Trade Openness, Conflict Risk and Income Inequality

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Abstract

This paper investigates the effect of trade openness on income inequality, and shows how this effect is shaped by the presence of conflicts. I argue that income-generating activities controlled by the rich expand during conflicts, whereas those controlled by the poor contract. I find that trade openness leads to greater income inequality in countries where the risk of conflicts is high. Moreover, income inequality is directly affected by conflicts, and is higher in more ethnically diverse countries and lower under democratic regimes. The econometric analysis suggests that these effects are robust to a wide range of economic and institutional factors.

Keywords: Trade Openness, Conflict Risk, Income Inequality, Institutional Quality, Military in Politics.

JEL Classifications: D6, F1, H7, P4.

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1. Introduction

This paper examines the effect of trade openness on income inequality and how this effect is shaped by the presence of conflict. A large literature exists on the relationship between trade openness and income inequality. The first group of studies, in line with the Heckscher-Ohlin (HO) prediction, finds a negative relationship between trade openness and income inequality (Bourguignon and Morrisson, 1990; Calderon and Chong, 2001; Dollar and Kraay, 2002). The second group draws the opposite conclusion; namely, that trade openness increases income inequality (Barro, 2000; Ravallion, 2001; Lundberg and Squire, 2003; Milanovic and Squire, 2003). Finally, the third group finds no empirical evidence of any effect of trade openness on income inequality (Edwards, 1997; Li et *al.*, 1998).

In this paper, I contend that this mixed empirical evidence likely arises because prior studies have ignored the existence of conflicts, which may affect the environment in which countries are called upon to open their economies. I argue that an accurate assessment of the effect of greater trade openness on income inequality must account for the conflict risk occurring in developing countries, and suggest two mechanisms by which conflict risk may mediate the relationship between trade openness and income inequality.

First, conflict risk may affect the structure of the economy. According to the literature on the political economy of conflict, economic activities can be classified into three main groups: war-invulnerable activities, war-vulnerable activities such as construction, transport, distribution, finance and manufacturing, and an unclassified group that includes other activities. Thus, during conflict, while war-vulnerable activities may contract, war-invulnerable activities can expand relative to GDP (Collier, 1999). In war-affected countries, farmers often lose their access to markets and the ability to profit from market exchange (Bircan et *al.*, 2010). For example,

Deininger (2003) finds that persistent civil conflict in Uganda during the 1990s reduced agricultural investments, leading to a shift of economic activities towards subsistence and less integration into the market. Furthermore, McKay and Loveridge (2005) exploit national representative surveys that provide the sources of income among agricultural households in Rwanda. They find that, after the 1994 genocide period, the poorest groups were unable to derive benefits from agricultural commercialization because they were pulled out of the markets, leading to a decrease in agricultural income for many rural households. They argue that this income reduction can be one driver of increasing inequality in rural areas. Second, conflict risk may act as a factor that shifts a redistribution of the gains from trade towards connected and well-informed people, and then exacerbates income inequality of already poor groups. This happens because if fragile countries characterised by higher risk of conflict attempt to increase their openness to trade, it may favor a minority of people close to a regime in power by concentrating all the gains generated by the trade openness.

Studying conflict risk and its effects is even more important, since the number of countries engaged in conflicts has increased significantly over the past two decades, reaching more than 20 percent during the 1990s (Blattman and Miguel, 2010). Most of those conflicts occurred in Sub-Saharan Africa (34) and Asia (33), followed by North Africa and the Middle East (17), Latin America (15), Eastern Europe, and the former Soviet Union (13) (Fearon and Laitin, 2003).

I begin by assessing the effects of both trade openness and conflict risk on income inequality. I refer to this model as the additive model. I then move on by showing that the effect of trade openness may depend on the level of conflict risk. The objective of this process is to capture the interaction effect on income inequality after controlling for a wide range of

macroeconomic, demographic and institutional variables, and a model to which I refer as the interactive model.

This study departs from the previous papers that proxy civil wars as internal conflicts that count for more than 1,000 battle deaths in a single year (Collier and Hoeffler, 2004; Bircan et *al.*, 2010), and civil conflicts as those counting 25 battle deaths per annum (Blattman and Miguel, 2010), as I view this approach as too restrictive and likely to underestimate the real effects of conflict on income inequality. This issue has been recently raised by Esteban and Ray (2011):

> '...But social conflict need not manifest itself in civil war alone, and there are various other measures (that incorporate, for instance, strikes, demonstrations, riots, assassinations, political prisoners, and the like)', Esteban and Ray (2011, p. 1368).

Instead, I use two variables - internal and external conflict risk - drawn from the Political Risk Services/International Country Risk Guide (PRS/ICRG) database, which captures a wider concept of conflict risk. For instance, internal conflict risk, which is an assessment of an armed or political violence and civil opposition to the government, includes not only civil war/coup threat and terrorism/political violence, but also civil disorder. External conflict risk captures war, cross-border conflict, and foreign pressures, including the risk to the incumbent government from foreign action through both non-violent external pressure (e.g., diplomatic pressures, trade restrictions, sanctions, withholding of aid) and violent external pressure (ranging from cross-border conflicts to all-out war). Note, however, that internal conflict risk can be local, and may not affect all of a country's economic activities.

I use a sample of 39 developing countries[1] to empirically examine the effects of trade openness, conflict risk and their interaction on income inequality. I start the estimations by

[1] Lundberg and Squire (2003) used a panel of 38 countries to analyse the simultaneous relationship between inequality and growth. Spilimbergo et *al.* (1999) used a panel of 34 countries to find that the effects of trade openness on inequality can be influenced by factor endowments, and Ravallion (2001) used a panel of 50 developing countries to show the correlation between growth, inequality and poverty.

applying the biased-corrected Least Squares Dummy Variable estimator (LSDVC), as suggested by Kiviet (1995) and Bruno (2005), to eliminate unobserved individual heterogeneity. It is particularly suitable for small samples and appropriate to unbalanced panel data. I deal with the endogeneity issues of some explanatory variables such as conflict risk and trade openness by using the System-Generalised Method of Moments (Sys-GMM) dynamic panel-data estimation technique suggested by Blundell and Bond (1998). This technique allows the instrumentation of endogenous variables by their lagged values.

The empirical results suggest the existence of a threshold effect; that is, the impact of trade openness on income inequality depends on the level of conflict risk. More precisely, trade openness worsens income inequality in countries where the risks of internal and external conflicts are high, but decreases inequality when the risks are low. The results also suggest a non-monotonous relationship between income inequality and conflict risk, indicating that countries with higher risk of external and internal conflicts are more unequal. Furthermore, I find consistently that the coefficient related to the lagged dependent variable is always positive and significant. This suggests the presence of high persistence in income inequality. While ethnic tensions appear to increase income inequality, democratic regimes are more egalitarian.

The remainder of the paper is organised as follows. Section 2 lays out a literature review of relevant theoretical and empirical studies. Section 3 presents an econometric strategy by describing the data and the methodology employed to test the main hypotheses of the paper, and to discuss endogeneity issues. The results are reported in Section 4. In Section 5 the robustness of the results is checked by including some additional control variables such as institutional quality, ethnic tensions, natural resource abundance, and financial development variables. Section 6 concludes.

2. Literature Review

2.1. *Trade Openness and Income Inequality*

The traditional model employed by researchers to study the distributional effect of greater openness on income inequality is the Heckscher-Ohlin (HO) model. As reported in Anderson (2005), the model predicts that in developing countries, greater openness boosts the demand for unskilled relative to skilled labor, which raises the wages of unskilled laborers and their share of national income relative to skilled labor. This decreases overall income inequality because unskilled labor is more equally distributed than skilled labor. One of the problems is that the outcomes of the HO model are based on many restrictive assumptions that are far from the real world (Meschi and Vivarelli, 2009).

A number of papers, departing from some of the main assumptions of the HO model, find interesting additional results that contradict or are in conflict with the standard prediction. For instance, Leamer (1987) used a *3-n* model where there are three factors of production (capital, labor and land) and *n* goods produced by allowing the inclusion of natural resources into the model, and showed that greater openness may increase income inequality in developing countries that have relatively abundant supplies of those resources. The argument is that greater openness will raise the relative returns to natural resources that are less equally distributed than other assets. Furthermore, one of the main hypotheses of the HO theory is that all countries have equal access to the best available production technology. In Pissarides (1997), this assumption is relaxed, and this study finds that greater openness to technology may well increase the relative demand for skilled labor, even in developing countries. The reason is that learning and adapting to a new technology always requires the use of skilled laborers, whose wages rise. In line with

Pissarides (1997), Feenstra and Hanson (1999) find that the wage gap between skilled and unskilled workers in developing countries increases if globalization is characterised by the transfer of production technology from developed to developing countries.

Other empirical studies on the distributional effect of trade openness find that trade openness increases income inequality (Barro, 2000; Lundberg and Squire 2003). Barro (2000) studies a relationship between inequality and growth and uses a panel of countries to estimate a Kuznets curve. After adding an interaction term between the openness ratio and the per capita GDP, Barro finds that the inequality increasing effect of trade openness is most pronounced in poor countries. Lundberg and Squire (2003), simultaneously estimating the evolution of growth and inequality, find that trade liberalization goes along with higher income inequality.

However, other empirical papers support the prediction of the HO model by asserting a decrease in income inequality after trade openness (Bourguignon and Morrisson, 1990; Calderon and Chong, 2001; Dollar and Kraay, 2002). In a cross-sectional analysis, the empirical findings of Bourguignon and Morrisson (1990) suggest that differences in income inequalities within developing countries are determined by the endowments in mineral resources, trade protection and land concentration in agricultural exports. They obtain a significant and large effect of comparative advantages and the foreign trade structure on income inequality. Using a panel of countries, Calderon and Chong (2001) find that an increase in the volume of trade leads to a long-run decline in income inequality.

Alternatively, other scholars show that the effects of trade on income inequality are contingent upon the level of countries' factor endowments. Spilimbergo et *al.* (1999) find that the link between trade liberalization and income inequality depends on the level of human capital

and arable land per capita. They found that trade openness reduces income inequality in capital-abundant countries, whereas it increases it in skill-abundant countries.[2]

Finally, several studies do not find any significant and systematic impact of trade openness on income inequality (Edwards, 1997; Li et *al.*, 1998). The next section reviews studies that focus on the relationship between conflict and income inequality.

2.2. *Conflict Risk and Income Inequality*

Most of the studies related to the link between conflict and income inequality have analysed the effect of income inequality on the conflict. Cross-sectional analysis suggests that horizontal inequality, defined as inequality between ethnic groups or regions, positively and significantly affects conflict (Ostby, 2008). Furthermore, in their econometric analysis of complex humanitarian emergencies (defined as human-made crises leading to physical violence, displacement, hunger and disease); Auvinen and Nafziger (1999) find that high income inequality is associated with emergencies.

However, a number of authors find no significant correlation between income inequality and the likelihood of conflict (Fearon and Laitin, 2003; Collier and Hoeffler, 2004). Collier and Hoeffler (2004) develop an econometric model predicting the outbreak of civil conflict, and conclude that income inequality has no explanatory power on the risk of civil conflict.

Recently, Bircan et *al.* (2010) analyse the potential relationship between conflict and income inequality in the other direction. They use a cross-country panel data to estimate war-related changes in income disparities, and determine that violent conflict not only increases income inequality, but that it is further reinforced in the first post-conflict years. While this paper

[2] Fischer (2001) has also tested his theoretical *2x2* factor abundance model related to the dynamic effects of trade liberalization on income distribution and found that the outcomes of trade openness on inequality are based on whether the country is land-abundant or capital-abundant.

has many interesting results, it does not account for the interaction effect between trade openness and conflict in the analysis of the distributional impact of conflict on income inequality.

2.3. *Trade Openness and Conflict*

Several studies explicitly examine the link between conflict and trade openness (e.g., Oneal and Russet, 1999; Hegre et *al.*, 2010), specifically asking whether conflicts influence the volume of goods and services traded in countries, or whether conflicts are the consequence of trade openness. Evidence on these two issues yields mixed results. A first series of papers finds that trade has important benefits by significantly reducing the likelihood of conflict between commercial partners (Oneal and Russett, 1999). While using a game-theoretic model of conflict to argue that trade prevents conflict because of the possible loss of trade gains, Morrow (1999) finds that the effect of trade flows on the initiation and escalation of international conflict is indeterminate. More recently, Hegre et *al.* (2010) adopt a simultaneous analysis to capture the reciprocal effects between trade and conflict, and show that trade promotes peace, while conflict reduces commerce.

Nonetheless, other studies, following Oneal and Russett (1999), have argued that there is no significant correlation between trade openness and conflict (Fearon and Laitin, 2003).

It follows from these literatures that no study has looked at the presence of conflict risk as a factor affecting the effect of trade openness on income inequality. To better understand the effect of trade openness on income inequality in developing countries, it makes sense to analyse whether the interaction effect between trade openness and conflict risk influences income inequality. To the best of my knowledge, this is the first study to analyse the interaction effect of trade openness and conflict risk on income inequality. By doing so, I deliver new insightful

results that allow to fill the gap in the literature on the distributional effect of trade openness on income inequality.

3. Empirical Analysis

3.1. *Model Specification*

Following Asiedu and Lien (2011), Michaud and Soest (2008), Meghir and Pistaferri (2004), and Calderon and Chong (2001) who use similar dynamic panel data model, I estimate the Equation (1) in order to test whether the impact of trade openness on income inequality depends on the level of external conflict risk and internal conflict risk.

$$EHII_{it} = \gamma_0 + \gamma_1 EHII_{it-1} + \gamma_2 TO_{it} + C_{it}\gamma_3 + (TO_{it} * C_{it})\gamma_4 + X_{it}^{'}\gamma_5 + \phi_{it} \quad (1)$$

where:

$\phi_{it} = \phi_i + \tau_{it}$, i and t represent the country and time period dummies, respectively; ϕ_i is the idiosyncratic individual and time invariant country effect and τ_{it} represents the usual error term.

3.1.1. *Dependent variable: estimated household income inequality (EHII)*

EHII is an index ranging from 0 to 100, with 0 corresponding to complete equality and 100 corresponding to complete inequality. It is drawn from the University of Texas Inequality Project (UTIP) database built by Galbraith and Kum (2003). They use the United Nations International Development Organization's (UNIDO) data source to compute the between-group component of the Theil's T-statistic as a measure of inequality and the corresponding database is called the UTIP-UNIDO data set. The EHII is then computed by combining the information provided by the Deininger and Squire (1996) data with the UTIP-UNIDO database. Even though the Deininger and Squire (1996) data are the standard reference for inequality studies, as argued by

Meschi and Vivarelli (2009), the coverage of their data is sparse and comes from different sources, leading to a variety of income and population definitions. Also, Atkinson and Brandolini (2001) point out that the differences in definitions may be quantitatively important and note that their preference calls for the alternative approach allowing for the use of data sets where the observations are as consistent as possible. Thus, the EHII, offering information that covers the period 1963-1999, has been constructed to account for serious data inconsistency and problems of comparability. In this paper, due to the availability of data for some variables, I restrict the sample to 39 developing countries during the period 1984-1999.[3]

3.1.2. *Independent variables*

TO, the trade openness variable measured as the ratio of exports plus imports to Gross Domestic Product (GDP), is used in this analysis, following Barro (2000).

C refers to a vector of external conflict risk (EC) and internal conflict risk (IC).[4] As described earlier, these two variables capture the risk of the incumbent government facing external and internal conflicts. For internal conflict risk, a maximum of four points and a minimum of 0 points are assigned to each subcomponent. The index of internal conflict risk is the sum of the scores of the three subcomponents, and ranges from 0 (very high risk of internal conflict) to 12 (very low risk of internal conflict), corresponding to countries where there is no armed or civil opposition to the government and the government does not indulge in arbitrary violence against its own people. The external conflict risk also ranges from 0 to 12. The highest

[3] The choice of this period is motivated by the fact that the estimated household income inequality database ends in 1999 and the data on internal and external conflict risks drawn from the ICRG database are available from 1984.
[4] Gupta et *al.* (2009) use this index to account for the role of non-economic factors in financial development among low-income countries. Recently, internal and external conflicts have also been used by Asiedu and Lien (2011) in their paper analyzing the interaction effect of natural resources and democracy on foreign direct investments (FDI).

rating, corresponding to a very low risk of external conflict, is assigned to countries where there are no wars, cross-border conflicts, or foreign pressures.

*TO*C* are the interaction terms between trade openness and external conflict risk *(TO*EC)* and internal conflict risk *(TO*IC)*.

X denotes a set of some control variables found in previous studies that can affect income inequality and includes:

GDPpc, the Gross Domestic Product per capita, captures the stage of economic development. Data are drawn from the World Development Indicators (WDI) database (World Bank, 2006).

Inflation rate, defined as the annual percentage change in the consumption price index, is included to apprehend the fluctuations of economic activities, which are likely to affect income inequality. A number of papers find that higher inflation is associated with higher income inequality (Lundberg and Squire, 2003; Gourdon et *al.*, 2008).

Population aged 65 and above (% of total population) is incorporated into the model, following Deaton and Paxson (1997), to capture the age structure of the population. This variable may affect income inequality, since it is argued that a higher elderly population suggests lower productivity, lower savings rates, and smaller intergenerational transfer of income.

Educational Attainment refers to gross enrollment of secondary education and is drawn from the Barro and Lee (2000) database. It measures the average number of years of secondary schooling and is included in the model to control for the effect of human capital on income inequality. A negative coefficient is anticipated.

I also include *Military in Politics* in the model. It summarises the degree of military participation in politics, and is drawn from the PRS/ICRG database. It ranges from 0 (indicating

that the level of military participation in politics is higher, leading to a higher level of political risk) to 6 (indicating that the level of political risk is very low). It may affect income inequality because a predominant military presence in politics can increase the defense budget and reduce the level of allocations attributable to social programs.

To check the robustness of the results, I use a set of variables such as institutions (corruption and democracy) and ethnic tensions that is drawn from the PRS/ICRG database, and a financial development variable proxied by liquid liabilities (M_3) as a percentage of GDP, which is drawn from the World Development Indicators (WDI) database of the World Bank (2006). Liquid liabilities, considered as the broadest measure of financial intermediation, are the sum of currency and deposits in the central bank (M_0) plus deposits, demand and interest of non-bank financial intermediaries (M_1 and M_2). Natural resource abundance, which is the sum of ores, metal and fuel exports as a percentage of merchandise exports, is also included in the model. It is provided by the World Development Indicators (WDI) database, World Bank (2006).[5] Table 1 summarises descriptive statistics of the data used in this analysis.

Now, to assess the marginal effect of trade openness on income inequality, the interactive model (Equation 1), which incorporates the interaction term, is used. This effect is computed by deriving the partial derivative of Equation 1 with respect to trade openness:

$$\frac{\partial EHII_{it}}{\partial TO_{it}} = \gamma_2 + C_{it}\gamma_4$$

This equation tells us that the estimated impact on income inequality due to a change in trade openness amounts to the estimated coefficient of trade openness γ_2, the product of the coefficient of the interaction between trade and conflict risk γ_4, and the level of conflict risk. If

[5] For more detailed information about variables, see: http://data.worldbank.org/indicator.

the effects of trade openness on income inequality are conditional to the level of conflict, the estimated coefficients γ_2 and γ_4 must be of opposite signs and the threshold level should belong to the interval (0, 12). The same analysis can be done for the marginal effect of conflict risk on income inequality through the following expression:

$$\frac{\partial EHII_{it}}{\partial C_{it}} = \gamma_3 + \gamma_4 TO_{it}$$

3.2. *Estimation Strategy*

In this section, I briefly describe the first estimation method used, namely, the bias-corrected Least Squares Dummy Variable (LSDVC) estimation technique, based on Kiviet (1995), which is extended by Bun and Kiviet (2003) and Bruno (2005). For simplicity, I rewrite the dynamic panel data model expressed in Equation 1 as follows:

$$y_{it} = \gamma y_{it-1} + X_{it}^{'}\beta + \eta_i + \varepsilon_{it}$$

Where y_{it} is the dependent variable, X_{it} is a set of explanatory variables, η_i is an unobserved individual effect, and ε_{it} is an unobserved white noise disturbance.

The model can compactly be written as:

$y = W\delta + D\eta + \varepsilon$ with $W = \left[y^{(-1)} \mid X \right]$ and $\delta^{'} = (\gamma, \beta^{'})$ and W is the matrix of explanatory variables and lagged dependent variable, D is the (NTxN) matrix of individual dummies, δ is the (kx1) vector of coefficients, η is the (Nx1) vector of individual effects, and ε is the (NTx1) vector of disturbances. The LSDV estimator of η, which is also often indicated as the fixed effect or the within-group estimator is:

$$\hat{\delta} = (W^{'}AW)^{-1}W^{'}Ay$$

where A is the within transformation matrix that gets rid of the individual effects. Anderson and Hsiao (1982) show that this estimator is not consistent for finite T and for large number N, even though it has a relatively small variance. In Bun and Kiviet (2003), it is shown that the bias associated with the LSDV estimator is:

$$E(\hat{\delta} - \delta) = c_1(T^{-1}) + c_2(N^{-1}T^{-1}) + c_3(N^{-1}T^{-2}) + O(N^{-2}T^{-2})$$

The bias-corrected LSDV estimator (LSDVC) is obtained by using the two-step procedure suggested by Kiviet (1995) and Bruno (2005). The first step obtains estimates for the variance and the vector of coefficients. The second step performs bias correction by depuring[6] the LSDV estimator from the bias approximation, as can be seen in the following expression:

$$LSDVC_i = \hat{\delta} - B_i,\ i = 1, 2, 3$$

The next section deals with issues of endogeneity.

3.3. *Endogeneity Issues*

Under the assumption of exogenous explanatory variables, the bias-corrected LSDV estimator is usually better than the GMM technique and most of other instrumental-variable estimators (Kiviet, 1995). Since the LSDVC estimator deals with the endogeneity of the lagged dependent variable in the dynamic specification but does not correct for the endogeneity of other explanatory variables, I control for endogeneity issues that can be driven by some regressors included in the model. It is well known that endogeneity likely arises as a result of measurement error, omitted variables, sample selection errors, and simultaneity problems. In this particular case, the endogeneity is engendered by the relation of reverse causality that may arise between income inequality and conflict risk. This allows the consideration of both internal and external

[6] For more detailed information about the bias approximations, see Bun and Kiviet (2003) and Bruno (2005).

conflict risk, trade openness, and their interaction terms as endogenous variables. Previous studies on growth and income inequality suggest a reverse causality from income inequality to the GDP per capita variable. Moreover, the measurement error of the dependent variable does not lead to biased estimated coefficients when the error is not correlated with other explanatory variables. However, the measurement error in income inequality can be affected by some explanatory variables such as the level of educational attainment in developing countries. The estimation of the model specified in Equation 1 is likely to experience reverse causality problems. So, the only use of the bias-corrected LSDV estimator could lead to inconsistent estimated coefficients.

Therefore, to address the likely endogeneity issues, I apply the consistent System Generalised Method of Moments (System-GMM) estimator suggested by Blundell and Bond (1998). The use of instruments is required to deal with these endogeneity problems that may arise due to reverse causality between income inequality and conflict risk, because if the current level of inequality can be affected by current and past levels of conflict risk, at the same time, contemporaneous income inequality can also influence the current realization of conflict risk. However, it is less likely that the current level of income inequality affects the past realization of conflict risk. To this end, GMM estimator incorporates the regression equation in both changes and levels, each with its specific set of instruments, in a single system. Two tests are crucial for the consistency of the GMM estimator in order to show whether the lagged values of explanatory variables are valid instruments. The first test is the Sargan test of overidentifying restrictions. This tests the hypothesis tested that the instrumental variables are uncorrelated to a set of residuals. If the null hypothesis is not rejected, the lagged variables used as instruments are acceptable and valid. The second test is the Arellano and Bond error autocorrelation test. The test

consists of examining the first and second-order serial correlations of the differenced error term (that is, the residual of the regression in differences). By construction, the first-order serial correlation of the disturbance term is expected. The hypothesis of the second-order serial correlation is that the differenced errors are not correlated. If the null hypothesis of the absence of autocorrelation of the error terms is not rejected, then the use of lagged variables as instruments is allowed. As argued by Asiedu and Lien (2011) and Roodman (2007), these two tests can lose power when the number of instruments, *i*, is higher than the number of countries, *n*; $i< 1$. To solve for this problem, I follow Roodman (2007) who suggests reducing the instrument count by limiting the number of lags used as instruments.

This GMM estimation technique has been widely used in the literature to solve for endogeneity issues related to reverse causality (Asiedu and Lien, 2011; Spilimbergo, 2009; Rajan and Subramanian, 2008; Djankov et *al.*, 2008; Fajnzylber et *al.*, 2002). For example, Rajan and Subramanian (2008) analyse the effects of aid on growth, and correct for the possible bias associated with the fact that poorer growth may draw aid contributions to recipient countries. In their analysis, they mention that the exclusion restriction underlying the use of lagged policy leads to the fact that trade reform has an important contemporaneous effect on growth, but absolutely no effect four years later. To assess the relationship between violent crime rates and income inequality, Fajnzylber et *al.* (2002) use this GMM technique to correct for the joint endogeneity problem, mentioning that the underlined relationship is often characterised by a two-way causality. Recently, Asiedu and Lien (2011) employ the GMM estimator to solve for the possibility of reverse causality between foreign direct investments (FDI) and democracy.

However, Windmeijer (2005) shows that, in small samples, estimated asymptotic standard errors of the two-step system-GMM estimator can be downward biased. As a robustness test, I provide robust standard errors by computing Windmeijer's finite-sample correction.

4. Results

4.1. *Effect of Trade Openness and Conflict Risks on Income Inequality*

Table 2 reports a series of regressions using the Least Squares Dummy Variable Corrected estimator (LSDVC) technique. Bootstrapped standard errors are obtained after 200 iterations to test for the statistical significance of the estimated coefficients.

Column 1 shows the results of the basic model with the lagged dependent variable, the five control variables, the country, and year fixed effects. The results of the model when adding trade openness are shown in Column 2. Columns 3 and 4 display the results obtained by taking into account external conflict risk and its interaction with trade openness, respectively. The results displayed in Columns 5 and 6 concern the case of internal conflict risk and its interaction with trade openness.

From all the regressions, the results indicate that the estimated coefficient associated with the lagged dependent variable is positive and highly statistically significant at 1%. This result is consistent with previous studies, suggesting that past income inequality appears to be a good predictor for current inequality (Calderon and Chong, 2001), and this gives support to the use of dynamic specification model of income inequality.

The results of Column 1 suggest that the coefficient related to inflation rate is positive and significant.[7] This denotes that higher rates of inflation worsen income inequality. The estimates of Column 1 also point out that the coefficients associated with GDP per capita and educational attainment have the expected signs and the coefficient of population structure is positive, even though they do not reach the conventional level of significance.

When the trade openness variable is added in Column 2, its coefficient is negative and statistically significant, suggesting that trade openness reduces income inequality. This gives support to the Heckscher-Ohlin prediction, arguing that greater openness helps to reduce income inequality in developing countries. The results of Column 2 also show that the coefficient estimate of the variable called *military in politics*, which measures the presence of militaries in a political sphere, is negative and statistically significant at 10%. This indicates that income inequality tends to be higher in countries with a large military presence in the political sphere. According to a theory of military dictatorships carried out by Acemoglu et *al.* (2010), when countries are supported by large militaries, they will find it difficult to consolidate democracy and will end up with military dictatorships, leading to worse economic performance because of conflict that may arise between citizens and soldiers. This large presence of militaries in politics may then induce an increase in income inequality, as a military regime poses the greatest risk and the system of governance will become corrupt and may create an armed opposition.

In Column 3, external conflict risk is added to the model. It appears, from the additive model, that the coefficient associated with external conflict risk is not significant: the estimate of trade openness remains negative and significant, even though it falls slightly in the absolute term.

The interaction term between external conflict risk and trade openness is introduced in Column 4. The results of the interactive model suggest that the coefficient of the trade openness

[7] This variable enters all the regressions with a positive and significant coefficient.

variable becomes positive and loses its significance. Moreover, the coefficient associated with external conflict risk remains positive and is significant. At the same time, the interaction term variable exhibits a negative coefficient and is statistically significant. This tends to support the hypothesis that the distributive impact of trade openness on income inequality depends on the level of external conflict risk; *that is, trade openness increases income inequality in those countries where the risk of external conflict is very high, but reduces income inequality in countries where the risk is very low.* More precisely, the estimates of Column 4 show that the positive effect of trade openness on income inequality is more pronounced in those countries where the risk of external conflict is higher.

Columns 5 and 6 display the results of the models including, respectively, internal conflict risk and its interaction with trade openness. It appears that the coefficient of interaction term is negative and significant. This suggests, once again, the existence of the *interaction effect* between internal conflict risk and trade openness on income inequality.

These empirical findings can be explained as follows: when the risks of internal and external conflicts are higher, the traditional mechanisms of transmission, by which exported and imported goods and services operate, work for a minority of well-informed and connected people, most of the time, who are very close to the regime in power. These people then enjoy an environment which profits them, but consequently excludes the large majority of the already vulnerable population. This leads to a reinforcement of income inequality among the populations. These results corroborate the findings of Barro (2000), who argued that the rich and politically connected will be most able to take advantage of the opportunities offered by global commerce, leading to the fact that increased trade would be most likely to raise inequality in

poor countries. In the next section, I deal with the endogeneity issues related to some of the explanatory variables included in this analysis.

4.2. *Generalised Method of Moments (GMM) Estimation Approach*

The LSDVC results presented in the previous sub-section are based on the assumption that all the explanatory variables, except the lagged dependent variable, are exogenously determined. In this section, I relax this assumption by tackling directly the endogeneity issues.

The results obtained with the System-GMM dynamic panel data estimation are summarised in Table 3. First, it is important to notice that the test of second-order autocorrelation of Arellano and Bond AR(2) does not reject the hypothesis of the absence of autocorrelation of the error terms. Second, the Hansen test of overidentifying restrictions accepts the null hypothesis that all the lagged variables used as instruments are not correlated with the error terms, supporting the use of the lagged explanatory variables as instruments.

Column 1 reports the estimated coefficients for the basic specification where neither the trade openness nor the conflict risk variables are included in the model specification. I find that the coefficient associated with the lagged dependent variable is higher than that obtained in the previous results with LSDVC, indicating that the positive effect of past levels of income inequality is more pronounced. The estimated coefficient of inflation rate remains positive and statistically significant. Educational attainment exhibits a negative coefficient but is not statistically different from zero.

The results of the model including trade openness are presented in Column 2. Those of the additive model are displayed in Column 3. It appears that the estimated coefficient of trade openness not only increases in absolute term from its value shown in Column 2 of Table 2 and remains negative, but also becomes statistically significant. The results also show that the

external conflict risk coefficient increases sharply from its value in Column 3 of Table 2 but does not reach the conventional significance level.

The outcomes of the interactive model (Column 4) are now discussed. The results show that the estimated coefficient of the trade openness variable becomes positive, and emerges even more significant. The coefficient of external conflict risk remains positive and becomes statistically different from zero. Another noteworthy feature is that the coefficient corresponding to the interaction term is negative and significant at 1%. Moreover, the inclusion of the interaction term causes the coefficient associated with the educational attainment variable to be negative and statistically significant, suggesting that an increase in human capital reduces income inequality.

Columns 5 and 6 examine the links between income inequality and internal conflict risk and their interaction with trade openness. The estimated coefficient of the multiplicative variable is, once again, negative and statistically significant, even though the direct effects of trade openness and internal conflict risk on income inequality fail to reach the conventional significance level. This can be explained by the fact that, in the case of internal conflict risk, either the interaction effect is important enough that it neutralises the direct effects, or as argued earlier, internal conflict risk may have little impact on all the countries' economic activities, since it can be local.

The implication of these findings, which goes along with popular assertion but contradicts standard trade theory, is that the worsening effect of trade openness on income inequality is accentuated in countries where the risks of external and internal conflicts are higher. It is important to highlight that the interactive model portrays conditional relationships, instead

of unconditional relationships suggested, until now, by the literature related to the political economy of trade openness.

Overall, these results indicate that the interaction effect between trade openness and the risks of external and internal conflicts must be accounted for in the analysis of the distributional impacts of trade openness on income inequality. Conflict risks in a country may matter when assessing the relationship between trade openness and income inequality, since the gains from trade may not be equally distributed.

4.3. *Relationship between Conflict Risk and Income Inequality*

Up to this point, I have only tested the linear relationship between conflict risk and income inequality. In this section, I further investigate a non-linear relationship between conflict risk and income inequality. For this reason, I introduce the squared variables for both external and internal conflict risks. The results are summarised in Table 4. Column 1 reports the outcomes of the model, including the squared external conflict risk variable. The estimated coefficients suggest a non-monotonous relationship between external conflict risk and income inequality. The linear coefficient associated with external conflict risk is positive and significant, and the coefficient related to the squared external conflict risk variable is significantly negative, showing that income inequality increases at first and then decreases for large values of external conflict risk.

Column 2 shows the results when internal conflict risk and its squared term are incorporated into the interactive model. I also find a non-monotonous relationship between internal conflict risk and income inequality. Since a greater value of conflict index corresponds to lower conflict risk, it is interesting for policy-makers to know that, after reaching a certain level of conflict index, any effort to reduce a conflict risk is associated with a decrease in income

inequality. The results also indicate that the coefficient estimate associated with the educational attainment variable is negative and statistically significant. Moreover, I find that the GDP per capita variable exhibits a positive and significant coefficient. This can be explained by the fact that during the early stage of economic development, income inequality increases over time.

Overall, this non-monotonous relationship implies that income inequality worsens in countries that have a higher risk of conflict, a result consistent with Bircan et *al.* (2010), who argued that conflict may negatively affect, social spending and limit the government's ability to raise revenues necessary for public investment.

5. Robustness Checks: Additional Control variables

In this section, I further check the robustness of the results by using other explanatory variables that can affect income inequality.

5.1. *Institutional Quality*

I examine whether the main findings of this study are influenced by the inclusion of some institutional quality variables. Following Chong and Gradstein (2007), I use democracy and corruption to proxy for institutional quality. The two institutional variables used come from the International Country Risk Guide (ICRG) database. The indices of democracy and corruption range from 0 to 6. The highest rates of democracy and corruption indicate that the country is more democratic and less corrupt, respectively.

The results of the models including the level of democracy and corruption perception are displayed, respectively, in Columns 1 and 2 of Table 5 for external conflict risk. The results are robust when controlling for those institutional variables, even though the estimated coefficients linked to democracy and corruption fail to be significant. However, their inclusion allows the

coefficient of the lagged dependent variable to be higher, denoting that the persistent characteristic of income inequality is much pronounced when controlling for the level of democracy and corruption. It is also worth mentioning that, with the model including the index of corruption, the coefficient related to educational attainment is negative and statistically significant.

The same exercise is performed for internal conflict risk. The results are reported in Columns 4 and 5. I observe that the coefficient associated with democracy is negative and significant, suggesting that democratic regimes are more likely to reduce income inequality.

5.2. *Ethnic Tensions*

The literature suggests that fragmented societies are associated with poor policy management (Alesina and La Ferrara, 2005) and that ethnically fragmented economies may find it difficult to agree on public goods and good policies (Easterly and Levine, 1997). As a robustness check, I include into the model the index of ethnic tensions which is an index that ranges from 0 to 6. It is drawn from the ICRG database as a proxy for ethnic diversity.

The results, summarised in Columns 3 (for external conflict risk) and 6 (internal conflict risk) of Table 5, also appear to be robust to the inclusion of the ethnic tensions variable. Even more, in Column 6, the coefficient estimate associated with the ethnic tensions variable is negative and statistically significant, suggesting that more ethnically diverse countries are likely to experience greater income inequality. This result is in line with Montalvo and Reynal-Querol (2005) when they noted:

'Trade may be restricted to individuals of the same ethnic group; public infrastructure may have an ethnic bias; government expenditure may favor some ethnic groups, etc.', (Montalvo and Reynal-Querol 2005, p. 796).

5.3. *Financial Development*

Are the results still robust when I control for financial development proxied by liquid liabilities as a percentage of GDP? This question is investigated in Table 6. Column 1, reporting the results for external conflict risk, shows that the coefficient related to the interaction term is statistically significant in the presence of liquid liabilities, and the coefficient associated with the financial deepening variable is negative but not statistically different from zero. The same analysis is performed with internal conflict risk, and similar results are presented in Column 2.

5.4. *Natural Resource Abundance*

It is well-documented that countries that are highly dependent on the exportation of natural resources are likely to experience civil violence (e.g., Collier and Hoeffler, 2004). To test for the effect of natural resource, I use variable called *natural resource abundance*. It is the sum of ores and metals exports and fuel exports as a percentage of merchandise exports. This variable is drawn from the World Development Indicator database (World Bank, 2006). The results, summarised in Table 7, do not change when this variable is incorporated into the model. The results associated with external conflict are reported in Column 1. It can be seen that the coefficients related to trade openness and external conflict risk are still positive and significant. Moreover, the coefficient linked to the interaction term is statistically negative. I run the same regression for internal conflict risk and report the results in Column 2. It appears that not only the interaction term coefficient is still negative and significant, but also that the coefficient related to the internal conflict risk variable is positive and becomes significant. However, the coefficient of the natural resource abundance variable is negative but not statistically significant.

5.5. *Robustness to Regional Effects*

In this section, I check the sensitivity of the results to the inclusion of regional effects. I include regional dummies for African countries, Latin American countries, and Asian countries in the models. I find that the results (not shown) are robust to the use of regional dummies variables. Interestingly, the statistical significance of the coefficients related to the interaction terms between external/internal conflicts risks and trade openness has increased even more.

5.6. *Additional Robustness Test*

In this section, since the two-step system-GMM estimator can yield downward biased standard errors in small samples, I run the same regressions displayed in Tables 3 and 4, and correct for the standard errors by computing the Windmeijer's finite-sample correction. The results with standard errors corrected by the Windmeijer's finite-sample correction method are reported in Tables 9 and 10. The correction method does not change the estimated coefficients, even though the statistical significance level decreases slightly for some coefficients.

6. Conclusion

I have investigated the effect of trade openness on income inequality and how this effect is shaped by the presence of conflicts. Conflicts contract some activities and expand others. In general, war-vulnerable activities are often controlled by the poor, whereas activities that prosper during a war are controlled by the rich. To show the existence of the interaction effect between trade openness and conflict risk on income inequality, I use a panel of 39 developing countries and two estimation techniques - the bias-corrected Least Squares Dummy Variable estimator (LSDVC) and the System GMM - to correct for endogeneity issues. I find that, once the interactive model is accounted for, trade openness increases income inequality, and this positive

relationship between trade openness and income inequality is even more exacerbated in states where the risk of conflict is higher. After controlling for a wide range of macroeconomic, demographic and institutional variables, this relationship appears to be clear empirical evidence that explains the differences in income inequalities across countries over time, and provides a new element to the debate. Whether the area is torn with conflict risk may matter when assessing the relationship between trade openness and income inequality. The results also suggest that past levels of income inequality are good predictors of current inequality.

The evidence that trade openness reduces income inequality in countries with low risk of conflict is encouraging. It suggests that all policies aimed at preventing or reducing the risks of internal and external conflicts and supporting "peace" in developing countries, are not only more likely to directly decrease income inequality, but also may help trade openness to be more egalitarian, shedding light on the recurrent debate about whether or not developing countries must open their economies more to international trade. This study suggests that taking conflicts into account might reconcile the conflicting literature on the effect of trade openness on income inequality.

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Table 1
Summary Statistics

Variable	*Full Sample*		*Africa*		*Latin America*		*Asia*	
	Mean	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*	*Mean*	*Std. Dev.*
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
EHII	46.93	4.24	47.73	5.33	46.44	3.63	46.76	3.55
Trade Openness	61.12	36.61	57.19	19.88	57.49	35.25	71.38	49.76
External Conflict	9.26	2.42	8.98	2.45	9.56	2.31	9.10	2.52
Internal Conflict	7.43	2.59	7.64	2.67	7.38	2.48	7.25	2.67
GDP per capita	2170.45	2478.97	1016.43	1003.76	2881.55	1756.63	2399.45	3827.47
Inflation Rate	105.63	745.56	21.45	32.45	225.93	1140.74	14.99	22.83
Population Structure	4.18	1.92	3.13	0.59	5.35	2.37	3.57	0.86
Military in Politics	3.26	1.60	3.42	1.51	3.29	1.63	3.01	1.65
Educational Attainment	4.35	1.81	3.13	1.49	5.32	1.42	4.23	1.81
Democracy Index	3.41	1.10	3.05	1.13	3.62	0.93	3.50	1.23
Corruption Index	2.95	1.00	3.32	0.87	2.86	0.94	2.66	1.12
Ethnic Tensions	3.62	1.59	3.19	1.20	4.68	1.31	2.48	1.33
Liquid Liabilities	41.48	24.51	34.83	16.71	33.73	11.96	61.4	34.07
Resource Abundance	23.97	26.72	29.39	33.14	23.48	23.95	20.73	25.09

Notes: For definitions of variables and sources, see Table 8.

Table 2

LSDVC Dynamic Estimation: Effect of Trade Openness, External and Internal Conflicts Risks on Income Inequality

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Lagged EHII	0.596***	0.588***	0.589***	0.579***	0.584***	0.572***
	(10.77)	(10.67)	(10.73)	(10.75)	(10.73)	(10.46)
Trade Openness		-0.0237**	-0.0227**	0.0138	-0.0246***	-0.0008
		(-2.50)	(-2.38)	(0.58)	(-2.57)	(-0.06)
External Conflict Risk			0.0254	0.292*		
			(0.35)	(1.87)		
Internal Conflict Risk					-0.0685	0.0996
					(-0.96)	(0.90)
*Trade Openness*External Conflict*				-0.00425*		
				(-1.75)		
*Trade Openness*Internal Conflict*						-0.00297*
						(-1.79)
Inflation Rate	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***
	(2.72	(2.75)	(2.74)	(2.82)	(2.75)	(2.90)
Population Structure	0.0972	0.00619	0.0584	-0.528	-0.0556	-0.501
	(0.13)	(0.01)	(0.08)	(-0.66)	(-0.07)	(-0.61)
Military in Politics	-0.224	-0.246*	-0.256*	-0.261*	-0.170	-0.201
	(-1.59)	(-1.75)	(-1.76)	(-1.81)	(-1.08)	(-1.29)
GDP per capita	-0.00020	-0.00023	-0.00023	-0.00006	-0.00019	-0.00002
	(-0.48)	(-0.53)	(-0.54)	(-0.16)	(-0.45)	(-0.06)
Educational Attainment	-0.334	-0.180	-0.189	-0.157	-0.198	-0.144
	(-1.19)	(-0.65)	(-0.69)	(-0.58)	(-0.72)	(-0.52)
Dummies :						
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	407	407	407	407	407	407
Number of countries	39	39	39	39	39	39

Notes: For definitions and sources of data, see Table 8. The estimation method is the Least Squares Dummy Variable Corrected (LSDVC) Dynamic Regression. *t* statistics are below the coefficients. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3

System-GMM Estimation: Effects of Trade Openness, External and Internal Conflicts Risks on Income Inequality

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Lagged EHII	0.8096***	0.7894***	0.5476*	0.7498***	0.6157***	0.5726***
	(5.28)	(5.43)	(1.92)	(5.63)	(5.78)	(5.27)
Trade Openness		-0.0027	-0.0219*	0.0959***	-0.0243**	0.0183
		(-0.26)	(-1.89)	(2.95)	(-2.04)	(1.09)
External Conflict Risk			0.2590	0.8991***		
			(1.40)	(2.96)		
Internal Conflict Risk					-0.0162	0.2067
					(-0.16)	(1.22)
*Trade Openness*External Conflict*				-0.0093***		
				(-2.85)		
*Trade Openness*Internal Conflict*						-0.0039*
						(-1.95)
Inflation Rate	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***
	(6.80)	(6.83)	(3.46)	(5.46)	(6.17)	(5.78)
Population Structure	0.0666	0.0153	-0.0330	0.0187	-0.2900	-0.1868
	(0.61)	(0.11)	(-0.13)	(0.11)	(-1.57)	(-0.70)
Military in Politics	-0.0392	-0.0679	0.0663	-0.1412	-0.1235	-0.0881
	(-0.39)	(-0.70)	(0.34)	(-1.34)	(-0.66)	(-0.36)
GDP per capita	-8.97e-06	-0.00003	-0.00006	0.00008	0.0002	0.0002
	(-0.05)	(-0.61)	(-0.14)	(0.70)	(1.23)	(0.55)
Educational Attainment	-0.3675	-0.2403	-0.6062	-0.5960*	-0.1306	-0.2588
	(-1.24)	(-0.86)	(-0.75)	(-1.86)	(-0.40)	(-0.62)
Constant	11.0109	11.8353	23.8853	6.1928	21.7476***	21.6420***
	(1.31)	(1.46)	(1.41)	(0.77)	(3.47)	(3.31)
Hansen Test of overidentying	9.30	8.67	7.53	5.75	3.60	4.48
(p-value)	(0.677)	(0.653)	(0.821)	(0.764)	(0.990)	(0.973)
AR(1)	0.046	0.044	0.059	0.035	0.029	0.025
AR(2)	0.276	0.279	0.351	0.289	0.298	0.288
Number of observations	407	407	407	407	407	407
Number of countries	39	39	39	39	39	39

Notes: For definitions and sources of data, see Table 8. The estimated method is a two-step. System-GMM estimator. *t*-statistics are below the coefficients. AR(1) and AR(2) are respectively Arellano-Bond first and second autocorrelation tests. Time dummy variables are included in all regressions. Variables such as trade openness, conflict risks, GDP per capita and education are instrumented, using their own lags in level and differences. Inflation rate, population structure and military in politics are treated as exogenous. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4
System-GMM Estimation: Non-Monotonous Relationship between Conflicts Risks and Income Inequality

Variable	(1)	(2)
Lagged EHII	0.738***	0.580***
	(8.76)	(5.66)
External Conflict Risk	1.291***	
	(3.13)	
External Conflict Risk Squared	-0.0580***	
	(-2.63)	
*Trade Openness*External Conflict*	-0.00624**	
	(-2.48)	
Internal Conflict Risk		1.514***
		(2.92)
Internal Conflict Risk Squared		-0.0863***
		(-2.57)
*Trade Openness*Internal Conflict*		-0.00136
		(-0.50)
Trade Openness	0.0543**	0.00399
	(2.05)	(0.16)
GDP per capita	0.00006	0.00043*
	(0.53)	(1.97)
Population Structure	-0.0759	-0.111
	(-0.43)	(-0.45)
Inflation Rate	0.0004***	0.0005***
	(5.81)	(6.03)
Educational Attainment	-0.283	-0.737**
	(-1.05)	(-2.14)
Military in Politics	-0.0520	-0.272
	(-0.51)	(-1.35)
Constant	7.737	18.60***
	(1.35)	(3.24)
Hansen Test of overidentying	5.29	9.09
(p-value)	(0.916)	(0.766)
AR(1)	0.037	0.029
AR(2)	0.263	0.258
Number of observations	407	407
Number of countries	39	39

Notes: For definitions and sources of data, see Table 8. The estimated method is a two-step System-GMM estimator. *t*-statistics are below the coefficients. AR(1) and AR(2) are respectively Arellano-Bond first and second autocorrelation tests. Time dummy variables are included in all regressions. Variables such as trade openness, conflict risks, GDP per capita and education are instrumented, using their own lags in level and differences. Inflation rate, population structure and military in politics are treated as exogenous. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5

System-GMM Estimation: Robustness of the Results to the Inclusion of Institutional Quality and Ethnic Tensions

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Lagged EHII	0.8235***	0.8326***	0.6985***	0.6266***	0.6249***	0.5533***
	(5.36)	(7.84)	(4.20)	(3.86)	(4.29)	(2.97)
Trade Openness	0.0876*	0.0853**	0.0998***	0.0123	0.0169	0.0162
	(1.84)	(2.25)	(2.93)	(0.85)	(0.91)	(1.07)
External Conflict Risk	0.8114**	0.7509***	0.8565***			
	(2.07)	(2.62)	(2.90)			
Internal Conflict Risk				0.1739	0.2235	0.1460
				(1.16)	(1.00)	(0.93)
*Trade Openness*External Conflict*	-0.0083**	-0.0079**	-0.0098***			
	(-2.11)	(-2.25)	(-3.85)			
*Trade Openness*Internal Conflict*				-0.0038**	-0.0036*	-0.0033**
				(-2.17)	(-1.80)	(-1.96)
Inflation Rate	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***
	(5.26)	(7.19)	(6.91)	(8.17)	(5.45)	(6.47)
Population Structure	0.0344	0.0633	0.0802	-0.1169	-0.2091	-0.0980
	(0.45)	(0.36)	(0.19)	(-0.73)	(-0.88)	(-0.51)
Military in Politics	-0.1052	-0.0641	-0.0735	0.0652	-0.0502	0.0006
	(-0.51)	(-0.36)	(-0.51)	(0.23)	(-0.12)	(0.00)
GDP per capita	0.00007	0.00002	0.00008	0.00001	0.0001	0.00008
	(0.41)	(0.21)	(0.46)	(0.03)	(0.29)	(0.15)
Educational Attainment	-0.2403	-0.5260*	-0.4916	-0.1317	-0.1432	-0.2353
	(-0.84)	(-1.88)	(-1.22)	(-0.36)	(-0.33)	(-0.47)
Democracy Index	-0.1295			-0.3132*		
	(-0.43)			(-1.92)		
Corruption Index		-0.0574			-0.0894	
		(-0.19)			(-0.25)	
Ethnic Tensions			-0.2472*			-0.1556
			(-1.90)			(-0.73)
Hansen Test of overidentying	11.68	5.82	4.84	4.25	5.40	4.59
(p-value)	(0.554)	(0.758)	(0.963)	(0.994)	(0.979)	(0.970)
AR(1)	0.041	0.038	0.047	0.036	0.027	0.039
AR(2)	0.296	0.280	0.293	0.295	0.287	0.296
Number of observations	407	407	407	407	407	407
Number of countries	39	39	39	39	39	39

Notes: For definitions and sources of data, see Table 8. The estimated method is a two-step System-GMM estimator. *t*-statistics are below the coefficients. AR(1) and AR(2) are respectively Arellano-Bond first and second autocorrelation tests. Time dummy variables are included in all regressions. Variables such as trade openness, conflict risks, GDP per capita and education are instrumented, using their own lags in level and differences. Inflation rate, population structure and military in politics are treated as exogenous. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6

System-GMM Estimation: Robustness of the Results to the Inclusion of Financial Development

Variable	(1)	(2)
Lagged EHII	0.719***	0.536*
	(4.59)	(1.88)
External Conflict Risk	0.863***	
	(2.57)	
*Trade Openness*External Conflict*	-0.0092**	
	(-2.50)	
Internal Conflict Risk		0.333
		(1.30)
*Trade Openness*Internal Conflict*		-0.0037**
		(-2.15)
Trade Openness	0.0977**	0.0211
	(2.20)	(0.99)
GDP per capita	0.00015	0.00014
	(0.82)	(0.37)
Population Structure	-0.0403	-0.0213
	(-0.24)	(-0.09)
Inflation Rate	0.0004***	0.0004***
	(6.23)	(4.39)
Educational Attainment	-0.554*	-0.628
	(-1.77)	(-1.03)
Military in Politics	-0.168	-0.167
	(-1.01)	(-0.49)
Liquid Liabilities	-0.0125	-0.0055
	(-0.89)	(-0.24)
Hansen Test of overidentying	5.17	7.68
(p-value)	0.819	0.809
AR(1)	0.034	0.032
AR(2)	0.281	0.275
Number of observations	407	407
Number of countries	39	39

Notes: For definitions and sources of data, see Table 8. The estimated method is a two-step System-GMM estimator. *t*-statistics are below the coefficients. AR(1) and AR(2) are respectively Arellano-Bond first and second autocorrelation tests. Time dummy variables are included in all regressions. Variables such as trade openness, conflict risks, GDP per capita and education are instrumented, using their own lags in level and differences. Inflation rate, population structure and military in politics are treated as exogenous. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7
System-GMM Estimation: Robustness of the Results to Natural Resource Abundance

Variable	(1)	(2)
Lagged EHII	0.8020***	0.7447***
	(11.55)	(6.05)
External Conflict Risk	0.8693***	
	(2.79)	
*Trade Openness*External Conflict*	-0.0086***	
	(-2.72)	
Trade Openness	0.0846***	0.0195
	(2.57)	(1.34)
GDP per capita	0.00005	0.00005
	(0.32)	(0.54)
Population Structure	-0.0979	-0.0402
	(-0.45)	(-0.22)
Inflation Rate	0.0004***	0.0004***
	(6.69)	(6.68)
Educational Attainment	-0.3843*	-0.4630*
	(-1.69)	(-1.90)
Military in Politics	-0.1035	-0.2830*
	(-0.71)	(-1.73)
Natural Resource Abundance	-0.0211	-0.0247
	(-0.75)	(-1.28)
Internal Conflict Risk		0.4364***
		(2.91)
*Trade Openness*Internal Conflict*		-0.0031*
		(-1.84)
Hansen Test of overidentying	4.23	5.34
(p-value)	0.937	0.868
AR(1)	0.007	0.023
AR(2)	0.936	0.963
Number of observations	348	348
Number of countries	39	39

Notes: For definitions and sources of data, see Table 8. The estimated method is a two-step System-GMM estimator. *t*-statistics are below the coefficients. AR(1) and AR(2) are respectively Arellano-Bond first and second autocorrelation tests. Time dummy variables are included in all regressions. Variables such as trade openness, conflict risks, GDP per capita and education are instrumented, using their own lags in level and differences. Inflation rate, population structure and military in politics are treated as exogenous. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8

Definitions of Variables and Sources of Data

Variable	Definition and sources
EHII	Estimated Household Income Inequality. It ranges from 0 to 100, with 0 corresponding to complete equality and 100 corresponding to complete inequality; provided by the Wage University of Texas Income Project (WUTIP).
Trade Openness, TO	Ratio of the sum of exports and imports to GDP (%). From World Development Indicators (WDI, 2006) of the World Bank.
External Conflict, EC	Index of external conflict risk. It is composed of war, cross-border conflict and foreign pressures. It ranges from 0 to 12 with 0 corresponding to very high risk of external conflict and 12 to very low risk. From the International Country Risk Guide (ICRG) database.
Internal Conflict, IC	Index of internal conflict risk. It is composed of civil war/coup threat, terrorism/political violence and civil disorder. It ranges from 0 to 12 with 0 corresponding to very high risk of internal conflict and 12 to very low risk, from the ICRG database.
*Trade Openness*External Conflict, TOEC*	Interaction term between trade openness and external conflict risk.
*Trade Openness*Internal Conflict, TOIC*	Interaction term between trade openness and internal conflict risk.
Educational Attainment, EA	Educational attainment of the total population aged 25 and over, from Barro and Lee (2004).
GDP per capita, GDPpc	Gross Domestic Product per capita (constant 2000 US). From WDI (2006), World Bank.
Inflation Rate, INFL	Consumer prices (annual %). From WDI (2006), World Bank.
Population Structure, POP	Population ages 65 and above (% of total) . From WDI (2006), World Bank.
Military in Politics, Milpol	Index of military in politics. It ranges from 0 to 6. From the ICRG database.
Democracy, Democ	Index of democracy, It ranges from 0 to 6. The value 0 is assigned to autarchies and 6 is assigned to alternating democracies. From the ICRG database.
Corruption, Corrup	Index of corruption. It ranges from 0 to 6 with 0 corresponding to more corrupt countries and 6 to less corrupt countries. From the ICRG database.
Ethnic Tensions, ET	Index of ethnic tensions, It ranges from 0 to 6. The value 0 corresponds to countries with high racial and nationality tensions and 6 to low racial and nationality tensions. From the ICRG database.
Liquid Liabilities, LL	Liquid liabilities (M_3) as % of GDP. From WDI (2006), World Bank.
Natural Resources Abundance, Res	Natural Resources abundance (exports of ores and metals) as % of total exports. From WDI (2006), World Bank.

Table 9

System-GMM Estimation with Windmeijer Finite Sample Correction: Trade Openness, External and Internal Conflicts Risks, and Income Inequality

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Lagged EHII	0.8096***	0.7894***	0.5493*	0.7498***	0.6157***	0.5726***
	(2.92)	(3.04)	(1.82)	(4.26)	(4.89)	(3.28)
Trade Openness		-0.0027	-0.0181*	0.0959***	-0.0243*	0.0183
		(-0.17)	(-1.83)	(3.01)	(-1.81)	(1.09)
External Conflict Risk			0.2145*	0.8991***		
			(1.75)	(3.04)		
Internal Conflict Risk					-0.0162	0.2067
					(-0.13)	(0.97)
*Trade Openness*External Conflict*				-0.0093		
				(-3.04)		
*Trade Openness*Internal Conflict*						-0.0039*
						(-1.86)
Inflation Rate	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***	0.0004***
	(5.80)	(6.89)	(3.75)	(5.40)	(6.42)	(6.50)
Population Structure	0.0666	0.0153	0.0635	0.0187	-0.2900	-0.1868
	(0.43)	(0.07)	(0.30)	(0.10)	(-1.49)	(-0.77)
Military in Politics	-0.0392	-0.0679	0.1391	-0.1412	-0.1235	-0.0881
	(-0.25)	(-0.45)	(0.83)	(-1.13)	(-0.55)	(-0.23)
GDP per capita	-8.97e-06	-0.00003	-0.0002	0.00008	0.0002	0.0002
	(-0.05)	(-0.20)	(-0.88)	(0.64)	(0.79)	(0.31)
Educational Attainment	-0.3675	-0.2403	-0.6842	-0.5960	-0.1306	-0.2588
	(-0.80)	(-0.84)	(-0.91)	(-1.52)	(-0.38)	(-0.51)
Hansen Test of overidentying	9.30	8.67	5.16	5.75	3.60	4.48
(p-value)	(0.677)	(0.653)	(0.923)	(0.764)	(0.990)	(0.973)
AR(1)	0.064	0.059	0.059	0.039	0.031	0.033
AR(2)	0.283	0.285	0.332	0.290	0.299	0.292
Number of observations	422	407	407	407	407	407
Number of countries	39	39	39	39	39	39

Notes: For definitions and sources of data, see Table 8. The estimated method is a two-step System-GMM estimator. *t*-statistics are below the coefficients. AR(1) and AR(2) are respectively Arellano-Bond first and second autocorrelation tests. Time dummy variables are included in all regressions. Variables such as trade openness, conflict risks, GDP per capita and education are instrumented, using their own lags in level and differences. Inflation rate, population structure and military in politics are treated as exogenous. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 10
System-GMM Estimation with Windmeijer Finite Sample Correction: Non-Monotonous Relationship between Conflicts Risks and Income Inequality

Variable	(1)	(2)
Lagged EHII	0.738***	0.580**
	(6.31)	(2.56)
External Conflict Risk	1.291***	
	(2.88)	
External Conflict Risk Squared	-0.0580**	
	(-2.30)	
*Trade Openness*External Conflict*	-0.00624**	
	(-2.32)	
Internal Conflict Risk		1.514**
		(2.19)
Internal Conflict Risk Squared		-0.0863**
		(-1.99)
*Trade Openness*Internal Conflict*		-0.00136
		(-0.35)
Trade Openness	0.0543*	0.00399
	(1.86)	(0.11)
GDP per capita	0.00006	0.00043
	(0.55)	(1.44)
Population Structure	-0.0759	-0.111
	(-0.39)	(-0.34)
Inflation Rate	0.0004***	0.0005***
	(5.07)	(5.33)
Educational Attainment	-0.283	-0.737
	(-0.92)	(-1.25)
Military in Politics	-0.0520	-0.272
	(-0.40)	(-0.95)
Constant	7.737	18.60
	(1.05)	(1.49)
Hansen Test of Overidentying	5.29	9.09
(p-value)	(0.916)	(0.766)
AR(1)	0.039	0.047
AR(2)	0.264	0.268
Number of observations	407	407
Number of countries	39	39

Notes: For definitions and sources of data, see Table 8. The estimated method is a two-step System-GMM estimator. *t*-statistics are below the coefficients. AR(1) and AR(2) are respectively Arellano-Bond first and second autocorrelation tests. Time dummy variables are included in all regressions. Variables such as trade openness, conflict risks, GDP per capita and education are instrumented, using their own lags in level and differences. Inflation rate, population structure and military in politics are treated as exogenous. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 11
List of Countries Included in the Analysis

Algeria, Botswana, Cameroon, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Senegal, South Africa, Tunisia, Uganda, Zimbabwe, Kuwait, Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Panama, Peru, Uruguay, Bangladesh, India, Indonesia, Jordan, Malaysia, Pakistan, Philippines, Thailand, Turkey.