The Impact of Political Instability on Myanmar Foreign Exchange Rates Using Text Analysis on Newspaper Articles

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1. Introduction

On February 1, 2021, the Myanmar military launched a coup, reversing a decade-long democratic process. Following the coup, massive protests and civil disobedience movements such as resigning government positions erupted nationwide. In a matter of days, the military started to display excessive use of force including but not limited to opening live fire into the crowd, arresting protestors and political opponents, detaining foreign press, imposing Martial law, and cutting off internet and telecommunication services. The international community has responded with condemnations and heavy economic sanctions. Likewise, most foreign companies have halted their operations with the most significant being the withdrawal from oil companies such as TotalEnergies and Chevron as petroleum gas is Myanmar's top export. To date, the Assistance Association for Political Prisoners (Burma) reports that 10,238 civilians have been arrested, charged, or sentenced and 1,756 civilians have been killed by the junta (AAPP 2022).

Dhaval explains that when a country is facing political instability, this deters foreign investment which then negatively impacts a country's currency. Existing literature supports this hypothesis. Asteriou and et al. (2019) finds that increased political instability and "negative shocks of structural reforms" leads to higher exchange rate volatility using panel data regression. Michail also concludes that "intra-state (civil) wars have a strong and significant depreciative impact on the exchange rate." Imai and Weinstein (2000) also confirm that "civil war has a negative impact on economic growth" by decreasing private investment.

The coup has casted ripples in the Myanmar economy causing illiquidity in the "cash-is-king" banking system. Given strong literature support for political instability impacts on the economy, this paper seeks to explore whether this relationship holds true for Myanmar as well. If so, this paper aims to measure the effect of the coup on three foreign exchange rates (U.S. dollar, Singaporean dollar, Thai bhat) by measuring political instability through newspaper articles. Myanmar also has a unique market structure. It has no active stock or bond markets to absorb market shocks and thus, all market uncertainties are absorbed by the foreign exchange markets and gold trade.

2. Data Sources and Descriptions

The following data sources are from Eikon:

1. Myanmar COVID-19 Case Reports (Daily)
2. Dollar-Kyat Exchange Rates (Daily)
3. Dollar Index (Daily)
4. Singapore-Dollar Index (Monthly)
5. Thai-Bhat Index (Monthly)
6. Government Consumption (Quarterly)
7. Private Consumption (Quarterly)

The Thai bhat-kyat and Singapore dollar-kyat exchange rates are from the Central Bank of Myanmar database.

The newspaper articles are derived from ProQuest Historical Newspapers Database. The search query for the selected articles is as follows:

- mention "Myanmar" or "Burma" in document title
- published between February 1, 2021 – February 21, 2022
- not an obituary
- source type is a newspaper
- must be written in English

This results in 798 articles with database origins such as U.S. Newsstream, U.S. Hispanic Newsstream, and Ethnic NewsWatch.

The data ranges from February 1, 2021, to February 21, 2022. Figure 2a plots the number of articles published by date. Figure 2b plots the term frequency of political instability words by date. Figure 2c plots the term frequency divided by the number of articles published by date. Figure 2d, 2e, and 2f plot the daily change in Myanmar foreign exchange rates. Figure 2g, 2h, and 2i provides initial data summary statistics.

3. Methodology

Bag-of-Words Model

For text analysis, this paper applies the bag-of-words model to find the term frequency of words that indicate geopolitical risk. This paper uses the geopolitical risk index developed by Caldara and Iacoviello (2021) which is conducted on a sample of 25 million English-language news articles from 1900 through the present. To represent a global set of newspaper, they chose six newspapers from the U.S., three from the U.K., and one from Canada. This dataset aligns with the ProQuest dataset and thus, their geopolitical risk index should be applicable to this paper's text analysis.

The search words from Caldara and Iacoviello cover eight categories where each category contains two set of search words: topic words and threat/act words. See Figure 3a. This paper applies the same search query to measure political instability of Myanmar on a daily frequency. To account for the fact that articles are concentrated around when the coup was launched and follows a decreasing trend afterwards, the political instability term frequency is divided by the number of articles published on that day to create a word score. Furthermore, foreign exchange markets do not operate on the weekends and there is a lag between articles being published and people reading the news. To address these two issues, the paper takes the average of the word scores over three days, mimicking a moving average process with two lags. The equation is as follows:

$$\pi_t = \frac{\pi_{t-2} + \pi_{t-1} + \pi_t}{3} \quad where\ \pi_t \text{ is the word score of day } t$$

Ordinary Least Square (OLS) Regression

To explore whether political instability in Myanmar affects the foreign exchange rates, this paper utilizes OLS regression. The regression model for U.S. dollar-kyat exchange rate is as follows:

$$\Delta Y_i = \mu + \beta \mathrm{X}_i + \theta \Delta D_i + \nu G_i + \varphi P_i + \phi C_i + \eta_i$$

ΔY_i represents the change in daily dollar-kyat exchange rate of day i. X_i represents the term frequency of words that indicate political instability divided by number of articles published on

day i and averaged over three days. ΔD_i represents the change in daily dollar index, G_i represents the government consumption, and P_i represents the private consumption, and C_i represents new covid cases of day i.

The regression model for Singapore dollar-kyat and Thai bhat-kyat exchange rate is as follows:

$$\Delta Y_i = \mu + \beta \mathrm{X}_i + \theta D_i + \nu G_i + \varphi P_i + \phi C_i + \eta_i$$

In this model, the paper does not regress on the change in foreign currency index because the data frequency for Singapore dollar and Thai bhat indices are monthly. Figure 3b, 3c, and 3d show the results of the regressions.

4. Results

The regression results show that the β for all three exchange rates are positive. For the U.S. dollar-kyat exchange rate, an increase in the political instability word score by one unit increases the change in daily dollar-kyat exchange rate by 0.6991 kyats. This β has a p-value of 0.259 which means that it is insignificant at the 95% level. For the Singapore dollar-kyat exchange rate, the β is 0.5018 with a p-value of 0.007 which means it is highly significant at the 95% level. Similarly, for the Thai bhat-kyat exchange rate, the β is 0.0158 with a p-value of 0.036 which means it is also highly significant at the 95% level.

These results are in line with the findings of existing literature. When there is increased civil instability (higher word score), it is expected that the exchange rates will increase (higher change in exchange rate) as investors shy away from local currency. There are a few notes of concern regarding the dataset of this paper. First, the U.S. dollar-kyat exchange rate was controlled by the Central Bank of Myanmar after the coup and thus, the data may not accurately reflect the high market demand for dollars. This could be an explanation for the high p-value in its regression. Second, although the Singapore dollar-kyat and Thai bhat-kyat exchange rates were not controlled, there could still be undiscernible spillover effects from the U.S. dollar-kyat exchange rate control. Third, the newspaper articles do not include articles from Myanmar whose inclusion would have made the data more frequent and accurate.

5. Conclusion

The military coup has not only increased violence and instability in Myanmar, but it has also seismically disrupted the economy. In agreement with existing literature, this paper finds significant and positive causal relationships between political instability and daily change in foreign exchange rates. To measure political instability, the research utilizes a search query developed by Caldara and Iacoviello on ProQuest news articles that follow the criteria mentioned in Section 2 above. The paper includes analysis on three exchange rates: U.S. dollar-kyat, Singapore dollar-kyat, and Thai bhat-kyat. As mentioned in Section 4, there are concerns around the data which calls for further exploration. A deeper analysis of this topic should include news articles from Myanmar and account for the controlling of U.S. dollar-kyat exchange rate.

Bibliography

"#WhatsHappeningInMyanmar." FORUM-ASIA. Accessed April 16, 2022. https://www.forum-asia.org/uploads/wp/2021/04/Myanmar-Coup-Timeline.pdf.

AAPP | Assistance Association for Political Prisoners. Accessed April 16, 2022. https://aappb.org.

Asteriou, Dimitrios, Antonios Sarantidis, and Augustinos I. Dimitras. "Political Instability and Exchange Rate Volatility." ResearchGate. Last modified July 30, 2019. https://www.researchgate.net/publication/334769748_Political_Instability_and_Exchange_Rate_Volatility.

Caldara, Dario, and Matteo Iacoviello. "Measuring Geopolitical Risk." Federal Reserve Board. Last modified November 15, 2021. https://www.federalreserve.gov/econres/ifdp/files/ifdp1222.pdf.

Dhaval. "Why Does Politics Impact Currency Exchange Rates?" Foreign Exchange Services | Universal Partners FX. Last modified November 12, 2019. https://www.upfx.co.uk/latest-news/post/why-does-politics-impact-currency-exchange-rates.

Imai, Kosuke, and Jeremy Weinstein. "Measuring the Economic Impact of Civil War." Harvard University. Last modified June 2000. https://imai.fas.harvard.edu/research/files/cid.pdf.

Michail, Nektarios. "The Impact of Conflict on the Exchange Rate of Developing Economies." ResearchGate. Last modified February 16, 2021. https://www.researchgate.net/publication/349460251_The_impact_of_conflict_on_the_exchange_rate_of_developing_economies.

Odhuno, Francis. "Does Civil War Violence Contribute to Exchange Rate Fluctuations? Evidence from Uganda." NZAE : New Zealand Association of Economists | Blog of Economic Ideas and Events. Last modified April 2009. https://www.nzae.org.nz/wp-content/uploads/2011/08/Does_Civil_War_Violence_Contribute_to_Exchange_Rate_Fluctuations-NZAE09.pdf.

Graphs and Tables

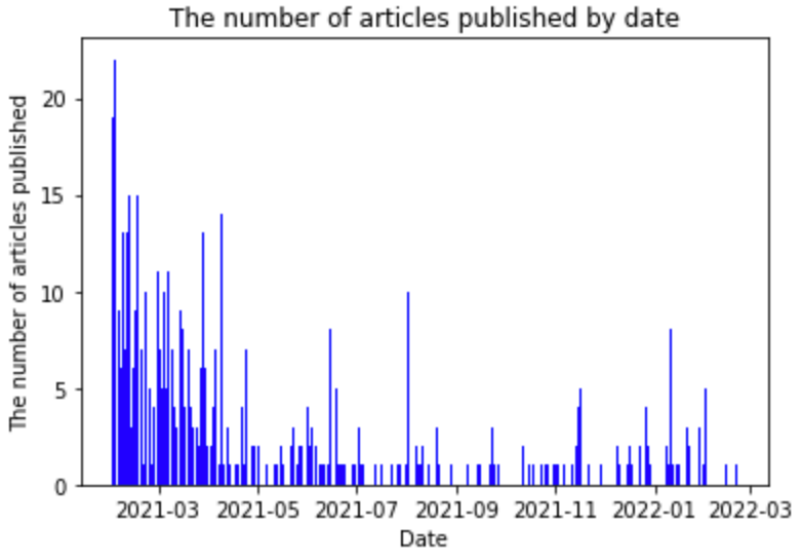

Figure 2a:

This plot shows the number of articles published by date.

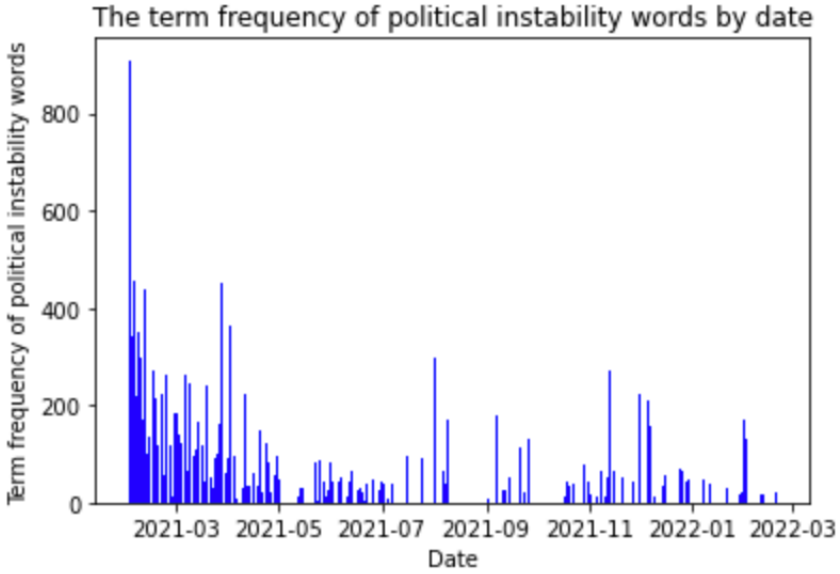

Figure 2b:

This plot shows the term frequency of political instability words by date.

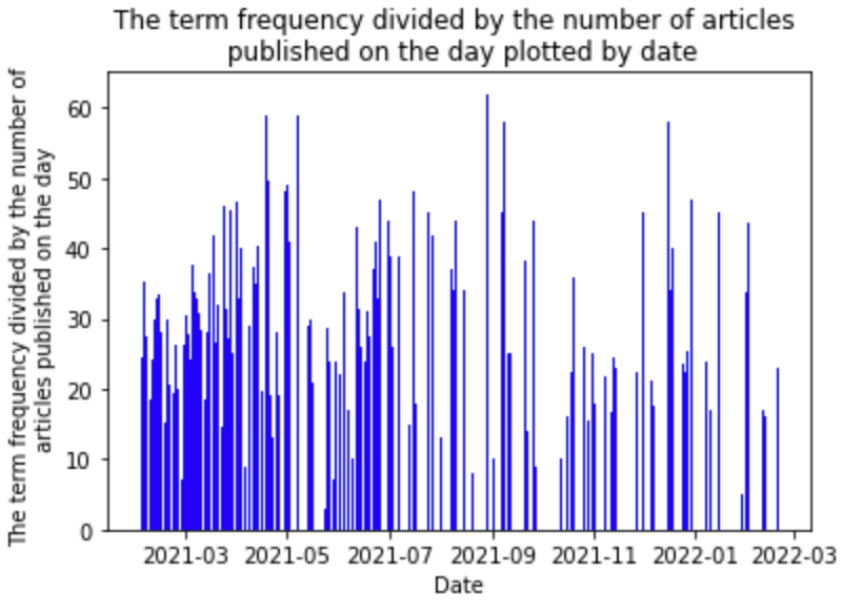

Figure 2c:

This plot shows the word score by date. The word score is calculated by dividing the term frequency by the number of articles published on that day.

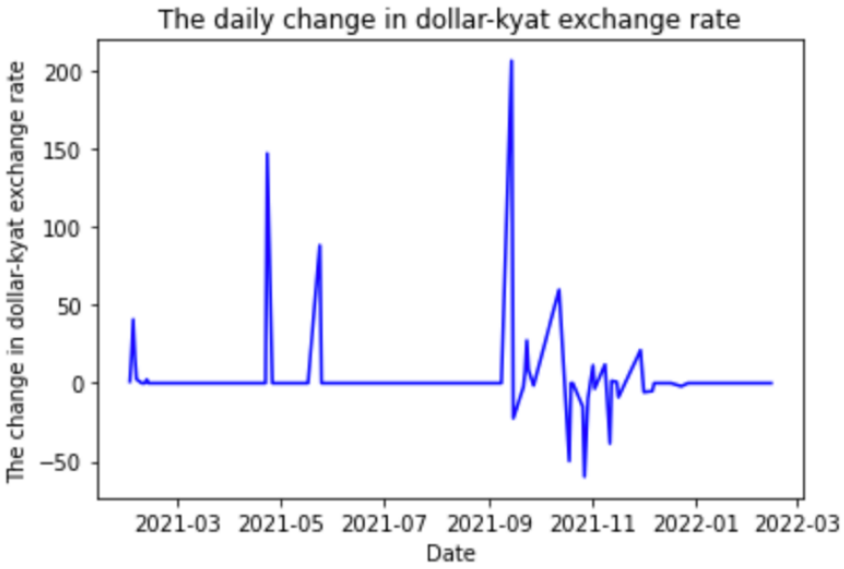

Figure 2d:

This plot shows the daily change in U.S. dollar-kyat exchange rate for business days. There is not much movement because the exchange rate is regime-controlled by the Central Bank of Myanmar after the coup.

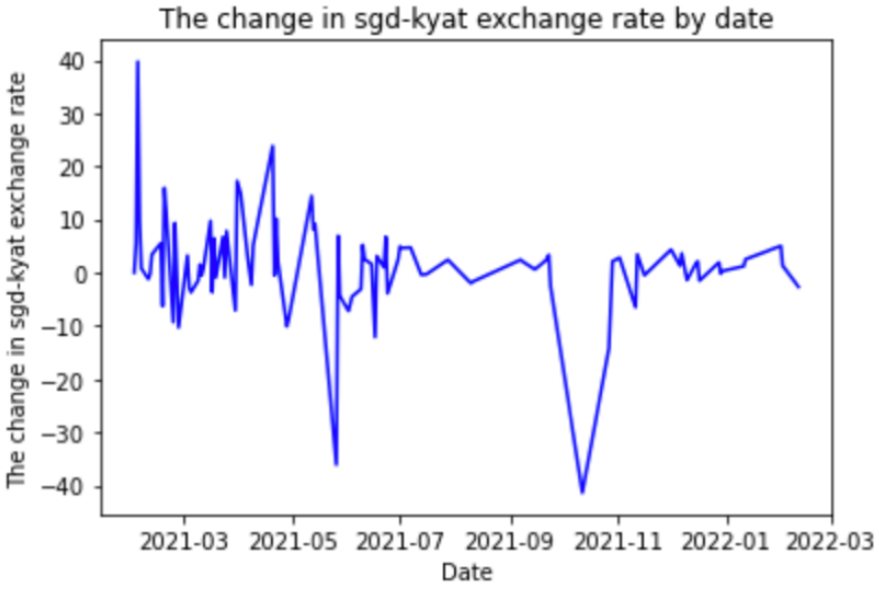

Figure 2e:

This plot shows the daily change in Singapore dollar-kyat exchange rate for business days.

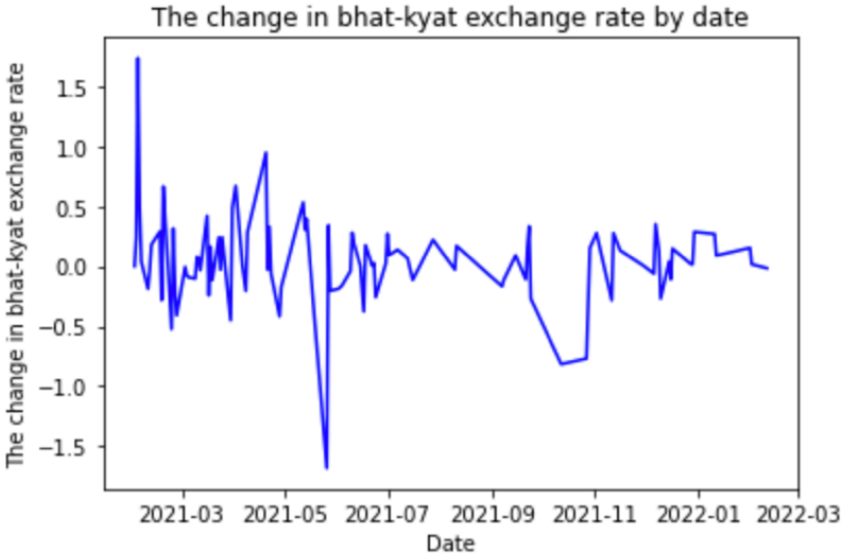

Figure 2f:

This plot shows the daily change in Thai bhat-kyat exchange rate for business days.

	diff1	word_by_article	change_dollar_index	government_consumption	private_consumption	change_covid_case
count	150.000000	150.000000	150.000000	150.000000	150.000000	150.000000
mean	3.003667	27.958418	0.035933	628.079100	2968.134067	2720.020000
std	24.199527	5.685481	0.379721	9.343526	240.778387	6721.908381
min	-60.000000	16.523649	-1.270000	616.634000	2691.350000	0.000000
25%	0.000000	23.898899	-0.187500	616.634000	2698.530000	25.000000
50%	0.000000	27.248357	0.010000	629.218000	3020.800000	187.500000
75%	0.000000	30.884632	0.237500	629.218000	3283.480000	1645.250000
max	207.000000	45.604175	1.350000	647.979000	3283.480000	40131.000000

Figure 2g:

This is a summary statistic of the regressors in the U.S dollar-kyat exchange rate regression.

- diff1: change in daily U.S. dollar-kyat exchange rate
- word_by_article: political instability term frequency / number of articles published
- change_dollar_index: daily change in U.S. dollar index
- government_consumption: Myanmar government consumption
- private_consumption: Myanmar private consumption
- change_covid_case: daily new covid cases in Myanmar

	diff1	word_by_article	sgd_index	government_consumption	private_consumption	change_covid_case
count	98.000000	98.000000	98.000000	98.000000	98.000000	98.000000
mean	1.229592	28.409004	75.951684	628.155224	2984.058776	1595.724490
std	9.253890	5.689836	0.719277	8.996149	246.541247	4210.355679
min	-41.400000	16.523649	74.939000	616.634000	2691.350000	0.000000
25%	-1.500000	24.148464	75.353000	616.634000	2698.530000	22.000000
50%	1.550000	28.795777	76.042000	629.218000	3020.800000	169.000000
75%	4.675000	32.188592	76.258000	629.218000	3283.480000	1000.250000
max	39.700000	42.900806	78.015000	647.979000	3283.480000	25351.000000

Figure 2h:

This is a summary statistic of the regressors in the Singapore dollar-kyat exchange rate regression.

- diff1: change in daily Singapore dollar-kyat exchange rate
- sgd_index: daily change in Singapore dollar index

	diff1	word_by_article	bhat_index	government_consumption	private_consumption	change_covid_case
count	98.000000	98.000000	98.000000	98.000000	98.000000	98.000000
mean	0.048071	28.409004	105.465102	628.155224	2984.058776	1595.724490
std	0.373573	5.689836	2.831390	8.996149	246.541247	4210.355679
min	-1.682000	16.523649	100.610000	616.634000	2691.350000	0.000000
25%	-0.113250	24.148464	102.270000	616.634000	2698.530000	22.000000
50%	0.024000	28.795777	105.470000	629.218000	3020.800000	169.000000
75%	0.241500	32.188592	107.880000	629.218000	3283.480000	1000.250000
max	1.735000	42.900806	109.340000	647.979000	3283.480000	25351.000000

Figure 2i:

This is a summary statistic of the regressors in the U.S dollar-kyat exchange rate regression.

- diff1: change in daily Thai bhat-kyat exchange rate
- bhat_index: daily change in Thai bhat index

A. Search Categories and Search Queries

	Category	Search Query	Peak (Month)	Contribution to Index%		
				Full sample	1900-1959	1960-2019
Threats	1. War Threats	War_words N/2 Threat_words	Germany Invades Czech. (September 1938)	13.5	17.9	9.2
	2. Peace Threats	Peace_words N/2 Peace_disruption_words	Iran Crisis of 1946 (April 1946)	3.5	4.3	2.7
	3. Military Buildup	Military_words AND buildup_words	Cuban Missile Crisis (October 1962)	23.5	21.3	25.8
	4. Nuclear Threats	Nuclear_bigrams AND Threat_words	Nuclear Ban Negotiations (August 1963)	10.1	4.2	16
	5. Terrorist Threats	Terrorism_words N/2 Threat_words	9/11 (October 2001)	2.7	0.3	5
Acts	6. Beginning of War	War_words N/2 War_begin_words	WWII Begins (September 1939)	18.8	26.8	10.7
	7. Escalation of War	Actors_words N/2 Actors_fight_words	D-Day (June 1944)	19.6	23.9	15.3
	8. Terrorist Acts	Terrorism_words N/2 Terrorism_act_words	9/11 (September 2001)	8.3	1.3	15.2

B. Search Words

Topic Sets	Phrases
War_words	war OR conflict OR hostilities OR revolution* OR insurrection OR uprising OR revolt OR coup OR geopolitical
Peace_words	peace OR truce OR armistice OR treaty OR parley
Military_words	military OR troops OR missile* OR "arms" OR weapon* OR bomb* OR warhead*
Nuclear_bigrams	"nuclear war*" OR "atomic war*" OR "nuclear missile*" OR "nuclear bomb*" OR "atomic bomb*" OR "h-bomb*" OR "hydrogen bomb*" OR "nuclear test" OR "nuclear weapon*"
Terrorism_words	terror* OR guerrilla* OR hostage*
Actor_words	allie* OR enem* OR insurgen* OR foe* OR army OR navy OR aerial OR troops OR rebels

Threat/Act Sets	Phrases
Threat_words	threat* OR warn* OR fear* OR risk* OR concern* OR danger* OR doubt* OR crisis OR troubl* OR disput* OR tension* OR imminen* OR inevitable OR footing OR menace* OR brink OR scare OR peril*
Peace_disruption_words	threat* OR menace* OR reject* OR peril* OR boycott* OR disrupt*
Buildup_words	buildup* OR build-up* OR sanction* OR blockad* OR embargo OR quarantine OR ultimatum OR mobiliz*
War_begin_words	begin* OR start* OR declar* OR begun OR began OR outbreak OR "broke out" OR breakout OR proclamation OR launch*
Actor_fight_words	advance* OR attack* OR strike* OR drive* OR shell* OR offensive OR invasion OR invad* OR clash* OR raid* OR launch*
Terrorism_act_words	attack OR act OR bomb* OR kill* OR strike* OR hijack*

Figure 3a:

This table shows search words for geopolitical risk index developed by Caldara and Iacoviello from the Federal Reserve Board. The term frequency calculated in this paper are for these words.

OLS Regression Results

Dep. Variable:	change_exch_rate	R-squared:	0.051
Model:	OLS	Adj. R-squared:	0.019
Method:	Least Squares	F-statistic:	1.102
Date:	Sun, 24 Apr 2022	Prob (F-statistic):	0.362
Time:	18:00:45	Log-Likelihood:	-686.33
No. Observations:	150	AIC:	1385.
Df Residuals:	144	BIC:	1403.
Df Model:	5		
Covariance Type:	HC3		

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	128.5383	116.385	1.104	0.269	-99.573	356.649
word_article	0.6991	0.620	1.128	0.259	-0.516	1.914
change_dollar_ind	-1.5231	5.516	-0.276	0.782	-12.334	9.288
gov_comp	-0.2287	0.173	-1.322	0.186	-0.568	0.110
pri_comp	-0.0009	0.007	-0.116	0.908	-0.015	0.014
change_covid	0.0004	0.000	1.047	0.295	-0.000	0.001

Omnibus:	197.633	Durbin-Watson:	2.190
Prob(Omnibus):	0.000	Jarque-Bera (JB):	9001.227
Skew:	5.218	Prob(JB):	0.00
Kurtosis:	39.487	Cond. No.	6.00e+05

Figure 3b:

This table shows the OLS regression results using U.S. dollar-kyat exchange rate with robust standard errors. Here, the impact of political instability on daily change in U.S. dollar-kyat exchange rate is 0.6991 with p-value of 0.259.

OLS Regression Results

Dep. Variable:	change_exch_rate	R-squared:	0.177
Model:	OLS	Adj. R-squared:	0.132
Method:	Least Squares	F-statistic:	1.840
Date:	Sun, 24 Apr 2022	Prob (F-statistic):	0.113
Time:	18:02:19	Log-Likelihood:	-347.08
No. Observations:	98	AIC:	706.2
Df Residuals:	92	BIC:	721.7
Df Model:	5		
Covariance Type:	HC3		

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	68.1384	151.338	0.450	0.653	-228.478	364.755
word_article	0.5018	0.186	2.697	0.007	0.137	0.866
sgd_index	-1.3816	1.903	-0.726	0.468	-5.111	2.348
gov_comp	0.0480	0.119	0.402	0.687	-0.186	0.282
pri_comp	-0.0018	0.006	-0.297	0.766	-0.014	0.010
change_covid	-0.0006	0.001	-0.937	0.349	-0.002	0.001

Omnibus:	19.972	Durbin-Watson:	1.962
Prob(Omnibus):	0.000	Jarque-Bera (JB):	100.037
Skew:	-0.306	Prob(JB):	1.89e-22
Kurtosis:	7.912	Cond. No.	9.77e+05

Figure 3c:

This table shows the OLS regression results using Singapore dollar-kyat exchange rate with robust standard errors. Here, the impact of political instability on daily change in U.S. dollar-kyat exchange rate is 0.5018 with p-value of 0.007.

OLS Regression Results

Dep. Variable:	change_exch_rate	R-squared:	0.102
Model:	OLS	Adj. R-squared:	0.053
Method:	Least Squares	F-statistic:	1.043
Date:	Sun, 24 Apr 2022	Prob (F-statistic):	0.398
Time:	18:01:25	Log-Likelihood:	-36.780
No. Observations:	98	AIC:	85.56
Df Residuals:	92	BIC:	101.1
Df Model:	5		
Covariance Type:	HC3		

	coef	std err	z	P>|z|	[0.025	0.975]
Intercept	-5.8261	4.433	-1.314	0.189	-14.515	2.863
word_article	0.0158	0.008	2.098	0.036	0.001	0.031
bhat_index	0.0517	0.037	1.382	0.167	-0.022	0.125
gov_comp	0.0025	0.005	0.522	0.602	-0.007	0.012
pri_comp	-0.0005	0.000	-1.279	0.201	-0.001	0.000
change_covid	-1.449e-05	1.45e-05	-1.001	0.317	-4.29e-05	1.39e-05

Omnibus:	22.474	Durbin-Watson:	2.101
Prob(Omnibus):	0.000	Jarque-Bera (JB):	157.219
Skew:	-0.197	Prob(JB):	7.25e-35
Kurtosis:	9.192	Cond. No.	5.35e+05

Figure 3d:

This table shows the OLS regression results using Thai bhat-kyat exchange rate with robust standard errors. Here, the impact of political instability on daily change in Thai bhat-kyat exchange rate is 0.0158 with p-value of 0.036.