

## Does Poverty Cause Conflict? Isolating the Causal Origins of the Conflict Trap<sup>\*</sup>

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### **Abstract**

Does poverty cause civil conflict? A considerable literature seeks to answer this question, yet concerns about reverse causality threaten the validity of extant conclusions. To estimate the impact of poverty on conflict and to determine whether the relationship between them is causal, it is necessary to identify a source of exogenous variation in poverty. We do this by introducing a robust instrument for poverty: a time-varying measure of international inequalities. We draw upon existing theories about the structural position of a country in the international economic network—specifically, the expectation that countries in the core tend to be wealthier and those on the periphery struggle to develop. This instrument is plausibly exogenous and satisfies the exclusion restriction, which suggests that it affects conflict only through its influence upon poverty. Instrumental variables probit regression is employed to demonstrate that the impact of poverty upon conflict appears to be causal.

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There is now a widespread and well-known body of quantitative social science research that posits a relationship between poverty and conflict (Hess and Orphanidis 1995; Collier and Hoeffler 2002; Collier et al. 2003; Fearon and Laitin 2003; Sambanis 2004; Blomberg et al. 2006). This research has helped shape the policy making agenda. For example, the UK Department for International Development has established a more conflict sensitive agenda (DFID 2007) and the World Bank focused its 2011 *World Development Report* upon ‘Conflict, Security, and Development’. A prominent theme in this literature and the associated policy discussion demonstrates that, in addition to the traditional concept of a poverty trap, there is also a ‘conflict trap’ (see, most notably, Collier et al. 2003). This is the notion that once a country experiences conflict, it faces a reversal of economic development, which in turn increases the likelihood of future onsets of conflict. A further claim within the literature is that poverty is the principal underlying cause of civil war. Whilst highly plausible our contention here is that scholars have yet to adequately demonstrate that this is indeed the case, largely because they have failed to satisfactorily tease out the directionality within the poverty and conflict relationship.

The examples of Burundi and Angola highlight the threat that countries can become caught in a cycle of conflict and underdevelopment. Burundi experienced multiple, separate conflicts over the last four decades (in 1972-73, 1988, and between 1991 and 2005). As a result of these recurrent civil wars, ‘GDP per capita fell by half in the 1990s, from \$211 in 1991 to \$110 in 1999’ (Sambanis 2003:265). Angola has similarly experienced multiple conflict onsets—in 1991, 1994, 1996, 1998, 2002, 2004, and 2007. These conflicts precipitated a decrease in GDP per capita from in excess of \$1000 in 1989 to \$954 in 1991 and \$630 in 1994. Thereafter, Angola’s growth rose very gradually while experiencing further conflict and only finally returning to the levels of the late 80s by the turn of the new century. These examples illustrate the threat of endogeneity in efforts to model the independent effect of poverty upon

conflict. While there is little doubt that the deterioration of security and incomes move together, their causal pathways are complex and unclear. Our contribution here is to provide a systematic evaluation of the causal impact of poverty on conflict onset. In addition to the methodological puzzle, there are also significant public policy implications to understanding whether or not the relationship between poverty and conflict is causal: evidence that poverty is indeed a root cause of conflict justifies earlier and sustained development interventions in the name of peace and security.

We contribute an answer to this puzzle by identifying a strong and valid instrument for poverty in order to observe the causal effect of poverty upon conflict. In our search to instrument for poverty we draw upon information characterizing states' positions within the international trade network. Our instrument is a robust predictor of poverty yet is uncorrelated with the error terms of the model predicting conflict. Moreover, as far as we are aware, it is the only time-varying instrument for poverty for a global sample that has been identified and tested.

This article proceeds as follows. First, we discuss the literature on the conflict trap and the relationship between conflict and poverty more generally. We build upon this literature to present our core claims: that poverty is endogenous to the onset of civil conflict, and that a state's position in the international system reflects variation in levels of poverty within the state that is exogenous to the processes determining conflict onsets. Second, we detail our research design, data, and model specifications. Third, we introduce results of our analyses before offering concluding remarks.

### **Poverty as a Cause of Civil Conflict**

A considerable literature in political science addresses the impact of poverty upon the occurrence of civil conflict (Gurr 1970; Muller and Seligson 1987; Collier and Hoeffler 2002; Collier et al. 2003; Fearon and Laitin 2003; Djankov and Reynal-Querol 2010; Jakobsen et al. 2013). This

work represents a significant portion of the recent growth in quantitative analyses of the causes of civil war more generally.<sup>2</sup> A key result of these studies has been the focus on poverty as the principal underlying cause of civil war, demonstrated by Collier et al. (2003:53) who state that “the key root cause of conflict is the failure of economic development”, and Sambanis’ (2002:216) assertion that “civil war is a problem of the poor.” However, while poverty is widely viewed as an underlying cause of conflict, the precise process through which poverty affects civil war continues to be debated (Collier and Hoeffler 2002; Fearon and Laitin 2003; Miguel et al. 2004; Jakobsen et al. 2013).

The burden of evidence mostly suggests that factors related to the economic opportunities for rebellion—such as poverty and low income (Collier and Hoeffler 2002; Fearon and Laitin 2003), low or negative growth (Blomberg and Hess 2002; Collier et al. 2003; Miguel et al. 2004), natural resource dependence (Collier and Hoeffler 2000, 2005; Ross 2004), and remittance flows from diaspora groups (Collier and Hoeffler 2002)—have a greater impact on the occurrence of civil war, than those associated with political grievance—such as inequality, state repression, ethnic fractionalization, and low levels of democracy in a country (see Collier and Hoeffler 2002; Fearon and Laitin 2003; Miguel et al. 2004). However, more recent studies have found that grievances linked to ethnic fractionalization and inequalities between ethnic groups are as important in explaining conflict onset as economic opportunities (Østby 2008; Cederman et al. 2011). Furthermore, given economic factors are often closely intertwined with political grievances – for example, with natural resources – that it is very difficult to distinguish between the two.

This is also relevant when considering the poverty-conflict relationship. One key element of the poverty-conflict debate pitches Collier and Hoeffler against Fearon and Laitin. Collier and Hoeffler (2002) argue that poverty increases the likelihood of civil war onset by making it easier

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<sup>2</sup> See Sambanis (2002) for a more comprehensive review of the literature that employs a focus on quantitative analyses of civil war.

for rebel groups to recruit fighters, because the economic benefits of joining a rebellion can outweigh conventional economic activities in impoverished societies. This, they argue, is supported by analyses demonstrating that higher male school enrolments reduce the risk of war. Fearon and Laitin (2003), however, argue that poverty increases the likelihood of civil conflict, not through increasing opportunities for rebel recruitment, but rather because poverty is more generally associated with a weaker state—both in terms of financial and military capabilities. A weaker state, they argue, increases the likelihood of a rebel group's success in a civil war. In both of these explanations, the process by which poverty or low income increases the likelihood of civil war rests upon provision of greater incentive and opportunity to rebels. The view that poverty may also cause or exacerbate the grievance that drives rebellion, as argued by Gurr (1970), is given relatively little consideration in the recent quantitative studies of civil war.

This may partly be due to the general absence of discussions on how poverty is conceptualized in the conflict trap literature. Poverty tends to be considered in terms of income alone leading to a focus on economic incentives and opportunities for rebellion in much of the existing literature. However, within the international development literature it is now widely accepted that poverty is linked to the deprivation of opportunities and freedoms (see Sen 1999). Such conceptualization is more closely linked to Gurr's (1970) notion of relative deprivation. It is also related to the issue of horizontal inequality that has been the focus of recent attention in the conflict literature (see Østby 2008). However, it is important to note that while poverty and inequality may be related; they are conceptually distinct. Poverty implies some form of deprivation, in terms of resources or opportunities; while inequality emphasizes differences between individuals or groups, which may or may not be linked to severe deprivation (see Sen 1983). Here our focus is on poverty. However – as outlined in the discussion of the data – our primary measure of poverty is infant mortality rate (IMR), which has been advocated by development scholars of a more valid measure of poverty than income (see Dasgupta 1993; Sen

1998; Deaton 2001). Furthermore, IMR data is available annually for most countries globally in the time period we consider, unlike other non-income poverty measures (Abouharb and Kimball 2007).

In parallel to poverty being viewed as an underlying cause of civil war, there are a number of studies that have addressed the impact of civil conflict upon economic conditions within the state—including levels of poverty (Collier 1999; Elbadawi 1999; Stewart, Huang, and Wang 2001; Hoeffler and Reynol-Querol 2003). This reciprocal relationship between poverty and conflict has become known as the “conflict trap” (see, most notably, Collier et al. 2003). This is the notion that once a country experiences conflict, it faces a reversal of economic development, which in turn increases the likelihood of further conflict. Hence, countries become caught in a cycle of conflict and underdevelopment. Collier and Hoeffler (2002) and Collier et al. (2003) examine the validity of the conflict trap thesis by building a single equation model in which the probability of war breaking out in a particular country, within a five-year period, is considered a function of a combination of variables measured at the outset of the period (for example, income per capita, primary commodity exports/GDP, population), during the previous period (for example, per capita income growth, previous conflict), and those that are largely time invariant (for example, social fractionalisation). As Miguel et al (2004) note, however, Collier and Hoeffler’s approach does not adequately address the potential endogeneity of economic factors to conflict; a problem common to the majority of the quantitative studies of civil wars (Gates 2002; Sambanis 2002).<sup>3</sup> As a consequence, the extant literature is not well placed to demonstrate a robust causal impact for poverty upon civil conflict.

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<sup>3</sup> Miguel et al. (2004) provide a notable exception by using a two-stage instrumental variable regression model to assess the impact of economic shocks on civil war occurrence. This important analysis makes use of changes in rainfall as an instrumental variable. It is worth highlighting two important differences between this study and the analysis conducted here. Firstly, Miguel et al. (2004) consider the impact of economic shocks on conflict, while our focus is on the poverty-conflict relationship. Secondly, their study is restricted to the analysis of civil wars in Africa, while we consider a global sample of states.

One response to the failure to adequately account for potential endogeneity in the effects of poverty on conflict has been to disaggregate the relationship between poverty and conflict, and to focus at the local level rather than the national level. Such efforts have proved productive with Buhaug et al. (2011), in particular, making an excellent contribution. However, while studies looking at the local level have helped shed greater light on the poverty-conflict relationship, the question of whether the relationship holds more consistently at the country-level is still of interest and important. As such, we examine whether countries with higher levels of poverty are more likely to experience civil wars as a result of this poverty.

We offer two contributions to the literature to compensate for the existing limitations. First, we address the failure to adequately account for the endogeneity of the poverty-conflict relationship in quantitative analyses of civil war, as discussed above. Second we address the relative analytical neglect of the international context in which poverty-induced civil conflict occurs. We do so by quantifying the impact of a state's position within the network structure of the international system.

By and large, the quantitative analysis of civil war focuses upon domestic factors. The literature that has focused on international factors has tended to consider just the immediate nature of the state's neighbourhood (Gleditsch 2007) or the impact of international interventions, only once a conflict has begun (for example, Elbadawi and Sambanis 2000; Regan 2002; Collier et al. 2003; World Bank 2011). However, as Keen (2001:19) points out 'interventions' are not simply something that 'the West' or the 'international community' does to remedy humanitarian disasters once they occur; more often than not, interventions occur prior to the disaster, perhaps helping to precipitate it.' In analyzing the international context in which poverty-induced civil conflict occurs, we also aim to shed greater light on the international conditions that shape the ways in which poverty increases the likelihood of civil war.

In line with the literature discussed above, we anticipate that civil conflict is more likely to occur in states with higher levels of domestic poverty—whether this process is channelled through a “greed” or a “grievance” frame. But equally so, we also expect that the occurrence of civil conflict worsens a state’s experience of poverty in line with Collier et al.’s (2003) description of the conflict trap. This corollary is what motivates our concerns here (and within the extant literature) about the potential endogeneity of poverty to conflict onset. Most extant treatments of this underlying reciprocal relationship—as captured by edge A in Figure 1—operate exclusively at the domestic level of analysis. However, our review of the relevant literature leads us to the conclusion that extant studies have tended to underspecify the international context in which domestic poverty and conflict traps emerge. We do not believe that a sufficient explanation of the relationship between poverty and civil conflict in developing countries can ignore the influence of international inequalities (Wade 2004; Pogge 2007; Gleditsch 2007; Dasandi 2014). Accordingly, we look for a suitable instrument for (and source of exogenous variation in) poverty by examining the international context of domestic poverty.

[Figure 1 About Here]

### **The International Context of Domestic Poverty**

Our expectation is that a state’s position within the international system will impact on the levels of domestic poverty and development, however we do not expect to find a significant relationship between structural position and the likelihood of civil conflict. Our results, reported below, also bear this out. On the one hand there is a well-developed and well-known literature on the impact of international inequality on poverty and underdevelopment. On the other hand there is much less reason to think that a country’s structural position within the international system directly increases the likelihood of civil violence. Indeed, Maoz (2011), in testing the effect of measures of international position on civil conflict, failed to establish a robust relationship across



different measures (structural equivalence and role equivalence) and different datasets (Fearon and Laitin, COW, and UCDP/PRIO).

In testing the relationship between measures of network position on civil conflict, Maoz draws on Galtung's (1971) 'structural theory of imperialism'. From this perspective, peripheral countries in the international system are seen as more likely to experience conflict because of conflicts of interest between groups concerning living conditions or 'quality of life' (Galtung 1971: 82). In other words, a country's position in the international system is seen to affect civil conflict through the impact on poverty (or quality of life). Other world-systems studies that use dyadic relations to examine the impact of external international relations on domestic conflict too find that 'peripherization' contributes to political conflict through its negative impact on domestic economic conditions (see Moaddel 1994). As such we have good reason to anticipate that a state's structural position in the international trade system is not correlated with their experience of civil conflict, *except* as channelled through its experience of poverty. This lack of a (direct) causal relationship is depicted along edge C in Figure 1. We seek to exploit this exogeneity to develop the theoretical case for our instrumental variable.

In the rest of this section we spend some time setting out the theoretical case for the relationship along edge B of Figure 1. There has been much attention given to the role of international inequalities on poverty. This includes research in international political economy (Hurrell and Woods 1999; Wade 2003; Payne 2005), international law (Krisch 2005; Salomon 2011), economic history (Galbraith 2002; Chang 2003), political theory (Pogge 2008), geography (Peet 2007), globalisation studies (Taylor 2005; Held and Kaya 2007), and the various strands of underdevelopment theory (Payne and Phillips 2010), such as world systems theory (Wallerstein 1974, 1979, 1980), dependency theory (Prebisch 1950; Singer 1958, Frank 1967, 1971; Dos Santos 1970) and imperialism (Galtung 1971). A key theme across this research centers upon the manner in which countries are connected to one another through various

economic and political ties. The structure of this network of international ties, and countries' structural positions within these international networks, is important for understanding contemporary poverty. To justify our expectation that a state's structural position significantly affects domestic development and poverty we expand on three key parts of the literature that examine the role of trade ties, the international division of labour, and the role of trade rules respectively.

First, the role of trade ties. The structural approaches to development originating largely in Latin America in the 1950s and 1960s – collectively labelled 'underdevelopment theory' (Payne and Phillips 2010) – have been particularly important in highlighting the links between international inequality and poverty. The underdevelopment approach focuses, in particular, on the issue of structural inequalities in the international trade system, put in place under colonial rule, whereby some countries are positioned as the producers of primary products (the periphery), while others are positioned as the producers of manufactures (the core). This structural inequality has an impact on poverty because of the secular deterioration in the terms of trade between primary products (mainly produced in the periphery) and manufactured goods (mainly produced in the core) (Prebisch 1950; Singer 1958). Despite increasing industrialisation within many developing countries, primary products continue to form the largest share of exports for the majority of developing countries. Moreover, the terms of trade between labour-intensive low-skill manufactures, such as textiles, and capital and knowledge intensive manufactures, such as electronics, continue to deteriorate (UNCTAD 2005; Kaplinsky 2005; Harvey, Kellard, Madsen, and Wohar 2010). This has meant that over time wealth has flowed from the periphery to the core, leading to the higher prevalence of poverty in the periphery countries due to insufficient resource availability (see Galbraith 2002). According to this view, the prevalence of poverty within a state has as much to do with position within the international structure as it does

with the domestic system.<sup>4</sup> Similar structural arguments can also be seen in more recent work on the impacts of globalization on poverty.

Second, the international division of labour. The recent global value chains (GVC) literature has focused on the way in which countries' structural positions in international trade networks, together with the process of globalisation, have led to falling incomes for producers in many countries (see Kaplinsky 2000, 2005; Gereffi *et al.* 2005; Gereffi and Fernandez-Stark 2011). The GVC analyses have highlighted the manner in which producers must be able to protect themselves from competition using barriers to entry if they are to generate sufficient rents (see Kaplinsky 2005). The globalization processes have led to greater competition and lower barriers to entry in different markets, particularly in the production of manufactured goods where there has been a move towards trade in sub-components. This has, in turn, led to downward pressure on prices. While some producers – particularly those in more developed economies who are positioned in the international trade network as exporters of higher value-added exports – have been able to guarantee economic rents through constructing barriers to entry in various ways, such as marketing and design (enabling product differentiation), through the use of advanced technology, and intellectual property right laws; other producers – particularly those in developing countries involved in more labour-intensive exports – are unable to construct barriers to entry and as such cannot generate sufficient economic rent, due to the way in which these countries are inserted into the international network. Subsequently, the manner in which these countries are inserted into markets with low barriers to entry has fuelled a 'race to the bottom', in which they face a situation of 'immiserising growth' with increasing competition and declining incomes (de Boer *et al.* 2012: 38; Kaplinsky 2000). Therefore, the combination of globalization

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<sup>4</sup> It is worth noting that differences in income levels between countries were relatively small prior to the colonial era (see Maddison 2003). The major differences in levels of development across the world occurred once the colonial global system was put in place, lending support for the argument that structural inequalities in the international system linked to colonial rule have produced the contemporary differences in levels of development around the world.

processes and countries' positions in international trade networks leads to greater poverty as well as driving further structural inequality between countries.

Third, international trade laws have perpetuated structural inequality between countries in at least four different ways. The first is the manner in which trade rules enable developed countries to continue to use tariff and non-tariff barriers to prevent developing countries from entering new markets (Wade 2003; Bardhan 2006; Pogge 2008). The second is the manner in which agricultural trade rules allow developed countries to use agricultural subsidies to lower world prices preventing developing country producers from being able to compete (see Khor 2005; Charlton and Stiglitz 2005). Third is the way in which rich countries have forced many developing countries into rapid and comprehensive trade liberalization. As Chang (2003) has highlighted, this runs counter to the historic experience of the richer nations, the majority of whom made tactical use of protectionist policies combined with investment in key sectors to develop their manufacturing sectors before liberalizing. The final area is the manner in which trade rules on intellectual property rights mean that developing countries have been unable to access technology (including essential medicines) as the price of technology has been driven up by patents (Wade 2003; Pogge 2008; Bardhan 2006; Gallagher 2008).

In summary, the existing literature suggests that the way that countries are inserted into the international network of economic and political ties structures the opportunities and barriers to development and forces states to inhabit particular roles, such as rule-makers or takers and exporters of high- or low-value goods. The evidence points towards structure causing poverty much more than poverty determining structural position. The example of the East Asian "Tiger" economies of South Korea, Singapore, Hong Kong, and Taiwan highlights this argument. The extensive literature on how these countries went from being developing to developed nations has demonstrated the manner in which political leaders in these countries made use of industrial

policy to shift their positions in the global economy, which *then* led to a fall in poverty levels (see Amsden 1989; Wade 1990; Evans 1995; Chang 2003).

In the following section we explain how we operationalize our concept of structural position, using the international trade network and network analysis. In our view this produces an aggregate measure of position which captures the positional inequalities reviewed above (and others) which help perpetuate the hierarchical and unequal international system.

### **Research Design, Data, and Methods**

It is significant that the literatures addressing the poverty-conflict nexus tend to employ single-equation research designs. We argue that, in fact, the two processes that lead to conflict and to poverty are best understood as being endogenous to one another and that any design that neglects to directly account for and model the reciprocal nature of their relationship is likely to reach incomplete (at best) and incorrect (at worst) conclusions.

We employ a two-step instrumental variables probit regression (IVProbit) method to isolate the independent effect of poverty on conflict (see Newey 1987; Rivers and Vuong 1988).<sup>5</sup> We use *network position* as an instrument for poverty, as this is an exogenous independent variable that enables us to examine the impact of poverty on conflict. Our study employs country-year units of observation. Our data matrix is constructed using the EUGene software package v3.204 (Bennett and Stam 2000) and is, in large part, populated using data drawn from the Quality of Government (QoG) database (Teorell, Samanni, Holmberg, and Rothstein 2011). In the first-stage analysis we consider the relationship between our instrumental variable, “network position”, and our endogenous independent variable, “poverty”, which enables us to assess the strength of our instrument. In the second-stage we examine the effect of poverty on our dependent variable, “civil conflict”, using our exogenous instrumental variable.

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<sup>5</sup> We do not include a fixed effects estimator as this would introduce considerable inconsistency due to the incidental parameters problem of using a fixed effects estimator in a nonlinear model – particularly given our analysis includes a high number of states relative to the number of years (see Arellano and Hahn 2007).

### *Dependent Variable*

Our dependent variable, “Civil Conflict”, is measured using the industry standard, UCDP/PRIO database v4-2010 (Harbom and Wallensteen 2010). This dataset includes extensive details of all conflicts within the state—those pitting Government against a non-state challenger/opponent—that resulted in a minimum of 25 battle-deaths. We employ a binary indicator of whether or not a new civil conflict began in the year or not. We specify a “1” if the onset occurs after at least a one year gap since the previous onset. All other country years are coded as “0”.

### *Explanatory Variable and Instrument*

We employ two substitutable measures of our endogenous explanatory variable, “Poverty”. First, “IMR” records the number of infants per thousand of the population that die in the country each year. These data are made available for the entire period of our analysis thanks to the release of Abouharb and Kimball (2007). We employ this as our primary explanatory variable because it captures a commonly cited outcome of the condition of poverty—namely the erosion or failed development of services and infrastructure within the state. Furthermore, IMR has a high level of country and year coverage, and is strongly correlated with other measures of human development and poverty that lack necessary data availability (see Dasandi 2014). As such, we feel confident that this is measuring the extent of underdevelopment and poverty within the state.

As a check on the robustness of results, we also use “GDP per capita” to capture the level of development within the state. This is a measure that is very commonly employed in the extant literature on civil conflict. GDP per capita is measured in US dollars at current year international prices, following Gleditsch (2002). Fearon and Laitin (2003) return strong evidence to show that lower levels of GDP per capita are strongly associated with higher odds of conflict onsets.

In order to shed greater light on the direction of causality between poverty and conflict, we introduce a new instrumental variable for poverty. This allows us to examine the effect of poverty on conflict, as it is exogenously related with poverty, and is informed by the existing literature on the causes of poverty. Specifically, we draw on structural development arguments, which link poverty to international inequality – where international inequality relates to the manner in which countries’ are incorporated into the world economy, as discussed previously.

Our measure reflects the position of countries in international trade networks. We conceptualize the structure of the international system as a network comprised of ties between countries. In order to measure structural inequality in the international system, we use a network analytic approach to calculate countries’ positions within international trade networks between 1980 and 2007. Network analysis is a methodological approach which focuses on examining the relations between actors, and the structures created by these relations, instead of solely considering the attributes of actors (Wasserman and Faust 1994; Scott 2000; Hanneman and Riddle 2005). As such, it enables the measurement of structures, and provides a more dynamic and structural measure of transnational processes such as inequality, dependence and power in the international system (see, for example, Hafner-Burton, Kahler, and Montgomery 2009; Maoz 2011).

We use positional analysis, a key area of network studies, to calculate countries’ positions in international trade networks for each year between 1980 and 2007, by partitioning states according to their “regular equivalence”. The principal aim of positional analysis is to “partition actors into mutually exclusive classes of equivalent actors who have similar relational patterns” (Borgatti and Everett 1992:3). Actors occupying the same position are, therefore, connected in very similar ways to equivalent others in the rest of the network. In the case of international trade networks, a country’s position reflects the way it is incorporated into the world economy; countries in the same position will face similar constraints and opportunities.

Hence, due to the hierarchical structure of international system, we argue that network position provides us with a good indicator of the level of structural inequality a country encounters and provides an efficient and consistent means by which to evaluate the structural position of members of the international system.

There are two stages to calculating countries' network positions for each year (1980-2007). In the first stage, we measure the level of regular equivalence between each pair of countries in each year, using the *REGE* algorithm (White and Reitz 1985). For this purpose, we analyse bilateral trade flow data made available by Gleditsch (2002). The REGE algorithm uses an iterative procedure whereby estimates of the level of regular equivalence between pairs of countries are adjusted based on the equivalences of the countries adjacent to and from members of the pair. Following White and Reitz (1985) and Wasserman and Faust (1994), the measure of regular equivalence based on the *REGE* algorithm can be specified as follows:

$$M_{ij}^{t+1} = \frac{\sum_{k=1}^g \max_{m=1}^g \sum_{r=1}^R M_{km}^t (i_{jr} M_{kmr}^t + j_{ir} M_{kmr}^t)}{\sum_{k=1}^g \max_m^* \sum_{r=1}^R (i_{jr} \text{Max}_{kmr} + j_{ir} \text{Max}_{kmr})}$$

In the equation,  $M_{ij}^{t+1}$  signifies the regular equivalence between countries  $i$  and  $j$  at iteration  $t + 1$  in the trade network.<sup>6</sup> The denominator is the maximum possible value attainable if all of  $i$ 's ties to and from all other countries, denoted  $k$ , perfectly matched all of  $j$ 's ties to and from all other countries, labelled  $m$  – and if  $i$ 's and  $j$ 's alters,  $k$  and  $m$ , were regularly equivalent with one another. The numerator selects the best matching of the ties between  $j$  and  $m$ , for  $i$ 's ties with  $k$ , weighted by the regular equivalence of  $k$  and  $m$  from the previous iteration. Therefore, the *REGE* algorithm finds the optimal matching of ties between  $i$  and all other countries, with ties between  $j$  and all other countries, weighted by the equivalence of the other countries, and divides this by the maximum possible value of the numerator (Mahutga 2006: 1870). Therefore,

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<sup>6</sup> The trade ties between countries are denoted  $X_r$ . In the above equation,  $i_{jr} M_{kmr}$  signifies the extent to which  $i$ 's ties with a country  $k$ , correspond with  $j$ 's ties with some country  $m$  on  $X_r$ . This can be quantified by  $i_{jr} M_{kmr} = \min(x_{ikr}, x_{jmr}) + \min(x_{kir}, x_{mjr})$



the regular equivalence value  $M_{ij}$  is a function of how well  $i$ 's ties with other actors can be matched by  $j$ 's ties with all other actors, and vice versa. The equivalences of each pair of actors are revised after each iteration (see Wasserman and Faust 1994: 477-478).

The second step of the positional analysis is to place countries into the different positions based on the regular equivalence scores. This is done using the hierarchical clustering procedure, which assigns the different countries to subsets based on the similarity of their regular equivalence scores (Johnson 1967). The complete link hierarchical clustering procedure works by setting a threshold value,  $\alpha$ , where the regular equivalence scores of all pairs of countries within the group is no lower than the threshold value. In other words for two countries  $i$  and  $j$ , with regular equivalence  $M_{ij}$ , each subset should consist of countries for which  $M_{ij} \geq \alpha$  (Wasserman and Faust 1994). The procedure uses sequentially less restrictive values of  $\alpha$  to produce the clusters. We chose to partition the actors in four positions for theoretical and methodological reasons.

Theorists have traditionally posited a threefold division of the world into a core, semi-periphery and periphery (Frank 1967, 1971; Wallerstein 1974, 1979, 1980). The core contains the industrialized countries that exploit the periphery and semi-periphery; countries in the semi-periphery exploit the periphery and play a political buffer role; and countries in the periphery are exploited, though with differences within each in terms of domestic elites and urban-rural exploitation. So a threefold partition was our default starting point, but we decided to produce 2-, 3-, 4-, and 5-fold partitions of the regular equivalence scores and compare. Upon inspection the fourfold partition made the most substantive sense. That is to say, cross-checking the partition memberships against the World Bank's income categories suggested that the fourfold organisation was the most plausible in terms of the internal coherence of the state groupings and the differences between the 4 partitions.

[Figure 2 About Here]

Finally, we also allowed the output from the hierarchical clustering to guide our choice. The measure of regular equivalence produced is between 0 and 1, where a score of 1 indicates strict regular equivalence. The hierarchical clustering output indicates the level at which a pair of actors are aggregated to produce a new cluster. Therefore, we can check to see how much extra regular equivalence is “gained” with each additional split. This is depicted in Figure 2 which shows the overall increase in the regular equivalence scores at which the cluster was made and the magnitude of jump from N-1 clusters to N clusters. As the figure suggests, going from two to three clusters improves the fit, but not as much as the decision to move from three to four clusters. As such we adopt a fourfold partition of regular equivalence scores derived from the international trade network. The hierarchy of these four positions was determined by the level of average trade that took place between countries in the same position.

Figure 3, below, depicts the international trade network for the year 2000 with countries’ positions indicated by the different colours of the nodes in the network. Countries in the core are coloured red, the ‘upper semi-periphery’ are coloured blue, the ‘lower semi-periphery’ yellow, and the periphery countries are coloured green. The diagram does not show the volume of trade between countries, only whether or not a country trades with other countries. For the purposes of clarity, only trade ties over the value of USD ten million (at 2000 prices) are included in the diagram.

[Figure 3 About Here]

### *Control Variables*

We also include a number of country-level control variables that are drawn from the literature on conflict onset. These variables are included because they represent alternative explanatory factors for conflict onset in a country based on arguments made in the existing civil conflict literature. As such, these variables are included to ensure that the relationship between poverty and conflict onset, which we examine here, is not spurious. Given our analysis centers on the poverty-conflict nexus, we have also taken care to ensure that our control variables are not intervening variables in the relationship between poverty and conflict onset (see Ray 2003).

“Lagged Economic Growth” is taken from the World Bank’s annual percentage growth rate of GDP data. Collier and Hoeffler (1999) show that economic growth has a significant impact on lowering the likelihood of a state experiencing a new onset of civil conflict. This, they argue, is because low and negative growth is linked to a lack of new income opportunities.

“Polity” is operationalized using data from the PolityIV dataset (Marshall and Jaggers 2002). We use the polity score to measure levels of democracy and institutional quality, which assigns countries a score between -10 and 10 based on the quality of executive recruitment, constraints on executive authority, and political competition. The link between democracy and lower levels of conflict is based on the argument that democracies are associated with lower political repression because citizens are able to vote for political leaders. Furthermore, democracies are associated with greater civil liberties, which again, makes repression less likely. The literature reports incredibly mixed findings on variables designed to capture the extent of democracy in the state. Fearon and Laitin (2003) do not identify a statistical impact for democracy upon the likelihood of conflict, whereas Hegre, Ellingsen, Gates, and Gleditsch (2001) identify evidence of a democratic civil peace.

“Oil exporter” is a dummy variable measured as a “1” if greater than one-third (33%) of a state’s export revenues come from the export of fuels. Oil producers are generally viewed as having weak state apparatus because leaders can rely on oil revenues. In addition, the high levels

of oil revenues make state power more attractive, increasing the likelihood of rebellions. These data represent an extended version of those employed in Fearon and Laitin (2003), where it was shown that being an oil exporter more than doubled the likelihood of a state experiencing a new onset.

“Population” is measured as the total number of inhabitants of the state. These data are drawn from the United Nations Statistics Division’s national accounts database (United Nations Statistics Divisions 2009). This variable is logged. This variable is consistently shown elsewhere to have a strong positive relationship with civil conflict onset (see, for example, Fearon and Laitin 2003, Collier and Hoeffler 2002). The argument being that larger populations make it more difficult for states to maintain order in a given territory, and also increase the number of potential recruits into rebel organizations.

“Peace Years” is calculated by considering the number of years since a country experienced a prior conflict onset, using the data from the UCDP/PRIO database (Harborn and Wallensteen 2010). This is included on the basis that a country that has recently experienced civil conflict is more likely to witness the onset of a new conflict than one that has not experienced civil conflict for a number of years.

“Mountainous Terrain” is the estimated % of territory with mountainous terrain. This variable is logged. This variable is included in the conflict equation and has been shown elsewhere to very strongly relate to civil conflict—with states with more mountainous terrains consistently more likely to experience new onsets (Fearon and Laitin 2003). More mountainous terrain is favourable for rebel groups as they are able to conceal themselves more easily from government forces.

“Ethnic Fractionalization” is based on the widely used ethnolinguistic fractionalization index, which uses data from the Soviet ethnographic index. The variable measures the probability that two random selected individuals in a country are from different ethnolinguistic

groups (Fearon and Laitin 2003). The cleavages associated with more ethnically fractionalized societies are commonly argued to be a primary source of conflict between ethnic groups and their governments.

## Results

Table 1 presents the results of the two-step IV-probit regression analysis, which considers the effect of poverty, measured by infant mortality rate (IMR) and GDP per capita, on the onset of civil conflict. We use our instrumental variable— *network position*— to test the effects of poverty on conflict onset. In Model 1 we use logged infant mortality rate to measure poverty, while in Model 2 we use logged GDP per capita as a measure of poverty. The table also presents the F-statistics from the first stage regressions, which enables us to assess the strength of our instrumental variable.

[Table 1 About Here]

The results demonstrate that poverty is associated with a higher likelihood of a country experiencing the onset of civil conflict. In Model 1, in which we substitute IMR with our instrument, the IV-probit regression yields a positive and highly statistically significant estimate for the coefficient of the poverty parameter. In Model 2, we use the network position variable as an instrument for GDP per capita. The IV-probit regression produces a negative and statistically significant parameter estimate. In order to test the strength of our instrumental variable, we conduct an additional test. In Table 1, the F-statistic from each of the first-stage regressions is presented, which enables us to assess the strength of our instrumental variable in each of the model specifications. In both of the models, the F-statistics far exceed any informal threshold (as established, for instance, by Staiger and Stock (1997)).

Hence, Table 1 helps us to reach two important conclusions. First, poverty (whether measured as greater infant mortality or as lower per capita income) is strongly associated with the onset of civil conflict. Second, *network position* serves as a strong instrument for poverty. The results of the analysis, in which we instrument for the endogenous poverty, are consistent and substantively non-trivial. Accordingly, we have uncovered strong evidence in support of our test hypothesis, demonstrating that poverty plays a causal role in the onset of civil conflict.

In order to illustrate the value of these substantive findings, it is meaningful to compare the model's predicted probabilities (having accounted for the endogeneity of the poverty-conflict relationship) of the likelihood of conflict in countries with relatively high and low levels of poverty. France in 1992 had an IMR of 7, which is close to the 10th percentile. At that same time, Burkina Faso had an IMR of 111.11, which is approximate to the 90th percentile for the population as a whole. In line with our expectation, the model identifies probabilities for civil war of 0.012 and 0.068, respectively. In other words, moving from the 10th to the 90th percentiles on poverty is associated with an almost six-fold increase in the likelihood of experiencing civil war.

In order to further highlight the real-world implications of these findings it is informative to examine the model's predicted probabilities for Angola, one of the countries discussed in the introduction. Given the extremely high level of poverty that the country experienced in 1991 (IMR = 205.9), it is unsurprising that the probability of the country experiencing the onset of civil conflict in that year was relatively high: 0.137. It is worth highlighting that at the same time, some of Angola's neighbors had much lower likelihoods of experiencing conflict, likely because of their lower levels of poverty. Zaire's probability was 0.070 (their IMR = 120); the Republic of Congo's was 0.058 (IMR = 114); and Zambia's was 0.094 (IMR = 108). Importantly, each of these countries experienced (relatively speaking) more peaceful conditions through the late 1980s and early 1990s.

In both of the models, we also find that the size of countries' *populations* impacts the likelihood of a country experiencing civil conflict, which supports the results of other studies (Collier and Hoeffler 2002; Fearon and Laitin 2003). The results suggest that when we control for other factors, including poverty levels, higher levels of democracy are associated with a higher risk of a country experiencing the onset of civil conflict.<sup>7</sup> Furthermore, in Model 1, in which we use logged IMR as a measure of poverty, we find that while a country being an *oil exporter* increases the likelihood of it experiencing civil war, *economic growth* does not have a statistically significant effect. In Model 2, in which logged GDP per capita is used to measure poverty, we find again that a country being an oil exporter increases its likelihood of experiencing civil war. However, *economic growth* remains statistically insignificant. In both models, we also find that greater *ethnic fractionalization* is associated with a greater likelihood of conflict but countries with greater amounts of *mountainous terrain* are no more likely to experience civil conflict. Finally, both models returns statistically insignificant estimates for the coefficients on the peace years parameter. This suggests that, *ceteris paribus*, temporal dependence does not appear to impact conflict onsets.

### *Robustness Checks*

In order to confirm the robustness of our finding, we conduct a number of additional checks. In Table 2, we use the individual positions as instrumental variables rather than the single continuous *network position* variable. Specifically, we include *Position 2*, *Position 3*, and *Position 4* as dummy variables to be used as instruments. The results of the IV-probit using the individual positions are very similar to the results when using the continuous variable.

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<sup>7</sup> We also included the variable (Polity)<sup>2</sup> in the regression model to test whether the effect of democracy on conflict onset is curvilinear. However, the inclusion of this variable did not have a significant impact on the findings, as the regression coefficient for Polity remained positive and statistically significant at the 99 percent confidence level, while the coefficient for (Polity)<sup>2</sup> was not statistically significant.

Furthermore, the F-statistics from the first stage regressions once again confirm that our instrument is strong.

[Table 2 About Here]

Finally, in Table 3 we use alternative measures of the dependent variable, *conflict onset*. Instead of using a measure of conflict onset based on a one-year gap between the onset of new conflicts in a country; we consider conflict onset based on two- and five-year gaps following a previous conflict in a country. By increasing the number of years between conflicts in a country, we ensure that we differentiate between the onset of new conflicts in a country and not just interruptions in the same prolonged conflict within a country. The results show that we using a measure of conflict onset with a two-year gap between conflict onsets, the results of the IV-probit are almost identical to our previous results. When using a measure of conflict onset with a five-year gap between onsets of conflict, we find that poverty is more strongly linked to conflict onset. As such, the results provide further support for the findings of our analysis.

[Table 3 About Here]

## **Conclusion**

In conclusion we address the policy, theoretical, and methodological implications of the article. With respect to the policy implications, we make two points based on our empirical results which are framed in reference to the benchmark statement on conflict and development provided by the World Bank's 2011 *World Development Report: Conflict, Security, and Development*. First, and our stronger claim, is that the trend towards taking poverty and development issues seriously when dealing with conflict is a welcome one. In essence our results merely confirm the



emphasis placed on reducing poverty and increasing economic empowerment is correct.

However, as the World Bank (2011:6) states, ‘it is difficult to disentangle causes and effects of violence.’ Our results provide the clearest systematic evidence that, in addition to the theoretical and intuitive arguments about the endogeneity of the poverty-conflict, there is a causal arrow running from poverty to conflict. Despite prior assumptions about this being the case it has not been demonstrated before at the country level. Future research can build on this by focusing upon identifying the microfoundations of this relationship.

In contrast, our second policy implication runs counter to the conclusions of the *World Development Report*. The World Bank grants a significant portion of the report to discussing new directions for international policy. The role of external factors is framed as ‘reducing external stresses and mobilizing external support’ (see Chapters 8 and 9), so for example the role of volatile food prices, or insecurity spillovers from neighbouring countries, and climate change. As such external economic factors are rendered as exogenous “shocks” and ignore the more ongoing and indeed political role of international inequalities. Likewise, the emphasis on donors helping to transform domestic institutions, building coalitions and confidence are certainly important, but mainstream analyses tend to reduce poverty and conflict to a purely “internalist” explanations. In contrast, our conclusions are very much in line with Thomas Pogge’s (2008) critiques of the problematic way in which international responsibility is framed as a question of positive duties to assist. Instead, the international community should consider its responsibility towards addressing global poverty (and in this case conflict too) through the frame of negative duties of ‘not harming’. The logic of our structural position instrument and our results suggest that there is a strong empirical case for considering domestic conflict and poverty within the context of international inequalities. Our results suggest these are fruitful and important avenues for further research.

In addition to our empirical results and their policy implications the article makes a number of further contributions, one theoretical and two methodological. Theoretically, we contribute to the existing literature in development and conflict studies and deepen understandings of the relationship between poverty and civil conflict, especially with respect to the influence of international structures upon this relationship. While the development-conflict literature has neglected the international context, the academic study of international relations has also typically neglected issues of poverty and development (Payne 2005; Taylor 2005; Thomas 2005). There is a strong case for studying the impact of international inequality on developing countries (Hurrell and Woods 1999; Held and Kaya 2007; Pogge 2008) and our article outlines an appropriate and rigorous methodology for doing so. As such we add to the existing literature on international relations and international political economy, developing a deeper understanding of the role of the structure of the international system on domestic outcomes such as poverty and conflict. What we haven't done here, is tease out the precise international mechanisms or channels through which poverty is perpetuated. Our measure is a consciously general one; we view it as a composite measure of a number of different processes. Future research can usefully build on the results presented here by unpacking how different ties – such as trade in types of goods and services, arms exports, production networks, rule making / taking, aid and so forth – matter for generating poverty, greed, grievance and its relationship to poverty.

Finally, methodologically, we have built upon a fledgling literature that accurately models conflict and poverty as endogenous. We have followed other recent efforts making use of instrumental variables to identify and exploit sources of exogenous variation in order to estimate the impact of poverty on conflict. Other notable efforts to instrument for endogenous "causes" of conflict have included examining rainfall and colonial settler mortality. Unfortunately, due to the logic justifying their employment, neither is applicable to models seeking to account for

variation outside of the African continent. We believe our international inequality instrument is a more global source of exogenous variation and significantly, and it has the added benefit of being time variant. Second, we have demonstrated the utility of formal network analysis tools in the investigation of the structure of international ties. Network analysis has been used extensively in disciplines such as sociology and anthropology, however, only since the late 1990s have scholars really begun to incorporate network analytic tools to address key issues in the study of international relations, security and development (Hafner-Burton et al. 2009; Maoz 2011).

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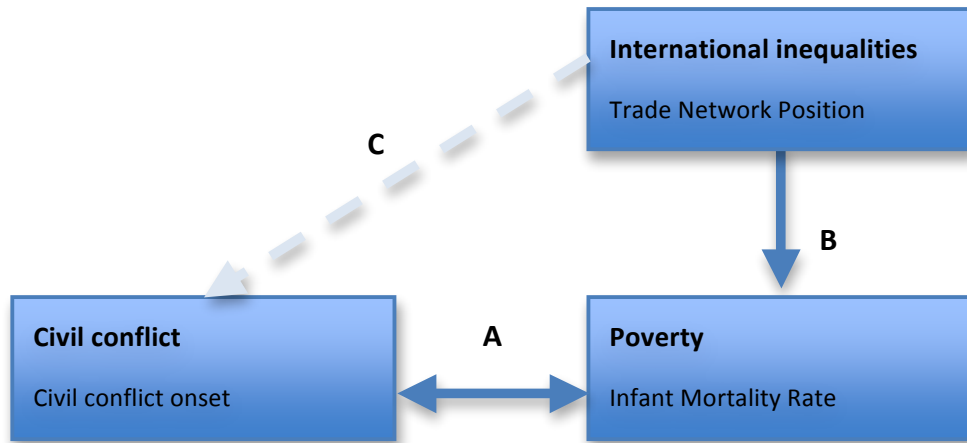
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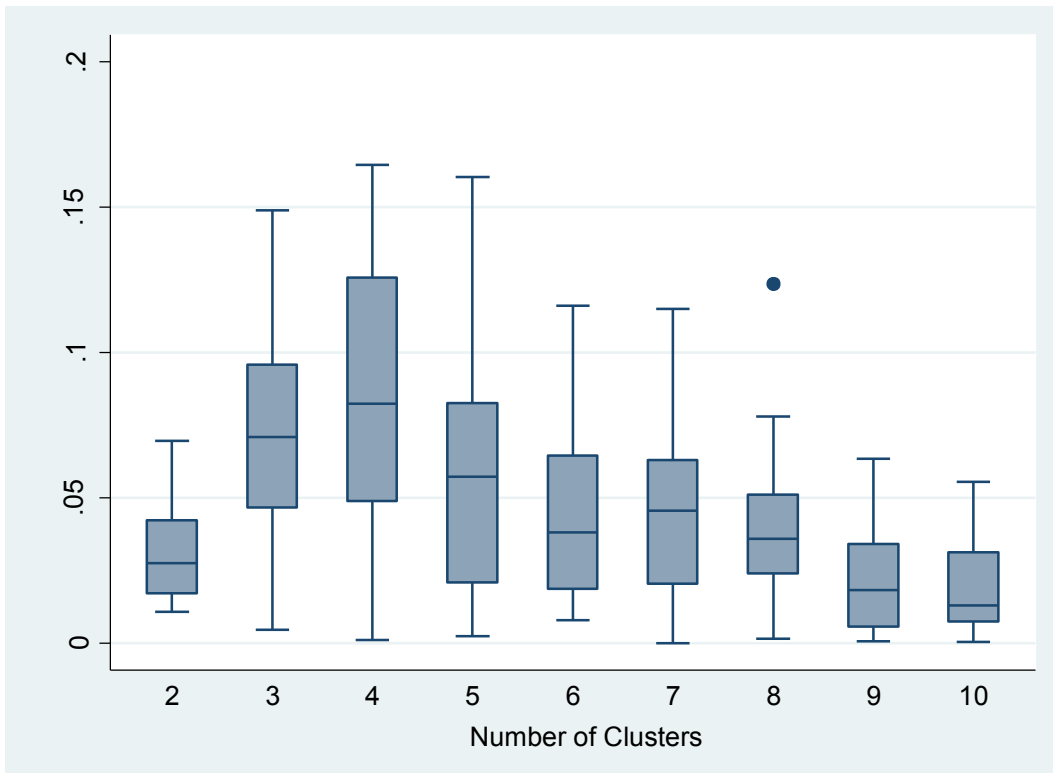


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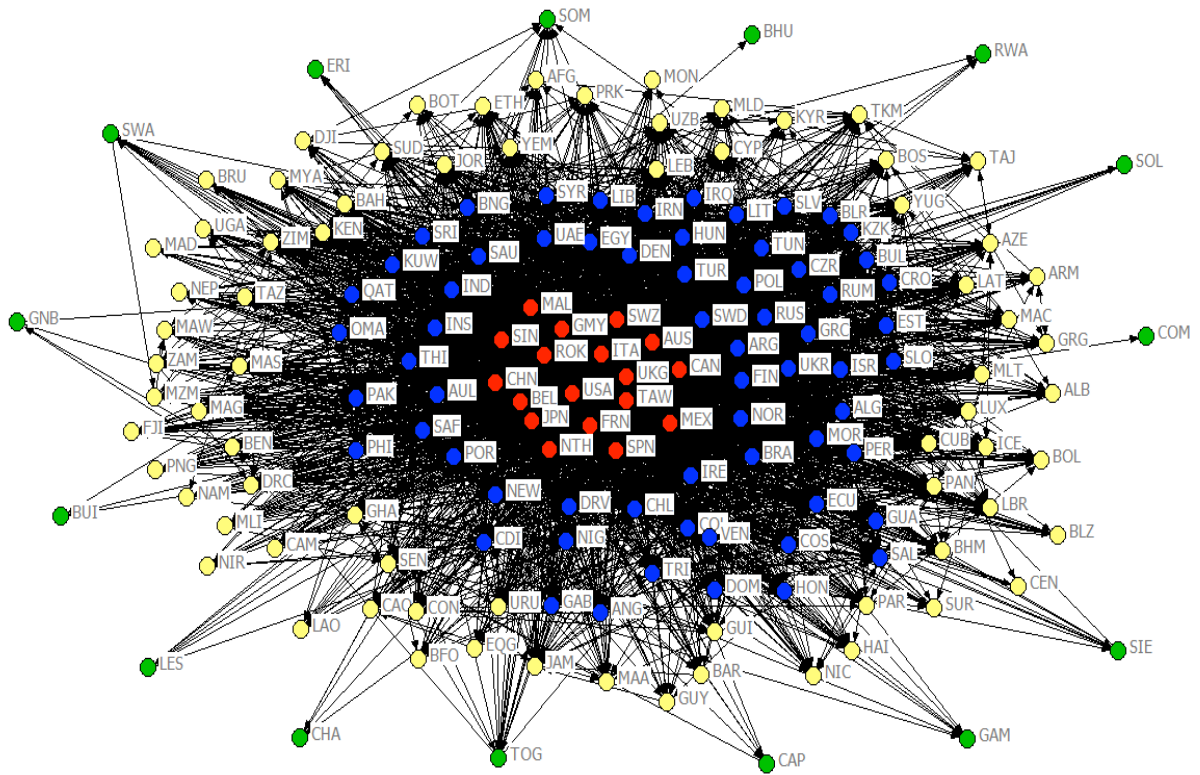
**Figure 1: Hypothesized relationships between conflict, poverty, and international inequalities**



**Figure 2: Hierarchical Clustering of Regular Equivalence**



**Figure 3: International Trade Network, 2000**



**Table 1: Two-step IV-probit estimate of poverty and conflict, DV: conflict onset**

	1	2
ln (IMR)	0.341*** (0.098)	
ln (GDP per capita)		-0.201*** (0.061)
Polity	0.033*** (0.009)	0.028*** (0.008)
Oil	0.257** (0.112)	0.413*** (0.128)
ln (Population)	0.161*** (0.031)	0.133*** (0.030)
Economic Growth <sub>(t-1)</sub>	0.010 (0.007)	0.012* (0.007)
ln (Mountainous)	0.015 (0.035)	0.025 (0.035)
Ethnic Fractionalisation	0.717*** (0.220)	0.850*** (0.202)
Peace Years	0.008 (0.060)	-0.005 (0.060)
Constant	-6.096*** (0.666)	-2.809*** (0.737)
Instrumental Variable	Network Position	Network Position
First-stage F-Statistic	793.29	868.27
No. of Observations	3302	3302

Note: Robust standard errors in parenthesis. \*\*\*, \*\*, \*, indicates significance at the 1, 5, and 10% level, respectively. Cubic splines included in models but omitted from table.

**Table 2: Two-step IV-probit estimate of poverty and conflict, DV: conflict onset, Instrument: individual network positions**

	1	2
ln (IMR)	0.340*** (0.099)	
ln (GDP per capita)		-0.199*** (0.062)
Polity	0.033*** (0.009)	0.027*** (0.008)
Oil	0.257** (0.112)	0.411*** (0.128)
ln (Population)	0.160*** (0.031)	0.134*** (0.030)
Economic Growth <sub>(t-1)</sub>	0.010 (0.007)	0.012* (0.007)
ln (Mountainous)	0.015 (0.035)	0.025 (0.035)
Ethnic Fractionalisation	0.717*** (0.221)	0.855*** (0.202)
Peace Years	0.008 (0.060)	-0.005 (0.060)
Constant	-6.083*** (0.664)	-2.836*** (0.745)
Instrumental Variable	Position 2 Position 3 Position 4	Position 2 Position 3 Position 4
First-stage F-Statistic	694.26	768.01
No. of Observations	3302	3302

Note: Robust standard errors in parenthesis. \*\*\*, \*\*, \*, indicates significance at the 1, 5, and 10% level, respectively. Cubic splines included in models but omitted from table.

**Table 3: Two-step IV-probit estimate of poverty and conflict, DV: conflict onset (2 year gap) and conflict onset (5 year gap)**

	1 (conflict onset: 2 year gap)	2 (conflict onset: 2 year gap)	3 (conflict onset: 5 year gap)	4 (conflict onset: 5 year gap)
ln (IMR)	0.281*** (0.106)		0.278** (0.117)	
ln (GDP per capita)		-0.159** (0.066)		-0.166** (0.073)
Polity	0.027*** (0.010)	0.023** (0.009)	0.027** (0.011)	0.025** (0.010)
Oil	0.299** (0.119)	0.422*** (0.136)	0.158 (0.140)	0.269* (0.159)
ln (Population)	0.151*** (0.033)	0.127*** (0.032)	0.130*** (0.036)	0.112*** (0.036)
Economic Growth <sub>(t-1)</sub>	0.008 (0.007)	0.009 (0.007)	0.000 (0.009)	0.002 (0.008)
ln (Mountainous)	0.023 (0.037)	0.031 (0.037)	-0.000 (0.041)	0.010 (0.041)
Ethnic Fractionalisation	0.743*** (0.238)	0.861*** (0.218)	0.531** (0.260)	0.639*** (0.238)
Peace Years	-0.009 (0.066)	-0.020 (0.065)	-0.086 (0.077)	-0.096 (0.077)
Constant	-5.910*** (0.705)	-3.230*** (0.799)	-5.532*** (0.776)	-2.907*** (0.901)
Instrumental Variable	Network Position	Network Position	Network Position	Network Position
First-stage F-Statistic	788.43	868.22	788.43	868.22
No. of Observations	3286	3286	3286	3286

Note: Robust standard errors in parenthesis. \*\*\*, \*\*, \*, indicates significance at the 1, 5, and 10% level, respectively. Cubic splines included in models but omitted from table.