Moments in time: Temporal patterns in the effect of democracy and trade on conflict

Mark David Nieman
University of Alabama, USA

Abstract

Building on economic norms theory, I argue that the causes of international conflict may be contextual rather than constant over time. I explore the temporal patterns in the predictors of conflict in data on European conflict between 1870 and 2001, using an endogenous Markov chain Monte Carlo Poisson change-point model. I find that the period can be divided into two time periods, different in terms of the direction of the effect of the main conflict predictors. While democracy has a positive effect on conflict in the period between 1870 and 1938, it has a negative effect from 1938 to 2001. Likewise, trade initially has no impact on conflict, but later exerts a pacifying effect. Post-estimation analyses suggest that such patterns are best explained by the externalization of contractual norms, which is consistent with economic norms theory.

Introduction

International relations (IR) scholars have identified a number of time- and context-specific patterns in international outcomes. The effect of democratization on war, for example, varies depending on the historical and regional context (Gleditsch and Ward, 2000). Barbieri (1996) finds that trade had a positive effect on militarized disputes between 1870 and 1938, while Oneal and Russett (1997) find a negative relationship between 1950 and 1985. Bennett and Stam (2004) test Bueno de Mesquita and Lalman's (1992) international interaction game and uncover significant variation in the model's explanatory power for different regions and time periods. Surprisingly, such temporal and contextual empirical inconsistencies are rarely theoretically problematized and explored.

In this paper, I integrate and explain these disparate results by supplementing rationalist theories with a social account.[1] The theoretical argument consists of two parts. First, I argue

Corresponding author:
Mark David Nieman, University of Alabama, Department of Political Science, 312 ten Hoor Hall, Tuscaloosa, AL, 35487, USA.
Email: mdnieman@ua.edu

that the effects of democracy and trade on conflict are non-constant over time, in direction or magnitude. In particular, the temporal period under analysis, limited to European states (1870–2001) owing to data availability, contains multiple distinct time periods or *temporal regimes*, such that the effect of the main predictors of conflict (trade and democracy) is constant within these time regimes, yet different between them.[2] Each time regime is separated from the previous one by a structural break in conflict predictors—a transition from one conflict regime to the next.[3] Second, I argue that this structural break occurred as a result of a change in the contractual norms within an economic system (e.g. from mercantilism to liberalism).

I identify temporal regimes in a system's conflict outcomes using an endogenous Markov chain Monte Carlo (MCMC) Poisson change-point model (Chib, 1998; Park, 2010). Change-point models work by identifying structural breaks in the effects of a set of covariates, while the MCMC simulations generate measures of uncertainty associated with these breaks. By allowing for changing effects, change-point models provide a valuable tool for rigorous analysis of social theory propositions. In addition, measures of uncertainty allow for constructing probabilities of a break at each time point. These probabilities, in turn, can be used in post-estimation analyses to identify predictors of the structural break.

The results demonstrate that the underlying data-generating process of European conflict differs by time period. Specifically, the model identifies one structural break between 1870 and 2001, pointing to the existence of two qualitatively distinct time periods. Importantly, the analysis reveals a between-period shift in the effects of *explanatory variables* of conflict (in terms of their strength, direction, and significance), rather than just a change in conflict propensity. Prior to 1938, the proportion of democratic states had a positive effect on conflict, while neither the level of trade nor power concentration were significant factors. After 1938, however, democracy exerted a negative effect on conflict, as did trade and power concentration. This means that the impact of key explanatory variables of conflict is context- and time-specific, rather than time-invariant, as implicitly assumed by most theoretical and statistical models.

Post-estimation analyses, using ordinary least squares (OLS) estimation, show that the break can be attributed to an increase of economic contractual norms in Europe. The results provide support for social explanations of conflict, which maintain that actors adjust their behavior in response to their contemporary social context. My theoretical and modeling approaches contribute to the broader IR literature by shedding new light on old theoretical puzzles, providing a more nuanced understanding of the political world and creating theoretical space for multiple theoretical accounts, albeit at different time periods.

Social context and empirical puzzles

Arguing for a richer understanding of international politics, social theories maintain that the significance and effect of explanatory variables are context-specific rather than constant over space and time. Wendt (1999: 159–160) argues that "common knowledge concerns actors' beliefs about each other's rationality, strategies, preferences, and beliefs, as well as about states of the external world". He continues, "common knowledge is subjective in the sense that the beliefs that make it up are in actors' heads, and figure in intentional explanations". Similarly, for Geertz (1973: 5), a social actor is "an animal suspended in webs of significance that he himself has spun" and "culture [is] those webs". That is, social outcomes are conditioned by the social structure in which they occur and these structures exist as part of an ongoing process.

For example, both the UK and North Korea possess nuclear weapons, but the USA considers only the latter a dangerous threat despite the logistical advantages of the former (Mueller, 2009: 54). Wendt (1999) emphasizes that this intersubjective knowledge and collective identity are not constant, but evolving. Unfortunately, most empirical studies ignore the effects of spatial and temporal contexts, instead treating data as though they were generated in an ahistoric manner (Ferguson and Mansbach, 1991).

This is unfortunate, as theories based on rational choice assumptions expect changes in observed behavior as individuals respond to the expected behavior of others, and these expected behaviors depend on the accepted responses within an underlying social structure. As Vasquez (2009: 95) argues, "[foreign policy] practices are similar to games in that they are social creations, they have their own rules, and these rules give rise to a set of expectations about what certain actions are taken and what future actions can be conceptualized". Thus, if the rules or payoffs in the game change in response to different social contexts, their expected outcomes will change as well (Bueno de Mesquita, 2004; Fearon and Wendt, 2002). Social theories account for this by expecting changes in observed behavior in response to the emergence of new social norms, which create new social structures with their own rules and accompanying shared expectations (Finnemore, 1996; Wendt, 1999).

Social theories are able to account for change because they view political actors as individuals or groups of individuals that both impact and are impacted by their social structure (Mansbach and Vasquez, 1981). Because of this, political actors are susceptible to intellectual fads of their era. Ferguson and Mansbach (2003: 145) contend that many concepts central to IR theories, such as interdependence, power, and national interests, "are constructions of the actors themselves and do not exist apart from the perceptions of authoritarian others". Therefore, actors' interpretations of the material world depend on the existing body of knowledge they hold at any particular place or time. Senese and Vasquez (2008), for example, argue that the *realpolitik* framework is a "culture", or expectation, held by state leaders, and this "culture" can change over time. This means that history is made up of different eras with different rules of play constraining actor behavior (Mansbach and Vazquez, 1981).

The change in government positions on monetary and fiscal policies over the past 100 years provides another illustration. Ikenberry (1993: 58–59) argues that, in the aftermath of World War II, most economists and officials held Keynesian views. These ideas were "crucial in defining government conceptions of postwar interests", and "the 'new thinking' of these experts transformed the way people thought of or framed the issue of postwar economic order and, as a consequence, changed the outcome". Similarly, Ruggie's (1982) analysis describes the post-World War II economic order as embedded within a larger social context. He notes that, for many governments, control of inflation became a more pressing concern than full employment in the late 1970s and early 1980s. This normative change is credited to the increased role of orthodox liberal economists within governments' economic ministries and American universities.[4]

Changes in normative dispositions also affect the security realm. Wendt (1999) suggests that during the eighteenth and nineteenth centuries, European states viewed each other as rivals over territory and glory but, owing to extensive ties among the royal families and nobility, did not seek to destroy one another. After democratization, these states no longer saw each other as rivals, but as friends. He argues that, while European states may hold disagreements, the act of warfare among them is inconceivable. Bennett and Stam (2004: 19) summarize Wendt's argument in statistical terms by stating "that a dyad's underlying tendency

to resort to war is a function [...] of some mutually socially constructed identity that is subject to change over time".

The changing nature of social context means that a single grand theoretical model may be insufficient for explaining the outcomes during different time-periods. Instead, each time period may necessitate its own theoretical model, consistent with the predominant social norms of that period. This helps explain a sometimes drastic difference in empirical findings when tested on different time-frames. Methodologically, the idea of time-dependent effects is consistent with the concept of weak exogeneity (Engle et al., 1983).

Conditional effects of democracy and trade

The literature offers a number of contrasting theoretical expectations regarding the effects of trade and democracy on conflict. In regards to trade, Grieco (1988) and Gowa (1989) theorize that states view their gains from trade in zero-sum terms and therefore fear relative losses, which they view in terms of decreased autonomy and security. As a result, relative losses from trade may lead to conflict. Snidal (1991), however, contends that, when the number of states is large, relative gains no longer matter. Since conflict is costly and trade is beneficial in absolute terms, trade should decrease, rather than increase, conflict. The empirical findings also diverge, as several scholars discover that trade reduces conflict (Oneal and Russett, 1997; Peterson and Thies, 2012), while others show that trade has either a positive or null effect (Barbieri, 1996; Keshk et al., 2004).

Contrasting expectations and results are also found in the literature regarding the effect of democracy on conflict, especially at the systemic level. Proponents of the democratic peace often extend the dyadic democratic peace logic to the system level, expecting a negative relationship between the number of democracies and conflict in the system (Cederman and Gleditsch, 2004; Mitchell, 2002). In contrast, Gleditsch and Hegre (1997) and Rasler and Thompson (2005) argue that conflict is initially more likely as the proportion of democracies increases, especially since democracies tend to initiate conflicts against autocratic regimes (Bennett and Stam, 1998). Maoz and Abdolali (1989) and Senese (1997) find empirical evidence for a positive relationship between democratization and conflict.

Another approach is to explicitly model the temporal influence of conflict and proportion of democracies in the system. Mitchell et al. (1999) find structural breaks in both the effect of democracy on war and that of war on democracy. Cederman and Rao (2001) examine the democracy–conflict dynamic at a dyadic level, finding that the pacifying effect of democracy on conflict has increased over time. Finally, Crescenzi and Enterline (1999) demonstrate that democracy reduces conflict at the macro-level within regions while Gleditsch and Ward (2000) find similar results at the dyadic level. Taken together, these studies suggest that the pacific effects of trade and democracy may be temporally and socially conditioned.

Contract norms as an intervening variable

This paper's framework allows for a reconciliation of the seemingly inconsistent theoretical and empirical results described in the previous section. This is accomplished by allowing for multiple time-periods, with a possibility of covariates exerting different effects on conflict during each period. I argue that, rather than downplaying or ignoring the existing empirical inconsistencies as they relate to trade and democracy, researchers should view these as evidence against the existence of a singular, universal explanation of conflict.

Building on economic norms theory (Mousseau, 2003, 2009), I argue that determinants of conflict are conditioned by the social context of the specific era, namely by the contemporaneous levels of contract intensity within a social system. In other words, variables affecting the amount of conflict within Europe—here I focus on the proportion of democratic states and the amount of trade—will have different effects during the earlier time period(s) of low contract-intensity and later time period(s) of high contract-intensity.[5]

Economic norms theory posits, in brief, that, while the economy, political institutions and social norms interact and mutually reinforce one another, the latter two should bend towards economic behavior (Mousseau, 2003; North et al., 2009). In the case of Europe, this suggests that European market-oriented economic development helped create liberal political and cultural values. In other words, the level of contractual enforcement, characteristic to a particular geographical region and time period, is a central tenet of a functioning market economy, and as such plays an important role in shaping political institutions (Mousseau, 2000).

In order to enforce contracts, states must create and enforce transparent legal mechanisms. Contractual norms develop and become internalized as economic legalization becomes embedded in a state's judicial system. Contractual norms generate "legalistic mechanisms [that] alter the cost–benefit calculus of cheating by increasing the probability of detection, resolving conflicts of interpretation, and endorsing commensurate sanctions or making rulings directly applicable in domestic law" (Smith, 2000: 138–139). Domestic economic contract-intensity alone, however, is not enough to produce structural changes in conflict behavior. As Mousseau (2003: 489) argues, "it is becoming more recognized … that institutions are not enough to grasp political phenomena" and that we should shift our collective focus towards finding "structural regularities that influence the formation of beliefs and preferences across nations". That is, in order to create an international community or society of states, contractual norms must be shared throughout this community.

Domestic transparency and information-sharing produces generalized norms and expectations that spill over into other realms of society, including relations between states. As economies become more robust owing to an increasingly complex division of labor, contract norms become entrenched at the domestic level because "most adults in a society obtain their incomes and consumer goods by interacting with the norms of market competition: with free choice, bargaining, and regularized interactions with strangers" (Mousseau, 2003: 489). Relative to non-contract intensive economies, states with strong economic contractual norms augment economic dynamism and growth by being more tolerant of strangers and outsiders, including foreign firms and migrants, to whom they extend the same liberal economic protections (Hollifield, 1992). Once the number of states possessing respect for legal contracts across a community or society reaches a critical threshold, its members start to observe the pacific effects of commerce and democracy.

Hence, I expect that increases in the externalization of contractual norms will be positively associated with qualitative changes in the effects of the determinants of conflict propensity among European states. This produces the following hypothesis:

Structural Break Hypothesis (H1): An increase in economic contractual norms is positively correlated with the probability of a structural break.

Conditional effect of trade on militarized conflict

Contract norms intensify as individuals increasingly interact with strangers within a market structure. On the inter-state level, these norms are externalized, as firms interact, reach agreements and sell goods between themselves. This means that it is not trade *per se* that reduces conflict, but rather trade within the context of a contract-intensive European society. The two types of arguments regarding the trade–conflict relationship summarized above may not be mutually exclusive; the benefits from international trade are highly contingent on the level of development of international contractual norms.

Weak contractual norms, lack of enforceability and the absence of non-violent means to protect international profits will not reduce—and may in fact increase—conflict among international traders, especially as the volume of trade increases. Some argue that increases in trade actually create new issues for states to fight over (Barbieri, 1996), or that the trade–peace link is spurious (Keshk et al., 2004). Recent work by Chatagnier and Kavaklı (2014) extends this logic, suggesting that states with similar export portfolios are especially likely to become commercial rivals, although this can be mediated by dyadic trade and closely aligned geopolitical concerns.

Building on these, I argue that, under some conditions, greater trade flows, in themselves, can become a rivalrous good. In accordance with the mercantilist view of international trade in zero-sum terms, increases in trade flows among states simply generate a larger pie to fight over. The British and the Dutch, for example, fought three wars between 1652 and 1674 for purely commercial reasons, as each sought to monopolize and profit from European trade with Asia (Ferguson, 2002: 15–18). Likewise, Kennedy (1980) points to trade competition as the root cause of the Anglo-German rivalry prior to World War I.

In contrast, systems with strong contractual norms are likely to view militarized conflict as a rather costly dispute-settling mechanism, as it increases investment risks and transaction costs, disrupts the established trade routes and information channels, and otherwise leads to economic losses (Gartzke, 2007). Militarized conflicts, in other words, create inefficiencies in the market. Mercantilism, moreover, is inherently anti-liberal and requires discriminatory enforcement of legal contracts. Liberal trading regimes, as found under systems with strong contract-intensive norms, view increasing trade flows as the result of interaction with the market and as opportunities for increased wealth. Therefore, as international contractual norms develop and start to provide a viable alternative mechanism to settle international disputes (e.g. reliable court systems), states become less likely to resort to conflict, especially when the trade volumes are high.

In sum, the effect of trade on conflict is conditioned by the time regime. A mercantilist view of trade was predominant during early time periods, when contractual norms were relatively weak. Merchantilism was replaced with a more liberal framework in later time periods, as the contractual norms strengthened. Empirically, this means that the impact of trade would change from exerting either a positive or no influence on conflict in an earlier time period to a negative influence in a later time period. This leads to the following hypothesis:

Trade Hypothesis (H2): Increases in total trade flows fail to reduce conflict in the early time regime(s), while increases in total trade flows reduce conflict in the later time regime(s).

Conditional effect of democracy on militarized conflict

The pacific effect of democracy is also conditional on strong contractual norms, as democratic states view one another as legitimate actors who can be trusted to adhere to international law

and norms of behavior (Mousseau, 2009). While contractual norms are often associated with democracy, they are also possible in non-democratic regimes (Li and Resnick, 2003). In fact, as noted by Doyle (1986: 1164), the number of liberal regimes has been more expansive than that of democratic states. Yet, contract-intensive states are more likely to democratize and engage in trade (Benhabib and Przeworski, 2006; Mousseau, 2003).

McDonald (2004: 551), for instance, argues that "the elimination of protective commercial policies empowers societal groups most opposed to war and constrains the ability of governments to redistribute the costs of war onto groups outside its ruling coalition". As these new groups become more entrenched in the domestic political process, the state's preferences increasingly reflect their own. One of these preferences is equality before the law. Moreover, because larger markets offer greater opportunities to individuals than smaller markets, citizens have no reason to limit the benefits of contract-intensive markets to their own groups (e.g. ethnic or religious) and instead promote them abroad (Mousseau, 2012). Therefore, states with greater contract intensity, and subsequently more open markets, are restricted in their use of force—by both domestic constituents and their international legal commitments.

In the absence of such contract enforcement, however, democratic governments are likely to be controlled by groups with narrow interests that promote their own interests over those of the broader society. The more discriminatory citizenship requirements reflect the more hierarchical and oligarchic nature of the Machiavellian republican state than that of the more egalitarian and legalistic democratic states of the second half of the twentieth century (Mousseau, 2003).[6] Such hierarchical norms are then externalized in the form of a disregard for the legal status of other states. Machiavelli argued that republican government encouraged imperialism as citizens sought greater public goods, such as foreign land and property, because they recognized that, once obtained, these goods are their own (Doyle, 1986). This produces the expectation that democracy without contract-intensive norms may actually produce conflict.

To summarize, the effect of democracy on conflict is conditional on the time regime. Democratic institutions without widespread acceptance of contractual norms fail to pacify, and may actually increase conflict, as democratic elites within states do not respect the sovereignty of other states, nor the property rights of foreign citizens. The pacifying effect of democracy emerges in later time periods, as contractual norms evolve to protect a broader democratic middle class. These expectations produce the following hypothesis:

> **Democracy Hypothesis (H3)**: Increases in the proportion of democracies in the European system fail to reduce conflict in the early time regimes, while increases in the proportion of democracies reduce conflict in the latter time regimes.

Research design

I test the above hypotheses using system-level data on European conflict (1870–2001). I focus on the systemic level because I am interested in the European system's culture rather than that of individual states.[7] The unit of analysis, therefore, is a (European) system-year, which produces a total of 132 observations.

Europe provides a good test of systemic theories of conflict owing to the relative homogeneity of the political culture among members, sometimes explicitly referred to as a "European society" (Bull, 1977; Watson, 2006). Granato et al. (1996) argue that the

distribution of cultures and attitudes tends to emerge in clumps or regions, while Bennett and Stam (2004) find significant variation in conflict behavior among different regions. By restricting the analysis to Europe, I am holding constant a common regional identity in order to test the theory outlined above along temporal dimensions.[8]

Methodology

The time-varying nature of many important covariates, such as democracy, conflict and trade, has been noticed in a number of empirical studies that have used temporal subsamples, yet these types of findings are generally down played in theoretical discussions (e.g. Bennett and Stam, 2004; Holsti, 1991; Maoz, 2006; Singer et al., 1978). The seeming lack of attention to the time-specific effects partially stems from the lack of methodological consistency in terms of research design (e.g. studies vary on the start and end points of the temporal regimes they use: some split the data based on centuries, others use major events such as global wars).

Aside from subsamples, the most common strategy for modeling time is by the use of temporal dummy variables (Green et al., 2001). It is important to keep in mind, however, that temporal dummy variables cannot and are not intended to capture changing effects in explanatory variables, when included as additive terms. Moreover, dummy indicators of time are a poor statistical tool, for they provide no guidance as to the placement, number or length of temporal regimes (Park, 2010, fn. 1). Even when scholars expect that behavior differs between particular time periods, specifying eras is often difficult and starting points are usually selected arbitrarily (e.g. did the Cold War affect global politics immediately following the end of World War II, or not until the creation of the Warsaw Pact 10 years later?). Finally, if there is a change in the effect or significance of variables, rather than merely in the baseline probability of an event, then a model utilizing temporal dummy variables is mis-specified and will produce biased estimates and possibly incorrect inferences.

To address these issues, I employ an endogenous MCMC Poisson change-point model (Chib, 1998; Park, 2010). This model is appropriate because the dependent variable is the number of militarized conflicts within the European system, and because of the expectation that the effects of covariates are conditioned by temporal regime. The change-point model identifies and accounts for structural breaks while estimating the parameters within the context of each time regime. In post-estimation analyses, I employ OLS to analyze the causes of a structural break.

In substantive terms, the goal of the estimation is to find the optimal way to split the data into sub-periods. The estimator does this by exploring a series of possible change-points until it identifies the model with the best fit to the data. The estimator effectively splits the data into subsamples, such that the effects of the covariates in the model change in significance or direction from one subsample to the next. In other words, the model is able to identify unique time periods because it is sensitive to changes in the effect of the explanatory variables. Thus, change-point models offer a sharp contrast to the traditional large-*n* assumption "that our models will be just as appropriate for the early twenty-first century as they are for the late nineteenth century" (Bennett and Stam, 2004: 172). To prevent over-fitting, several models are estimated and compared using Bayes Factor, which penalizes too much structure.

An endogenous MCMC change-point model can be understood as a Markov model with hidden states and restricted transition properties (Chib, 1998).[9] The outcome variable y_t is treated as a function of a set of explanatory variables x_t and temporal regime-specific

parameters β_{s_t}, where subscript s indicates the temporal regime. The variable s_t follows a discrete-time, discrete-state Markov process. This nonergodic Markov process is represented as a one-step transition matrix:

$$P = \begin{pmatrix} p_{11} & p_{12} & 0 & \cdots & 0 \\ 0 & p_{22} & p_{23} & \cdots & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ \vdots & \vdots & 0 & p_{mm} & p_{m,\,m+1} \\ 0 & 0 & \cdots & 0 & 1 \end{pmatrix}$$

where $p_{i,j} = \Pr(s_t = j | s_{t-1} = i)$ is the probability of moving to temporal regime j at time t, given that the temporal regime at time $t-1$ is i, and m is the number of change-points.[10]

In other words, temporal regimes are considered to be latent variables and are treated probabilistically when estimating parameters of the explanatory variables in the conflict equation. The model is fitted so that the probability of a change-point is not constant, but is endogenous, depending on the current time regime itself (Chib, 1998: 223). The probabilities of transitioning from one temporal regime to another are used to identify the timing of the change-point. Finally, parameter estimates are the average values from sampling the full state space of the posterior distribution, thus accounting for the precision (or imprecision) of the estimated change-point.[11]

The MCMC change-point model offers several advantages over traditional change-point models. First, traditional change-point models fail to convey the level of confidence in the placement of a change-point, while the MCMC model recovers the conditional probabilities of a structural break occurring for each year. The conditional probabilities convey a clearly stated level of confidence that the change-point occurred in a particular year t, or within a range of years, while simultaneously indicating whether a structural break occurred suddenly (high concentration around year t) or gradually (low concentration spread over many t).

Second, the conditional probabilities of a structural break can be treated as a linear function of a set of exogenous variables in post-estimation analysis (Park, 2010: 771). I can therefore test my hypothesis regarding the determinants of the structural break using these conditional probabilities as a dependent variable in an OLS regression. An advantage of using OLS is that it allows for testing of multiple exogenous determinants of structural breaks at one time.[12] Substantively, this means that I can simultaneously explore competing explanations of a structural break occurrence.

Dependent variables

I use two dependent variables in the analysis. The first dependent variable is the total count of militarized disputes (MIDs) between European dyads.[13] There were 407 total MIDs over the 132 years included in the study.[14] Data are obtained from the MID Correlates of War dataset (Ghosn et al., 2004). The count of MIDs provides behavior outcomes of the underlying culture, as more MIDs are an expression of a more conflictual culture. This is consistent with previous treatments of social theories (e.g. Thies, 2008).

The second dependent variable is the probability of entering into a new time regime, that is, the probability of a structural break in the data-generating process of European MIDs. As was noted above, the MCMC change-point model allows for the recovery of the

probability of structural breaks for post-estimation. Calculating the conditional probability of a structural break is done in two steps (Park, 2010: 771): first, I obtain the probability of each time regime at time t, by taking random draws from each time regime's posterior sampling distribution; second, I obtain the probability of the change-point, by taking the first difference of each time regime's probabilities. These probabilities are regressed on a set of variables exogenous to the change-point model.

Independent variables

Conflict equation. There is a long literature examining system-level causes of conflict (see Rasler and Thompson, 2012). In addition to the two primary independent variables—trade and democracy—I control for power concentration, alliance density and the number of states in the European system, which are common to systemic explanations of conflict propensity (e.g. Maoz, 2006).

Trade is measured as the natural log of total trade exchanged between European states, in billions of US dollars. Trade data are obtained from the Correlates of War international trade dataset (Barbieri et al., 2009).

Democracy is measured as the proportion of democracies in Europe. A country is considered a democracy if it has a Polity2 score ≥ 7, according to the Polity dataset (Marshall and Jaggers, 2008).

Power concentration is measured using the capacity concentration index discussed by Ray and Singer (1973) on national material capabilities (CINC) for European states (Singer et al., 1972). Deutsch and Singer (1964) and Waltz (1979) argue that power concentration reflects the level of uncertainty in the system, although the former expects increases to reduce conflict while the latter expects the opposite. Lastly, Vasquez (2009) expects power concentration to exert varying effects since power politics is a norm subject to change.

Alliance density is calculated according to the network polarization index utilized by Maoz (2006). The measure uses binary dyadic alliance data and accounts for the number of groups, or cliques in Europe, as well as the various associations (dyadic, triadic, etc.) between states. *Alliance density* ranges from 0 to 1, where 0 indicates zero polarization (one clique) and 1 indicates maximum polarization (two cliques with no overlap). Binary alliance data were obtained from the Alliance Treaty Obligations and Provisions dataset (Leeds et al., 2002). There is debate whether alliances deter or encourage the spread of conflict (e.g. Smith, 1996), although Kegley and Raymond (1982) contend that the effect of alliances is conditioned by norms regarding honoring contracts.

Finally, I control for the *number of states* in Europe. This is necessary because a greater number of independent states allows for a greater opportunity for MIDs between states.

Post-estimation: explaining the structural break in conflict predictors. In the post-estimation analysis, I use OLS to investigate the determinants of the structural break. As previously noted, the MCMC change-point model uses information from the current temporal regime to calculate the probability of a change-point, that is, it is endogenous. This means that the post-estimation analysis of the causes of the break cannot (owing to identification issues) and should not (from the theoretical perspective) include the same covariates as the model used to identify a change-point in the first place, that is, the *conflict* equation (Park, 2010: 771, 772). In other words, while the conflict equation is specified as an additive function of

covariates, the *structural break in conflict* equation must include the variables suspected to have a conditional effect on conflict, rather than an additive function.[15]

There are a number of factors that may have such a conditional effect. Aside from changing economic norms, a structural break in the determinants of conflict may be caused by power shifts in the global system, the level of ongoing territorial threats, the invention and procurement of nuclear weapons and lessons learned from the World Wars.

I operationalize *economic contract norms* using three measures. First, I follow Mousseau (2003: 493–494) and employ a measure based on energy consumption per capita. This variable, *European economy*, acts as a proxy for economic development. Mousseau (2003: 494) argues that greater economic development is indicative of more complex divisions of labor, and these complex divisions of labor suggest increased involvement of citizens with markets. Data on energy consumption per capita come from Singer et al. (1972) and are logged to control for skewness.[16] Second, in order to account for complex divisions of labor created by the state rather than the market (e.g. fascist and communist societies), I create analogous energy consumption per capita measures that separate *liberal* and *illiberal economies*. Separating liberal and illiberal economies ensures that the model is capturing contract norms rather than merely increased wealth. Data on liberal and illiberal economies are obtained from Doyle (1986) and the variable is logged to control for skewness.

Third, I include intergovernmental organizations (IGO) membership as another alternative measure of economic norms. *IGO memberships* serves as a proxy for the externalization of norms, because IGOs are created to promote and institutionalize norms. The argument that institutions are norm-manifestations rather than norm-enforcers is evidenced, for example, by the existence of numerous non-binding institutions, whose sole goal is to support a norm by coordinating actions of like-minded states (Bearce and Bondanella, 2007).[17] Much like an invention being evidence of an idea (Watson, 2006), formally joining an international organization is evidence of a state's recognition of legalistic contractual norms. Moreover, legal action on the part of states is necessary to create or join an IGO. Thus, membership is a manifestation of a member's legalistic norms. *IGO membership* is measured as the log of the number of IGO memberships among European countries using the Correlates of War IGO dataset (Pevehouse et al., 2004).

To control for changes in global polarity and the Cold War dynamics, I include a measure of *US Power*. This measure captures the rise/decline of bipolarity in the international system, and is especially applicable as the USA became increasingly involved in European affairs in the twentieth century (Bueno de Mesquita and Lalman, 1988).[18] The USA effectively acted as an off-shore balancer and as a proponent of a liberal order featuring free trade and democratic political institutions, altering the payoffs and subsequent strategic behavior of European states. The rise of global bipolarity may serve as an alternative explanation for the structural break in the effect of democracy and trade on conflict. *US Power* is measured as the USA's CINC score.

Another explanation for why democracy and trade have a negative effect on conflict may attribute it to the decline of European states' preoccupation with territorial concerns. Gibler (2012) argues that the settlement of outstanding territorial issues increases the likelihood of both democratic transitions and more peaceful interactions among governments. By reducing the territorial threat, settlement of outstanding claims may also stimulate a transition from a mercantilist economic orientation (focused on relative power considerations) to a liberal economic orientation (emphasizing free trade). *Territorial threat* is a continuous

measure obtained from Gibler and Tir (2014) that accounts for the underlying probable threat to the territorial core of a state; this measure is aggregated to the European-system level.

Next, depending on the number of break-points identified by the model, as well as their timing, it might be necessary to account for the explanations attributing this change to the invention and procurement of nuclear weapons (Gaddis, 1986). Finally, despite the exogeneity assumption discussed above (the variables explaining the structural break must be different from the variables used to identify the break), I run additional robustness checks, in which I somewhat relax this assumption. These additional tests include indicator variables for World Wars I and II. The inclusion of these variables will allow for testing of the "lessons from the world wars" explanation of a break in the European conflict dynamics, according to which the devastation of the two World Wars made Europe wary of future conflict (Mueller, 1989).

Empirical analysis

In this section, I discuss the results and implications of the main change-point model—the model that allows for identifying and exploring the presence of temporal regimes in the data. This model also allows for evaluation of hypotheses concerning regime-specific effects of trade and democracy on militarized conflict in Europe (H2 and H3).[19] The causes of the structural break, identified by this model, with the focus on the role of economic contract norms (H1), are explored in the post-estimation analysis.

Analyzing conflict in Europe

As described in the Research Design, in order to identify the number of possible temporal regimes, I first use the MCMC Poisson change-point model to calculate the marginal likelihood for models including (a) all observations belonging to n distinct temporal regimes, (b) observations belonging to $n + 1$ distinct time regimes, and so on. Next, I use model fit statistics to identify the model with the best fit, that is, the best-fitting model is used to determine the most likely number of structural breaks in the data.[20] In this case, the Bayes Factor analysis has identified the best-fitting model to contain two distinct regimes, or one change-point.

The (posterior) probabilities for each of these regimes over time and the probabilities of a change-point for each year are presented in Figure 1. The top of Figure 1 presents the cumulative density function (CDF) for each temporal regime's probability in each year for 1870–2001. The change-point is evidenced by the rapid decline of the CDF for the first temporal regime and the accompanying rise of the probability of the second temporal regime. The bar graph at the bottom of Figure 1 reports the probability densities of the structural break for each year. Figure 1 demonstrates that the change-point occurred just prior to or soon after the start of World War II, as the 95% credible interval (based on the conditional probabilities) for the structural break is between 1936 and 1939 with the expected break in 1938, as indicated by the median value of the conditional probabilities. This indicates that the change-point occurred very suddenly, as opposed to a gradual or stepwise transition. In addition, the change in the local means between the first and second time periods is rather stark, increasing from 2.16 to 4.06 MIDs per year.

Table 1 displays the results of the conflict equation from the endogenous MCMC Poisson change-point model. Note that, since the model identified a structural break in the data
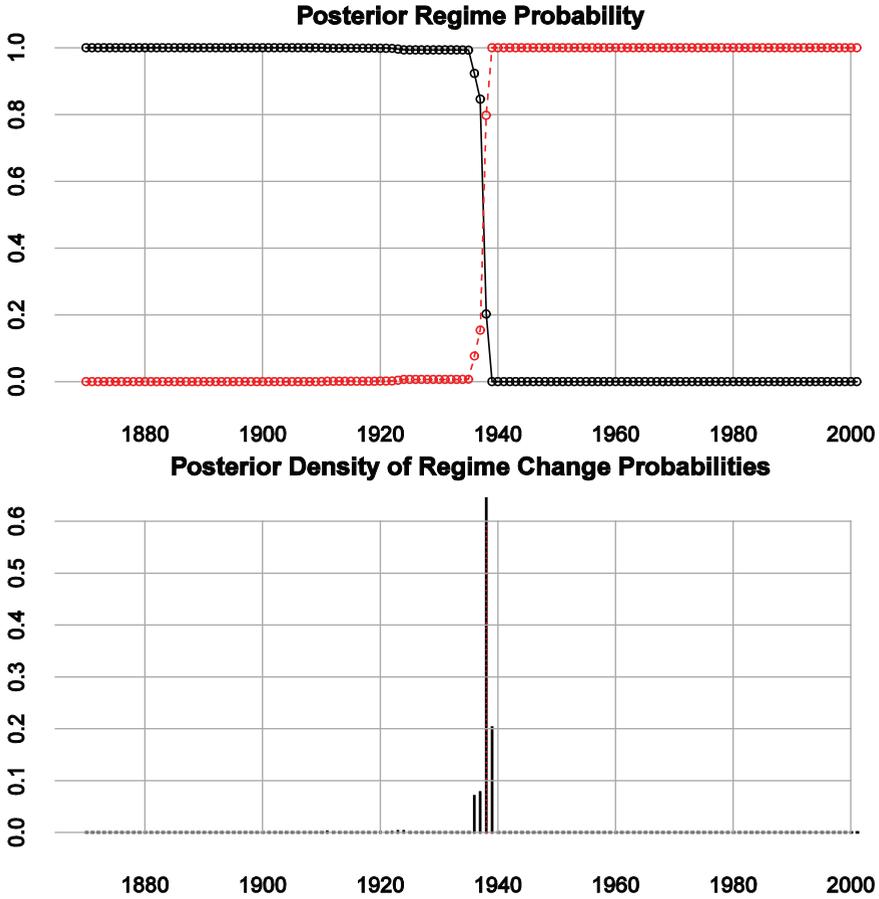
Figure 1. Identifying structural breaks.
Note: Expected change-points: 1938. Local mean of MIDs for each regime: 2.16 and 4.06.

between 1936 and 1939, rather than estimating a single set of results for the whole time-period, the estimator produces two sets of results, one for each temporal subsample or regime, while also accounting for the probability of a structural break in the data. The coefficient for *trade* is statistically insignificant at conventional levels in the first temporal regime, but is negative and statistically significant in the second temporal regime. In other words, increasing the volume of *trade* among European states did not affect the propensity for European states to engage in militarized conflict prior to 1938, but afterwards it appears to exert a pacifying affect. These results provide support for the *Trade Hypothesis*, which posits that trade only reduces conflict in the later temporal regimes.

The effect of *democracy* is also time-variant. The coefficient for *democracy* is positive and statistically significant at conventional levels prior to 1938, but is negative and statistically significant after 1938. The change in the direction of effect and statistical significance in each time period associated with democracy offers support for the *Democracy Hypothesis*, which

Table 1. Poisson regression estimation of European MIDs with one change-point, 1870–2001

Variable	Pre-1938				Post-1938			
	Mean	SD	Lower	Upper	Mean	SD	Lower	Upper
Trade	0.081	(0.198)	−0.308	0.470	−0.374	(0.092)	−0.555	−0.194
Democracy	2.676	(0.909)	0.895	4.457	−2.748	(0.777)	−4.272	−1.224
Power concentration	0.548	(1.032)	−1.475	2.570	−2.085	(0.841)	−3.733	−0.437
Alliance density	0.242	(0.976)	−1.671	2.154	0.648	(0.837)	−2.289	0.992
Number of states	−0.004	(0.030)	−0.062	0.055	0.135	(0.017)	0.103	0.168
Constant	−0.093	(0.870)	−1.798	1.161	−0.630	(0.724)	−2.049	0.790

SD, Standard deviation.
Note: Mean (standard deviation in parentheses) estimates with lower and upper 95% credible interval are drawn from the posterior distribution. MCMC chains are run 50,000 times after discarding 20,000 burnin draws. The median posterior probability of a break in the model was in 1938, for the estimated period 1870–2001 (N=132). Parameter estimates of the posterior for the pre-1938 and post-1938 average over the full state space, accounting for the precision (or imprecision) of the estimated change-point.

stated that increases in the proportion of democracies exhibit a negative effect on conflict only in the later temporal regime(s).

Several control variables exhibit similar patterns. The coefficient for *power concentration* changes from statistically insignificant in the first temporal regime to having a negative and statistically significant coefficient in the second regime. The coefficient for the *number of states* changed from being insignificant before 1938 to having a positive effect afterwards. Neither the coefficient for *alliance density* nor the intercept is significant in either temporal regime.

Evaluating the structural break in the effect of conflict predictors

By identifying the probable timing of the structural break in conflict (1936–1939), the above results also provide some insights regarding the relevance of the theoretical explanations for the causes of the break. Given that the MCMC model identified that the change-point occurred around 1938 and definitely by 1940 (see Figure 1), we can, for example, rule out the explanation that links the change in the European conflict dynamics to the invention and procurement of nuclear weapons. The identified timing of the change-point in conflict also puts into question "the lessons from the two great wars" explanation.[21] Table 2 presents the results of the determinants of the identified structural break. I regress the probability of the structural break on each of the three economic contract norms measures—*European economy*, *liberal economy* and *IGO memberships*.[22] I estimate two models using each of the three measures. The first model includes a measure of *economic contract norms* and the control variables *US power* and *territorial threat*. The second model includes indicator variables for World Wars I and II.

Across each of the models reported in Table 2, the measures for *economic contract norms* have positive coefficients and are statistically significant at conventional levels. Consistent with the Structural Break Hypothesis, increases in economic contract norms are positively correlated with the probability of the structural break. The coefficient associated with *US power*, on the other hand, is negative and statistically significant across each of the models.

Table 2. OLS estimation of the probability of the structural break

Model	European economy		Liberal economy		IGO membership	
With WWI and WWII?	No	Yes	No	Yes	No	Yes
European economy	0.230 (0.050)	0.212 (0.056)				
Liberal economy			0.297 (0.080)	0.302 (0.085)		
Illiberal economy			−0.013 (0.022)	−0.013 (0.023)		
IGO memberships					0.066 (0.017)	0.063 (0.018)
US power	−0.820 (0.252)	−0.827 (0.273)	−0.863 (0.270)	−0.878 (0.287)	−0.884 (0.281)	−0.842 (0.296)
Territorial threat	0.008 (0.082)	0.007 (0.114)	−0.023 (0.080)	−0.018 (0.112)	0.017 (0.084)	0.007 (0.116)
WWI		0.001 (0.048)		−0.002 (0.049)		0.002 (0.0493)
WWII		−0.004 (0.060)		−0.012 (0.059)		0.030 (0.058)
Constant	0.163 (0.046)	0.164 (0.050)	−0.021 (0.042)	−0.021 (0.043)	−0.178 (0.062)	−0.169 (0.065)
R^2	0.217	0.217	0.254	0.254	0.186	0.190
SEE	0.073	0.074	0.072	0.073	0.075	0.076

Note: Standard errors in parentheses. The dependent variable is the posterior probability of the structural break in European conflict from 1870 to 1940 (*N*=70). Analysis runs until 1940 because the posterior regime probability for second temporal regime equals 1 in 1941 (see Figure 1). Analyses where the dependent variable is the CDF of the probability of the second temporal regime at each *t* for the entire period (1980–2001) produce similar results.

This result suggests that, as *US power* increases, and with it changes in the global power distribution, the probability of a structural break actually becomes *less* likely. The coefficient for *territorial threat* is statistically insignificant across all models. The model indicates that risk associated with outstanding territorial claims has no effect on the structural break occurrence. Finally, the two World Wars are not significantly related to the probability of the structural break.

Conclusion

I argue that the causes of international outcomes are contextual and time-specific rather than constant over time. Specifically, I use an endogenous MCMC Poisson change-point model to separate the history of European conflict between 1870 and 2001 into two qualitatively different time periods. Each of these time periods is distinct in terms of the direction of the effect of the main conflict predictors, reflecting the predominant contemporary contractual norms. Thus, while trade has an insignificant effect on conflict in the first time period between 1870 and 1938, it has a negative effect in the second time period between 1938 and 2001. Democracy also exhibits varying effects, exerting a positive effect on conflict in the first time period and a negative effect in the second time period. In post-estimation analysis, I regress the probability of a structural break occurring on variables exogenous to

the conflict equation. I find that economic contractual norms are best able to account for the change seen in trade and democracy on conflict propensity in Europe.

I contribute to the broader IR literature by demonstrating that the expectations of social theories can be empirically evaluated using quantitative methods. MCMC change-point models are ideally suited for this task because they can identify and account for structural breaks in the data-generating process of the dependent variable. The results of my analyses demonstrate that "the structure of any system, whether it be global or domestic, must be seen not as something that is given by nature, but something that has been socially constructed by the combination of practices that have been employed by political actors" (Vasquez, 2009: 95). Thus, there are multiple paths to conflict, which depend, in part, upon the shared expectations of actors within their specific spatial and temporal contexts.

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Notes

1. I refer to a "thin" form of social theory that suggests that structures and identities are determined from shared ideas, yet "concedes important points to materialist and individualist perspectives and endorses a scientific approach to social inquiry" (Wendt, 1999: 1). This is in contrast to "thick" forms of social theory, in which ideas are thought to "go all the way down".
2. To narrow the scope of the paper and ensure data quality, I focus on exploring the variation in the *temporal* regimes, while holding the regional context constant by limiting the analysis to European states.
3. Note that a structural break does not require a "sharp" or quick transition from one regime to another. A structural break may occur quickly or gradually over a period of years. As I explain in the Research Design section, the advantage of the statistical estimator employed here is that it allows for an empirical assessment of how quickly breaks occur.
4. See Dion (2009) for an examination of Mexico's social policy reformation within this changing political and economic context.
5. Although this paper's empirical analysis is constrained to 1870–2001 owing to data availability, theoretically one can think of alternative normative economic regimes, such as feudal (Cutler, 1999) or even post-capitalist regimes (Schweickart, 2002).
6. The Machiavellian republic is analogous to the "partial democracy" described by Boix (2003), where political elites extend suffrage to the middle class, but do not pursue universal suffrage.
7. A renewed focus upon the systemic level of analysis is evident in other recent work, such as the systemically oriented studies employing social network analysis (e.g. Cranmer et al., 2012; Maoz, 2006). More theoretically, Braumoeller (2008) stresses the need to understand system effects,

arguing that conflict, like other relational outcomes, is a two-step process that occurs first at the system level and conditions dyadic behavior.

8. I operationalize a state as "European" in adherence with the Correlates of War project: if its country code is between 200 and 399 in the Correlates of War State System Membership dataset.

9. See Chib's (1998) more technical description of the estimator. See Park (2010) for a thorough discussion of the estimator and an application to political science.

10. A nonergodic Markov process does not return to a previous temporal regime (Gill, 2006: 415).

11. The posterior sampling distribution of a Poisson with covariates does not adhere to a known conditional distribution. Fruhwirth-Schnatter and Wagner (2006) develop a technique taking the logarithm of time between successive events to transform the Poisson regression into a linear regression with log exponential (1) error. See Park (2010) for more detail of this technique in political science.

12. OLS examines the instantaneous relationship between a set of variables and the probability of a break. To account for potential long-run effects, I conducted separate analyses using Granger causality tests. The results of these additional tests (not shown here but available upon request) support those using OLS.

13. I include only original participants and exclude joiners to a militarized dispute.

14. Results are robust to varying the severity of MID to only include those coded as greater than 3 or 4.

15. Note that the determinants of the structural break are modeled in a similar, yet not identical, manner to interacting each of these determinants with each of the covariates in the conflict equation. Estimating a model with an interaction allows for varying marginal effects based on the values of the conditioning variable, while the estimation approach adopted here models a constant change in the effect of covariates, in response to a transition from the pre- to the post-break time period. A model with an interaction would estimate a continuous effect of the conditioning variables on the determinants of conflict: for example, as the contractual economic norms become more prevalent among the European states, the effect of trade on conflict gradually changes from positive to negative and continues to fluctuate with any change in contractual economic norms. In contrast, according to both the theory and the estimation approach adopted here, once the internalization of contractual economic norms reaches a tipping point, there is a *constant*, rather than a gradual, change in the effect of trade on conflict, from positive to negative. In fact, in the case of a sharp (within a single time period) break that occurred with complete certainty, one could achieve equivalent results by using the time period as a binary variable, interacted with each other variable in the model (assuming, of course, that the timing of the break is known). Unlike the current approach, an interaction with a binary time regime variable, would, however, not allow for exploring the possible causes of a structural break.

16. This measure was computed by aggregating energy consumption and dividing by total population for all European states. I choose energy consumption per capita, rather than either GDP per capita or Mousseau's (2009) life insurance contracts measure, because it is available for a larger time period. The correlation of energy consumption and GDP per capita in the post-1970 period for which GDP per capita data are available is $r = 0.72$, suggesting that it acts as a reasonably strong proxy.

17. For example, global capitalists and proponents of free trade meet at the World Economic Forum in Davos, Switzerland. The organization is non-binding and does not (formally) punish members who defect; instead, membership provides an avenue to coordinate activities and signify support for a cause.

18. Soviet power is already incorporated in the conflict equation as part of *polarity*, and is therefore not exogenous to the change-point, that is, it cannot be explicitly included in the equation, owing to identification issues.

19. I employ non-informative, uniform priors for all parameter estimates and for the probability of when structural breaks occur. All models are estimated from 50,000 MCMC chains after discarding 20,000 draws as a burnin. All analyses are conducted using MCMCpack in R (Martin et al., 2011).

20. I estimate 10 models and employ a Bayes Factor comparison in order to determine the model with the most appropriate number of change-points to include in the main analysis. See the Online Appendix at www.marknieman.net.
21. Had such learning taken place, the structural break would have occurred immediately following the outcome of one of the conflicts rather than at the start of World War II. In addition, the average number of militarized disputes actually increased in the second time period, from 2.16 to 4.06 MIDs.
22. The three measures of *economic contract norms* are highly correlated with one another (all are correlated at least $r = 0.90$).

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