

Environmental Policy Uncertainty: Measurement and Impact on Clean Markets

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Partner Meeting

3 June 2021



Sustainable Economy
National Research Programme

Motivation and objective

Inability for investors to foresee future environmental regulations is costly to society because it hinders large-scale green investments.

- ▶ Dorsey (2019): uncertainty around 2005 CAIR rules → increased compliance costs by \$124 million due to delayed investments

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- ▶ Dorsey (2019): uncertainty around 2005 CAIR rules → increased compliance costs by \$124 million due to delayed investments
- ▶ We construct a **newspaper-based** measure of US environmental policy *uncertainty* over the last 30 years:
 - ▶ policy has uncertain fate in congress
 - ▶ unexpected revision or rollback of regulations
 - ▶ legal challenges / awaiting for court decision
 - ▶ ...



Contribution

1. Added-value of news-based index of environmental policy uncertainty
 - ▶ first consistent measure over time: **high frequency data** over long time periods
 - ▶ covers various **topics** and **multi-dimensional facets** of environmental policy (Brunel and Levinson, 2016)
 - ▶ captures uncertainty as **perceived** by investors

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 - ▶ captures uncertainty as **perceived** by investors
2. Novel methods relying on **text-mining techniques** (Gentzkow and Shapiro, 2010; Bybee et al, 2020)
 - ▶ More precise and comprehensive than methods based on keyword searches

Caveats

- ▶ Our news-based index measures environmental policy uncertainty as perceived by the media.
 - ▶ Potential media bias – readers preferences, journalists' norms, topic competitions, business and political cycles – can be mitigated and corrected for (Gentzkow and Shapiro, 2006; Mullainathan and Shleifer, 2005).

Measuring Environmental Policy Uncertainty

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Aggregate investments

Firm-level investments

Conclusions

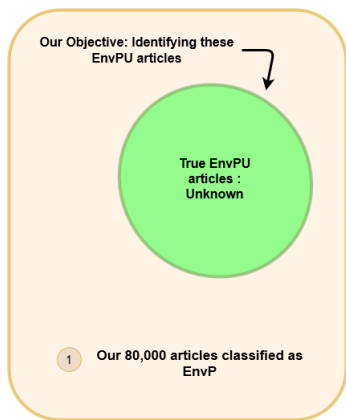
Data

- ▶ News articles extracted from 10 US newspapers over 1979-2019 that were identified as talking about environmental policy (EnvP) in our previous project.
- ▶ Source: automated access to Factiva, Dow Jones.

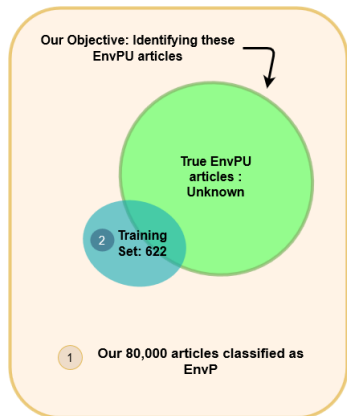
Newspaper	% of sample
New York Times	22.9%
Washington Post	16.2%
Wall Street Journal	14.4%
Houston Chronicle	13.8%
San Francisco Chronicle	8.3%
Tampa Bay Times	8.3%
Dallas Morning News	6.4%
San Jose Mercury News	4.9%
San Diego Union Tribune	2.7%
Boston Herald	2.1%

Identifying EnvPU articles through text mining (1)

1. 80,000 articles about EnvP → Only a subset are 'true' EnvPU articles.



Identifying EnvPU articles through text mining (1)



▶ How we code EnvPU

1. 80,000 articles about EnvP → Only a subset are 'true' EnvPU articles.
2. Training set II: random draw of 622 articles that annotators label manually. An article is coded as irrelevant in our codebook if:
 - ▶ **No policy uncertainty:** *"Heightened levels of climate uncertainty make real estate in coastal areas a risky investment."*
 - ▶ **No ambiguity:** *"Congress passes bill to shelter US solar firms from cheap imports."*

Identifying EnvPU articles through text-mining (2)

Training a supervised ML algorithm for text classification

- ▶ Training set (622 articles) as input for our support vector machine (SVM) classifier.

Classifying our newspaper articles

- ▶ Using SVM prediction rule on our set of 80,000 EnvP articles, we identify 25,174 news articles as "true" EnvPU.

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A glimpse into our SVM's decision rule

Word	Weight	Word	Weight	Word	Weight
epa	1.77	cut	0.74	treaty	0.64
agency	1.24	trump	0.73	delay	0.64
rule	1.06	court	0.73	oil	0.64
state	0.93	new	0.71	regulation	0.64
congress	0.93	bill	0.69	economy	0.63
could	0.91	emission	0.69	canada	0.62
administration	0.91	clean	0.69	official	0.62
pipeline	0.90	wind	0.68	fracture	0.62
review	0.90	arpaes	0.67	sand	0.61
permit	0.88	issue	0.67	federal	0.61
group	0.86	fight	0.67	lease	0.60
proposal	0.85	clinton	0.67	republican	0.60
drilling	0.81	acid	0.66	lead	0.60
law	0.78	txi	0.66	ballot	0.59
auto	0.75	forest	0.64	cape wind	0.58

Environmental Policy Uncertainty

Newspaper articles with highest SVM-score

Title	Date	Score	Newspaper	Excerpt
Trump officials deploy court tactic to reverse Obama rules	Apr 18, 2017	2.14	Washington Post	"[...] President Trump has signed executive orders with great fanfare and breathed life into a once-obscure law to nullify numerous Obama-era regulations. But his administration is also using a third tactic: Going to court to stop federal judges from ruling on a broad array of regulations that are being challenged [...]"
Court Rebuffs Trump's Effort To Halt Obama Methane Rule	Jul 4, 2017	2.07	New York Times	"[...] a federal appeals court ruled on Monday that the EPA cannot suspend an Obama-era rule to restrict methane emissions [...] The ruling signals that the Trump administration's efforts to simply delay environmental and public health actions are likely to face an uphill battle in the courts and require a more painstaking process"
Rule-Making Process Could Soften Clean Air Act	Sep 21, 1991	2.07	Washington Post	"As the Senate neared passage of the new Clean Air Act last year, the Bush administration was pushing hard for inclusion of a special provision easing expensive pollution control requirements for electric utilities. [...] Administration efforts for the provision were rebuffed three times [...]"
23 Environmental Rules Rolled Back in Trump's First 100 Days	May 3, 2017	1.93	New York Times	"President Trump, with help from his administration and Republicans in Congress, has reversed course on nearly two dozen environmental rules, regulations and other Obama-era policies during his first 100 days in office."
Texas leads climate rules attack	Jan 11, 2011	1.86	Dallas Morning News	"Texas has filed nearly a dozen legal challenges of EPA regulations over the past year, mostly over climate-change rules. [...] Environmental groups say they expected that some states and business groups would continue to fight carbon limits, even after the Supreme Court's decision [...]"

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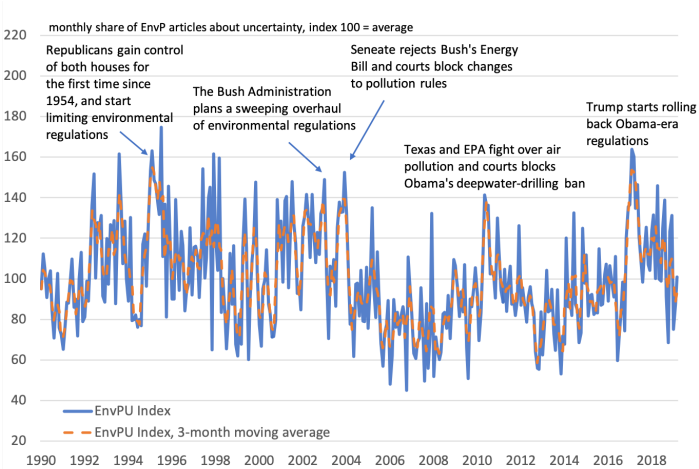
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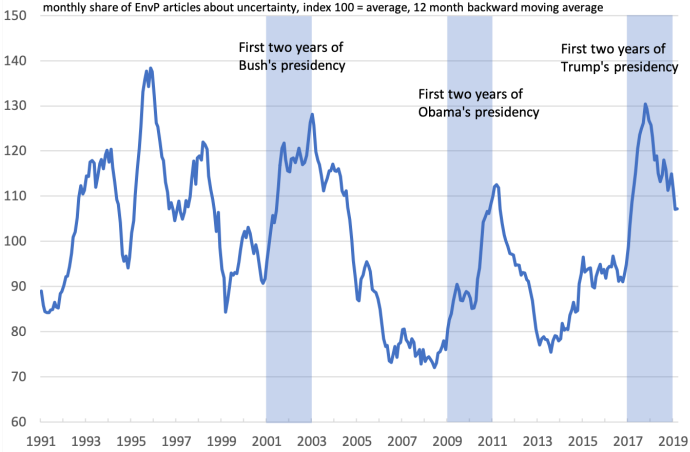
General EnvPU Index (scaled by EnvP)



Source: Dow Jones, EPFL, IHEID, SIB & HES-S

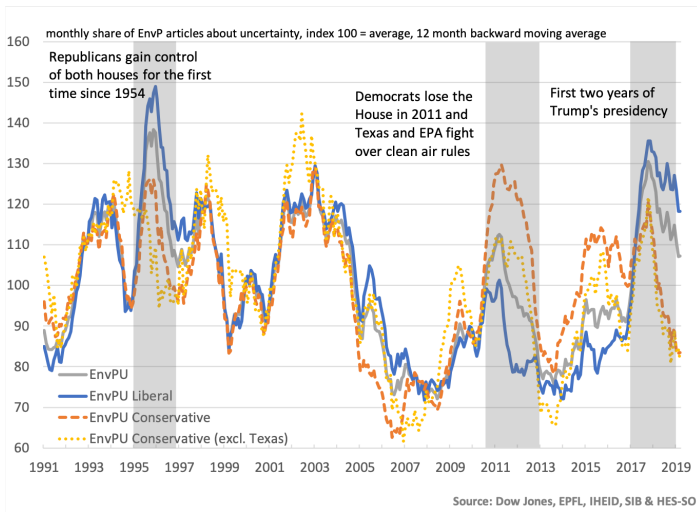
► Comparison between our indices and Engle index

EnvPU during transitional periods in American Politics



Source: Dow Jones, EPFL, IHEID, SIB & HES-SO

Is EnvPU Partisan?



Liberal-leaning: New York Times, Washington Post, San Francisco Chronicle, Tampa Bay Times, San Diego Union Tribune and San Jose Mercury News. **Conservative-leaning:** Wall Street Journal, Houston Chronicle, Boston Herald and Dallas Morning News.

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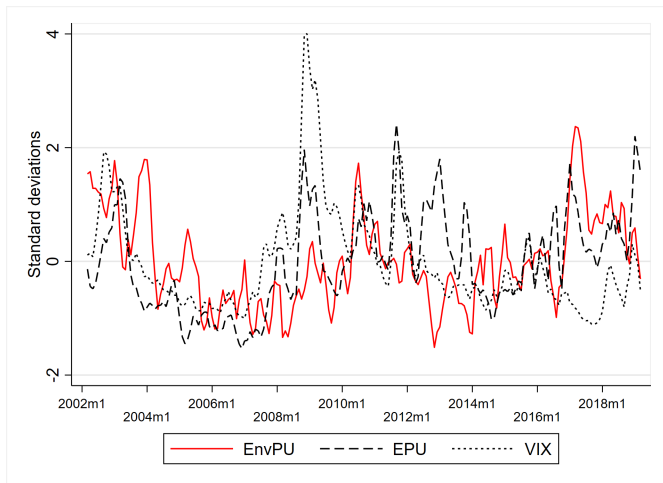
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EnvPU shows little co-movement with common economic uncertainty measures.



Correlations: EnvPU with EPU (28%) and with VIX (23%).

Environmental Policy Uncertainty and Clean Investments

- ▶ How does our news-based environmental policy *uncertainty* index relate to clean markets? In particular, **venture capital deals** and **stock volatility**.

Environmental Policy Uncertainty and Clean Investments

- ▶ How does our news-based environmental policy *uncertainty* index relate to clean markets? In particular, **venture capital deals** and **stock volatility**.
- ▶ Does environmental policy uncertainty make investors pull back from undertaking clean investments?
 - ▶ Policy uncertainty worsens risk-return tradeoff of clean investments so investors may prefer to *wait-and-see* until the uncertainty is resolved

Our results: Aggregate (VAR)

Dynamic relationship between our news index and aggregate VC deals and volatility of Exchange Traded Fund (ETF) index in clean energy in VAR models.

We find that, keeping the level of media attention to climate policy constant, a positive shock to EnvPU is associated with:

- ▶ a decrease in clean-tech VC deals.
- ▶ an increase in demand volatility for the main benchmark clean-energy ETF.

Our results: Firm-level (Panel)

Firm-level regressions — identification strategy differentiate firms by exposure to environmental policy.

We find that, keeping the level of media attention to climate policy constant, an increase in EnvPU is associated with:

- ▶ a lower probability of funding for clean-energy startups with no impact on other startups, clean-tech or otherwise.

Rationale: capital intensive energy investment are particularly sensitive to policy uncertainty.

- ▶ an increase in stock return volatility of firms with a higher green revenue share

Rationale: green revenues reflect that investment returns are contingent on environmental policies being implemented.

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- ▶ News provide a rich dataset covering environmental policies at high frequency and allow to measure perceptions about policy uncertainty in real-time.
- ▶ Novel methods based on text-mining ML algorithms to extract information from news.
- ▶ Positive relationship between our news-based EnvPU index and firm stock volatility of exposed firms with larger green revenues .
- ▶ **Questions?**
 - ▶ What kind of validation exercise would you like to see for our EnvPU index?
 - ▶ Is this data useful for you? For which purposes?

Thank you.

Supplementary Slides

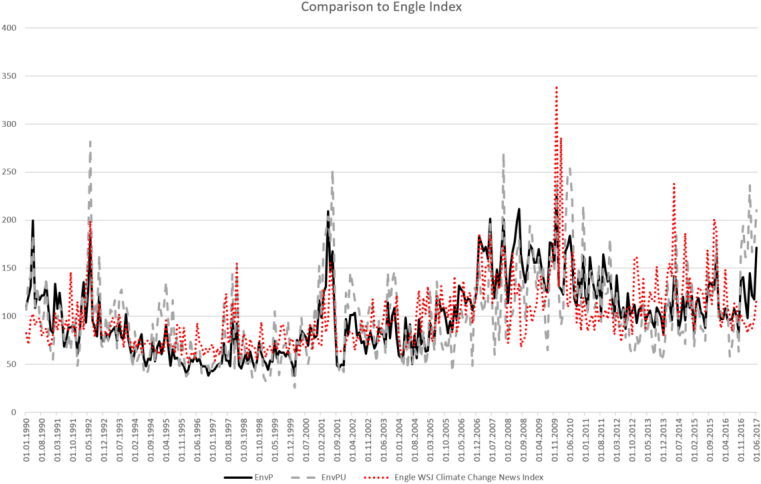
How we code EnvPU

An article is coded as EnvPU = 1 if there is:

- ▶ a clear reference to current environmental policies.
- ▶ uncertainty about the timing of environmental policies.
- ▶ uncertainty about an important detail about the policy design.
- ▶ a lack of political will and commitment for environmental policies.
- ▶ uncertainty about the enforcement of environmental policies.
- ▶ a risk of a sudden reversal/discontinuation of current environmental policies.
- ▶ ...

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EnvP and EnvPU versus Engle Index



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