Military Spending Timeline

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Overview and Motivation:

At first, we wanted to create an interactive exploratory map on U.S. government spending per state. However, due to difficulty in finding the dataset, we decided to focus on military spending, since this data was easier to find. Once we obtained a separate dataset on military spending of countries around the world and population, we aimed to create a surprise map. We wanted to explore the relationship between military spending and population change. We made our prospectus on this idea, but due to a lack of understanding of the topic and how to incorporate time into calculating surprise, we took another direction in the project. We finally settled on building a timeline that demonstrates the change in military spending of countries based on specific events. This motivation came from when we visualized the data, we found that the military spending does not stay constant or increase. The overall shape of the lines are irregular. We felt that it is an interesting area to explore and investigate what events could cause such changes.

Related Works:

After we finalized the idea for the project, we were reminded of a visualization we saw that incorporated scrollytelling and sequential elements. The visualization is "How the Recession Reshaped the Economy, in 255 Charts" by New York Times. This visualization presented the economic changes based on specific different topics and demonstrated different lines as we scroll. Scrollytelling is something we want to include in our project because it creates an immersive experience. Another inspiration is how they showed the different lines based on the specific topics. We also modeled after this as major historical events tend to have the most impact on military spending.

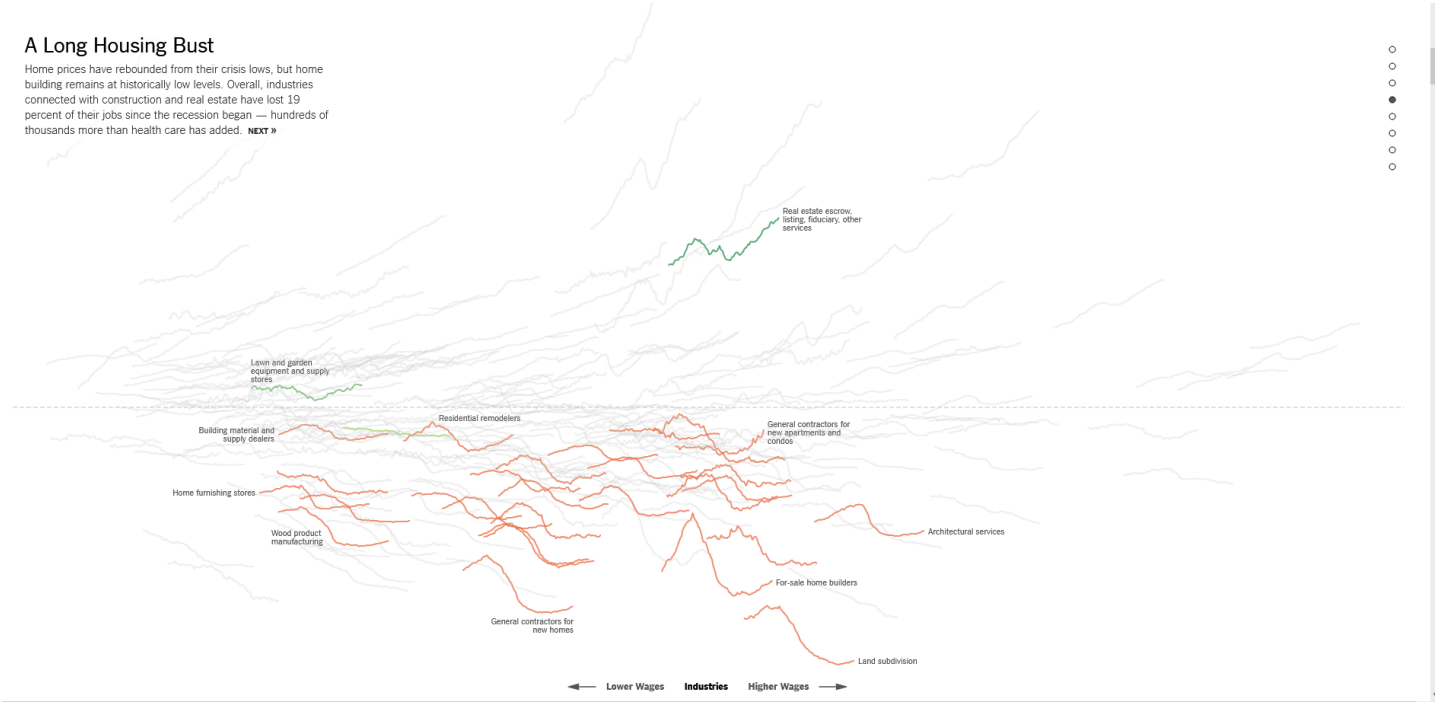


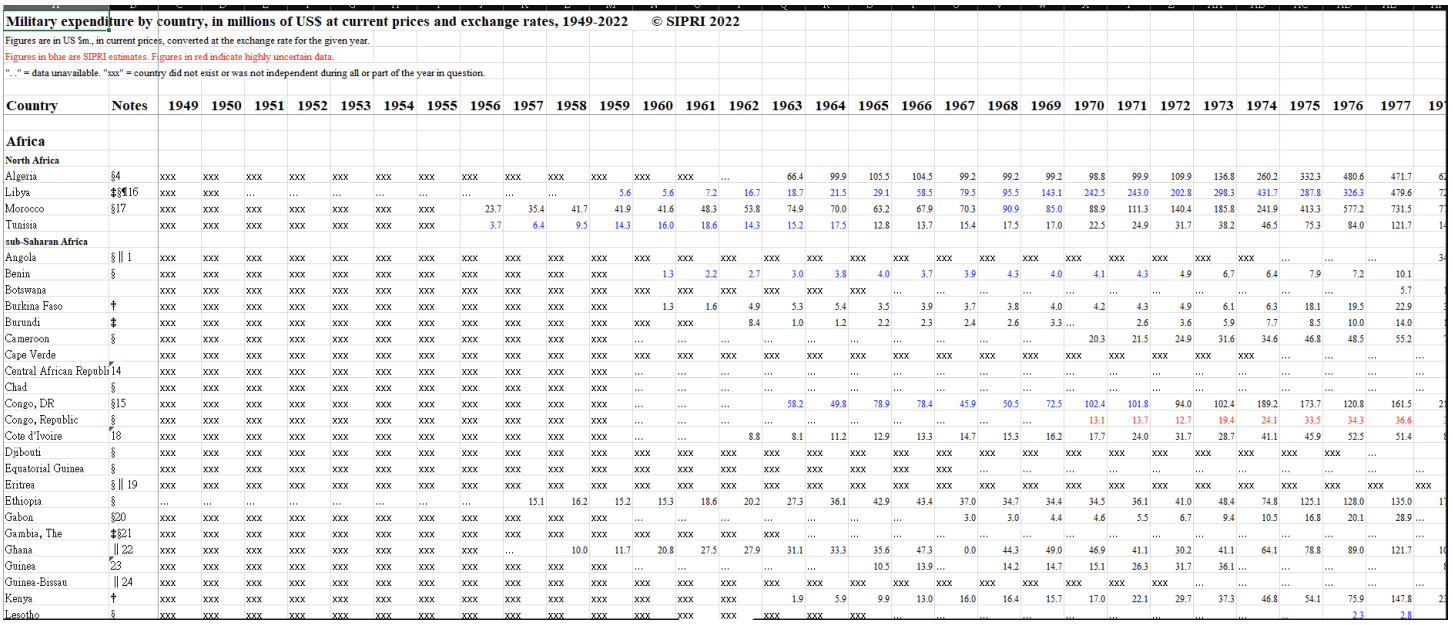
Figure 1: Topic-based selection and varying lines

Questions:

Our initial sets of questions involved how population and military spending are tied together, whether a rise or decline in population have any correlation. Then it shifted to how surprise can be calculated from said relationship. When is it surprising for a large country to increase their spending, or what prompts a small country to increase their spending? Lastly, the question became what causes a country to increase their spending. Does a smaller country respond more to major world events or its internal affairs? How much more does world power spend in their military? These were the main questions that we were trying to answer.

Data:

Our main dataset on military spending comes from SIPRI, an independent international institute dedicated to research into conflict, armaments, arms control and disarmament. The dataset is quite large as it contains data of most countries from the year 1940 - 2022. The dataset was irregular and contained a lot of custom symbols and different formatting. For instance, there were different symbols for when the country did not exist, and when the data was not present. The first step in cleaning our data was to remove all the custom symbols and try to convert all the symbols into NaN so they are easier to process.



Military expenditure by country, in millions of US$ at current prices and exchange rates, 1949-2022 © SIPRI 2022

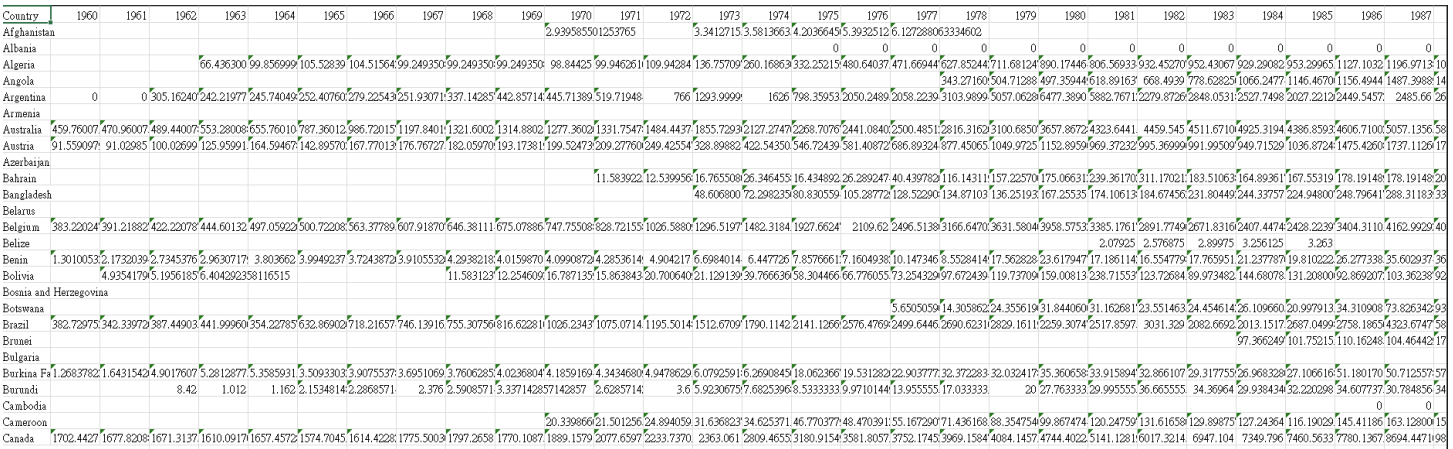
Figures are in US $m., in current prices, converted at the exchange rate for the given year.

Figures in blue are SIPRI estimates. Figures in red indicate highly uncertain data.

"..." = data unavailable. "xxx" = country did not exist or was not independent during all or part of the year in question.

Country	Notes	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	19
Africa																															
North Africa																															
Algeria	§4	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	66.4	99.9	105.5	104.5	99.2	99.2	99.2	98.8	99.9	109.9	136.8	260.2	332.3	480.6	471.7	62
Libya	‡§¶16	xxx	xxx	...	...	...	...	...	...	...	...	5.6	5.6	7.2	16.7	18.7	21.5	29.1	58.5	79.5	95.5	143.1	242.5	243.0	202.8	298.3	431.7	287.8	326.3	479.6	72
Morocco	§17	xxx	xxx	xxx	xxx	xxx	xxx	xxx	23.7	35.4	41.7	41.9	41.6	48.3	53.8	74.9	70.0	63.2	67.9	70.3	90.9	85.0	88.9	111.3	140.4	185.8	241.9	413.3	577.2	731.5	7
Tunisia		xxx	xxx	xxx	xxx	xxx	xxx	xxx	3.7	6.4	9.5	14.3	16.0	18.6	14.3	15.2	17.5	12.8	13.7	15.4	17.5	17.0	22.5	24.9	31.7	38.2	46.5	75.3	84.0	121.7	14
sub-Saharan Africa																															
Angola	§ ‖ 1	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	3
Benin	§	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	1.3	2.2	2.7	3.0	3.8	4.0	3.7	3.9	4.3	4.0	4.1	4.3	4.9	6.7	6.4	7.9	7.2	10.1	
Botswana		xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	...	...	...	...	...	...	...	...	...	5.7	
Burkina Faso	†	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	1.3	1.6	4.9	5.3	5.4	3.5	3.9	3.7	3.8	4.0	4.2	4.3	4.9	6.1	6.3	18.1	19.5	22.9	2
Burundi	‡	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	8.4	1.0	1.2	2.2	2.3	2.4	2.6	3.3	...	2.6	3.6	5.9	7.7	8.5	10.0	14.0	
Cameroon	§	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	...	...	...	...	...	...	...	20.3	21.5	24.9	31.6	34.6	46.8	48.5	55.2	
Cape Verde		xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	...
Central African Republi	14	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chad	§	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Congo, DR	§15	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	58.2	49.8	78.9	78.4	45.9	50.5	72.5	102.4	101.8	94.0	102.4	189.2	173.7	120.8	161.5	2
Congo, Republic	§	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	...	...	...	...	...	...	...	13.1	13.7	12.7	19.4	24.1	33.5	34.3	36.6	
Cote d'Ivoire	18	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	8.8	8.1	11.2	12.9	13.3	14.7	15.3	16.2	17.7	24.0	31.7	28.7	41.1	45.9	52.5	51.4	
Djibouti	§	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	
Equatorial Guinea	§	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	...	...	...	...	...	...	...	...
Eritrea	§ ‖ 19	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx
Ethiopia	§	...	...	...	...	...	...	...	...	15.1	16.2	15.2	15.3	18.6	20.2	27.3	36.1	42.9	43.4	37.0	34.7	34.4	34.5	36.1	41.0	48.4	74.8	125.1	128.0	135.0	17
Gabon	§20	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	...	...	...	...	...	3.0	3.0	4.4	4.6	5.5	6.7	9.4	10.5	16.8	20.1	28.9	...
Gambia, The	‡§21	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Ghana	‖ 22	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	10.0	11.7	20.8	27.5	27.9	31.1	33.3	35.6	47.3	0.0	44.3	49.0	46.9	41.1	30.2	41.1	64.1	78.8	89.0	121.7	10
Guinea	23	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	...	...	10.5	13.9	...	14.2	14.7	15.1	26.3	31.7	36.1	...	...	...	...	
Guinea-Bissau	‖ 24	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	...	...	...	...
Kenya	†	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	1.9	5.9	9.9	13.0	16.0	16.4	15.7	17.0	22.1	29.7	37.3	46.8	54.1	75.9	147.8	25
Lesotho	§	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	xxx	...	...	...	...	...	...	...	...	...	...	2.3	2.8	

Figure 2: Formatting in the SIPRI dataset



Country	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Afghanistan											2.939585501253765			3.3412715	3.5813663	4.203664	5.3932512	6.127288063334602										
Albania																0	0	0	0	0	0	0	0	0	0	0	0	0
Algeria				66.436300	99.856999	105.52839	104.51564	99.249350	99.249350	99.249350	98.84425	99.946261	109.94284	136.75709	260.16863	332.25215	480.64037	471.66944	627.85244	711.68124	890.17446	806.56933	932.45270	952.43067	929.29082	953.29965	1127.1032	1196.9713	10
Angola																			343.27160	504.71288	497.35944	618.89163	668.4939	778.62825	1066.2477	1146.4670	1156.4944	1487.3988	14
Argentina	0	0	305.16240	242.21977	245.74049	252.40760	279.22543	251.93071	337.14285	442.85714	445.71389	519.71948	766	1293.9999	1626	798.35953	2050.2489	2058.2239	3103.9899	5057.0628	6477.3890	5882.7671	2279.8726	2848.0531	2527.7498	2027.2212	2449.5457	2485.66	26
Armenia																												
Australia	459.76007	470.96007	489.44007	553.28008	655.76010	787.36012	986.72015	1197.8401	1321.6002	1314.8802	1277.3602	1331.7547	1484.4437	1855.7293	2127.2747	2268.7076	2441.0840	2500.4851	2816.3162	3100.6850	3657.8672	4323.6441	4459.545	4511.6710	4925.3194	4386.8593	4606.7100	5057.1356	58
Austria	91.559097	91.02985	100.02699	125.95991	164.59467	142.89570	167.77013	176.76727	182.05970	193.17381	199.52473	209.27760	249.42554	328.89882	422.54350	546.72439	581.40872	686.89324	877.45065	1049.9725	1152.8959	969.37232	995.36999	991.99509	949.71529	1036.8724	1475.4260	1737.1126	17
Azerbaijan																												
Bahrain											11.583922	12.539956	16.765508	26.346455	16.434892	26.289247	40.439782	116.14311	157.22570	175.06631	239.36170	311.17021	183.51063	164.89361	167.55319	178.19148	178.19148	20
Bangladesh														48.606800	72.298235	80.830559	105.28772	128.52290	134.87103	136.25193	167.25535	174.10613	184.67456	231.80449	244.33757	224.94800	248.79641	288.31183	33
Belarus																												
Belgium	383.22024	391.21882	422.22078	444.60132	497.05922	500.72208	563.37789	607.91870	646.38111	675.07886	747.75508	828.72155	1026.5880	1296.5197	1482.3184	1927.6624	2109.62	2496.5139	3166.6470	3631.5804	3958.5753	3385.1761	2891.7749	2671.8316	2407.4474	2428.2239	3404.3110	4162.9929	40
Belize																						2.07925	2.576875	2.89975	3.256125	3.263		
Benin	1.3010053	2.1732039	2.7345376	2.9630717	3.803662	3.9949237	3.7243872	3.9105532	4.2938218	4.0159870	4.0990872	4.2853614	4.904217	5.6984014	6.447726	7.8576661	7.1604938	10.147346	8.5528414	17.562828	23.617947	17.186114	16.554779	17.765951	21.237787	19.810222	26.277338	35.602937	36
Bolivia		4.9354179	5.1956185	6.4042923	5.8116515				11.583123	12.254609	16.787135	15.863843	20.700640	21.129139	39.766636	58.304466	66.776055	73.254329	97.672439	119.73709	159.00813	238.71553	123.72684	89.973482	144.68078	131.20800	92.869207	103.36238	92
Bosnia and Herzegovina																												
Botswana																	5.6505059	14.305862	24.355619	31.844060	31.162681	23.551463	24.454614	26.109660	20.997913	34.310908	73.826342	93
Brazil	382.72975	342.33972	387.44903	441.99960	354.22785	632.86902	718.21657	746.13916	755.30756	816.62281	1026.2343	1075.0714	1195.5014	1512.6709	1790.1142	2141.1266	2576.4769	2499.6446	2690.6231	2829.1611	2259.3074	2517.8597	3031.329	2082.6692	2013.1517	2687.0499	2758.1865	4323.6747	58
Brunei																											97.366249	101.75215	110.16248	104.46442	17
Bulgaria																												
Burkina Fa	1.2683782	1.6431542	4.9017607	5.2812877	5.3585931	3.5093303	3.9075537	3.6951069	3.7606285	4.0236804	4.1859169	4.3434680	4.9478629	6.0792591	6.2690845	18.062366	19.531282	22.903777	32.372283	32.032417	35.360658	33.915894	32.866107	29.317755	26.968328	27.106616	51.180170	50.712557	57
Burundi			8.42	1.012	1.162	2.1534814	2.2868571		2.376	2.5908571	3.3371428571428571		2.6285714		3.6	5.9230675	7.6825396	8.5333333	9.9710144	13.955555	17.033333	20	27.763333	29.995555	36.665555	34.36964	29.938434	32.220288	34.607737	30.784856	34
Cambodia																												0	0	
Cameroon											20.339866	21.501256	24.894059	31.636823	34.625371	46.770377	48.470391	55.167290	71.436168	88.354754	99.867474	120.24759	131.61658	129.89875	127.24364	116.19029	145.41186	163.12800	15
Canada	1702.4427	1677.8208	1671.3137	1610.0917	1657.4572	1574.7045	1614.4228	1775.5003	1797.2658	1770.1087	1889.1579	2077.6597	2233.7370	2363.061	2809.4655	3180.9154	3581.8057	3752.1745	3969.1584	4084.1457	4744.4022	5141.1281	6017.3214	6947.104	7349.796	7460.5633	7780.1367	8694.4471	98
Central African Republic																												
Chad																								39.363259	40.049707	37.839750	48.800771	34.271986	77
Chile	126.79104	160.93092	162.62622	152.91745	149.95037	168.21577	186.69796	182.70534	173.78102	179.9809	388.38395	651.58986	745.66118	1005.9197	1103.1904	486.72007	599.807	924.04275	1036.1450	1312.8997	1787.1794	2292.3076	2160.7478	1497.6843	1462.2629	1137.6352	1114.3938	1166.7813	99
China																												
Colombia	75.960813	97.31343	153.59625	170	190	185.20286	172.59259	178.54188	141.18484	131.63896	162.66245	263.89857	170.58758	173.87993	194.90410	227.94215	229.14691	280.08233	360.66362	467.68727	611.24823	638.64343	667.8661	859.81360	889.73089	716.73506	679.49820	721.33120	86
Congo, Dem. Rep.				58.217821	49.818181	78.90909	78.363636	45.907648	50.479041	72.455089	102.39520	101.79640	94.01198	102.39520	189.22155	173.65269	120.79535	161.47110	214.95189	190.94470	152.18367	71.671582	147.16242	78.9198	53.403541	40.371344	67.436312	28.297227	2
Congo, Rep.											13.100436	13.749473	12.744615	19.426710	24.137429	33.493068	34.337727	36.633018	37.960435	52.566260	57.416698	63.535260	72.42716		49.423627	55.646692	47189	2855	100.51341	432
Costa Rica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cote d'Ivoire			8.7668459	8.0647794	11.190603	12.902909	13.269401	14.711322	15.305071	16.156269	17.727738	23.968971	31.742504	28.713844	41.129189	45.886157	52.462858	51.449039	86.76481	102.73502	118.47311	92.002752	86.425689	76.251882	70.1648	69.56504	96.559112	122.78022	12
Croatia																												

Figure 3: After initial cleanup

Year	Country	Military	Population
1960	Albania		1608800
1960	Algeria		11394307
1960	Angola		5357195
1960	Argentina	0	20349744
1960	Armenia		1904148
1960	Australia	459.76007	10276477
1960	Austria	91.559097	7047539
1960	Azerbaijan		3894500
1960	Bahrain		160691
1960	Bangladesh		50396429
1960	Belarus		8198000
1960	Belgium	383.22024	9153489
1960	Belize		91403
1960	Benin	1.3010053	2512284
1960	Bolivia		3707515
1960	Bosnia and Herzegovi		3262539
1960	Botswana		512865
1960	Brazil	382.72975	73092515

Figure 4: Final cleanup

After we did this, the data was still separated and therefore hard to parse. Thus we combined the datasets into a single 4 column CSV, with Country, Year, Population, and Spending. This allows us to quickly grasp all spending by a country instead of iterating through the different columns by years. Thus each year will have multiple entries, one for each country in our dataset, until the end of our year range is reached. Though we did not use the population data in the end, it is still a useful metric to have in the data.

Exploratory Data Analysis:

Since our goal is to determine the trend in the data, we decided to plot multiple types of line charts to start. We also tried to incorporate the population at the start to see if we can find additional relationships. One of the problems that we noticed was that the spending for the United States and China far surpass any other country, so we had to normalize the data in log base 10. We plotted graphs for spending vs population, and spending vs years. We see that spending vs years give us more interesting graphs and potential to explore as it has a nonlinear relationship.

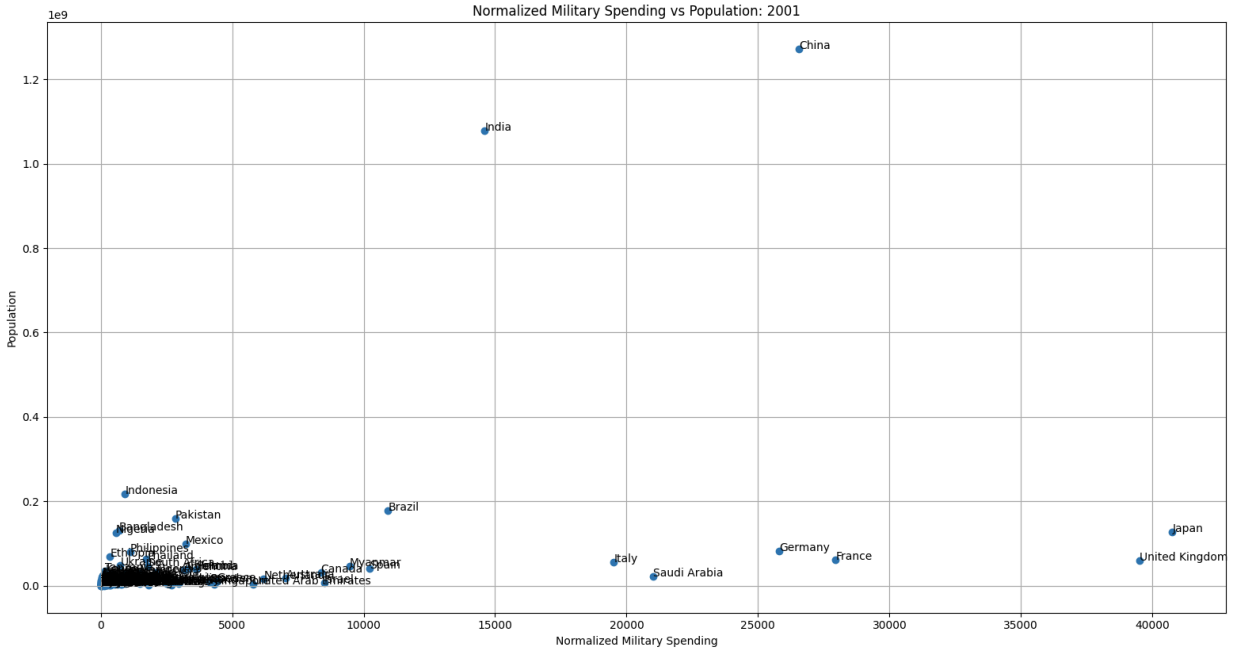


Figure 5: Spending vs Population

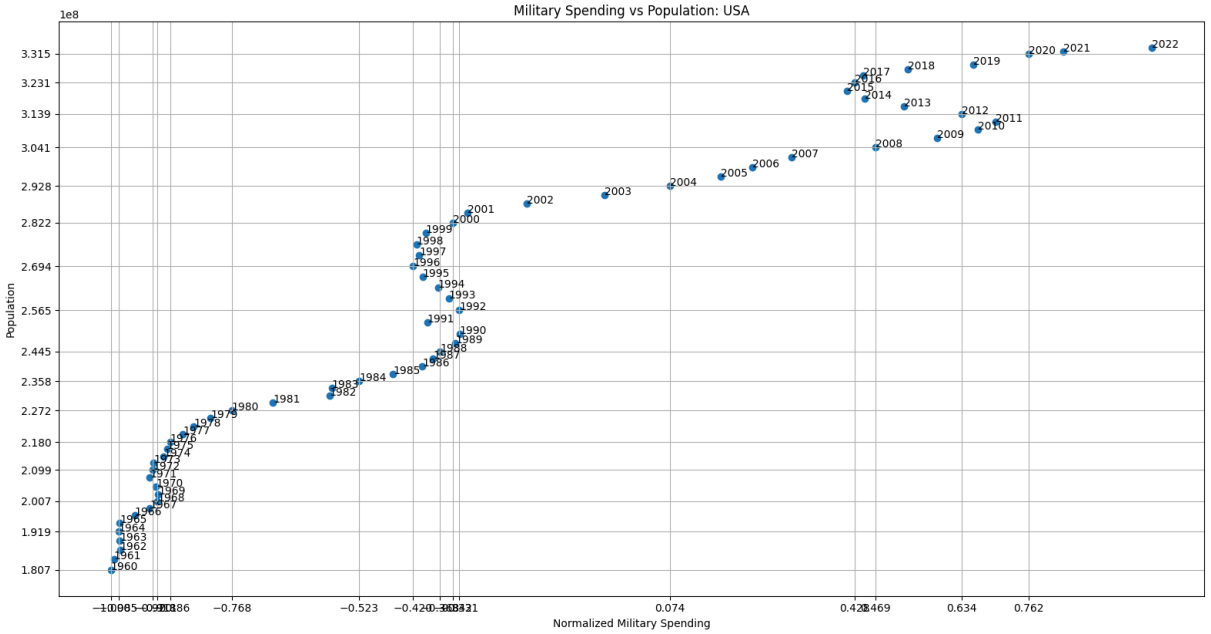


Figure 6: Spending per year

Design Evolution:

Initially originally imagined a set of surprise graphs as the crux of this project, with a map-based display of each individual country's surprise status. This map would change over time, with each country having a specific shade of color depending on the factor of its surprise. We started this map by using d3.js. We used geojson data to import a mapping of each country's boundaries, then use functions built into d3 to construct an equirectangular projection with each country's borders defined. Then we added an ability to the backend to change the color of any specific country on the map. Finally, we added hover ability, which grabs chosen information from any country the mouse hovers over.

Figure 7: Depiction of the working map implementation

However, due to the change in the nature of our work, the map idea was eventually scrapped, in favor of a cartesian coordinate-based system. From this point, our vision was to create surprise graphs and compare military spending with population. We created multiple test graphs using D3.js, plotting a variety of different nations, different years, and different values of log to experiment with what the graphs would look like.

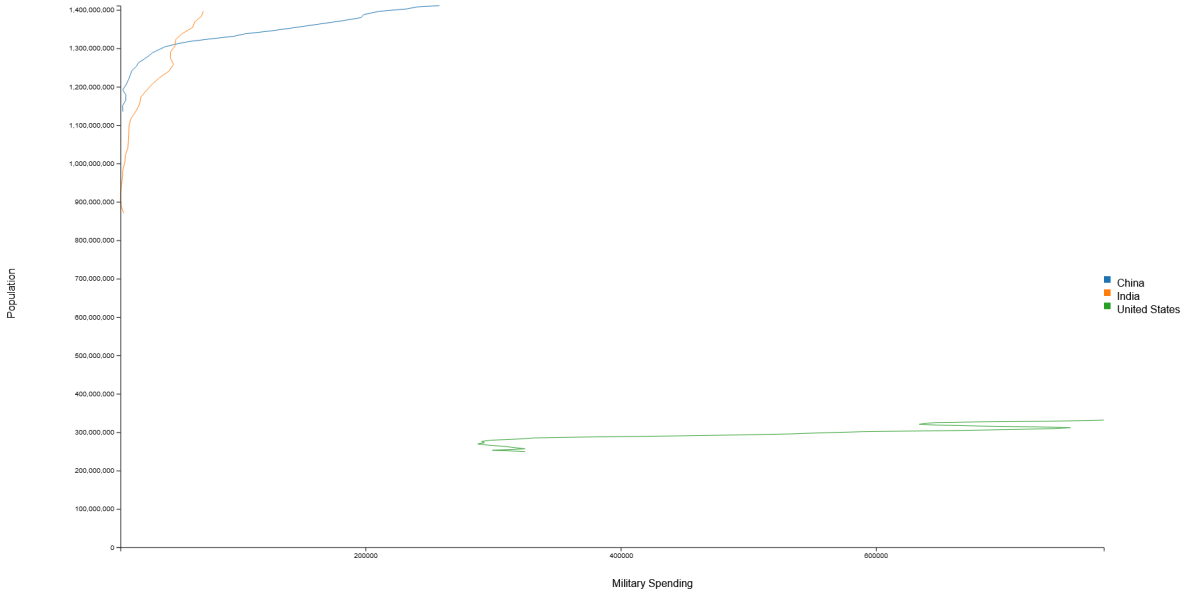


Figure 8: An example graph of our three largest outliers, military spending vs. population

While these graphs were interesting, we ultimately realized that in such a short time period, military spending would not be directly affected by population, and would instead be driven by more complicated factors, such as geopolitics, elections, and economics. We shifted our focus to depicting the changes in military spending over time, irrespective of population. Thus we created new graphs in D3.js, taking this into account. However, the outliers in our dataset meant that in order to depict the whole set, we had to represent the military spending values in log base 10.

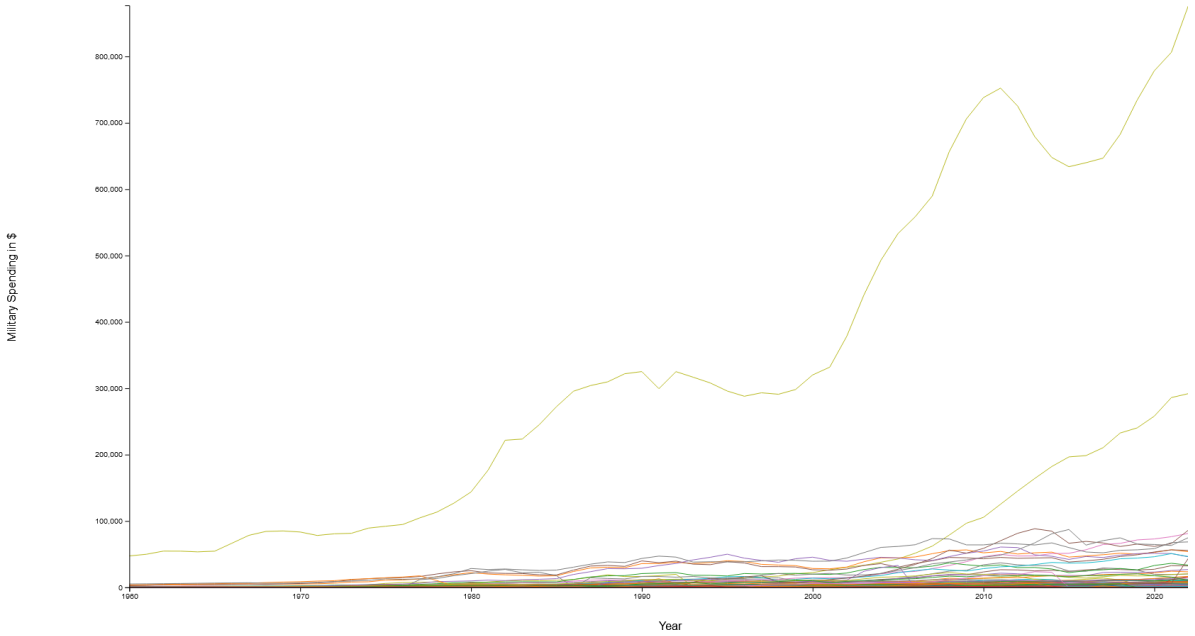


Figure 9: Early graph of year vs. military spending.

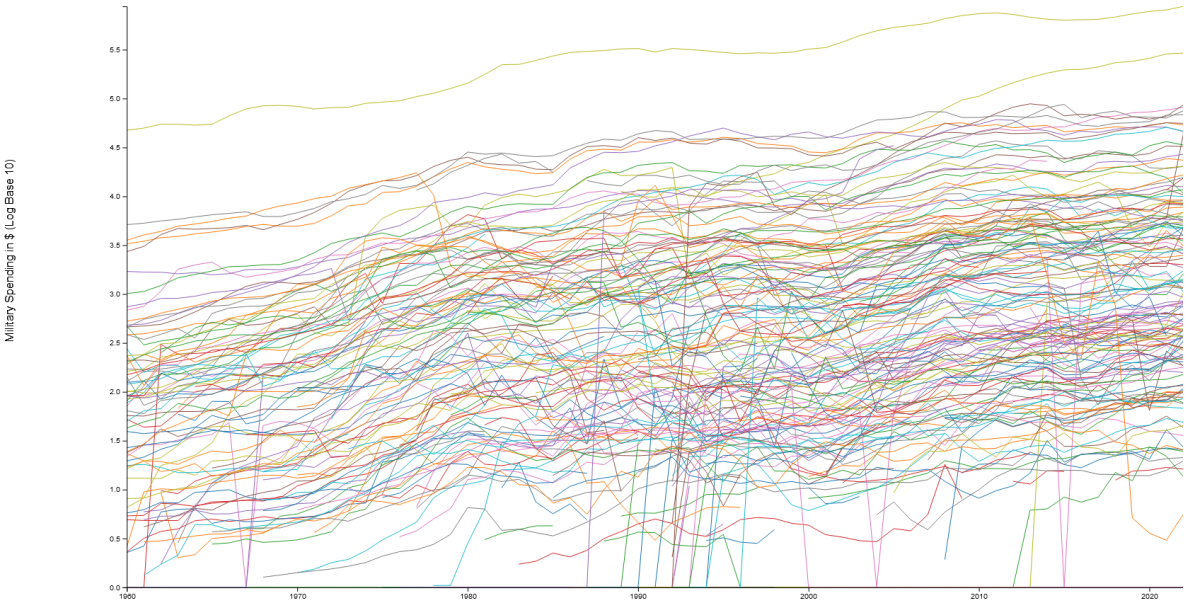


Figure 10: Final total graph of year vs. Military spending log base 10.

Another factor that changed our design was what data were present in the dataset. Much of the data prior to 1960 were not available and makes it hard to find any interesting changes. There was more available data starting in 1960 and we decided to shift the timeline to start from 1960 instead of 1940. One additional challenge is that despite wanting to use most of the major events, much of the data is not available for communist countries. Take the Cold War for example, it would be important to see how the Soviet influence military spending around the globe. Yet,

there was no data available. We were only able to observe the U.S. military spending. This happens for quite a lot of countries and limits what events we can use. It would also be difficult to find additional reliable data in a short time.

Implementation:

The goal of our visualization tool is to enable users to interact with military spending data trends for specific countries during significant global events. Our approach uses interactive visualizations to create an in-depth analysis of how major world events influence military expenditures.

At the top of our webpage is an interactive timeline implemented using Timeline.js, which serves as a chronological guide through our selected global events from 1960 to 2022. This timeline prominently displays each event in large text within a banner at the top of our webpage, accompanied by a brief description of the event (Figure 11). Below this banner, a horizontal stacked timeline marks the duration of each selected world event, indicating both the start and end years. This allows users to navigate through time either by using the left and right arrow keys on their keyboard or by clicking on the arrows within the banner that denote the next and previous events. Additionally, users can two-finger scroll over the timeline to advance through the timeline and select an event that captures their interest.

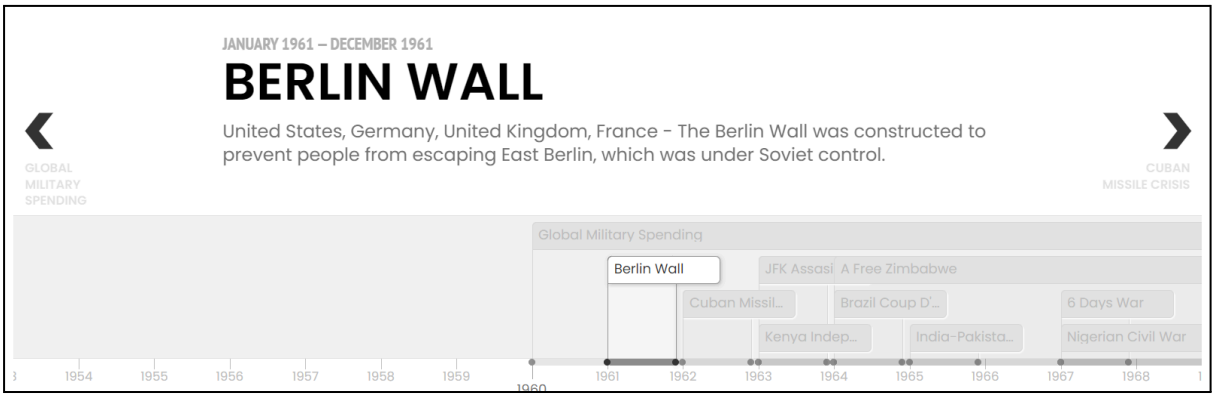


Figure 11: Interactive Timeline using Timeline.js showing key world events.

Beneath the timeline, we present a detailed graph of military spending, which is dynamically linked to the timeline events. The graph logic is contained within a separate HTML file called graph.html, and is embedded in the main index.html page via an iframe. This separation allows for better management and isolation of the graphical logic. Each timeline event object is associated with specific start and end years for military spending data, which extend beyond the actual years of the event to better illustrate the trends before and after the event (Figure 12).

Upon selecting an event on the timeline, the associated data — including the specific years and countries relevant to that event — are dynamically routed to the iframe, prompting the graph to update. Initially, when the title banner displays when

first loading the application, the graph displays the military spending for all included countries from 1960 to 2022.

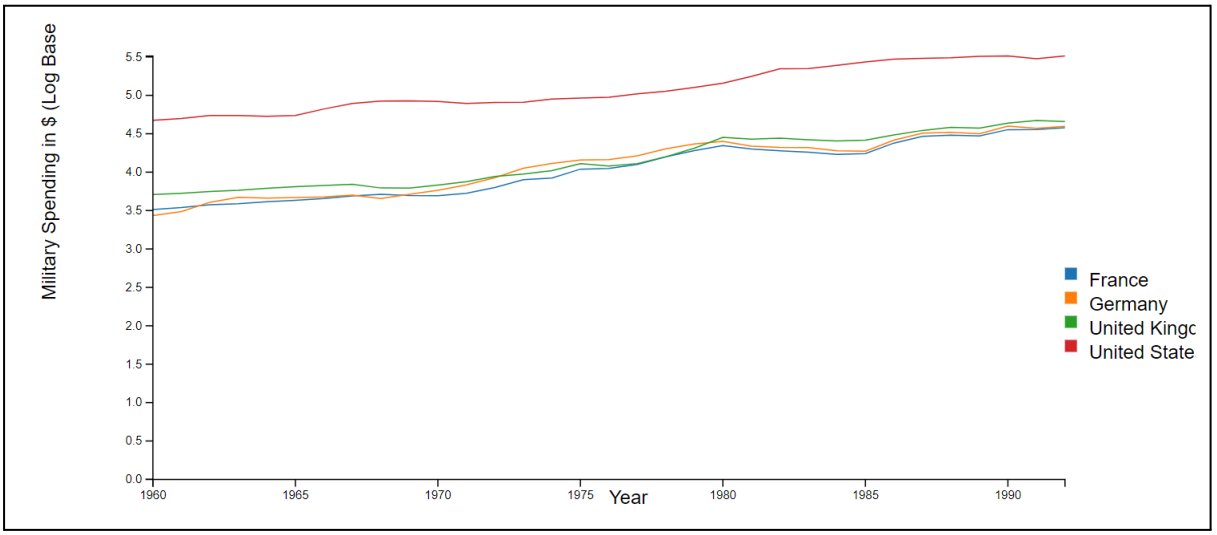


Figure 12: Dynamic graph displaying military spending trends associated with selected world events.

The interface design utilizes Google Fonts' Poppins typeface to create a clean and modern aesthetic, enhancing readability and user interaction. The clear, uncluttered layout was designed to facilitate user engagement and ease navigation through our complex dataset.

Our implementation focuses on interactivity and dynamic data handling, where the selection of an event on the timeline directly influences the data displayed in the graph. This interaction makes the exploration of data engaging and allows users to form a clearer understanding of the impact of specific events on military spending across different nations.

Evaluation:

Through the development and interaction with our visualizations, we were able to gain substantial insights into the trends of global military spending in response to significant historical events. Our visualizations enabled us to observe key patterns – specifically reactive spending trends where countries increase their military spending in response to regional conflicts or global tensions in periods like the Cold War or after the events of 9/11. We also noticed that the impact of these events can extend over several years, impacting national spending long-term for different countries. If a civil war or coup occurred in a country and the regime changed, we would see a drop in spending followed by steady increase. Additionally, the ability to compare multiple countries simultaneously allowed us to discover that not all nations react similarly to the same global incidents, due to their political stances, military capabilities, economic conditions, and other factors.

The objective of our visualization was to explore how significant events influence military spending and to identify any corresponding patterns or anomalies. Our tool effectively pinpointed moments of significant spending increases and linked them directly to specific events, supporting our hypothesis that global events will change military spending. However, our graphs were limited in their ability to express change in spending as everything was calculated in log base 10.

Our interactive timeline and dynamic graphs engaged users and made complex datasets accessible and manageable. This interface excelled in its ability to highlight spending trends over time, and provide analyses of how various factors affect military spending. Though, there are several areas where our visualization tool could be improved:

1) Enhancing User Interaction: Introducing mechanisms to better display data to the user would greatly improve usability. We wanted to add a feature that would display a popup over the data to further explain the effects of the time period on each country.
2) Expanding Data Variables: Including additional data variables such as economic indicators or political stability indexes could offer a more comprehensive view of the factors driving military spending.
3) Incorporating Advanced Analytical Tools: Providing tools for trend analysis, anomaly detection, and forecasting within the visualization could empower users with sophisticated ways to analyze and predict spending trends. We also wanted to highlight the timeframe that the event occurred within the graph to better show when the event happened and its aftermath
4) Mobile Optimization: Improving the visualization's responsiveness and compatibility to mobile devices would make it accessible on any platform, broadening the user base and enhancing usability.