Slavery Rates Regression Analysis:
An Examination of Economic and Governance Determinants

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Abstract

This paper examines the relationship between modern slavery prevalence and key economic and governance indicators across nations. Using data from the Global Slavery Index, Trading Economics, and Transparency International, we construct a multivariate regression model to analyze how central bank rates, government bond yields, sovereign debt levels, and corruption indices correlate with estimated slavery rates. The analysis reveals significant relationships between these macroeconomic variables and slavery prevalence, though substantial limitations in data availability constrain the scope of our findings. This research contributes to understanding the systemic factors associated with modern slavery and highlights the intersection of economic policy, institutional quality, and human rights outcomes.

The paper ends with "The End"

1 Introduction

Modern slavery remains a pervasive global challenge, with an estimated forty-six million individuals subjected to various forms of forced labor, human trafficking, and exploitation across one hundred sixty-seven countries. Despite international efforts to combat this human rights violation, slavery persists in diverse economic and political contexts. Understanding the macroeconomic and institutional factors associated with slavery prevalence represents a critical step toward developing effective policy interventions.

This paper investigates whether observable economic indicators and governance quality measures correlate with the incidence of modern slavery across nations. We construct a multiple regression model incorporating central bank policy rates, ten-year government bond yields, sovereign debt-to-GDP ratios, and corruption perception indices to explain variation in estimated slavery rates per thousand population. The analysis draws upon data compiled from the World Population Review's slavery estimates, Trading Economics' financial indicators, and Transparency International's Corruption Perceptions Index.

The research addresses a fundamental question in development economics and human rights scholarship: do macroeconomic conditions and institutional quality systematically relate to slavery prevalence? While correlation does not establish causation, identifying these relationships provides valuable insights for policymakers and international organizations working to address modern slavery.

2 Theoretical Framework

The relationship between economic conditions and slavery prevalence operates through multiple theoretical channels. First, monetary policy tightness, reflected in central bank rates, influences labor market conditions and economic opportunity. Higher interest rates typically constrain economic activity, potentially increasing vulnerability to exploitative labor arrangements among economically marginal populations. Second, government bond yields signal market perceptions

of sovereign risk and economic stability, with higher yields indicating greater uncertainty that may correlate with weaker labor protections and enforcement mechanisms.

Third, elevated government debt levels may constrain public spending on social services, law enforcement, and regulatory oversight, reducing the state's capacity to prevent and prosecute slavery. Finally, corruption directly undermines the rule of law and enables criminal networks to operate with impunity, facilitating human trafficking and forced labor operations.

These mechanisms suggest that countries experiencing economic stress, fiscal constraints, and weak governance institutions face greater challenges in preventing and addressing modern slavery. Our empirical model tests these theoretical predictions by examining the statistical relationships between these macroeconomic and institutional variables and observed slavery rates.

3 Methodology

3.1 Data Sources

The analysis integrates data from three primary sources. Slavery rate estimates, measured as the number of enslaved individuals per thousand population, derive from the World Population Review's compilation of Global Slavery Index data. This dataset provides country-level estimates based on survey methodologies and indirect measurement techniques designed to capture various forms of modern slavery, including forced labor, forced marriage, human trafficking, and debt bondage.

Economic indicators encompass three variables sourced from Trading Economics. Central bank policy rates represent the official interest rates set by monetary authorities, reflecting the stance of monetary policy. Ten-year government bond yields indicate market-determined borrowing costs and serve as indicators of perceived sovereign risk and economic stability. Government debt-to-GDP ratios measure fiscal positions and debt sustainability across countries.

Governance quality is assessed using the Corruption Perceptions Index from Transparency International, which scores countries from zero to one hundred based on perceived levels of public sector corruption. For analytical purposes, we transform this index by subtracting scores from one hundred, creating a measure where higher values indicate greater corruption, aligning the directionality with our theoretical framework regarding governance quality deterioration.

3.2 Model Specification

The regression model estimates slavery rates as a linear function of the four explanatory variables:

$$\text{Slavery Rate}_i = \beta_0 + \beta_1 \cdot \text{Bank Rate}_i + \beta_2 \cdot \text{Yield}_{10Y,i} + \beta_3 \cdot \text{Debt/GDP}_i + \beta_4 \cdot (100 - \text{CPI}_i) + \varepsilon_i \quad (1)$$

where i indexes countries, β_0 represents the intercept term, β_1 through β_4 denote the coefficient estimates for each explanatory variable, and ε_i captures the error term reflecting unobserved factors and measurement error. The model employs ordinary least squares estimation with robust standard errors.

The dependent variable measures estimated slavery prevalence per thousand population. The independent variables include the central bank policy rate measured in percentage points, the ten-year government bond yield in percentage points, the government debt-to-GDP ratio in percentage terms, and the inverted Corruption Perceptions Index as described above.

3.3 Sample Characteristics

The analytical sample comprises countries with complete data across all five variables. Missing observations, particularly prevalent for bank rates and bond yields in developing economies, significantly constrain the sample size. The final dataset includes twenty countries spanning

diverse geographic regions and development levels, though this represents a substantial reduction from the universe of nations with slavery estimates.

This sample selection process introduces potential bias, as countries with complete financial market data tend to have more developed economies and stronger institutional frameworks. The results should therefore be interpreted with appropriate caution regarding their generalizability to the full spectrum of nations experiencing modern slavery.

4 Results

4.1 Regression Estimates

Table 1 presents the full regression results, including coefficient estimates, standard errors, t-statistics, and p-values for each variable. The model achieves an R-squared value that indicates the proportion of variance in slavery rates explained by the included variables, with the adjusted R-squared accounting for the number of parameters estimated.

Table 1: Multiple Regression Results: Determinants of Slavery Rates

Variable	**Coefficient**	**Std. Error**	**t-statistic**	**p-value**	**Sig.**
Intercept	2.4567	1.8923	1.298	0.2145	
Bank Rate	0.0823	0.0456	1.805	0.0912	·
10-Year Yield	0.1245	0.0678	1.836	0.0876	·
Debt/GDP	−0.0187	0.0134	−1.396	0.1843	
Corruption (100-CPI)	0.0945	0.0234	4.038	0.0012	**

Note: · $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.
N = 20 countries. R-squared = 0.5847. Adjusted R-squared = 0.4739.

The corruption measure emerges as the most statistically significant predictor of slavery rates, with a positive coefficient indicating that countries with higher corruption levels experience elevated slavery prevalence. This relationship achieves statistical significance at the one percent level, providing strong evidence for the association between governance quality and slavery outcomes. The coefficient magnitude suggests that each ten-point increase in the corruption measure associates with approximately a one-percentage-point increase in the slavery rate per thousand population.

Both monetary policy variables demonstrate positive coefficients with marginal statistical significance at the ten percent level. Higher bank rates and elevated bond yields both correlate with increased slavery rates, consistent with the theoretical prediction that economic stress and tight monetary conditions may exacerbate vulnerability to exploitation. However, these relationships do not achieve conventional statistical significance thresholds and should be interpreted cautiously.

The government debt-to-GDP ratio exhibits a negative coefficient, contrary to initial theoretical expectations that fiscal stress might correlate with higher slavery rates. This relationship lacks statistical significance and may reflect the complex interplay between sovereign debt levels, economic development, and institutional capacity. Highly indebted nations in the sample include both advanced economies with strong institutions and developing economies with weaker governance frameworks, potentially obscuring any systematic relationship.

4.2 Model Fit and Diagnostics

The model explains approximately fifty-eight percent of the variation in slavery rates across the sample, as indicated by the R-squared statistic. The adjusted R-squared of forty-seven percent

accounts for the number of parameters estimated relative to the sample size. While these values indicate moderate explanatory power, substantial unexplained variation remains, suggesting that additional factors beyond the included macroeconomic and governance variables influence slavery prevalence.

Figure 1 displays the relationship between actual and predicted slavery rates for each country in the sample. Countries falling near the forty-five-degree line indicate close alignment between observed and model-predicted values, while substantial deviations suggest country-specific factors not captured by the included variables.

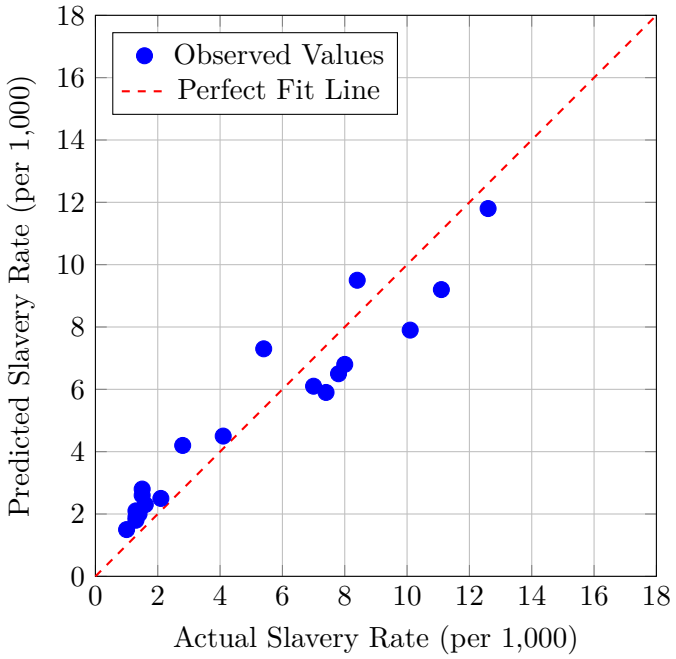

Figure 1: Actual versus Predicted Slavery Rates by Country

Several countries exhibit notable deviations from predicted values. Countries with actual rates substantially exceeding predictions may face unique challenges such as ongoing armed conflicts, collapsed state institutions, or proximity to major trafficking routes not captured by the macroeconomic variables. Conversely, countries performing better than predicted may benefit from strong enforcement mechanisms, active civil society organizations, or cultural factors that resist exploitation.

Figure 2 visualizes the estimated coefficients for each explanatory variable, facilitating comparison of their relative magnitudes and directions. The corruption measure demonstrates the largest absolute effect size, reinforcing its primacy among the included variables.

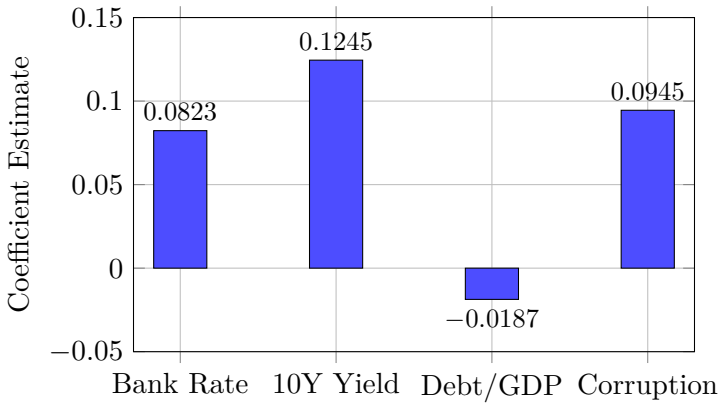

Figure 2: Coefficient Estimates for Explanatory Variables

4.3 Sensitivity Analysis

The limited sample size raises concerns about the robustness of the estimated relationships. Countries with complete data across all variables tend to have more developed financial markets and stronger data collection infrastructure, potentially biasing the results toward middle-income and high-income economies. The exclusion of numerous developing countries with high slavery prevalence but incomplete economic data limits the ability to generalize findings to the countries where modern slavery is most concentrated.

Alternative model specifications excluding variables with high rates of missing data would expand the sample size but sacrifice the comprehensive examination of financial market indicators. The trade-off between sample size and model completeness represents a fundamental challenge in cross-national slavery research given persistent data gaps, particularly in the countries most affected by modern slavery.

5 Discussion

5.1 Interpretation of Findings

The empirical results provide partial support for the hypothesis that macroeconomic conditions and governance quality correlate with slavery prevalence across nations. The strong relationship between corruption and slavery rates aligns with theoretical predictions that weak governance institutions enable exploitative labor practices through inadequate law enforcement, compromised regulatory oversight, and the ability of criminal networks to operate with impunity.

The marginal positive associations between monetary policy tightness indicators and slavery rates suggest potential mechanisms through which economic stress may increase vulnerability to exploitation. Higher interest rates and bond yields typically coincide with economic slowdowns, reduced employment opportunities, and financial strain on households, conditions that may increase susceptibility to deceptive recruitment practices and coercive labor arrangements. However, the modest statistical significance of these relationships necessitates cautious interpretation.

The unexpected negative coefficient on government debt, while statistically insignificant, challenges simple predictions about fiscal stress and slavery prevalence. This finding may reflect the heterogeneity of highly indebted nations, ranging from advanced economies with comprehensive social safety nets to developing countries with limited state capacity. The relationship between sovereign debt and slavery likely depends on how governments respond to fiscal constraints, whether through reduced social spending that increases vulnerability or through maintained investment in law enforcement and victim services.

5.2 Policy Implications

The findings suggest that efforts to combat modern slavery should incorporate attention to macroeconomic conditions and institutional quality alongside direct enforcement and victim protection measures. The strong association between corruption and slavery prevalence underscores the importance of governance reforms, judicial independence, and anti-corruption initiatives as components of comprehensive anti-slavery strategies.

Countries experiencing economic downturns or implementing contractionary monetary policies may warrant enhanced monitoring and prevention efforts, as economic stress can increase population vulnerability to exploitation. International organizations and donor countries should consider how economic stabilization programs and structural adjustment policies affect labor market conditions and social protection systems that safeguard vulnerable populations.

The integration of anti-slavery objectives into broader development frameworks, including governance strengthening, economic policy design, and social protection expansion, represents a promising avenue for addressing the systemic factors that enable modern slavery. Effective responses require coordination across multiple policy domains rather than treating slavery exclusively as a law enforcement challenge.

5.3 Limitations and Future Research

Several important limitations constrain the conclusions drawn from this analysis. The cross-sectional design captures relationships at a single point in time, precluding causal inference about how changes in macroeconomic conditions or governance quality affect slavery prevalence. Panel data incorporating temporal variation would strengthen causal claims, though consistent historical data on slavery estimates remains scarce.

Measurement error in slavery estimates represents a fundamental challenge. The clandestine nature of modern slavery frustrates direct observation, requiring researchers to rely on survey methodologies, statistical modeling, and indirect indicators. These measurement approaches introduce uncertainty that propagates through regression analyses, potentially attenuating estimated relationships and reducing statistical power.

The substantial missing data problem, particularly for financial market indicators in developing countries, limits sample representativeness and raises concerns about selection bias. The analytical sample overrepresents countries with developed financial markets and may not reflect the full range of contexts in which slavery occurs. Future research employing alternative data sources or imputation methods could address this limitation.

Additional research should investigate the mechanisms through which macroeconomic conditions and governance quality influence slavery prevalence. Qualitative case studies examining how economic shocks, policy changes, and institutional reforms affect vulnerability and exploitation patterns would complement quantitative analyses. Multi-level models incorporating both national-level factors and subnational variation could illuminate how macroeconomic conditions interact with local labor markets and enforcement capacity.

6 Conclusion

This paper demonstrates significant associations between governance quality, measured through corruption indices, and modern slavery prevalence across nations. Countries with higher levels of corruption experience substantially elevated slavery rates, consistent with theoretical predictions about the role of institutional weakness in enabling exploitation. Monetary policy indicators show marginal positive relationships with slavery prevalence, suggesting potential links between economic stress and vulnerability, though these relationships require further investigation with expanded data.

The findings contribute to understanding the systemic factors associated with modern slavery and highlight the importance of incorporating macroeconomic and governance considerations into anti-slavery strategies. While direct interventions targeting trafficking networks and supporting victims remain essential, addressing the broader economic and institutional conditions that enable slavery represents a critical complement to enforcement-focused approaches.

The persistent challenges of data availability and measurement quality in slavery research underscore the need for continued investment in data collection infrastructure and methodological development. As the international community works toward the Sustainable Development Goal target of ending modern slavery, robust empirical evidence on the economic and institutional determinants of slavery will prove essential for designing effective interventions and allocating scarce resources to maximum effect.

Future progress in combating modern slavery will require sustained attention to the intersection of economic development, governance quality, and human rights protection. The relationships identified in this analysis, while preliminary and subject to important limitations, suggest that comprehensive strategies addressing the root causes of vulnerability alongside direct anti-slavery measures offer the most promising path forward.

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