Economic Policy Uncertainty, Political Uncertainty and the Greek Economic Crisis

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The paper:

- 1) Creates an EPU index for Greece
- 2) Creates EPU sub-indices, EU and POLU indices for Greece
- 3) Explores the association of the indices with financial and macro variables
- 4) Explores the possible role of EPU in the Greek crisis
- 5) Explores issues of causality: Does EPU lead or follow economic activity?

Two phases prolong the Greek crisis: Economic imbalances drive the first – Politics the second





How much has Uncertainty contributed to the Depth and Length of the Greek Depression?

- □ The analysis thus far depends critically on calibration exercizes of DSGE models
 - Casual observation suggests fiscal tightening and the rise in funding costs is mainly responsible for the recession. See Gourinchas, Philippon, Vayanos (2017)
 - Some claim the underground economy is also to blame, as activity has shifted there and is not being recorded (Dellas, Malliaropulos, Papageorgiou, Vourvachaki (2017))
 - Others blame Institutional quality (Economides, Papageorgiou, Philippopoulos (2017))
- **We ask: Does uncertainty play a role?**
- **No one** has so far explored the role of uncertainty because no such index exists
- We construct EPU, POLU and sub-indices of EPU related to fiscal policy (EPUF), monetary policy (EPUM), currency or GREXIT uncertainty (EPUC), pension policy (EPUM) and banking (EPUB)
- □ The methodology is textual analysis: We search more than half a million articles in 4 Greek newspapers from Jan 1999 to Dec 2017 and record the frequencies of articles containing certain key words. See Baker, Bloom, Davis (2016)

The construction of EPU, EU, EPU sub-indices

- EPU: The frequency of articles in which words in all three groups appear
 - 1) uncertainty
 - 2) economic
 - 3) policy
- EU: Articles with words only in 1) uncertainty, and 2) economic
- EPU sub-indices: Article with words in groups 1), 2), 3) plus an extra 4th group
- POLU: An article has to have words from group 1) plus a second group defined separately

The construction of EPU

Group	English translation	Greek term
1	"uncertainty" or "uncertain"	"αβεβαιότητα" or "αβέβαιος"
1	"concern"	"ανησυχία"
1	"vagueness"	"ασάφεια"
1	"doubt"	"αμφιβολία"
2	"economy" or "economic"	"οικονομία" or "οικονομικός"
3	"reform"	"μεταρρύθμιση"
3	"structural changes"	"διαρθρωτικές αλλαγές"
3	"legislation" or "legislative"	"νομοθεσία" or "νομοθετικό"
3	"Bank of Greece"	"Τράπεζα της Ελλάδος"
3	"central bank"	"κεντρική τράπεζα"
3	"law"	"νόμος"
3	"minister"	"υπουργείο" or "υπουργός"
3	"prime minister"	"πρωθυπουργός"
3	"Maximos Mansion"	"Μαξίμου"
3	"deficit"	"έλλειμμα" or "ελλειματικό"
3	"deregulation"	"απορρύθμιση"
3	"regulatory framework"	"ρυθμιστικό πλαίσιο" or ''κανονιστικό πλαίσιο''
3	"Capital Market Commission"	"Επιτροπή Κεφαλαιαγοράς"
3	"Competition Commission"	'Έπιτροπή Ανταγωνισμού''
3	"government"	"κυβέρνηση"
3	"Council of State"	"Συμβούλιο της Επικρατείας"
3	"parliament"	"βουλή" 6

Greek Economic Policy Uncertainty over time



The construction of POLU

Group 1	words on uncertainty as in E	PU
2	"ballot box"	"κάλπη"
2	"elections"	"εκλογές"
2	"party"	"κόμμα"
2	"absolute majority"	"αυτοδυναμία"
2	"no government formation"	"ακυβερνησία"
2	"proportional voting"	"αναλογική"
2	"parliamentary majority"	"δεδηλωμένη"
2	"parliament"	"βουλή"
2	"plenary session"	"ολομέλεια"
2	"political uncertainty"	"πολιτική αβεβαιότητα"
2	"political instability"	''πολιτική αστάθεια''
2	"political crisis"	"πολιτική κρίση"
2	"political deadlock"	"πολιτικό αδιέξοδο"
2	"political developments"	"πολιτικές εξελίξεις"
2	"political landscape"	"πολιτικό τοπίο" or "πολιτικό σκηνικό"
2	"government"	"κυβέρνηση"
2	"government coalition"	"συμπολίτευση" or "συγκυβέρνηση"
2	"parliamentary vote"	"ψηφοφορία στη βουλή"
2	"reshuffle"	"ανασχηματισμός"
2	"polls"	''δημοσκοπήσεις''

Greek Political Uncertainty over time



Greek Debt Policy Uncertainty

Debt Policy Uncertainty (EPUD)

4	"government spending"	"δημόσιες δαπάνες" or "δαπάνες δημοσίου" or "κρατικές
		δαπάνες" or ''δαπάνη γενικής κυβέρνησης"
4	"primary spending"	"πρωτογενής δαπάνη"
4	"defense spending"	"εξοπλιστική δαπάνη"
4	"public investment"	"δημόσια επένδυση"
4	"budget"	"προϋπολογισμός"
4	"sovereign debt"	"κρατικό χρέος"
4	"public debt"	"δημόσιο χρέος" or "οφειλές δημοσίου"
4	"transfer payments"	"μεταβιβαστικές πληρωμές"
4	"public consumption"	"δημόσια κατανάλωση"
4	"benefit" or "allowance"	"επιχορήγηση" or "επίδομα"
4	"default of the country"	"πτώχευση της χώρας" or "πτώχευση της Ελλάδας" or
		"χρεοκοπίας της χώρας" or "χρεοκοπία της Ελλάδας"

Greek Currency Policy Uncertainty & Banking Policy Uncertainty

Currency Uncertainty (EPUC)

4	"exchange rate"	"συναλλαγματική ισοτιμία" or "ισοτιμία του ευρώ"
4	"drachma"	"δραχμή"
4	"Eurozone"	"Ευρωζώνη" or "ζώνη του ευρώ"
4	"national currency"	"εθνικό νόμισμα"
4	"economic and monetary union"	"ονε" or "οικονομική νομισματική ένωση"
4	"grexit"	"grexit" or "έξοδος από το ευρώ"
4	"currency appreciation"	"ανατίμηση"
4	"currency depreciation"	"υποτίμηση"

Banking Uncertainty (EPUB)

	\mathbf{U}	
4	"bank"	"τράπεζα"
4	"banking sector"	''τραπεζικός κλάδος'' or ''τραπεζικός τομέας''
4	"banking system"	''τραπεζικό σύστημα''
4	"interbank market"	"διατραπεζική αγορά"
4	"lending rate"	''επιτόκιο χορηγήσεων''
4	"deposit rate"	"επιτόκιο καταθέσεων"
4	"deposits"	"καταθέσεις"
4	"loans"	"δάνεια"

Which sub-index explains EPU?

Sample	e split into pre-	1/1998-	1/1998-	1/1998-	8/2007-
crisis 8	crisis parts	12/2017	12/2017	7/2007	12/2017
Explanatory power	EPUF	0.31 (8.58)		0.40 (8.49)	0.17 (4.86)
from 82% to 88% in crisis sample	EPUD		0.11 (4.50)		
Fiscal less important in crisis	EPUT		0.15 (4.77)		
Monetary always	FPUM	0.01	0.00	0.03	0.03
unimportant		(0.56)	(0.02)	(0.59)	(1.59)
Currency more	EPUC	0.07	0.08	-0.03	0.14
important in crisis		(2.47)	(2.80)	(-0.45)	(5.86)
	FPUR	0.39	0.41	0.36	0.42
Banking always		(10.09)	(10.66)	(5.87)	(8.14)
important	FDUD	0.05	0.04	0.06	0.05
Pension more		(2.13)	(1.88)	(1.61)	(2.48)
important in crisis	Const	0.81	0.94	0.81	0.92
	CUIISI.	(5.26)	(5.89)	(3.59)	(5.43)
	Adj-R ² %	86.0	84.7	82.2	88.2
	Obs.	240	240	115	125

Sources of Greek Economic Policy Uncertainty

Relative contribution of Monetary Policy Uncertainty EPUM is minimal and declines
Relative contribution of Currency (or GREXIT) uncertainty EPUC rises during the crisis
Relative contribution of Banking Uncertainty EPUB rises during the crisis
Relative contribution of Fiscal uncertainty EPUF declines during the crisis



Charts use the Lindeman, Merenda and Gold (1980) methodology to allocate the weights between the five sub-indices

Greek EPU, EU, EPU sub-indices and POLU: Positive and high bivariate correlations

Full Monthly Sample: 1/1998-12/2017

	EPU	EPUF	EPUD	EPUT	EPUM	EPUC	EPUB	EPUP	EU	POLU
EPU	100									
EPUF	82.7	100								
EPUD	71.1	83.6	100							
EPUT	68.0	86.0	50.3	100						
EPUM	34.3	22.8	20.5	22.2	100					
EPUC	76.2	62.2	57.1	44.1	20.7	100				
EPUB	87.8	69.9	61.0	56.6	44.4	75.2	100			
EPUP	49.7	49.3	34.0	52.2	11.9	25.9	39.0	100		
EU	93.5	71.7	64.1	56.5	33.3	64.7	79.2	44.7	100	
POLU	85.2	74.7	57.1	66.1	10.2	71.9	70.9	42.0	75.5	100

Greek EPU correlations with international EPUs vary across the different crisis periods

with: Global EPU	^{7/2007} 66.6%	85.4%	52.7%	0.6%	
Correlation	1/1998	8/2007 9/2009	10/2009	12/2014 12/2017	
Greek EPU	Crisis	Crisis	Phase I	Phase II	
	Pre-	International	Greek Crisis	Greek Crisis	

Source: Hardouvelis, Karalas, Karanastasis, Samartzis, 2018, "Political, Economic and Economic Policy Uncertainty in Greece"

- Earlier Diagram showed Greek EPU driven by important international events in the pre-crisis sample
- The common global financial crisis raised further the positive correlation
- Correlation dropped during Greek Crisis Phase I
- Correlation collapsed during Greek Crisis Phase II, showing the completely idiosyncratic nature of Greek Crisis Phase II

The Recursive VAR Model – Peak responses

$$x_t = A_1 x_{t-1} + A_2 x_{t-2} + B z_t + \varepsilon_t$$

Optimal lag length = 2, Z_t is a time trend

Panel A: log(Uncertainty Index), r, log(ASE), log(E), log(IP), π, log(ESI) Panel B: log(Uncertainty Index), log (HD), r, log(E), log(IP), π, log(ESI) Panel C: log(Uncertainty Index), r, log(ASE), log(I), log(GDP) The contemporaneous ordering is as above

Panel	A					В	(2
Monthly						Monthly	Quar	terly
22% Δ(EPU)	IndPr	Empl	r	ASE	ESI	HDep	Inv	GDP
Response	-0.58%	-0.47%	46.1bp	-4.13%	-1.51%	-1.24%	-3.89%	-0.89%
[t-stat]	[-2.68]	[2.34]	[3.10]	[-4.81]	[-4.85]	[-2.58]	[-3.27]	[-3.30]
(peak lag)	(15)	(33)	(3)	(3)	(5)	(26)	(3)	(3)

 X_{t}

The main Model: Impulse response functions

Industrial Production (IP) Response, %

Interest rate (r) Response, bp



The main Model: Impulse response functions

Stock Market (ASE) Response, %



Robustness tests: IP response to 22% EPU shock



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Greek vs. Global EPU

- Most local economic variables are driven by domestic EPU shocks and much less by Global EPU shocks
- The Table records the % contribution to the 3-year ahead VAR forecast variability of each economic variable (in first column) originating from either a Greek EPU shock or a global EPU shock
- Greek EPU is affected by global EPU but not vice versa

3-year Ahead	Contribution of:			
VAR Forecast Variability of:	Greek EPU shock	Global EPU shock		
Ind. Production	17.3%	0.4%		
Employment	20.1%	0.0%		
Bond yield	13.9%	0.1%		
ASE	7.0%	9.9%		
Econ. Sentiment	22.7%	2.7%		
H/ld Deposits	25.3%	1.2%		
G.D.P.	2.8%	4.5%		
Investment	13.5%	0.8%		
Greek EPU index	53.4%	27.0%		

6.7%

Contemporaneous ordering: log(global EPU), log(Greek EPU), r, log(ASE), log(E), log(IP) and log(ESI)

Global EPU index

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69.3%

VAR Variance Decomposition

3-year cumulative effect of 22% uncertainty shock

Average EPU increased 22% Actual POLU EPU Change from the pre-crisis to the Industrial crisis period -18.2% -8.4% -24.0% Production **EPU** shocks can explain -11.4% -13.4% -7.8% Employment both direction & magnitude 10-yr bond of economic fluctuations 1197 881 586 yield (bps) **EPU more successful than Athens Stock** -76.0% -32.6% -83.4% **POLU in separate VARs** Exchange Economic Monthly models provide -21.3% -9.4% -30.4% Sentiment better statistical fits than Household -41.5% -33.6% -30.4% quarterly models Deposits -6.2% -1.5% -25.5% G.D.P. VARs estimated from Jan 1998 to Dec 2017 Statistically significant coefficients in **bold**

Investment

- The actual changes of Industrial Production, Employment, Economic Sentiment, Athens Stock Exchange index and 10-yr yield are the % changes of their average values from the period 1/1998-7/2007 to the period 8/2007-12/2017
- The actual changes of Household Deposits, GDP and Investment are the % changes of their values from July 2007 to December 2017.

-12.3%

Contemporaneous Ordering: log(uncertainty index), log(HD), r, log(E), log(IP) and log(ESI)

-22.2%

-70.3%

Which Variable can explain both the Depth and Length of the Greek 10-year Depression?

- The change in EPU is consistent with the DEPTH: The large drop in output, employment, stock market, economic sentiment, household deposits, and with the increase in bond yields
- But can EPU explain the on-going stagnation? the lack of recovery? The LENGTH of the depression?
- □ VAR analysis plus Variance decomposition analysis show the three EPU sub-indices related to the Debt crisis (EPUD), the Banking crisis (EPUB) and GREXIT or currency uncertainty (EPUC):
 - Explain <u>both</u> the change in magnitudes from the pre-crisis period to the crisis period and a large fraction of the variability in GDP and Investment <u>during</u> the crisis period
 - The bond yield is another such important variable
- POLU explains the variability in Household Deposits, whereas interest rates do not
- POLU seems to dominate the remaining uncertainty variables in explaining the behavior of bond spreads but fails to explain the rest

Variance decomposition of GDP

		Full Sam	ple		
	Uncertainty	r	ASE	Ι	GDP
EPU	6.75	48.01	0.96	2.40	41.89
EPUD	21.29	36.28	0.93	3.08	38.41
EPUC	18.05	39.73	0.53	3.24	38.45
EPUB	17.55	45.22	0.30	2.72	34.21
POLU	1.66	49.95	3.05	1.53	43.81
		Pre-crisis Sa	mple		
	Uncertainty	r	ASE	Ι	GDP
EPU	13.07	9.42	4.78	54.52	18.21
EPUD	4.77	7.00	6.93	64.27	17.04
EPUC	5.93	9.88	1.76	59.78	22.66
EPUB	7.34	14.50	4.91	55.57	17.67
POLU	13.92	3.88	9.54	47.17	25.49
		Crisis Sam	ple		
	Uncertainty	r	ASE	Ι	GDP
EPU	13.26	63.97	2.47	11.61	8.69
EPUD	55.58	28.30	1.65	2.28	12.20
EPUC	35.57	47.19	0.98	4.86	11.40
EPUB	17.77	61.04	1.47	11.11	8.61
POLU	3.65	69.96	4.52	11.41	10.46

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The effects on EPU



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Does EPU cause IP or vice versa?

$$X_{t} = \log(EPU_{t}), \log(IP_{t}), \log(ESI_{t})$$
$$X_{t} = \sum_{i=1}^{2} A_{i}X_{t-1} + u_{t}, \quad u_{t} : N(0, \Omega), \quad \Omega = PP'$$

- The model follows an alternative specification without a contemporaneous ordering among the 3 variables of the Choleski decomposition, but with restrictions on the structural shocks \mathcal{E}_t
 - $u_t = B \mathcal{E}_t$, B is a 3X3 matrix with 9 elements, 6 of which are identified by the variance covariance matrix Ω
- Event Constraint: EPU structural shock > 3 St. dev. in <u>at least</u> one month during 12/2014 – 9/2015
- Correlation Constraint: Absolute value of correlation of EPU structural shock with global EPU < 10% during Phase II of the Greek crisis</p>
- 1 million simulations and 7,232 (or 0.72%) satisfied the constraints. These solutions are used to create the impulse response functions

Does EPU cause IP or vice versa?

 EPU affects IP in <u>all</u> 7,232 cases that satisfy the restrictions, namely there is no single positive response !

 At first glance, IP does not seem to affect EPU, as the max values are all positive and high



Does EPU cause ESI or vice versa?

□ Standard errors		$EPU \rightarrow IP$	$IP \rightarrow EPU$		$EPU \rightarrow IP$	$IP \rightarrow EPU$
are inside the	1	-0.97 (0.45)	-9.81 (8.31)	19	-0.80 (0.17)	-0.51 (0.19)
parentheses	2	-0.51 (0.22)	-4.7 (4.57)	20	-0.79 (0.17)	-0.48 (0.19)
The opposite	3	-0.78 (0.30)	-4.04 (3.39)	21	-0.78 (0.17)	-0.46 (0.18)
influence from	4	-0.70 (0.24)	-3.00 (2.44)	22	-0.76 (0.16)	-0.44 (0.18)
IP to FPU, in the	5	-0.78 (0.25)	-2.44 (1.75)	23	-0.75 (0.16)	-0.42 (0.18)
middle months.	6	-0.77 (0.23)	-1.94 (1.28)	24	-0.73 (0.15)	-0.40 (0.18)
shows	7	-0.80 (0.22)	-1.60 (0.93)	25	-0.72 (0.15)	-0.38 (0.17)
statistically	8	-0.81 (0.21)	-1.35 (0.69)	26	-0.70 (0.15)	-0.37 (0.17)
significant	9	-0.83 (0.21)	-1.16 (0.53)	27	-0.68 (0.14)	-0.35 (0.17)
responses	10	-0.84 (0.21)	-1.01 (0.42)	28	-0.67 (0.14)	-0.34 (0.17)
☐ The evidence	11	-0.84 (0.20)	-0.89 (0.34)	29	-0.65 (0.13)	-0.32 (0.17)
from IP to EPU	12	-0.84 (0.20)	-0.80 (0.29)	30	-0.63 (0.13)	-0.30 (0.16)
is neither strong	13	-0.84 (0.20)	-0.74 (0.26)	31	-0.62 (0.13)	-0.29 (0.16)
nor consistent	14	-0.84 (0.19)	-0.69 (0.23)	32	-0.60 (0.12)	-0.28 (0.16)
across the	15	-0.84 (0.19)	-0.64 (0.22)	33	-0.58 (0.12)	-0.27 (0.16)
months	16	-0.83 (0.18)	-0.60 (0.21)	34	-0.54 (0.12)	-0.26 (0.15)
	17	-0.82 (0.18)	-0.57 (0.20)	35	-0.55 (0.11)	-0.25 (0.15)
Gikas A. Hardouvelis	18	-0.81 (0.18)	-0.53 (0.19)	36	-0.53 (0.11)	-0.23 (0.15) 27

Does ESI cause IP or vice versa?

Influence is negative in the early months but close to zero and in both directions

Not statistically significant either



Does EPU cause ESI or vice versa?



Conclusion

- **We constructed Uncertainty indices for Greece**
- The indices are related to the macro-economy in an intuitive way: Impulse response functions have the correct signs
- Moreover, changes in EPU from the pre-crisis sample to the crisis sample seem able to also explain the magnitude of the changes in most macro-variables
- Certain EPU sub-indices seem consistent with the unusual length of the crisis, particularly EPUD, EPUC and EPUB
- There is stronger evidence that EPU leads economic activity rather than vice versa
- **Future research: A competition between EU and POLU**

Thank you for your attention!

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Level,	1/1998-	1/1998- 1/1998-		8/2007-	10/2009-	12/2014-	
[autocorr]	12/2017	7/2007	12/2017	9/2009	11/2014	12/2017	
EPU	100	89.57	109.59	95.99	110.83	117.08	
	(27.7)	(24.7)	(27.1)	(19.6)	(25.7)	(31.0)	
	[0.65]	[0.65]	[0.56]	[0.59]	[0.41]	[0.65]	
EU	100	90.78	108.48	105.63	107.45	112.21	
	(27.2)	(27.0)	(24.8)	(19.0)	(25.6)	(27.2)	
	[0.67]	[0.70]	[0.56]	[0.70]	[0.50]	[0.58]	
POLU	100	84.98	113.50	84.30	115.49	130.38	
	(36.1)	(22.0)	(40.8)	(16.3)	(39.1)	(44.96)	
	[0.65]	[0.59]	[0.58]	[0.61]	[0.33]	[0.69]	
	100	87.47	111.53	84.36	118.66	118.68	
EPUF	(31.3)	(2/.2)	(30.5)	(22.3)	(2/.2)	(30.7)	
	[0.61]		[0.56]		[0.34]		
	100	85.55	113.49	90.19	151.43	99.81	
EPUD	(42.9)	(57.9)	(43.1)	(34.2)	(45.1)	(31./)	
-		[0.34]	[0.30]	$\begin{bmatrix} 0.33 \end{bmatrix}$	[0.41]	[0.38]	
	(22.0)	(28.0)	(22, 2)	$\frac{62.73}{(19.7)}$	108.30	(27.2)	
EPUI	(52.9)	(20.9)	(33.3)	(10.7)	(20.0)	(37.2)	
	100	100.05	00.85	[0.47]	78.07	01.49	
EPUM	(A1 2)	(109.93)	(40.0)	(17.01)	(31.9)	(37.0)	
	(41.2) [0.52]	(40.3) [0.47]	(40.0)	[0, 56]	(0.1.7)	(37.7)	
-	100	85.86		72 70	130.77	11156	
EPUC	(489)	(33.8)	(567)	(24.6)	(59.1)	(547)	
	[0.69]	[0.60]	[0.68]	[0.59]	[0.54]	[0.78]	
	100	87.87	111.16	102.44	113.37	113.56	
FPUR	(34.2)	(31.4)	(33.1)	(33.8)	(33.6)	(31.8)	
	0.56	[0.55]	(0.45)	[0.60]	(0.32)	[0.56]	
-	100	90.59	108.66	85.14	98.37	142.43	
EPUP	(45.1)	(34.8)	(51.5)	(26.2)	(36.8)	(68.1)	
Gikas A. Hardouvelis	[0.49]	[0.28]	[0.55]	[0.28]	[0.35]	[0.52]	

Greek EPU correlations with international EPUs

	Full sample	1 st half	2 nd half	t-test sign.level	Int/al crisis	Greek I	Greek II
US	49.7%	59.1%	27.2%	0.00	62.1%	41.3%	9.1%
EU	58.7%	69.2%	40.8%	0.00	74.7%	55.3%	0.6%
Global	57.0%	66.6%	39.7%	0.00	85.4%	52.7%	0.6%
France	52.3%	48.9%	39.2%	0.36	64.0%	31.6%	22.0%
Germany	52.9%	47.8%	41.5%	0.55	64.1%	53.2%	10.1%
Italy	47.1%	54.5%	32.7%	0.04	44.4%	29.6%	31.2%
Spain	53.6%	71.4%	38.4%	0.00	54.3%	58.5%	3.3%
UK	39.8%	62.6%	19.7%	0.00	65.0%	46.0%	-16.8%

APPENDIX: Monetary Policy Uncertainty carries small weight

