# Specifying Mobility: Trade, Inequality, and Democratization in Developing Countries

Steven Liao

Department of Politics
University of Virginia

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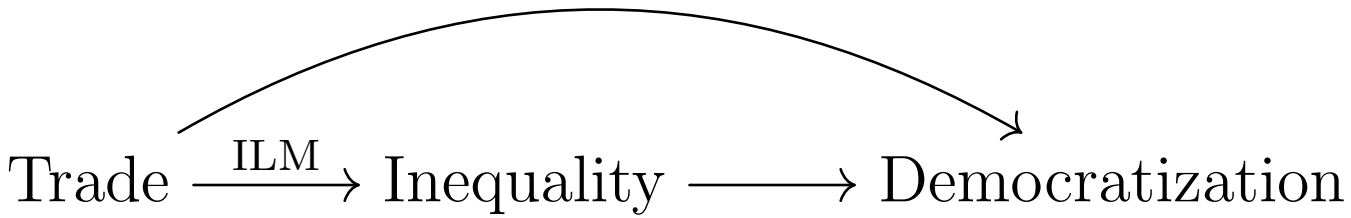
# A Tale of Three Worlds

- Question: What is the effect of trade on income inequality and, by extension, democratization in developing countries?




- Three disconnected literatures:
  - Trade-democratization: overlooks inequality as mediator
  - Inequality-Democratization: assumes closed economy
  - Trade-inequality: inter-industry labor mobility as key assumption
- Mixed findings:
  - Trade-democratization: postive, negative, no correlation.
  - Inequality-Democratization: inverse U-shaped, U-shaped, positive, negative, no correlation.
  - Trade-inequality: slight positive correlation, but disagreement on causal mechanism

# Goals of the Paper

- Premise: A focus on how **Inter-industry Labor Mobility** (the ease with which labor can move across industries) conditions the effect of trade on inequality and democratization can help bridge the disconnected literatures.
  - Inter-industry Labor Mobility is assumed to be perfect in factor endowment trade models, which is usually unjustifiable.
  - Acemoglu and Robinson (2006)'s formal model relies on this assumption to establish how trade affects inequality and democratization.
  - This study turns to a specific factors trade model that allows labor specificity and derive testable hypotheses.
  - Pit the two competing theories and their theory-specific predictions against each other and evaluate their performance with empirical data and a finite mixture model (Imai and Tingley 2012).

# Inequality and Democratization

- Acemoglu and Robinson (2006): decrease in inequality leads to an increase in the probability of democratization.
  - Lower costs of tolerating democracy for elites because tax redistributions are less severe
  - High costs of repression since elites are usually capital holders and capital is vulnerable to revolutions.
  - Inverse U-shaped relation
- Assume that this is true for now and focus on how trade impacts inequality

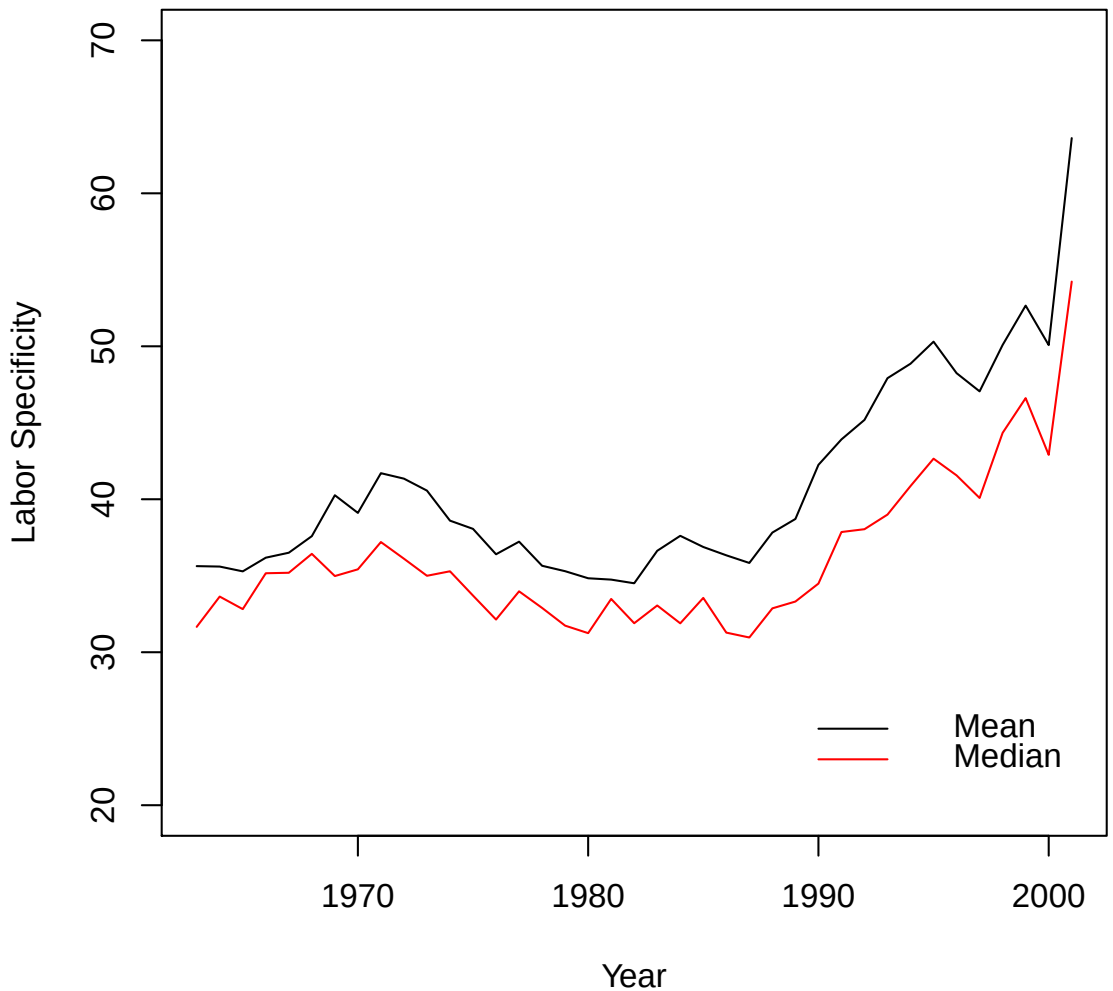
# Trade and Inequality

- Acemoglu and Robinson (2006) adopt a Stolper-Samuelson (SS) model of trade:
  - Key assumption: perfect labor mobility
  - Predicts **class** cleavage: as trade increases, return for owner of relatively **abundant** factor increases while return for owner of relatively **scarce** factor decreases.
    - **H1**: All else equal, the probability of AR's model and derived predictions being consistent with empirical data should decrease as labor specificity increases.
    - **H2A**: All else equal, increased trade in a **labor** abundant country that has *low inter-industry labor specificity* reduces income inequality, which by extension leads to higher probabilities of democratization.
    - **H2B**: All else equal, increased trade in a **land** abundant country that has *low inter-industry labor specificity* increases inequality, which by extension leads to lower probabilities of democratization.

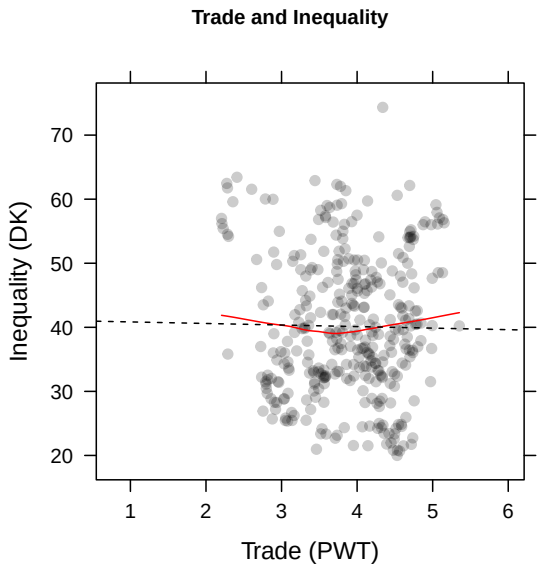
# Trade and Inequality

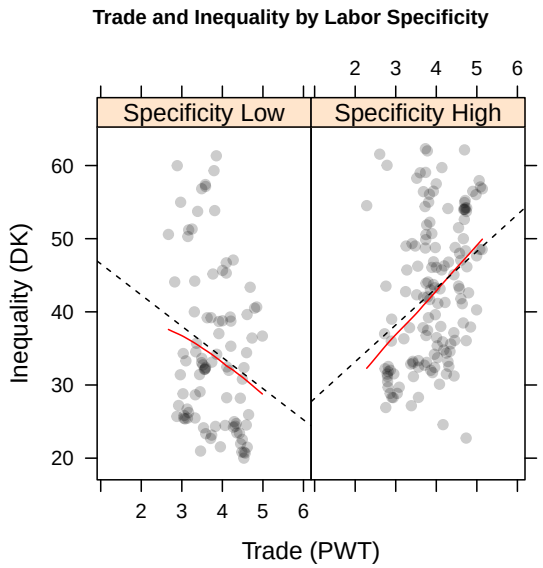
- I adopt a specific factors model of trade (Ricardo-Viner, RV) instead:
  - assumes labor specificity
  - Predicts **sectoral** cleavage: as trade increases, return for factors specific to the **import** sector decreases while return for factors specific to the **export** sector increases.
    - inequality increases between sectors
- Additionally, export industries pay a premium for higher skill
  - inequality increases within the export sector
- As inequality increases both between sectors and within the export sector, inequality increases overall.
  - **H3**: All else equal, increased **export-orientation** in a labor abundant country with high inter-industry labor specificity leads to higher inequality, which by extension leads to lower probabilities of democratization.

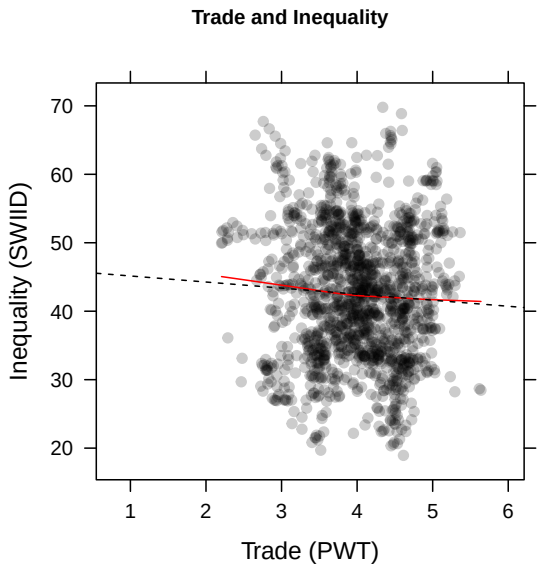
# Labor Specificity Across Years

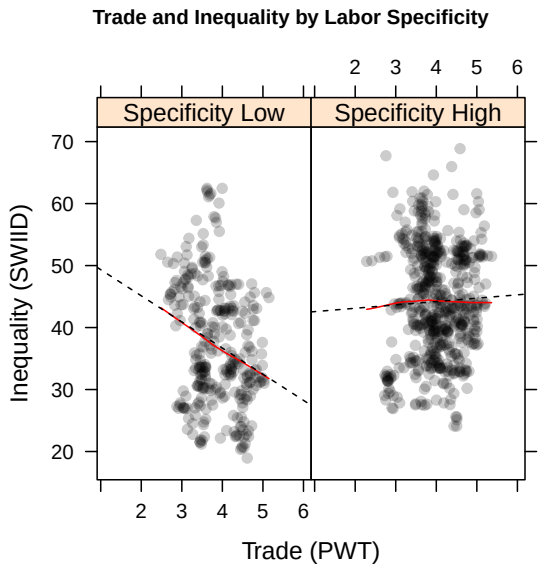


# Trade and Inequality



# Data Overview

- Unit of analysis: Country-year
- Universe of analysis: 172 countries from 1980-2000
  - This period provids more variation in both regime change and trade integration in developing countries compared to other periods.
  - Countries included are all independent countries in a given year.
  - Missing data problem:
    - For example: sparseness of inequality data
    - Fit models to five multiply imputed datasets using the **R** package `Amelia II`

# Operationalization

- Outcome of interest: Democratization
  - Democracy = 1, Non-democracy = 0
  - Dichotomous measure (Przeworski et al. 2000 extended) and continous measure (POLITY IV)
- Key covariates:

| Model | Hypothesis | Predictor | Coef. Sign |
|---|---|---|---|
| Mixture | Hypothesis 1 | Labor Specificity | + |
| SS-implied | Hypothesis 2a | Trade*Labor | + |
| | Hypothesis 2b | Trade*Land | − |
| RV-implied | Hypothesis 3 | Export*Labor | − |

  - Data: Labor Specificity (Zhou 2008), Trade (PWT 7.0), Export (UN Comtrade), Labor/land endowment (Constructed; WDI), Inequality (SWIID, EHII, and DK)
- Controls: list of covariates included in Table 2.17 in Przeworski et al. (2000)

# Models and Methods

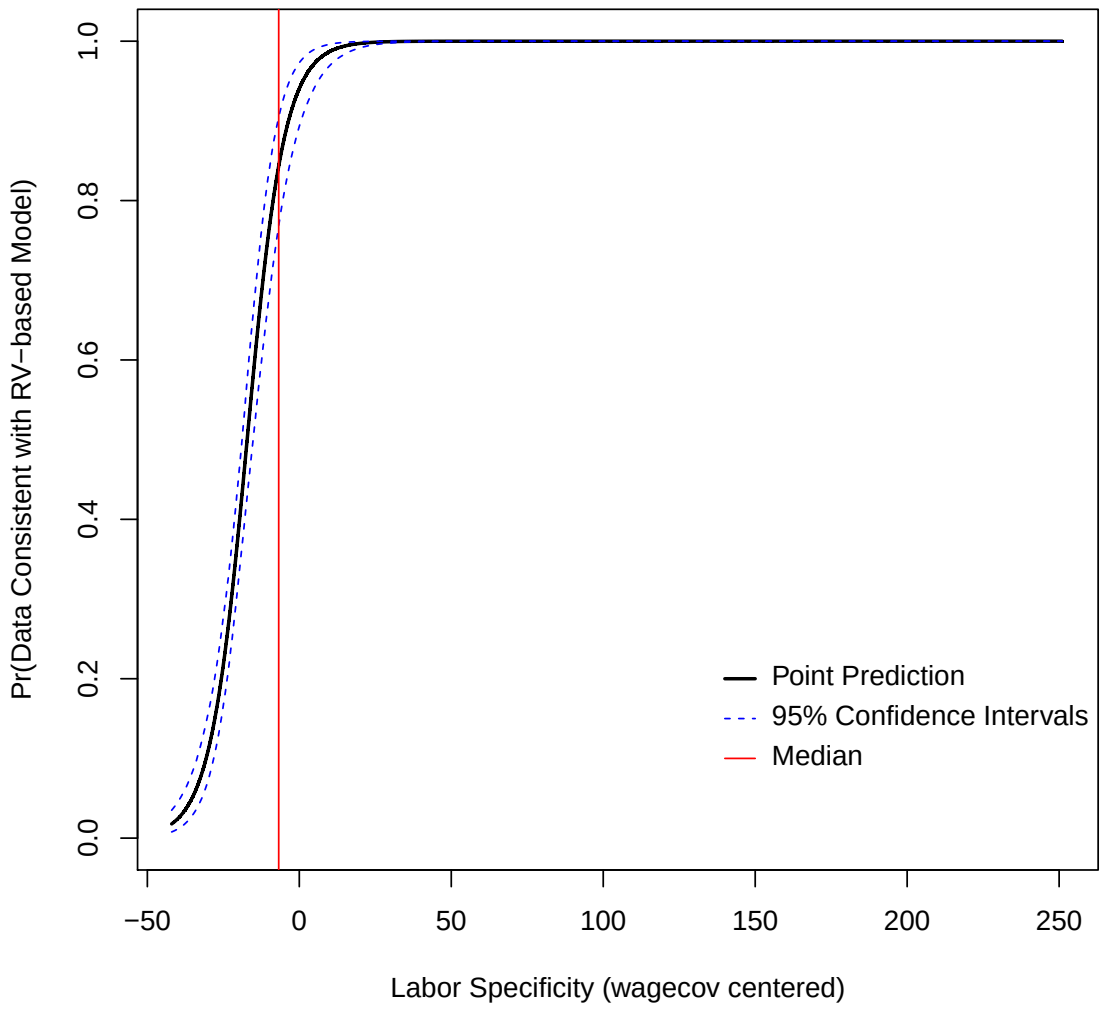
- "Garbage-can" dynamic probit model: include all key covariates and controls
  - Standard approach in the democratization literature
  - Assume one theory applies to all observations in the study
- **Finite Mixture Model**: mixture of two dynamic probit models

$$f_{SS}(\text{Dem}_{it} = 1|\text{Dem}_{it-1}, \mathbf{X_{it}}, \theta_{SS}) = \Phi(\beta \mathbf{X_{it}} + \alpha \mathbf{X_{it}} \text{Dem}_{it-1})$$
$$f_{RV}(\text{Dem}_{it} = 1|\text{Dem}_{it-1}, \mathbf{X'_{it}}, \theta_{RV}) = \Phi(\beta' \mathbf{X'_{it}} + \alpha' \mathbf{X'_{it}} \text{Dem}_{it-1})$$
$$\pi_{RV}(W_{it}, \phi_{RV}) = \text{logit}^{-1}(\delta_0 + \delta_1 \text{Specificity}_{it})$$

  - Assumes multiple theories can co-exist to explain the same outcome of interest
  - Allows estimation of the probability that a specific observation is consistent with one of the competing theories based on key assumption differences (e.g. levels of labor specificity)
  - The mixture model is fit using the **R** package `flexmix`

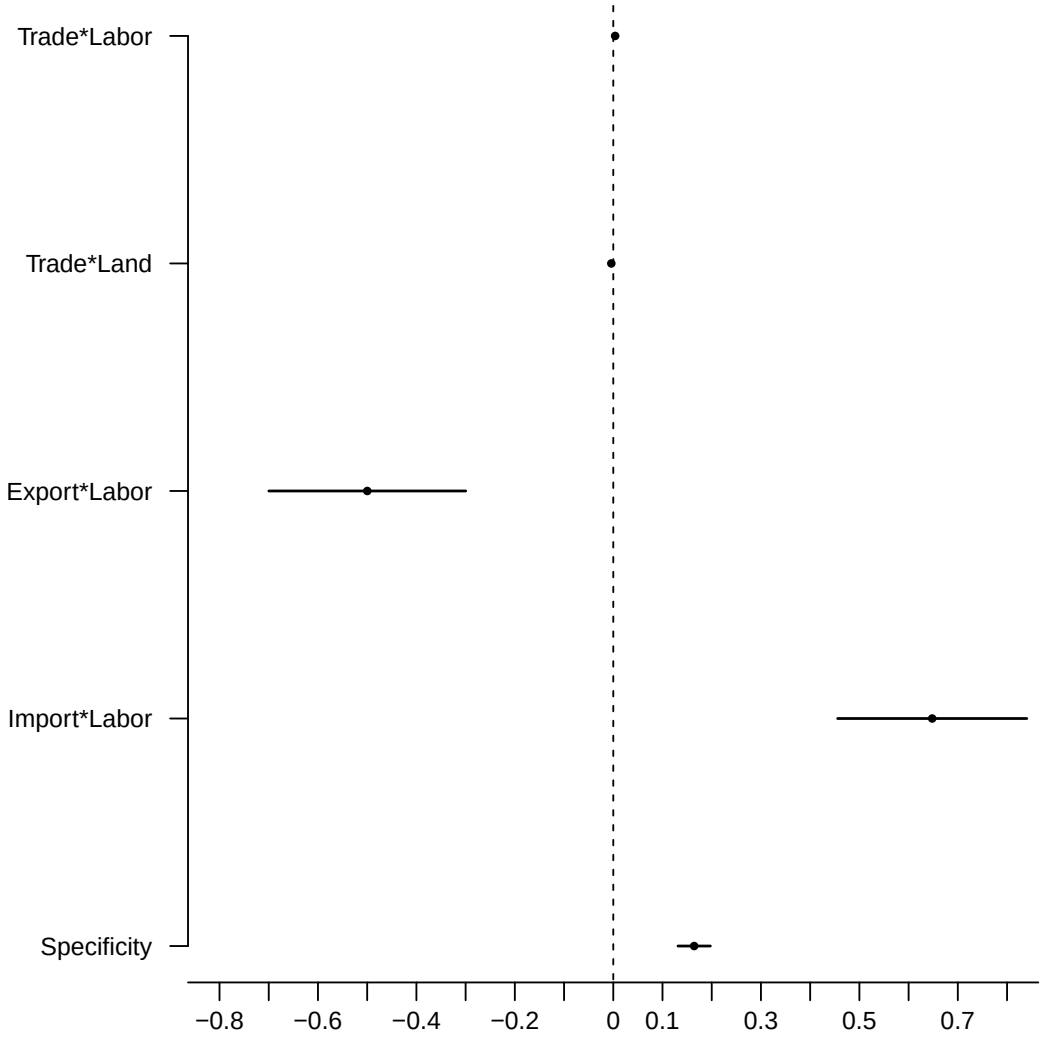
# Plausibility Probe: Inequality as Outcome

## Probability Data is Consistent with RV-implied Model



# Plausibility Probe: Inequality as Outcome

## Parameters and Estimates



# Democratization as Outcome

- Convergence issues with a mixture model consisting two dynamic probit models.
  - Comments and suggestions highly appreciated.
- Results from a "garbage-can" dynamic probit model shows no support for SS or RV-implied hypotheses.
  - Isn't surprising given that it assumes each competing model fits all observations and that the plausibility probe shows that the applicability of the competing theories depend on labor specificity.

# Concluding Remarks

- Wrap up
  - Relax key but unjustified assumption about inter-industry labor mobility that was previously assumed away in the literature.
  - Develop and test alternative testable hypotheses about the effect of increased trade on inequality and democratization in developing countries.
- Mixed results when treating inequality as outcome
  - RV-implied model is indeed more consistent with the data.
  - The findings contradict theory-specific hypotheses.
  - A reexamination of the both SS-implied and RV-implied theories and testable hypotheses.
- Coming in future interations
  - Solving convergence issues with the mixture model for democratization.
  - Generating list of observations consistent with SS and RV-implied models to compare with qualitative evidence.

E-mail for comments and suggestions:

stevenliao@virginia.edu

# Trade and Inequality

Table: Inequality as Outcome: Summary of Hypotheses and Predicted Signs

| Hypothesis | Predictor | Coef. | Prediction |
|---|---|---|---|
| Hypothesis 1 | Labor Specificity | $\delta_1$ | $+$ |
| Hypothesis 2a | Trade*Labor | $\beta_1$ | $-$ |
| Hypothesis 2b | Trade*Land | $\beta_2$ | $+$ |
| Hypothesis 3 | Export*Labor | $\gamma_1$ | $+$ |

# Trade and Inequality

Table: Mixture Model vs. "Garbage-can" Model Results

| DV = Inequality (SWIID data) | | Mixture | | "Garbage-can" | |
|---|---|---|---|---|---|
| Models | Variable | coef. | s.e. | coef. | s.e. |
| Stolper-Samuelson-based | Intercept | 31.871 | 0.329 | 39.578 | 0.195 |
| | Trade*Labor | 0.004 | 0.002 | 0.004 | 0.001 |
| | Trade*Land | -0.004 | 0.001 | -0.005 | 0.001 |
| | Trade | 0.003 | 0.007 | 0.012 | 0.005 |
| | Labor | 0.042 | 0.080 | -0.017 | 0.038 |
| | Land | 0.237 | 0.059 | -0.012 | 0.022 |
| Ricardo-Viner-based | Intercept | 42.947 | 0.269 | | |
| | Export*Labor | -0.500 | 0.102 | -0.447 | 0.107 |
| | Import*Labor | 0.648 | 0.098 | 0.583 | 0.104 |
| | Export | 2.649 | 0.843 | 0.488 | 1.018 |
| | Import | -1.259 | 0.799 | -0.332 | 1.067 |
| | Labor | -0.147 | 0.029 | | |
| Mixture Probability | Intercept | 2.818 | 0.365 | | |
| | Specificity | 0.164 | 0.017 | | |

# Descriptive Statistics

## Continuous Variables

| Variable | n | Min | $\tilde{x}$ | $\bar{x}$ | Max | #NA |
|---|---|---|---|---|---|---|
| Polity IV Score (polity2) | 3057 | -10.00 | 0.00 | 0.71 | 10.00 | 270 |
| Gini Index (DK) | 598 | 16.63 | 35.14 | 37.17 | 74.33 | 2729 |
| Gini Index (EHII) | 1876 | 22.92 | 41.69 | 41.32 | 64.36 | 1451 |
| Gini Index (SWIID) | 2214 | 18.94 | 37.47 | 38.61 | 71.33 | 1113 |
| Labor Specificity (Zhou 2008) | 1849 | 8.58 | 36.68 | 42.66 | 256.36 | 1478 |
| Trade (OPENK from PWT 7.0) | 3209 | 1.03 | 59.82 | 71.00 | 395.98 | 118 |
| Trade (OPENK from PWT 6.1) | 2618 | 9.12 | 59.55 | 69.69 | 440.50 | 709 |
| Export per GDP (UN Comtrade; WDI) | 2124 | 0.01 | 0.20 | 0.25 | 4.34 | 1203 |
| Import per GDP (UN Comtrade; WDI) | 2121 | 0.03 | 0.25 | 0.31 | 5.65 | 1206 |
| Relative Labor Endowment | 3084 | 0.07 | 2.27 | 5.33 | 71.84 | 243 |
| Relative Land Endowment | 3023 | 0.00 | 2.16 | 6.27 | 180.67 | 304 |
| GDP per capita (PWT 7.0) | 3209 | 117.23 | 4086.88 | 8769.49 | 74162.95 | 118 |
| GDP per capita (PWT 5.6/6.1) | 2834 | 281.26 | 4313.34 | 7101.34 | 50092.49 | 493 |
| GDP per capita growth (PWT 7.0) | 3191 | -64.56 | 1.69 | 1.28 | 122.23 | 136 |
| GDP per capita growth (PWT 5.6/6.1) | 2834 | -97.79 | 1.60 | 2.78 | 2294.03 | 493 |
| GDP growth (WDI) | 3022 | -51.03 | 3.44 | 2.87 | 106.28 | 305 |
| FDI net inflows per million USD (WDI) | 3007 | -4550.36 | 73.00 | 2197.36 | 321274.00 | 320 |
| Capital Openness (Chinn and Ito 2005) | 2786 | -1.72 | -0.85 | -0.05 | 2.66 | 541 |
| Lagged Leadership Turnover (ACLP Extended) | 3301 | 0.00 | 0.12 | 0.23 | 4.00 | 26 |
| Religious Fractionalization (ACLP Extended) | 3320 | 0.00 | 0.27 | 0.33 | 0.74 | 7 |
| Percentage of Catholic (ACLP Extended) | 3320 | 0.00 | 16.50 | 31.79 | 99.00 | 7 |
| Percentage of Protestant (ACLP Extended) | 3320 | 0.00 | 2.80 | 15.71 | 96.50 | 7 |
| Percentage of Moslem (ACLP Extended) | 3320 | 0.00 | 1.90 | 25.87 | 100.00 | 7 |
| Previous Transitions (ACLP Extended) | 3327 | 0.00 | 0.00 | 0.41 | 5.00 | 0 |
| Percentage of World Democracies (POLITY IV) | 3327 | 27.01 | 35.29 | 35.14 | 42.58 | 0 |

# Descriptive Statistics
## Nominal Variables

| **Variable** | **Levels** | **n** | % |
|---|---|---|---|
| Democracy (ACLP Extended) | no | 1852 | 55.7 |
| | yes | 1475 | 44.3 |
| | all | 3327 | 100.0 |
| New Country (ACLP Extended) | no | 1336 | 40.2 |
| | yes | 1991 | 59.8 |
| | all | 3327 | 100.0 |
| British Colony (ACLP Extended) | no | 2376 | 71.4 |
| | yes | 951 | 28.6 |
| | all | 3327 | 100.0 |