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Working Paper

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TIGER Working Paper Series, No. 104

Provided in Cooperation with:

TIGER - Transformation, Integration and Globalization Economic Research, Warsaw

Suggested Citation: Yu, Miaojie (2007) : Trade globalization and political liberalization: A gravity approach, TIGER Working Paper Series, No. 104, Transformation, Integration and Globalization Economic Research (TIGER), Warsaw

This Version is available at:

<https://hdl.handle.net/10419/140756>

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TIGER Working Paper Series

No. 104

**Trade Globalization and Political Liberalization:
A Gravity Approach**

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Warsaw, July 2007

Trade Globalization and Political Liberalization: A Gravity Approach*

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July 2007

Abstract

The literature has paid very little attention to a potential positive endogenous nexus between trade globalization and political liberalization. In this paper, I apply a structural approach to investigate two-way causality between the two based on the gravity trade theory, using data from a sample of 134 IMF countries over the period 1974-1998. An extensive search shows that trade globalization *dampens* political liberalization, though political liberalization fosters trade globalization. The paper also presents ample evidence of simultaneous bias when such bidirectional causality is ignored. Finally, it contains a thorough exploration of parameter heterogeneity by income and by region.

JEL: F13, P16

Keywords: Trade, Democracy, Gravity Equation

*I would like to thank Robert Feenstra, Joaquim Silvestre, Peter Lindert, Deborah Swenson, Justin Yifu Lin, Bruce Blonigen and conference participants in the 6th Annual Asian Pacific Rim University Conference at Eugene, Oregon, for their very helpful comments. All errors are mine.

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"It has been said that arguing against globalization is like arguing against the laws of gravity."

—Kofi Annan

1 Introduction

One of the important components of globalization is the growing trade flow. Since the 1960s, trade globalization has advanced tremendously. In 2005, the world trade in goods and services reached \$10.51 trillion, accounting for more than a quarter of the global produced goods and services.¹ For many industrialized countries, the share of merchandise trade relative to GDP remained stable during the last few decades. Since the service sector has grown faster (Rodrik, 1996), the world is much more integrated today than at any time before when we measure merchandise trade relative to merchandise value-added instead (Feenstra, 1998). For example, the average bilateral trade volume grew twice as fast as country GDP for OECD countries from 1958 to 1988 (Baier and Bergstrand, 2001). On the other hand, the level of merchandise trade relative to GDP for developing countries increased from around 50% in the early 1960s to 75% in the late 1990s (Rudra, 2005).

Simultaneously, the world has made significant progress toward democracy over these decades. Stimulated by the first wave of democratization in the early 19th century, political liberalization experienced a second wave that started at the end of World War II, and a third wave that pattered by the early 1960s (Huntington, 1993). In particular, there were about 36 countries that had democratic regimes in that era (Papaioannou and Siourounis,

¹Data source: WTO, International Trade Statistics (Geneva, 2006), Table II.2.

2005), and this number has increased dramatically. Since the late 1980s, 70% of developing countries made substantial improvements in political liberalization (Rudra, 2005).

This paper tries to make progress towards understanding the endogenous nexus between trade globalization and political liberalization. A country's political liberalization has a significant effect on globalization. The democratization of a nation, which is a standard index of political liberalization ², essentially implies that political power is transferred from non-elected elites to a wider population group, which in turn pushes their government to choose a trade policy favorable to them. Accordingly, trade volume is changed due to a change in trade policy (Milner and Kubota, 2005). Without a doubt, the effects of democratization on trade are different between developed and developing countries (O'Rourke and Taylor, 2006, Yu, 2006). On the other hand, there is a reverse causality of trade globalization on political liberalization. Trade does not only change the consumption possibility set for trading partners but also creates a channel for people to communicate ideas, which would be a spillover from a country to its trading partner (Lipset, 1960).

Previous studies have paid very little attention to the two-way causality relationship. Most only mention one of the two causal connections. Some researchers emphasize the effects of democratization on trade. They include, among others, Grofman and Gray (2000), Fidrumc (2001), Quinn (2001), Milner and Kubota (2005), Giavazzi and Tabellini (2005), O'Rourke and Taylor (2006), and Yu (2006). These studies vary in theoretical setups, operation channels, empirical methodology, democracy measurement, countries

²According to Giavazzi and Tabellini (2005): "By political liberalization, we mean the event of becoming a democracy, as conventionally defined by political scientists."

coverage, and time span, yet they all reach a similar result: democracy fosters trade. On the other hand, some other studies such as Bussmann (2002), Li and Reuveny (2003), Lopez-Cordova and Meissner (2005), Papaioannou and Siourounis (2005), Roberto and Rodrik (2004), and Rudra (2005), focus on the effect of trade on democracy. The findings from such studies diverge. For example, Lopez-Cordova and Meissner (2005) and Rudra (2005) find a positive effect of trade on democracy; conversely, Li and Reuveny (2003) and Rigobon and Rodrik (2004) argue that the impact is negative. Last but not least, Bussmann (2002) finds no impact of trade globalization on democracy at all.

The studies that concentrate on a one-way effect could suffer from an estimation bias since globalization and democratization are mutually affected. Democracy is an important index of institutional quality, which is clearly endogenous (Acemoglu, Johnson, and Robinson, 2001). Democratization affects globalization, which in turn affects the next stage of democratization. Few studies treat them as jointly evolving phenomena. Recent studies such as Giavazzi and Tabellini (2005) and Eichengreen and Leblang (2006) take an important step forward. Particularly, Giavazzi and Tabellini (2005) use the difference-in-difference empirical methodology to argue that countries that liberalize the economy followed by democratization perform much better than those countries that reverse the sequence. Eichengreen and Leblang (2006) provide a variety of estimations to argue the existence of a bidirectional positive causality between trade openness and democracy, using long historical data from years 1870-2000.

To completely investigate the mutual effects of trade and democracy, this paper considers their bidirectional causality in line with the works of Giavazzi and Tabellini (2005) and

Eichengreen and Leblang (2005). However, in contrast to previous studies, the estimations in this paper have a theoretical basis. Particularly, a gravity model is used to underpin the effects of democracy on trade. In its simplest form, the gravity model assumes that trade globalization is positively proportional to trading countries' GDP but is negatively related to their transportation costs. The importer's democratization could affect artificial transport costs (e.g., tariffs) and then change bilateral trade volume (O'Rourke and Taylor, 2006). Also, empirical evidence shows that a democratic regime could become a favorable exporter in international trade. One possible explanation for this phenomenon is that products produced in highly democratic countries have a relatively high quality due to their intrinsic institutional stability and relatively strict quality regulation, *ceteris paribus* (Yu, 2006). Given this theoretical background, I therefore choose import volume as a measure of trade openness, which is different from the economic liberalization indicator used in the two above-mentioned papers.

I then adopt a structural approach to estimate the bidirectional causality between trade globalization and political liberalization, using data from a sample of 134 IMF countries over the period 1974-1998. My data coverage is broadly similar to Giavazzi and Tabellini's (2005). As compared to that in the Eichengreen and Leblang (2006), my data set is shorter but involves more countries. With regard to the empirical methodology, instead of the difference-in-difference approach used by Giavazzi and Tabellini (2005) or the Generalized Methods of Moments (GMM) used by Eichengreen and Leblang (2006), I use three-stage-least-squares (3SLS) estimation to take full account of the error-term correlations between the two equations. Generally speaking, I do not see a positive bidi-

rectional causality between trade and democracy. An extensive search shows that trade globalization dampens political liberalization, though political liberalization fosters trade globalization during the period 1974-1998. Various robustness checks using different measurements of democratization confirm such findings. Finally, I also explore parameter heterogeneity by income and by region.

The rest of the paper is organized as follows. Section 2 reviews the theory. Section 3 describes the data and measurements. Section 4 presents the estimation results and the sensitivity analysis. Section 5 concludes the paper.

2 Theory

This section specifies the trade globalization equation, the democracy equation, and the simultaneity of trade and democracy.

2.1 The Determinants of Trade Globalization

What are the causes of the growth in trade? This was an unexpected topic of dispute for trade economists before (Krugman, 1995). Today, it is commonly believed that the growing GDP in trading countries plays the most important role in trade globalization. Furthermore, declining transportation costs and trade liberalization are important determinants of growing trade as well (Feenstra, 1998).

The gravity model is perhaps the only approach that has consistently been proven useful for the analysis of bilateral trade flows. Isaac Newton originally devised the model to explain the gravitational force in the universe: the gravitational pull between two celestial bodies is positively proportional to the product of their masses but is negatively

related to their distance.³ Tinbergen (1962) was the first one to use the gravity model to explain trade globalization. He mentioned that in its simplest form, the bilateral trade volume is positively related to the trading countries' GDP, but is negatively related to their geographical distance. For many years, the gravity model was regarded only as an empirical specification without any theoretical justification. But, Anderson (1979) provided a micro-foundation for the gravity equation using a constant elasticity substitution (CES) utility function. Later, Anderson and van Wincoop (2003) developed a general equilibrium framework to estimate the determinants of trade flow. Based on this, Yu (2006) introduced democracy into the gravity equation by arguing that democratization would affect trade barriers between trading partners. Table 1 lists potentially important determinants of trade globalization. In fully discussing these determinants, it is helpful to investigate several categories: growing GDP, declining transportation costs, trade liberalization, and democratization.

2.1.1 Growing GDP

The contribution of growing GDP to trade globalization is significant and easy to understand. The gravity model has two implications concerning the growth of GDP. First, larger countries trade more because they produce more goods. Second, world trade increases when trading countries become more similar in size (Helpman, 1987). Particularly, using OECD countries' data and taking the differences between the averages in the years 1958-1960 and 1986-88, Baier and Berstrand (2001) find evidence that real GDP growth could explain 67-69% of trade globalization.

³Source: http://www.goldenessay.com/free_essays/1/biographies/isaac-newton.shtml.

2.1.2 Transportation Costs

Samuelson (1952) mentions iceberg transportation costs in the sense that, in order for one unit of a commodity to reach the destination country, there should be more than one unit shipped since some quantities will "melt" during transportation. Usually, there are two types of transportation costs which capture the difference between the free-on-board (f.o.b.) price and the cost-insurance-freight (c.i.f.) price: the natural transportation costs and artificial transportation costs (e.g., tariffs). Rose (2004) suggests the following indices to measure natural transportation costs: (a) The geographical distance. (b) Whether or not trading countries share a common land border. (c) Whether or not trading countries are land-locked. (d) Whether or not trading countries are island countries.

2.1.3 Trade Liberalization

A multilateral trade negotiation could greatly foster trade growth. For example, the Uruguay round of GATT/WTO in 1994, where advanced countries agreed to cut their tariffs by almost 40 percent, clearly encouraged trade globalization. Recently, the expiration of the Multi-Fiber Agreement (MFA) also caused a boom of bilateral trade between China and the United States. Chinese garment exports to the United States, in particular, soared after January 2005.⁴ However, whether or not a membership to the WTO increases trade globalization is still an on-going debate among experts. Rose (2004) finds surprising evidence that membership to the WTO does *not* help globalization. Based on an identical data set but a different econometric technique, Subramanian and Wei (2003)

⁴See "*US-China Trade Disputes: Rising Tide, Rising Stakes*" (pp.30-32) by Gary Hufbauer, Yee Wong, and Ketki Sheth (2006) for detailed discussion .

argue that the WTO promotes trade strongly but unevenly across sectors and regions. Aside from this, various preferential trade agreements such as customs unions and free trade agreements significantly reduce trade barriers for their members, hence the increase in trade volume. Similarities such as a common colonization or a common official language also have positive effects on trade (Rose, 2004).

2.1.4 Democratization

More interestingly, how does a trading country's democratization affect trade globalization? Democratization in developing countries could push governments in those countries to choose a pro-trade policy which in turn fosters trade globalization. The economic rationales for this argument are the following. First, according to the Heckscher-Ohlin theorem, most developing countries are labor-abundant countries and export relatively labor-intensive products while importing relatively capital-intensive products. Second, according to the Stolper-Samuelson theorem, an increase in the import tariff of a capital-intensive good increases the real return of capital, hence benefitting capital owners but harming labor owners. Third, democratization implies that political power is switched from non-elected elites to labor, which in turn would push the government to choose a pro-trade policy (O' Rourke and Taylor, 2006). Finally, trade liberalization fosters world trade growth. Following a similar logic, the democratization of developed countries would therefore hamper trade growth.

Aside from the effect of an importer's political liberalization, recent studies like Yu (2006) find evidence that an exporter's democratization could improve trade globalization

as well. Democratization helps a country improve product quality, which in turn makes its products more popular to foreign consumers. Accordingly, a high democratic regime becomes a favorable exporter in international trade.

To summarize, trade globalization is affected by trading countries' growing GDP, declining transportation costs, deepening trade liberalization, and democratization. In this study, I am particularly interested in the effect on bilateral trade volume of democratization by both the importer and exporter.

2.2 The Determinants of Political Liberalization

Political liberalization is not exogenously given, but it is affected by many factors such as a country's trade openness, standard of living, colonial history, and ethnolinguistic diversity (Barro, 1999, Papaioannou and Siourounis, 2005). Table 1 includes some important determinants of political liberalization as well, which we will discuss in this section.

2.2.1 Trade Globalization

As Hayek (1960) and Friedman (1962) emphasize, economic freedom is one of the essential means toward the achievement of political freedom. Trade globalization is a good proxy to measure economic freedom. However, whether or not trade liberalization fosters democracy is still a controversial topic for experts.

The first view is ideological diffusion of democracy (Lipset, 1960). Trade creates a channel for people to communicate ideas. Accordingly, the ideologies that are dominant in rich clubs would easily spill over to poor countries. In this sense, trade globalization fosters democracy. A recent empirical investigation by Papaioannou and Siourounis (2005)

finds that political liberalization is more likely to emerge in countries that are open to international trade.

However, an important caveat for this view is the downward side of democracy itself. Admittedly, trade opening is helpful for communication, yet people in low democracy countries might be more aware of the negative characteristics of democracy when they trade with people in high democratic regimes. As a result, trade hinders, but not fosters, democracy. One good example is the case in China and Taiwan. Bilateral trade increases across the Taiwan Strait over these years, yet people in mainland China more and more doubt the current Taiwan's democratization due, in large part, to its recent turmoil.⁵

Second, as proposed by Acemoglu and Robinson (2006), international trade has a function of mitigating "class conflict" since it can reduce the income gap between the poor and the rich. In the absence of trade, locally scarce factors have relatively higher prices compared to the world average level. International trade, in principle, could equalize factors prices across trading countries. As a result, the income gap between the abundant factor owners (i.e., the poor) and the scarce factor owners (i.e., the rich) closes. With the smaller income gap, the poor, therefore, have less incentive to incur a coup to revert the trend of democracy. In sum, trade opening, again, fosters democracy.

Aside from this, Rudra (2005) also delivers a specific channel to explain how trade globalization affects democratization. She argues that trade globalization affects the democracy level of developing countries because the security and cohesiveness of the governing strata are challenged by the globalization. In order to avoid such potential threat, the

⁵The view is particularly popular for many Chinese interviewees from different social strata.

elites will more likely push up democracy.

However, this may not be the choice for elites in land-abundant countries such as Argentina and Chile. Trade globalization makes political liberalization less likely in land-abundant and capital-scarce countries. When such countries are open to trade, land owners get benefit from globalization. The land-owner elites are more likely to preserve their country nondemocratic. This is perhaps because they are afraid that they have to suffer from a higher income tax or bear a higher risk of losing their assets in land reforms when their country moves toward democracy (Acemoglu and Robinson, 2006). In this sense, they have strong incentive to resist the democratization. As a result, trade globalization dampens democracy.

In a nutshell, the effect of trade globalization on political liberalization seems ambiguous. Whether or not trade fosters democracy, therefore, remains an empirical question which I will address soon in the next section.

2.2.2 Standard of Living

Democratization is also affected by a country's standard of living indicators such as GDP and GDP per capita. The ruling elite in wealthy nations are in favor of some democratic reforms as well as the associated wealth redistribution (Lipset, 1960). Likewise, a growing GDP fosters democracy. Economic growth may increase income inequality which in turn leads to the emergence of special interest groups (Feng and Zak, 1999). According to the theory initiated by Aristotle and later developed by Huntington (1993), democracy is the most appropriate political regime for a country with many social classes and ethnic groups.

Hence, a country's GDP could serve as one determinant of its democracy. Finally, a country's urbanization rate is also an important factor to determine political liberalization since it could affect the managerial ability of the central authority (Barro, 1999).

2.2.3 Historical and Cultural Factors

History affects democratization as well. Studies conducted by Acemoglu, Johnson, and Robinson (2001) argue that historical colonization shaped early European institutions which in turn affected current institutions. In other words, historical colonization affects political liberalization since democracy is one of the important indicators of institution formation. Similar arguments apply to geographical indicators. Geographical difference, such as country size and climate difference, partially explain productivity differences which in turn lead to different income levels across countries (Sachs and Warner, 2001). Although whether or not income difference causes democracy is still an on-going debate (see, for example, Acemoglu, Johnson, Robinson, and Yared, 2004a), it is useful to consider the effects of geographical differences (e.g., a country's size) on democratization. Finally, ethnolinguistic heterogeneity could make it more difficult for a country to sustain democracy (Barro, 1999). It also suggests a possibility that ideas could be exchanged among countries that have some common cultural background (e.g., using a common language). I therefore take common language usage into account as well.

In a nutshell, the determinants of a country's democratization include, among others, trade globalization, GDP per capita, GDP, historical colonization, country size, and language homogeneity.

2.3 Simultaneity of Trade and Democracy

To estimate the interactions between trade globalization and political liberalization as stipulated above, I consider the following simultaneous equations model (SEM):

$$\ln X_{ijt} = \alpha z_{jt} + \gamma \mathbf{Q}_{ijt} + \epsilon_{ijt}, \quad (1)$$

$$z_{jt} = \beta \ln X_{ijt} + \zeta \mathbf{Q}_{ijt}^* + \mu_{ijt},$$

where $\ln X_{ijt}$ is the logarithm of country j 's imports from country i at year t , z_j is importer j 's democracy level, \mathbf{Q}_{ij} collects measures of the determinants of trade globalization, \mathbf{Q}_{ij}^* collects measures of the determinants of democracy, and $(\epsilon_{ijt}, \mu_{ijt})$ is a bivariate residual vector. The coefficients α and β take into account the simultaneous feedback from changes of trade and democracy, while the vectors of coefficients γ and ζ capture the effects of the predetermined variables.

I follow the literature on the gravity model using a logarithm function of importer j 's import volume from exporter i to measure trade volume (e.g., see Baier and Bergstrand, 2001, Feenstra, 2003, and Anderson and van Wincoop, 2003). The logarithm model adopted here can control for a potential nonlinearity between trade and democracy. The advantages of using imports as the indicator of trade globalization will be discussed in details in the next section. Similarly, I will offer a careful scrutiny of measuring political liberalization in the next section.

My main interests for this SEM are the signs of the coefficients α and β . Since the error terms in the SEM, generally speaking, are correlated with the dependent variables, the estimated coefficients using conventional methods, such as Ordinary Least Square

(OLS) and Generalized Least Square (GLS), will be inconsistent. Instead, the Three-Stage Least Squares (3SLS) will be an appropriate method for estimation since it takes into consideration the error-term correlations between the two equations. Particularly, one needs three steps to perform the 3SLS estimations: (1) obtaining the Two-Stage Least Squares (2SLS) of the identified equations; (2) applying the 2SLS estimates to perform estimations for the structural equations' errors, and then using these errors to calculate the simultaneous variance-covariance matrix of the structural equations' errors; and (3) using the GLS method on the large equation representing all of the identified equations of the system (Wooldridge, 2002).

The endogenous variables in this SEM are importer j 's democracy level and its logarithm import volume ($\ln X_{ij}$) from country i . Guided by the theory presented above, I include the variables listed in Table 1 as exogenous variables for this SEM. In particular, exporter i 's democracy is included in both equations for two reasons. First, a democratic exporter would directly lead to more trade due to the possible upgrading of their products' quality; hence, z_i enters the trade equation. Second, an exporter's democracy could indirectly affect its import counterpart's democracy via other channels such as international political cooperation and educational interaction; hence, z_i enters the democracy equation. Various geographical variables (e.g., distance, land-locked dummy, common land border dummy, number of island countries, and number of landlocked countries) serve as *exclusive* exogenous variables of the democracy equation. Put in another way, these variables are included into the trade equation but *not* included into the democracy equation. Correspondingly, such variables as a country's GDP per capita, urbanized ratio, infant mortality

rate, and a dummy for death penalty abolition serve as *exclusive* exogenous variables of the trade equation (i.e., they are not included into the trade equation but included into the democracy equation), though the validity of such a treatment will be explored in the later section.⁶

3 Data Descriptions and Measurements

Table 1 lists all regressors in the estimation whose sources are described in Appendix A. My sample covers 134 countries for about the last quarter of the 20th century, from 1974 to 1998, which is the period of trade globalization and approximately the third wave of democratization (Feenstra, 1998, Feng, 2003).

The literature usually has three different ways to measure trade openness. First, studies like Baier and Bergstrand (2001) used directional imports to measure a country's trade openness. Second, some other studies like Eichengreen and Leblang (2006) define trade openness as exports plus imports relative to a country's GDP. Third, Sachs and Warner (1995) introduce a dichotomous indicator to measure economic liberalization, which includes trade openness. A country is defined as a closed economy when average tariffs are higher than 40%, or when non-barriers on importables cover more than 40% of volume.

Here, I choose the first indicator (i.e., directional imports) for estimations for three reasons. First, it has a solid theoretical micro-foundation. The gravity equation specified by Anderson and van Wincoop (2003) is derived from a general equilibrium model which

⁶According to Wooldridge (2002), this SEM is identified since its order and rank conditions are satisfied. Particularly, $M - M_i \geq G, \forall i = 1, 2$, where M is the whole exogenous variables in the two equations (i.e., Equations 1 and 2), M_i is the whole exogenous variables in equation i , and G is the endogenous variables which equals two in this SEM.

clearly suggests that a measurement of country j 's imports from exporter i is a good index. Second, as compared to the second trade openness measurement (i.e., the sum of imports and exports relative to a country's GDP), directional imports can clearly describe the *direction* of trade that specifies the source and destination countries. Accordingly, trade data are more disaggregated and the samples are much larger, which in turn can reduce the possible multicollinearity problem among regressors and avoid aggregated bias (Wooldridge, 2002). Third, instead of using exports data, we use a country's imports data to measure its trade volume since imports data are more reliable. For instance, it is more precise to use the American imports data rather than the Chinese exports data to measure the Sino-U.S. trade volume since a lot of re-exporting activities exists in Hong Kong (Feenstra and Hanson, 2004). Finally, the discrete indicator is too simplified to capture the detailed thickness of trade globalization though it is a good proxy for measuring broadly economic liberalization.

Controversial measures of a country's democracy exist. As Feng (2003) summarizes, the literature offers four measures of a country's democracy: (1) the institutionalized democracy index from the *Polity IV* data set constructed by Gurr, Jagers, and Moore (1990) and developed by Marshall and Jagers (2004); (2) the dichotomous index proposed by Przeworski, *et al.* (1996) which labels a regime as democratic if the government is selected in a contested election; (3) the liberal democracy index initiated by Bollen (1998) which is defined as a function of political liberties and democratic rule. The index ranges between 0 and 100. The higher the number, the higher the level of political liberalization; and (4) The Freedom House indicator. It rates countries on two

separate seven-point scales to measure their political rights and civil liberties, with one representing the highest degree of freedom and seven the lowest. Countries whose combined average ratings for political rights and civil liberties fall between 1.0 and 2.5 are designated "Free," between 3.0 and 5.5 "Partly Free," and between 5.5 and 7.0 "Not Free."⁷

The institutionalized democracy index from the *Polity IV* data set is perhaps the most widely accepted measurement of democracy in the literature. In particular, it includes annual composite indicators measuring both "institutionalized democracy" and "institutionalized autocracy" for just about every independent country with a population over 500,000.⁸ The political liberalization index is thus defined as the difference between the democracy indicator and the autocracy indicator. Each indicator is an additive eleven-point scale (0-10) based on the scale weights of four factors: (1) competitiveness of political participation, (2) competitiveness of executive recruitment, (3) openness of executive recruitment, and (4) constraints on the chief executive. Accordingly, the political liberalization index is scaled between -10 and 10, with -10 representing the lowest level of political liberalization.

I adopt the *Polity IV* data set in my estimations for the following reasons. First, as compared to the dichotomous index, the institutionalized democracy index is a continuous

⁷Beginning with the ratings for 2003, countries whose combined average ratings fall between 3.0 and 5.0 are "Partly Free, and those between 5.5 and 7.0 are "Not Free." Data source: <http://www.freedomhouse.org>.

⁸Note not all regimes are "countries" in the political sense of the word. The word "countries" used here is simply for convenience.

variable and hence avoids a possibly arbitrary cut-off line for democracy. Second, the liberal democracy index has the disadvantage of limited data coverage in terms of countries as well as years. Similarly, data from the Freedom House only cover a short period. Data prior to 1972 are unavailable. Nevertheless, to fully investigate the two-way causality between trade and democracy, I also use the last two data sets for robustness checks.

Various preferential trade agreements such as customs unions and free trade agreements are also included in my estimations. My coverage directly follows the work of Rose (2004): EEC/EC/EU (European Economic Community, predecessor to the European Communities and the European Union), US-Israel Trade Agreement, GSP (Generalized System of Preferences), CUTA/NAFTA (Canada-U.S. Trade Agreement, predecessor to the North American Free Trade Agreement), CARICOM (Caribbean Community and Common Market), PATCRA (Papua New Guinea Trade and Commercial Relations Agreement), CACM (Central American Common Market), MERCOSUR (Common Market of the South), ASEAN (Association of South East Asian Nations), and SPARTECA (South Pacific Regional Trade and Economic Cooperation Agreement).

For the purpose of identification, I include four variables in the democracy equation which are exclusive of the trade equation: importer's infant mortality ratio, urbanized ratio, GDP per capita, and dummy of death penalty abolition. As recognized by Barro (1999), the first three variables are important exogenous determinants of democracy. Infant mortality ratio is positively related to democracy but not necessarily related to trade. In democracy literature, urbanized ratio is also argued to affect the organizational ability of the government, though its sign is unclear in theory. More importantly, GDP per capita

is one of the most important determinants of democracy but not of trade. The gravity equation merely emphasizes that larger countries trade more. It has no implication that richer countries trade more instead.⁹ This is the main reason why seminal gravity literature does not include GDP per capita in their estimations (e.g., see Baier and Bergstrand, 2001, Anderson and van Wincoop, 2003).¹⁰

Another variable serving as an exclusive exogenous variable for the trade equation is the indicator of death penalty abolition. Specifically, I consider four death-penalty regimes according to whether or not the death penalty is (1) absolutely outlawed (e.g., Austria); (2) allowed in extreme cases (e.g., Brazil); (3) *de facto* banned, that is, death penalty is sanctioned by law but has not been practiced for 10 or more years (e.g., Congo Republic); and (4) permitted.¹¹

To avoid an arbitrary scoring assignment for these four types of countries, I therefore construct a binary dummy variable which is *zero* if the death penalty is allowed at a particular year in a country; and *one* otherwise. Accordingly, by checking their partial correlations, one can observe that the dummy of death penalty abolition of a country is highly correlated with its democracy level ($corr = 0.25$) but is relatively weakly correlated with its bilateral trade volume ($corr = 0.09$). Generally speaking, a country that outlaws the death penalty is a democratic regime but is not necessarily a highly open economy,

⁹For example, Austria of course is a rich country but only has limited foreign trade volume.

¹⁰Of course, one can include dummy variables for different income groups as robustness checks.

¹¹For example, during 2004, more than 3,797 people were executed in 25 countries, and more than 7,395 people were sentenced to death in 64 countries. See <http://web.amnesty.org/pages/deathpenalty-index-eng> for details.

though some outliers exist (e.g., the United States).

4 Estimates

This section presents the estimation results of the trade and democracy equations. The structural parameters of the simultaneous equations system are estimated using the 3SLS. The sensitivity analysis will be discussed in the next section, and the main findings of the paper are shown to be robust to the different specifications and data set choices. The section first reports the estimates of different specification choices, followed by the argument of simultaneous bias as compared to the OLS, fixed-effect, and 2SLS estimates. Moreover, I specify estimates by dividing the countries into different groups according to their income and geographical distinction. Finally, several robustness checks are included.

4.1 Choices of Specifications

Tables 2A and 2B report the 3SLS estimates of the simultaneous equations system. In Specification (1) of Table 2A, I take the simplest form of the gravity equation to estimate the effects of democracy on trade. Except for the importer's *endogenous* democracy, country j 's import from country i is only affected by two trading countries' GDP. Simultaneously, as shown in Specification (1) of Table 2B, importer's democracy is affected only by two exogenous variables (i.e., importer's GDP per capita and its urbanized ratio) which are the essential determinants of democracy in the literature (Barro, 1999).

The benchmark estimation results in Table 2A show that democracy fosters trade significantly at the conventional statistical level, and as predicted in the standard gravity literature, a higher GDP leads to more trade. Turning to Table 2B, one can observe

that a higher GDP per capita and a lower urbanized ratio leads to a higher democracy, respectively. Rich countries are probably more aware of civil rights and hence promote democracy, as hypothesized by Aristotle. At the same time, when more citizens of a nation live in the rural area, that is, a lower urbanized ratio, it is more difficult for the central dictator to control and suppress them.

Most importantly, the estimation results also suggest that trade hinders democracy. Since these asymmetric findings of the bidirectional causality cast doubt on traditional wisdom, which hypothesizes intuitively that trade should encourage democracy, and to some extent, distinguish previous empirical findings like those in the work of Eichengreen and Leblang (2006), I search further for more evidence by adopting different specifications.

My first enrichment, Column (2) in Tables 2A and 2B, provides significant supportive evidence to the asymmetric endogenous nexus between trade and democracy, controlling trading partners' geographical factors in the trade equation whereas infant mortality ratio and death penalty abolition are included in the democracy equation. Trade dampens democracy significantly, whereas its reverse casualty is positive. The reasons to include such controlling factors in Specification (2) follow. Geographical endowments have been fully recognized as substantial factors of international trade (see, for example, Rose, 2004) but are not directly connected to democracy. In contrast, a country's infant mortality ratio and death penalty abolition are exogenous but highly correlated with its democracy in an economic and statistic sense. Particularly, in my sample of 114,193 observations, the partial correlation of an importer's democracy with its infant morality ratio is -0.58, while with the dummy of death penalty abolition is 0.25. The estimates in Table 2B

confirm our traditional belief that a highly democratic regime is associated with a low infant mortality ratio and generally abolishes the death penalty. Turning to the effects of geographical factors on trade, the findings are encouraging and consistent with the gravity literature: (a) countries with a long distance between them trade less; (b) countries that share a common land border trade more; (c) landlocked countries trade less; and (d) island countries trade more.

My second extension again confirms the asymmetric findings between trade and democracy by taking colonial history and languages into account. I include two variables (i.e., common colony and ever colony) to measure simultaneously the effects of colony in both equations. The estimates from Specifications (3) and (4) suggest that these two variables are positively associated with bilateral trade and democracy, respectively. These findings are consistent with Acemoglu, Johnson, and Robinson (2001). Colonial history affects the formation of current institutions, which in turn affects a country's openness and its political liberalization level by at least two means. A country's current democracy level could benefit from its colonial history, which replaces the much worse system of feudalism or slavery in the country. One good example is the case of Hong Kong which was controlled by the impotent Qing Empire before colonization by Great Britain about 150 years ago. Furthermore, a shared colonial history fosters bilateral trade, in line with Rose's (2004) work.

Specification (5), a complete version of my estimations, once again confirms that trade dampens democracy, whereas democracy encourages trade. Aside from geographical factors, I also include membership to GATT/WTO and various regional trade agreements

into the trade equation (but exclusive of the democracy equation). Simultaneously, I still keep GDP per capita, urbanized ratio, infant mortality ratio, and dummy of death penalty abolition as regressors of the democracy equation (but exclusive of the trade equation). Finally, land products, which measure trading countries' sizes, and exporter's democracy, are included in both equations as well. It is easy to understand that various international trade negotiations affect trade, yet it is hard to convince people that such agreements could affect democracy directly. Their effects on democracy, if any, go through trade. Accordingly, such trade agreements are included in the trade equation but are excluded in the democracy equation.

When exporter's democracy is included in the democracy equation, one more striking finding appears: exporter's democracy is significantly negatively associated with importer's democracy as shown in Columns (4) and (5) in Table 2B. This implies that other non-trade channels does not seem helpful for international ideological diffusion. One might question that this is due to the use of pooled world-level data. To address this concern, I therefore offer a careful scrutiny of regional heterogeneous imports' influence in the next section.

Note that a time-trend variable is included in all specifications. Such a variable is used to measure time-varying exporter and importer effects to control for multilateral resistance which captures effects of other unspecified variables in the SEM (Anderson and van Wincoop, 2003).¹² Evidently, I need to check the validity for such specifications before

¹²An alternative way to control for the multilateral resistance is to use country-pair specific and time-specific fixed-effects. I also report such estimation results in the next section for the purpose of comparison.

I move too far.

To check the validity of exclusive instruments in my empirical specifications, I first report the first-stage F statistics in the 3SLS for each specification that is used to test the exclusion of the instruments from the first stage. The null hypothesis that the model is mis-specified is rejected at the 0.1% level. Second, to check whether or not the excluded instruments are correlated with the endogenous regressors, I perform Anderson's (1984) canonical correlation likelihood-ratio test to verify the null hypothesis that my specification is under-identified. The rejections at 0.1% level for each specification again show that my specification is identified. Third, I also go a step forward to see whether or not such excluded instruments are weakly correlated with the endogenous regressors. If so, then the estimates can perform poorly in this SEM. The Cragg and Donald (1993) F statistics provide strong evidence to reject the null hypothesis that the first stage is weakly identified at a highly significant level. Fourth, the Anderson and Rubin (1949) test for the significance of endogenous regressors in the structural estimation being estimated is included as well. All specifications reject the null hypothesis that the coefficients of the endogenous regressors in this SEM jointly equal zero. Finally, I include Shea's (1997) partial R-square which takes into account the inter-correlation among instruments. In a nutshell, such various statistical tests give me sufficient confidence that the model is well specified.

4.2 Simultaneous Bias

Table 3 provides novel evidence for the simultaneity bias by comparing estimates of different econometric models like OLS, 2SLS, fixed-effect, and 3SLS. Suppose one falsely takes democracy as exogenous given, and the trade equation can then be estimated separately from the democracy equation, as a single-equation OLS model.

Seen in isolation in Panel A of Table 3, the key parameter, α , in most of these single-equation OLS estimates still has the predicted positive sign with a high statistical significance. However, such OLS estimates are substantially different from our previous 3SLS estimates. For example, in Specification (4), the single OLS estimate yields $\alpha_{OLS} = .01$ ($t = 9.12$) whereas $\alpha_{3SLS} = .07$ ($t = 26.84$). The simultaneous equation estimate of the impact of democracy on trade is around 7 times larger than its single-equation counterpart. The most striking difference appears in the estimates of Specification (5). The magnitude of effect of democracy on trade in the 3SLS estimation is around 14 times larger than its single-equation OLS counterpart ($\alpha_{3SLS} = .07$; $\alpha_{OLS} = -.005$), and, perhaps more strikingly, they have different significantly predicted signs ($t_{3SLS} = 23.00$; $t_{OLS} = -3.85$). Thus, these results suggest that a group of evidence of simultaneous bias when the endogeneity issue between trade and democracy is ignored.

One might argue that such a simultaneous bias could be mitigated using the single-equation 2SLS estimation. Admittedly, it would be, to some extent, correct if one could have truly exogenous instruments. For example, the single-equation 2SLS estimations in all specifications in Panel A are fairly close to their counterparts in the 3SLS estimates.

However, we cannot take the single-equation 2SLS too seriously. Turning to the estimates of trade on democracy, as shown in Panel B of Table 3, the single-equation 2SLS estimates do reduce the simultaneous bias caused by the single-equation OLS. Various validity tests for instruments such as the Anderson (1984) canonical correlation likelihood-ratio test, the Cragg and Donald (1993) F statistic, and the Anderson and Rubin (1949) test confirm that each model's specification is accepted.¹³ However, we still find a substantial difference between estimates of 2SLS and 3SLS. For example, in Specification (5), the estimate from 3SLS, $\beta_{3SLS} = -.09$, is different from its counterpart in the 2SLS, $\beta_{2SLS} = -.07$.

An alternative fixed-effect estimation cannot help much to reduce the simultaneous bias either. Compared to the pooled OLS, the fixed-effects estimation is a two-edged sword. On the one hand, it has an advantage of controlling for the multilateral resistance by specifying country-pair and time-varying fixed-effects. On the other hand, it also suffers from the imprecise measurement due to the data loss from most developed countries. In the post-Bretton-Woods era, many developed countries have already maintained a stable high democracy level. As a result, samples of such countries will be dropped automatically when we perform the within fixed-effect estimations (Wooldridge, 2002). One can clearly observe the under-estimates from the fixed-effect results in Column (5). For instance, the estimated effect of democracy from 3SLS, $\alpha_{3SLS} = .07$, is around 20 times larger than its counterpart in the fixed-effect estimate, $\alpha_{FE} = .003$. Simultaneously, the estimated effect

¹³Such statistic tests results are not reported here since they are almost identical to their counterparts of the 3SLS reported in Table 2B, though they are available upon readers' request.

of trade, $\beta_{3SLS} = -.09$, is 3 times larger than its counter part in the fixed-effect estimate, $\beta_{FE} = -.03$, in the absolute term.

4.3 Further Specifications

Table 2A and 2B show evidence that, at the world level, democracy fosters trade whereas trade dampens democracy. Yet, countries in different regions or with different income level may have idiosyncratic characteristics. Hence, I further investigate the *heterogenous* endogenous nexus between trade and democracy by income and by region, separately.

4.3.1 Income Heterogeneity

I separate sample countries into different income groups according to the World Bank's classification. A country is classified as low-income if its Gross National Income (GNI) per capita is less than \$826, lower middle income if less than \$3,255, and high income if its GNI per capita is more than \$10,066. Accordingly, countries with a GNI per capita in the range [3,256, 10065] are categorized as upper-middle income.

Table 4 reports the estimates varied according to different income groups. For the rich club of the OECD and high income non-OECD countries, democracy has a negative effect on trade. Such a finding is consistent with the theoretical prediction of the Heckscher-Ohlin theorem. Generally speaking, rich countries are capital abundant and import labor-intensive products. A rise in an import tariff would benefit the workers' group. On the other hand, democracy essentially implies a transfer of power from non-elected elites to wider population groups such as workers. Accordingly, the workers' group would push the government to choose a high tariff which in turn diminishes trade. In a nutshell, trade will

shrink when a rich country's democracy increases. Moreover, the reverse argument for the developing world also hold true broadly. The effects of democracy on trade are positive for the middle poor club such as lower-middle and upper-middle income countries. Finally, the low-income group seems to have an unexpected negative sign, yet it is insignificant.

Regarding the imports' influence on democracy, one can observe a much more complicated causal relationship. First, the effect for high income non-OECD countries is negative. One possible economic interpretation for this finding is that, with more trade, countries like Singapore may be aware that the traditional Britian-type democracy does not fit with its reality. Accordingly, such countries would search for a special path for themselves. For instance, Singapore does not have opposition parties, which makes them keep a relative low *Polity IV* indicator, even though its citizens have full election rights.¹⁴ Partially because of this, the nondemocratic regime in such countries can survive a long time without major repression (Acemoglu and Robinson, 2006). Second, the effect of trade on democracy for OECD countries is insignificant ($\beta = -.008, t = -0.18$). This is easy to understand since democracies in OECD countries are already fully consolidated. A marginal increase in trade cannot turn them back into the unconsolidated position.

Third, the effect for least developed countries is positive, due, in part, to the ideological diffusion. People in very poor countries admire the advantages of democracy. Therefore, trade creates a channel to make the dominant ideologies of rich clubs spill over to such poor countries. Finally, the imports' influence in both lower-middle and upper-middle income

¹⁴Interested readers can refer to *Democracy, Governance, and Economic Performance* by Feng (2003), MIT press, for detailed introduction.

groups are negative. To fully understand the economic rationale behind these empirical findings, I go further to explore the regional heterogeneity.

4.3.2 Regional Heterogeneity

Table 5 shows the estimation results by geographical regions. The findings are strikingly consistent with those in Table 4. For instance, most countries in such regions as South Asia, Mid-east, Sub-Sahara, and Latin America are middle-income. As shown in Table 4, they also have a negative imports' influences. Note that most countries in Latin America and Sub-Sahara are relatively land abundant. One possible reason is the negative effect is that trade globalization makes democratization less likely in such countries since elites of land owners are reluctant to foster democracy (Acemoglu and Robinson, 2006). The negative effect of trade in South Asia is perhaps because people in such a region are more sensitive to the downward side of democratic characteristics (e.g., inefficiency) when their countries open up.

In contrast, effects of trade on democracy are positive in both East Asia and Europe. Note that most East-asian countries are poor. Therefore the ideological diffusion argument may work for such a region. However, most of the OECD rich countries are located in Europe, in which effects of trade are insignificant as seen in Table 4. Therefore, the positive imports' influence in Europe must mainly come from the contributions of transition countries, which have recently experienced a dramatic political change. I therefore investigate separately the 20 transition countries to check bidirectional causality.¹⁵ The complete

¹⁵Such transition countries include: Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Poland, Russia, Slovenia, Tajikistan, Turkmenistan, and Uzbekistan.

version of my investigation, Specification (5), suggests that the effects of democracy on trade, and vice versa, are not statistically significant.

4.4 Robustness Checks

Econometric analysis can be performed in a variety of ways. Results would be suspect if they depended on a peculiar measurement. In other words, data analysis should not be taken seriously unless its inferences can be shown to be insensitive to reasonable changes in these measurements. In the estimates above, the *Polity IV* indicator is used to measure democracy, yet as noted above, there are still several alternative indicators of democracy, which I use as robustness checks.

I first substitute Bollen's (1998) political liberalization indicator for the *Polity IV* indicator. The Bollen's (1998) political liberalization index is measured on a scale from 0 to 100, where a higher score means higher political liberalization for a country. The simultaneous nexus between trade and democracy using such an index is presented in the first row of Panels A and B of Table 6, respectively. The estimates clearly suggest that democracy increases trade, while the reverse causality is negative. Thus, the primary findings reported above are not sensitive to the various data sets. I also compare the simultaneous bias once again if the regression is taken one-way only. When comparing the coefficients obtained from the 3SLS and their counterparts from the fixed-effect estimates, we find little difference for effects of democracy on trade, but huge for effects of trade on democracy. By way of comparison, the OLS estimation results are substantially different from their counterparts in the 3SLS. In contrast, the estimates obtained from the 2SLS

are broadly consistent with those from the 3SLS.

Second, I replace the *Polity IV* indicator with the Freedom House data. Democracy is measured by taking the average of ratings for political rights and civil liberties with a range of 0 to 7, with a higher score meaning less freedom. The democracy indicator from the Freedom House captures two attributes. First, elections should be held fairly, freely, and competitively. Equally important, opposition parties should exist and play a significant role in balance and checks. For example, the Freedom House index for Singapore is not sufficiently high, 4.5 on the average for the period 1974-1998, mainly because of the lack of opposition parties in Singapore. The estimates, as shown in Table 7, again suggest that high democracy (i.e., a low Freedom House index) leads to more trade, whereas more trade causes less democracy. Thus, it provides additional evidence to support my previous findings.

5 Concluding Remarks

The previous literature highlighted the importance of the effects of political liberalization on trade globalization, or vice versa. However, very few studies consider their endogenous nexus. This paper thus fills the gap by providing ample evidence that trade globalization discourages political liberalization, whereas political liberalization fosters trade globalization.

A recent study by Eichengreen and Leblang (2006) investigates a similar issue. By estimating the two-way connections *separately*, they find positive endogenous bidirectional causality between democratization and globalization historically, yet it was insignificant

during the Bretoon-woods era. By way of comparison, I go a step forward to provide robust evidence that trade globalization hinders democratization even though the reverse effect is positive by concentrating on the post-Bretton-Woods era. Particularly, the study here enjoys more advantages in four ways.

First, I use a more disaggregated data set to measure trade globalization. Trade volume is measured as the *directional* imports between trading partners. As we noted above, my data set has a striking advantage to reduce possible multicollinearity among regressors and avoid aggregation bias.

Second and more importantly, I adopt a structural approach and use a system of simultaneous equations, which is reducing the simultaneous bias of one-way estimation. As shown in the text, estimating the two-way connection *separately* is insufficient to capture the essence of the endogenous nexus. Put in another way, the neglect of simultaneous effects in previous works can cause substantial bias.

Third, the model presented in the current paper has a theoretical guidance, particularly for trade globalization. All the determinants of the trade equation are directly suggested by the gravity trade theory with a micro-foundation base. Similarly, the model also offers empirical insights into the determinants of the democracy equation. In other words, the methodology used here converges to a more accurate estimation by avoiding *arbitrarily* adding or substractting regressors in some previous works.

Finally, I go further to explore the parameter heterogeneity by region and by income. Since my data set covers more countries than many others, the exploration here enriches people to understand a complicated two-way endogenous nexus, and particularly, the

effects of trade on democracy across regions. Overall, trade dampens democracy in the post-Bretton-Woods era. However, as we discussed above, the effects differ in different regions. Regions with different factors endowments are expected to have different imports' influences on democracy.

Several extensions merit special consideration. The extensive search has already shown that trade globalization dampens political liberalization in the post-Bretton-Woods era. Nevertheless, it is interesting to ask what causes democratization in the absence of trade globalization. In brief, one of the important factors is a country's GDP per capita, as suggested by Barro (1999) and as shown in the paper. An increase in the people's standard of living calls for a rise in democracy. But what causes a distinction of income across countries? Endogenous growth theory suggests that this is due to the technology difference across borders. However, technology itself is not exogenous either. In any event, these topics are beyond the current paper's objective and thus call for further research in the future.

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6 Appendix A

Data Sources:

Directional Imports: Data are from Feenstra *et.al.*(2005) via <http://www.internationaldata.org>.

GDP, GDP per capita, Urbanization ratio, Infant Mortality Ratio: Data are from World Development Indicators CD-Rom (2002) by the World Bank.

Polity IV index: Data are from the *Polity IV* project maintained by Marshall, Monte G. and Keith Jagers (2004) via <http://www.cidcm.umd.edu/polity/>.

Bollen (1998)'s Political Liberalization Index: Data of the Cross-National Indicators of Liberal Democracy, 1950-1990, can be accessed from the ICPSR web page via <http://webapp.icpsr.umich.edu/cocoon/ICPSR-STUDY/02532.xml>.

Freedom House's Liberalization Index: Data are from <http://www.freedomhouse.org>.

Death Penalty Abolition: Data are from Amnesty International (2005) via <http://web.amnesty.org/pages/deathpenalty-index-eng>.

All Other Data are from Rose (2004) via <http://www.haas.berkeley.edu/~arose>.

Table 1: Regressors in the SEM System

Regressors	Descriptions and Measurements
	<i>Common variables in the trade and democracy equations</i>
Directional Imports	Logarithmic country j 's import from country i
Importer's GDP	Logarithmic GDP of importer j
GDP per capita	Logarithmic GDP per capita of exporter i and importer j
Democracy	Using data from <i>Polity IV</i> , Bollen's liberal democracy index, and Freedom House indicator, respectively, to measure exporter and importer's political liberalization level
Common Colony	A dummy to measure whether or not two trading partners are colonized by a common country
Ever Colony	A dummy to measure whether or not each of the two trading partners are colonized before
Common Language	A dummy to measure whether or not two trading partners use the same official language
Land Area	Log Product of trading countries land area
	<i>Variables in the trade equation but not the democracy equation</i>
Exporter's GDP	Logarithmic GDP of exporter i
Distance	Great-circle geographical distance between the two trading countries' capital, in a logarithmic.
Border Dummy	Whether or not two trading countries share the common land border
Number Landlocked	Number of trading countries that are landlocked
Number Islands	Number of trading countries that have islands
WTO membership	A dummy to measure whether or not a country is a member of the GATT/WTO
Regional Trade Agreements	A dummy to measure whether or not a country is a member of various regional trade agreements such as CU, FTA and GSP
	<i>Variables in the democracy equation but not trade equation</i>
Importer's GDP per capita	Logarithmic GDP per capita of importer j
Urbanization Ratio	Percentage of people who live in an urban area
Death Penalty Dummy	A dummy to measure whether or not a country outlaws death penalty
Infant Mortality Rate	Number of infants that die before reaching one year of age, per 1,000 live births in a given year

Notes: Sources of each variable are listed in Appendix Table A.

Table 2A: 3SLS Estimates of Democracy on Trade

Regressand: Directional Imports	(1)	(2)	(3)	(4)	(5)
Importer's Democracy	0.14** (63.50)	0.08** (33.28)	0.07** (26.20)	0.07** (26.84)	0.07** (23.00)
Exporter's GDP	2.48** (240.32)	2.36** (178.25)	2.60** (177.98)	2.55** (169.27)	2.49** (167.22)
Importer's GDP	1.88** (207.25)	1.98** (144.48)	2.26** (144.71)	2.27** (145.56)	2.20** (143.10)
Distance		-1.13** (-82.72)	-1.00** (-71.22)	-1.00** (-71.33)	-1.00** (-71.56)
Common Border Dummy		0.37** (5.95)	0.47** (7.68)	0.47** (7.67)	0.55** (9.13)
# of Landlocked Countries		-0.17** (-8.61)	-0.17** (-8.60)	-0.17** (-8.72)	-0.26** (-13.12)
# of Island Countries		0.58** (28.98)	0.29** (13.60)	0.27** (12.48)	0.23** (11.26)
Common Colony			0.37** (8.72)	0.45** (12.36)	0.67** (15.57)
Ever Colony			0.54** (6.23)	0.51** (5.95)	0.72** (8.51)
Common Language			0.50** (20.14)	0.49** (19.82)	0.48** (19.73)
Land Products			-0.15** (-32.47)	-0.14** (-30.34)	-0.12** (-27.52)
Exporter's Democracy				0.02** (14.64)	0.01** (8.44)
Both WTO Members					0.22** (4.17)
One WTO Member					0.13** (2.52)
FTA					1.44** (19.05)
GSP					0.68** (35.13)
Time Trend	-0.08** (-64.89)	-0.15** (-38.75)	-0.17** (-45.80)	-0.18** (-47.59)	-0.17** (-44.65)
# of Observations	114,913	45,792	45,792	45,792	45,792
First Stage F-value	7,732 [‡]	5,365 [‡]	4,853 [‡]	5,295 [‡]	4,836 [‡]
Anderson Likelihood-ratio Test	11,765 [‡]	15,863 [‡]	14,767 [‡]	15,556 [‡]	14,728 [‡]
Cragg-Donald F-statistics	13,414 [‡]	18,957 [‡]	17,427 [‡]	18,526 [‡]	17,373 [‡]
Anderson-Rubin χ^2 Statistic	2,087 [‡]	1,766 [‡]	1,181 [‡]	1,993 [‡]	946.89 [‡]
Shea Partial R^2	0.23	0.29	0.28	0.28	0.28
R^2	0.42	0.55	0.58	0.58	0.59

Table 2B: 3SLS Estimates of Effects of Trade on Democracy

Regressand: Importer's Democracy	(1)	(2)	(3)	(4)	(5)
Directional Imports	-0.21** (-4.88)	-0.16** (-9.70)	-0.20** (-11.62)	-0.18** (-10.38)	-0.09** (-5.11)
Importer's GDP per capita	11.05** (105.57)	5.86** (44.81)	5.83** (43.90)	5.78** (43.48)	5.54** (39.28)
Importer's Urbanized Ratio	-0.06** (-25.77)	-0.09** (-41.87)	-0.09** (-43.45)	-0.09** (-43.28)	-0.09** (-43.08)
Importer's Infant Mortality Ratio		-78.68** (-59.56)	-81.87** (-59.96)	-81.28** (-59.31)	-79.31** (-58.58)
Importer's Death Penalty Abolition		2.32** (39.60)	2.35** (39.62)	2.40** (39.45)	2.46** (40.38)
Common Colony			-0.53** (-4.20)	-0.63** (-4.98)	-0.61** (-4.83)
Ever Colony			0.90** (3.47)	0.90** (3.48)	0.71** (2.75)
Common Language			0.77** (10.37)	0.76** (10.35)	0.76** (10.31)
Land Products			0.07** (6.00)	0.06** (4.92)	0.01 (1.13)
Exporter's Democracy				-0.03** (-6.16)	-0.03** (-7.70)
Importer's GDP					0.19** (3.83)
Time Trend	0.06** (17.06)	0.08** (7.78)	0.09** (8.31)	0.10** (9.67)	0.09** (8.26)
# of Observations	114,913	45,792	45,792	45,792	45,792
First Stage F-statistics	17,261 [‡]	9,424 [‡]	8,316 [‡]	8,291 [‡]	5,109 [‡]
Anderson Likelihood-ratio statistic	25,195 [‡]	33,567 [‡]	31,319 [‡]	27,145 [‡]	28,735 [‡]
Cragg-Donald test statistic	33,591 [‡]	49,518 [‡]	44,953 [‡]	37,047 [‡]	39,975 [‡]
Anderson-Rubin χ^2 Statistic	33.52 [‡]	465.78 [‡]	537 [‡]	534.43 [‡]	2074 [‡]
Shea Partial R^2	0.42	0.52	0.50	0.45	0.47
R^2	0.33	0.40	0.40	0.40	0.41

Notes: this table reports the estimates of the democracy equation in the SEM. Numbers in parenthesis are t-value. *(**) indicates significance at 1 (5) percent level. †(‡) indicates p-value of the statistic is less than 0.01(0.001).

Table 3: Evidence of Simultaneity Bias

Model Selection ^a	(1)	(2)	(3)	(4)	(5)
<i>Panel A: Estimates of Democracy on Trade</i>					
Simultaneous equations	0.14** (63.50)	0.08** (33.28)	0.07** (26.20)	0.07** (26.84)	0.07** (23.00)
Single equation, OLS ^b	0.02** (25.45)	0.02** (13.02)	0.01** (8.31)	0.01** (9.12)	-0.005** (-3.85)
Single equation, FE ^c	-0.002** (-2.51)	-0.001 (-1.22)	-0.001 (-1.22)	0.003* (1.86)	0.003* (1.68)
Single equation, 2SLS ^d	0.13** (63.59)	0.09** (34.12)	0.07** (26.71)	0.09** (36.55)	0.06** (23.31)
<i>Panel B: Estimates of Trade on Democracy</i>					
Simultaneous equations	-0.21** (-4.88)	-0.16** (-9.70)	-0.20** (-11.62)	-0.18** (-10.38)	-0.09** (-5.11)
Single equation, OLS ^b	-0.06** (-8.55)	-0.09** (-9.11)	-0.11** (-10.90)	-0.11** (-10.14)	-0.11** (-10.14)
Single equation, FE ^c	-0.07** (-6.55)	-0.07** (-4.25)	-0.07** (-4.25)	-0.03** (-2.13)	-0.03** (-2.13)
Single equation, 2SLS ^d	-0.07** (-7.02)	-0.09** (-6.16)	-0.13** (-8.64)	-0.14** (-8.45)	-0.07** (-4.48)

Notes: a. This table reports the coefficients of the key variables α and β in each model specification. The numbers in parenthesis are the t-value. *(**) indicates significance at the 1 (5) percent level. The number of observations in estimate (1) is 114,913, while that in estimates (2)-(5) is 45,792.

b. This is the OLS with robust standard errors.

c. This is the fixed-effect estimations with robust standard errors. Country-pair specific and time-specific effects are included.

d. This is the IV (2SLS) regression with robust standard errors. In (1), the instruments for the importer's democracy in the trade equation are its urbanized ratio and GDP per capita, whereas those for directional imports in the importer's democracy equation are two trading countries' GDP. From (2) to (4), the instruments for the importer's democracy in the trade equation are its urbanized ratio, GDP per capita, infant mortality ratio, and death penalty abolition dummy; the instruments for the directional imports in the democracy equation are bilateral trading partners' GDP, geographical distance, common land border dummy, number of landlocked countries, and number of islands countries. In (5), the instruments for bilateral trade in the importer's democracy equation include various trade agreements, as well as those covered in (2)-(4); the instruments for the importer's democracy in the bilateral trade equation are the same as those in (2)-(4).

Table 4: Simultaneous Effects between Trade and Democracy by Income

Income Group	(1)	(2)	(3)	(4)	(5)	Obs.
<i>Panel A: Estimates of Democracy on Trade</i>						
Low Income	-0.006 (-0.86)	0.02** (4.50)	-0.02** (2.87)	-0.02** (3.00)	-0.001 (-0.15)	15,020
Lower-middle Income	0.05** (9.83)	0.07** (17.2)	0.07** (15.42)	0.07** (16.08)	0.01** (2.35)	14,581
Upper-middle Income	0.07** (5.00)	0.06** (11.40)	0.05** (9.50)	0.05** (9.12)	0.04** (7.75)	9,492
High Income OECD	-0.04** (-3.59)	-0.07** (-11.28)	-0.03** (-3.83)	-0.02** (-3.23)	-0.02** (-3.58)	3,154
High Income Non-OECD	0.10** (3.14)	0.04** (2.91)	0.06** (3.64)	0.06** (3.77)	0.005 (0.35)	2,452
<i>Panel B: Estimates of Trade on Democracy</i>						
Low Income	0.70** (9.75)	0.15** (4.55)	0.14** (4.10)	0.21** (5.81)	0.05 (1.40)	15,020
Lower-middle Income	-1.14** (-15.02)	-0.50** (-15.59)	-0.40** (-11.09)	-0.42** (-11.47)	-0.06* (-1.77)	15,581
Upper-middle Income	0.25** (2.64)	0.23** (5.75)	0.07 (-1.40)	0.04 (-0.9)	-0.15** (-3.23)	9,492
High Income OECD	0.62** (-3.74)	0.21** (3.64)	0.16** (2.94)	0.22** (3.97)	-0.008 (-0.18)	3,154
High Income Non-OECD	-0.63** (-7.09)	-0.70** (-11.97)	-0.70** (-11.75)	-0.80** (-13.27)	-0.56** (-9.61)	2,452

Notes: This table reports the coefficients of the key variables α and β in each model specification. Countries are separated into five categories according to the importer's income level based on the World Bank's classification standard. The numbers in parenthesis are the t-value. *(**) indicates significance at the 1 (5) percent level.

Table 5: Simultaneous Effects between Trade and Democracy by Regions

Regions ^a	(1)	(2)	(3)	(4)	(5)	Obs.
<i>Panel A: Estimates of Democracy on Trade</i>						
East Asia	0.13** (18.24)	0.14** (23.48)	0.13** (23.13)	0.13** (22.15)	0.09** (14.12)	7,714
South Asia	0.09** (3.84)	-0.01 (-1.20)	-0.01 (-1.12)	-0.01* (-1.27)	-0.04** (-3.78)	3,028
Mid-east	0.12** (8.87)	0.006** (1.04)	-0.01** (-2.19)	-0.009 (-1.44)	-0.03** (-3.81)	5,183
Sub-sahara	0.04** (6.28)	0.06** (10.32)	0.03** (5.01)	0.03** (5.48)	0.02** (3.61)	11,722
Europe	0.31** (31.79)	0.16** (24.65)	0.14** (20.29)	0.13** (19.87)	0.11** (15.12)	6,491
North America	0.02 (0.31)	-0.05 (-1.46)	-2.74** (-5.63)	-3.54** (-6.61)	-0.11** (-3.12)	162
Latin America	0.01 (1.47)	0.13** (19.29)	0.12** (18.02)	0.12** (18.25)	0.07** (11.25)	10,398
Transition ^b	0.19** (10.54)	0.10** (7.76)	0.07** (5.13)	0.06** (4.98)	0.06** (4.31)	2,720
<i>Panel B: Estimates of Trade on Democracy</i>						
East Asia	-1.57** (-14.25)	-0.24** (-7.05)	-0.37** (-10.01)	-0.37** (-9.90)	0.11** (2.99)	7,714
South Asia	1.42** (7.75)	0.22** (3.85)	0.04 (0.63)	0.06 (0.96)	-0.31** (-5.33)	3,028
Mid-east	-1.29** (-7.44)	-0.21** (-3.86)	-0.27** (-4.60)	0.04 (0.78)	0.007 (0.14)	5,183
Sub Sahara	-0.28** (-3.14)	-0.33** (-7.92)	-0.25** (-5.87)	-0.19** (-4.43)	-0.27** (-6.40)	11,722
Europe	0.30** (2.41)	0.06* (1.68)	0.07* (1.91)	0.02 (0.62)	0.10** (2.69)	6,491
North America	-0.56** (-2.99)	-0.07 (-0.4)	-2.74** (-5.63)	-3.54** (-6.61)	-4.02** (-5.45)	162
Latin America	-0.70** (-9.47)	-0.15** (-4.62)	-0.08* (-1.86)	-0.09** (-2.18)	-0.05** (-1.41)	10,398
Transition ^b	-0.47 (-1.58)	-0.06 (-0.77)	-0.05 (-0.63)	0.13 (1.51)	0.11 (1.27)	2,720

Notes: a. This table reports coefficients of key variables α and β in each model specification. Countries are separated by importer's geographical location according to the World Bank's standard. Numbers in parenthesis are t-value. *(**) indicates significance at 1 (5) percent level.

b. This column reports the simultaneous effect between trade and democracy for the 20 transition countries.

Table 6: Alternative Evidence of Simultaneity Bias using Bollen's Data Set

Model Selection ^a	(1)	(2)	(3)	(4)	(5)
<i>Panel A: Estimates of Democracy on Trade</i>					
Simultaneous equations	0.02** (24.96)	0.01** (24.21)	0.01** (20.30)	0.01** (22.41)	0.01** (18.42)
Single equation, OLS ^b	0.01** (17.52)	0.01** (16.42)	0.005** (12.89)	0.01** (14.92)	0.003** (8.39)
Single equation, FE ^c	0.00 (0.62)	0.00 (0.62)	0.00 (0.62)	0.00** (2.12)	0.00* (1.92)
Single equation, 2SLS ^d	0.02** (24.10)	0.01** (24.57)	0.01** (20.62)	0.02** (27.97)	0.01** (18.85)
<i>Panel B: Estimates of Trade on Democracy</i>					
Simultaneous equations	-1.43** (-5.99)	-0.83** (-8.69)	-0.65** (-6.15)	-0.60** (-5.38)	-0.10 (-0.89)
Single equation, OLS ^b	-0.02 (-0.24)	-0.20** (-3.48)	-0.09 (-1.52)	-0.17** (-2.61)	-0.17** (-2.61)
Single equation, FE ^c	0.12 (1.09)	0.11 (1.06)	0.11 (1.06)	0.26** (3.21)	0.26** (3.21)
Single equation, 2SLS ^d	-0.60** (-6.07)	-0.51** (-6.03)	-0.27** (-2.96)	-0.68 (-6.52)	-0.02 (-0.18)

Notes: a. This table reports the coefficients of the key variables α and β in each model's specification. Democracy is measured on a scale from 0 to 100, from Bollen (1998), where a higher score means higher political liberalization. The numbers in parenthesis are the t-value. *(**) indicates significance at 1 (5) percent level. The number of observations in each estimate is 27,461.

b. This is the OLS with robust standard errors.

c. This is the fixed-effect estimations with robust standard errors. Country-pair specific and time-specific effects are included.

d This is the IV (2SLS) regression with robust standard errors. In (1), the instruments for the importer's democracy in the trade equation are its urbanized ratio and GDP per capita, whereas those for directional imports in the importer's democracy equation are two trading countries' GDP. From (2) to (4), the instruments for the importer's democracy in the trade equation are its urbanized ratio, GDP per capita, infant mortality ratio, and death penalty abolition dummy; the instruments for the directional imports in the democracy equation are bilateral trading partners' GDP, geographical distance, common land border dummy, number of landlocked countries, and number of islands countries. In (5), the instruments for bilateral trade in the importer's democracy equation include various trade agreements, as well as those covered in (2)-(4); the instruments for the importer's democracy in the bilateral trade equation are the same as those in (2)-(4).

Table 7: Alternative Evidence of Simultaneity Bias using Freedom House's Data Set

Model Selection ^a	(1)	(2)	(3)	(4)	(5)
<i>Panel A: Estimates of Democracy on Trade</i>					
Simultaneous equations	-0.42** (-45.14)	-0.30** (-40.01)	-0.26** (-33.02)	-0.29** (-36.56)	-0.25** (-30.74)
Single equation, OLS ^b	-0.16** (-31.05)	-0.14** (-27.62)	-0.11** (-21.34)	-0.13** (-24.74)	-0.09** (-17.11)
Single equation, FE ^c	-0.01** (-2.23)	-0.01** (-2.23)	-0.01** (-2.23)	-0.03** (-4.05)	-0.03** (-4.56)
Single equation, 2SLS ^d	-0.37** (-44.36)	-0.31** (-39.75)	-0.26** (-32.71)	-0.34** (-44.45)	-0.26** (-31.19)
<i>Panel B: Estimates of Trade on Democracy</i>					
Simultaneous equations	0.01** (5.50)	0.02** (8.00)	0.01** (6.30)	0.04** (10.22)	0.00 (0.26)
Single equation, OLS ^b	0.03** (12.11)	0.03** (14.84)	0.03** (12.46)	0.01** (1.98)	0.01** (1.98)
Single equation, FE ^c	-0.004 (-1.22)	-0.003 (-0.90)	-0.003 (-0.90)	-0.005 (-1.48)	-0.005 (-1.48)
Single equation, 2SLS ^d	0.04** (12.24)	0.04** (12.32)	0.03** (9.64)	0.02** (6.09)	0.00 (0.30)

Notes: a. This table reports the coefficients of the key variables α and β in each model's specification. Democracy is measured on a scale from 0 to 7 from the Freedom House data set, where a higher score means less freedom. The numbers in parenthesis are the t-value. (**) indicates significance at 1 the (5) percent level. The number of observations in each estimate is 48,423. In contrast to the other indicators in the tables above, here, the smaller the average rating of freedom house indicator, the higher the political liberalization of the country.

b. This is the OLS with robust standard errors.

c. This is the fixed-effect estimations with robust standard errors. Country-pair specific and time-specific effects are included.

d. This is the IV (2SLS) regression with robust standard errors. In (1), instruments for democracy in the trade equation are its urbanized ratio and GDP per capita whereas instruments for directional imports in the democracy equation are bilateral trading partners' distance and common land border dummy. From (2) to (5), instruments for democracy in the trade equation are its urbanized ratio, GDP per capita, and death penalty abolition dummy; instruments for directional imports in the democracy equation are bilateral trading partners' distance, common land border dummy, number of landlocked countries, number of islands countries. The F-statistics and t-statistics for variables in the first-stage regression, which are available upon request, are highly significant at the conventional statistical level in each specification.