

# The Frequency of Wars\*

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## Abstract

Wars are increasingly frequent, and the trend has been steadily upward since 1870. The main tradition of Western political and philosophical thought suggests that extensive economic globalization and democratization over this period should have reduced appetites for war far below their current level. This view is clearly incomplete: at best, confounding factors are at work. Here, we explore the capacity to wage war. Most fundamentally, the growing number of sovereign states has been closely associated with the spread of democracy and increasing commercial openness, as well as the number of bilateral conflicts. Trade and democracy are traditionally thought of as goods, both in themselves, and because they reduce the willingness to go to war, conditional on the national capacity to do so. But the same factors may also have been increasing the capacity for war, and so its frequency.

Keywords: wars, state capacity, democracy, trade.

JEL codes: H56, N40.

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## The Frequency of Wars: Appendix

*Table A1. Time series data, 1870 to 2001*

Variable name	Number of countries # of countries	Pairwise conflicts		Democracy measures			Foreign trade openness <i>Openness</i>
		Total <i>FW</i>	Excluding United States <i>FW no US</i>	Polity 2 <i>Democracy</i>	Executive constraint <i>Exconst</i>	Political competition <i>Polcomp</i>	
1870	47	4	2	-2.32	3.43	4.58	0.11
1871	46	5	5	-2.05	3.62	4.75	0.16
1872	43	5	5	-1.65	3.63	4.98	0.18
1873	43	4	3	-1.65	3.53	5.02	0.17
1874	43	2	2	-1.56	3.62	5.00	0.18
1875	43	4	3	-1.46	3.64	5.00	0.16
1876	44	8	7	-1.60	3.72	4.76	0.18
1877	44	4	4	-1.63	3.73	4.69	0.19
1878	46	8	7	-1.65	3.73	4.73	0.20
1879	46	2	2	-1.53	3.71	4.78	0.21
1880	46	4	3	-1.15	3.72	5.00	0.20
1881	46	4	4	-1.13	3.75	4.98	0.21
1882	45	4	4	-1.13	3.75	4.98	0.20
1883	44	3	3	-1.06	3.74	5.12	0.20
1884	44	4	4	-1.15	3.74	5.12	0.20
1885	44	8	6	-1.15	3.74	5.12	0.20
1886	44	6	6	-1.34	3.66	5.02	0.19
1887	45	6	6	-1.34	3.66	5.02	0.19
1888	45	5	3	-1.21	3.68	5.08	0.19
1889	45	3	1	-1.13	3.70	5.08	0.20
1890	45	4	4	-0.96	3.72	5.35	0.16
1891	45	6	5	-1.00	3.75	5.37	0.20
1892	45	1	1	-0.98	3.77	5.37	0.20
1893	46	5	4	-0.96	3.77	5.46	0.19
1894	46	3	3	-0.89	3.85	5.38	0.20
1895	46	7	6	-0.91	3.85	5.29	0.18
1896	46	6	6	-1.00	3.81	5.29	0.21
1897	46	5	5	-1.00	3.81	5.29	0.21
1898	46	10	9	-0.66	3.85	5.51	0.21
1899	46	4	4	-0.66	3.85	5.51	0.20
1900	46	8	6	-0.68	3.89	5.42	0.16
1901	46	5	5	-0.48	3.96	5.48	0.19
1902	47	8	6	-0.40	3.94	5.51	0.19
1903	48	6	3	-0.44	3.91	5.55	0.19
1904	48	6	4	-0.53	3.81	5.62	0.19
1905	49	7	5	-0.47	3.87	5.71	0.20
1906	48	5	4	-0.20	3.87	5.87	0.20
1907	47	6	6	-0.51	3.77	5.76	0.20
1908	48	9	8	-0.07	3.94	5.96	0.20
1909	49	9	8	-0.02	4.00	5.90	0.19
1910	49	9	8	0.21	4.02	5.87	0.19
1911	49	19	16	0.50	4.14	5.96	0.20
1912	48	12	11	0.56	4.14	5.96	0.21
1913	48	13	12	0.93	4.27	6.08	0.18
1914	47	27	23	0.63	4.12	5.90	0.17
1915	47	16	15	0.68	4.22	5.96	0.19
1916	46	15	11	0.78	4.28	5.96	0.22
1917	46	18	14	1.28	4.42	6.24	0.23
1918	54	32	27	1.54	4.50	5.98	0.20
1919	53	23	21	1.63	4.53	6.06	0.19
1920	59	20	17	1.80	4.55	6.00	0.18
1921	60	18	16	2.05	4.63	6.20	0.13

Variable name	Number of countries # of countries	Pairwise conflicts		Democracy measures			Foreign trade openness <i>Openness</i>
		Total <i>FW</i>	Excluding United States <i>FW no US</i>	Polity 2 <i>Democracy</i>	Executive constraint <i>Exconst</i>	Political competition <i>Polcomp</i>	
1922	62	11	11	1.88	4.67	6.24	0.14
1923	62	11	11	1.56	4.57	6.12	0.15
1924	62	2	2	1.15	4.41	6.02	0.15
1925	63	6	6	0.94	4.30	5.85	0.16
1926	63	8	7	0.79	4.25	5.87	0.15
1927	64	9	8	0.69	4.23	5.92	0.15
1928	64	6	6	0.43	4.05	5.72	0.15
1929	64	4	3	0.18	3.98	5.65	0.14
1930	64	3	3	0.00	3.87	5.59	0.12
1931	64	6	6	-0.16	3.91	5.45	0.10
1932	65	7	6	-0.13	3.91	5.46	0.08
1933	65	8	7	-0.50	3.75	5.23	0.08
1934	67	14	13	-1.01	3.56	4.94	0.10
1935	67	11	11	-1.00	3.54	4.99	0.10
1936	67	11	11	-1.56	3.32	4.72	0.10
1937	66	15	15	-1.10	3.45	4.95	0.12
1938	66	13	13	-0.96	3.46	5.02	0.10
1939	65	37	37	-1.15	3.32	5.06	0.11
1940	61	67	66	-2.17	3.03	4.55	0.10
1941	54	33	29	-1.74	3.15	4.60	0.09
1942	52	31	31	-1.82	3.11	4.59	0.09
1943	52	18	18	-1.66	3.15	4.60	0.09
1944	55	14	14	-0.86	3.44	5.22	0.09
1945	62	19	18	-0.09	3.67	5.56	0.09
1946	65	9	7	0.09	3.97	5.74	0.12
1947	67	5	5	-0.16	3.82	5.68	0.15
1948	72	9	8	-0.11	3.88	5.46	...
1949	74	24	23	-0.38	3.87	5.24	0.13
1950	74	21	19	-0.14	3.94	5.28	0.13
1951	75	18	16	-0.28	3.91	5.31	0.17
1952	75	21	20	-0.14	4.01	5.26	0.15
1953	77	23	19	-0.22	4.01	5.19	0.14
1954	81	25	21	-0.45	4.01	5.03	0.14
1955	83	31	30	-0.39	3.95	5.00	0.16
1956	86	29	24	-0.06	4.01	5.12	0.16
1957	88	17	14	0.05	4.06	5.05	0.16
1958	89	38	33	-0.45	3.81	4.85	0.13
1959	88	41	39	-0.26	3.87	4.90	0.13
1960	106	33	29	-0.74	3.77	4.49	0.14
1961	110	38	31	-0.87	3.75	4.44	0.14
1962	117	37	30	-0.85	3.81	4.42	0.14
1963	119	36	34	-1.17	3.65	4.32	0.14
1964	122	34	29	-1.21	3.68	4.30	0.15
1965	125	41	37	-1.26	3.63	4.18	0.15
1966	129	35	34	-1.35	3.54	4.23	0.15
1967	130	33	28	-1.64	3.42	4.14	0.15
1968	134	23	20	-1.48	3.42	4.20	0.16
1969	134	34	30	-1.78	3.31	4.08	0.17
1970	136	17	15	-1.77	3.35	4.10	0.18
1971	142	27	25	-2.20	3.25	3.85	0.18
1972	142	20	18	-2.55	3.17	3.66	0.18
1973	143	28	25	-2.49	3.23	3.70	0.21
1974	145	26	25	-2.38	3.24	3.75	0.27
1975	152	35	31	-2.37	3.26	3.67	0.26
1976	152	35	31	-2.62	3.20	3.56	0.27
1977	153	37	35	-2.65	3.18	3.54	0.27
1978	155	33	31	-2.19	3.34	3.74	0.27

Variable name	Number of countries # of countries	Pairwise conflicts		Democracy measures			Foreign trade openness <i>Openness</i>
		Total <i>FW</i>	Excluding United States <i>FW no US</i>	Polity 2 <i>Democracy</i>	Executive constraint <i>Exconst</i>	Political competition <i>Polcomp</i>	
1979	159	35	29	-1.75	3.47	3.94	0.30
1980	160	33	31	-1.94	3.38	3.85	0.32
1981	162	34	28	-1.95	3.38	3.86	0.33
1982	162	39	34	-1.83	3.44	3.89	0.31
1983	163	40	28	-1.63	3.51	3.98	0.29
1984	164	46	42	-1.70	3.47	4.02	0.27
1985	164	47	43	-1.45	3.52	4.16	0.27
1986	166	46	42	-1.33	3.57	4.20	0.25
1987	166	72	68	-1.31	3.60	4.24	0.26
1988	166	46	41	-1.03	3.67	4.36	0.27
1989	166	23	21	-0.56	3.76	4.64	0.31
1990	169	13	11	0.55	4.13	5.19	0.32
1991	182	21	17	1.24	4.38	5.72	0.31
1992	183	24	22	1.92	4.52	5.97	0.31
1993	187	35	30	2.13	4.56	6.11	0.30
1994	186	42	36	2.42	4.64	6.25	0.32
1995	187	43	41	2.39	4.60	6.25	0.34
1996	187	44	41	2.28	4.58	6.24	0.35
1997	187	44	41	2.26	4.54	6.26	0.37
1998	187	28	23	2.42	4.60	6.43	0.36
1999	187	43	39	2.65	4.63	6.59	0.37
2000	187	32	25	2.89	4.70	6.66	0.41
2001	187	43	39	3.09	4.75	6.76	0.40

#### Sources.

FW: The Militarized Inter-State Disputes dataset, version 3.1, at <http://www.correlatesofwar.org>, described by Ghosn, Palmer, and Bremer, 'The MID3 data set'. Disputes are coded from level (1 no action) through 2 (threat of force), 3 (display of force), 4 (use of force), and 5 (war). We use all disputes of level 3 (the closing of a border or the dispatch of ships or troops) and above.

Openness and # of countries: Martin, Mayer, and Thoenig, 'Make trade not war'.

Democracy: the Polity2 (or net democracy), Exconst (executive constraint), and Polcomp (political competition) variables from the Polity IV dataset at <http://www.systemicpeace.org>, described by Marshall and Jaggers, 'Political regime characteristics'.

*Table A2. Unit root tests on FW (the frequency of pairwise conflicts)*


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Null Hypothesis: FW has a unit root  
 Exogenous: Constant  
 Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

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	Adj. t-Stat	Prob.*
Phillips-Perron test statistic	-2.915191	0.0463
Test critical values:		
1% level	-3.481217	
5% level	-2.883753	
10% level	-2.578694	

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\*MacKinnon (1996) one-sided p-values.

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Residual variance (no correction)	65.63298
HAC corrected variance (Bartlett kernel)	54.22658

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Phillips-Perron Test Equation  
 Dependent Variable: D(FW)  
 Method: Least Squares  
 Date: 01/17/11 Time: 09:05  
 Sample (adjusted): 1872 2001  
 Included observations: 130 after adjustments

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
FW_NEW(-1)	-0.152393	0.047833	-3.185957	0.0018
C	3.267484	1.176782	2.776626	0.0063

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R-squared	0.073473	Mean dependent var	0.292308
Adjusted R-squared	0.066235	S.D. dependent var	8.449069
S.E. of regression	8.164465	Akaike info criterion	7.052725
Sum squared resid	8532.287	Schwarz criterion	7.096840
Log likelihood	-456.4271	Hannan-Quinn criter.	7.070650
F-statistic	10.15032	Durbin-Watson stat	2.230413
Prob(F-statistic)	0.001813		

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*Table A2 (continued).*


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Null Hypothesis: FW has a unit root  
 Exogenous: Constant  
 Lag Length: 0 (Automatic - based on SIC, maxlag=12)

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	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-3.185957	0.0231
Test critical values:		
1% level	-3.481217	
5% level	-2.883753	
10% level	-2.578694	

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\*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Dependent Variable: D(FW)

Method: Least Squares

Date: 01/17/11 Time: 09:08

Sample (adjusted): 1872 2001

Included observations: 130 after adjustments

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
FW(-1)	-0.152393	0.047833	-3.185957	0.0018
C	3.267484	1.176782	2.776626	0.0063

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R-squared	0.073473	Mean dependent var	0.292308
Adjusted R-squared	0.066235	S.D. dependent var	8.449069
S.E. of regression	8.164465	Akaike info criterion	7.052725
Sum squared resid	8532.287	Schwarz criterion	7.096840
Log likelihood	-456.4271	Hannan-Quinn criter.	7.070650
F-statistic	10.15032	Durbin-Watson stat	2.230413
Prob(F-statistic)	0.001813		

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**Sources.** As Table A-1.

Table A3. The trend in FW (pairwise conflict frequency), 1871-2001

Dep. Var. = FW

<i>Regression Statistics</i>				
Multiple R		0.8796		
R Square		0.7737		
Adjusted R Square		0.7702		
Standard Error		0.4444		
Observations		131		
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Regression	2	86.45	43.23	218.9
Residual	128	25.28	0.1975	
Total	130	111.7		
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.6187	0.1233	5.017	1.71E-06
AR(1)	0.5344	0.0747	7.150	5.91E-11
time	0.009387	0.001827	5.139	1.01E-06

**Note.** Time is annual with t = 0 in 1871.**Sources.** As Table A-1.

Table A4. The trend in FW no US (pairwise conflict frequency, excluding those involving the United States), 1871-2001

Dep. Var. = FW no US

<i>Regression Statistics</i>				
Multiple R		0.8782		
R Square		0.7714		
Adjusted R Square		0.7678		
Standard Error		0.4547		
Observations		131		
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Regression	2	89.310	44.65	215.9
Residual	128	26.47	0.2068	
Total	130	115.8		
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.5552	0.1152	4.820	4E-06
AR(1)	0.5419	0.07404	7.319	2.44E-11
time	0.009245	0.001855	4.983	1.99E-06

**Note.** Time is annual with t = 0 in 1871.

**Sources.** As Table A-1.



Table A5. The trend in average percentile rank of countries originating conflicts, 1871-2001, by GDP

Dep. Var. = GDP%R

<i>Regression Statistics</i>				
Multiple R	7.969E-03			
R Square	6.351E-05			
Adjusted R Square	-2.523E-04			
Standard Error	0.2779			
Observations	3168			
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Regression	1	0.01553	0.01553	0.2011
Residual	3166	244.5	0.0772	
Total	3167	244.5		
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.6699	0.01480	45.26	0
time	7.039E-05	1.570E-04	0.4484	0.6539

**Note.** Time is annual with t = 0 in 1870.

**Sources.** As Table 1; see the text.

*Table A6. The trend in average percentile rank of countries originating conflicts, 1871-2001, by GDP per head*

Dep. Var. = GDPC%R

Regression Statistics				
Multiple R	0.03353			
R Square	0.00112			
Adjusted R Square	8.085E-04			
Standard Error	0.2889			
Observations	3168			
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>
Regression	1	0.2973	0.2973	3.563
Residual	3166	264.2	0.08344	
Total	3167	264.5		
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>
Intercept	0.4868	0.01539	31.64	3.7E-191
t	3.080E-04	1.632E-04	1.887	0.05919

**Note.** Time is annual with t = 0 in 1870.

**Sources.** As Table 1; see the text.

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