December 4, 2024

To whom it may concern,

There are many debates surrounding the West's (particularly, the U.S.'s) use of military intervention in the Middle East. A prominent perspective is that rather than aiming to address terrorism, an ulterior (or at least secondary) motivation for the War on Terror was to secure the strength of the U.S. Dollar. This report aims to compare the effects of the use of military measures and economic measures on the strength of a country's currency. It is hypothesized that military measures will not remain a statistically significant indicator of a currency's strength when also considering the effects of economic measures.

To determine what factors influence the strength of a nation's currency, three independent variables were considered to represent military and economic measures. The number of inter-state wars the nation was taking part in during a given year was taken to be a representative of military measures. Military spending was also taken to be a representative of military measures, although it could have some bearing as a representative of economic measures as well. Yearly average federal interest rate was taken as a representative of economic measures.

USDX and U.S. federal interest rates were taken from Statista. Pound Sterling PPP data and UK federal interest rates were taken from the Federal Reserve Bank of St. Louis Economic Database. Conflict data for both countries were taken from the Correlates of War inter-state war dataset. Military spending data for both countries were taken from Our World in Data.

The conflicts variable was coded as the number of conflicts a country was in during a given year. This variable was hand-coded, with each year starting at 0 and adding 1 to each year for each conflict the country was in during that year as defined by the Correlates of War inter-state war dataset.
Interest rates for both countries and USDX were given as monthly data. To transform to yearly data, the yearly average of all months were taken as the value for each year. Data were also standardized due to measuring on different scales.

After these transformations, datasets for the dependent variable and each independent variable were merged by year into one dataset for each country, upon which regressions were run.

Regression Analysis

It was expected that interest rate would have a positive statistically significant effect on the strength of a nation's currency, as high interest rates are generally associated with stronger currencies. Meanwhile, it was hypothesized that military spending and number of conflicts would have statistically insignificant effects on currency strength when considered in a model next to an economic measure. It was expected that military expenditure would have a positive coefficient, as projecting strength is also vital in keeping other countries' faith in a nation and its currency, while number of conflicts would have a negative

coefficient due to the immediate economic cost of a war while any economic benefits to come from the war may be delayed.

To represent the strength of the U.S. Dollar, the USDX index, an index widely accepted as an official measure of the strength of the Dollar, was used as a dependent variable.

Regression Model on Strength of the U.S. Dollar			
Variable	Beta	S.E.	P-Value
Conflicts	0.058310	0.359275	0.8718
Military Expenditure	-0.116288	0.173093	0.5051
Interest Rate	0.355372	0.167395	0.0392
Intercept	-0.006997	0.138088	0.9598

Given that interest rate was the only variable with a p-value below 0.05, the regression supports the hypothesis that military measures would have a statistically insignificant effect on the USDX when compared to the effect of economic measures. While interest rate had a positive relationship with the USDX as expected, conflicts and military expenditure had coefficients of opposite sign than expected. This indicates that getting into wars strengthens the Dollar while increasing military expenditure weakens the Dollar — though, again, these findings are statistically insignificant.

To more thoroughly test the hypothesis that military measures have insignificant effect when considered together with economic measures, the same analysis was run on the Pound Sterling. The PPP over GDP (a widely used measure of the strength of non-Dollar currencies) of the UK was taken as a measure of the Pound Sterling's strength, while independent variables were kept the same between analyses.

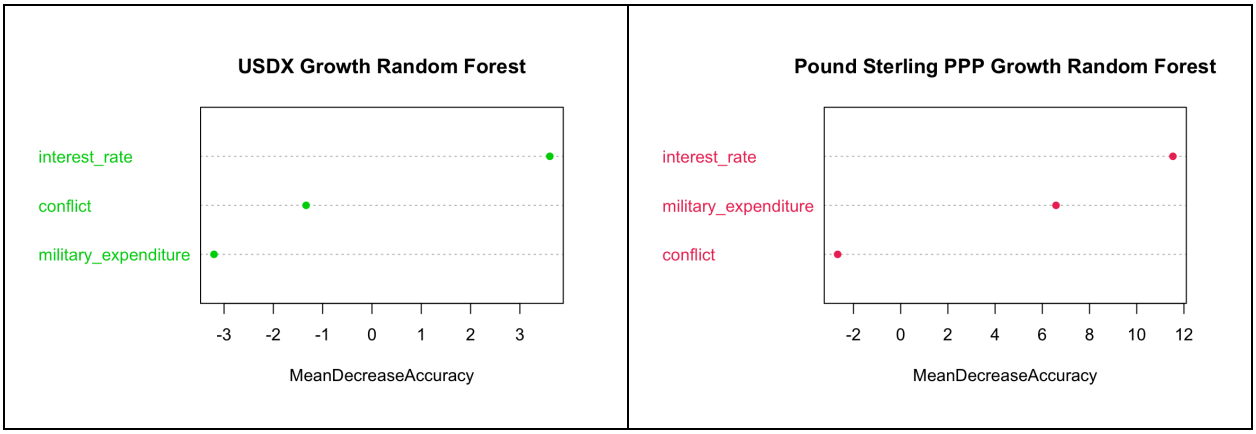
Regression Model on Strength of the Pound Sterling			
Variable	Beta	S.E.	P-Value
Conflicts	0.49661	0.34776	0.1574
Military Expenditure	0.63714	0.08522	<0.001
Interest Rate	-0.18423	0.08515	0.0337
Intercept	-0.03143	0.08736	0.7200

While interest rate remains statistically significant in a regression on the Pound Sterling, military expenditure is highly significant with a p-value < 0.001. Thus, even though the number of conflicts the UK was in was statistically insignificant, the hypothesis was not supported. Military expenditure had a positive coefficient as expected, however conflicts and interest rates had opposite signs than expected. This indicates that, for the UK, increasing military spending and taking part in wars strengthens its currency while raising interest rates weakens it.

Random Forests

To further investigate the comparative effects of economic and military measures on a currency's strength, a random forest analysis was run on the data to determine which independent variables had the most significant effect on currency strength.

In order to run a random forest analysis, DVs were transformed from numeric variables into binary variables indicating whether or not currency strength as measured by their respective indices increased or decreased from the previous year.
Below are variable importance plots for each random forest run on both currencies. A larger coefficient indicates that variable was more important in predicting whether or not currency strength grew or shrank in a given year, while a negative coefficient indicates that trying to use that variable to predict an outcome makes the prediction less accurate.



According to the random forest for the USDX, interest rate is the only effective predictor of whether or not the Dollar strengthens or weakens in a given year. Conflict and military expenditure both decrease the accuracy of predictions when taken into account.
This supports the hypothesis that military measures do not predict currency strength when considered next to economic measures, as military measures are detrimental in predicting whether or not currency strength increases in a given year when an economic measure is included in the prediction.

According to the random forest for Pound Sterling PPP, interest rate is the most effective predictor of whether or not the Pound Sterling strengthens or weakens in a given year. Military expenditure is also

an important predictor, though not as important of a predictor. Conflict decreases accuracy when considered in the prediction.
This somewhat supports the hypothesis that military measures do not predict currency strength when considered next to economic measures. While conflict is not a useful predictor and interest rate is the most useful predictor, military expenditure is also a useful predictor of whether or not currency strength increases in a given year.

Conclusions

These analyses mostly support the hypothesis that military measures are not a significant predictor of currency strength when also considering economic measures, while regression on the strength of the Pound Sterling did not support the hypothesis. However, military measures are still obviously important in protecting a country's interests and national security, without which a country's currency may collapse, which is an observation these analyses may not be communicating.

A limitation of these analyses is that lags were not incorporated, as each independent variable may have different delays in how long they take to begin affecting their nation's currency strength. Additionally, analyses are limited in scope of currencies analyzed and variables considered for each country. Future analyses may incorporate lags, more countries, and more variables to represent military and economic measures.

Sincerely,
David