

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

Steven Liao\*

November 8, 2012

## Abstract

What is the effect of trade on income inequality and, by extension, democratization in developing countries? Literature on trade and democracy abound in political science while literature on trade and inequality abound in economics. Furthermore, inequality explanations of democratization have become increasingly popular in political science. However, little work exists to bridge our understandings about trade and democratization via inequality. The rare studies that do either rely on trade models that assume perfect labor mobility across industries, which economists find problematic, or lack systematic empirical tests. Theoretically, I make a critical departure from extant literature by building on trade models that allow labor specificity and arguing that the effect of trade on inequality and democratization should be *mediated* through different levels of inter-industry labor mobility (ILM). In particular, I expect increased export-orientation in a labor abundant and low labor mobility country to *increase* inequality, which then lowers probabilities of democratization. This contrasts a well-established literature that assumes high labor mobility and expects increased trade to *lower* inequality and raise probabilities of democratization. Empirically, I employ a finite mixture model and rely on a original ILM dataset to evaluate the performance of the two competing theories that differ on fundamental labor mobility assumptions.

---

\*Ph.D Student, Department of Politics, University of Virginia, Charlottesville, VA 22904. E-mail: [stevenliao@virginia.edu](mailto:stevenliao@virginia.edu). Draft prepared for the 2012 Annual Meeting of the International Political Economy Society (IPES). *Work in progress. Please do not cite.*

# 1 Introduction

Recent developments outside and within the academia show a rise in interest towards the causes and consequences of income inequality. On one hand, the “Occupy” movement has stirred up strong public emotions around the world about the origins of inequality. On the other hand, academic interest has gradually shifted from wealth level towards wealth distributional explanations of democratization (Acemoglu and Robinson 2006; Ansell and Samuels 2010; Boix 2003; Freeman and Quinn 2012; Houle 2009). In light of these developments, the paper tackles a large and timely question: What is the effect of globalization, particularly trade, on income inequality and, by extension, democratization in developing countries?

The research question can be boiled down to three main parts: the relationship between trade and inequality, the relationship between inequality and democratization, and the relationship between trade and democratization with or without inequality as the mediator, as shown in Figure 1.



Figure 1: Research Question

Each of the three relationships has spawned a large yet separate literature. First, studies on the general relationship between trade and democratization abound, but tend to overlook the role of income inequality as a mediator.<sup>1</sup> Second, studies focusing specifically on the relationship between inequality and democratization have recently grown in popularity, but tend to omit trade (Ansell and Samuels 2010; Boix 2003; Freeman and Quinn 2012; Houle 2009; Haggard and Kaufman 2012). Influenced by Lipset (1959)’s seminal contribution, previous scholarship has focused mainly on modernization-style theories that examine

---

<sup>1</sup>Please see Eichengreen and Leblang (2008) and Li and Reuveny (2003) for a survey of the literature.

the relationship between wealth level and democracy. This changed when Przeworski et al. (2000) find that the positive correlation found between per capita income and democracy was due to the consolidation effect of wealth while wealth has no effect on democratization. Since then the literature has shifted interest towards income distributional explanations of democratization. Unfortunately, this literature has either assumed a closed economy (Ansell and Samuels 2010; Houle 2009; Haggard and Kaufman 2012) or focused on the financial aspect of globalization (Boix 2003; Freeman and Quinn 2012). Studies on the effect of trade are rare. Third, theoretical and empirical literature on the relationship between trade and inequality also abound, particularly in economics. Goldberg and Pavcnik (2007) review the literature and discuss how assumptions about Interindustry Labor Mobility (ILM) are key to trade theories but are oftentimes unrealistic.<sup>2</sup> In addition, they show how recent empirical studies on trade and inequality in developing countries find that the two are generally positively correlated, which contradicts classical theoretical predictions that increased trade would reduce inequality in labor abundant countries, albeit the causal effects are difficult to identify. These assumptions and findings, however, seem to be lost in transition when ported to the democratization literature (Acemoglu and Robinson 2006).

Therefore, extant literature is unsatisfying in two main ways. First, within extant literature only Acemoglu and Robinson (2006) explicitly tie the relationship between trade and democratization through inequality. However, they had no real intention of evaluating their theory systematically after developing their formal model. As a result, we currently know little about how well Acemoglu and Robinson (2006)'s model stands in face of empirical evidence and the effect of trade on democratization via inequality in general.<sup>3</sup> Second, all inequality-democratization literature that incorporates aspects of globalization such as trade

---

<sup>2</sup>Please see footnote 14 and page 58-59 in Goldberg and Pavcnik (2007).

<sup>3</sup>Ahlquist and Wibbels (2012), which was published recently, is the only empirical paper that I know of that explicitly focuses on the relationship between trade, inequality, and democratization. However, their paper and this study differ in country scope, timeframe, and how trade is theorized and operationalized. Specifically, they don't consider the key trade theory assumptions that I discuss in this paper and operationalize trade as trade openness at the system level whereas this study focuses on country-level trade flows.

or finance assumes that factors of production can move both across countries *and* across different domestic industries at no costs (Acemoglu and Robinson 2006; Boix 2003; Freeman and Quinn 2012). The former assumption may be plausible as cross-border economic integration has increased, but as the trade-inequality literature points out, inter-industry labor mobility (ILM) tends to be immobile rendering the latter assumption difficult to justify (Goldberg and Pavcnik 2007).

In light of these problems, this study seeks to bridge the disconnected literatures and make two main contributions. Theoretically, I make a critical departure from existing literature by incorporating a specific factors model of trade (Ricardo-Viner, RV), which relaxes the perfect labor mobility assumption that is rather heroic, and derive hypotheses of how trade impacts inequality in low labor mobility countries. In particular, I argue that the effect of trade on inequality and democratization should be *mediated* through different levels of ILM, as shown in Figure 1. I posit that increased trade in an export-oriented labor abundant country with low ILM, i.e. high labor specificity, should have an *increasing* effect on inequality instead, which then lowers probabilities of democratization. This contrasts Acemoglu and Robinson (2006)'s argument that increased trade in a labor abundant country decreases inequality and leads to higher probabilities of democratization. Empirically, I seek to contribute to the literature by pitting Acemoglu and Robinson (2006)'s well established formal model against a specific factors implied trade model in an empirical test. In particular, I adopt a finite mixture model approach suggested by Imai and Tingley (2012) to test the competing models. In contrast to standard model selection methods, this approach allows for the possibility that multiple models can co-exist and lets researchers estimate the probability that a specific observation is consistent with one of the competing models depending on key assumptions.

The remainder of this study is organized as follows. Section 2 lays out the scope of this study and briefly surveys and summarizes the findings of extant literature on trade, inequality, and democratization. Section 3 focuses on ILM as the mediator between trade

and inequality, reviews and refines Acemoglu and Robinson (2006)'s theory and testable hypotheses, develops a theory that allows labor specificity, and derives alternative testable hypotheses. Section 4 discusses the empirical analysis of the study: data, operationalization, statistical methods, models, and results. In particular, I first conduct a plausibility probe to see whether the relationship between trade and inequality follows the causal story that the hypotheses derived from each competing theories lay out. Then, I turn to examine the relationship between trade and democratization employing similar methods. Section 5 discusses the implications of this study and concludes the paper.

## 2 Trade, Inequality, and Democratization

The main outcome of interest is democracy etiology, i.e., transitions from non-democracies to democracies. When conceptualizing what constitutes a democracy and what should be considered a transition to democracy, the existing literature debates whether a continuous, dichotomous, or trichotomous measure of democracy is more appropriate.<sup>4</sup> This study doesn't address the debate, but instead it begins with a dichotomous measure and employs a continuous measures of regime type for robustness checks.<sup>5</sup> In addition, I will focus on examining the relationship between inequality and *democratization* and not democratic consolidation. Similar to wealth-level explanations of democratization, wealth-distribution literature also distinguishes between effects of inequality on democratization versus consolidation, but this paper will focus only on the former.

As briefly mentioned earlier, there's a large yet disjunct literature that seeks to address the relationships between trade, inequality, and democratization. Furthermore, a closer examination of the separate literatures shows that each of them have produced quite conflicting findings. First, studies on the general relationship between trade and democratization abound, but tend to overlook the role of income inequality as a mediator. Although the bulk

---

<sup>4</sup>See, for example: Collier and Adcock (1999), Elkins (2000), Munck and Verkuilen (2002), Casper and Tufis (2003), Epstein et al. (2006).

<sup>5</sup>Specifically, Przeworski et al. (2000)'s dichotomous measure and POLITY IV's continuous measure.

of the literature focuses on the impact of democratization on trade (Eichengreen and Leblang 2008; Milner and Kubota 2005; Milner and Mukherjee 2009), there is a body of research that examines the impact of trade on democratization (see Eichengreen and Leblang (2008) and Li and Reuveny (2003) for reviews). This literature posits at least seven different potential mechanisms through which increased trade may “promote” or “obstruct” democratization such as via increased income, reduced information costs, increased decentralization, or the diffusion of democratic ideas (Li and Reuveny 2003). Absent in the literature is scholarship focusing on the role of inequality as a mediator. Furthermore, due to the array of different mechanisms and measurement, this body of literature has produced conflicting findings on the relationship between trade and democratization that range from positive correlation (Eichengreen and Leblang 2008) to negative correlation (Li and Reuveny 2003) to no relationship at all (Milner and Mukherjee 2009).

Second, studies focusing specifically on the relationship between inequality and democratization has recently grown in popularity, but tend to omit trade variables (Ansell and Samuels 2010; Boix 2003; Freeman and Quinn 2012; Houle 2009). As illustrated earlier, the literature has shifted interest towards wealth distributional explanations of democratization after Przeworski et al. (2000)’s influential study showed that wealth makes democracies more likely to survive but doesn’t have an effect on transitions to democracies. Unfortunately, this literature has either assumed a closed economy (Ansell and Samuels 2010; Houle 2009; Haggard and Kaufman 2012) or focused on the financial aspect of globalization (Boix 2003; Freeman and Quinn 2012). Furthermore, due to diverse model specifications of globalization and measurements, studies have produced quite conflicting findings on the relationship between inequality and democratization. The predictions range from inverse U-shaped (Acemoglu and Robinson 2006; Freeman and Quinn 2012), U-shaped (Freeman and Quinn 2012), negative correlation (Boix 2003), positive correlation (Boix 2003), to no relationship at all (Bollen and Jackman 1985; Muller 1988; Houle 2009; Ahlquist and Wibbels 2012).

For example, Acemoglu and Robinson (2006) argue that there’s an inverse U-shaped re-

relationship between inequality and democratization due to the implication of taxation and redistribution under democracies: at low levels of inequality, the poor have little to gain from democracy since tax redistributions are low; at high levels of inequality, the rich have too much to lose from democracy since tax redistributions are high; and thus only at intermediate levels of inequality will the poor and the rich be willing to bargain for democratization. Furthermore, they argue that this relationship holds even when globalization, i.e., trade or financial integration, is accounted for. On the other hand, studies that focus on the effect of financial integration on inequality and democratization have produced quite conflicting findings. Boix (2003) finds (a) a negative correlation between inequality and the probability of democratization when capital mobility is low across borders, and (b) a positive correlation when capital mobility is high across borders. In other words, as inequality increases in a country, its probability of democratization decreases when cross-border capital mobility is low, but *increases* when capital mobility is high. In contrast, Freeman and Quinn (2012) find an inverse U-shaped relationship between inequality and democratization when cross-border capital mobility is low and a U-shaped relationship when cross-border capital mobility is high. Finally, Houle (2009) assumes a closed economy and finds that although inequality and democratic consolidation are negatively correlated, inequality has no effect on democratization.

Third, empirical models on the relationship between trade and inequality also abound, particularly in the field of economics (Goldberg and Pavcnik 2007). Yet the findings are rarely if ever applied to the democratization literature with the notable exception of Acemoglu and Robinson (2006). This literature has reached a consensus on a slightly positive correlation between trade and income inequality in developing countries in the 1980s and 1990s regardless of the different measures of trade or inequality used. However, the literature disagrees on whether a causal link can be established between trade and inequality and posits three different causal channels through which trade impacts inequality that range from changes in labor income, changes in relative price and consumption, to changes in

household production decisions. Furthermore, it recognizes how assumptions about labor mobility/specificity across industries are key to classical trade theories but are oftentimes empirically unjustified.

In sum, although each of the three relationships have spawned large literatures, there has been a disjuncture between them. Furthermore, the literatures have produced quite conflicting findings. Therefore, this study seeks to bridge the literatures by concentrating on the effect of trade on democratization through inequality. Again, empirical studies on this specific mechanism have been mostly absent, and this study seeks to fill in the gap. Finally, one consistent theme among inequality-democratization studies that try to incorporate financial openness is that they all tend to relax assumptions about factor mobility *across* borders when discussing the effects of globalization. An alternative and unexplored way to examine the implications of globalization on democratization is to relax assumptions about factor mobility *domestically* and see how it moderates effects of globalization. I will argue, and develop in more details in the next section, that increased trade integration may have different effects on inequality conditional on different levels of labor mobility across industries and thus yielding different effects on democratization.

### **3 Trade, Inter-industry Labor Mobility, and Inequality**

Since Acemoglu and Robinson (2006) is the only study that offers a model that explicitly links trade and democratization through inequality, I build on their model but make a critical departure regarding the key assumption about inter-industry labor mobility. As a result, I derive different predictions about the effect of trade on inequality and democratization.

Acemoglu and Robinson (2006) extend their argument about the inverse U-shape relationship between inequality and democratization from a closed to open economy in chapter 10. On the impact of trade integration, they incorporate a Stolper-Samuelson (SS) model of international trade, which assumes perfect labor mobility, and essentially argues that in-

creased trade integration in developing countries decreases inequality and leads to higher probabilities of democratization. This is because if one assumes developing countries are relatively abundant in labor, one would expect increased trade to increase real returns for labor (the relatively abundantly factor) and reduce real returns for owners of capital (the relatively scarce factor) under the Stolper and Samuelson (1941) theorem thus ultimately reducing inequality in these countries.<sup>6</sup> Lower inequality then reduces the costs of tolerating democracy for elites because tax redistributions are less severe for elites when inequality is low. In addition, since elites are also likely to be capital owners, costs of repression are high for elites when they face revolutions. Combined, lower costs of tolerance and higher costs of repression lead to higher probabilities of democratization for countries at intermediate to high levels of income inequality.

In some sense, Acemoglu and Robinson (2006) build on Rogowski (1990)'s classical study that applied the SS model of trade to political outcomes. Rogowski predicted that increased trade leads to different *class* cleavages (e.g. land, capital, labor) since trade would create real income changes for different factor owners and thus create different domestic winners, losers, and alliances depending on a country's relative factor endowment. Acemoglu and Robinson (2006) extend this type of argument and apply SS models to their democratization argument by using trade to explain changes in inter-class inequality. They equate the elites to owners of capital and the mass to owners labor and thus increased trade changes the distribution of wealth between the elites and the mass under the SS theorem. However, SS models of trade rely on the simple yet unjustified assumption of perfect factor mobility, which means that factors of production (e.g. labor) can move between sectors or industries at no costs. Only under this assumption would trade benefit owners of relatively abundant factors of production. Therefore, I argue that Acemoglu and Robinson (2006)'s model and predictions should be less applicable when labor is more specific to certain industries (i.e., labor specificity is high). This first hypothesis can be summarized as follows:

---

<sup>6</sup>The Stolper-Samuelson theorem states that increased trade increases real returns for owners of relatively abundant factors of production in the economy, but real returns for owners of relatively scarce factors decline.

**Hypothesis 1:** Holding all else equal, the probability of Acemoglu and Robinson (2006)'s model and derived predictions being consistent with empirical data should decrease as labor specificity increases.

Furthermore, their predictions about the effect of trade in labor abundant developing countries should be restated more precisely as follows:

**Hypothesis 2a:** Holding all else equal, higher 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.

However, Acemoglu and Robinson (2006) note an important caveat: many developing countries in Latin America are relatively land abundant instead of being labor abundant. Furthermore, land is oftentimes under the control of elites in Latin American countries. Therefore, increased trade in these developing countries would benefit land owners, i.e., the elite, and *increase* inequality under the SS theorem. By extension, this would lower the probability of democratization for Latin American developing countries. Again, this caveat should work under the conditions of perfect factor mobility, therefore it should be stated more precisely as follows:

**Hypothesis 2b:** Holding all else equal, higher trade in a land abundant country that has low inter-industry labor specificity increases inequality, which by extension leads to lower probabilities of democratization.

If a specific factors model (Ricardo-Viner, RV) is adopted instead, which assumes factor specificity (imperfect factor mobility), cleavages should no longer fall on the lines of class. Hiscox (2002) makes this argument to explain differences in trade preferences between factor owners in export and non-export sectors. Since the returns to industry-specific factors are tied closely to the well being of the industry in which they are employed, factors specific

to export industries receive a real increase in returns due to benefits from trade, while those employed in import-competing industries receive a decrease in returns. I follow Hiscox (2002)'s argument, but instead apply RV models to explain variation in inequality. First, increased trade would increase inequality *between* export and non-export industries since trade benefits the former but hurts the latter. Second, since export sectors are shown to be more skill-intensive and pay higher wages for skill labor (Bernard and Jensen 1997), increased trade would also increase inequality *within* the export industry. Assuming that elites in developing country are holders of higher skills, this implies that higher export orientation in a labor abundant country would increase inequality since trade increases inequality *both between and within sectors*. This hypothesis can be summarized as follows:

**Hypothesis 3:** Holding all else equal, higher 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.

In contrast, the distributional effect between sectors and the distributional effect within the export sector due to skill premiums should be absent in a more import-oriented labor abundant countries. This suggests that higher import-orientation shouldn't increase inequality but it's not clear whether inequality should decrease or maintain under a RV model.

In sum, since Acemoglu and Robinson (2006) employ a trade model that assumes perfect inter-industry labor mobility (i.e., the SS model), their democratization theory may become problematic if they don't account for varying levels of inter-industry labor mobility in their model. Cross-sectionally, their theory and predictions may not hold in developing countries that experience increased exports but also have low labor mobility. Temporally, although their theory may hold around World War I when average inter-industry labor mobility peaked, the applicability of their theory may have decreased since inter-industry labor mobility, on average, has since decreased in the world due to specialized production processes (Hiscox 2002). Figure 2 illustrates this decreasing labor mobility (increasing labor

specificity) trend using labor specificity data from Zhou (2008). Finally, since Acemoglu and Robinson (2006) subsequently relax assumptions about factor mobility *across borders* it's a natural extension to relax assumptions about factor mobility *domestically* between industries.

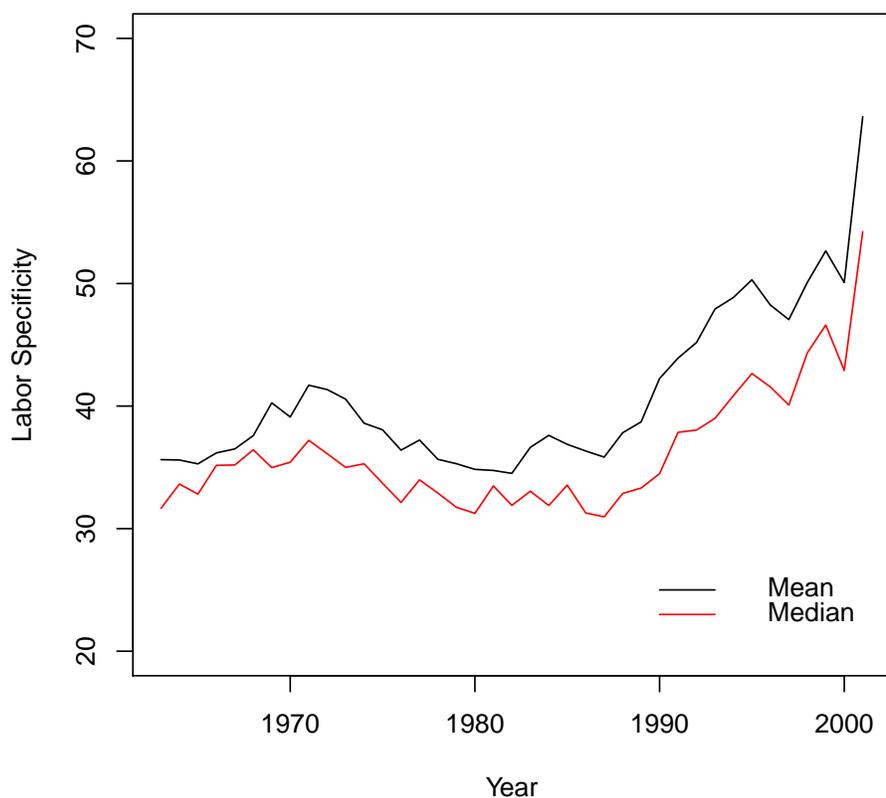


Figure 2: Labor Specificity Across Years

*Note:* Labor specificity is measured as the coefficient of variation of inter-industry wage differentials (*wage-cov*) using data from Zhou (2008).

## 4 Empirical Analysis

Focusing on the “third wave” of democratization, I compile an unbalanced panel dataset that covers 172 countries from 1980-2000 with country-year as the unit of analysis. This period

benefits the study by providing more variation in both regime change and trade integration in developing countries compared to other periods: democratization spread to many developing countries during the 80s and 90s (Haggard and Kaufman 2012) while many developing countries also began to open up to trade (Goldberg and Pavcnik 2007). Furthermore, data quality and availability on many of the covariates in this study improve greatly after 1980. To address remaining missing data problems such as the sparseness of inequality data, I create five multiply imputed datasets using the **R** package *Amelia II* (Honaker, King and Blackwell 2011), fit the study’s empirical models to each of the datasets, and combine the results.<sup>7</sup> Countries included are all independent countries in a year, as defined in Gleditsch (2004). Therefore, country-years for former Soviet Union Republics before their independence are naturally excluded. In the following, I will discuss in detail the variables included in the study’s models, their data sources and operationalization, and the models I fit to the data.

## 4.1 Outcome of Interest

Democratization, a transition from a non-democracy to a democracy, is the outcome of interest. For the dichotomous measure, a democracy is coded as 1 and 0 otherwise. Regime type data relies on the *Democracy and Development Extended Data Set*, which extends Przeworski et al. (2000) and covers 199 countries between 1946 and 2002. As mentioned earlier, I acknowledge the debate on whether a continuous or dichotomous measure of democracy is more appropriate. Therefore, I use the Przeworski et al. (2000) measure as first cut and turn to POLITY IV measures for robustness checks.

## 4.2 Covariates

*Inequality* serves as a mediator between trade and democratization and the outcome of interest for the plausibility probe. I measure inequality using Gini coefficient data from

---

<sup>7</sup>See <http://gking.harvard.edu/amelia/>.

three sources: Dollar and Kraay (2002) (DK), the Estimated Household Income Inequality (EHII 2008) (Galbraith and Kum 2005), and the Standardized World Income Inequality Database (SWIID) (Solt 2009).<sup>8</sup> Since SWIID provides the largest set of observations for this study, I focus on SWIID's data and use DK and EHII as robustness checks.

Existing inequality indicators are plagued by problems of sparseness and inconsistency. First, many data sets have few observations over few countries.<sup>9</sup> For example, the widely used Deininger & Squire data set (DS) provides Gini coefficients for less than 11 percent of the country-years from 1950 to 1996 (Deininger and Squire 1996). Gini coefficient data provided by World Development Indicators (WDI, World Bank) includes only 598 country-year observations since 1960.<sup>10</sup> Second, the data sets suffer from poor quality. The DS data contains information from diverse sources using diverse methods on diverse populations and needs to be adjusted before being used in cross-national, time-series analyses. Specifically, the measures don't distinguish between income or expenditure inequality, individual or household inequality, and net of taxes or gross income inequality.<sup>11</sup>

DK, EHII, and SWIID try to address these concerns. DK offer a transforming metric that controls for gross income, expenditure, and region. Overall, it provides a sample of 953 country-year observations covering 137 countries over the period of 1950 to 1999.<sup>12</sup> The EHII dataset uses United Nations Industrial Organization (UNIDO) wage data with a Theil T's statistic, a measure of the spread in wage pay, to generate a sample of 3,513 country-year observations of pay inequality covering 154 countries over the period of 1963 to 2002. It

---

<sup>8</sup>For EHII 2008, please see: <http://utip.gov.utexas.edu/data.html> For SWIID, please see: <http://myweb.uiowa.edu/fsolt/swiid/swiid.html> There's an ongoing debate on the appropriateness of using capital share of the value added in the industrial sector, which is assembled by Rodriguez and Ortega (2006), as a measure of *inter-group* inequality. Houle (2009) argues that it better captures the rich vs. poor inter-group inequality stated in Acemoglu and Robinson (2006) while Freeman and Quinn (2012) question its cross-national validity. However, the Rodriguez and Ortega (2006) data only offers ten-year averages thus doesn't provide much variation for the two decade timeframe for this study. Therefore, it's not used in this study.

<sup>9</sup>For a list of data sets used by previous studies examining relation between inequality and democracy, please see Table 1 in Houle (2009).

<sup>10</sup>For data, please see Gini index in the WDI database, World Bank.

<sup>11</sup>For more discussion on this problem, see Freeman and Quinn (2012) pp. 17, and Houle (2009) pp. 590.

<sup>12</sup>For transformation details, please see Dollar and Kraay (2002) pp. 200 and appendix.

also adjusts for the problem above by controlling for source characteristics.<sup>13</sup> The SWIID dataset tries to maximize cross-country comparability of income inequality data by starting with the World Income Inequality Database (WIID) and using the Luxembourg Income Study (LIS) as the standardizing baseline. It covers 153 countries since 1960 to 2010, with 3,351 country-year observations on net inequality and 3,322 country-year observations of gross inequality.

*Inter-industry labor mobility* (ILM), which can be loosely defined as how easily labor can move between industries, serves as a key independent variable to determine the applicability of Acemoglu and Robinson (2006) compared to the theory proposed in this study as stated in Hypothesis 1. However, getting ILM data for the temporal and spatial scope of this study is challenging. Fortunately, Zhou (2008) offers three measures of ILM that cover an unbalanced dataset of 217 countries from the period of 1963 to 2001.<sup>14</sup> To my knowledge, Zhou (2008) is the only extant study that offers panel data for ILM at this magnitude. Among the different measures available in the dataset, this study focuses on the coefficient of variation of interindustry wage differentials (*wagecov*). The measure is constructed following Hiscox (2002)'s method and can be conceptualized as a measure of labor specificity. Assuming that individuals arbitrage wage differences between industries, higher *wagecov* implies that certain barriers exist that increase the cost of moving between industries thus proxying for higher labor specificity. Since this measure is constructed based on wage differences, there's concern that measures for inter-industry labor mobility may be just capturing inequality. The correlation between *wagecov* and the three inequality measures (DK, EHII, SWIID) is respectively: 0.4504, 0.6781, 0.4135. Although the positive correlation between *wagecov* and the EHII measure is higher, the hypotheses in the study focus on the effect of trade in countries with *different* levels of labor specificity, which is different from predicting inequality

---

<sup>13</sup>In particular, EHII2008 data is estimates of gross household income inequality, computed from a regression relationship between the Deininger & Squire inequality measures and the UTIP-UNIDO pay inequality measures, controlling for the source characteristics in the DS data and for the share of manufacturing in total employment.

<sup>14</sup>For Zhou (2008), please see: <http://home.uchicago.edu/~qiang/Data.htm>

with just labor specificity and should mitigate concerns of tautology. Furthermore, EHH data is only used as a robustness check for SWIID data.

*Trade* is the main covariate of interest in this study and is operationalized in two main ways: total trade (sum of exports and imports of goods) as a share of GDP to test Hypothesis 2a and 2b; total export as a share of GDP to test Hypothesis 3. Specifically, the former takes Penn World Table 7.0's OPENK measure interacted with relative labor endowment ( $trade*labor$ ), which I discuss below.<sup>15</sup> The latter uses UN comtrade export and import data (Classification SITC.1) and GDP data from WDI to construct the export and import orientation of countries (total export to GDP; total import to GDP). Again, export-orientation and import-orientation is interacted with labor endowment ( $export*labor$ ;  $import*labor$ ).

The usual two-good three-factor model of trade includes three factors of production: land, labor, and capital. Developing countries discussed by Acemoglu and Robinson (2006) in essence tries to get at labor abundant countries. Therefore, developing country is operationalized as *relative labor endowment* in this study. Following Leamer (1985), Midford (1993), and Ahlquist and Wibbels (2012), country<sub>*i*</sub>'s relative labor endowment is measured as:  $(labor\ force_i/world\ labor\ force)/(GDP_i/world\ GDP)$ .<sup>16</sup> Small values on relative labor endowment indicate that country<sub>*i*</sub> produces a large GDP compared to the world with just a small labor force compared to the world thus suggesting country<sub>*i*</sub> is labor scarce, which captures the key concept of *relative* factor abundance: comparison made against the world and not against the endowment of other factors in the same country.<sup>17</sup> Similarly, country<sub>*i*</sub>'s *relative land endowment* is measured as:  $(arable\ land_i/world\ arable\ land)/(GDP_i/world\ GDP)$ <sup>18</sup>. Again, small values indicate that country<sub>*i*</sub> produces a large GDP compared to the

---

<sup>15</sup>For Penn World Table 7.0 (Heston, Summers and Aten 2011), please see <https://pwt.sas.upenn.edu/>

<sup>16</sup>Labor force comprises people ages 15 and older who meet the International Labour Organization definition of the economically active population.

<sup>17</sup>For dichotomous measures of relative labor endowment, I arbitrarily take the continuous measure and use 20% quantile as the cut-point: country-years above the 20% quantile are coded with the value 1 while those below are coded 0.

<sup>18</sup>Arable land includes land defined by the Food and Agriculture Organization (FAO) of UN, as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded.

world with little arable land compared to the world thus being relatively land scarce. Both Labor force data and Arable land data are taken from the World Development Indicators (WDI), World bank.

*Other covariates.* I include the standard set of variables that Przeworski et al. (2000) list in Table 2.17.<sup>19</sup> Varying model specification is one of the main reasons why extant findings diverge. Therefore, it may be more helpful to build on one standard set of covariates as the baseline, add key covariates, and compare the results, in contrast to an approach that both changes model specification and adds new variables. With all the moving pieces, the latter makes it more difficult to distinguish whether different results were due to the modifying of conventional models or due to the new variables introduced in this study. The variables and data above are taken from Przeworski et al. (2000)’s *Democracy and Development Extended Data Set*. I update Przeworski et al. (2000)’s older Penn World Table per capita income level and growth data (PWT 5.6/6.1) to the newer PWT 7.0 version. Since the proportion of other democracies in the world is no longer included in the *Extended Data Set*, I construct the variable using data from POLITY IV (Marshall, Jaggers and Gurr 2011).

Descriptive statistics for all variables are reported in Table 5 (continuous variables) and Table 6 (nominal variables) in the appendix.

### 4.3 Models and Methods

The study employs a finite mixture model approach proposed by Imai and Tingley (2012) to evaluate the performance of the competing hypotheses derived from SS and RV trade models, which differ on fundamental assumptions about labor mobility. In contrast to “garbage can regressions” that fit a regression model with many explanatory variables that are derived from multiple theories (Achen 2005) or standard model selection methods that assume one

---

<sup>19</sup>Przeworski et al. (2000), pp. 124. The eleven variables include: per capita income lagged (LEVLAG); rate of per capital income growth (GLAG); cumulative rate of leadership turnover (TLAG); religious fractionalization (RELDIF); proportion of Catholics (CATH), Protestants (PROT), and Muslims (MOSLEM); new countries (NEWC); British colonies (BRITCOL); number of past transitions to authoritarianism (STRA); proportion of other democracies in the world (ODWP).

theory explains all observations, this approach allows for the possibility that multiple theories co-exist and lets researchers estimate the probability that a specific observation is consistent with one of the competing theories. In the context of this study, this approach allows for the possibility that both SS models and RV trade models can explain inequality and democratization. The key is that some country-years may be more consistent with the predictions of SS models since they have lower labor specificity while other country-years may be more consistent with the prediction of RV models since they have higher labor specificity. The average of the observation-specific probabilities can then be used to evaluate the overall performance of each theory.

As illustrated above, this approach is tailored for the purpose of this study: evaluating in a principled way whether the relative applicability of the two competing theories and their derived hypotheses depend on assumptions about labor mobility. Furthermore, scholars can use the identified list of theory-consistent countries to examine whether quantitative evidence agrees with qualitative knowledge about each democratizing case. A caveat is that it is very difficult to enable the identification of causal effects in an observational study on the relationship between trade, inequality, and democratization where most covariates are likely to be endogenous to each other. However, the question is also too important to simply give up on. Therefore, this study should be thought of as an instance of *predictive* inference instead of causal inference.

## 4.4 Results

### 4.4.1 Plausibility Probe: Trade and Inequality

If the argument proposed in this study is true, increased trade would have opposing effects on *inequality* depending on a country's labor specificity as the first step. Therefore, the empirical analysis begins by probing this plausibility by first treating inequality as the outcome of interest.

Figure 3 shows plausibility of the argument that increased trade may have opposing effects

on inequality in developing countries depending on the level of labor specificity. Using DK data, the top-left plot shows that inequality is relatively flat as trade increases in developing countries in general. However, the top-right plot shows that even though inequality decreases in low labor specificity developing countries, as predicted by Acemoglu and Robinson (2006), inequality actually *increases* in high labor specificity developing countries. Similar patterns hold when switching to SWIID data as shown in the lower panel.

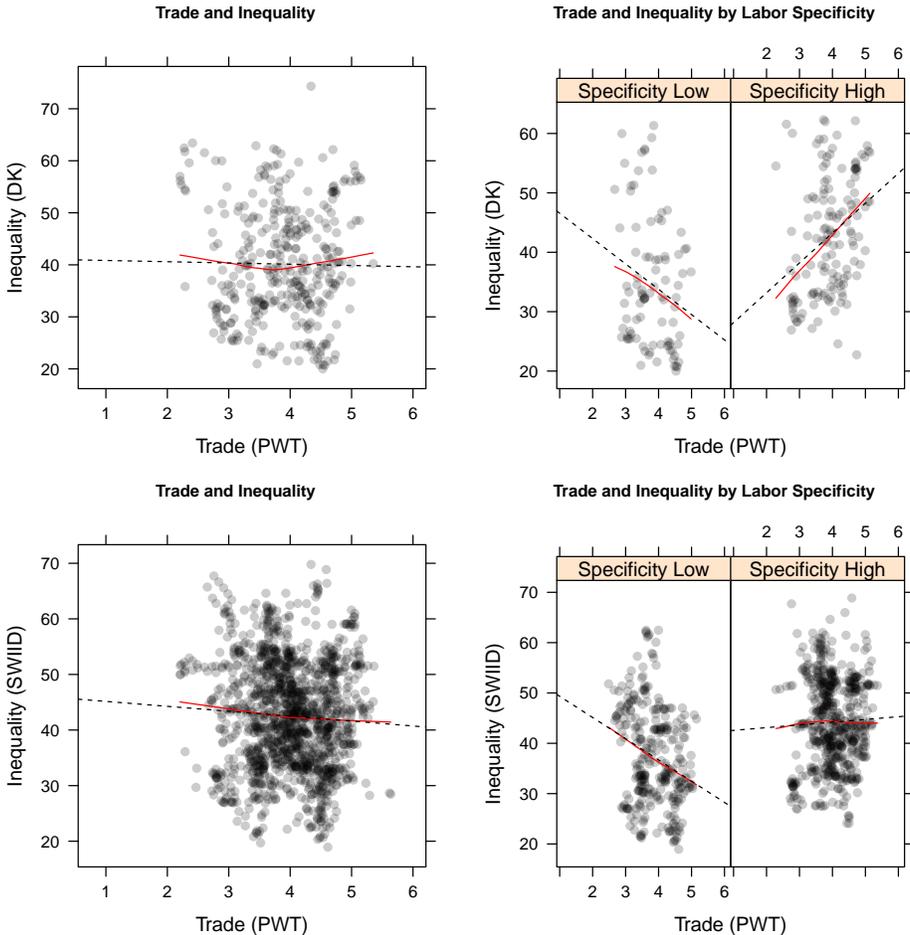


Figure 3: Trade and Inequality

*Note:* Trade is lagged total trade (export + import) in goods to GDP and logged (PWT 7.0). Labor specificity dichotomizes Zhou (2008)'s lagged *wagecov* variable at the median. Developing country defined as the dichotomous version of relative labor endowment illustrated previously.

As bivariate/trivariate correlation plots are certain to be vulnerable to omitted variable

biases, I turn to more systematic analyses taking a mixture model approach. Specifically, I estimate parameters for a mixture of two OLS regression models for the outcome of interest inequality: the first with covariates corresponding to Hypothesis 2a and 2b derived from trade models that assume perfect labor mobility; the second with covariates corresponding to Hypothesis 3 derived from trade models that assume factor specificity. Next, I model the mixing probability (the proportion of observations consistent with the RV model),  $\pi$ , using a logistic regression with labor specificity as the only covariate. Formally, the mixture model is specified as the following:

$$f_{SS}(\text{Inequality}_{it} | \mathbf{X}_{it}, \theta_{SS}) = \beta_0 + \beta_1 \text{Trade}_{it} \times \text{Labor}_{it} + \beta_2 \text{Trade}_{it} \times \text{Land}_{it} + \beta_3 \text{Trade}_{it} + \beta_4 \text{Labor}_{it} + \beta_5 \text{Land}_{it} + \boldsymbol{\beta}_6 \mathbf{Z}_{it} \quad (1)$$

$$f_{RV}(\text{Inequality}_{it} | \mathbf{X}_{it}, \theta_{RV}) = \gamma_0 + \gamma_1 \text{Export}_{it} \times \text{Labor}_{it} + \gamma_2 \text{Import}_{it} \times \text{Labor}_{it} + \gamma_3 \text{Labor}_{it} + \gamma_4 \text{Export}_{it} + \gamma_5 \text{Import}_{it} + \boldsymbol{\gamma}_6 \mathbf{Z}_{it} \quad (2)$$

$$\pi_{RV}(W_{it}, \phi_{RV}) = \text{logit}^{-1}(\delta_0 + \delta_1 \text{Specificity}_{it}) \quad (3)$$

where  $f_{SS}$  and  $f_{RV}$  denote statistical models implied by SS and RV models, respectively, inequality is the outcome variable of interest for this plausibility probe,  $\mathbf{X}_{it}$  is a vector of predictors for each model,  $\theta_{SS}$  and  $\theta_{RV}$  are vectors of parameters for each model, and  $i$  and  $t$  index countries and years, respectively. All other potential covariates that may have a direct effect on inequality are included in the vector  $\mathbf{Z}_{it}$ . These include GDP growth (WDI), level of per capita income (PWT), per capita income growth (PWT), FDI net inflows (WDI), and capital account openness (Chinn and Ito 2006). Finally, all variables are centered to mitigate multicollinearity and facilitate interpretation of interaction terms.

The current version of the study estimates the parameters of the above mixture model from a frequentist approach using the **R** package `flexmix` (Grün and Leisch 2008).<sup>20</sup> Pre-

---

<sup>20</sup>A Bayesian version is still in work.

dictions based on the first part of the hypotheses in this study are summarized as follows in Table 1. First, following the predictions of Hypothesis 1,  $\delta_1$  is expected to be positive and statistically significant since higher labor specificity in a certain country-year is more likely to yield support for the RV model in general. Second, following the predictions of Acemoglu and Robinson (2006) (Hypothesis 2a and 2b),  $\beta_1$  is expected to be negative and statistically significant, which would suggest that higher levels of trade in relatively labor abundant countries is correlated with lower levels of inequality;  $\beta_2$  is expected to be positive and statistically significant, which would suggest that higher levels of trade in relatively land abundant countries is correlated with higher levels of inequality. Third, following my prediction in Hypothesis 3,  $\gamma_1$  is expected to be positive and statistically significant, which would suggest that higher levels of export in labor abundant countries is correlated with higher levels of inequality.<sup>21</sup>

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	$\gamma_1$	+

Table 1: Predictions: Relationship Between Trade and Inequality

Results for the plausibility probe with inequality as the outcome of interest are the following. Figure 4 plots the estimated probability,  $\hat{\pi}$ , that country-years are consistent with a RV-implied model as labor specificity increases, which can serve as an indicator for the model’s overall performance. The positive slope supports this argument. In other words, Acemoglu and Robinson (2006)’s SS-implied theory on the relation between trade and inequality becomes less consistent with the data in this study when level of labor specificity is high. In particular, there’s about a 0.845 probability that a country-year is consistent with

<sup>21</sup>In addition, since RV models don’t provide clear predictions for inequality as trade increases in import-oriented developing countries, it’s not clear what direction  $\gamma_2$  should take.

a RV-implied model when its labor specificity level is at the centered median (-6.7802).

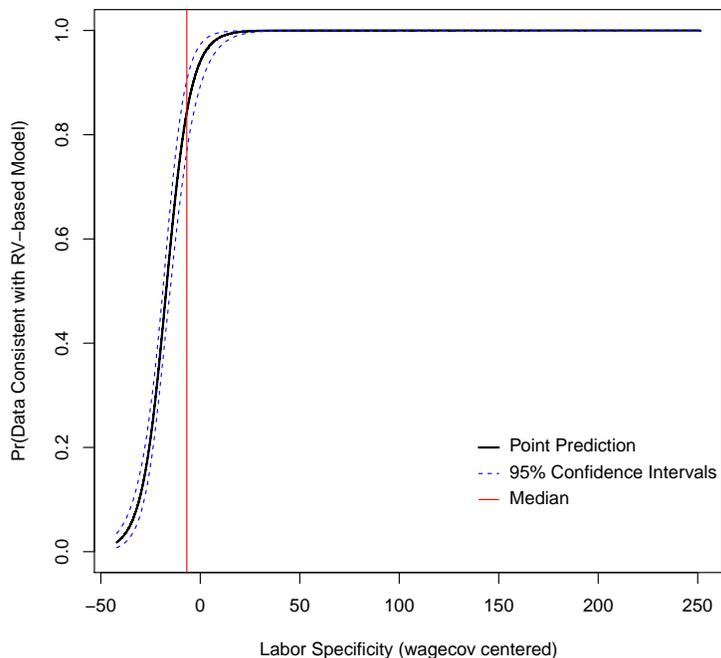


Figure 4: Trade and Income Inequality: Labor Specificity and Probability of Data Consistent with RV-implied Model

*Note:* The positive slope indicates that a RV-implied model on trade and inequality is more consistent with the data than Acemoglu and Robinson (2006)’s SS-implied model (Hypothesis 2a and 2b) as labor specificity increases.

The mixture model also provides estimates of the model parameters for each of the SS-implied and RV-implied models. Figure 5 plots the estimated coefficients for each key covariate while Table 2 reports the detailed estimates and compare them to a “garbage-can” regression, which refers to a single OLS regression that contains all covariates taken from equation (1) and (2).

The results are quite surprising. Beginning with Acemoglu and Robinson (2006)’s SS-implied model (Hypothesis 2a and 2b), the results are completely opposite of their predictions: higher levels of trade in relatively labor abundant and labor mobile countries actually correlates with *higher* levels of inequality while higher levels of trade in relatively land abun-

dant and labor mobile countries correlates with *lower* levels of inequality (Table 2 shows this clearer than Figure 5 as coefficients were too small to plot). Turning to a RV-implied model (Hypothesis 3), which is more applicable in high labor specificity countries, the results show that more export-oriented labor abundant countries correlates with *lower* inequality, which contradicts Hypothesis 3. Furthermore, more import-oriented labor abundant countries correlate with *higher* inequality.

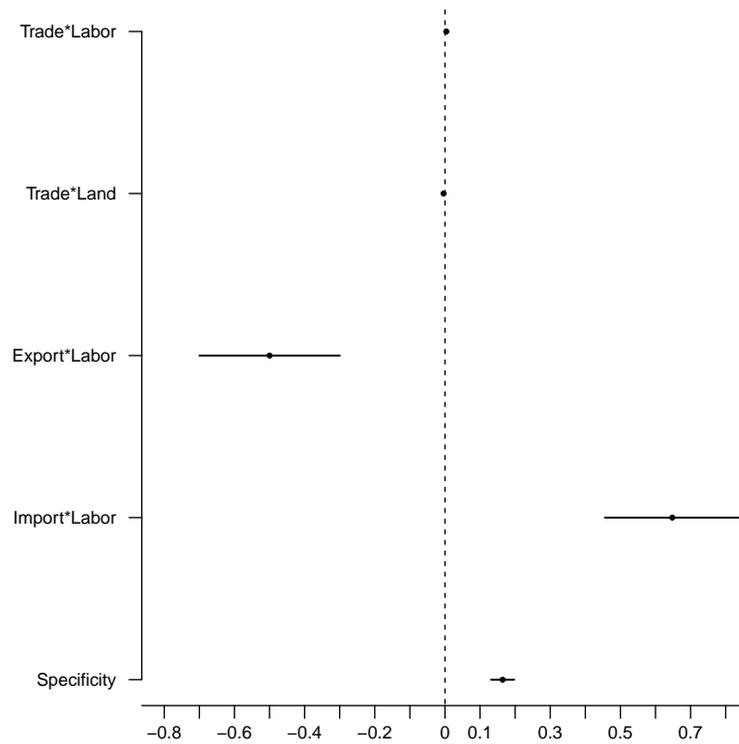


Figure 5: Trade and Income Inequality: Parameters and Estimates

*Note:* The bars indicated 95% confidence intervals

Comparing the mixture model results with the “garbage can” regression results shows the superior discrimination power of each variable in the mixture model. All coefficients in a RV-implied model were larger in magnitude while standard errors were smaller despite that the “garbage can” regression was fit to the entire data. In contrast, *Trade\*Labor* and *Trade\*Land* in Acemoglu and Robinson (2006)’s SS-implied model had slightly smaller coefficients and slightly larger standard errors. This reduction in discrimination power is likely because far

more observation in the data are consistent with the RV-implied model.

DV = Inequality (SWIID data) Models	Variable	Mixture		“Garbage-can”	
		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		

Table 2: Trade and Inequality: Parameter Estimates and Standard Errors from the Mixture Model

*Note:* All covariates are centered to mitigate multicollinearity and facilitate interpretation of interaction terms and are also lagged. Control variables are omitted in order to ease presentation. For details about the mixture model, please see equations (1), (2), and (3). The “garbage-can” regression refers to a single OLS regression that contains all covariates taken from equation (1) and (2). Both models include 3296 country-years.

Overall, the results for probing the relationship between trade and inequality are interesting since it suggests that applicability of the two competing theories in this study do differ on the key assumption about labor specificity, but the theory-specific predictions regarding increased trade or exports are opposite of expectations. This contradicting result may be due to omitted variable biases since variables such as tax rates were not included as controls: countries with higher trade may also have higher tax rates and lead to lower inequality. However, it may also suggest a reexamination of the soundness of the theoretical logic for both SS-implied and RV-implied theories and the way specific hypotheses were operationalized.

## 4.5 Trade and Democratization

In this section, I shift focus to the relationship between trade and democratization. Similar to the plausibility probe above, I take a mixture model approach but with *democratization* as the outcome of interest and a mixture of two *dynamic probit* models instead. The dynamic probit models follow the standard in the literature in which they treat regime transitions as first-order Markov processes and model the various transition probabilities into and out of democracy. Formally, the new mixture model is specified as the following:

$$f_{SS}(\text{Dem}_{it} = 1 | \text{Dem}_{it-1}, \mathbf{X}_{it}, \theta_{SS}) = \Phi(\boldsymbol{\beta}\mathbf{X}_{it} + \boldsymbol{\alpha}\mathbf{X}_{it}\text{Dem}_{it-1}) \quad (4)$$

$$f_{RV}(\text{Dem}_{it} = 1 | \text{Dem}_{it-1}, \mathbf{X}'_{it}, \theta_{RV}) = \Phi(\boldsymbol{\beta}'\mathbf{X}'_{it} + \boldsymbol{\alpha}'\mathbf{X}'_{it}\text{Dem}_{it-1}) \quad (5)$$

$$\pi_{RV}(W_{it}, \phi_{RV}) = \text{logit}^{-1}(\delta_0 + \delta_1 \text{Specificity}_{it}) \quad (6)$$

where  $f_{SS}$  and  $f_{RV}$  denote statistical models implied by SS and RV models, respectively; the probability that a country is a democracy given the country being a non-democracy at the previous period is the outcome of interest with  $i$  and  $t$  indexing countries and years, respectively;  $\mathbf{X}_{it}$  and  $\mathbf{X}'_{it}$  are vectors of covariates specific to  $f_{SS}$  and  $f_{RV}$ , respectively;  $\theta_{SS}$  and  $\theta_{RV}$  are vectors of parameters for each model, respectively;  $\Phi$  is the standard Normal Cumulative Density Function (CDF);  $\boldsymbol{\beta}$  and  $\boldsymbol{\alpha}$  are coefficient vectors associated with vector  $\mathbf{X}_{it}$  in equation (4) while  $\boldsymbol{\beta}'$  and  $\boldsymbol{\alpha}'$  are coefficient vectors associated with vector  $\mathbf{X}'_{it}$  in equation (5).  $\mathbf{X}_{it}$  and  $\mathbf{X}'_{it}$  include separate sets of key predictors but include the same set of controls variables listed in Table 2.17 of Przeworski et al. (2000). Specifically,  $\mathbf{X}_{it}$  includes key predictors corresponding to Hypothesis 2a and 2b derived from trade models that assume perfect labor mobility.<sup>22</sup>  $\mathbf{X}'_{it}$  includes key predictors corresponding to Hypothesis 3 derived from trade models that assume factor specificity.<sup>23</sup> The mixing probability model, equation (6), models the probability of observations consistent with the RV model ( $\pi$ ) and is a logistic

<sup>22</sup>i.e., Trade\*Labor, Trade\*Land, and their individual terms.

<sup>23</sup>i.e., Export\*Labor, Import\*Labor, and their individual terms.

regression with labor specificity as the only predictor. Finally, all variables are centered to speed up convergence and facilitate interpretation of interaction terms. The mixture model is fit using the **R** package `flexmix`. Table 3 below summarizes the expected signs for the coefficients of the key predictors in this study.

Hypothesis	Predictor	Coef. Sign
Hypothesis 1	Labor Specificity	+
Hypothesis 2a	Trade*Labor	+
Hypothesis 2b	Trade*Land	-
Hypothesis 3	Export*Labor	-

Table 3: Predictions: Relationship Between Trade and Democratization

*Note:* Assuming that the relationship between inequality and democratization is linear and negatively-sloped instead of inverse U-shaped to reduce empirical testing complexity.

Note that inequality *isn't* included in the vectors of covariates. This is because controlling for inequality would create post-treatment bias when estimating the effect of trade on democratization if one agrees that trade has a direct causal effect on inequality. Controlling for inequality in this case means that one is asking the effect of trade on democratization given the *same* level of inequality, i.e., the direct effect of trade on democratization, which differs from Acemoglu and Robinson (2006)'s main argument that the probability of democratization changes as inequality *changes* because of changes in levels of trade. For example, post-treatment bias may be a potential problem for Ahlquist and Wibbels (2012) when they include inequality and its squared term in their Table 1 given that their main argument is about the indirect effect of trade openness on democratization via inequality. When inequality is included in their model, their finding suggests no *direct* effect of trade on democratization but doesn't answer the main argument whether trade affects democratization *indirectly* through inequality.

Turning to the intuition of dynamic probit models, the  $\beta$ 's describe the effect of a covariate on the probability of democratic transition, i.e., the probability a country is a democracy

given that it was a non-democracy in the previous period. This is because the second term on the right-hand side of equation (4) and (5), the terms with the  $\alpha$ 's, drop out when a country is a non-democracy in the previous period since  $\text{Dem}_{it-1} = 0$ . Alternatively, the probability that a democracy persists equals  $\beta + \alpha$  since  $\text{Dem}_{it-1} = 1$ . Other transition probabilities such as authoritarian persistence and democratic breakdown can also be easily derived.

Before moving on to the mixture model, I begin the empirical analysis by replicating the dynamic probit model results reported in Przeworski et al. (2000)'s Table 2.17 using their original data. Next, I replicate Table 2.17 again but narrow the timeframe to 1980-2000 and use both their *Extended Data Set* and updated Penn World Table 7.0 data to see whether a different timeframe or updated data changes their results. Finally, I fit a "garbage can" dynamic probit model adding all key covariates and control variables taken from equation (4) and (5) and compare the results with the replications. Table 4 reports the results from the three models.

	Przeworski et al. (2000) 1950-1990	Przeworski et al. (2000) 1980-2000/PWT 7.0	“Garbage-can” Dynamic Probit
(Intercept)	-3.406*** (0.543)	-3.063*** (0.445)	-2.257*** (0.446)
Trade*Labor			$-1.7 \times 10^{-4}$ ( $3.0 \times 10^{-4}$ )
Trade*Land			$5.2 \times 10^{-4}$ ( $2.8 \times 10^{-4}$ )
Trade			-0.005 (0.003)
Labor			-0.011 (0.022)
Land			-0.022 (0.017)
Export*Labor			-0.036 (0.047)
Import*Labor			0.036 (0.044)
Export			0.150 (0.557)
Import			-0.467 (0.544)
GDP per Capita	0.000 (0.000)	-0.000 (0.000)	$-2.0 \times 10^{-5}$ ( $2.0 \times 10^{-5}$ )
GDP per Capita Growth	-0.020* (0.010)	-0.014* (0.007)	-0.014* (0.007)
Leadership Turnover	0.542** (0.203)	0.417* (0.194)	0.349* (0.168)
Religious Fractionalization	0.105 (0.455)	0.215 (0.330)	0.235 (0.352)
% Catholic	0.002 (0.003)	0.001 (0.003)	$-1.9 \times 10^{-6}$ ( $2.7 \times 10^{-3}$ )
% Protestant	-0.003 (0.006)	-0.005 (0.005)	-0.003 (0.005)
% Moslem	-0.001 (0.003)	-0.005* (0.002)	-0.006* (0.003)
New Country	-0.434* (0.205)	-0.257 (0.168)	-0.194 (0.178)
British Colony	0.165 (0.202)	-0.031 (0.170)	0.009 (0.177)
Previous Transitions	0.361*** (0.069)	0.217** (0.072)	0.165* (0.074)
% World Democracies	3.036* (1.202)	0.041*** (0.012)	0.035** (0.012)
BIC	781.291	746.165	
N	3991	3150	3296
No. countries	135	172	172

Table 4: Replications of Przeworski et al. (2000) Table 2.17 Compared to “Garbage-can” Model

*Note:* Standard errors in parentheses. Results are consistent when using Heteroskedasticity and Autocorrelation Consistent (HAC) standard errors. “Garbage-can” dynamic probit model results report coefficients and standard errors combined after fitting to five multiply imputed datasets. All variables listed above and including Leadership Turnover are lagged to the previous period (t-1) in all three models following Przeworski et al. (2000).

Results from column 1 in Table 4 is consistent with Epstein et al. (2006, pp.554)’s finding that Przeworski et al. (2000) miscalculated the p-values for transitions to democracy: they fail to report the significance level of the *sum* of the relevant coefficients. Therefore, variables such as GDP per capita and religious fractionalization are in fact not statistically significant predictors for transitions to democracy as Przeworski et al. (2000) reported while new countries (i.e. those that gained independence after 1945) are now statistically significant negative predictors of democratization.<sup>24</sup> All other results are virtually identical.

Column 2 reports the replication results with updated data and the narrower timeframe 1980-2000. The results are similar to column 1 except that the percentage of moslems in a country is now a negative and statistically significant predictor of democratization while being a new country is no longer statistically significant. Given that the oil curse literature finds that oil impedes democracy via rentier or suppression effects (Ross 2001) and that Islamic countries are highly correlated with oil export countries, it’s likely that percentage of moslems is actually picking up the democracy hindering effect of oil export countries since Przeworski et al. (2000)’s model doesn’t include oil exports as a covariate. Furthermore, since the study’s narrower time frame comes after the 70’s oil crises, the results may be picking up exacerbated oil curse effects (Ross 2012). Also, given that the study’s narrower timeframe comes much later than Przeworski et al. (2000)’s timeframe, it’s likely that “new country” negative effects on democratization may have eroded by the 80’s and 90’s.

Column 3 reports the results when adding all the key covariates in Table 3. None of the key predictors are statistically significant. Recall that such a “garbage-can” model assumes that one model explains all observations. Since the plausibility probe suggests that the two competing models in this study differ on their applicability to observations depending on a country-year’s labor specificity, it’s possible that this is why the key predictors are not statistically significant. If the competing models were fit to the theoretically appropriate subsets

---

<sup>24</sup>The corrected result on GDP per capita is in fact more favorable to Przeworski et al. (2000)’s central hypothesis on how per capita income has an effect on democratic consolidation but no effect on democratization as Epstein et al. (2006, pp.554) point out.

of the observations (i.e., subsets distinguished by labor specificity), then one would expect to get more precise results. Finally, all other results are similar to column 2. Additionally, I find that the percentage of democracies in the world is positive and statistically significant with democratization regardless of model specification or estimation method. This result is consistent with Ahlquist and Wibbels (2012)'s finding that democratization in neighboring countries and in the world is likely the most robust predictors of democratization in a given country.

*Note:* Currently, I have yet to achieve convergence with the mixture model using the specified set of covariates. I suspect that this is due to the complexity of mixing two dynamic probit models, a long list of covariates, and high correlations between some of the covariates. I'm still working to resolve this issue. Any suggestions on this is highly appreciated.

## 5 Concluding Remarks

This study relaxes a basic but essential and unjustified assumption about inter-industry labor mobility that was previously assumed away in the literature and attempts to develop and derive alternative predictions about the effect of increased trade on inequality and democratization in developing countries. The study then follows up by empirically evaluating the theoretical implications of the different models with tailored methods.

The current results are mixed for the first part of the empirical analysis that probes whether the relationship between trade and inequality follows the causal story that Acemoglu and Robinson (2006) and my RV-implied theory lay out. It suggests that a theory that assumes high labor specificity is indeed more consistent with the data gathered based on 172 countries from 1980-2000 as Hypothesis 1 posited. However, the theory-specific hypotheses regarding increased trade or export-orientation are in fact opposite of the results. Specifically, higher levels of trade in relatively labor abundant and labor mobile countries actually correlates with *higher* levels of inequality while higher levels of trade in relatively land

abundant and labor mobile countries correlates with *lower* levels of inequality, which contradicts Acemoglu and Robinson (2006)'s Hypotheses 2a and 2b. On the other hand, more export-oriented labor abundant countries correlate with *lower* inequality, which contradicts Hypothesis 3. The above contradicting results may be due to omitted variable biases when variables such as tax rates are not included as controls in the probe or other endogeneity issues. However, it may also warrant a reexamination of the theoretical soundness of both Acemoglu and Robinson (2006)'s SS-implied model and the proposed RV-implied model in this study.

This study has yet to achieve convergence with the mixture model consisting two dynamic probit models. A “garbage-can” dynamic probit model doesn't show statistically significant support for each of the hypothesis, but this isn't surprising given that it assumes the model fits all observations. On the other hand, the replications show that the percentage of moslems may be picking up oil curse effects after the 70's oil crises while “new country” effects may have eroded by the 80's and 90's. Finally, consistent with Ahlquist and Wibbels (2012)'s finding, democratization in neighboring countries and in the world is likely the most robust predictors of democratization in a given country regardless of model specification and method.

Ultimately, this study seeks to bridge three main literatures: trade and democratization, inequality and democratization, and trade and inequality. The International Political Economy (IPE) literature on the general relationship between trade and democratization abound, but tend to overlook the role of income inequality as a mediator. The inequality and democratization literature has mostly assumed a closed economy or focused only on the financial aspect of globalization. Economics literature on the relationship between trade and inequality also abound, but the key assumptions and findings are rarely if ever applied to the democratization literature. What is missing is research that intersects the three literature by synthesizing theories of globalization with theories of democratization. The premise of this study is that inter-industry labor mobility will be the key to integrating the three literature

and help enhance our understanding of the relationship between globalization, inequality, and democratization.

## References

- Acemoglu, Daron and James A. Robinson. 2006. *Economic Origins of Dictatorship and Democracy*. Cambridge University Press.
- Achen, Christopher. 2005. "Let's Put Garbage-Can Regressions and Garbage-Can Probits Where They Belong." *Conflict Management and Peace Science* 22(4):327–339.
- Ahlquist, John S. and Erik Wibbels. 2012. "Riding the Wave: World Trade and Factor-Based Models of Democratization." *American Journal of Political Science* pp. no–no.
- Ansell, B. and D. Samuels. 2010. "Inequality and Democratization: A Contractarian Approach." *Comparative Political Studies* 43(12):1543–1574.
- Bernard, Andrew B. and J. Bradford Jensen. 1997. "Exporters, Skill Upgrading, and the Wage Gap." *Journal of International Economics* 42(1-2):3–31.
- Boix, Carles. 2003. *Democracy and Redistribution (Cambridge Studies in Comparative Politics)*. Cambridge University Press.
- Bollen, Kenneth A. and Robert W. Jackman. 1985. "Political Democracy and the Size Distribution of Income." *American Sociological Review* 50(4):438–57.
- Casper, G. and C. Tufis. 2003. "Correlation Versus Interchangeability: The Limited Robustness of Empirical Findings on Democracy Using Highly Correlated Data Sets." *Political Analysis* 11(2):196–203.
- Chinn, Menzie D. and Hiro Ito. 2006. "What Matters for Financial Development? Capital Controls, Institutions, and Interactions." *Journal of Development Economics* 81(1):163–192.

- Collier, David and Robert Adcock. 1999. "Democracy and Dichotomies: A Pragmatic Approach to Choices about Concepts." *Annual Review of Political Science* 2(1):537–565.
- Deininger, Klaus and Lyn Squire. 1996. "A New Data Set Measuring Income Inequality." *World Bank Economic Review* 10(3):565–91.
- Dollar, David and Aart Kraay. 2002. "Growth Is Good for the Poor." *Journal of Economic Growth* 7(3):195–225.
- Eichengreen, Barry and David Leblang. 2008. "Democracy and Globalization." *Economics & Politics* 20(3):289–334.
- Elkins, Zachary. 2000. "Gradations of Democracy? Empirical Tests of Alternative Conceptualizations." *American Journal of Political Science* 44(2):293–300.
- Epstein, David L., Robert Bates, Jack Goldstone, Ida Kristensen and Sharyn O'Halloran. 2006. "Democratic Transitions." *American Journal of Political Science* 50(3):551–569.
- Freeman, John R. and Dennis P. Quinn. 2012. "The Economic Origins of Democracy Reconsidered." *American Political Science Review* 106(01):58–80.
- Galbraith, James K. and Hyunsub Kum. 2005. "Estimating the Inequality of Household Incomes: A Statistical Approach to the Creation of a Dense and Consistent Global Data Set." *Review of Income and Wealth* 51(1):115–143.
- Gleditsch, Kristian. 2004. "A Revised List of Wars Between and Within Independent States, 1816-2002." *International Interactions* 30(3):32.
- Goldberg, Pinelopi Koujianou and Nina Pavcnik. 2007. "Distributional Effects of Globalization in Developing Countries." *Journal of Economic Literature* 45(1):39–82.
- Grün, Bettina and Friedrich Leisch. 2008. "FlexMix Version 2: Finite Mixtures with Concomitant Variables and Varying and Constant Parameters." *Journal of Statistical Software* 28(4):1–35.

- Haggard, Stephan and Robert R. Kaufman. 2012. "Inequality and Regime Change: Democratic Transitions and the Stability of Democratic Rule." *American Political Science Review* 106(03):495–516.
- Heston, Alan, Robert Summers and Bettina Aten. 2011. *Penn World Table Version 7.0*. Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania.  
**URL:** <http://pwt.econ.upenn.edu/>
- Hiscox, Michael J. 2002. "Commerce, Coalitions, and Factor Mobility: Evidence from Congressional Votes on Trade Legislation." *American Political Science Review* 96(03):593–608.
- Honaker, James, Gary King and Matthew Blackwell. 2011. "Amelia II: A Program for Missing Data." *Journal of Statistical Software* 45(7):1–47.
- Houle, Christian. 2009. "Inequality and Democracy: Why Inequality Harms Consolidation but Does Not Affect Democratization." *World Politics* 61(4):589–622.
- Imai, Kosuke and Dustin Tingley. 2012. "A Statistical Method for Empirical Testing of Competing Theories." *American Journal of Political Science* 56(1):218–236.
- Leamer, Edward E. 1985. *Sources of International Comparative Advantage: Theory and Evidence*. The MIT Press.
- Li, Quan and Rafael Reuveny. 2003. "Economic Globalization and Democracy: An Empirical Analysis." *British Journal of Political Science* 33(01):29–54.
- Lipset, Seymour Martin. 1959. "Some Social Requisites of Democracy: Economic Development and Political Legitimacy." *American Political Science Review* 53(1):69–105.
- Marshall, Monty G., Keith Jagers and Ted Robert Gurr. 2011. "Polity IV."
- Midford, Paul. 1993. "International Trade and Domestic Politics: Improving on Rogowski's Model of Political Alignments." *International Organization* 47(4):535–564.

- Milner, Helen V. and Bumba Mukherjee. 2009. "Democratization and Economic Globalization." *Annual Review of Political Science* 12(1):163–181.
- Milner, Helen V. and Keiko Kubota. 2005. "Why the Move to Free Trade? Democracy and Trade Policy in the Developing Countries." *International Organization* 59(01):107–143.
- Muller, Edward N. 1988. "Democracy, Economic Development, and Income Inequality." *American Sociological Review* 53(1):50–68.
- Munck, G. L. and J. Verkuilen. 2002. "Conceptualizing and Measuring Democracy: Evaluating Alternative Indices." *Comparative Political Studies* 35(1):5–34.
- Przeworski, Adam, Michael E. Alvarez, Jose Antonio Cheibub and Fernando Limongi. 2000. *Democracy and Development: Political Institutions and Well-Being in the World, 1950-1990 (Cambridge Studies in the Theory of Democracy)*. Cambridge University Press.
- Rodriguez, F. and Daniel Ortega. 2006. "Are Capital Shares Higher in Poor Countries? Evidence from Industrial Surveys." *Wesleyan Economics Working Papers* (860).
- Rogowski, Ronald. 1990. *Commerce and Coalitions: How Trade Affects Domestic Political Alignments*. Princeton University Press.
- Ross, Michael L. 2001. "Does Oil Hinder Democracy?" *World Politics* 53(3):325–361.
- Ross, Michael L. 2012. *The Oil Curse: How Petroleum Wealth Shapes the Development of Nations*. Princeton University Press.
- Solt, Frederick. 2009. "Standardizing the World Income Inequality Database." *Social Science Quarterly* 90(2):231–242.
- Stolper, Wolfgang F. and Paul A. Samuelson. 1941. "Protection and Real Wages." *The Review of Economic Studies* 9(1):58.

Zhou, Qiang. 2008. Partisanship, Union Centralization, and Mobility: The Political Roots of Interindustry Labor Mobility. PhD thesis Columbia University.

# A Appendix 1: Descriptive Statistics

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

Table 5: Descriptive Statistics of Continuous 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

Table 6: Descriptive Statistics of Nominal Variables

## B Appendix 2: Countries in Data Set by ISO3 Country Code

AFG, AGO, ALB, ARE, ARG, ARM, AUS, AUT, AZE, BDI, BEL, BEN, BFA, BGD, BGR, BHR, BHS, BIH, BLR, BLZ, BOL, BRA, BRB, BRN, BTN, BWA, CAF, CAN, CHE, CHL, CHN, CIV, CMR, COD, COG, COL, COM, CPV, CRI, CSK, CUB, CYP, CZE, DEU, DJI, DNK, DOM, DZA, ECU, EGY, ERI, ESP, EST, ETH, FIN, FJI, FRA, GAB, GBR, GEO, GHA, GIN, GMB, GNB, GNQ, GRC, GTM, GUY, HND, HRV, HTI, HUN, IDN, IND, IRL, IRN, IRQ, ISL, ISR, ITA, JAM, JOR, JPN, KAZ, KEN, KGZ, KHM, KOR, KWT, LAO, LBN, LBR, LBY, LKA, LSO, LTU, LUX, LVA, MAR, MDA, MDG, MDV, MEX, MKD, MLI, MLT, MMR, MNG, MOZ, MRT, MUS, MWI, MYS, NAM, NER, NGA, NIC, NLD, NOR, NPL, NZL, OMN, PAK, PAN, PER, PHL, PLW, PNG, POL, PRT, PRY, QAT, ROU, RUS, RWA, SAU, SDN, SEN, SGP, SLB, SLE, SLV, SOM, SUR, SVK, SVN, SWE, SWZ, SYR, TCD, TGO, THA, TJK, TKM, TON, TTO, TUN, TUR, TWN, TZA, UGA, UKR, URY, USA, UZB, VEN, VNM, YEM, YUG, ZAF, ZMB, ZWE.