Lower Bound of 90% Confidence Interval
  - Control of Corruption: Percentile Rank, Upper Bound of 90% Confidence Interval
- **Coverage**: El Salvador, 1996–2022
- **Notes**: National-level data only

1.4 3. Method

1. Filtered the dataset for El Salvador and selected the lower and upper bound control of corruption indicators.
2. **Extracted relevant columns**: Year, Indicator Name, and Value.
3. Pivoted the dataset to create a side-by-side chronological comparison of the lower and upper bounds.
4. Produced a dual-line time series plot to visualize trends, convergence, and periods of improvement or decline over time.

(Analysis is descriptive; no causal inference applied.)

1.5 4. Results

- **Lower bound of control of corruption**: Increased substantially from 1996 to 2010, peaking around 2010, then decreased somewhat through 2022. Overall, the net increase since 1996 remained significant.
- **Upper bound of control of corruption**: Also increased until around 2010, though less sharply than the lower bound, and declined more steeply after 2010. The net increase compared to 1996 was slight.
- **Comparison**: At the beginning of the period, the upper bound was roughly four times the lower bound; by 2022, the two bounds had converged to about twice the lower bound. Both series trace slight upside-down U-shaped patterns ("frowns") over time, indicating periods of improvement followed by declines.

(Figure 1. El Salvador: Control of Corruption, Lower vs. Upper Bound of 90% Confidence Interval, 1996–2022)

(Table 1. Pivoted dataset summary)

1.6 5. Interpretation

- The initial large gap between upper and lower bounds indicates substantial uncertainty in the level of control of corruption in 1996.
- Convergence over time suggests increasing precision in governance assessments and potential institutional improvements.
- The pre-2010 rise in both bounds reflects progress in anti-corruption measures or governance structures.
- The post-2010 decline, particularly in the upper bound, may signal governance challenges, policy setbacks, or socio-political instability affecting control of corruption.
- Overall, the trajectory highlights fluctuations in institutional quality and the need for sustained anti-corruption efforts to ensure durable governance improvements.

1.7 6. Limitations

- National aggregates may obscure regional, municipal, or sector-specific corruption dynamics.
- WDI estimates incorporate modeled data, especially for earlier years, introducing uncertainty.
- The descriptive analysis does not identify causal factors behind improvements or declines in control of corruption.

1.8 7. Next Steps / Extensions

- Examine correlations between control of corruption trends and political transitions, economic growth, or institutional reforms.
- Compare El Salvador's trajectories with other Central American countries to contextualize governance trends regionally.
- Investigate post-2022 developments to assess whether declines reversed or persisted.
- Explore sector-specific indicators to understand which areas of governance contributed most to changes in corruption control.

[1]:
```
# How has El Salvador's control of corruption evolved between the lower and␣
 ↪upper bounds of the 90% confidence interval from 1996 to 2022?

import pandas as pd
import matplotlib.pyplot as plt
import os

# Folders
data_raw_folder = "data_raw/"
data_clean_folder = "data_clean/"
figures_folder = "figures/"

# Load CSV
filename = "public-sector_slv_filtered.csv"  # Filtered dataset with only␣
 ↪relevant rows
df = pd.read_csv(os.path.join(data_raw_folder, filename))

# Keep only needed columns
df = df[["Year", "Indicator Name", "Value"]]

# Convert Year and Value to numeric, drop invalid rows
df["Year"] = pd.to_numeric(df["Year"], errors="coerce")
df["Value"] = pd.to_numeric(df["Value"], errors="coerce")
df = df.dropna(subset=["Year", "Value"])

# Pivot indicators into separate columns
df_pivot = df.pivot(index="Year", columns="Indicator Name", values="Value").
 ↪reset_index()
df_pivot = df_pivot.sort_values("Year")

print("Pivoted El Salvador dataset:")
display(df_pivot)

# Interpolate missing values for smooth plotting (optional)
df_plot = df_pivot.interpolate(method='linear')

# Plot the indicators
plt.figure(figsize=(10,6))
```

```
plt.plot(df_plot["Year"], df_plot["Control of Corruption: Percentile Rank,␣
 ↪Lower Bound of 90% Confidence Interval"],
         marker='o', linestyle='-', label="Control of Corruption: Percentile␣
 ↪Rank, Lower Bound of 90% Confidence Interval")
plt.plot(df_plot["Year"], df_plot["Control of Corruption: Percentile Rank,␣
 ↪Upper Bound of 90% Confidence Interval"],
         marker='o', linestyle='-', label="Control of Corruption: Percentile␣
 ↪Rank, Upper Bound of 90% Confidence Interval")

plt.title("El Salvador: Lower bound vs Upper bound percentile rank of 90%␣
 ↪confidence interval for control of corruption (1996-2022)")
plt.xlabel("Year")
plt.ylabel("Percentile Rank")
plt.legend()
plt.grid(True)
plt.tight_layout()
plt.savefig(os.path.join(figures_folder,␣
 ↪"el_salvador_lower_bound_vs_upper_bound_percentile_rank_of_90%_confidence_interval_for_cont
 ↪png"))
plt.show()

# Save cleaned CSV
df_pivot.to_csv(os.path.join(data_clean_folder,␣
 ↪"el_salvador_lower_bound_vs_upper_bound_percentile_rank_of_90%_confidence_interval_for_cont
 ↪index=False)
```

Pivoted El Salvador dataset:

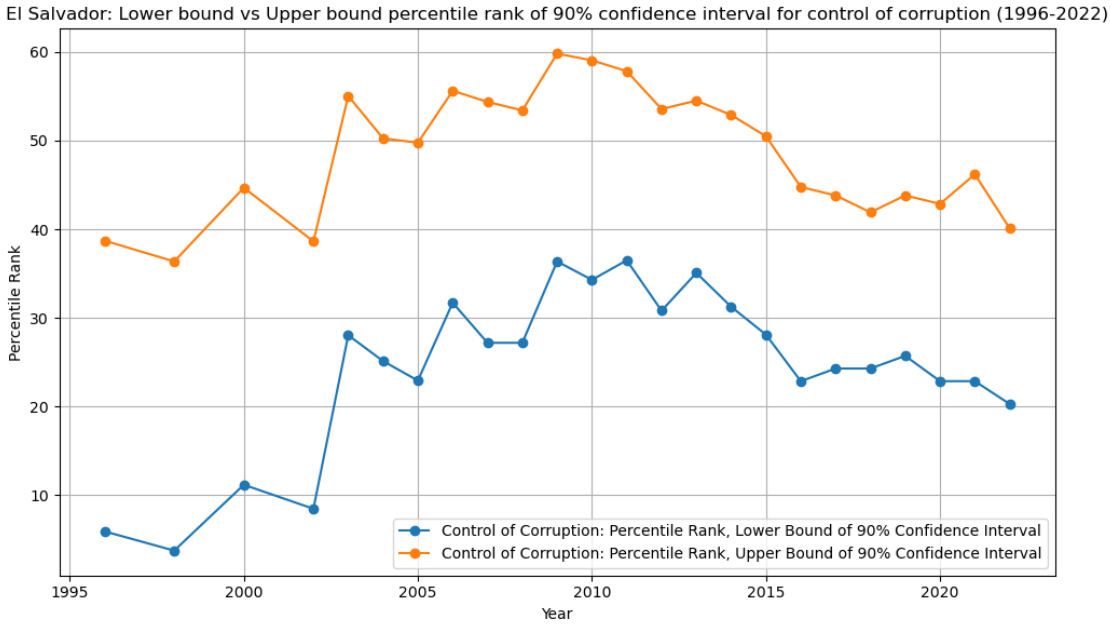
Indicator Name	Year \
0	1996
1	1998
2	2000
3	2002
4	2003
5	2004
6	2005
7	2006
8	2007
9	2008
10	2009
11	2010
12	2011
13	2012
14	2013
15	2014
16	2015
17	2016
18	2017

```
19              2018
20              2019
21              2020
22              2021
23              2022

Indicator Name  Control of Corruption: Percentile Rank, Lower Bound of 90%␣
 ↪Confidence Interval  \
0                                                    5.913979
1                                                    3.743315
2                                                   11.170213
3                                                    8.465609
4                                                   28.042328
5                                                   25.123152
6                                                   22.926828
7                                                   31.707317
8                                                   27.184465
9                                                   27.184465
10                                                  36.363636
11                                                  34.285713
12                                                  36.492889
13                                                  30.805687
14                                                  35.071091
15                                                  31.250000
16                                                  28.095238
17                                                  22.857143
18                                                  24.285715
19                                                  24.285715
20                                                  25.714285
21                                                  22.857143
22                                                  22.857143
23                                                  20.283018

Indicator Name  Control of Corruption: Percentile Rank, Upper Bound of 90%␣
 ↪Confidence Interval
0                                                   38.709679
1                                                   36.363636
2                                                   44.680851
3                                                   38.624340
4                                                   55.026455
5                                                   50.246304
6                                                   49.756096
7                                                   55.609756
8                                                   54.368931
9                                                   53.398060
10                                                  59.808613
11                                                  59.047619
```

12	57.819904
13	53.554501
14	54.502369
15	52.884617
16	50.476189
17	44.761906
18	43.809525
19	41.904762
20	43.809525
21	42.857143
22	46.190475
23	40.094341



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