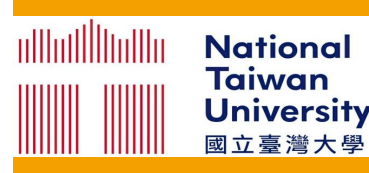# Constructing Noise Free Economic Policy Uncertainty Index

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Economic Policy Uncertainty Index (EPU Index)

Economic Terms	Uncertainty Terms	Policy Terms			
United States & China	United States & China	United States		China	
economic economy	unceretainty uncertain	congress white house	regulation federal reserve	China Beijing	interest rates People's Bank of China

$$EPU_{Raw} = \frac{N_{EPU}}{N_{All}}$$

Monthly US Economic Policy Uncertainty Index

https://www.policyuncertainty.com/

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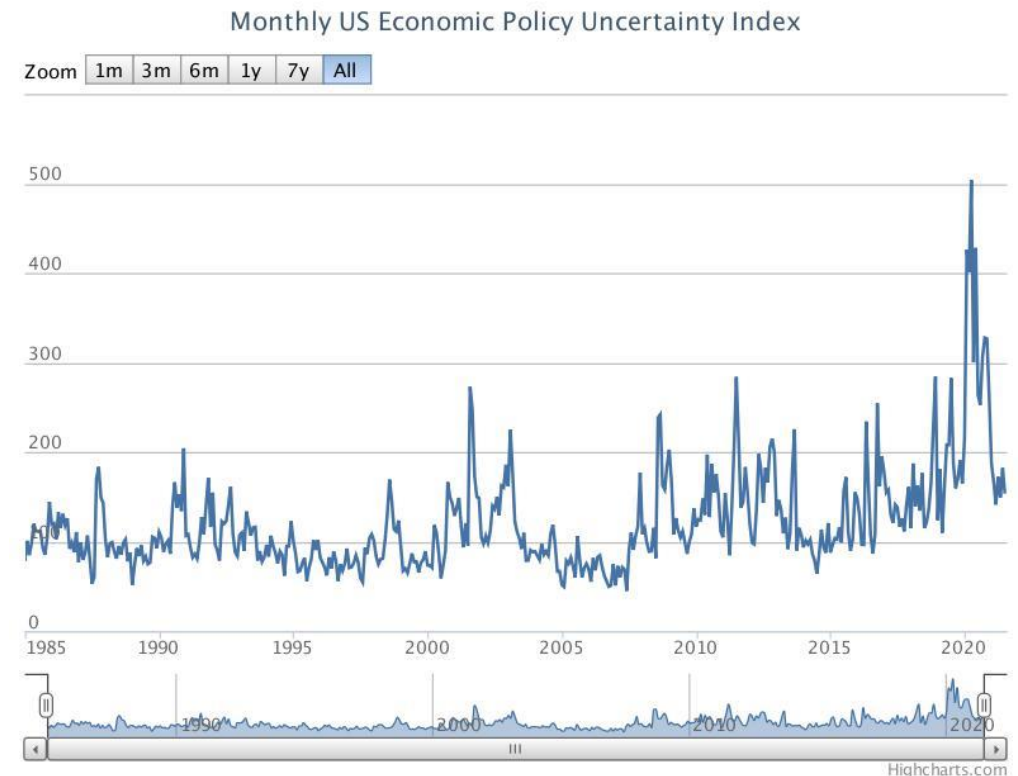
Shortcomings of Keyword-Based Methods

- 單親家庭　耕築夢田（**Personal Economy)**
  - 不管是單親爸爸或單親媽媽，首先就得獨自面對經濟(Economy)壓力，感情上更有無依無靠的惶恐(Terrified)，身心上都很脆弱。吉安鄉深耕公益發展協會體認到「單親家庭」是社會極為弱勢、卻易被忽視的一群人，所以向行政院(Executive Yuan)勞委會申請多元就業開發方案補助，名為「花田喜事 – 單親家庭代耕後山田園計畫」，招募一公頃的農地，提供單親家庭穩定墾耕的機會。

- 馬籍婦人跳樓不成婆婆痛斥（**Personal Economy)**
  - 李女覺得自己很倒楣，嫁個窮老公，每次要不到錢就大吵大鬧，甚至動手打丈夫。現在經濟(Economy)不好，黃的工作不穩定(Uncertain)，收入銳減，夫妻三天兩頭就為錢吵架。...馮思和建議政府(Government)相關單位，應該對婚姻仲介業者進行管制，避免業者把人當成商品，甚至發生「一物多賣」的情形出現。

Noise Free Economic Policy Uncertainty Index

1. Annotate Data
   - Noise: 38.9% (18,371/47,171) of news articles
2. Design and Train Models
   - Convolutional Neural Network (CNN)
   - Recurrent Neural Network (BiGRU)
   - Capsule Neural Network (CapsNet)
   - Bidirectional Encoder Representations from Transformers (BERT)
3. Evaluation and Select the Best-Performing Model
4. Apply the Selected Model to Unlabeled Data
5. **Constructing Noise Free Economic Policy Uncertainty Index**

Informativeness of Different Part in the Article

Model	Input Data	Micro-F1	Macro-F1
CNN	Title	82.57%	81.54%
	Article	80.92%	79.48%
	Text Span	82.51%	81.31%
BiGRU	Title	82.59%	81.46%
	Article	83.19%	82.47%
	Text Span	83.93%	83.10%
CapsNet	Title	81.92%	81.07%
	Article	81.39%	80.28%
	Text Span	81.03%	79.57%
BERT	Title	87.94%	87.69%
	Article	88.62%	88.31%
	Text Span	**89.57%**	**89.38%**

Model	Data	Micro-F1	Macro-F1
BiGRU	Title + Article	83.50%	82.31%
	Title + Text Span	85.41%	84.42%
BERT	Title + Article	89.76%	89.48%
	Title + Text Span	**90.74%**	**90.45%**

$$y_t = \beta EPU_t + \sum_{i=0}^{p} \alpha_i y_{t-i} + \alpha + \epsilon_t$$

Variable	Before		After	
	β	t-stat	β	t-stat
CPI	-0.002	-2.396**	-0.002	-2.674**
Industrial Production Index	-0.001	-1.905	-0.001	-2.975**
Market Volatility	0.001	1.041	0.001	3.311**
VIX	0.042	5.855**	0.033	5.105**

Predictability

$$y_{t+1} = \beta EPU_t + \sum_{i=0}^{p} \alpha_i y_{t-i} + \alpha + \epsilon_{t+1}$$

Variable	Before		After	
	β	t-stat	β	t-stat
CPI	-0.001	-1.897	-0.001	-2.037*
Industrial Production Index	-0.001	-0.565	-0.001	-6.232**
MV	0.001	2.817*	0.001	2.307*
VIX	0.002	-0.286	0.001	-2.182*

Connectedness Table

Representative Countries

To	From	USA	China	UK
	Original EPU	9.26	7.30	2.69
	Noise Free EPU	**7.43**	**2.48**	**1.42**

Near Countries

To	From	Korea	HK	Singapore
	Original EPU	7.77	10.08	11.05
	Noise Free EPU	**6.84**	**9.19**	**7.76**

Conclusion

- We point out and remedy the shortcomings of the keyword-based economic indexes.

- We integrate the advantages of the keyword-based method and context-aware method, and propose a high-accurate denoising method.

- Our results show that the proposed noise free EPU index can better reflect the real-world economic environment.

	Explainability		Predictability	
	Original	Noise Free	Original	Noise Free
CPI	↑↑	↑↑	-	↑
IPI	-	↑↑	-	↑↑
VIX	↑↑	↑↑	-	↑

Related Works and Events

- **Related Works**
  - **From Opinion Mining to Financial Argument Mining**. (Springer Nature – Open Access)
    - http://springer.nlpfin.com/
  - Distilling Numeral Information for Volatility Forecasting (CIKM'21)
  - NQuAD: 70,000+ Questions for Machine Comprehension of the Numerals in Text (CIKM'21)

- **Related Events**
  - **Call for Paper:** Financial Technology on the Web @ ACM TWEB
    - https://acmfinweb.nlpfin.com/
  - FinNum-3 **Shared Task** @ NTCIR-2022 – Investor's and Manager's **Fine-grained Claim Detection**
  - **EMNLP-2021 Tutorial**: Financial Opinion Mining
  - The **Workshop** of **Financial Technology** and Natural Language Processing (FinNLP @ **IJCAI**)
  - The Workshop on Financial Technology on the Web (FinWeb @ **WWW**)
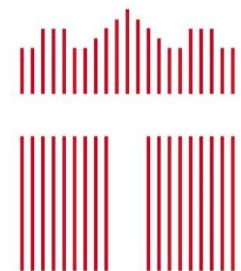
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Thank you for your attention!

Feel free to contact us if you have any questions.

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