Trade Openness and the Channels of its Impact on Democracy: An Empirical Analysis in Latin America
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Abstract

Does stronger integration in world trade affect levels of democracy? Using a system of simultaneous equations in a panel of 23 Latin American countries between 1970 and 1999, this paper assesses the possible channels through which trade may affect democracy. It finds that, ceteris paribus, trade openness fosters democracy in Latin America mainly through an increase in the size of government consumption. It also hinders democracy by increasing labor mobility and exacerbating class conflict. The net effect of openness is not statistically significant, suggesting that the direct impact of level of integration in world markets is irrelevant for democratic governance in the region.

Resumen

¿Una mayor integración en el comercio mundial afecta los niveles de democracia? Usando un sistema de ecuaciones lineales simultaneas en un panel de 23 países de América Latina con datos de 1970 a 1999, este documento de trabajo evalúa los posibles canales por medio de los cuales el comercio puede afectar la democracia. Se demuestra que, ceteris paribus, la apertura comercial promueve la democracia en América Latina principalmente por medio de un incremento en el tamaño del gasto público. También inhibe la democracia al aumentar la movilidad laboral y exacerbar el conflicto entre clases socioeconómicas. El efecto neto de la apertura no es estadísticamente significativo, sugiriendo que el impacto directo del nivel de integración en los mercados mundiales es irrelevante para la gobernabilidad democrática en la región.
Introduction

Does stronger integration in world trade affect Latin American countries’ levels of democracy? If so, how exactly does trade openness matter for democratic governance? While many scholars and policy-makers (including Washington and major international organizations such as the World Bank and the IMF) have proclaimed the wonders of free markets in promoting both economic growth and democracy, anti-globalization supporters claim that openness triggers disruptive economic, political, and social forces, which may ultimately produce regime instability, decay, and democratic breakdown. A consensus has not yet been reached, highlighting the need for further systematic empirical tests with enhanced methodological tools. Using a system of simultaneous equations in a panel of 23 Latin American countries between 1970 and 1999, this paper assesses the possible channels through which trade may affect democracy. More specifically, it finds that, *ceteris paribus*, trade openness (defined as the sum of imports and exports as a share of real GDP) fosters democracy in Latin America mainly through an increase in the size of government consumption. It also hinders democracy by increasing labor mobility and exacerbating class conflict. The net effect of openness is not statistically significant, suggesting that the direct impact of level of integration in world markets is irrelevant for democratic governance in the region.

The relationship between democracy and trade liberalization has been an important empirical puzzle, particularly in Latin America. In the late 1970s and the 1980s, there was an ostensible move towards democracy (albeit some important cross-national variation in the quality of democracy). Despite unimpressive economic growth, disheartening social performance, and high levels of inequalities, most Latin American countries (LACs) not only established but also maintained democratic regimes. During the so-called “third-wave of democratization,” only Haiti and Peru have experienced full-fledged democratic breakdown (Mainwaring and Pérez-Liñán, 2005).

Concurrent with this democratization process, there has been a regional movement towards freer trade. As many LACs began to tear down their tariffs and other barriers to trade, trade flows increased steadily during the same period. With the exception of a decrease in trade flows during the 1981-1983 and 1991-1992 periods, the numbers presented in Figure 1 show that trade flows—imports plus exports as a percentage of the domestic economy—rose from an average of 58% in 1976 to about 80% in 2000.

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1 The 23 Latin American countries included in this study are: Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay and Venezuela.

2 For an excellent review of the process of trade reforms in Latin America see Edwards (1994).
Such a rush to freer trade and democracy, however, seems anomalous in light of the protectionist trade policies and authoritarian tradition that characterized the region before the late 1970s. During more than four decades, most LACs, followed a selective protectionist approach based on development strategies and import substitution, which placed the region as having the most distorted external sector in the world (Edwards, 1994; Erzan et al., 1989).\(^3\) Moreover, democracies did not live for extended periods of time and authoritarian regimes were spread throughout the region.

As many Latin American democracies are increasingly experiencing some sort of “reform fatigue” and setbacks in the democratization process, the debate over the nature of the relationship between trade openness and

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\(^3\) The major shift in trade policies came after the debt crisis of 1982 and towards the end of the 1980s, when many LACs started to relax the restrictions to free-trade as part of the broader set of structural adjustment programs. Trade reforms since then have proceeded in an impressive fast pace.
democracy is (re-)gaining in prominence. Could integration in world markets be used as a palliative method against the rise of anti-system parties, the non-constitutional deposition of elected presidents, and the fall of democracy’s legitimacy in the region? Could international trade spur enough economic, political, and social transformations to ensure continued public support for democratic regimes? These are just some of the questions that have been recently circulated both in the academic milieu and in the policy-making world, which this paper addresses.

The paper proceeds as follows. In section I, I briefly review the mixed findings of the literature on the link between democracy and trade. Next, I identify the possible channels of the impact of trade on levels of democracy. In the last three parts, I present the model, the results and the main conclusions.

I. The Literature on Democracy and Trade as one of its Determinants

Comprehensive theories addressing the effects of trade on both the levels and survival prospects of democracy are seriously lacking. The trade (and globalization broadly speaking) literature is primarily concerned with the effects of greater market interdependence on economic growth, social and economic policy, and the mobilization of domestic interests (Garrett, 1999; Keohane and Milner, 1996; Strange, 1997; Cerny, 1995; Katzenstein, 1985), but it has largely understudied the influence of greater levels of trade flows on regime type per se. The democracy literature in its turn has focused primarily on domestic level explanations (such as the role of elites, political institutions, and economic growth), overlooking the importance of exposure to international trade. The two bodies of literature remain largely disjointed, with few instances of interconnection (Verdier, 1994; Li and Reuveney, 2003; Rudra, 2002a; Hadenius, 1992).

Studies that do try to bring the two bodies of literature together suffer from two main shortcomings. First, the large majority reverses the direction of causality. Instead of examining the influence of trade on democracy, they look into democratic regimes to find explanations for certain levels of trade openness (e.g., Milner and Kubota, 2005) or economic growth (e.g., Tavares and Wacziarg, 2001). Second, most of these studies focus primarily on the direct effects of trade on democracy, failing to identify its indirect effects,

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4 See Hagopian and Mainwaring (2005) for a good review of the advances and setbacks of the recent democratization process in Latin America and IADB (2004) for an overview of the shortcomings of economic reforms in the region.

5 Most of the democratization literature focusing on international level variables analyzes the implications for democracy of the dependency theory (Wallerstein, 1974; Cardoso and Faletto, 1979; Gonick and Rosh, 1988; Bollen, 1983) and the effects of diffusion (Starr, 1991; Brinks and Coppedge, 2001).
filtered through channel (or intervening) variables. Overall, the literature bridging the different aspects of the impact of trade on democracy seems to be in its infancy, constituting a rich field for future research.

Indeed, the bulk of the literature concerning the effects of trade on democracy is largely theoretical (rather than empirical) and it is usually embedded in the broader discussions of the impact of globalization on regime type. As Li and Reuveny (2003) excellently review, three main claims have been put forth. First, the argument that international trade fosters democracy is mainly based on the assumption that openness promotes economic growth, education, increases the size of the middle class, and reduces inequality (e.g., Held, 1992; Lipset, 1994; Platner, 1993). It also defends that international trade intensifies the diffusion of technology, information, and ideas that facilitate the spread of democratic values (e.g., Whitehead, 1996; Starr, 1991; Przeworski et al., 1996). Conversely, the proposition that trade openness hinders democracy highlights the fact that integration produces structural adjustments that create domestic instability (e.g., Cox, 1996). It claims that trade liberalization creates more losers than winners, underscoring the decrease in the ability of the state to compensate those losers (e.g., Rodrik, 1997, 1998). Lastly, a third hypothesis is that trade openness does not matter for regime type. According to this line of reasoning, international trade neither affects the capabilities of the welfare state (Frieden and Rogowski, 1996; Garrett, 1999) nor does it have a uniform effect across countries (Haggard and Kaufman, 1995; Keohane and Milner, 1996). For this group of authors, the role of international trade in promoting democracy has been greatly exaggerated (Jones, 1995). The empirical evidence supporting each of these hypotheses is not conclusive, warranting further empirical investigation.

The present study attempts to advance the discussions in two main ways. On the one hand, it employs a methodology that makes explicit the endogeneity issues inherent to the study of the trade-democracy relationship. On the other hand, it goes beyond the rather simplistic debate of the positive/neutral/negative impact of openness on regime type to specify the conditions under which trade may affect levels of democracy. Detailing the channels of influence of trade on democracy can help us better comprehend the costs and benefits of openness.
II. The Possible Channels of the Impact of Trade on Democracy

Trade has both positive and negative consequences for the economy, government policy, and society in general. If we do not disaggregate the total effect of trade into its different components, we can only evaluate what its net impact is, thus impairing our ability to identify possible causal mechanisms between trade and democracy. In addition, Table 1—presenting the correlation matrix between levels of democracy (measured by the Polity IV project) and trade openness in various time periods in Latin America—shows that the magnitudes and the signs of the simple contemporaneous correlations do not remain constant over time, which suggests that the link between the two variables might be conditional on other factors rather than absolute. Taken together, these observations imply that the effects of trade liberalization—at least in Latin America—are not as straightforward as free-trade supporters’ purport. At the very least, further empirical tests of the assumption of a linear positive link openness → democracy should be conducted.

### TABLE 1. UNCONDITIONAL CORRELATION BETWEEN LEVELS OF DEMOCRACY AND TRADE OPENNESS IN LATIN AMERICA (1970-1999)

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Here, eight possible channels of the impact of trade on democracy are analyzed. The theoretical literature on democratization and trade guided the choice of channel variables. The assumption is that these factors capture most (preferably all!) of the effect of trade on democracy. In what follows, each of these factors is discussed.

Channel 1: Economic growth

Based on the classic works of Lipset (1959), Curtright (1963) and Hadenius (1992), modernization theory suggests the first possible channel of influence of trade openness on democracy: economic development (or modernization). The generic argument of the thesis holds that economic development leads to increases in education and an enlargement of the middle class, which in turn expands the “receptivity to democratic political tolerance” (Lipset, 1959: 83-84). A refinement of such an argument has been developed more recently through the works of Przeworski and Limongi (1997) and Przeworski et al., (2000) and its main proposition is that although an increase in income level does not necessarily increase the probability of any given country becoming democratic, it does have a significant positive impact on the endurance of democracies. Rejecting what Przeworski et al., (2000) have called the “endogenous theory” of democratic transition, the supporters of this claim defend that economic development increases the probability that a democracy will sustain itself. Notwithstanding the relative merits of either version, the main contribution of this line of research is the finding of a robust positive association between economic development/growth (measured in various forms, i.e., levels and changes in GDP per capita, energy consumption, or education) and democracy.

The literature on the effects of international trade on economic development is less conclusive, however. Traditional Heckscher-Ohlin models predict that trade openness leads to static welfare gains for society in general. These gains come from increased efficiency in production (countries specialize in the production of goods in which they have comparative advantage) and lower consumer prices. Increased levels of competition in domestic as well as in international markets, resulting from greater openness, would also contribute to growth, usually characterized as movements towards the production possibilities frontier.

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6 I welcome discussions (suggestions) of omitted channel variables!!!!
7 Boix and Stokes (2003) provide an excellent critique of this argument.
8 Also known as factors theory of trade.
9 Static gains refer to a one-time considerable increase in the level of output and only a short-term increase in the output growth rates after the liberalization episode. The dynamic gains of openness are discussed later when addressing other channels 8 & 9.
More recent theoretical arguments have questioned the extent of the growth benefits of openness. Rodrik and Rodríguez (2001), for instance, review a number of explanations for why stronger integration in international markets can be detrimental to growth in developing countries. One such explanation is that in countries with market imperfections (such as excessive regulation of labor markets) openness can lead to concentration of markets and under-utilization of resources (Chang et al., 2005). Other works highlighting the importance of market imperfections for an accurate understanding of growth effects of trade include Matsuyama (1992), Sachs and Warner (1995, 1999) and Grossman and Helpman (1991).10

Such a debate makes the derivation of theoretical expectations for the total effect of openness on levels of democracy via economic growth ambiguous. While economic growth is expected to be positively associated with higher levels of democracy, the impact of trade on growth is unclear. The overall impact of channel 1 is, thus, an inherent empirical question.

Channel 2: Inequality

The relationship between trade and inequality is also ambiguous and subject to a lot of theoretical debates and inconclusive empirical findings. In fact, the literature on the link between trade (or globalization) and inequality (or poverty) is so vast that here I just highlight the most common argument about the impact of openness.11 In particular, I offer some observations about Latin America that cast some doubt on the presumed positive effect of integration on reducing inequalities.

According to the Stolper-Samuelson theorem, the abundant factor—(unskilled) labor in the case of LDCs including Latin America—benefits from trade liberalization due to factor price equalization. Openness would provoke labor reallocation across sectors, decreasing the returns to skilled-labor (used intensively in the import-competing sector), while increasing the wages of workers specialized in the production of unskilled-labor-intensive products (such as textiles). The wage gap between skilled and unskilled workers would, thus, be reduced, fact that would be reflected in lower levels of poverty and income inequality.

The problem with this theorem is that it assumes that factors of production are perfectly mobile within countries.12 In Latin America, this condition is not always fulfilled, and therefore, the equality gains from trade integration might not be as positive and important as predicted. Indeed, a

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10 Please refer to Lora et al., (2003), Stallings and Peres (2000), and Shirley and Walsh (2000) for a discussion of the effects of economic reforms in general and trade liberalization in particular for growth in Latin America.

11 For a recent review of the literature refer to Goldberg and Pavcnik (2004).

12 Other assumptions are perfect competition, no market imperfections (such as externalities, public goods or uncertainty).
number of studies have reported the lack of labor mobility and sector re-allocation in developing countries (e.g., Wacziarg and Seddon Wallack, 2004). In general, these works attribute the lack of labor mobility to the existence of various labor regulations and other rigidities (Heckman and Pagés, 2000).

Similarly, other studies have shown an increase (rather than a decrease) in the wages paid to skilled-workers not just in developed but also in developing countries (e.g., Cragg and Epelbaum, 1996). The usual justification is that trade liberalization has increased the demand for professional and managers with high levels of education. Robbins (1996), Sanchez-Paramo and Schady (2003) and Attanasio et al., (2004), for example, show that the share of skilled workers within-industry has increased in Argentina, Brazil, Mexico, Chile, and Colombia.

Moreover, as Latin American countries reduce their trade barriers, natural resources are one of the most important commodities produced domestically that can successfully compete in world markets. As the few owners of these natural assets benefit from openness, income distribution becomes more skewed. The result is an increasingly more unequal distribution of income, fact that is highlighted in the Inter-American Development Bank’s Economic and Social Progress Report in Latin America (1998-1999).

Notwithstanding these empirical observations concerning the nature of the impact of trade on inequality especially in Latin America, there is a consensus that greater levels of equality are conducive to democracy. According to Boix (2003), higher levels of equality decrease the redistributive demands from the poor (i.e., taxes), making the costs of adhering to mass democracy relatively lower than the costs of repression in authoritarian regimes. Such a change in relative costs thus makes democratic transition and survival more likely. Other arguments for the positive association between equality and democracy include the claims that inequality decreases the size of the middle-class and promotes social instability, all of which hinders the prospects for democracy.

In short, the overall effect of trade on democracy via the inequality channel will depend on the nature of the trade-inequality relationship. Although the classic Stolper-Samuelson theorem predicts a negative impact of trade on inequality, I am not confident this is really the case in Latin America. Given the findings of the empirical studies mentioned above, there are reasons to believe the reverse is true: openness increases inequality. Just as in the case of channel 1, further empirical testing is necessary to attest which hypothesis holds in the specific case of Latin America.

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13 For a survey of the literature linking democracy and inequality, see Landa and Kapstein (2001).
Channel 3: Labor mobility

It is undisputable that trade liberalization leads to structural changes which, at least in the short-run, is associated with inter-sectoral displacements of labor. So much so, that anti-liberalization protests and anti-globalization rhetoric have become a frequent occurrence in our every-day life.\(^{14}\) The protectionist supporters blame liberalization for the closure of firms, increase of unemployment rates, and the social instability, all of which do not constitute fertile grounds for democracy. Conversely, advocates of free-trade remind us that it is exactly this re-allocation of resources (including labor) that allows for an increase in efficiency and augmented economic growth, which are important sources of democratic governance. Consequently, the degree to which the structural adjustments caused by liberalization affect democracy will depend on labor (and more broadly factor) mobility, i.e., the ease with which labor (or a factor of production) can move across industries within the domestic economy.\(^{15}\)

As argued by Hiscox (2002), the degree of inter-industry factor mobility is “crucial for understanding the political-economic origins of a vast range of trade, monetary, industrial, and regulatory policies that affect the relative fortunes of different industries or mediate the effects of other exogenous changes upon them” (p. 5). According to the author, one can link the type of conflict surrounding these policies to the levels of factor mobility found within an economy. If factors are mobile across industries, the redistributive effects of trade will divide individuals along class lines: the relevant policy cleavage would be among owners of different factors (i.e., capital vs. labor). Conversely, if factors are immobile across industries, openness divides individuals along industry lines, promoting industry-based rent-seeking (i.e., owners of same factors in different industries against each other).

The question then becomes whether or not this distinction in political cleavages would matter for democracy. On the one hand, one could claim that industry-based rent-seeking can become a rather harmful zero-sum distributive game in which lobby-groups fight for bigger shares of benefits, depleting the economy’s resources and thus hindering the prospects for democracy. This would be an argument for a positive association between class coalitions, which are more encompassing of society as a whole, and democracy. On the other hand, one could easily argue that broad-based class conflicts are at least as equally disruptive for economic resources and the prospects for democracy as narrow-based coalitions. This is because of the high instability in economic (as well as other redistributive) policy generated

\(^{14}\) Many studies and the media have reported the signs of public discontent with trade and other market reforms in Latin America (see Shifer 1997 and IADB 2004).

\(^{15}\) Due to data limitations, in this paper, I do not examine the role of domestic capital mobility.
by the constant shifts in control of government. The veracity of each claim is thus contingent upon empirical verification.

**Channel 4: Macroeconomic policy quality**

Another possible channel of influence of trade on democracy is what experts have commonly referred to as “good macroeconomic governance”. Supporters of free-trade (and globalization more broadly) have pointed to the fact openness creates incentives for policy-makers to avoid financing excesses with large budget deficits and imprudent expansion of the monetary base (i.e., creation of inflation). As economies become more and more integrated, the competition for capital and trade partners would increase. Such a competition would exert pressures for increased macroeconomic discipline, which would ultimately limit the size of public deficit and inflation. Another way openness would increase the quality of macroeconomic policy would be through international agreements, which implicitly (e.g., signaling effects) or explicitly (e.g., conditionality) would limit policy-makers’ excessive spending behavior.

Improved macroeconomic policy quality, in turn, is expected to be associated with higher levels of democracy. The reason is that good macroeconomic policy is associated with higher levels of economic growth (Fischer 1993) and decreased levels of inequality (since the burden of inflationary tax falls disproportionately on the poor). The overall expectation is that trade increases macroeconomic policy quality, which in turn, is associated with higher levels of democracy.

**Channels 5 & 6: Government size and Social spending**

Beyond changing the incentives of policy-makers in the conduct of macroeconomic policies, trade openness may also affect the size of government, including its ability to fund social programs (Cameron, 1978; Rodrik, 1998). In fact, one of the most prominent debates surrounding the effects of globalization has been the extent to which exposure to international markets exert pressures on governments to cut back their expenditures, especially in the social sector. Garrett (1999) has identified two main hypotheses. On the one hand, the “compensation” hypothesis posits that if countries are more exposed to international shocks, governments are more likely to increase their overall spending levels in order to smooth consumption, provide safety-nets against risks, and compensate the losers of liberalization. On the other hand, the “efficiency” (or “race-to-the-bottom”) hypothesis suggests that openness induces government retrenchment as a way to ensure the economy’s competitiveness and attractiveness to foreign investors. Empirical studies provide evidence supporting both hypotheses:

In modeling the choice of the level of trade openness and the size of the public sector as determined simultaneously, Adsera and Boix (2002) link openness and the size of government to the choice of political regime. More specifically, they show that political agents under a democratic regime will develop two alternative strategies in order to win elections: (1) support an increase in tariffs or (2) support the combination of openness with some sort of compensation scheme for the losers of the liberalization process. However, because the combination of openness and liberalization requires higher taxes, the authors claim that there is a third available political strategy: to establish an authoritarian regime in which the losers from increasing economic integration are excluded and public spending is not increased. Taken together, these alternatives suggest that higher levels of democracy are more likely to occur in places that combine openness and a large government.

Channel 7: Social conflict

Although stronger integration in world markets can bring some important welfare benefits to an economy, it can also spur political and social instability. As already mentioned, trade openness has redistributive consequences, which may lead to an increase in opposition to trade reforms by the losers of the liberalization process. Beyond the usual channels of lobbying activities, opposition groups might choose to express their discontent and disagreement through demonstrations, strikes, riots or even civil wars. If that is the case, social conflict ensues, creating an environment that is not fertile for democracy to thrive.

Research on the effects of trade integration (or globalization more broadly) on domestic social conflict has thus far been rather limited. Most studies focus on extreme forms of conflict such as civil wars, yielding mixed results. Some authors find no direct impact of trade on the probability of occurrence of civil wars (e.g., Hegre et al., 2003) or political instability (De Soysa, 2002). Other studies, however, find that reiterated international contacts may prolong civil wars. In both cases, the impact of trade on less violent forms of collective action such as strikes and riots has been largely overlooked and under-studied (one exception is Walter, 2003).

It is interesting to note that in Latin America, the protests against structural reforms (particularly against privatization) have been common. Yet, I am not aware of any study directly linking trade openness to the frequency of strikes, riots, and anti-government demonstrations in the region as a whole. Once again, empirical tests are necessary to ascertain the nature of the effect of trade integration on levels of democracy via social conflict.
Channels 8 & 9: Transmission of technology, information flows, and diffusion of democratic ideas

The last two channels to be considered are supposed to capture the so-called *dynamics* gains from trade.¹⁶ The idea that open trade promotes a spill-over effect of transmission of technology, information, and ideas from one country to another stems from two main bodies of literature: the endogenous growth and the diffusion of democracy literatures. Through increased exposure to an international stock of scientific knowledge and democratic values, openness is said to sponsor long-run growth and democracy.

In particular, there are two main ways the transmission of both technology and values can occur. First, international trade leads to an increase in the number of interactions with foreign countries, which makes it easier for domestic individuals to learn, imitate and incorporate the “new” ideas and production processes coming from abroad (Edwards, 1994). Second, trade openness tends to attract more foreign direct investments which can act as a vehicle for the diffusion of both technology and expertise (Harrison and Revenga, 1995).

Overall, the expectation is that trade would be positively associated with democracy through both channels – transmission of technology (information), and the diffusion of ideas— if the countries to which they are most exposed are democratic.

III. The Model, the Data and Estimation Issues

The Model and Estimation

In order to empirically examine the channels whereby trade openness may affect democracy, this paper employs a system of simultaneous equations in a panel of 23 Latin American countries between 1970 and 1999. The equations are supposed to capture all of the theoretical arguments presented in the preceding section, while accounting for the potential endogeneity issues that exist between trade and democracy. The 30 years are divided into six periods, with each observation consisting of the average over five years: 1970-1974, 1975-1979, 1980-1984, 1985-1989, 1990-1994, and 1995-1999. The joint estimation of the parameters is done using three-stage least squares (3SLS).¹⁷

¹⁶ These gains are supposed to affect long-run economic growth via accumulation of physical capital, technological transmissions and improvements in quality of macroeconomic policy.

¹⁷ This estimation procedure was first used by Tavares and Wacziarg (2001) and is becoming the preferred estimation procedure for analyzing the effects of channel variables. Other works using the same (or similar) estimation procedures include Wacziarg (1998), Chang et al., (2005), Bolaky and Freund (2004), Lake and Baum (2003), and Pinto and Timmons (2005).
More specifically, the model consists of (1) a democracy equation, (2) a trade openness equation, and (3) nine channel equations. In the first equation, only the channel variables are included; the trade openness variable appears solely in the channels equations. The equation identifying the determinants of trade openness is only included in order to check for the endogeneity issues related to the co-determination of trade and democracy.\footnote{This equation does not affect the estimation of the channel effects (except insofar as efficiency gains are concerned), and could be removed altogether from the system of equations.} Because some endogenous variables also appear as explanatory variables, a number of instruments are included.\footnote{The instruments included in this specification of the model are: log of land area, the log of population, human capital, capital formation, inflation, population growth, log of initial level of income, growth of GDP, manufactures exports, unemployment, ethnic fractionalization, fiscal decentralization, population over 65 and population under 15.} Instrumenting ensures consistency of the estimates, and joint estimation allows for asymptotic efficiency (Wacziarg 1998). A summary of the model specification is shown in Table 2.

**TABLE 2: SUMMARY OF THE MODEL SPECIFICATION**

<table>
<thead>
<tr>
<th>SYSTEM OF EQUATIONS</th>
<th>DEPENDENT VARIABLE</th>
<th>INDEPENDENT VARIABLES (BEYOND THE INTERCEPT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) DEMOCRACY EQUATION</td>
<td>DEMOCRACY</td>
<td>PER CAPITA GROWTH, INEQUALITY, LABOR MOBILITY, MACRO POLICY, SOCIAL SPENDING, GOV CONSUMPTION, SOCIAL CONFLICT, TECH TRANSFERS, DIFFUSION</td>
</tr>
<tr>
<td>(2) TRADE OPENNESS EQUATION</td>
<td>TRADE OPENNESS</td>
<td>DEMOCRACY, INITIAL INCOME, AREA, POPULATION</td>
</tr>
<tr>
<td>(3) CHANNEL VARIABLES EQUATIONS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(A) PER CAPITA GROWTH</td>
<td>GROWTH PER CAPITA</td>
<td>OPENNESS, INITIAL, HUMAN CAPITAL, CAPITAL FORMATION, POPULATION GROWTH, INFLATION</td>
</tr>
<tr>
<td>(B) INEQUALITY</td>
<td>INEQUALITY</td>
<td>OPENNESS, GDP GROWTH, LABOR MOBILITY, INFLATION</td>
</tr>
<tr>
<td>(C) LABOR MOBILITY</td>
<td>LABOR MOBILITY</td>
<td>OPENNESS, GDP GROWTH, UNEMPLOYMENT, MANUFACTURES EXPORTS</td>
</tr>
<tr>
<td>(D) MACRO POLICY QUALITY</td>
<td>MACRO POLICY INDEX</td>
<td>OPENNESS, ETHNIC FRACTIONALIZATION, FISCAL DECENTRALIZATION, INFLATION</td>
</tr>
<tr>
<td>(E) SOCIAL SPENDING</td>
<td>SOCIAL SPENDING</td>
<td>OPENNESS, GDP GROWTH, SHARE OF POPULATION OVER 65, SHARE OF POPULATION UNDER 15</td>
</tr>
<tr>
<td>(F) GOVERNMENT SIZE</td>
<td>GOVERNMENT CONSUMPTION</td>
<td>OPENNESS, AREA, POPULATION, ETHNIC FRACTIONALIZATION</td>
</tr>
<tr>
<td>(G) SOCIAL CONFLICT</td>
<td>SOCIAL CONFLICT</td>
<td>OPENNESS, INEQUALITY, ETHNIC FRACTIONALIZATION</td>
</tr>
<tr>
<td>(H) TECHNOLOGICAL TRANSFERS</td>
<td>TECH TRANSFERS</td>
<td>OPENNESS, LEVEL OF INCOME, INFLATION</td>
</tr>
<tr>
<td>(I) DIFFUSION OF IDEAS</td>
<td>DIFFUSION</td>
<td>OPENNESS, LEVEL OF INCOME, AREA, INFLATION</td>
</tr>
</tbody>
</table>

In order to obtain the coefficients for the total effect of trade openness on democracy via the nine channels, I multiply the respective estimated parameters in the democracy equation by the coefficient for openness in the channel equations. Because this is a non-linear transformation, finding the
standard errors and the t-statistics of the product of two coefficients is not straightforward. To do so, I employ the delta method, which is made possible thanks to the joint estimation of all equations in the system that allows for the retrieval of the covariance matrix for all of the estimated parameters.

The Data

A summary of the sources and the definitions of the variables used in the various equations are presented in Appendix 1. Unfortunately, annual data are not available for some of the variables, which justify the procedure of using five-year averages for each observation (Barro, 1996). For instance, the value for trade openness for Argentina for period 1990-1994 represents the average of all available observations on trade openness in Argentina from 1990 to 1994. Overall, the number of observations amount to 23 countries X 6 time periods.

A word about the measurement of some of the variables is in place. First, measuring the level of trade openness can be a rather controversial issue. The most usual and widely available measure—the sum of imports and exports as a share of GDP— is an outcome variable, which well describes the volume of existing trade and the actual level of integration in world markets. However, it does not adequately capture the policy attitudes and the institutions related to trade. Although policy variables determine outcome variables, they only do so, in a partial manner; an ideal measure of trade would then be an index that would combine elements of both types of variables. As a second-best option, however, I employ the measure of trade flows collected from the World Development Indicators (World Bank, 2002).

Among the various indicators of democracy, this paper employs the polity indicator developed by the Polity IV project (Marshall and Jaggers 2002). This index, which goes from -10 (most autocratic) to +10 (most democratic), is the combination of two weighted indicators—AUTOC and DEMOC— that are supposed to capture the degree of competitiveness of political participation, the openess of executive recruitment, and the constraints on the chief executive (Marshall and Jaggers, 2002: 13). Because it adopts a minimalist definition of democracy and it allows for changes in the level of democracy (rather than a dichotomous definition of regime type), I believe this is a suitable measure for cross-country analysis.

Direct measures of domestic labor mobility such as rates of labor turnover are difficult to find, especially for LACs. In an attempt to fill this gap, I have gathered data from the UN Industrial Statistics Yearbook on inter-industry wage differentials in the manufacturing sectors for the sample of countries
and years used in this paper. Using these data, I calculated the coefficient of variation for wage across manufacturing industries. The reasoning is that when mobility is high, (actual or threats of) movements of labor between industries should equalize the wages across industries, decreasing the values of the coefficient of variation. At the extreme, labor would be perfectly mobile (coefficient of variation equal to zero) if there were no costs involved in moving a worker from one industry to another. It is exactly the possibility of trade flows influencing these costs that justifies the use of labor mobility as a channel variable in evaluating the impact of trade on democracy. The next step was to rank the countries according to the decile of the coefficient of variation. The first decile received a 10, signaling higher levels of labor mobility, while the last decile received a 1. The use of deciles avoids the normative judges of what a flexible labor market is; the definition of what constitutes more or less mobility is given by the relative position of a country as compared to its counterparts in the region.

Similarly, the macroeconomic policy quality index is a ranking of LACs according to two components: the ratio of central government budget deficit to GDP and a measure of inflationary tendencies (equal to the difference between the growth rate of one of the definitions of money supply M2 and the growth rate of real GDP). Each country is first ranked according to each component ranging from 1 to 10 with higher numbers given for better policies (low deficit and low excess money supply). These numbers are then summed up for a total macroeconomic policy index ranging from 2 (least sound) to 20 (most sound macroeconomic policy). All of the data used for the construction of this index came from the World Bank’s World Development Indicators (2002).

In order to create the indicator of social conflict, I employ three variables taken from the Arthur Banks’ Cross-National Time-Series Data Archive (2002): the number of general strikes, riots and anti-government demonstrations. The indicator is the simple sum of these three variables. Higher numbers are a sign of high levels of social unrest and conflict. It is interesting to reiterate that I am interested in evaluating the effect of trade on forms of conflict that are less violent than civil wars, revolutions, and guerrilla warfare.

Finally, two indicators are used to capture the diffusion of technology and ideas. The net inflow of foreign direct investment (World Bank’s World Development Indicators, 2002) is used as a proxy for the transfer of technology. The idea is that in order to set up a plant of production in the host country, firms need to import capital goods and some degree of know-how and expertise. As a measure of the diffusion of ideas, I use the proportion

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20 Ideally, I would like to compile measures of profit rates across industries in order to construct a measure of inter-industry capital mobility. So far, I have not been able to find those measures.

21 These costs are a function of a series of economic and political variables, including labor market regulations, geographic dispersion of industries, and the costs of communication and transportation.
of bordering countries that are classified as democracies by the Cheibub and Gandhi (2004) dataset in a given year. Cuba, Dominican Republic, Haiti, Jamaica and Trinidad and Tobago are considered to be “bordering” countries. Appendix 2 provides the summary statistics for each variable.

**IV. Results**

Appendix 3 presents the 3SLS estimates for the entire system of equations. Table 3 summarizes the results for the effect of the various channels on democracy (column 1), the impact of openness on the channels (column 2), as well as the corresponding non-linear transformations of the estimated parameters (column 3). For instance, focusing on the estimates for government size, the product of the coefficients in columns 1 and 2 provides the effect of trade openness on democracy via the size of government (.099). Because all of the coefficients are estimated jointly (within the simultaneous equation framework), we are able to specify the relative importance of each channel and their statistical significance.

<table>
<thead>
<tr>
<th>CHANNEL</th>
<th>EFFECT OF CHANNEL ON DEMOCRACY</th>
<th>EFFECT OF TRADE OPENNESS ON CHANNEL</th>
<th>EFFECT OF TRADE OPENNESS ON DEMOCRACY</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECONOMIC GROWTH</td>
<td>105.109**</td>
<td>-.000</td>
<td>-.009</td>
</tr>
<tr>
<td></td>
<td>(42.285)</td>
<td>(.000)</td>
<td>(.027)</td>
</tr>
<tr>
<td>INEQUALITY</td>
<td>-.852***</td>
<td>-.079</td>
<td>.068</td>
</tr>
<tr>
<td></td>
<td>(.180)</td>
<td>(.056)</td>
<td>(.049)</td>
</tr>
<tr>
<td>LABOR MOBILITY</td>
<td>-1.634***</td>
<td>.031*</td>
<td>-.051*</td>
</tr>
<tr>
<td></td>
<td>(.458)</td>
<td>(.017)</td>
<td>(.031)</td>
</tr>
<tr>
<td>MACROECONOMIC POLICY QUALITY</td>
<td>-.269</td>
<td>.041</td>
<td>-.011</td>
</tr>
<tr>
<td></td>
<td>(.276)</td>
<td>(.044)</td>
<td>(.016)</td>
</tr>
<tr>
<td>SOCIAL SPENDING</td>
<td>-.482**</td>
<td>.078***</td>
<td>-.038</td>
</tr>
<tr>
<td></td>
<td>(.245)</td>
<td>(.028)</td>
<td>(.024)</td>
</tr>
<tr>
<td>GOVERNMENT SIZE</td>
<td>.780**</td>
<td>.127***</td>
<td>.099*</td>
</tr>
<tr>
<td></td>
<td>(.308)</td>
<td>(.045)</td>
<td>(.053)</td>
</tr>
<tr>
<td>SOCIAL CONFLICT</td>
<td>-1.834***</td>
<td>-.016</td>
<td>.030</td>
</tr>
<tr>
<td></td>
<td>(.369)</td>
<td>(.019)</td>
<td>(.036)</td>
</tr>
<tr>
<td>TECHNOLOGY TRANSMISSIONS</td>
<td>.567</td>
<td>-.006</td>
<td>-.003</td>
</tr>
<tr>
<td></td>
<td>(.385)</td>
<td>(.022)</td>
<td>(.013)</td>
</tr>
<tr>
<td>DIFFUSION OF DEMOCRATIC IDEAS</td>
<td>-5.640</td>
<td>.000</td>
<td>-.004</td>
</tr>
<tr>
<td></td>
<td>(4.714)</td>
<td>(.004)</td>
<td>(.022)</td>
</tr>
<tr>
<td>TOTAL EFFECT</td>
<td></td>
<td></td>
<td>0.081</td>
</tr>
</tbody>
</table>

*p-value<.10; **p-value<.05; ***p-value<.01

22 This effect is statistically significant at the 90% level of confidence.
While trade openness contributes negatively for democracy through seven out of the nine channels, its net impact is positive (albeit not statistically significant). With the exception of government size and labor mobility, all other channels are statistically insignificant, meaning that we cannot affirm that level of trade openness matters for democracy via those channels. That is a surprising result in light of the importance that international trade has recently received in the discussions about the effects of globalization for both economic growth and democracy.

Yet, it is interesting to discuss the results for labor mobility and government size. As shown in Table 3, openness is associated with and increase in labor mobility, which in turn is associated with a decrease in level of democracy. As mentioned in section II, higher levels of labor mobility are correlated with broad-based patterns of political coalition along class lines (Hiscox, 2002). Class conflict can be a disruptive force in politics, especially because it produces important fluctuations in economic (and other redistributive) policy as different classes alternate in governmental positions. Put it differently, class conflict generates a sort of instability in distributive policy outcomes, which do not constitute a fertile ground for democracy.

Such instability can be mitigated, however, with a large public sector and governments’ willingness to provide compensation (in the form of training for dislocated workers for example) and assistance to those adversely affected by international exposure. It should be no surprise then that the effect of trade on democracy via government size is positive and statistically significant at the 90% level of confidence (this result resonates with Rodrik, 1998). Taken together, these results suggest that the nature of the overall impact of trade integration on democracy hinges upon governments’ decision about the size of the public sector. As a suggestion for future research, it would be interesting to test whether or not the prospects for democratic governance are impaired when countries present high levels of trade openness and small government size, holding everything else constant.

In addition, it is worth mentioning that the fact that the impact of trade openness on democracy via both economic growth and inequality is statistically insignificant does not provide empirical support to the claims that the benefits of trade occur through more efficient allocation of resources. This finding does not resonate with some important works in the literature such as Lipset (1994), which compels us to conduct further investigation of

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23 Examples of this type of policy include exchange-rate policy, industrial policy, tax incentives, labor laws and immigration regulations.

24 See Adsera and Boix (2002) for an excellent review of the relationship between trade, democracy and the size of the public sector.

25 In a paper presented at the annual conference of the International Studies Association (2004), Hiscox and Kastner present some preliminary evidence that supports this hypothesis: trade openness interacted with a measure of size of government makes democratic breakdown (or failure) more likely.
the link between trade, growth/inequality, and regime type within the Latin American domain.

Indeed, all of these results should be taken with a grain of salt. Admittedly, the quality of the data (especially concerning inequality) is doubtful. Further efforts to collect better data and conduct tests of robustness with different model specifications, variable measurements, and estimation methods are needed. This paper is a first attempt to systematically understand the costs and benefits of openness to LACs, while empirically testing some compelling theoretical arguments regarding the link trade integration and democracy.

Finally, it should be noted that there is no evidence of reverse causation. Although the coefficient for democracy in the openness equation is negative, its effect is statistically insignificant, meaning that we cannot affirm that the contemporaneous level of democracy affects the level of trade openness observed in Latin America.
Conclusions

Two main observations motivated this paper. First, the theoretical literature holds conflicting expectations regarding the effect of trade openness on levels of democracy. Second, the channels through which integration in world markets is supposed to affect democracy have yet to be empirically tested. In employing a system of simultaneous equations in a panel of 23 Latin American countries between 1970 and 1999, I attempted to provide an answer (at least, a first shot at it!) to some of the lingering questions regarding the relationship between trade and regime type. While the overall direct impact of trade openness on democracy is not statistically significant, integration in world markets affects democracy indirectly through two main channels: labor mobility (negatively) and size of government (positively).

Some relevant implications follow from this analysis:

- International trade does not necessarily spur enough economic growth or social transformations to ensure continued public support for democratic regimes. Trade openness is neither a sufficient nor a necessary condition for democratic governance. As scholars and policymakers look for ways to increase both the quality of democracy and the chances of regime survival in the region, international trade cannot be taken as a universal panacea for all problems that impair democratic institutionalization in the region. Most importantly, international actors should not rely on a “one-size fits all” prescription of trade openness as an effective instrument to guarantee continued public support for a democratic regime.

- At most, openness to trade intensifies labor mobility and class conflict, which require an enlargement of the public sector in order to ensure that a stable pattern of compromise can be achieved across broad class coalitions.

- Ultimately, a strong case emerges for extensive forms of compensation and adjustment assistance to those losers of the liberalization process. These programs would enable them to respond to shocks in the international economy in more efficient and nonpolitical ways.

- The benefits and costs of openness have to be carefully measured. The fact that much of the impact of trade on democracy is negative (albeit not statistically significant) reminds us that trade is not always beneficial and that it entails some serious re-distributive costs.
# Appendix

## APPENDIX 1

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>DEFINITION</th>
<th>SOURCES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trade openness</td>
<td>Trade is the sum of exports and imports of goods and services measured as a share of real gross domestic product</td>
<td>Alan Heston, Robert Summers and Bettina Aten, Penn World Table 6.1 available at <a href="http://pwt.econ.upenn.edu/">http://pwt.econ.upenn.edu/</a></td>
</tr>
<tr>
<td>Log initial level of income</td>
<td>Log of real GDP per capita, chain index</td>
<td>Alan Heston, Robert Summers and Bettina Aten, Penn World Table 6.1 available at <a href="http://pwt.econ.upenn.edu/">http://pwt.econ.upenn.edu/</a></td>
</tr>
<tr>
<td>Log level of income</td>
<td>Log of real GDP per capita, chain index, for the beginning year under consideration</td>
<td>Alan Heston, Robert Summers and Bettina Aten, Penn World Table 6.1 available at <a href="http://pwt.econ.upenn.edu/">http://pwt.econ.upenn.edu/</a></td>
</tr>
<tr>
<td>Growth per capita</td>
<td>Change in the log of real GDP per capita (five year average)</td>
<td>Alan Heston, Robert Summers and Bettina Aten, Penn World Table 6.1 available at <a href="http://pwt.econ.upenn.edu/">http://pwt.econ.upenn.edu/</a></td>
</tr>
<tr>
<td>GDP growth</td>
<td>Percentage growth rate of real GDP</td>
<td>World Bank, World Development Indicators (2002)</td>
</tr>
<tr>
<td>Inequality</td>
<td>Gini coefficients ranging from 0 (most equal) to 100 (most unequal)</td>
<td>UNU/WIDER World Income Inequality Database (WIID, 2005) available at <a href="http://www.wider.unu.edu/wiid/wiid.htm">http://www.wider.unu.edu/wiid/wiid.htm</a></td>
</tr>
<tr>
<td>Labor mobility</td>
<td>Index constructed ranking countries according to deciles of coefficient of variation for wages per worker in manufacturing industries: 1 (least mobile) – 10 (most mobile)</td>
<td>United Nations, Industrial Statistics Yearbook (various years)</td>
</tr>
<tr>
<td>Macroeconomic policy quality</td>
<td>Index constructed in two-steps: (1) ranking countries according to deciles of (a) overall budget balance of central government and (b) excess money growth (defined as the difference between the growth rate of M2 and the growth rate of real GDP); the indicator for each component ranges from 1 (low deficit and low excess money growth) to 10. (2) add the numbers given to each of the two components. The overall index ranges from 2 (low macroeconomic policy quality) to 20 (high quality)</td>
<td>World Bank, World Development Indicators (2002), CD-ROM.</td>
</tr>
<tr>
<td>VARIABLE</td>
<td>DEFINITION</td>
<td>SOURCES</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Social spending</td>
<td>Social spending (sum of expenditures on education, health and social security) as a percentage of GDP</td>
<td>Robert Kaufman and Alex Segura-Uberiego (2001)</td>
</tr>
<tr>
<td>Government size</td>
<td>General government final consumption expenditure (general government consumption) as a percentage of GDP; includes all government current expenditures for purchases of goods and services (including compensation of employees)</td>
<td>World Bank, World Development Indicators (2002), CD-ROM.</td>
</tr>
<tr>
<td>Technology transfers</td>
<td>Net foreign direct investment (FDI) inflows as a percentage of GDP: net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments</td>
<td>World Bank, World Development Indicators (2002), CD-ROM.</td>
</tr>
<tr>
<td>Diffusion of ideas</td>
<td>Percentage of bordering countries that are democracies as classified by Cheibub and Gandhi (2004). In this paper, Cuba, Dominican Republic, Haiti, Jamaica, and Trinidad and Tobago were considered bordering countries</td>
<td>Cheibub and Gandhi (2004)</td>
</tr>
<tr>
<td>Log area</td>
<td>Log of land area (in square kilometers): a country’s total area, excluding area under inland water bodies, national claims to continental shelf, and exclusive economic zones</td>
<td>World Bank, World Development Indicators (2002), CD-ROM.</td>
</tr>
<tr>
<td>Log population</td>
<td>Log of total population</td>
<td>World Bank, World Development Indicators (2002), CD-ROM.</td>
</tr>
<tr>
<td>Human capital</td>
<td>Secondary School enrollment ratio (gross): the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the secondary level of education</td>
<td>World Bank, World Development Indicators (2002), CD-ROM.</td>
</tr>
<tr>
<td>Share of</td>
<td>Percentage of total population with</td>
<td>World Bank, World Development Indicators (2002), CD-ROM.</td>
</tr>
<tr>
<td>VARIABLE</td>
<td>DEFINITION</td>
<td>SOURCES</td>
</tr>
<tr>
<td>----------</td>
<td>------------</td>
<td>---------</td>
</tr>
<tr>
<td>population over 65</td>
<td>ages 65 and above</td>
<td>Indicators (2002), CD-ROM.</td>
</tr>
<tr>
<td>Share of population under 15</td>
<td>Percentage of total population with ages 15 and under</td>
<td>World Bank, World Development Indicators (2002), CD-ROM.</td>
</tr>
<tr>
<td>Capital formation</td>
<td>Gross capital formation (also known as gross domestic investment) as percentage of GDP: consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories</td>
<td>World Bank, World Development Indicators (2002), CD-ROM.</td>
</tr>
<tr>
<td>Unemployment</td>
<td>Share of the labor force that is without work but available for and seeking employment</td>
<td>World Bank, World Development Indicators (2002), CD-ROM.</td>
</tr>
<tr>
<td>Manufactures exports</td>
<td>Percentage of merchandise exports that are manufactures</td>
<td>World Bank, World Development Indicators (2002), CD-ROM.</td>
</tr>
<tr>
<td>Fiscal decentralization</td>
<td>Sub-national Expenditures as a percentage of total expenditures</td>
<td>International Monetary Fund, Government Finance Statistics (GFS, 2001)</td>
</tr>
<tr>
<td>Inflation</td>
<td>Inflation as measured by the consumer price index</td>
<td>World Bank, World Development Indicators (2002), CD-ROM.</td>
</tr>
</tbody>
</table>

**APPENDIX 2**

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>NO. OF OBSERVATIONS</th>
<th>MEAN</th>
<th>STD. DEVIATION</th>
<th>MINIMUM</th>
<th>MAXIMUM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Democracy</td>
<td>138</td>
<td>2.194</td>
<td>6.590</td>
<td>-9.8</td>
<td>10</td>
</tr>
<tr>
<td>Trade openness</td>
<td>135</td>
<td>57.093</td>
<td>32.874</td>
<td>12.700</td>
<td>215.469</td>
</tr>
<tr>
<td>Growth per capita</td>
<td>134</td>
<td>.008</td>
<td>.028</td>
<td>-.060</td>
<td>.118</td>
</tr>
<tr>
<td>Inequality</td>
<td>99</td>
<td>49.743</td>
<td>7.553</td>
<td>27</td>
<td>68.2</td>
</tr>
<tr>
<td>Labor mobility</td>
<td>103</td>
<td>5.304</td>
<td>2.632</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Macroeconomic policy quality</td>
<td>107</td>
<td>10.196</td>
<td>3.575</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>Social spending</td>
<td>77</td>
<td>8.071</td>
<td>4.725</td>
<td>2.658</td>
<td>23.519</td>
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<tr>
<td>Government size</td>
<td>130</td>
<td>12.329</td>
<td>4.844</td>
<td>4.360</td>
<td>32.844</td>
</tr>
<tr>
<td>Social conflict</td>
<td>138</td>
<td>1.581</td>
<td>1.568</td>
<td>0</td>
<td>7.6</td>
</tr>
<tr>
<td>Technological transfers</td>
<td>132</td>
<td>1.709</td>
<td>2.432</td>
<td>-2.515</td>
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