Title
Trade and the flag:integration and conflict in 19th and early 20th century deglobalization

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integration and conflict in 19th and early 20th century deglobalization

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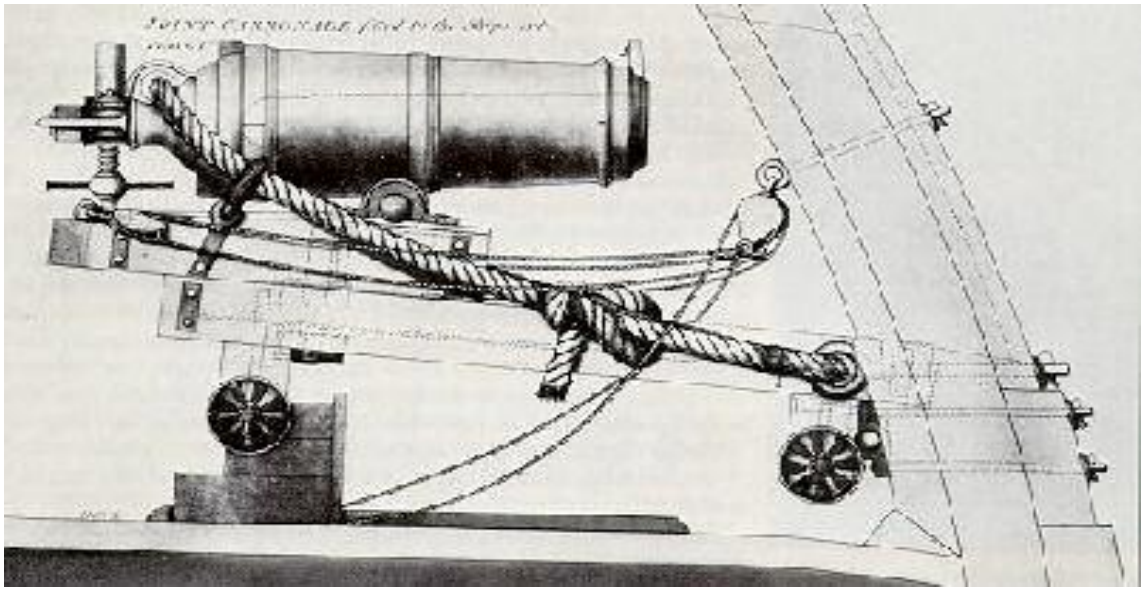

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Abstract:

The density and contours of networks of transnational and international economic integration are hypothesized by many theorists to be causally related to the patterns of cooperation and conflict. [1[1]] The usual notion is that trade creates ties of symmetrical interdependence, which are likely to inhibit conflict. We seek to test this hypothesis in the 19th and early 20th century run-up to World War I. We examine the relationship between the structure of conflict and the contours of trade ties during the 19th century wave of globalization and deglobalization. How were the international trade ties related to the patterns of conflict and alliance that emerged during World War I? Germany was linked by trade, immigration and elite family connections with both Britain and the United States, and yet both World Wars I and II pitted the Germans against Britain and the U.S. But were the trade ties of Germany with its enemies large and significant relative to the total international trade, or were they insignificant elements that had little bearing on the proclivities of nation-states to fight one another? We replicate and improve upon earlier studies that used correlational analysis of nation-state dyads (e.g. Barbieri 2002) and wel also employ formal network analysis to test the earlier finding of a **positive** relationship between trade ties and enmity.

Waves of Globalization

Over the past few decades, there has been a surge of interest in the relationship between globalization and political conflict in the interstate system. Most of the theorists of the global capitalism school contend that beginning with the 1960s and 1970s, the world of national economies became transformed into a transnational and global political economy (e.g. Sklair 2001). Scholars using the world-systems perspective contend that the world-system of capitalism has been importantly transnational for hundreds of years and that globalization in the sense of the expansion and intensification of large-scale intercontinental interaction networks is both an upward trend and a cycle. There were earlier periods of rapid globalization that were followed by periods of deglobalization in which large-scale interactions diminished. Keynesian national development (the global New Deal) was the predominant strategy of the development project led by the hegemonic United States after World War II. These global policies were designed to regulate the cowboy capitalism of the roaring 1920s, to prevent the reoccurrence of the radical deglobalization that occurred in the 1930s, and to prevent the reoccurrence of the global warfare of the 1940s. The international financial institutions that were set up at the Bretton Woods, New Hampshire conference in 1944 were designed to take the rough edges off of global capitalism by enabling national states to regulate their economies, to encourage good wages, and to develop industrial capacities. Thus the world of regulated national economies between World War II and the 1980s, to the extent that it really existed, was a product of the global New Deal, however watered down from its original vision. It is the comparison of this "development project" image of national economies with the "globalization project" image of the post-1980s world that gives the global capitalism school its boost.

Neoliberalism was the political ideology that became hegemonic in the 1980s because the competing core countries - Japan and Germany - caught up with the U.S. in the most profitable mass consumption industries in the 1970s, and the long-term tendency for

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[1[1]] This is part of a larger study of global integration and conflict that uses both quantitative analysis of international patterns and a historical sociology of transnational elite ties. The research proposal for our project is at http://irows.ucr.edu/research/glbelite/globelite.htm and a related paper is at http://irows.ucr.edu/papers/irows27/irows27.htm

labor costs and taxes to rise resulted in a crisis of overaccumulation. The profit rate in production and trade declined in the most profitable sectors, and so capital and its organic intellectuals responded by attacking labor unions and the welfare state.[2[2]] The market was glorified and the state was depicted as a vampire of taxation. Privatization, deregulation, down-sizing, streamlining, cutting entitlements and outsourcing became the order of the day, and these policies spread from their points of origin in the United States and Britain to the rest of the world. This political ideology used the new cheap information, communications and transportation technologies to globalize markets for trade and investment and to pit poor workers in the periphery against better-paid workers in the core.

Yet, in contrast to the global capitalism school, we argue that the old system of national states still exists and that something like the current wave of globalization had happened before during the decline of British hegemony in the late 19th and early 20th century. Studies of trade globalization – the ratio of international trade to the world GDP-- show that there was a high peak in the 1880s, then a decline until 1900, then another small rise, and a crash in 1929, and then a rise after World War II to the present, which is somewhat higher than the peak in 1880, but not extremely higher (see Figure 1). Investment globalization probably followed a similar trajectory (Chase-Dunn, et al 2002)

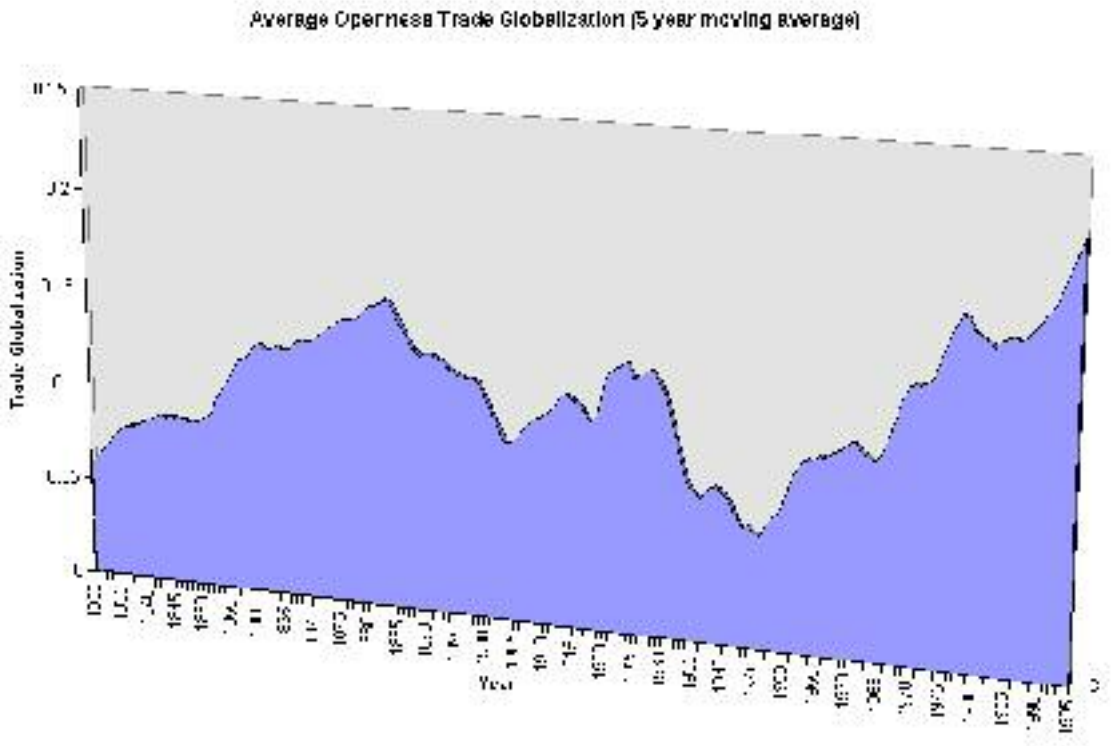

Figure **Error! Bookmark not defined.**: Waves of trade globalization (Chase-Dunn, Kawano and Brewer 2000)

Global Elite Networks and International Trade Links

This paper is part of a larger project, the purpose of which is to study the contours of global elite and international integration since 1840 and to study the relationship between

[2[2]] The politicians took pages from the anti-statist ideology and tactics of the New Left in the world revolution of 1968.

these contours of connection and the patterns of conflict that emerged over the same time period. There have been a significant number of theoretical and empirical works by political scientists and sociologists that examine the effects of economic interdependence and international conflict (McMillan 1997; Barbieri and Schneider 1999; Barbieri 2002; Rosecrance and Thompson 2003; Maoz 2004, Maoz *et al* 2006, forthcoming). Various liberal theories of globalization argue that economic integration should decrease international conflict. [3][3]We observe that these approaches should distinguish between horizontal connections (of equality) and vertical connections (power-dependency relations). The latter may be quite likely to produce conflict (Barbieri 2002; Rosecrance and Thompson 2003).

Contra these perspectives, many observers have noted that interdependent connections have not served to prevent major conflicts in the modern international system (Thompson and Tucker 1997; Rosecrance and Thompson 2003). Both Britain and the United States had major connections with Germany before the outbreaks of World Wars I and II. We want to study the whole global network so that we can see how these known ties compare with the connections between other actors. It may be that the international network ties of Germany and Turkey (allies in World War I) were significantly stronger than those among the countries that they ended up fighting. And it may be that indirect ties that can only be ascertained by formal analysis of the whole network will reveal contours that can account for the emergence of conflict. Only a study of the international network can allow us to see whether the links that crosscut conflict chasms were small or large relative to the other links in the network.[4][4]

Our larger project consists of two parts. In the first we are using a world historical perspective to examine the links between elite individuals, families and organizations within each country with those same actors in other countries. This involves a close reading of the histories of each country with attention to connections with other countries (see Reifer and Chase-Dunn 2003; Barr *et al* 2006). The second part of our project (discussed here) uses quantitative data on the interactions among nation-states to trace the changing patterns of network connections since 1880. This enables us to use the national network patterns to place the information from our studies of elites in a world historical context, and to study the congruence or lack thereof, between different kinds of international connections. We also intend to examine the relationships between international network structures and the patterns of conflictive relations that were so evident in the first half of the twentieth century. We know that the international system bifurcated into Allies and Axis states in the World Wars. Were these conflict-alliance bloc structures related to the trade network? Did the network of global trade become more factional in the years prior to the outbreak of world war? And did these factions correspond with the emergent conflict factions?

We also will eventually use network data to compare the overall magnitude of global integration in the nineteenth century with the magnitude and forms of integration that have emerged since World War II.[5][5] The question of global magnitudes is important because many students of globalization have assumed that the high degree of contemporary integration of the global capitalist class will prevent the emergence of future interimperial

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[3][3] The Democratic Peace hypothesis is a major theoretical framework that makes this argument.

[4][4] This need to compare the size of links means that we need interval-level measurement scales, which we have in our trade data. But it also means that the requirement for dichotomizing variables to make them useful in many of the formal network analysis techniques will constrain us.

[5][5] The comparison of changes in the magnitude of international economic integration over time was the main focus of our earlier studies of trade and investment (Chase-Dunn, Kawano and Brewer 2000; Chase-Dunn, Jorgenson, Giem, Lio, Reifer and Rogers 2002).

rivalry and war among core states. But if there was a similarly high level of global elite integration in the late nineteenth century this assumption may be brought into question.

In this paper we analyze mainly international trade relations, but international financial links are another important dimension of global economic networks that we plan to empirically examine in the future. Imports and exports of goods and services are much easier to get comparable information on than flows of investment, especially for the nineteenth century. Ideally we would like to differentiate trade flows into goods that are more strategic and profitable vs. those that are less so. But that is not possible on a sufficient scale for the nineteenth century.

Transnational Relations and State-centrism

The use of data on nation-states is defensible on both theoretical and practical grounds, and should not expose us to the slings and barbs of those who would accuse us of state-centrism. Firstly, national states have been, and still are, important organizations within the world-system. Transnationalism has not just arisen since 1980. There have been waves of transnationalism and waves of nationalism since the chartered companies of the seventeenth century organized production and distribution on a global scale. The contemporary transnational corporations undoubtedly organize a greater portion of the total world economy than the 17th century chartered companies did. But then and now, national states were and remain important players on the global stage.

We may say this without denying the perspective developed by William I. Robinson (2004) and others on the emergence of a transnational capitalist state that reconfigures existing national states (and international organizations) as its instruments. Indeed, we see the emergence of a transnational state, not just in the period since the 1980s, but since the Concert of Europe that was Britain's effort to prevent further French revolutions and Napoleonic escapades. The Concert of Europe, the League of Nations and the United Nations have been the first steps toward global state formation, but the top of the stairway to a true world state remains in the distant future. We agree with Robinson that it is important to theorize the transnational state and to study its emergence (see Chase-Dunn1990;2005). None of this prevents us from studying existing national states, and for using data on national states and international trade to study world-system patterns.

The practical reason for using data on national states is that they are the only data that are available for most of the regions of the system over the time period that we seek to study. As with all secondary data analyses, we need to be chary about the ways in which the structuring of the data by its original providers may distort our results.

Methods for Our Analysis

We adopt the generalized strategy of measurement error modeling that is part of the structural equations tradition. This means that instead of trying to pick the best single empirical indicator of an underlying concept or variable, we want to use several proxy indicators and to model the relationships among the proxies as well as using them to estimate the true underlying values of the variables. In practice we may not have enough data to be able to actually employ the techniques of structural equations modeling of measurement error. But we shall use the generalized logic of gathering multiple proxy indicators whenever this is possible.

Because the data are less complete in the early decades, we have a growing population of nodes as we get closer to the present. This, and the actual changes that

occurred in country boundaries over the period studied (e.g. the break-up of the Ottoman and Austro-Hungarian empires, etc.), mean that we have a changing set of nodes in the network. This makes it difficult to know whether observed changes were due to real changes in the pattern of trade ties or to the inclusion of nodes that were formerly not included because of missing data. One approach to this problem that we have used in earlier research is to study **constant groups over time**. If we find similar trends between the constant groups and the networks that are adding (or deleting) nodes we can infer that observed changes are not due to changes in the compared units.

Variable Construction

Trade Network Data

Much of the late 19th century and early 20th century trade data are reported in the country's domestic currency, which makes cross-national comparison impossible. There are several possible ways to deal with this problem. One is to convert all the country currency values into a single currency such as the pound sterling or the U.S. dollar using currency market exchange rates.[6][6] There are a number of known problems with this approach. Currency market exchange rates are set by the competitive buying and selling of currencies during some periods, but in other periods the exchange rates have been set by international agreements. Between the Bretton Woods conference in 1944 and the early 1970s the U.S. dollar was pegged to a fictitious gold standard, and other currencies were pegged to the dollar. These regulated exchange rates can still be used to change country currencies into dollars, but this conversion reflects a worldwide agreement to regulate currency markets rather than a world market for money. In 1974 the dollar and other currencies were freed to exchange in world money markets.

Another problem is that market exchange rates reflect the activities of large currency traders, rather than just the daily conversions of currencies carried out by people who need to change money. The actions of currency traders are intended to make profits by buying and selling money, and this activity does not necessarily reflect the value of the goods and services that national economies produce. This is why economists have tried to devise a better method for converting currencies into a single comparable metric that is based on purchasing power in different countries (Kravis Heston and Summers 1982). These so-called purchasing power parity (PPP) conversion ratios are not available for the 19th century and the whole approach has been savaged by critics (e.g. Korzeniewicz, Stach and Patil 2004).

Another method of making country currency values comparable is to compute a percentage using a denominator in the same metric units (country currencies). We have the total value of exports and imports for each country in country currency, so we could compute the percentage of the country's trade with a particular other trade partner. This puts the numbers into a comparable metric: percentages. But this is not a good solution to the problem for our purposes. It does eliminate the need to use exchange rates, but at the cost of computing a variable that will not be useful for our purpose of examining the relative importance of a particular trade link in the context of the larger world trade network.

Knowing that the imports of Germany from Britain were x% of Germany's total imports does not tell us how important this was in world trade. Ideally we would like to know the ratio of the value of the imports to the size of the world economy as a whole, or to the total value of international trade (but see below). To compute these percentages we

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[6][6] Currencies also need to be converted from current into constant values to take out the effects of inflation for purposes of comparisons across time.

would need to have the relevant denominator values in the currency of the country, and these we do not have. So we will need to use exchange rates to convert the country currency values into a common comparable metric. Most of the Barbieri (2000) trade data used in our analysis was converted to current US dollars using exchange rates taken from the Polity II project (Gurr, Jaggers, and Moore1989).

(did we use imports, exports, both or what?)

Construction of Conflict Dyads

The countries considered in this analysis are those that fought in World War I, those core countries of Western Europe that remained neutral, and the three largest, non-combatant, semiperiphery countries. Specifically these include the Allied and Central Powers, Sweden, Switzerland, Denmark, and the Netherlands, as well as China, Mexico and Brazil.

To quantify the intensity of conflict between two states (dyads), we relied upon three separate indicators: 1) the Correlates of War data set compiled by Singer and Small measuring the number of battle deaths experienced by each country in the WWI, and 2) the Barbieri conflict data set consisting of two ordinal measures of conflict during WWI: one representing the level of aggression country A displayed towards country B, and the other representing the level of aggression country B displayed towards country A. Interestingly, each of these data sets exhibited complimentary weaknesses. The Correlates of War data is useful *after* a country goes to war because it demonstrates how "intensely" the country was committed to fighting as a function of the number of its dead, but the data says nothing of the level of conflict between countries *before* they go to war. In a similar fashion, the Barbieri data does an excellent job of demonstrating the "ramping up" processes leading up to WW1, but after the fact it is useless in distinguishing various levels of commitment to the war once it has begun. Further, both data sets in isolation demonstrated very high skewness and kurtosis, making interpretation of correlation coefficients problematic.

To remedy both of these problems we constructed a standardized index of conflict intensity that combined all three measures. This was carried out by transforming the "raw" values of each data set into standardized scores using SPSS, and summing the result. At this point we realized that by constructing the index in this fashion, we had inadvertently reduced the contribution of the Correlates of War data. What was once a very large difference in intensity between "a militarized shared border," and, "a combined war dead of over one million soldiers," had now been reduced to a one or two point index difference. Also, one country's decision to enter into the war as an ally of another is an indicator level of (low) conflict intensity that was not being taken into account. So we modified our conflict indicator by doubling the weight of the contribution of the battle deaths, and also coding for whether or not a state was an ally of another.

So as to make neutrality during WWI represent zero conflict between a pair of states, the index was scaled so that a value of –3.16 equated to **war ally**, 0 equated to **neutral** and a value of 16 equated to **the highest level of conflict intensity**. We do not have a measure that takes into account various degrees of "war ally," so the index jumps from –3.14 to 0, and then ramps up incrementally to more than 16. It should also be noted that although this final measure of conflict does still display minor skewness and kurtosis, it is by far the best in this regard when compared to the Correlates of War and Barbieri indicators (see Table 1).

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis

Level of Conflict						
552	-3.14	16.09	.6315	3.14	2.023	4.8
COW Battle Deaths						
552	0	3500000	208681.88	602579.10	3.143	9.584
Barbieri Conflict Measure						
552	0	20	1.04	3.998	3.747	12.386

Table 1. Descriptive Statistics for our constructed conflict indicator (**level of conflict**), the original COW battle death data, and the Barbieri conflict data. (Notice the significant reduction in both skewness and kurtosis.)

Dyadic Correlations between Conflict and Trade in 1880-1913

After constructing the conflict index, a Pearson r test was used to determine the correlation between levels of trade for eight time periods leading up to World War I and the intensity of conflict between combatants during the war. The results are shown in Table 2:

	Intensity of Conflict
Amount of Trade 1913	.231
2-tailed Significance	.000***
Amount of Trade 1912	.232
2-tailed Significance	.000***
Amount of Trade 1911	.233
2-tailed Significance	.000***
Amount of Trade 1910	.235
2-tailed Significance	.000***
Amount of Trade 1905	.173
2-tailed Significance	.000***
Amount of Trade 1900	.103
2-tailed Significance	.016*
Amount of Trade 1895	.110**
2-tailed Significance	.010
Amount of Trade 1890	.101*
2-tailed Significance	.017
Amount of Trade 1885	.088*
2-tailed Significance	.040
Amount of Trade 1880	.044
2-tailed Significance	.299
*** Significant at .001 level	
** Significant at .01 level	
* Significant at .05 level	

Table 2: Dyadic Correlations between Conflict and Trade in 1880-1913

As indicated by the table, the amount of imports one country received from another had a significant positive correlation with the level of conflict experienced within the dyad

during WWI. This was the case in each of the above years, except 1880, which was also positive.

Controlling for Size: Partial Correlation between Trade and Conflict

Given that a portion of the intensity of conflict index is measured in battle deaths, it is advisable to control for the size of the population of the countries involved. Population dyads were created as a control variable using 1913 population data compiled by the Correlates of War Project and the Eugene software database. The 1913 data were used because we are interested specifically in WWI. While population obviously grew at different rates in different countries between the years of 1880 (our earliest period) and 1913, we do not believe that differential growth occurred at a rate substantial enough to affect the outcome of our analysis. Table 3 depicts the results of the partial correlation between the amount of trade leading up to World War I and the level of intensity of conflict, controlling for total population:

Partial Correlation Controlling for Population	
	Intensity of Conflict
Amount of Trade 1913	.2289
2-tailed Significance	.000***
Amount of Trade 1912	.2302
2-tailed Significance	.000***
Amount of Trade 1911	.2304
2-tailed Significance	.000***
Amount of Trade 1910	.2327
2-tailed Significance	.000***
Amount of Trade 1905	.1703
2-tailed Significance	.000***
Amount of Trade 1900	.1012
2-tailed Significance	.018*
Amount of Trade 1895	.1081
2-tailed Significance	.011
Amount of Trade 1890	.0994*
2-tailed Significance	.020
Amount of Trade 1885	.0864**
2-tailed Significance	.043
Amount of Trade 1880	.0425
2-tailed Significance	.319
*** Significant at .001 level ** Significant at .01 level * Significant at .05 level	

Table 3: Dyadic Correlations between Conflict and Trade in 1880-1913 controlling for population size

Although controlling for population size reduced the strength of the positive correlation between level of trade and conflict by small amount, the relationship once again remains significant in all years except 1880. Thus our new analysis of dyadic correlations using an improved measure of conflict confirms earlier results by Barbieri (2002) that show a significant positive relationship between trade connections and the emergence of conflict.

But does this relationship hold up when we examine the whole network of interaction. Analysis of dyads cannot take account of indirect connections but formal network analysis can examine the structure of the whole system and look for cliques or factions in the system. Are there strong subgroups in the trade structure and, if so, do these correspond with the conflict factions that emerged in World War I?

Network Analysis of Trade and Conflict

We used UCINet to produce comparable square matrices of our conflict and trade datasets for purposes of formal network analysis. A square matrix is produced by UCINet for purposes of formal network analysis. Network analysis is superior to dyadic correlation analysis because it allows the whole structure of a network to be analyzed including all the direct and indirect links and non-links. This makes it possible to identify cliques or factions within a network and to examine the centrality or peripherality of network nodes. The nodes in this analysis are countries.

The conflict matrix contains the values for each pair of countries computed for our level of conflict indicator described above. This is then used to produce Figure 2 by means of specifying a cutting point in the distribution of dyad values. For Figure 2 we used _____.

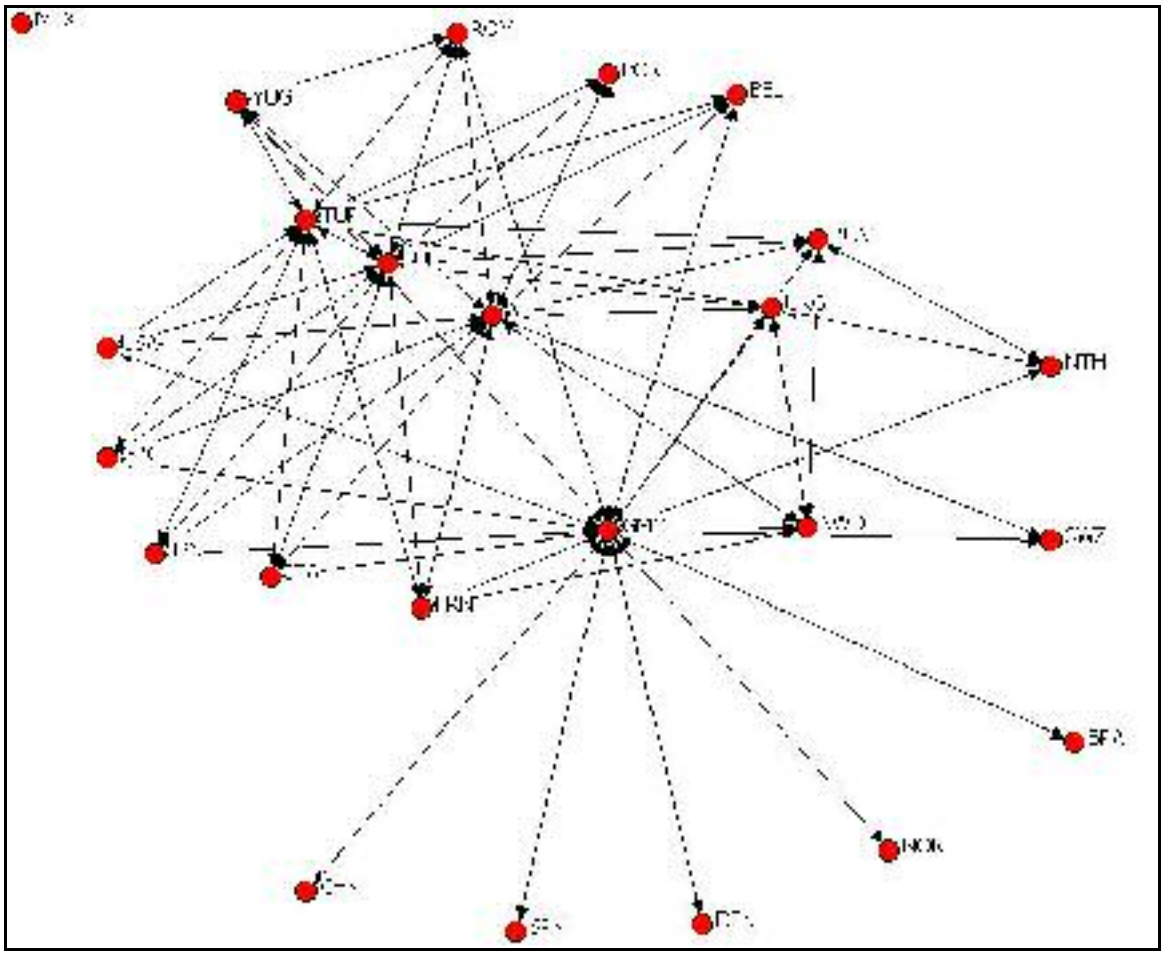

Figure 2: Level of Conflict Network for World War I. (Country names are Correlates of War abbreviations.)

Compare Figure 2 with the list of the blocks in World War I in Table 4.

Allies (Entente)	Central Powers	Neutrals
Belgium	Austria-Hungary	Brazil
France	Bulgaria	China
Greece	Germany	Denmark
Italy	Turkey	Mexico
Japan		Netherlands
Portugal		Norway
Romania		Spain
Russia		Sweden
UK		Switzerland
USA		
Balkans (YUG)		

Table 4: Conflict Blocs in World War I

The Central Powers in the middle of Figure 2 are not linked by conflict ties with one another (except for something between Bulgaria and Turkey?). They are surrounded by Entente powers and out on the edges are the neutrals.

(insert the graphic of trade network in 1880 here and compare it with the next figure)

Figure 3 shows the network structure of trade in 1913 just before the outbreak of World War I. The cutting point we used for the trade network graphic is

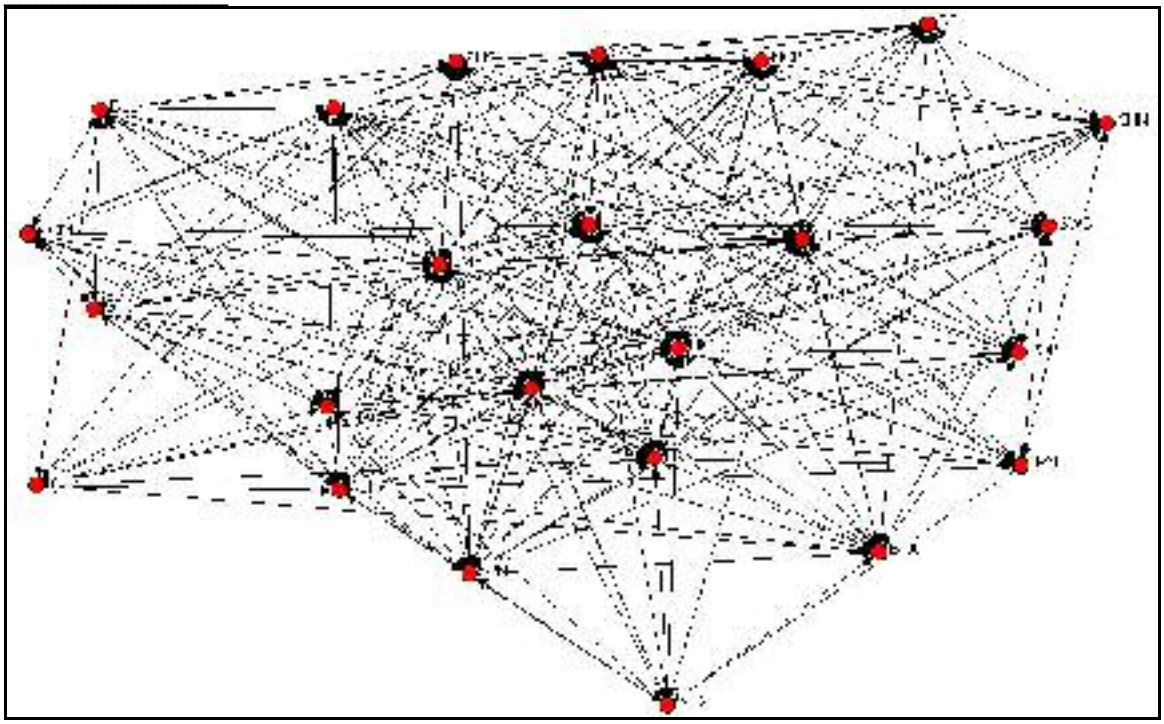

Figure 3 Trade Network for 1913. (Country names are the Correlates of War abbreviation.)

The trade network graphic uses the values for dyads that we used in our correlational analysis above. We have trade networks every five years from 1880 to 1913. This is a dense network but it clearly has a multicentered core and a periphery.

Multiplicative Coreness

The interaction matrices were also used to calculate multiplicative coreness. A multiplicative core is characterized as a set of nodes possessing a high density of connections amongst themselves, while the multiplicative periphery is characterized as possessing few interconnections. The consequence of such a structural condition is that nodes located within the core are often capable of greater coordinated action and a greater mobilization of resources, while nodes in the periphery are not. Computed a coreness score for each country using the trade matrices for every five years between 1880 and 1913 and then used these score to compute a gini coefficient that indicates how much dispersion there is in the distribution of coreness scores across countries.

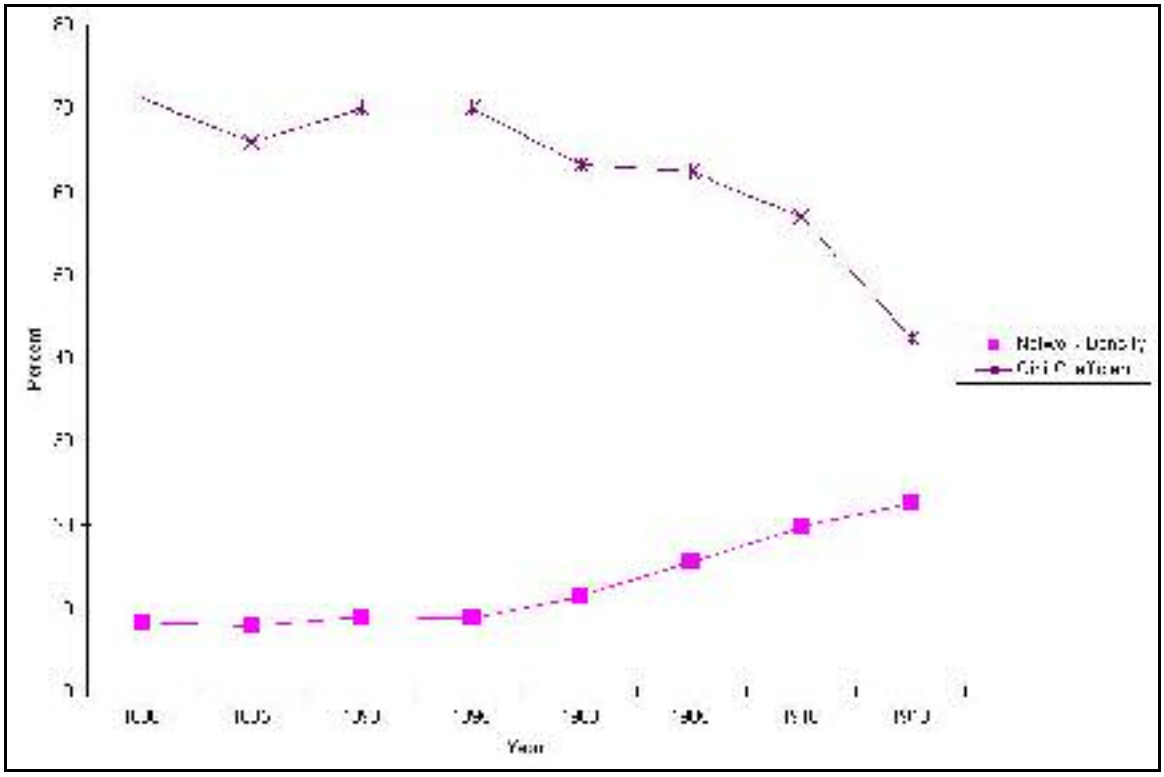

Figure 4 Graph of the relationship between the Gini Coefficient and Level of Network Density for the Trade Network from 1880 to 1913

Figure 4 is the graph demonstrating the relationship between the Gini Coefficient and the Level of Network Density for the Trade Network of participants in World War 1. In network analysis, Gini Coefficient measures the amount of inequality between the core and periphery nodes in terms of the distribution of connections. (What is network density?) Within the trade network presented here the level of inequality as indicated by the Gini Coefficient declines slightly from 1880 to 1910 and then it declines steeply. This indicates that the network is becoming less centralized as British hegemony in the world economy is declining because other countries are growing. From 1880 to 1910 the core of the network consists solely of the United Kingdom, but in 1910 it expands to include the United

Kingdom, the United States, France, Germany, and the Netherlands (representing the current hegemon, the future hegemon, the past hegemonic challenger, the current hegemonic challenger, and the past hegemon respectively).

At the same time the Gini Coefficient is decreasing, the density of the network is increasing. In other words, the centralization of control over trade in the world-system is decreasing at the same time the level of competition for trade is increasing. Thus at the level of the global economy, a clear increase in the level of competition and distribution of resources preceded the world war, and these changes accelerated in the years just before the outbreak of the war. [7][7]

QAP Correlations

	Trade 1913	Trade 1910	Trade 1895	Trade 1885	Trade 1870	Trade 1850	Trade 1830	Trade 1815	Conflict
Trade 1913	1.000	0.933	0.933	0.768	0.851	0.845	0.819	0.785	0.231
Trade 1910	0.933	1.000	0.917	0.760	0.850	0.845	0.820	0.791	0.235
Trade 1895	0.933	0.917	1.000	0.854	0.941	0.941	0.898	0.878	0.173
Trade 1885	0.768	0.760	0.854	1.000	0.831	0.848	0.806	0.802	0.103
Trade 1870	1	1	.41	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]
Trade 1850	0.845	0.845	0.941	0.848	0.983	1.000	0.955	0.958	0.101
Trade 1830	0.819	0.820	0.898	0.806	0.933	0.955	1.000	0.950	0.088
Trade 1815	0.785	0.791	0.878	0.802	0.947	0.958	0.950	1.000	0.044
Conflict	[illegible]	[illegible]	17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1 [illegible]

QAP P Values

	Trade 1913	Trade 1910	Trade 1895	Trade 1885	Trade 1870	Trade 1850	Trade 1830	Trade 1815	Conflict
Trade 1913	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.018
1.1					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Trade 1..					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Trade 1895	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.113
Trade 1885	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.115
Trade 1850	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.129
Trade 1					[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Trade 1815	1.000	1.000	1.000	1.000	0.000	0.000	0.000	0.000	0.236
Conflict	1.018	1.012	1.081	1.113	0.115	0.129	0.149	0.236	0.000

Table 5: QAP correlations between the level of trade between nodes in the network and the level of conflict occurring during World War 1

We used the QAP routine in UCINet to produce Pearson's r correlation coefficients for the values in the square conflict and trade matrices. QAP assesses the frequency of random correlations as large as those actually observed, making it possible to test the statistical significance of the observed correlations between two square matrices despite the fact that the cells are not independent from one another.

As was the case in the dyadic analysis, there is a clear non-negative correlation between trade and conflict. In other words, the more the nodes of the network trade with each other, the more likely they are to go to war. Unlike the dyadic analysis though, only the levels of trade in 1913 and 1910 are significant predictors of the level of conflict in

[7][7] It is interesting to note that the density and level of inequality of the network both begin their respective upward and downward trends in 1895, the same year in which the upward swing of the long Kondratieff wave began.

World War 1. Interestingly, the size of the positive correlations is the same for both the dyadic and network analysis.

We used UCINet's Faction routine to identify trade factions from the trade network matrix. The Faction routine allows valued data but requires specification of the number of factions. When three factions are specified UCINet groups the countries as shown in Table 6 based on the trade network data. Table 6 also shows which countries are in which conflict bloc.

Entente Allies	Central Powers	Neutral
Belgium 2	Austria-Hungary 2	Brazil 1
France 2	Bulgaria 2	China 3
Greece 2	Germany 1	Denmark 1
Italy 3	Turkey 2	Mexico 3
Japan 3		Netherlands 1
Portugal 1		Norway 1
Romania 2		Spain 1
Russia 2		Sweden 1
UK 2		Switzerland 1
USA 3		
Balkans 2		

Table 6: War Factions and Trade Faction (1,2, and 3)

Table 7 below is a crosstabulation of the conflict blocs and the trade factions.

	War faction			Total
	Entente Allies	Central Powers	Neutrals	
Trade faction #1	1	1	79	
Trade faction #2	7	3	10	
Trade faction #3	3		25	
Total	11	4	924	

Table 7: Crosstabulation of trade faction by war faction

For the Entente Allies 7 of 11 are in trade faction #2. For the Central Powers 3 of 4 are also in trade faction #2. For the Nuetrals 7 of 9 are in trade faction #1. None of the Central Powers are in trade faction #3, which contains 3 Entente Allies and 2 Neutrals.

So there is not a great match between the trade factions and the conflict blocs.

Trade faction #2 contains 75% of the Central Powers and 64% of the Allies. The best match is that 7 of 9 Neutrals are in trade faction #1. It would seem logical according to the liberal hypothesis that a country would remain neutral if it was trading with both sides and did not want to offend either one. But instead Tables 6 and 7 show that those countries that were less connected with either side by trade were more likely to remain nuetral. And Germany is in the #1 trade faction with the neutrals. [8][8]

Thus the results of network analysis do not contradict earlier findings or the replicated (and improved) dyad analysis described above. Indeed there is some additional positive support for the notion that trade connections do not reduce the likelihood of conflict. But a new connection between trade and conflict is shown in Figure 4 above. The overall shape of the trade network was changing in the decades prior to the war and these changes accelerated just before the war. The network was getting denser and less hierarchical. The centrality of Great Britain was declining. There were more competitors in the center and more connections in the whole network. Figure 1 (on p. 3) shows the trends in overall trade globalization in these same years. Trade globalization is the ratio of the total amount of international trade to the size of the whole world economy (global GDP). What Figure 1 shows is that even though international trade had been growing rapidly in the last decades of the 19th century the whole world economy had been growing even more rapidly, resulting in a decline in trade globalization that bottomed in 1900 and then began a recovery. So the trends of less centralized and denser international trade were occurring in context of decreasing globalization.

The lack of correspondence that we find between trading factions and the conflict blocs that emerged in the Great War echos what many war historians have often said – the structure of alliances were fluid and did not gell until just before the conflagration. As late as 1901, during the second Boer War, the populations of both Britain and France were gripped with fear that war might break out between these erstwhile allies.

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[8][8] We also intend to block the trade and conflict networks among core and upper tier semiperipheral countries using regular equivalence to see if the resulting blocks are similar. We will also compute degree, betweeness and flow centrality scores for the trade networks to see how the positions of countries change over time. This approach uses the full data at each point in time to compute scores for each node, and so it is superior to studying dyads. The scores of countries on these network node attributes will be correlated over time to see how countries are stable or move in the networks. We will also block the data at each point in time into core and non-core groups and examine changes in the volume of flows within and between blocks

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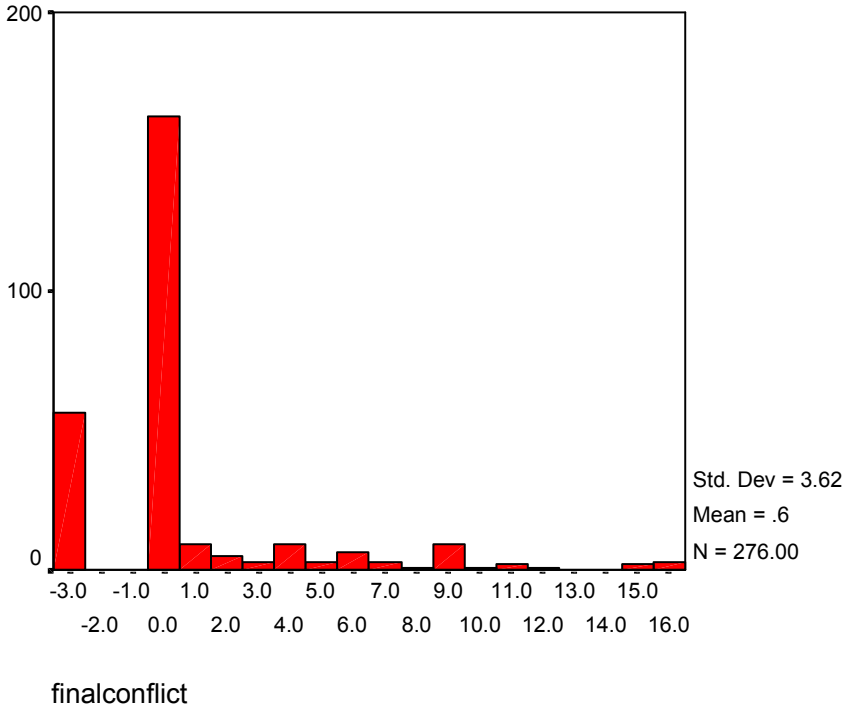
Appendix

Histogram for Level of Conflict Index



Supplementary Trade Data

According to Barbieri (2003), "The Statesman's Yearbook contains country profiles that usually include tables of foreign trade figures. When these tables are not present, information was pieced together by reading entries related to a particular state's economic activities. For the period 1873-1885 U.S. Congressional records proved to be a useful source of trade data, in particular U.S. Congress (House) Miscellaneous Documents (1887), "Abstract of the Foreign Commerce of Europe, Australia, Asia and Africa, 1873-1885," United States Consular Reports, No. 85, October. (Washington: Government Printing Office). Data for this period were supplemented with other sources, including the Statesman's Yearbook; Mitchell (1982) International Historical Statistics for Africa and Asia (New York: New York University Press); Mitchell (1983) International Historical Statistics for the Americas and Australasia (Detroit, MI: Gale Research Company); and Wattenberg (1976) Introduction and User's Guide to The Statistical History of the United States from Colonial Times to the Present (New York: Basic Books). For the period 1912-1913, the primary source used was the League of Nations (1912-1945) annual publications of International Trade Statistics, (Geneva: League of Nations)."

According to Barbieri (2003), "several problems arose when converting trade figures from local currencies to US dollars. The primary problem was the lack of available

exchange rates for many states. In many instances trade data reports were available, but exchange rates were unavailable. In addition, Polity II contains a variable that lists the name of the national currency to which the exchange rate is presumed to correspond. However, in many instances no currency name is given. Also, in some instances, particularly in Latin American states, the value of import and export flows are reported in two different currencies. For example, silver pesos may be used for imports, while gold pesos are used for exports. This requires separate exchange rates for converting imports and exports into US dollar values (see Appendix for supplementary data sources)."

Links to Related Data Online

Conflict Data Sets: http://www.pcr.uu.se/pdf/conflictdataset2.pdf
http://www.umich.edu/~cowproj/dataset.html
(Link to Correlates of War Project; includes a number of datasets that deal with war/conflict)
Katherine Barbieri Trade Data Sets:
http://sitemason.vanderbilt.edu/site/k5vj7G/new_page_builder_4
http://weber.ucsd.edu/~kgledits/Polity.html
(Link to POLITY project datasets, which include data on cross-national authority structures)