UNCERTAINTY IN ECONOMICS.

ROBUST ECONOMIC POLICY
Lecture Notes (PhD Level)

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CSUD, ***Buchares, 2024***

ABSTRACT

The phenomenon of economic uncertainty has attracted considerable attention in recent years.

New indicators have been introduced aiming at measuring uncertainty and its potential economic consequences.

Still, the Corona pandemic has hit the world economy virtually out of the blue.

In our lectures, we argue that, while it is clear that true uncertainty, by definition, cannot be forecasted, better early warning systems could be built.

!

UNCERTAINTY AND INSTABILITY

!

WHAT IS UNCERTAINTY?

Uncertainty results in ignorance. It is essentially an epistemic property induced by a lack of information.

A DIGRESSION: IMPRECISION AND UNCERTAINTY

- ***Suppose the official estimate for the GDP growth rate for Country A is 4,5% in 2019. Consider the following statements***

1) ***"The rate of growth of the GDP of Country A is certainly above 3,5 % in 2019, I am sure about it."***
   Imprecise but certain...

2) ***"GDP of Country A increased 4,5 % in 2019, but I am not sure about it."***
   Precise [in fact true] but not certain...

3) ***"I am sure that in the 2019 the GDP growth in Country A was 6 %"***
   It is both precise and certain, but it is not true. (You believe that the GDP growth rate was 6 % which was, in fact, only 4,5%)

I. PROBABILITY, RISK AND UNCERTAINTY

CLASSICAL PROBABILITY THEORY

- ***The classical theory***

  Lapalce's definition of probability, based on the assumption that a fundamental set of *"equipossible events"* exists (like in the case of games of chance, dice etc.). The probability of an event is then the ratio of the number of cases it occurs to the number of all equipossible cases.

- ***Relative Frequency Theory***

  Probability is essentially the convergence limit of relative frequencies under repeated independent trials. This pragmatic argument explains its popularity.

SUBJECTIVE (BAYESIAN) PROBABILITY

For the Bayesian school of probability, the probability measure quantifies one's belief that an event will occur, that a proposition is true. It is a subjective, personal measure. "Probability is degree of belief"

BAYESIAN APPROACH TO PRBABILITY

Bayesian probability interprets the concept of probability as ' a measure of a system. Its name is derived from the 18th century statistician Thomas Bayes (1702-1765). There are two views on Bayesian probability that interpret the 'state of knowledge' concept in different ways.

1)Objectivist view, the rules of Bayesian statistics can be justified by requirements of rationality and consistency and interpreted as an extension of logic.

2) Subjectivist view, the state of knowledge measures a 'personal belief'.

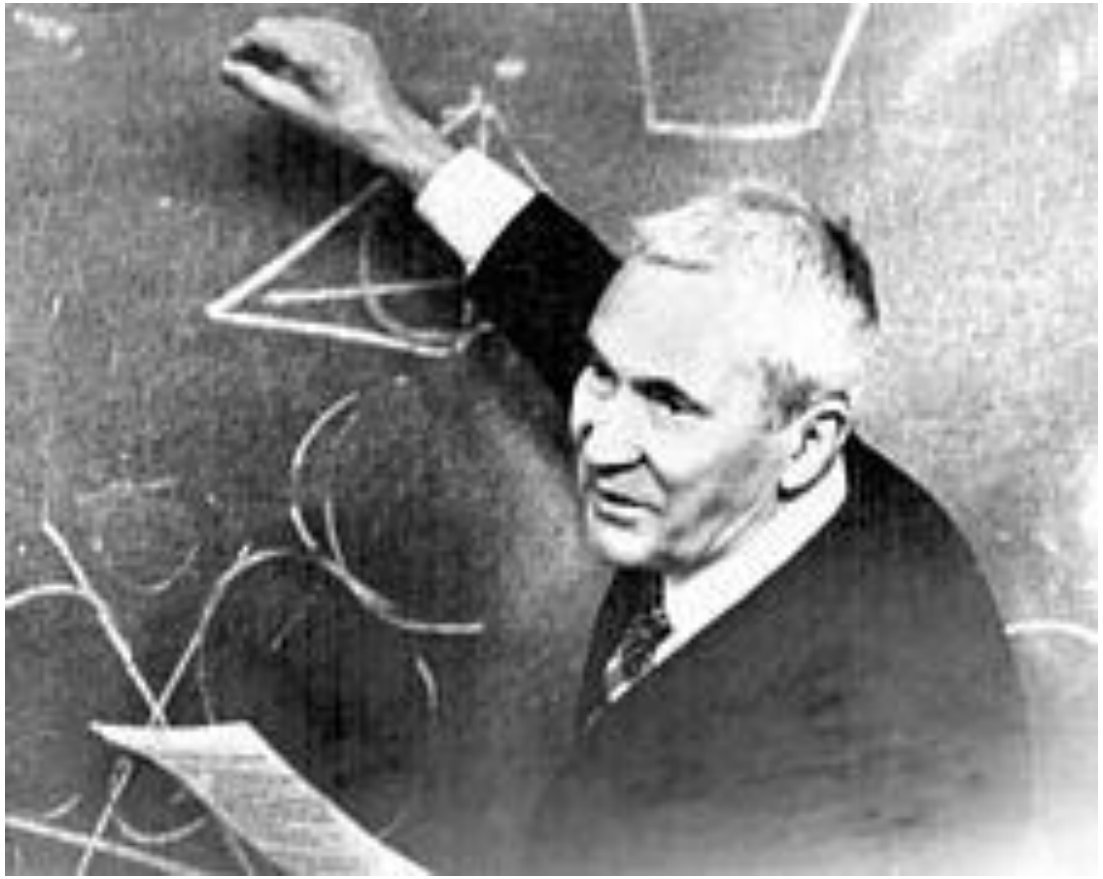
SUBJECTIVE PROBABILITY

Some economists argue that there are actually no probabilities out there to be "known" because probabilities are really only "beliefs".

In other words, probabilities are merely subjectively-assigned expressions of beliefs and have no necessary connection to the true randomness of the world (if it is random at all!).

AXIOMATIC PROBABILITY

Andrei Nikolaevich KOLMOGOROV (1903-1987)



KOLMOGOROV's AXIOMS

- ***First axiom***

  For any set E, the probability of an event set is ***represented by a real number between 0 and 1.***

- ***Second axiom***

  The probability that some elementary event in the entire sample set will occur is 1, or certainty. More specifically, there are no elementary events outside the sample set.

- ***Third axiom***

  The probability of an event set which is the union of other disjoint subsets is the sum of the probabilities of those subsets. This is called σ-additivity. If there is any overlap among the subsets this relation does not hold.

Stochastic differential calculus

Brownian motion $\{W(t), t \geq 0\}$ with the mean $\mu = 0$ and dispersion $\sigma 2 = 1$ is called Wiener process

: Norbert Wiener (1884-1964) and Robert Brown (1773-1858).

Ito lemma

Let f(x, t) be a C_2 smooth function of x, t variables. Suppose that the process $\{x(t), t \geq 0\}$ satisfies SDE

$$dx = \mu(x,t)dt + \sigma(x,t)dW,$$

Then the first differential of the process f = f(x(t), t) is given by

$$df = \frac{\partial f}{\partial x}dx + \left(\frac{\partial f}{\partial t} + \frac{1}{2}\sigma^2(x,t)\frac{\partial^2 f}{\partial x^2}\right)dt\,,$$

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Figure: Kiyoshi Itō (1915–2008).

Black–Scholes model for pricing financial derivatives

The parabolic partial differential equation for the option price V = V (S, t) defined for S > 0,

t ∈ [0, T]

$$\frac{\partial V}{\partial t} + \frac{1}{2}\sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} + rS\frac{\partial V}{\partial S} - rV = 0$$

is referred to as the Black–Scholes equation.

Solution of the Black–Scholes equation

Solution of the Black–Scholes equation

$$V(S,t) = SN(d_1) - Ee^{-r(T-t)}N(d_2)\,,$$

Where

$$N(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-\frac{\xi^2}{2}}\, d\xi$$

is a distribution function of the normal distribution and

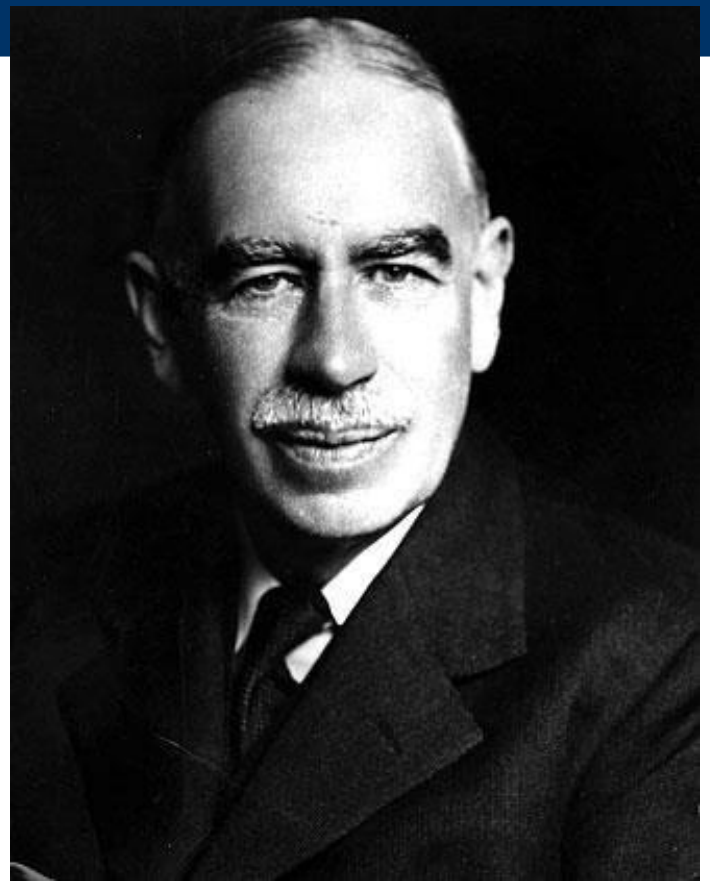
$$d_1 = \frac{\ln \frac{S}{E} + (r + \frac{\sigma^2}{2})(T-t)}{\sigma\sqrt{T-t}}, \quad d_2 = d_1 - \sigma\sqrt{T-t}$$

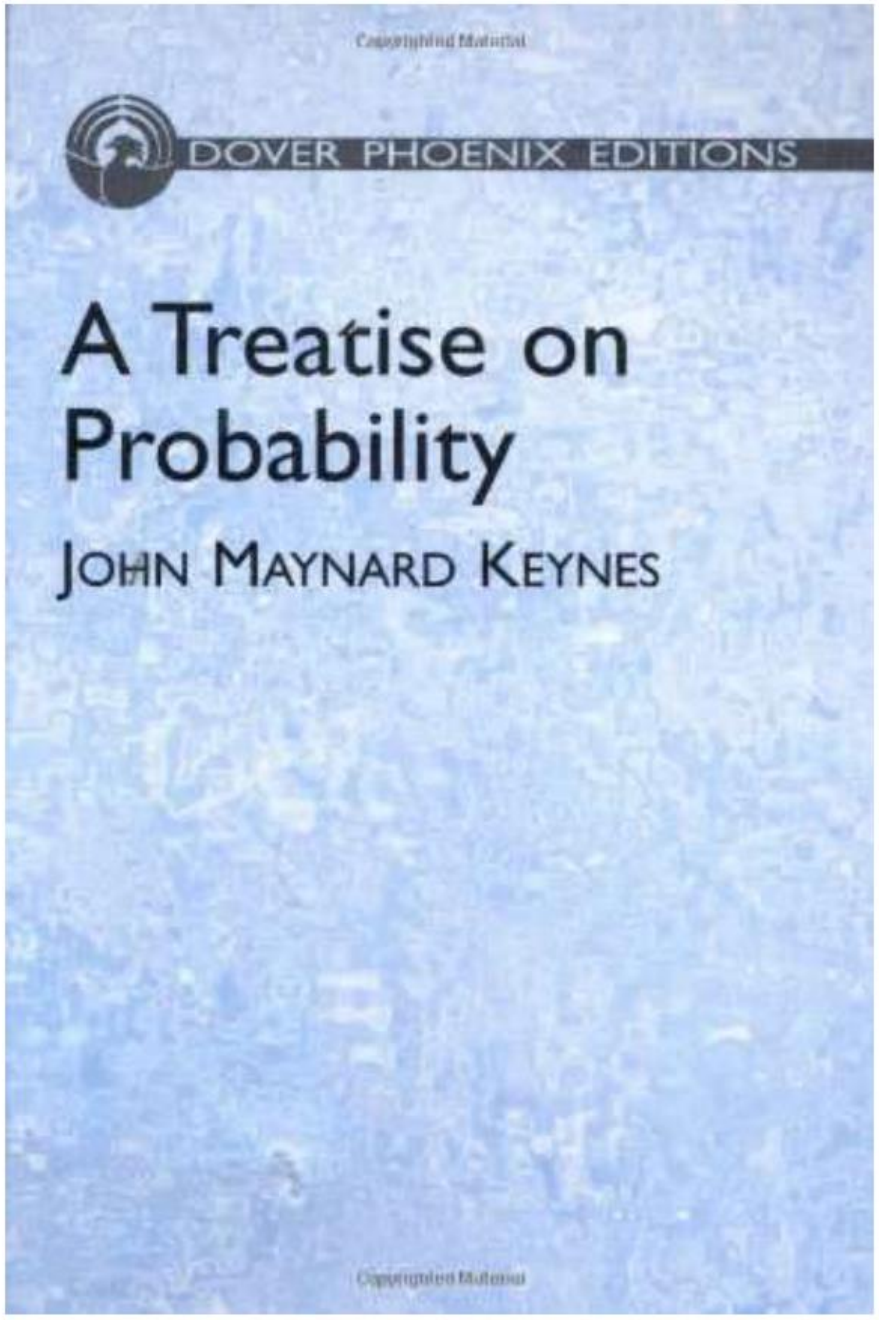


M. S. Scholes a R. C. Merton were awarded by the Price of the Swedish Bank for Economy in the memory of A. Nobel in 1997, Fisher Black died in 1995

KEYNES' CONCEPT LOGICAL OF PROBABILITY

John Maynard KEYNES (1883-1946)





KEYNES'S APPROACH TO PROBABILITY

John Maynard Keynes Keynes was concerned with situations where frequency probability cannot be used. In this case, the use of intuitive probabilities can help understand the rationality in this kind of situation.

The intuitive thesis in probability asserts that probability derives directly from the intuition, both in its meaning and in the majority of laws which it obeys. Contrary to the common use of probability, the intuitive approach claims that experience should be interpreted in terms of probability and not the inverse. Thus, intuition comes prior to objective experience.

KEYNES' VIEW OF PROBABILITY-1

- ***Keynes interpreted probability differently from chance or frequency. Probability is a logical relation between two sets of propositions***

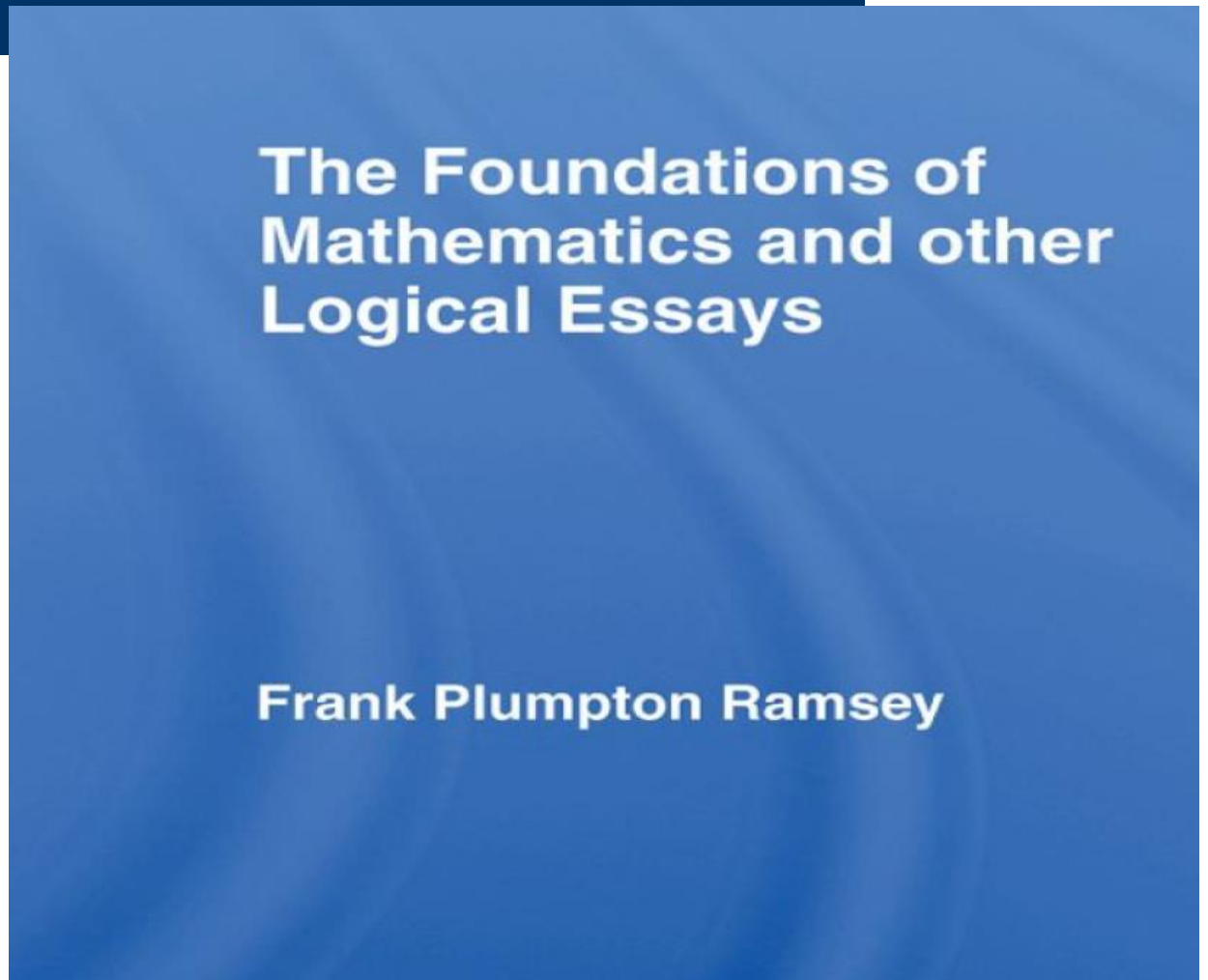
- ***The measurement of probabilities involves two magnitudes: the probability of an argument and the weight of the argument***

- ***Measurement of probability means comparison of the arguments, for such a comparison is "theoretically possible, whether or not we are actually competent in every case to make"***

KEYNES' VIEW OF PROBABILITY-2

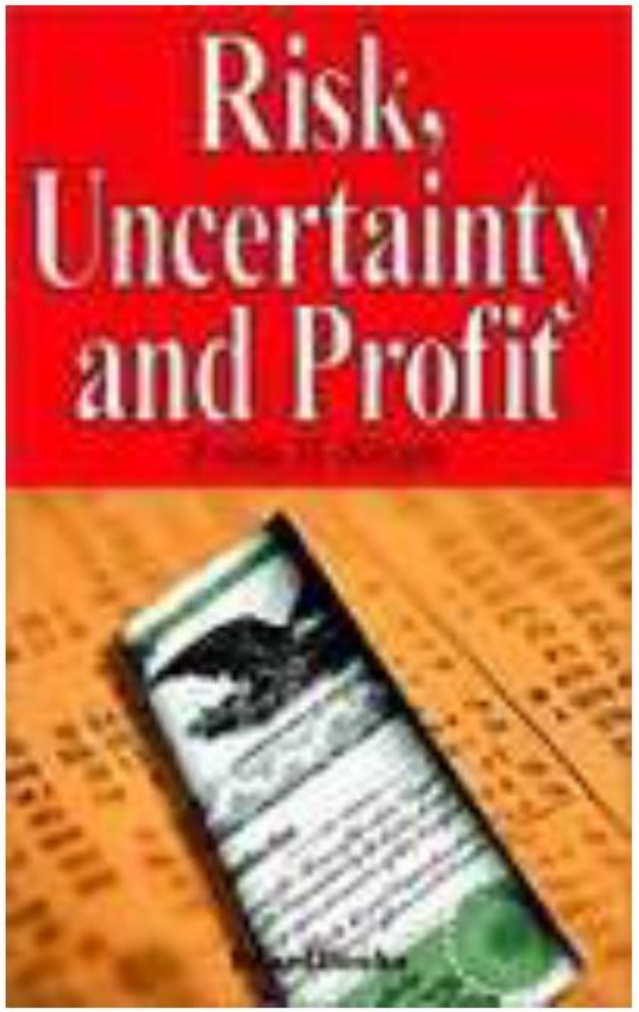
- ***Keynes was well aware that the probabilities of two quite different arguments can be incomparable.***
- ***Probabilities can be compared if they belong to the same series, that is, if they "belong to a single set of magnitude measurable in term of a common unit"***
- ***Probabilities are incomparable if they belong to two different arguments and one of them is not (weakly) included in the other***

Frank Ramsey (1903 – 1930)



THE DISTINCTION BETWEEN RISK AND UNCERTAINTY

Frank KNIGHT (1885-1972)



KNIGHTIAN DISTINCTION BETWEEN RISK AND UNCERTANITY

"Uncertainty must be taken in a sense radically distinct from the familiar notion of Risk, from which it has never been properly separated.... The essential fact is that 'risk' means in some cases a quantity susceptible of measurement, while at other times it is something distinctly not of this character; and there are far-reaching and crucial differences in the bearings of the phenomena depending on which of the two is really present and operating.... It will appear that a measurable uncertainty, or 'risk' proper, as we shall use the term, is so far different from an unmeasurable one that it is not in effect an uncertainty at all"

RISK CALCULATION

$$Risk = p.x$$

p=The probability that some event will occur

x= The consequences if it does occur

Question: What happens if p is a very small number and x is a large negative number (corresponding to a hazard) ? Such as the occurance of a financial crisis!

SUGGESTED POPULAR TEXTS

Bernstein, Peter L.: Against the Gods-The Remarkable Story of Risk, New York: John Wiley & Sons, 1996.

Mandelbrot Benoit B. & Richard L. Hudson: The (Mis) Behavior of Markets- A Fractal View of Risk, Ruin and Reward, Basic Books, 2004.

Taleb, Nassim N.: The Black Swan, New York: Random House, 2007.

RATIONAL EXPECTATIONS THEORY

RATIONAL EXPECTATIONS

- ***According to John Muth, who developed the rational expectations theory in 1961,***
- ***"Expectations will be identical to optimal forecasts (the best guesses of the future) using all available information"***
- ***He used the term to describe the many economic situations in which the outcome depends partly upon what people expect to happen.***

EXPECTATIONS AND OUTCOMES

- ***The concept of rational expectations asserts that outcomes do not differ systematically (i.e., regularly or predictably) from what people expected them to be.***
- ***This is an important hypothesis from economic policy-making point of view. Consider the following statement by Abraham Lincoln:***
- ***"You can fool some of the people all of the time, and all of the people some of the time, but you cannot fool all of the people all of the time."***

RATIONAL EXPECTATIONS AND MAKING ERRORS

- ***Rational expectations theory does not deny that people often make forecasting errors, but it does suggest that errors will not persistently occur on one side or the other.***
- ***Even though a rational expectation equals optimal forecast using all available information, a prediction based on it may not always be perfectly accurate.***

REASONS WHY EXPECTATIONS MAY FAIL TO BE RATIONAL

- ***People may be aware of all information but find it takes too much effort to make their expectation the best guess possible (the cost of information processing)***
- ***People might be unaware of some available relevant information, so their best guess of the future will not be accurate. (asymmetric information)***

IMPLICATIONS OF THE RATIONAL EXPECTATIONS THEORY

- ***If there is a change in the way a variable moves the way in which expectations of this variable are formed will change as well***
- ***The forecast errors of expectations will, on average, be zero and can not be predicted ahead of time.***

THE EFFICIENT MARKET HYPOTHESIS

- ***The so-called Efficient Market Hypothesis is in fact an application of rational expectations to the pricing of stocks and other securities.***
- ***Efficient markets hypothesis can be expressed simply as:***

  "in an efficient market, a security's price reflects all available information."

EFFICIENT MARKETS HYPOTHESIS-MAIN ARGUMENTS

- ***A sequence of observations on a variable (say daily stock prices) is said to follow a random walk if the current value gives the best possible prediction of future values.***

- ***The efficient markets hypothesis uses the concept of rational expectations to reach the conclusion that, when properly adjusted for discounting and dividends, stock prices follow a random walk.***

INFORMATION AND OUT - PERFORMING THE MARKET

- Information or news, in the efficient market hypothesis, is defined as anything that may affect prices that is unknowable in the present and thus appears randomly in the future.
- The efficient market hypothesis states that it is not possible to consistently outperform the market by using any information that the market already knows, except through luck.

FORMS OF EFFICIENCY

- ***WEAK: No excess returns can be earned by using investment strategies based on historical share prices or other financial data. Current share prices are the best, unbiased, estimate of the value of the security.***
- ***SEMI-STRONG: Share prices adjust within an arbitrarily small but finite amount of time and in an unbiased fashion to publicly available new information, so that no excess returns can be earned by trading on that information.***
- ***STRONG: Share prices reflect all information and no one can earn excess returns.***

STRONG-FORM OF EFFICIENCY

- *If there are legal barriers to private information becoming public, as with insider trading laws, strong-form efficiency is impossible, except in the case where the laws are universally ignored.*
- *To test for strong form efficiency, a market needs to exist where investors cannot consistently earn excess returns over a long period of time. Even if some money managers are consistently observed to beat the market, no refutation even of strong-form efficiency follows*.

UNCERTAINTY IN ECONOMICS

THE NATURE OF ECONOMIC LIFE AND UNCERTAINTY

- ***Economics is forward looking,***
- ***Economic environment constantly changes. Observations (data) provide only a weak basis for making generalizations and/or forecasting,***
- ***Real time matters, because most of the important decisions are irreversible, therefore mistakes can not be corrected,***
- ***Such a state of affairs encourages cautious behavior- i.e. a particular attitude towards the likelihood of events.***

POST KEYNESIAN VIEW-1

- Post-Keynesians argue that Knightian "uncertainty" may be the only relevant form of randomness for economics - especially when that is tied up with the issue of time and information.

- In contrast, situations of Knightian "risk" are only possible in some very contrived and controlled scenarios when the alternatives are clear and experiments can conceivably be repeated.

POST KEYNESIAN VIEW-2

- ***In the "real world" economic decision-makers usually face with situations that are almost unique and unprecednted. In most instances the alternatives are not really all known or understood.***

- ***In these situations, mathematical probability assignments usually cannot be made. Thus, decision rules in the face of uncertainty ought to be considered different from conventional expected utility.***

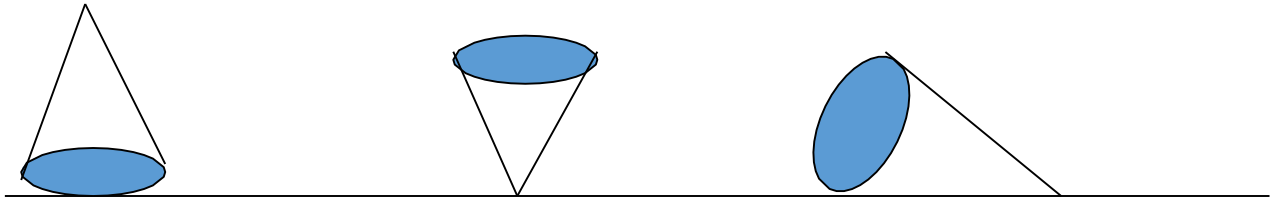
RATIONAL INATTENTION THEORY

- ***Under rational inattention theory (Christopher Sims), information is also fully and freely available, but people lack the capability to quickly absorb it all and translate it into decisions.***

- ***Rational inattention is based on a simple observation: Attention is a scarce resource and, as such, it must be budgeted wisely.***

- ***Individuals choose bits of information according to their interests; risk aversion may induce people to process negative news faster than positive news*.**

INHERENT INSTABILITY OF THE MARKET SYSTEM



A cone resting on its base is stable.

Unstable

Neutrally stable. Assumes new position caused by the disturbance.

DEFINITION OF STABILITY

sssssrastacSTABILITY

- *A system is said to be stable if it can recover from small disturbances that affect its operation*

STRUCTURAL STABILITY

- ***In mathematics, structural stability is a fundamental property of a dynamical system which means that the qualitative behavior of the trajectories is unaffected by small perturbations.***

- ***Structural stability deals with perturbations of the system itself, in contrast to Lyapunov stability which considers perturbations to initial conditions for a fixed system.***

- ***Structurally stable systems were introduced by Aleksandr Aleksandrovich Andronov (1901 –1952) and Lev Semanovich Pontryagin (1908-1988) in 1937 under the name of rough systems.***

STRUCTURAL INSTABILITY

- ***Structural instability focuses mainly on the structural properties of the object to which it refers.***

- ***A system is structurally unstable if it is liable to change very rapidly the qualitative characteristics of its structure.***

- ***Since there is often a strict correspondence between the structural properties of a certain object and the qualitative characteristics of its dynamic behavior, structural instability generally implies also a radical and swift change in the latter, and vice versa.***

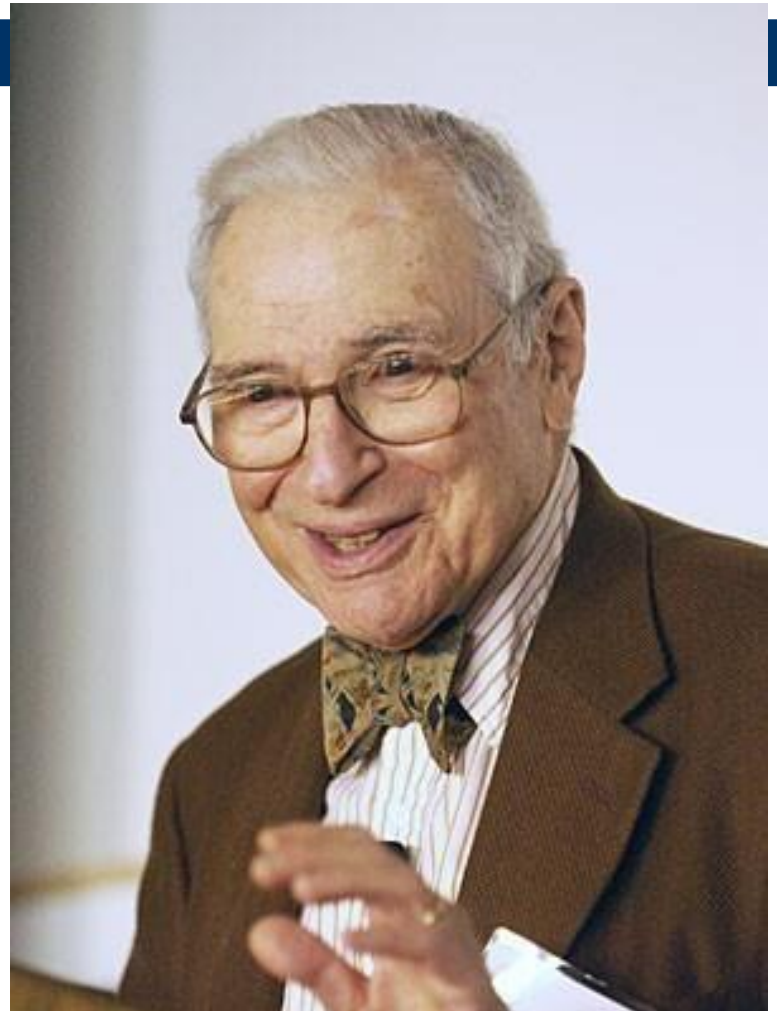
BACK TO ECONOMICS….

STABILITY IN ECONOMICS

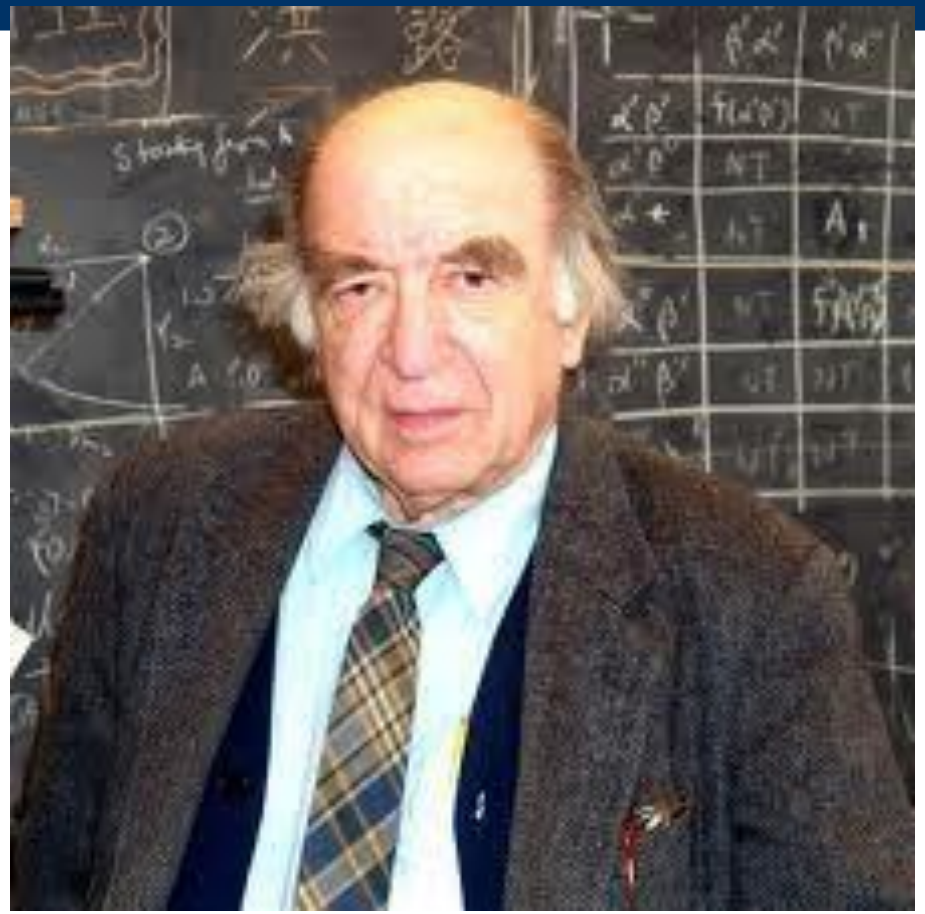
- ***Stability of the markets drew attention of the economists very early (Cobweb Theorem)***
- ***A detailed analysis of the dynamic systems and their stability was offered by Paul Anthony Samuelson in 1940s in his celebrated book Foundations of Economic Analysis.***
- ***In Late 1950's Kenneth Arrow and Leonid Hurwicz examined the stability of competitive equilibrium***

PAUL ANTHONY SAMUELSON (1915-2009)

KENNETH ARROW (1921-2017)



LEONID HURWICZ (1917-2008)

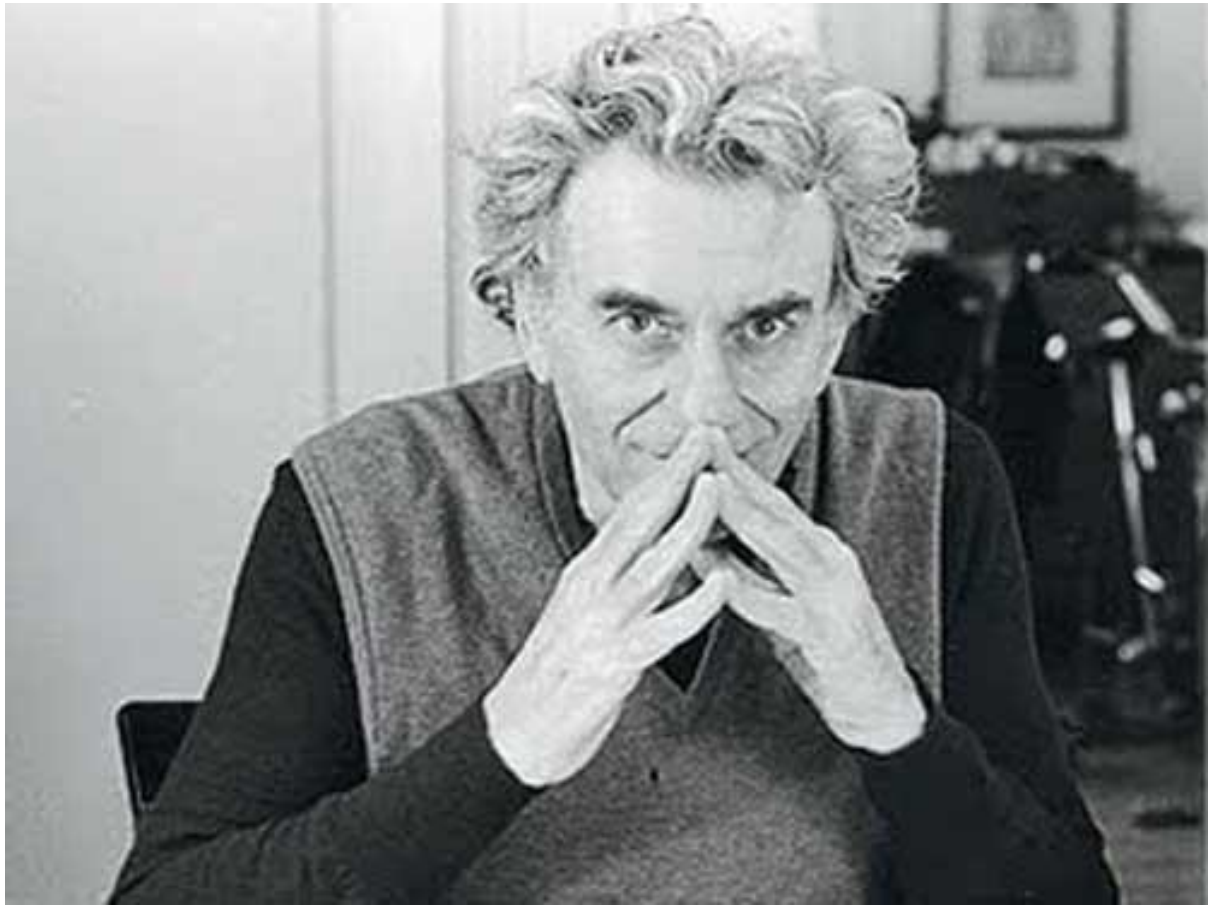


KOLMOGOROV's AXIOMATIC APPROACH TO PROBABILITY

- ***The probability (P) of some event (E), denoted P(E), is defined with respect to a "universe" or sample space (Ω) of all possible elementary events in such a way that P must satisfy the Kolmogorov Axioms.***
- ***[Kolmogorov's famous book on probability is Foundations of the Theory of Probability (1933)]***

INHERENT INSTABILITY OF THE FINANCIAL SYSTEM

Hyman Minsky (1919-1996)



STRUCTURAL INSTABILITY OF CAPITALISM

- ***Hyman Minsky argued in a capitalist system as each crisis is successfully contained, it encourages greater speculation and risk taking in borrowing and lending. Financial innovation makes it easier to finance various schemes.***
- ***To a large extent, borrowers and lenders operate on the basis of trial and error. If a behavior is rewarded, it will be repeated. Thus stable periods naturally lead to optimism, to booms, and to increasing fragility.***
- ***A financial crisis can lead to asset price deflation and repudiation of debt. A debt deflation, once started, is very difficult to stop. It may not end until balance sheets are largely purged of bad debts, at great loss in financial wealth to the creditors as well as the economy at large.***

AN INHERENTLY UNSTABLE SYSTEM

- ***According to Hyman Minsky, the general equilibrium theory has not been able to show that the equilibriums are stable conditions.***
- ***General equilibrium theory only offered a set of "rather restrictive" conditions for dynamic stability but did not address the question of structural instability)***
- ***In competitive equilibrium model there are not enough institutions to constrain structural instability. The only way to have stability is to have more institutions, such as Big Government and Big Banks.***

MINSKY'S FINANCIAL INSTABILITY HYPOTHESIS

- Financial instability hypothesis states that over a period of good times, the financial structures of a dynamic capitalist economy endogenously evolve from being robust to being fragile, and that once there is a sufficient mix of financially fragile institutions, the economy becomes susceptible debt deflations.

MINSKY'S CLASSIFICATION OF BORROWERS

- ***Minsky identified three types of borrowers that contribute to the accumulation of insolvent debt:***

  1)The "hedge borrower" can make debt payments (covering interest and principal) from current cash flows from investments.

  2)For the "speculative borrower", the cash flow from investments can service the debt, i.e., cover the interest due, but the borrower must regularly roll over, or re-borrow, the principal.

  3)The "Ponzi borrower" borrows based on the belief that the appreciation of the value of the asset will be sufficient to refinance the debt but could not make sufficient payments on interest or principal with the cash flow from investments; only the appreciating asset value can keep the Ponzi borrower afloat.

PONZI SCHEME

- ***Named after Charles Ponzi(1882-1949), an Italian citizen who launched the following scheme during 1918-1920 in the USA: "pay early investors returns from the investments of later investors."***

- ***He was sentenced in 1920 and spent 12 years in jail. Died in Rio da Janeiro.***

MINSKY'S ARGUMENT

- *Minsky proposed linking financial market fragility, in the normal life cycle of an economy, with speculative investment bubbles. He claimed that in prosperous times, when corporate cash flow rises beyond what is needed to pay off debt, a speculative eupohoria develops.*
- *Soon thereafter debts exceed what borrowers can pay off from their incoming revenues, which in turn produces a financial crisis.*
- *As a result of such speculative borrowing bubbles, banks (and other lenders) tighten credits availability, even to companies that can afford loans, and the economy subsequently contracts.*
- *Minsky's work stipulates three phases in a functioning financial system within a capitalist economy.*

I. *THE HEDGE PHASE*

- ***Conservative estimates of cash flows when making financial decisions; business plans provide more than enough cash generation to pay off cash commitments.***
- ***Debt tends to be conservative and at long term fixed interest rates***
- ***Margin of safety is high***
- ***This is a phase dominated by borrowers, (mostly companies) who can fulfill their debt payments (interests and principals) to creditors (mostly banks) from their cash flows***.

II. *THE SPECULATIVE PHASE*

- ***Estimates of cash flows are more aggressive- expected cash inflows provide just enough to cover to make interest payments on debts with principal rolled over,***
- ***Debt becomes shorter term and therefore needs regular refinancing; borrowers become exposed to short term changes in Lender's willingness to extend loans***
- ***Margin of safety is lower***
- ***The 'speculative phase' is dominated by borrowers, (including governments and households) that are capable of servicing their interests on their debts from their incoming revenues.***
- ***At this stage, financial institutions become very adept in employing all means to find ways of rolling-over the principal amounts of their borrowers.***

III. THE "PONZI" PHASE

- ***Estimates of cash generation not expected to cover cash commitments.***
- ***Widespread borrowing against asset collateral, debt is short term and rolled over***
- ***Strongly rising asset prices needed to underpin debt repayments; Margin of safety is low***
- ***The majority of borrowers in the system are unable to pay even the interests on their debts (let alone the principals) from their revenues.***
- ***Credit starts to dry up and creative practices (new financial instruments etc.) by financial institutions to collect fresh loans that can be extended to borrowers to enable them pay the interests on the previous debts***.

FINANCIAL CRISIS

- ***If the use of Ponzi finance is general enough in the financial system, then the inevitable disillusionment of the Ponzi borrower can cause the system to seize up.***
- ***When the bubble pops, i.e., when the asset prices stop increasing, the speculative borrower can no longer refinance (roll over) the principal even if able to cover interest payments.***
- ***Collapse of the speculative borrowers can then bring down even hedge borrowers, who are unable to find loans despite the apparent soundness of the underlying investments***.

MINSKY'S SOLUTION TO THE CRISIS

- ***According to Minsky: "the financial system swings between robustness and fragility and these swings are an integral part of the process that generates business cycles".***

- ***These swings, and the booms and busts that can accompany them, are inevitable in a market economy unless government steps in to control them, through regulation etc.***

THE MINSKY MOMENT

At this stage, debt payments can only be settled by liquidating the real assets of borrowers - the moment of deleveraging and default. This situation is now called "Minsky's Moment"

GOVERNMENT INTERVENTION AND NEW INSTITUTIONS

- ***Minsky observes that the government intervention (proper fiscal policy measures) are necessary but not sufficient to deal with such a financial crisis.***
- ***They have to supplemented with strong regulatory and superviory measures on the financial system.***

FISCAL POLICY: THE IMPORTANCE OF AUTOMATIC STABILIZERS

- ***Fiscal policy may have a discretionary component, such as the introduction of new taxes in a boom or new spending in a downturn.***

- ***However the discretionary action usually comes with a long lag, when it comes at all: His goal was to present a structure of capitalism that would be more prosperous and stable.***

- ***Minsky stressed that "the budget structure must have the built-in capacity" to produce sizable deficits when the economy plunges, and to run surpluses during inflationary booms. (Automatic stabilizers)***

GOVERNMENT INTERVENTION: UNINTENDED CONSEQUENCES

Government intervention is needed to stabilize it.

If policies are successful, the economy booms. Expectations about the future returns become increasingly optimistic. As mentioned before, riskier behavior is awarded.

This leads to fragility in the economy.

GOVERNMENT INTERVENTION MAY NOT BE ENOUGH

- ***Governments alone may not be enough to stabilize the economy.***
- ***In a recession, if a big firm or bank defaults on its debt, it can also bring down others in the economy due to the interlocking nature of their balance sheets. This could cause a "snowball effect" on the economy.***
- ***An additional constraining institution is needed to prevent debt deflation from occurring.***

LIMITATIONS OF MONETARY POLICIES

- **Monetary policy can constrain undue expansion and inflation operates by way of disrupting financing markets and asset values.**

- **Monetary policy to induce expansion operates by interest rates and the availability of credit, which do not yield increased investment if current and anticipated profits are low.**

SUPERVISION AND REGULATION

- ***The Central Bank will generally be taking up the role of the lender of last resort. The Central Bank will lend to financial institutions. By lending to them, especially to the big financial institutions, the Central Bank prevents big financial institutions from defaulting.***
- ***One problem with being the lender of last resort is that if banks know that the central banks will always step in if the borrower defaults, banks will have nothing to worry about. Risky behavior is rewarded.***
- ***There is, therefore, a need to supervise the private banks to decrease the number of bad loans they approve.***
- ***Minsky notes that profit-seeking firms have incentives to leverage and borrow more against equity as long as the economy appears to be stable, therefore, "stability is destabilizing." People take on more and more risk.***
- ***Hence, regulation and supervision are needed***.

Inequality and Macroeconomics

- Macroeconomics and inequality is a two-way street

$$\text{inequality} \quad \Leftarrow\Rightarrow \quad \text{macroeconomy}$$

1. macroeconomic shocks and policies affect inequality
2. inequality affects macroeconomic aggregates

- This idea may sound obvious to you but
  - it only made its way into mainstream macro relatively recently
  - lots of people (economists, journalists, ...) frequently forget
- Another theme: large gap between
  - current research in academic macroeconomics
  - macroeconomics in media/blogs, undergraduate teaching

Plan

1. Inequality in macroeconomics: a history of thought

2. How inequality affects how we should think about monetary policy

- based on joint work with Yves Achdou, SeHyoun Ahn, Andreas Fagereng, Xavier Gabaix, Jiequn Han, Martin Holm, Greg Kaplan, Pierre-Louis Lions, Jean-Michel Lasry, Gisle Natvik, Galo Nuño, Gianluca Violante, Tom Winberry, Christian Wolf

Inequality in Macro: A History of Thought

I find it useful to categorize macroeconomic theories as follows:

- before modern macro: 1930 to 1970
- 1st generation modern macro: 1970 to 1990
- 2nd generation modern macro: 1990 to financialcrisis
- 3rd generation modern macro: after the financial crisis

Main drivers of evolution in modern macro era

1. better data
2. better computers & algorithms
3. current events (rising inequality, financial crisis)

Before Modern Macro: 1930 to 1970

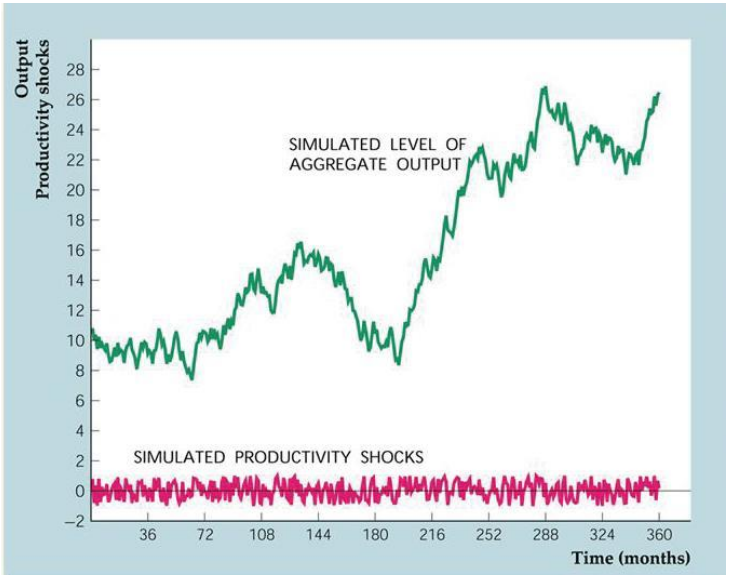
1. Keynesian IS/LM: about aggregates, no role for inequality/distribution by design

2. Distribution does play role in growth theory
   - mostly factor income distribution: Kaldor, Pasinetti and other Cambridge UK theorists
   - rarely personal income distribution: e.g. Stiglitz, Blinder

3. Disconnected empirical work on inequality (Kuznets)

First Generation Macro Theories: 1970 to 1990

Representative agent models, e.g. RBC & New Keynesian models



About aggregates, no role for inequality/distribution by design

Advertised as “microfounded” but representative agent assumption cuts 1st generation modern macro from micro inequality research

First Generation Macro Theories: 1970 to 1990

What's wrong with that?

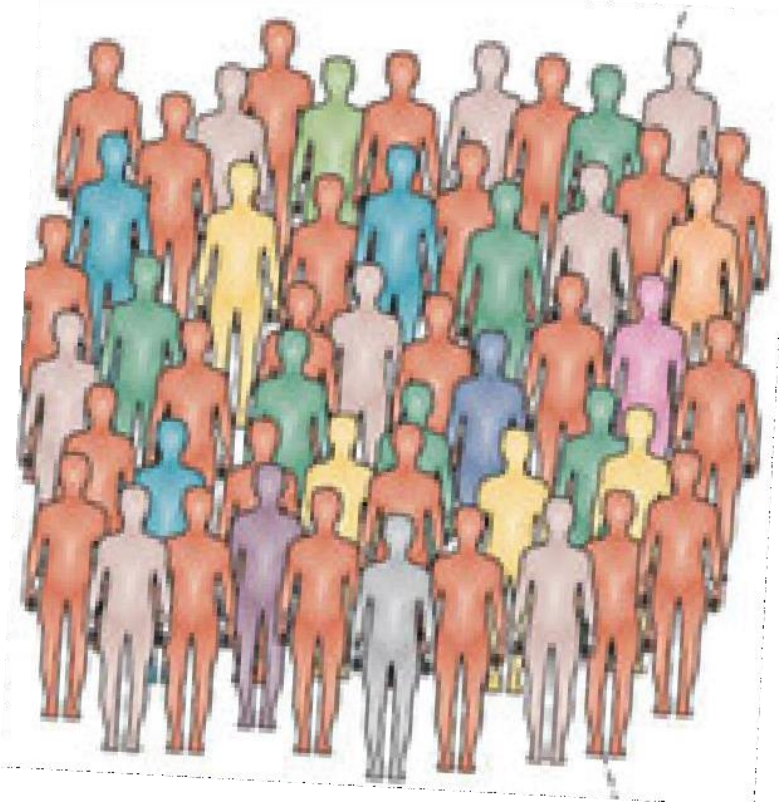
1. cannot speak to a number of important empirical facts, e.g.
    - unequally distributed growth
    - poorest hit hardest in recessions

2. cannot think coherently about welfare – "who gains, who loses?"

Second Generation Macro Theories: 1990 to 2008

(a) First Generation Theories

(b) Second Generation Theories

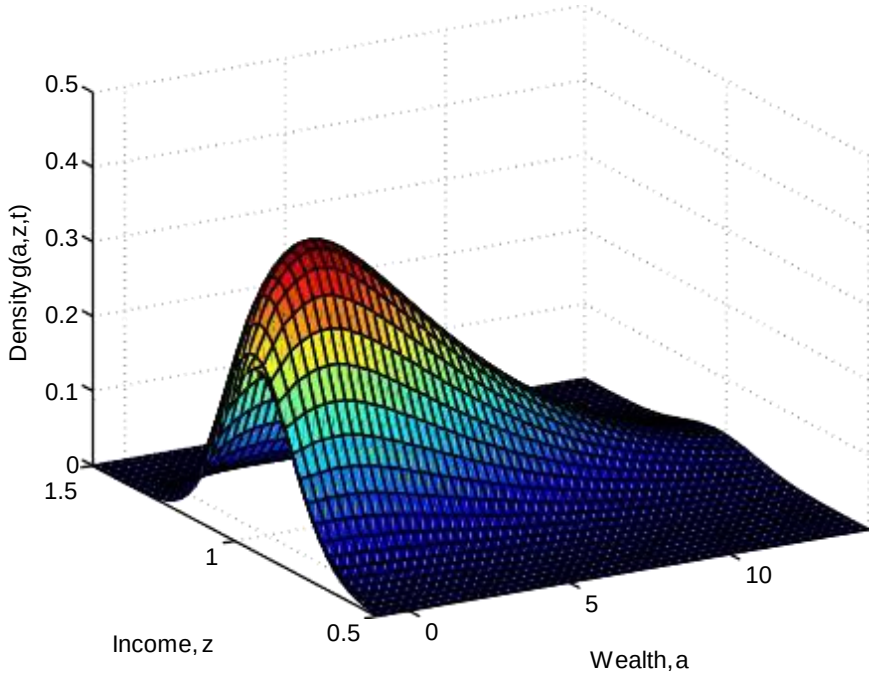


Second generation theories incorporate heterogeneity from micro data, particularly in income and wealth

Second Generation Macro Theories: 1990 to 2008

(a) First Generation Theories

(b) Second Generation Theories

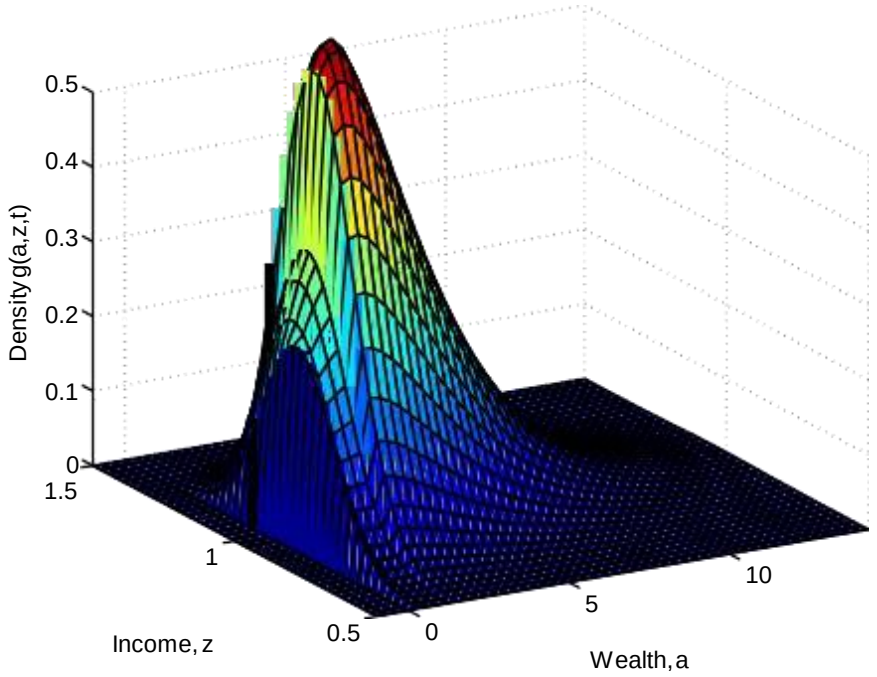


Second generation theories represent economy with a distribution...

Second Generation Macro Theories: 1990 to 2008

(a) First Generation Models

(b) Second Generation Models



Second generation theories represent economy with a distribution...
that moves over time, responding to macroeconomic shocks, policies

Second Generation Macro Theories: 1990 to 2008

(a) First Generation Models

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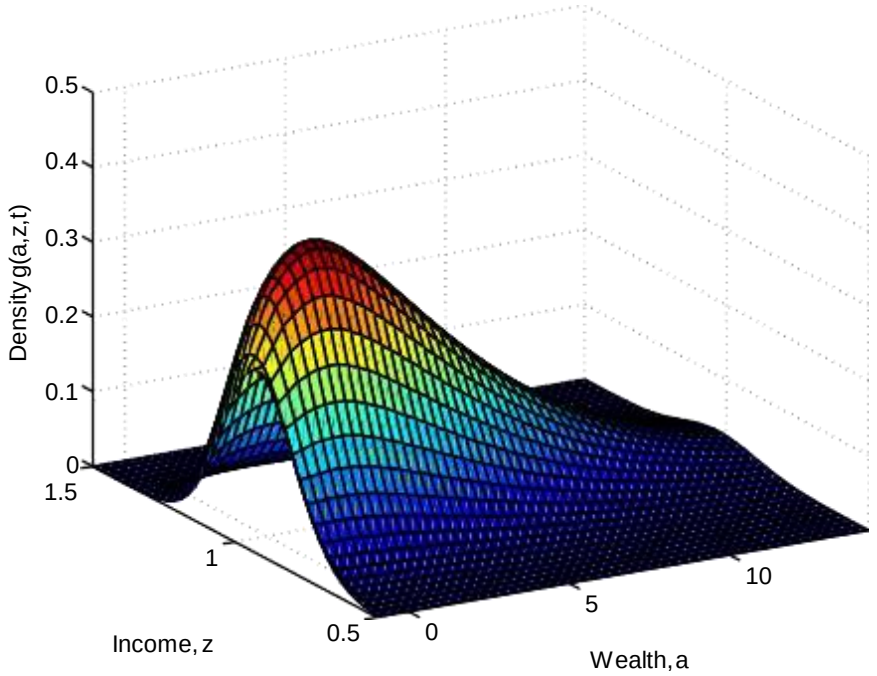


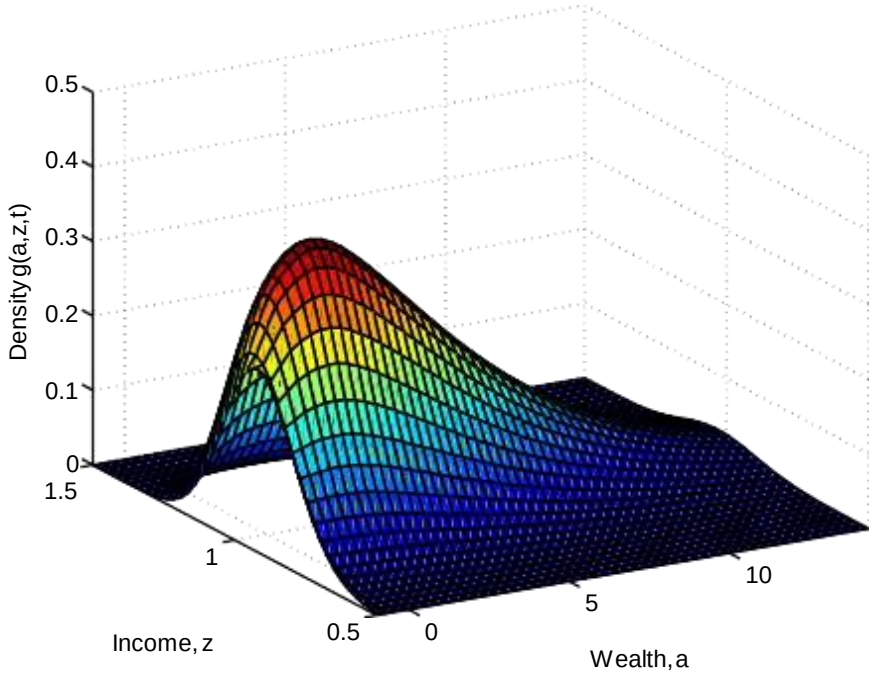
Second generation theories represent economy with a distribution... that moves over time, responding to macroeconomic shocks, policies

- important early contributions in the 1990s by Aiyagari, Bewley, Huggett, Krusell-Smith, Den Haan,...

Second Generation Macro Theories: 1990 to 2008

(a) First Generation Models

(b) Second Generation Models



Second generation theories can potentially speak to

- unequally distributed growth
- poorest hit hardest in recessions

and are useful for welfare analysis

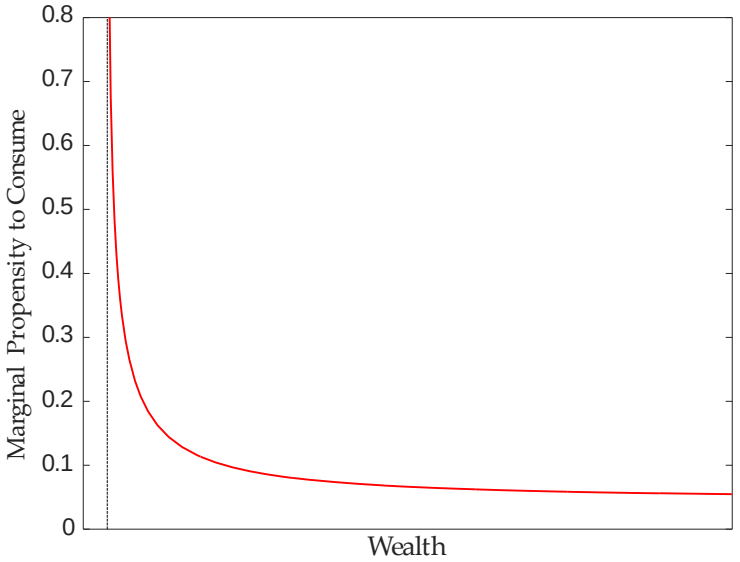
Second Generation Theories: Inequality/ Macro

- 2nd generation theories featured rich heterogeneity ....
- ... but typically found small effects of heterogeneity on macroeconomic aggregates, particularly consumption and saving
- Summary by Lucas (2003):
  - "For determining the behavior of aggregates, [Krusell and Smith] discovered, realistically modeled household heterogeneity just does not matter very much. For individual behavior and welfare, of course, heterogeneity is everything."
- Reason: rich and poor differ in their wealth but not their consumption and saving behavior – rich = scaled version of poor
- Note: some important contributions from same time period don't fit my narrative
  - Banerjee-Newman, Benabou, Galor-Zeira, Persson-Tabellini, ...
  - also related: 1950s "capitalist-worker theories" of Kaldor, Pasinetti, ...

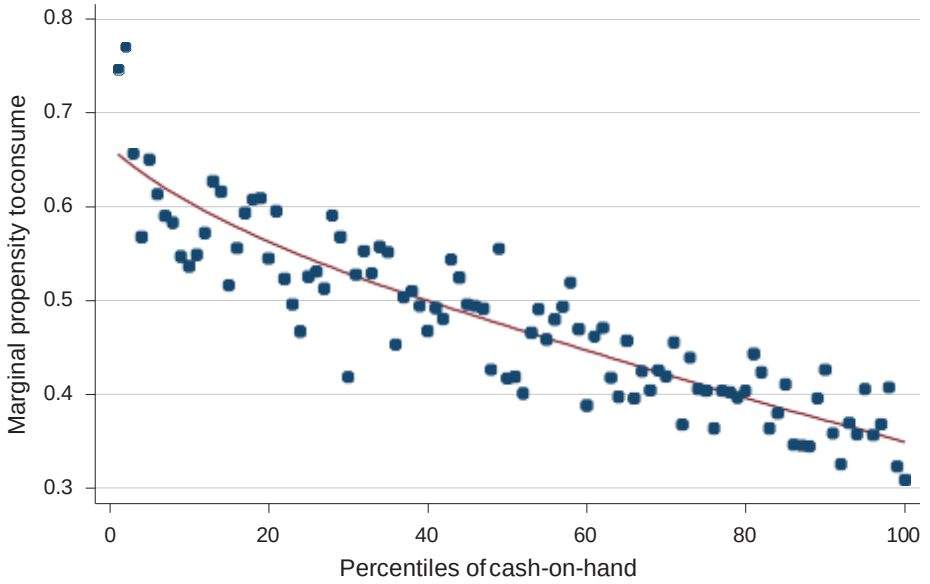
What's Wrong with Second Generation Theories?

They don't square well with consumption, saving behavior in micro data

- e.g. evidence on marginal propensities to consume (MPCs) out of transitory income changes



(a) 2nd Generation Model



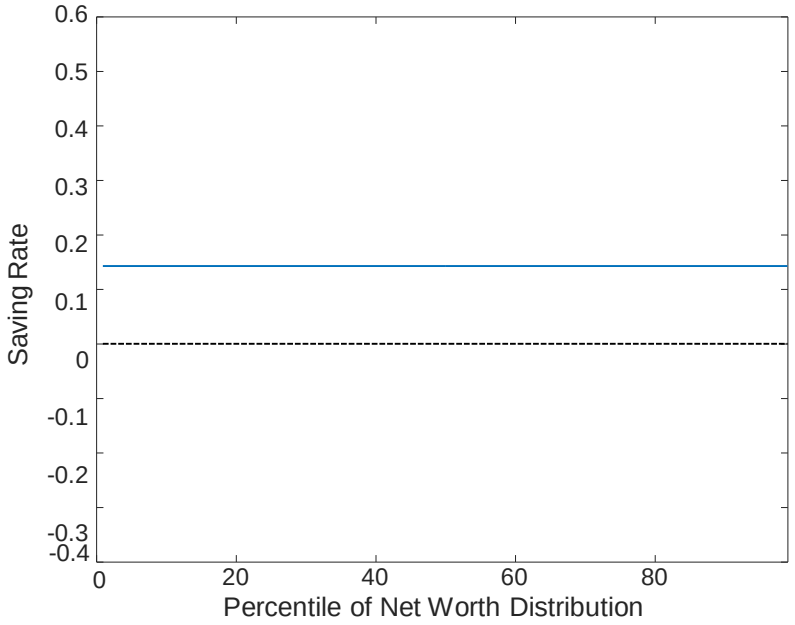
(b) Data

- data source: Jappelli & Pistaferri (2014), note: self-reported MPCs

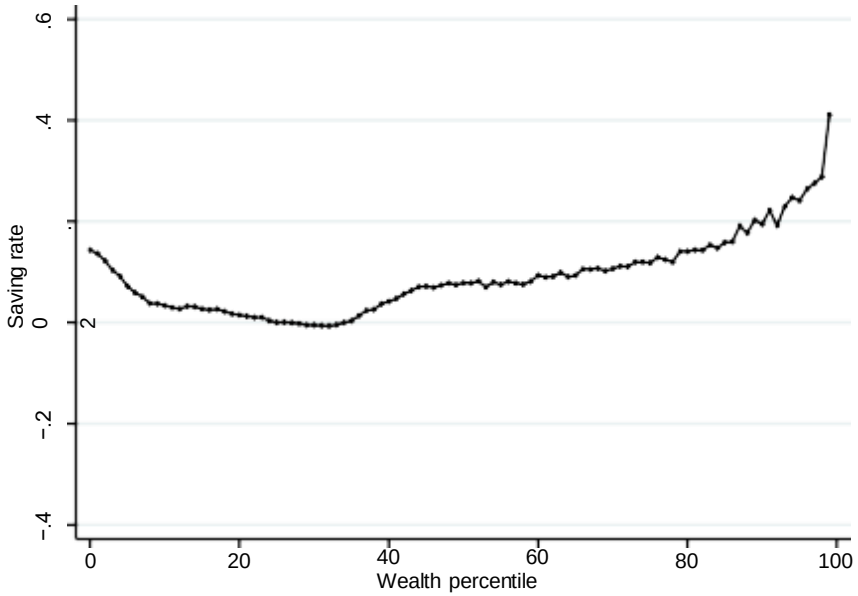
What's Wrong with Second Generation Theories?

They don't square well with consumption, saving behavior in micro data

- e.g. evidence on saving rates across the wealth distribution



(a) 2nd Generation Model



(b) Data

- Note: depending on particular variant, 2nd generation models may also feature downward-sloping saving rates (De Nardi & Fella 2017)
- Data source: Fagereng, Holm, Moll & Natvik(2017)

What's Wrong with Second Generation Theories?

- Angus Deaton (2016) again:
  - "While we often must focus on aggregates for macroeconomic policy, it is impossible to think coherently about national well-being while ignoring inequality and poverty, neither of which is visible in aggregate data."
  - "Indeed, and except in exceptional cases, macroeconomic aggregates themselves depend on distribution."

- Second generation models are exactly such "exceptional cases"

Third Generation Theories: after the Crisis

Recent Janet Yellen speech "Macroeconomic Research After the Crisis": http://www.federalreserve.gov/newsevents/speech/yellen20161014a.htm

- "My second question asks whether individual differences within broad groups of actors in the economy can influence aggregate economic outcomes – in particular, what effect does such heterogeneity have on aggregate demand?"
- "Prior to the financial crisis, representative-agent models were the dominant paradigm for analyzing many macroeconomic questions."
- "However, a disaggregated approach seems needed to understand some key aspects of the Great Recession. To give one example, consider the effects of negative housing equity on consumption..."
- "While the economics profession has long been aware that these issues matter, their effects had been incorporated into macro models only to a very limited extent prior to the financial crisis [= 2nd generation]."
- "I am glad to now see a greater emphasis on the possible macroeconomic consequences of heterogeneity [= 3rd generation]."

Third Generation Theories: after the Crisis

Recent speech by Bank of Japan Governor Haruhiko Kuroda

https://www.boj.or.jp/en/announcements/press/koen_2017/ko170524a.htm

- "The third issue is related to monetary policy and inequality."
- "We know that increasing attention is being paid to the distributional effects of economic and other public policies. I would like to reiterate that [...] monetary policy is not a tool that is well suited for dealing with inequality or polarization and that central banks should remain focused on the aggregate implications of their own policy decisions."
- "At the same time, however, this does not mean that central banks are allowed to ignore the distributional effects of monetary policy, especially if the distributional effects have an aggregate impact. With this aim, central banks should be, and in fact are, open to learning about heterogeneous agent macroeconomics."
- "These days, much progress has been made on this front in computational economics. Central banks are keenly following the technical progress [...]"

Third Generation Theories: after the Crisis

Recent speech by ECB vice president Vítor Constâncio

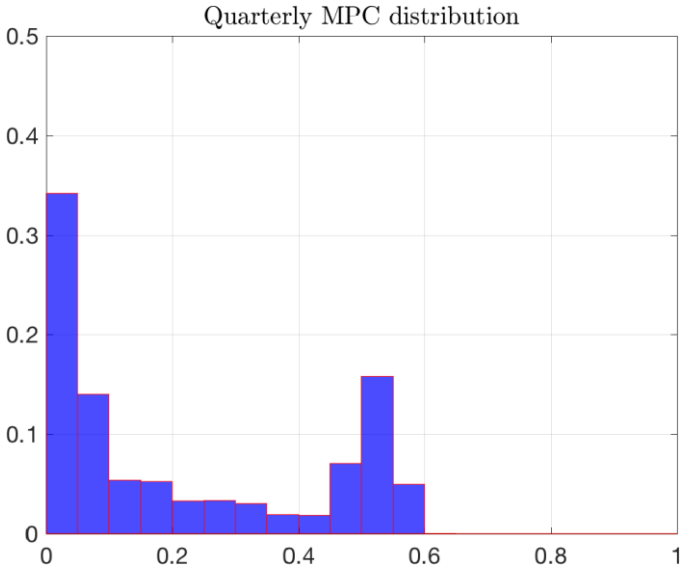
https://www.ecb.europa.eu/press/key/date/2017/html/ecb.sp170822.en.html

- "For too long, the distribution of income and wealth was almost ignored by macroeconomics. As recently recalled by Krusell, this is perhaps due to the 'presumption in the literature that the distribution does not matter in the determination of aggregates'"
- "These views were wrong and, naturally, the crisis shattered both presumptions."
- "First, the contributions of Mian and Sufi, Carroll or Muellbauer showed how relevant heterogeneities related to indebtedness, credit restrictions or marginal propensities to consume out of different sources of income or wealth, were important to explain aggregate consumption behaviour before and after the crisis. "
- "Since then, the Heterogeneous Agents New Keynesian – HANK – class of models became an active area of research on the monetary policy transmission mechanism."

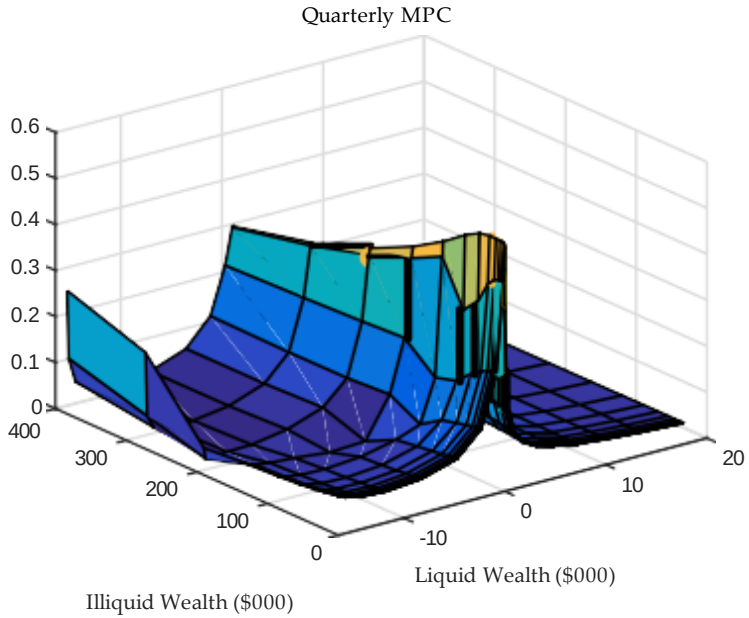
Third Generation Theories: after the Crisis

In order to match micro data, 3rd generation theories emphasize

- household balance sheets,
- e.g. nominal vs real assets, liquid vs. illiquid
- MPCs that are high on average but heterogeneous. Example:



(a) High and heterogeneous MPCs...



(b) ... that depend on balancesheets

Source: Kaplan, Moll, Violante (2017) "Monetary PolicyAccording to HANK"

Mechanisms Through Which Inequality ⍰ Macro

1. Demand side
   - rich spend smaller fraction of their income than poor ⇒ increase in inequality causes lower consumer spending
   - more subtle versions of this story, e.g. what matters is not whether you're rich but whether you're liquid-wealth rich
   - stories that emphasize housing and mortgages,...
1. Supply side
   - credit constraints in education ⇒ poor children get inferior education ⇒ bad for long-run growth
   - credit constraints in entrepreneurship ⇒ wealth distribution matters for entry, allocation of capital
   - deregulation, tax cuts may boost growth, raise inequality
3. (Political economy, e.g. too much inequality leads to revolution)

- Theory makes no clear prediction whether inequality is good or bad for macro, only common feature is that distribution matters

Inequality in Macro: Summary

- Before modern macro: 1930 to 1970
  - it's complicated
- 1st generation: 1970 to 1990
  - representative agent models (RBC, New Keynesian etc)
  - no role for inequality by design
- 2nd generation: 1990 to financial crisis
  - early "distributional macro" models
  - "macro ⇒ inequality" but "macro/⇐inequality"
- 3rd generation: after the financial crisis
  - current "distributional macro" models
  - rich interaction: "inequality ⇐⇒ macro"

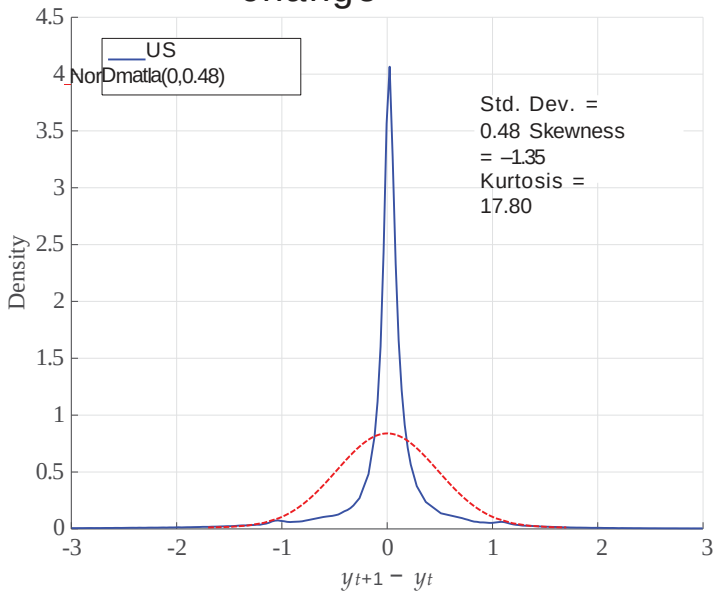
What's Been Driving this Evolution?

1. Better data
   - explosion of availability of high-quality micro data
   - e.g. administrative data from places such as Internal Revenue Service, Social Security Administration,...
   - need large samples to document fine-grained heterogeneity, particularly since distributions are typically very skewed
2. Better computers
   - models with heterogeneity (generations 2 and 3) much harder to compute than those without (generation 1)
   - 3rd generation models harder than 2nd generation ones
3. Current events
   - rising inequality in many developed countries
   - cannot understand some key aspects of Great Recession without thinking about heterogeneity

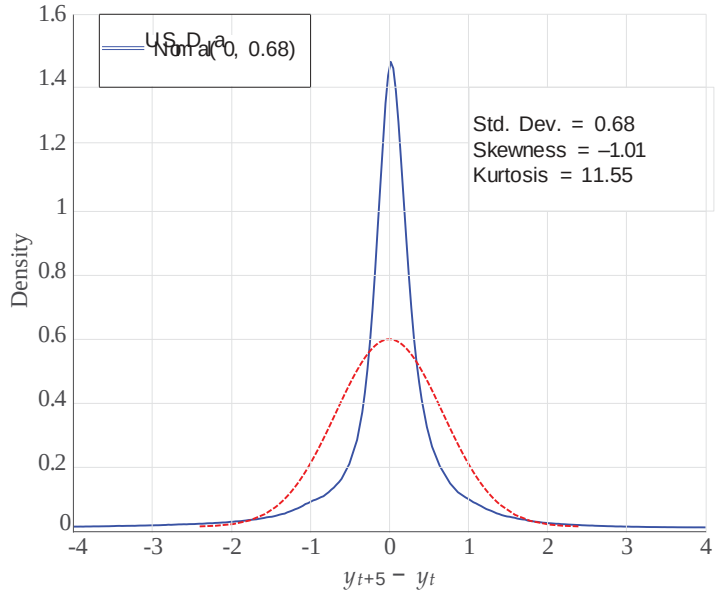
Example of Better Data

- Models with heterogeneity traditionally assume changes in individual income are normally distributed
- Social Security Administration data: bad description of data
- Recent models take new evidence on board

One-year change change



Five-year



Source: Guvenen, Karahan, Ozkan, Song (2016) "What Do Data on Millions of U.S. Workers Reveal about Life-Cycle Earnings Dynamics?"

Media and Undergrad Teaching are Stuck pre 1990

- Both almost exclusively concerned with first generation theories in which there is no role for inequality by assumption
- Media often critizices macroeconomists for ignoring heterogeneneity. Here is a 5 May 2017 example from Reuters:
  - "The preference for high theory and abstruse mathematical modeling meant that mainstream economics had come to rest on a number of gloriously improbable assumptions."
  - "In their models, millions of households were reduced to a single 'representative agent,' aGod-like being, omniscient and immortal."
  - "This unreal creature inhabited a world where peace – or equilibrium – ruled. Crises were impossible in such an Eden..."

    http://de.reuters.com/article/us-review-crisis-breakingviews-idDEKBN1811XP
- This is simply a wildly inaccurate description of academic macroeconomics, at least after end of 1990s

Bank of Japan Governor Kuroda Has it Right Again

- “In the aftermath of the global financial crisis, a number of pundits argued that macroeconomics and monetary economics are totally useless.”
- “One of the misconceptions of such critics is that they believe that modern macroeconomics relies only on representative agent models and ignores important implications arising from various heterogeneities in the economy, such as debtors and creditors, the financial sector and the non-financial sector, importers and exporters, and more controversially, haves and have-nots.”
- “Heterogeneous agent models were developed in the 1990s, and have been extended since then.”

Media and Undergrad Teaching are Stuck pre 1990

- Place where "macroeconomists ignore heterogeneity" criticism does apply: undergraduate teaching
  - undergrads typically learn Old Keynesian IS-LM
  - or maybe RBC-type representative agent models
  - but very rarely heterogeneous agent models

- For similar points, see
  - Kocherlakota (2009) "Some Thoughts on the State of Macro"

    http://online.wsj.com/public/resources/documents/KOCHERLAKOTA20090930.pdf
  - Ricardo Reis (2016) "Is Something Really Wrong with Macroeconomics?"

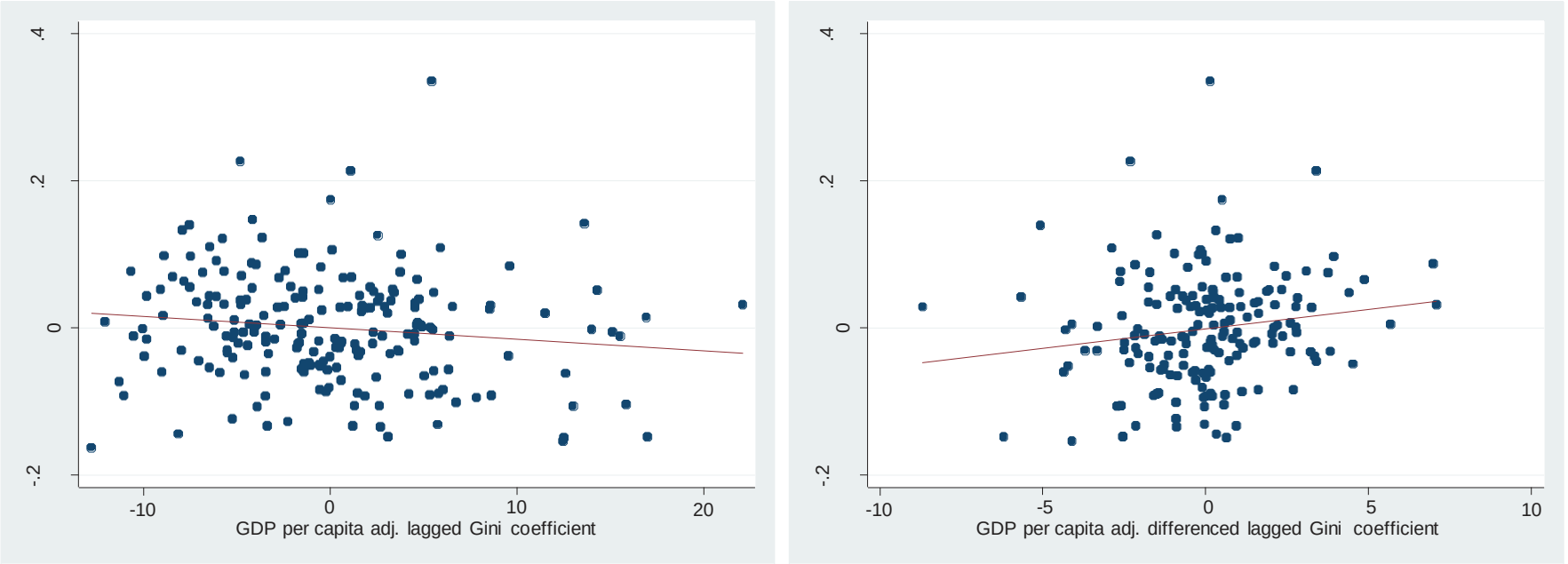
    http://personal.lse.ac.uk/reisr/papers/17-wrong.pdf

Aside: Inequality-Growth Cross-Country Regressions

Large number of papers:

- country-level data on GDP growth, inequality measure (e.g. Gini)
- regress growth in subsequent 10 years on inequality in base year
- see e.g. recent IMF and OECD studies that got a lot of press

Example: Inequality and Economic Growth in OECD Countries



Source: Kolev and Niehues (2016) who criticize the literature

Aside: Inequality-Growth Cross-Country Regressions

Most economists are quite skeptical of such studies

See e.g. Banerjee and Duflo (2003) "Inequality and Growth: What Can the Data Say?"

- "On the question of whether inequality is bad for growth, [cross-country] data has little to say. It is clear that the most compelling evidence on this point has to come from micro data."

Reasons:

1. many omitted variables in such cross-country regressions
2. relation could be very non-linear (see e.g. Banerjee-Duflo, 2003)
3. "inequality $\Leftarrow\Rightarrow$ macro", not just "inequality $\Rightarrow$ macro" (see e.g. Fuest, 2017)
4. typically lack of evidence on particular mechanisms

- This skepticism is probably justified

Inequality Changes How We Should Think about Macroeconomic Policies: Case of Monetary Policy

---

- Based on Kaplan, Moll and Violante (2017) “Monetary Policy According to HANK”

- “HANK” = Heterogeneous Agent New Keynesian model

- Goal: introduce heterogeneity into models used by Central Banks which we like to call

- “RANK” = Representative Agent New Keynesian model

How monetary policy works in RANK

- Total consumption response to a drop in real rates

$$C \text{ response} = \underbrace{\text{direct response to } r}_{>95\%} + \text{ indirect effects due to } \underbrace{Y}_{<5\%}$$

- Direct response is everything, pure intertemporal substitution

- However, data suggest:

  1. Low sensitivity of C to r
  2. Sizable sensitivity of C to Y
  3. Micro sensitivity vastly heterogeneous, depends crucially on household balance sheets

How monetary policy works in HANK

- Once matched to micro data, HANK delivers realistic:
  - wealth distribution: small direct effect
  - MPC distribution: large indirect effect (depending on ΔY)

C response = direct response to r + indirect effects due to Y

RANK: >95% RANK: <5%

HANK: <1/3 HANK: >2/3

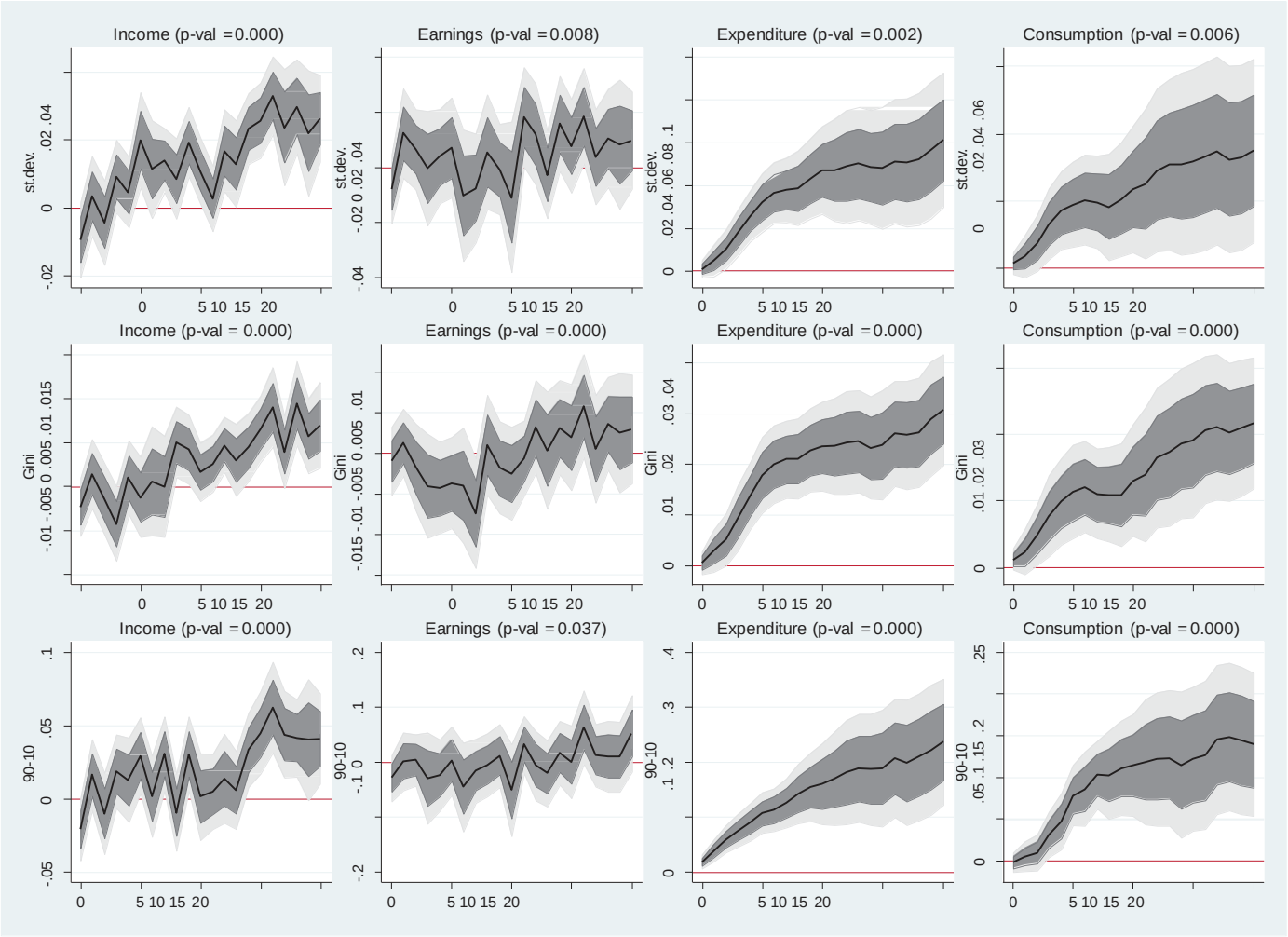
- Overall effect depends crucially on fiscal response, unlike in RANK where Ricardian equivalence holds
- **Q:** Is Central Bank less in control of C than we thought?

Macro Also Matters for Inequality

- HANK allows studying distributional implications of monetary policy
  - lower interest rates ⇒ negative income effect on savers,
    - positive on borrowers
- Empirical evidence?
  - Yellen again: "even though the tools of monetary policy are generall effects of macroeconomic developments on different groups within

Distributional Effects of Monetary Policy?

FIGURE 3: RESPONSE OF ECONOMIC INEQUALITY TO A CONTRACTIONARY MONETARY POLICY SHOCK



Source: Coibion, Gorodnichenko, Kueng, Silva (2016) "Innocent Bystanders"

Monetary vs Fiscal Policy?

- In HANK model with wealthy-hand-to-mouth also fiscal policy is much more powerful than in RANK
  - See Kaplan and Violante (2016) “Wealthy ‘hand-to-mouth’ households: key to understanding the impacts of fiscal stimulus”
- RANK: clear pecking order between monetary and fiscal policies
  - away from zero lower bound, monetary policy can by itself restore first-best equilibrium allocation (“divine coincidence”)
- HANK: no longer true
  - Is fiscal policy sometimes preferable to monetary policy when there are incomplete markets and distributional concerns?

Conclusion

- Macroeconomics and inequality is a two-way street

$$\text{inequality} \quad \Leftarrow\Rightarrow \quad \text{macroeconomy}$$

- Current research in macroeconomics takes this seriously,...
- ... incorporates enormous heterogeneity observed at micro level, in particular the large disparities in income and wealth
- Doing so often delivers strikingly different implications for monetary and fiscal policies...
- ... and allows us to study their distributional implications

References: Some "Third Generation" Papers

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Measuring Economic Policy Uncertainty

Steven J. Davis, University of Chicago
Research with Scott Baker and
Nick Bloom of Stanford University

Conference on the Causes and Consequences of Economic Uncertainty

Federal Reserve Bank of Dallas

October 2013

Our Initial Goal: Assess the Policy Uncertainty View

Policy Uncertainty View

1. Policy-related economic uncertainty is at historically high levels in recent years in the United States and in Europe.
2. High levels of policy uncertainty cause businesses and households to cutback or defer spending, investment and hiring – undermining macroeconomic performance and slowing recovery from recent financial crises.

Broadening Our Goals

1. Construct new measures of economic policy uncertainty (EPU) for many countries. Thus far:
   - Monthly indexes for USA, Canada, UK, Germany, France, Italy, Spain, China, India and Japan.
   - Daily measure for USA
2. Develop methods to evaluate and refine our EPU indexes, especially the news-based component
3. Assess the effects of policy uncertainty on macroeconomic performance
4. Future work: Study economic, political and social forces that underlie policy uncertainty

What Do We Want our Measures to Capture?

All of the following:

- Uncertainty about *who* will make economic policy decisions – e.g., who will win the next elections?
- Uncertainty about *what* economic policy actions decision makers will undertake, and *when*.
- Uncertainty about the economic *effects* of policy actions – past, present and future actions
- Economic uncertainty induced by policy inaction
- Economic uncertainty related to national security concerns and other policy matters that are not mainly economic in character

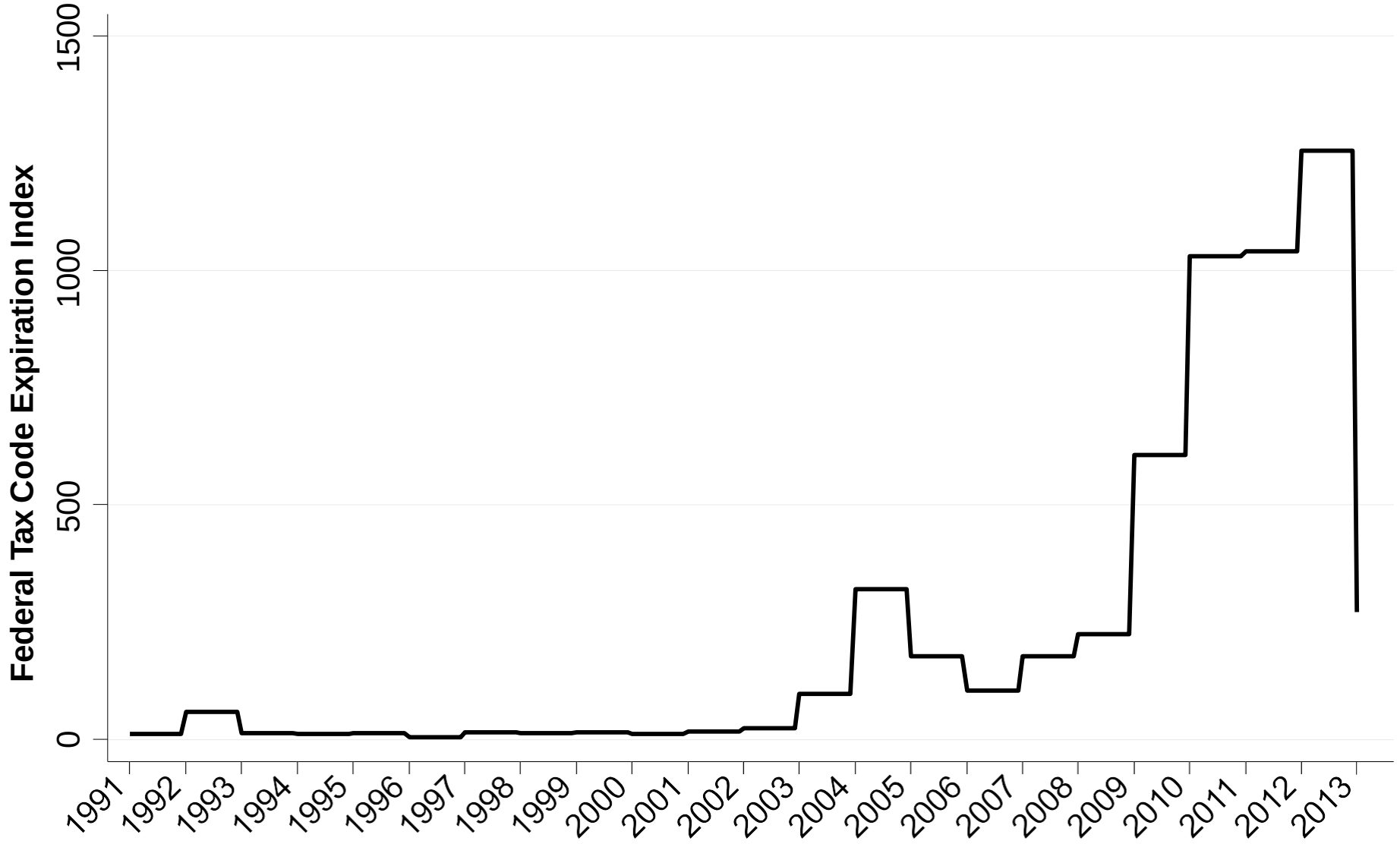
Our Index of Policy-Related Economic Uncertainty

Components:

- Scheduled tax code expirations (1/6)
- Forecaster disagreement about government purchases of goods and services (1/6)
- Forecaster disagreement about inflation (1/6)
- Newspaper-based index (1/2 weight)

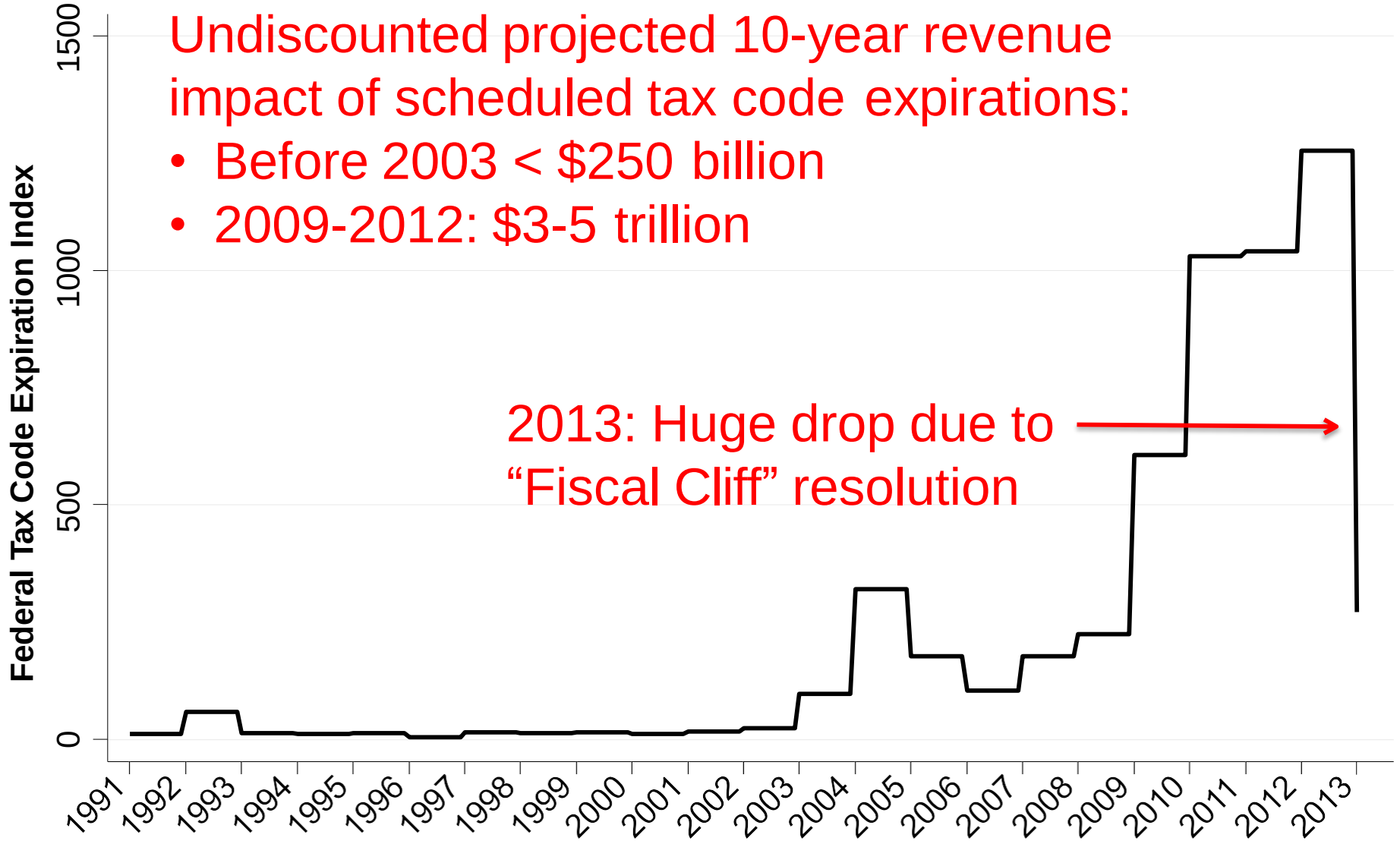
Normalize each component to have unit standard deviation, then compute weighted sum to get overall index.

Figure 3: Federal Tax Code Expirations Index, 1991-2013



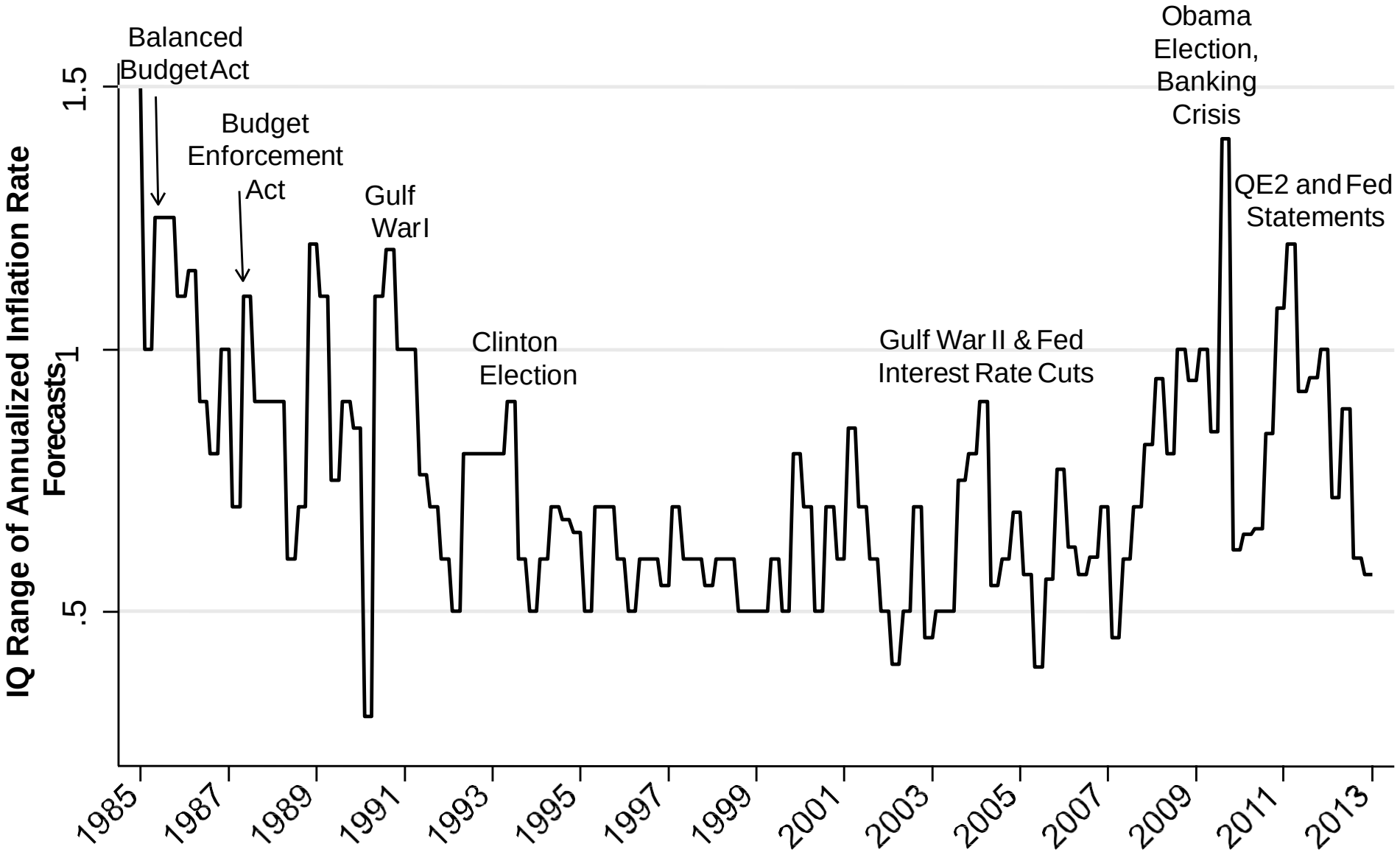
Notes: Based on Congressional Budget Office data on projected revenue effects of federal tax code provisions set to expire in the current calendar year and next ten years. For a given year, the index value is calculated as the discounted sum of projected revenue effects associated with expiring tax code provisions, using a discount factor of 0.5^T applied to future revenue effects for T=0,1,…10 years. Index normalized to a mean of 100 before 2010.

Figure 3: Federal Tax Code Expirations Index, 1991-2013



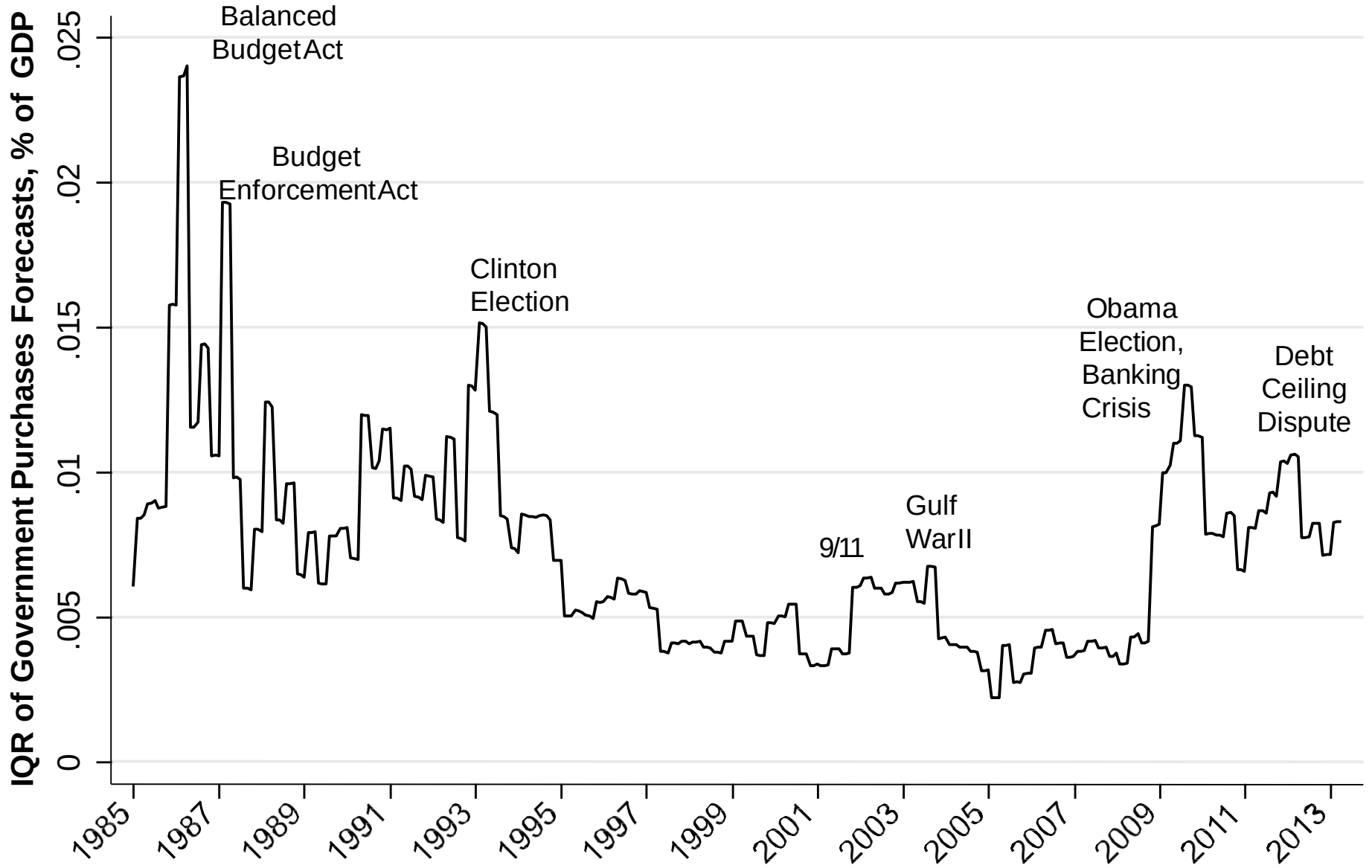
Notes: Based on Congressional Budget Office data on projected revenue effects of federal tax code provisions set to expire in the current calendar year and next ten years. For a given year, the index value is calculated as the discounted sum of projected revenue effects associated with expiring tax code provisions, using a discount factor of 0.5^T applied to future revenue effects for T=0,1,…10 years. Index normalized to a mean of 100 before 2010.

Figure 4: Interquartile Range of Four-Quarter-Ahead CPI Inflation Forecasts, Percentage-Point Spread, Q1 1985 to Q4 2012



Notes: From the Federal Reserve Bank of Philadelphia Survey of Professional Forecasters (made every quarter; offset one month due to release dates such that Q4 covers Nov-Jan. Displays the Interquartile (IQ) range of the quarterly 1-year-ahead forecasts of CPI.

Figure 5: Interquartile Range of Government Purchases Forecasts, Q1 1985 – Q2 2013



Notes: Based on data from the Federal Reserve Bank of Philadelphia Survey of Professional Forecasters. We compute the interquartile range (IQR) of 1- year ahead forecasts of government purchases of goods and services and scale the IQR by the median forecast. We carry out these calculations separately for federal purchases and state & local purchases, then aggregate using the purchases share of nominal GDP for each level of government. See the main text for additional details.

Constructing Our Newspaper-Based Index o for the U.S.

- Search digital archives of 10 major newspapers for articles with terms related to EPU
- For each newspaper:
  - Get monthly EPU article counts
  - Scale by count of all articles in same month
  - Normalize scaled count so that SD=1 for 1985-2010

  → Newspaper-level EPU Index
- Sum across the newspaper-level indexes by month to get the U.S. news-based EPU index

Constructing Our Newspaper-Based EPU Inc for the U.S.

Text String Search Criteria:

EU: {economic OR economy} AND

{uncertain OR uncertainty}

EPU: … AND {regulation OR deficit OR "federal reserve" O congress OR legislation OR "white house"}

Constructing Our Newspaper-Based EPU Ind for the U.S.

Text String Search Criteria:

EU: {economic OR economy} AND

{uncertain OR uncertainty}

EPU: … AND {regulation OR deficit OR "federal reserve" O congress OR legislation OR "white house"}

Later, if time allows: How did we select the "policy" terms fo our EPU search filter?

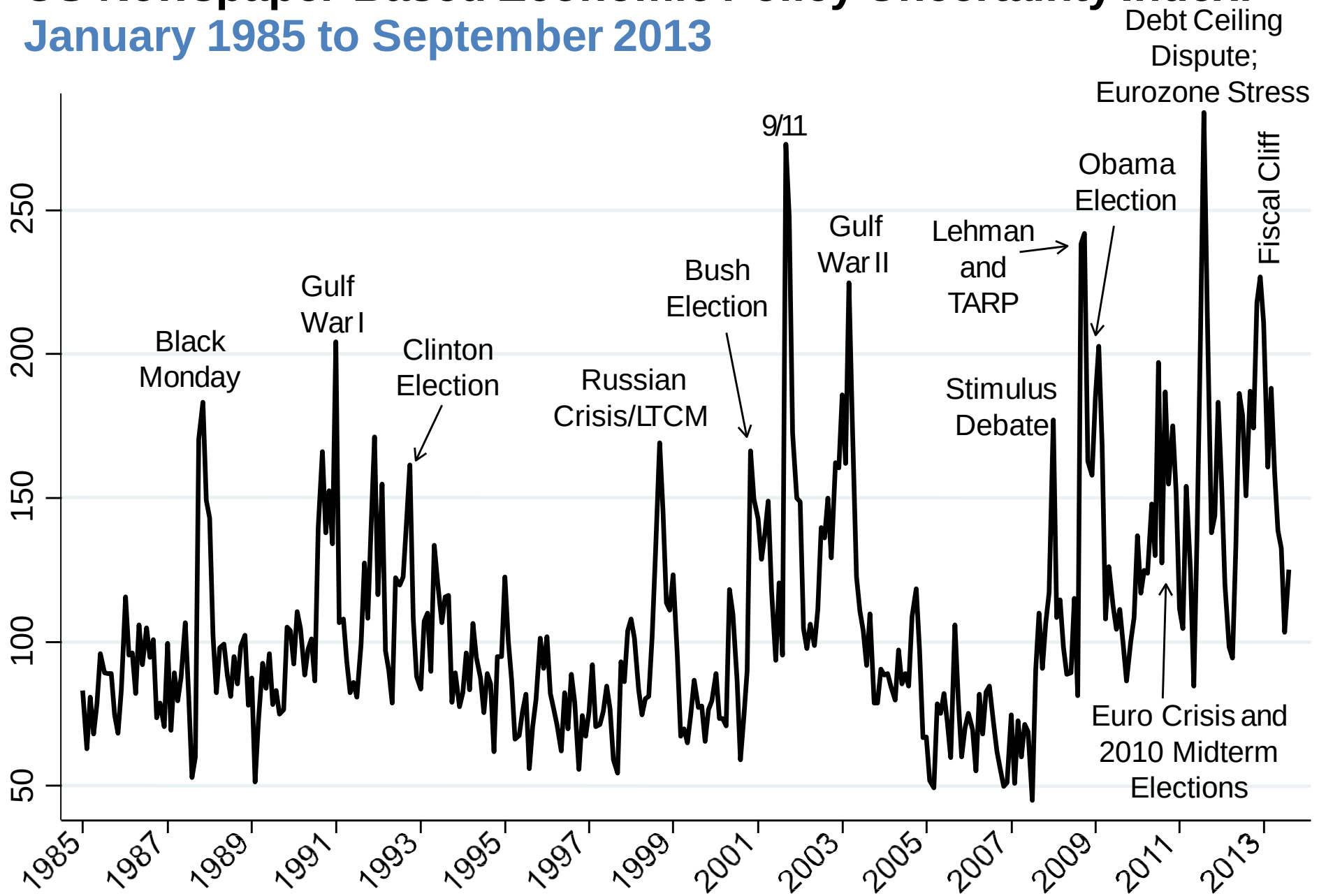
Constructing Our Newspaper-Based EPU Ind for the U.S.

<u>Newspapers:</u>

- Boston Globe
- Chicago Tribune
- Dallas Morning News
- Los Angeles Times
- Miami Herald
- New York Times
- SF Chronicle
- USA Today
- Wall Street Journal
- Washington Post

Note: We use Access World News Newsbank Service when constructing a daily EPU Index, because the daily index requires a higher density of news sources.

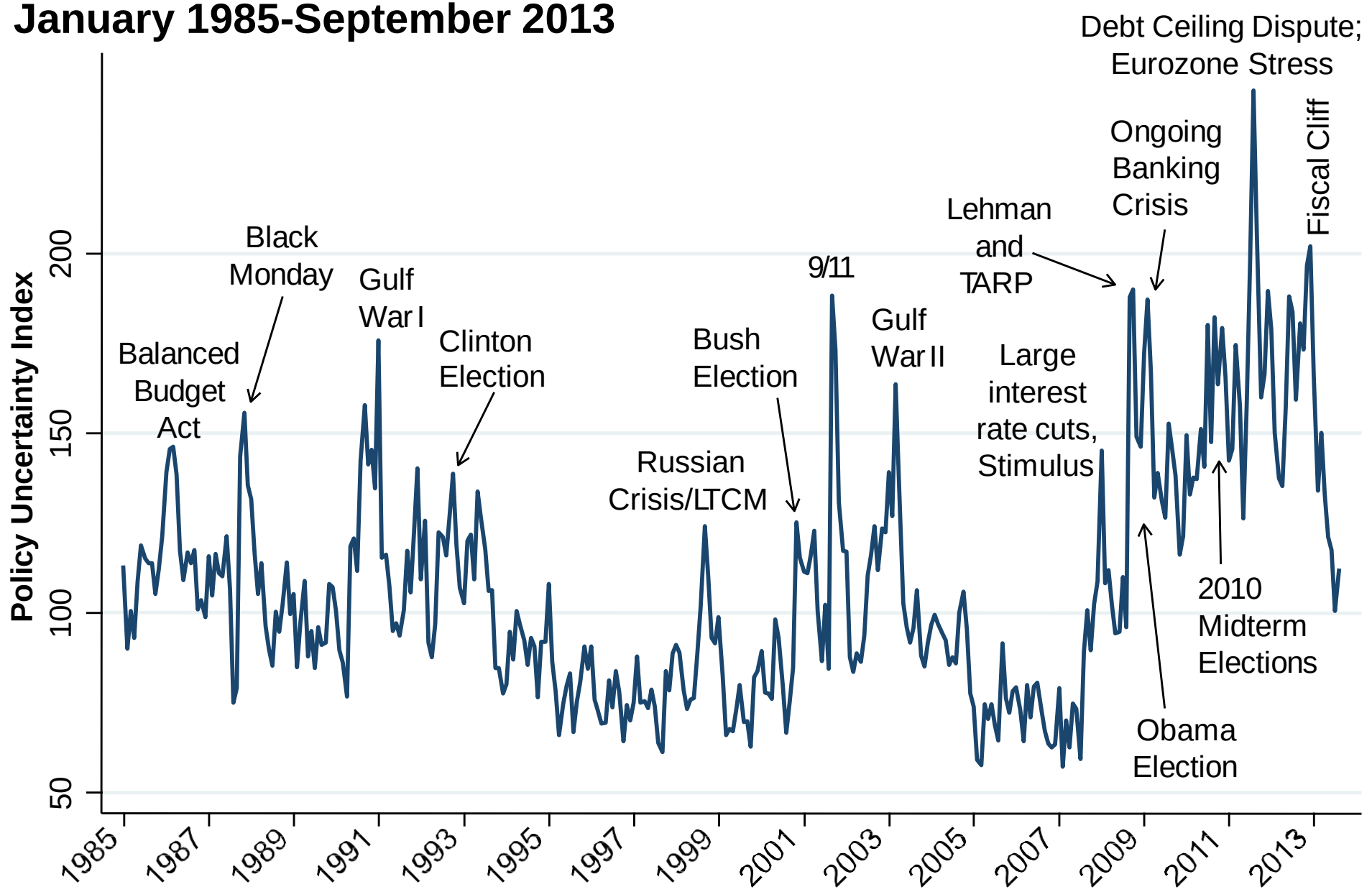
US Newspaper-Based Economic Policy Uncertainty Index:
January 1985 to September 2013



Source: "Measuring Economic Policy Uncertainty" by Scott Baker, Nicholas Bloom and Steven J. Davis, all data at www.policyuncertainty.com. Data normalized to 100 prior to 2010.

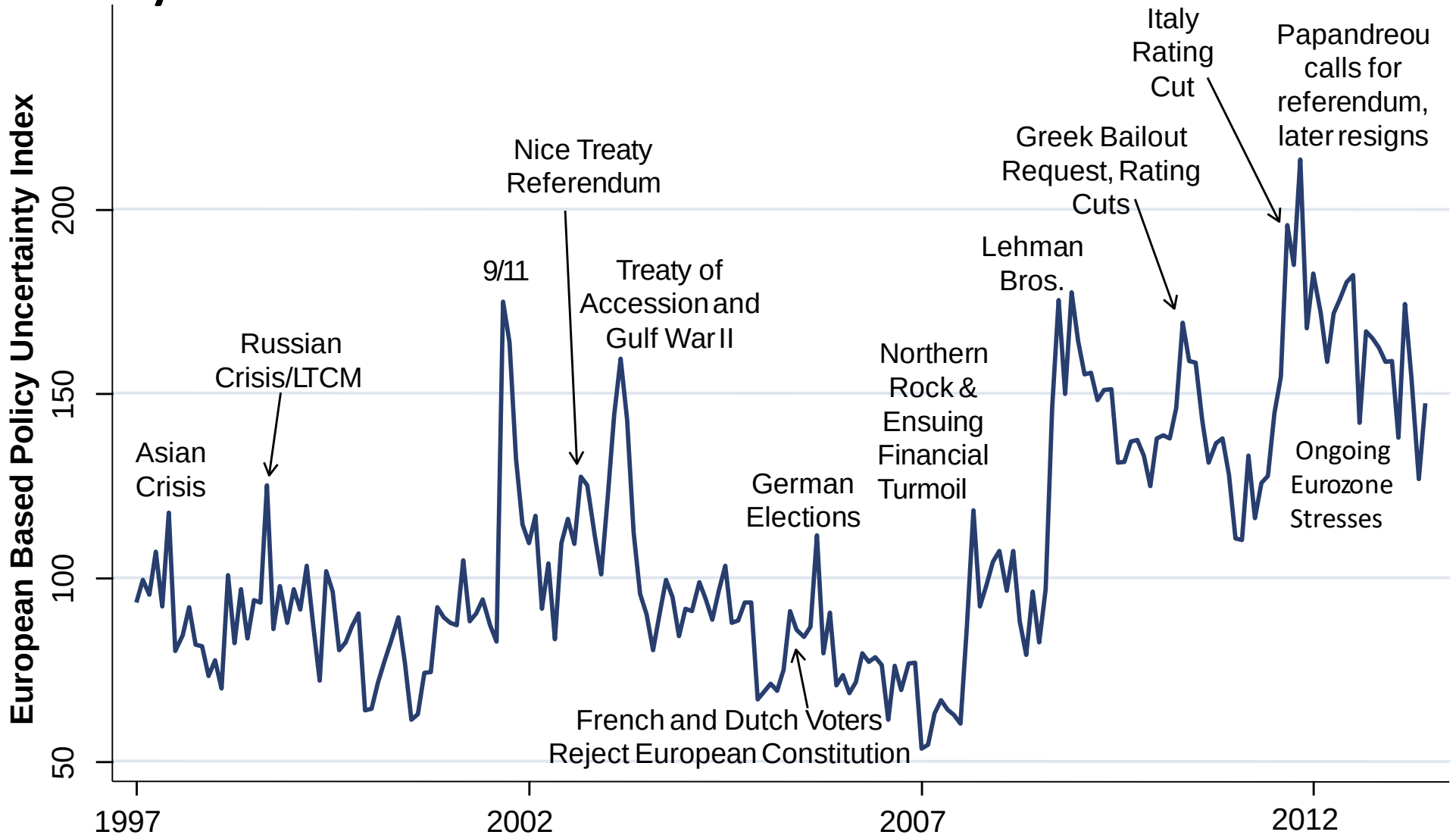
Our main index of US economic policy uncertainty

January 1985-September 2013



Source: Data at www.policyuncertainty.com. Data normalized to 100 prior to 2010.

European Economic Policy Uncertainty Index
January 1997 to June 2013



Notes: Index composed of a News-Based Index (0.5 weight), and country-level components measuring forecaster disagreement about inflation rates and federal government budget balance (each 0.25 weight). News-Based component composed of the monthly number of news articles containing uncertain or uncertainty, economic or economy, as well as policy relevant terms (scaled by the smoothed number of articles containing 'today'). Policy relevant terms include: 'policy', 'tax', 'spending', 'regulation', 'central bank', 'budget', and 'deficit'. Series is normalized to mean 100 from 1997-2010. Index covers Jan 1997 – June 2013. Papers include El Pais, El Mundo, Corriere della Sera, La Repubblica, Le Monde, Le Figaro, Financial Times, The Times, Handelsblatt, FAZ. All searches done in the native language of the paper in question.

Two Measurement Concerns

Suitability: Whether an accurate count for news articles about a particular type of uncertainty provides a good indicator for that type of uncertainty.

Accuracy: Whether specific text-string search criteria accurately identify the set of articles that discuss a certain type of uncertainty, e.g., policy-related economic uncertainty.

Assessing Suitability Concern

Idea: Apply news-based approach to a concept of uncertainty for which we have external, market-based evidence.

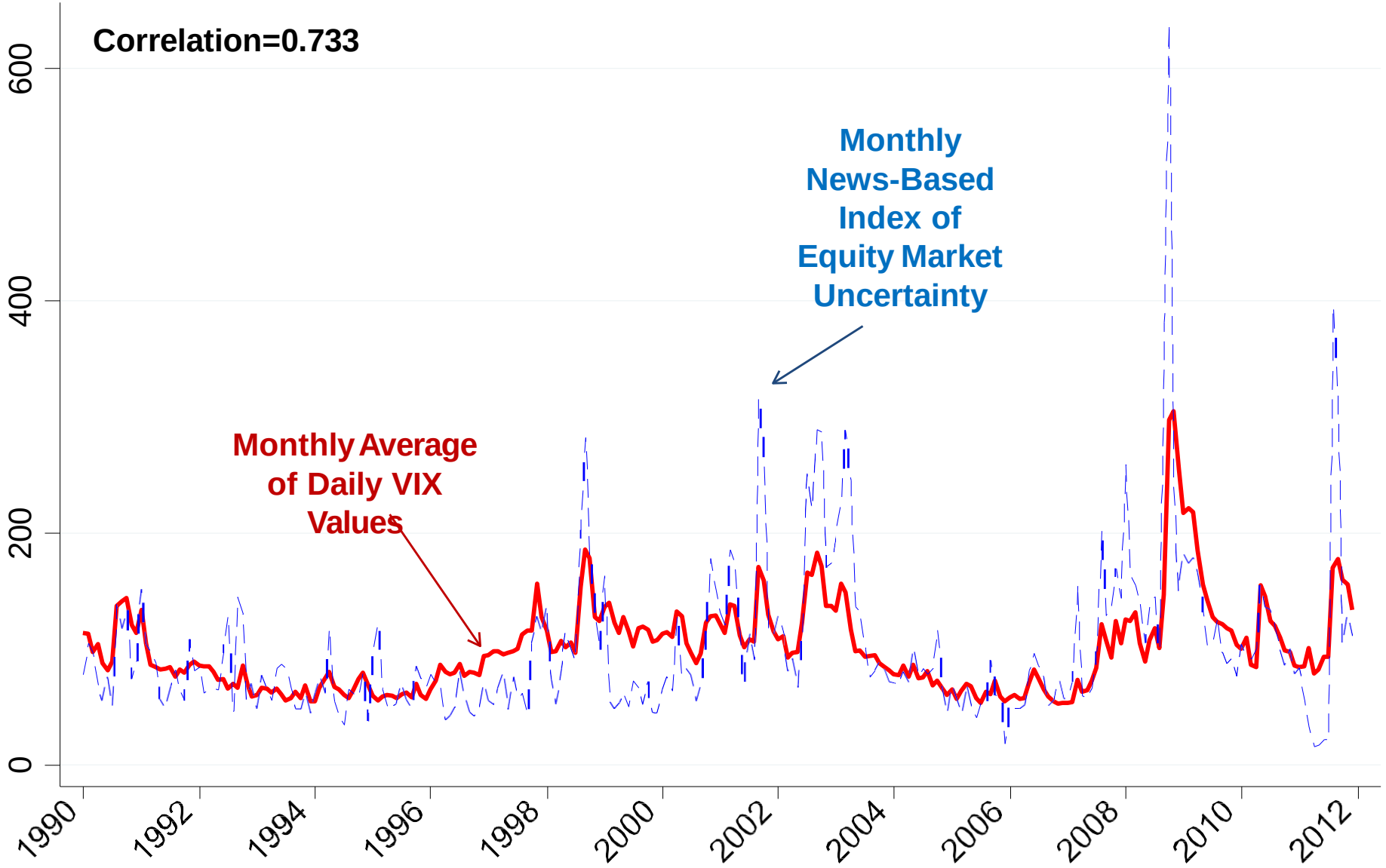
Implementation: Compare VIX measure of uncertainty about future equity returns to a news-based index of equity market uncertainty, with search terms as follows:

{economic OR economy} AND

{uncertain OR uncertainty} AND

{“stock price” OR “equity price” OR “stock market”}

Figure 7: News-based index of equity market uncertainty compared to market-based VIX, January 1990 to December 2012



Notes: The news-based index of equity market uncertainty is based on the count of articles that reference 'economy' or 'economic', and 'uncertain' or 'uncertainty" and one of 'stock price', 'equity price', or 'stock market' in 10 major U.S. newspapers, scaled by the number of articles in each month and paper. The news-based index and the VIX are normalized to a mean of 100 over sthe period.

Assessing Accuracy Concern

Working under our direction, several RA's read 4,000+ newspap articles, following a 50-page audit guide to code articles: "econo uncertainty"=0/1, "economic policy uncertainty"=0/1, and more ..

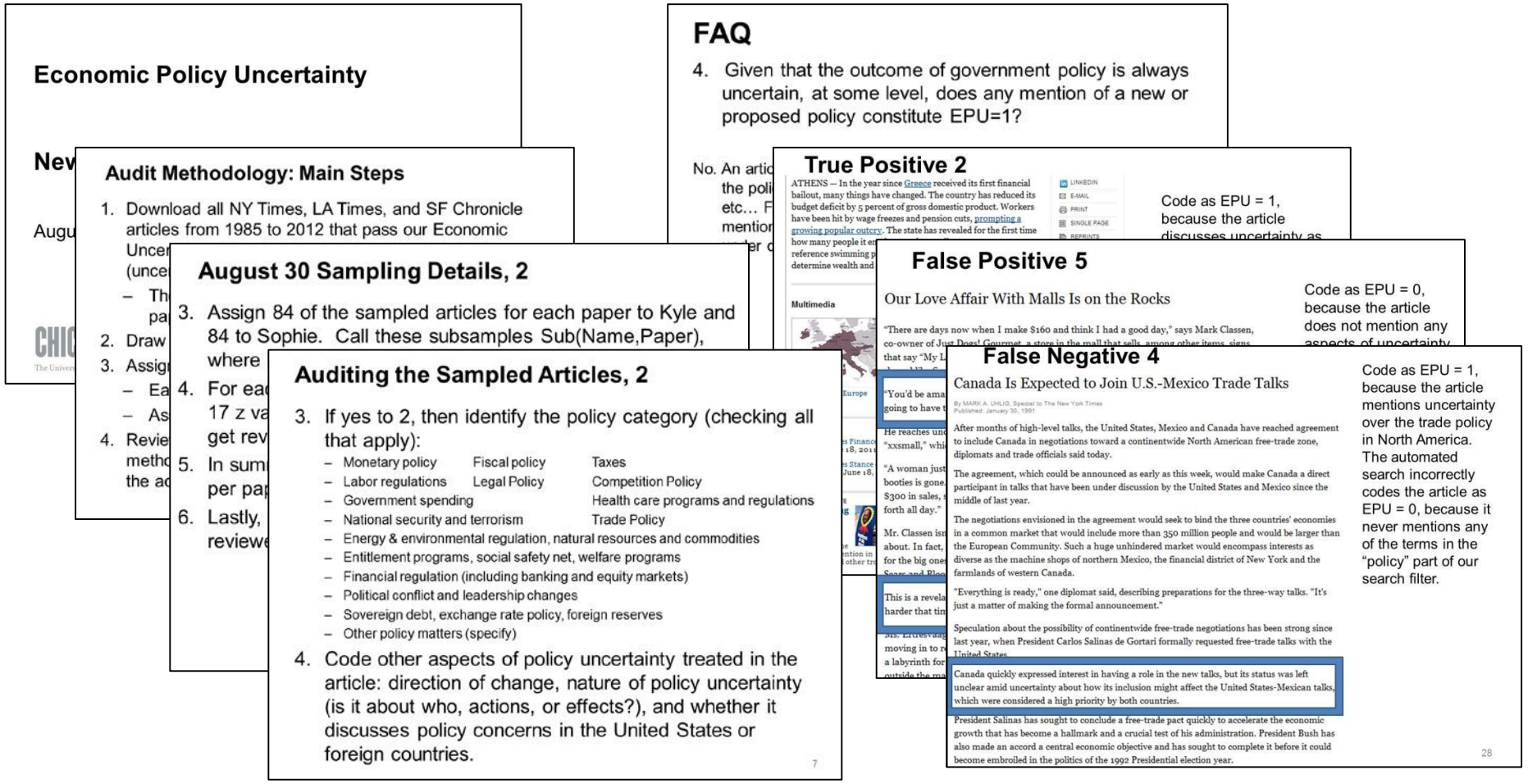
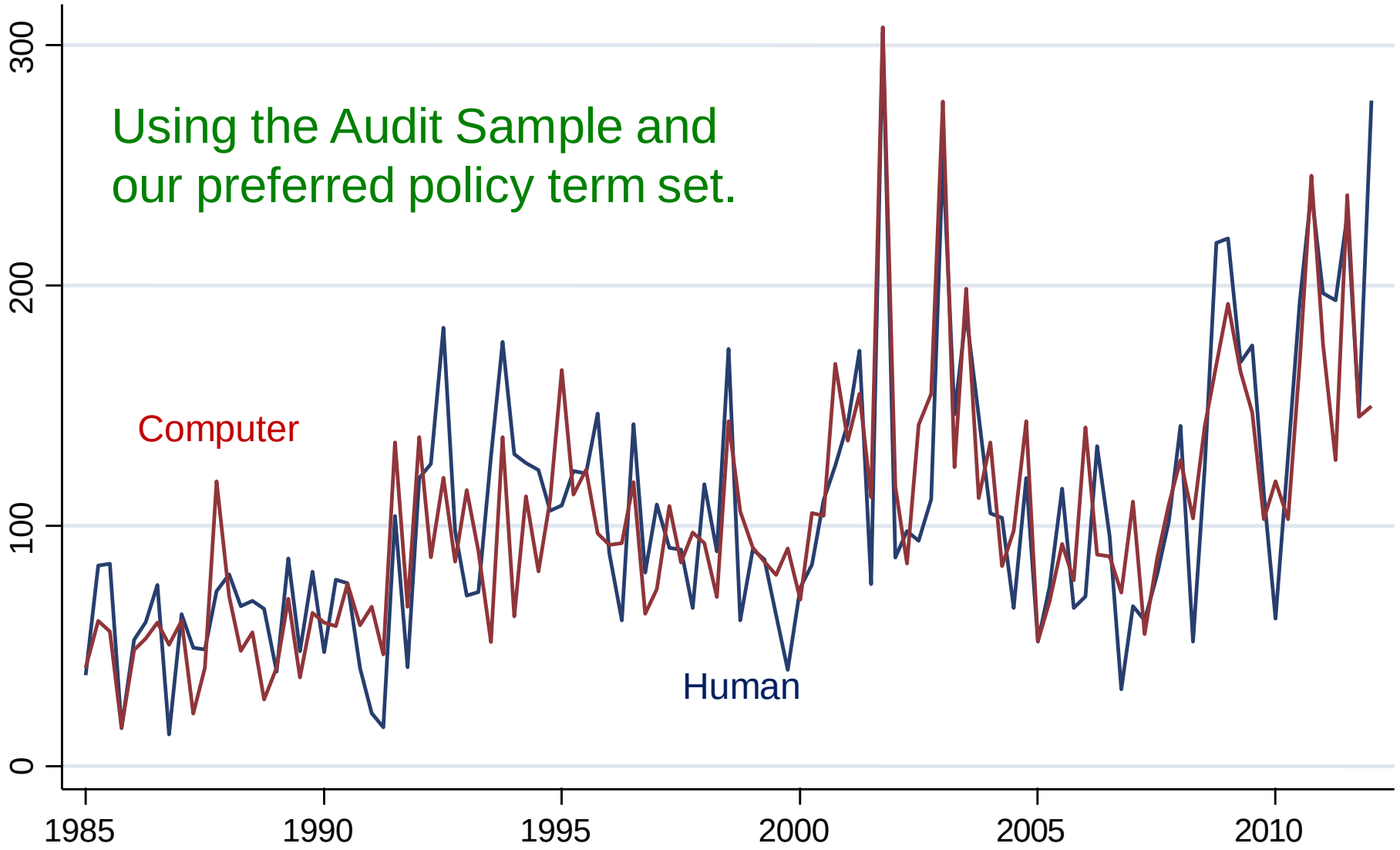


Figure 8: Human Readings and Automated Computer Methods Yield Similar News-Based EPU Indexes, 1985Q1 to 2012Q2



Note: Based on random samples of 45 articles per quarter (fewer prior to 1993). For these articles, we calculate quarterly EPU rates based on human readings (red line) and based on automated computer methods (blue line).

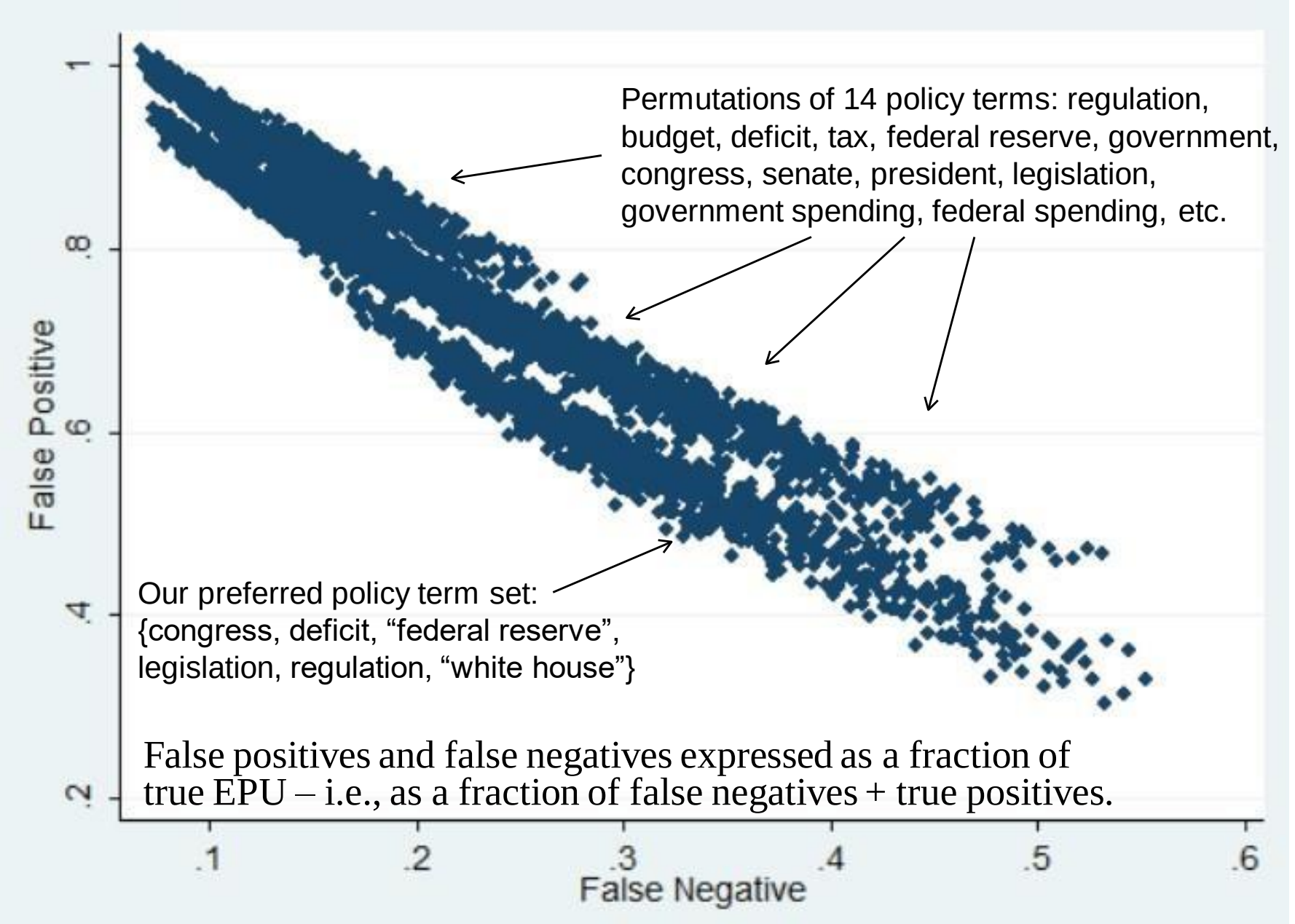
Other Audit Results

- Correlation of news-based EPU error rate and real GDP growth rate = -0.02 (quarterly data)
- Correlation of news-based EPU error rate and "true" EPU = 0.004 (quarterly data)
- Only 2% of EPU=1 articles are mainly about low or declining uncertainty.
- Among EPU=1 articles in the Audit Sample:
  - 69% discuss uncertainty about *what* or *when*
  - 40% discuss uncertainty about *effects*
  - 21% discuss uncertainty about *who* – nearly doubles in presidential election years

Selecting a Preferred Term Set

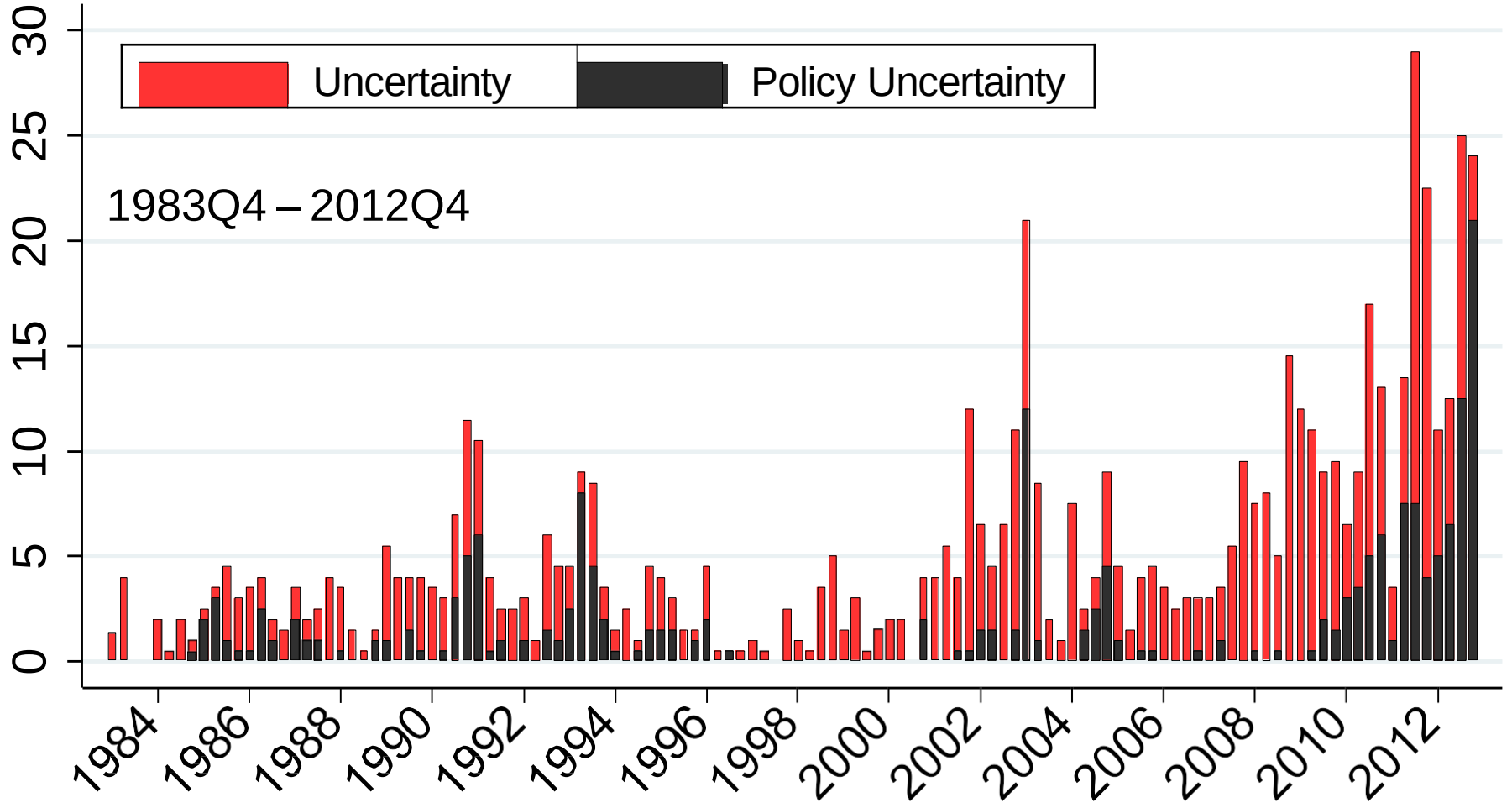
- Consider 16,000 permutations of 14 policy-relevant terms: regulation, budget, spending, policy, deficit, tax, ‘federal reserve’, ‘white house’, ‘house of representatives’, government, congress, senate, president, and legislation.
- + 14,000 combinations that replace terms like “policy” and “government” with multi-word terms like “government policy”
- Interpreting the human coding as truth, select the term set that minimizes the sum of false positive and false negative error rates

Error rates for 28,000 permutations of 14 policy terms in a human audit sample of 3,500 randomly selected articles



A Different Text Source:
The “Beige Books”
Produced for the FOMC

Figure 9: The frequency of "uncertainty" and policy-related "uncertainty" discussions in FOMC Beige Books rose sharply after 2008



Note: Plots the frequency of the word "uncertain" in each quarter of the Federal Open Market Committees' (FOMC) Beige Book. The Beige Book is an overview of economic conditions of about 15,000 words in length prepared two weeks before each FOMC meeting. The count of "Policy Uncertainty" uses a human audit to attribute each mention of the word uncertain to a policy context (e.g. uncertainty about fiscal policy) or a non-policy context (e.g. uncertainty about GDP growth). See the paper for full details.

Evidence about Sources of Policy Uncertainty

What drives recent rise in U.S. economic policy uncertainty?

SHARE OF POLICY UNCERTAINTY ARTICLES BY TOPIC, %			
	1985-2007	2008-2012	Change
Taxes	35.2	61.1	25.9
Health care	12.7	33.3	20.6
Regulation	14.9	28.4	13.6
Social Security	10.3	19.4	9.1
Government spending	15.0	23.9	8.9
Sovereign debt, currency cris	1.4	2.8	1.4
Monetary policy	29.0	27.6	-1.5
National security	25.3	19.9	-5.4

Note: Analysis uses Newsbank coverage of around 1000 US national and local newspapers
See Table 1 in the Baker, Bloom and Davis (2013) for a more detailed analysis.

What drives recent rise in U.S. economic policy uncertainty? Newspaper articles point mainly to concerns about fiscal and healthcare policies

SHARE OF POLICY UNCERTAINTY ARTICLES BY TOPIC, %

	1985-2007	2008-2012	Change
Taxes	35.2	61.1	25.9
Health care	12.7	33.3	20.6
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National security	25.3	19.9	-5.4

Note: Analysis uses Newsbank coverage of around 1000 US national and local newspapers
See Table 1 in the Baker, Bloom and Davis (2013) for a more detailed analysis.

Beige Books Tell a Similar Story …

Counts By Category and Selected Time Period, 1983Q3 to 2013Q1

	1990 Q4 - 1991 Q1 Gulf War I	1993 Q2 - 1993 Q3 Clinton Tax Reforms	2001 Q4 - 2002 Q2 9/11 Attacks	2002 Q4 - 2003 Q2 Gulf War II	2004 Q2 - 2004 Q4 Bush/Kerry Election	2008 Q3 - 2009 Q4 Lehman's and recession	2010 Q1 - 2013 Q1 Debt-ceiling crisis	1983 Q3 – 2013 Q1 Overall Average
Overall Economic Uncertainty	11	8.8	7.7	13.5	5.2	10.2	15.8	5.5
Economic Policy Uncertainty	5.5	6.3	1.2	4.8	2.8	0.8	6.8	1.7
All Fiscal Matters	1	5.5	1.5	0	0	0.4	3.3	1.0
Taxes Only	0	3.3	0.2	0	0	0.3	1.4	0.4
Spending Only	0.5	1	1	0	0	0.2	1.2	0.3
Monetary Policy	0	0	0	0	0	0	0	0
Health Care	0	2	0	0	0	0.2	0.5	0.1
National Security and War	5.3	0.3	0	2	0	0	0.1	0.2
Financial Regulation	0	0	0	0	0	0.2	1.2	0.2
Sovereign debt, currency crisis	0	0	0	0	0	0	0.8	0.1
U.S. Elections and Leadership Changes	0	0	0	0.2	2.2	0	0.9	0.2
Other Specified Policy Matters	0	0.5	0.7	0	0.2	0	0.5	0.2
Politics, Unspecified	0.5	1	0	3	0.7	0	1.6	0.3
Sum of Policy & Politics Categories	6.8	9.3	2.2	5.2	3.0	0.8	10.0	2.5

… But also Highlight Concerns Related to Financial Regula
Sovereign Debt, and Politics

	1990 Q4 - 1991 Q1 Gulf War I	1993 Q2 - 1993 Q3 Clinton Tax Reforms	2001 Q4 - 2002 Q2 9/11 Attacks	2002 Q4 - 2003 Q2 Gulf War II	2004 Q2 - 2004 Q4 Bush/Kerry Election	2008 Q3 - 2009 Q4 Lehman's and recession	2010 Q1 - 2013 Q1 Debt-ceiling crisis	1983 Q3 – 2013 Q1 Overall Average
Overall Economic Uncertainty	11	8.8	7.7	13.5	5.2	10.2	15.8	5.5
Economic Policy Uncertainty	5.5	6.3	1.2	4.8	2.8	0.8	6.8	1.7
All Fiscal Matters	1	5.5	1.5	0	0	0.4	3.3	1.0
Taxes Only	0	3.3	0.2	0	0	0.3	1.4	0.4
Spending Only	0.5	1	1	0	0	0.2	1.2	0.3
Monetary Policy	0	0	0	0	0	0	0	0
Health Care	0	2	0	0	0	0.2	0.5	0.1
National Security and War	5.3	0.3	0	2	0	0	0.1	0.2
Financial Regulation	0	0	0	0	0	0.2	1.2	0.2
Sovereign debt, currency crisis	0	0	0	0	0	0	0.8	0.1
U.S. Elections and Leadership Changes	0	0	0	0.2	2.2	0	0.9	0.2
Other Specified Policy Matters	0	0.5	0.7	0	0.2	0	0.5	0.2
Politics, Unspecified	0.5	1	0	3	0.7	0	1.6	0.3
Sum of Policy & Politics Categories	6.8	9.3	2.2	5.2	3.0	0.8	10.0	2.5

And NEVER Breathe a Word about about Monetary Policy Uncertainty!

	1990 Q4 - 1991 Q1 Gulf War I	1993 Q2 - 1993 Q3 Clinton Tax Reforms	2001 Q4 - 2002 Q2 9/11 Attacks	2002 Q4 - 2003 Q2 Gulf War II	2004 Q2 - 2004 Q4 Bush/Kerry Election	2008 Q3 - 2009 Q4 Lehman's and recession	2010 Q1 - 2013 Q1 Debt-ceiling crisis	1983 Q3 – 2013 Q1 Overall Average
Overall Economic Uncertainty	11	8.8	7.7	13.5	5.2	10.2	15.8	5.5
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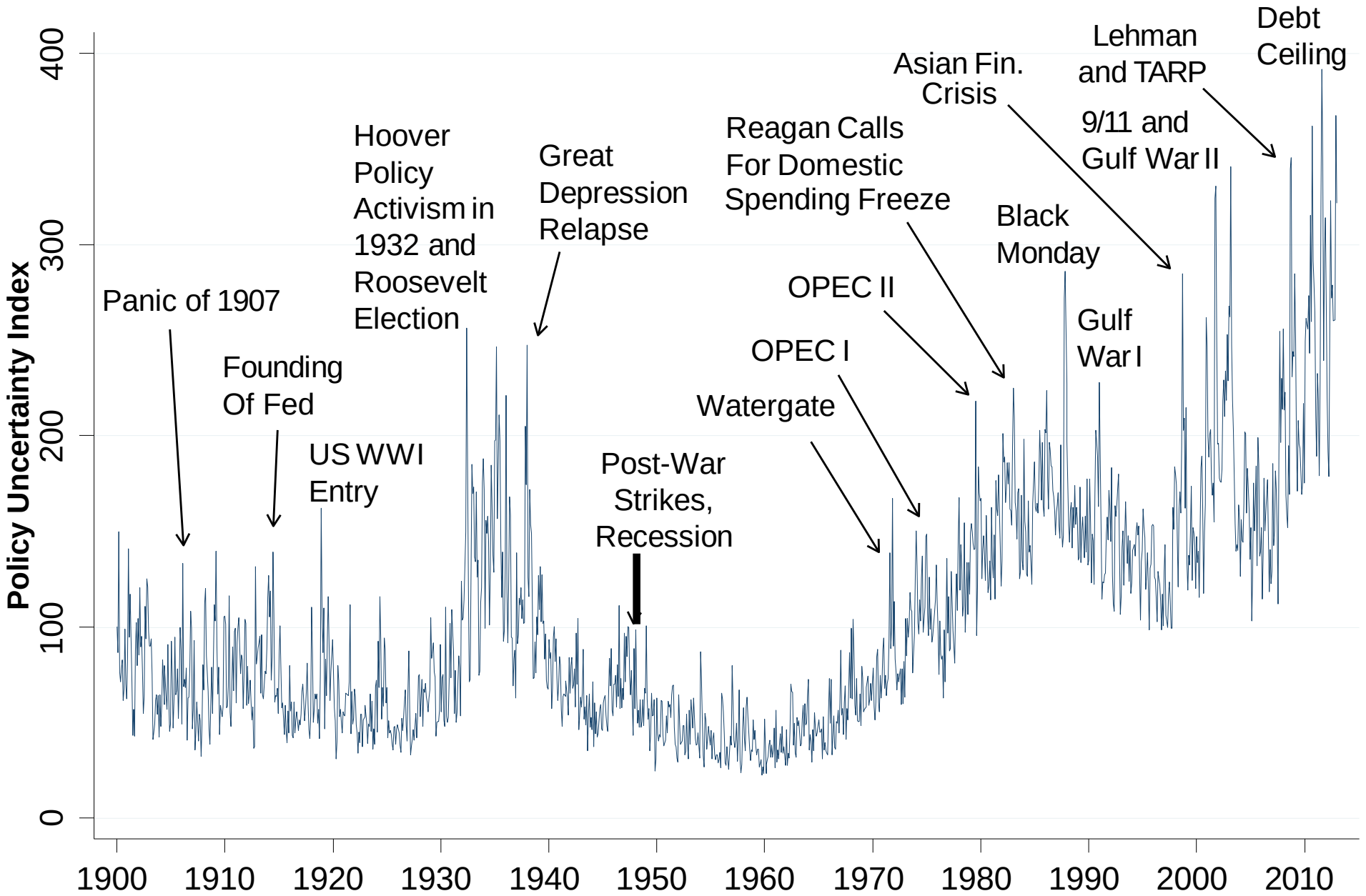
All Fiscal Matters	1	5.5	1.5	0	0	0.4	3.3	1.0
Taxes Only	0	3.3	0.2	0	0	0.3	1.4	0.4
Spending Only	0.5	1	1	0	0	0.2	1.2	0.3
Monetary Policy	0	0	0	0	0	0	0	0
Health Care	0	2	0	0	0	0.2	0.5	0.1
National Security and War	5.3	0.3	0	2	0	0	0.1	0.2
Financial Regulation	0	0	0	0	0	0.2	1.2	0.2
Sovereign debt, currency crisis	0	0	0	0	0	0	0.8	0.1
U.S. Elections and Leadership Changes	0	0	0	0.2	2.2	0	0.9	0.2
Other Specified Policy Matters	0	0.5	0.7	0	0.2	0	0.5	0.2
Politics, Unspecified	0.5	1	0	3	0.7	0	1.6	0.3
Sum of Policy & Politics Categories	6.8	9.3	2.2	5.2	3.0	0.8	10.0	2.5

U.S. Economic Policy Uncertainty: A Longer Term Perspective

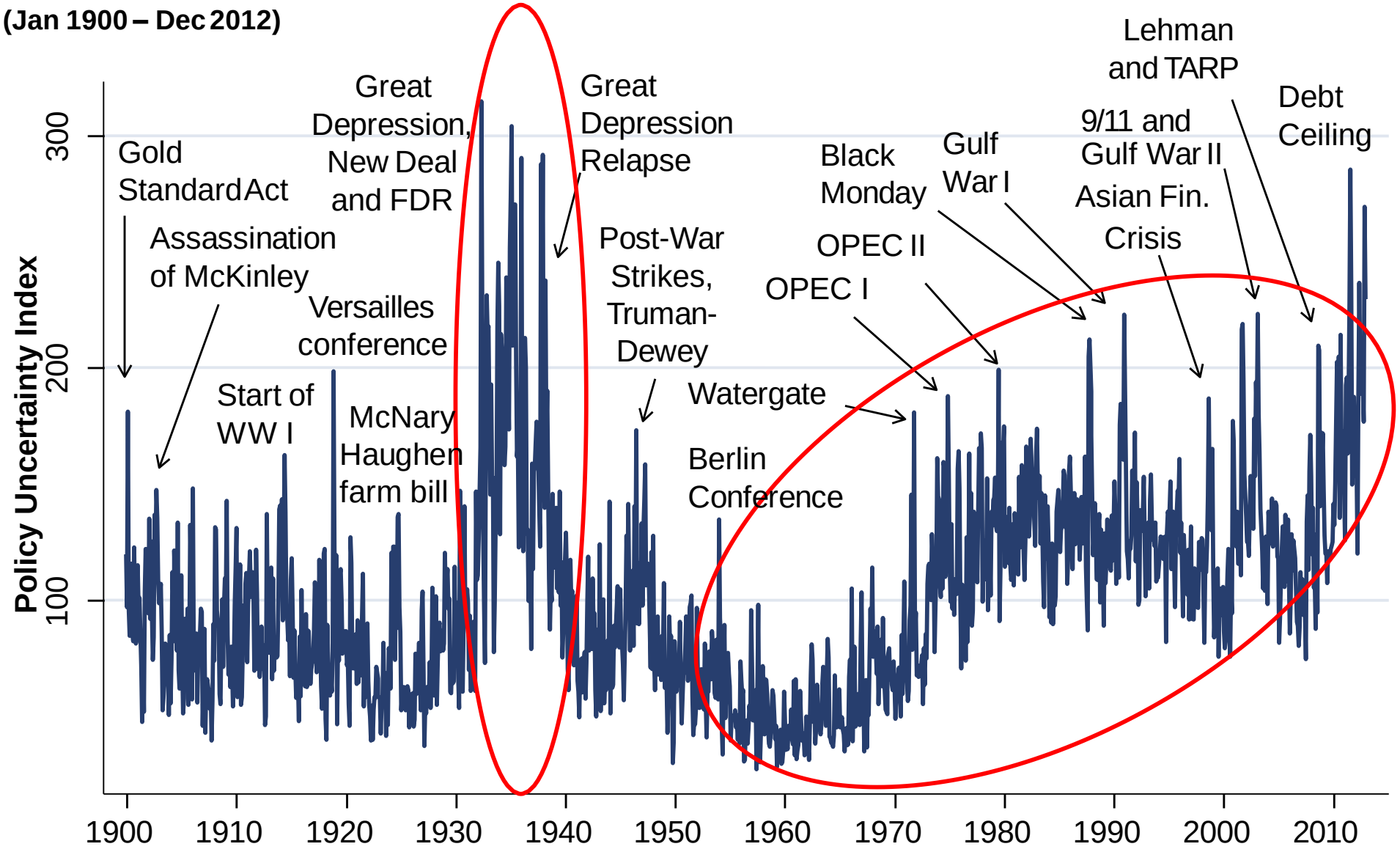
Figure 14: The policy uncertainty news index extended back to 1900



Notes: Index of Policy-Related Economic Uncertainty composed of quarterly news articles containing uncertain or uncertainty, economic or economy or business or commerce, and policy relevant terms (scaled by count of all articles) in 6 newspapers (WP, BG, LAT, NYT, WSJ and CHT). Data normalized to 100 from 1900-2011.

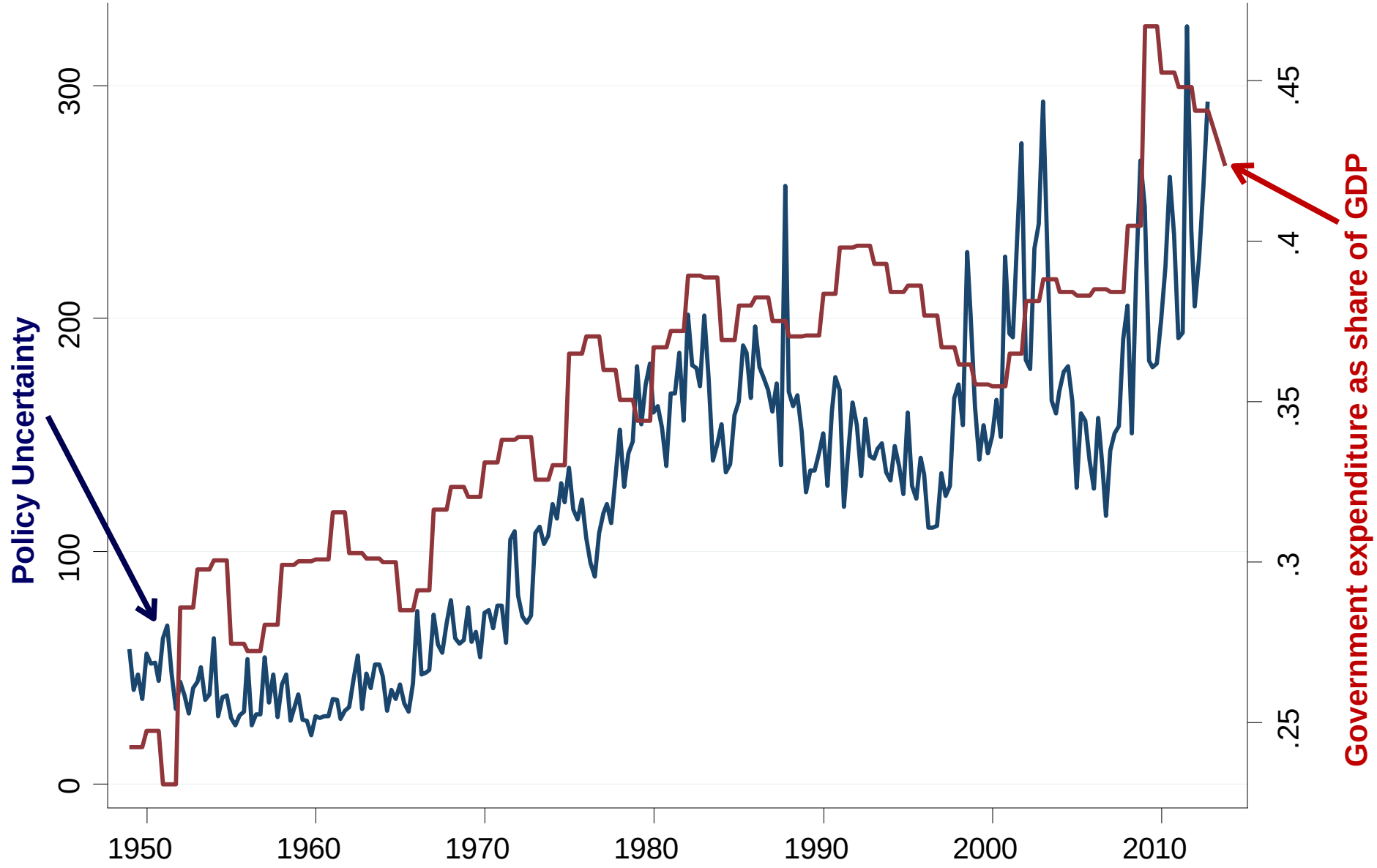
My Coauthors Prefer to Scale the Long-Span Series by # of Articles on Economic Matters, Yielding …

(Jan 1900 – Dec 2012)



Notes: Index of Policy-Related Economic Uncertainty composed of quarterly news articles containing uncertain or uncertainty, economic or economy, and policy relevant terms (scaled by the smoothed total number of articles) in 5 newspapers (WP, BG, LAT, WSJ and CHT). Data normalized to 100 from 1900-2011.

Figure 15: Policy uncertainty and government expenditure share of GDP



Notes: Index of Policy-Related Economic Uncertainty composed of quarterly news articles containing uncertain or uncertainty, economic or economy, and policy relevant terms (scaled by the smoothed total number of articles) in 6 newspapers (WP, BG, LAT, NYT, WSJ and CHT). Data normalized to 100 from Jan 1900- Dec 2011. Government expenditure is total federal, state, and local expenditures over GDP, annually.

How Could Policy Uncertainty Hold Back Economy?

Potential Mechanisms (Not an Exhaustive List)

1. More precautionary savings and deleveraging by households
2. When investment and hiring decisions are costly to reverse, greater uncertainty depresses and delays investment and hiring (Bernanke, 1983)
3. More costly debt and equity finance (Gilchrist et al., 2010, and Pastor and Veronesi, 2012, 2013)
4. Higher markups, intensifying monopoly distortions (Fernandez-Villaverde et al., 2011)
5. Managerial risk aversion (Panousi and Panikolaou, 2011)
6. Intensification of agency problems, reducing the value of new and existing employment, business and financial relationships (Narita, 2011)

Assessing the Effects of EPU: Summ of our Work

1. Micro approach: Exploit differences in exposure to government contracts to estimate the effects of EPU on firm-level investment and hiring (working through one specific channel).

1. Macro approach: Include our EPU measure in an otherwise standard VAR model of aggregate dynamics. Estimate the effects of EPU shocks on aggregate output, investment and employment.

Micro evidence: exploiting differences in exposure to government contract awards

Table 4: The Ten Highest Contract Intensities by SIC Code

SIC Code	Industry Description	Contract Intensity
376	Guided Missiles And Space Vehicles And Parts	0.767
379	Miscellaneous Transportation Equipment	0.472
800	Health services	0.438
348	Ordnance And Accessories, Except Vehicles And Guided Missiles	0.384
381	Search, Detection, Navigation, Guidance & Aeronautical Systems	0.261
871	Engineering Services	0.224
160	Heavy Construction Other Than Building Construction Contractors	0.152
372	Aircraft And Parts	0.147
162	Water, Sewer, Pipeline, & Communications & Power Line Construction	0.138
278	Blankbooks, Looseleaf Binders, And Bookbinding	0.110

Source: Federal Registry of Contracts (1999 to 2013)

Cross-Firm Effects of EPU Changes on Investment Rates and Employment Growth

Table 5: Cross-Firm Effects of Policy Uncertainty

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Investment (I_t/K_{t-1})			Investment (I_t/K_{t-1})		ΔLog(Emp)	
ΔLog(EPU)×SIC Intensity	-0.0578***	-0.064***	-0.065***		-0.056***	-0.009	-0.019**
	(0.008)	(0.008)	(0.008)		(0.012)	(0.008)	(0.009)
ΔForecast Fed Exp/GDP×SIC Intensity		2.103***	2.004***	2.394***	2.989***	1.208***	0.441
		(0.607)	(0.678)	(0.633)	(0.612)	(0.362)	(0.423)
ΔFederal Exp/GDP×SIC Intensity			2.269	1.961	1.507		3.886***
			(3.639)	(3.270)	(3.344)		(1.311)
ΔVIX×SIC Intensity				-0.034***	-0.011		
				(0.004)	(0.007)		
Periodicity	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Yearly	Yearly
Firm and Time Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	717,104	717,104	717,104	717,104	717,104	184,804	184,804
Number of Firms	22,638	22,638	22,638	22,638	22,638	21,667	21,667
Number of SIC codes	440	440	440	440	440	440	440

Notes: All columns include a full set of firm and time fixed effects (year by quarter in columns 1 to 5, and yearly in columns 6 and 7). For columns 1-5, independent variables are lagged by one quarter. Standard errors clustered at the 4-digit SIC code level.

Using annual firm-level data from 2000.

Key variable of interest is the interaction between aggregate EPU change and firm-level exposure to government contract awards.

Table 5: Cross-Firm Effects of Policy Uncertainty

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Investment (I_t/K_{t-1})			Investment (I_t/K_{t-1})		ΔLog(Emp)	
ΔLog(EPU)×SIC Intensity	-0.0578***	-0.064***	-0.065***		-0.056***	-0.009	-0.019**
	(0.008)	(0.008)	(0.008)		(0.012)	(0.008)	(0.009)
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ΔFederal Exp/GDP×SIC Intensity			2.269	1.961	1.507		3.886***
			(3.639)	(3.270)	(3.344)		(1.311)
ΔVIX×SIC Intensity				-0.034***	-0.011		
				(0.004)	(0.007)		
Periodicity	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Yearly	Yearly
Firm and Time Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	717,104	717,104	717,104	717,104	717,104	184,804	184,804
Number of Firms	22,638	22,638	22,638	22,638	22,638	21,667	21,667
Number of SIC codes	440	440	440	440	440	440	440

Notes: All columns include a full set of firm and time fixed effects (year by quarter in columns 1 to 5, and yearly in columns 6 and 7). For columns 1-5, independent variables are lagged by one quarter. Standard errors clustered at the 4-digit SIC code level.

Firm-level exposure measures are time invariant. We calculate exposure as weighted SIC-level government contract intensity, with weights given by firm's own industry distribution of sales.

Controls include interactions of firm-level exposure with current change and forecasted future change in government purchases.

Table 5: Cross-Firm Effects of Policy Uncertainty

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent Variable	Investment (I_t/K_{t-1})			Investment (I_t/K_{t-1})		ΔLog(Emp)	
ΔLog(EPU)×SIC Intensity	-0.0578***	-0.064***	-0.065***		-0.056***	-0.009	-0.019**
	(0.008)	(0.008)	(0.008)		(0.012)	(0.008)	(0.009)
ΔForecast Fed Exp/GDP×SIC Intensity		2.103***	2.004***	2.394***	2.989***	1.208***	0.441
		(0.607)	(0.678)	(0.633)	(0.612)	(0.362)	(0.423)
ΔFederal Exp/GDP×SIC Intensity			2.269	1.961	1.507		3.886***
			(3.639)	(3.270)	(3.344)		(1.311)
ΔVIX×SIC Intensity				-0.034***	-0.011		
				(0.004)	(0.007)		
Periodicity	Quarterly	Quarterly	Quarterly	Quarterly	Quarterly	Yearly	Yearly
Firm and Time Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	717,104	717,104	717,104	717,104	717,104	184,804	184,804
Number of Firms	22,638	22,638	22,638	22,638	22,638	21,667	21,667
Number of SIC codes	440	440	440	440	440	440	440

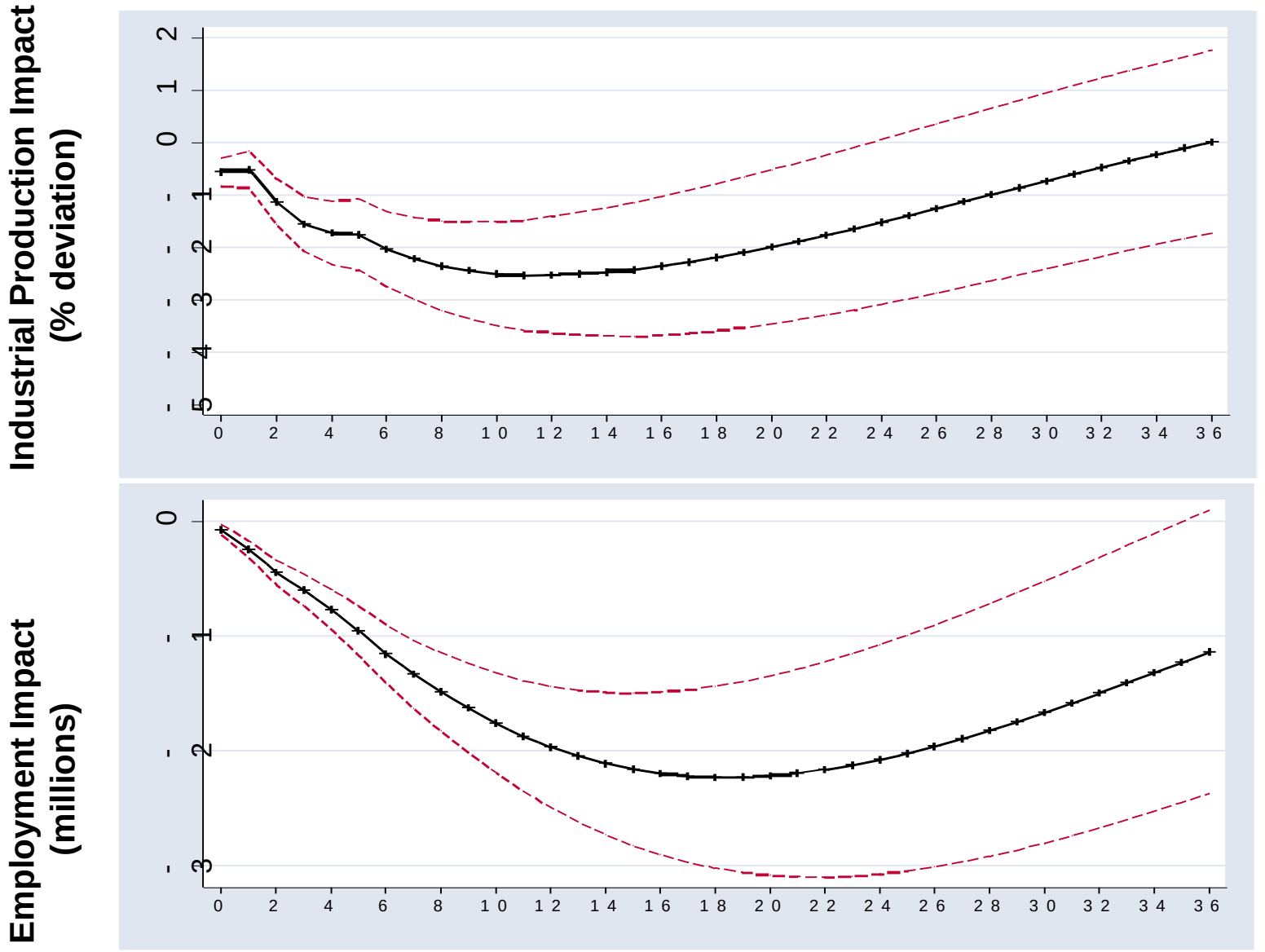
Notes: All columns include a full set of firm and time fixed effects (year by quarter in columns 1 to 5, and yearly in columns 6 and 7). For columns 1-5, independent variables are lagged by one quarter. Standard errors clustered at the 4-digit SIC code level.

And interaction with change in VIX, plus firm and time fixed effects.

Magnitude of Firm-Level Effects

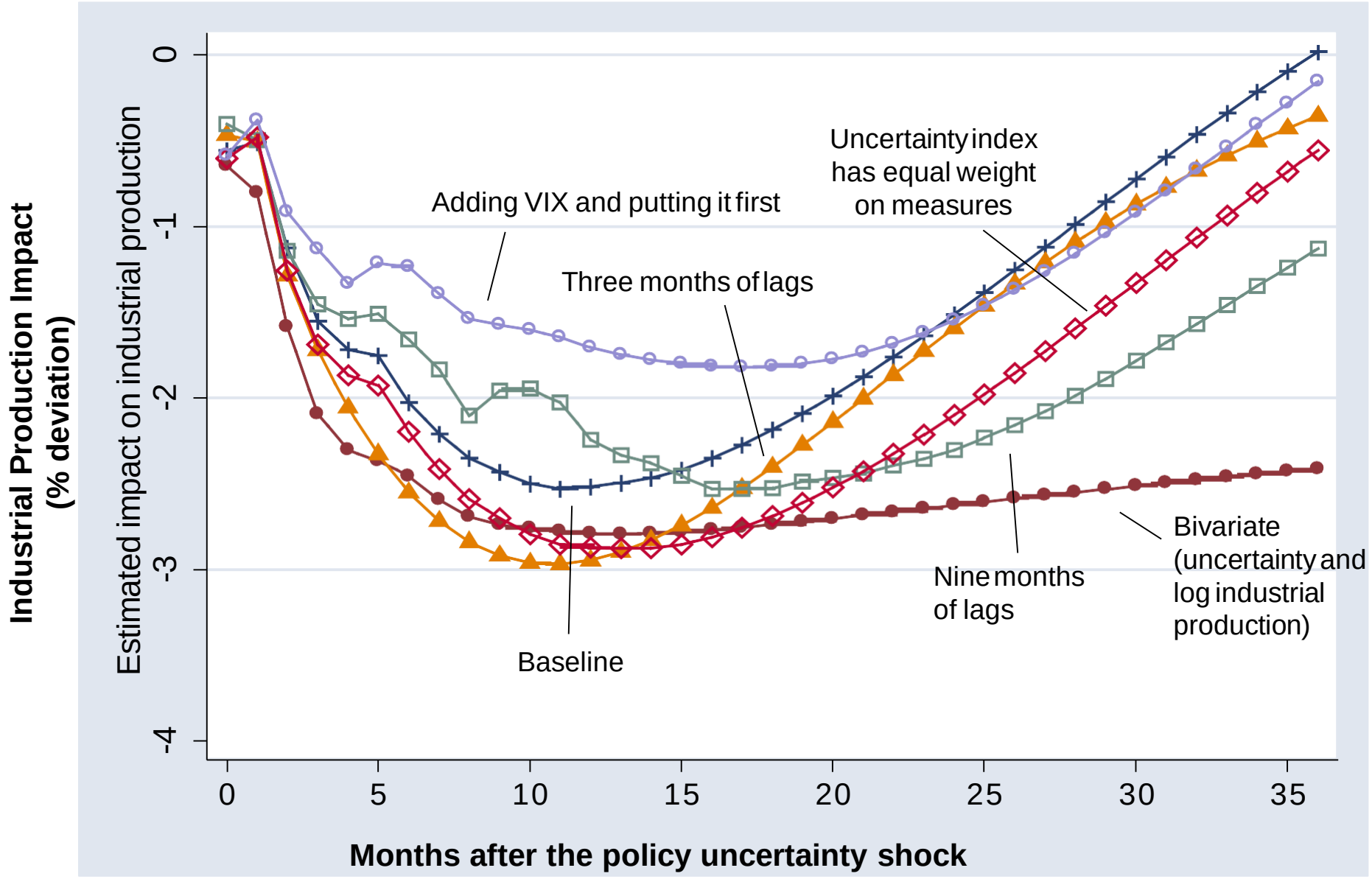
- For a firm with average investment rate and average contract exposure, doubling EPU results in estimated investment fall of only 0.08 percentage points (~1.2% fall).
- For firms in the 90th percentile of exposure rates, the impact is much larger, with predicted investment drops of 0.8-5.0 percentage points, depending on specification and baseline investment.

Figure 12: Estimated Industrial Production and Employment after a Policy Uncertainty Shock



Notes: This shows the impulse response function for Industrial Production and employment to an 102 unit increase in the policy-related uncertainty index, the increase from 2006 (the year before the current crisis) to 2011. The central (black) solid line is the mean estimate while the dashed (red) outer lines are the one-standard-error bands. Estimated using a monthly Cholesky Vector Auto Regression (VAR) on the EPU index, log(S&P 500 index), federal reserve funds rate, log employment, log industrial production and linear time trend. Fit to data from 1985 to 2011.

Figure 13: Robustness of Estimates to Different VAR Specifications



Notes: This shows the impulse response function for GDP and employment to an 102 unit increase in the policy-related uncertainty index. Estimated using a monthly Cholesky Vector Auto Regression (VAR) of the uncertainty index, log(S&P 500 index), federal reserve funds rate, log employment, log industrial production and time trend unless otherwise specified. Data from 1985 to 2011.

Assessing the Effects of EPU: Select Other Work

1. Geography of Great Recession: Shoag and Veuger (2013) find larger unemployment rate rises from 2006 to 2009 in states with (a) greater increases in state-level uncertainty and (b) institutions less well suited for mediating the effects of a general rise in uncertainty.
2. International Spillovers: The IMF's World Economic Outlook (2013) finds that increases in U.S. and European EPU reduce growth in other regions of the world, with bigger spillover effects from U.S. EPU.
3. Firm-Level Studies: Julian and Yook (2010) and Gulen and Ion (2013) find that political and policy uncertainty retard business investment. Durnev (2010) finds a lower sensitivity of investment to stock prices in election years.

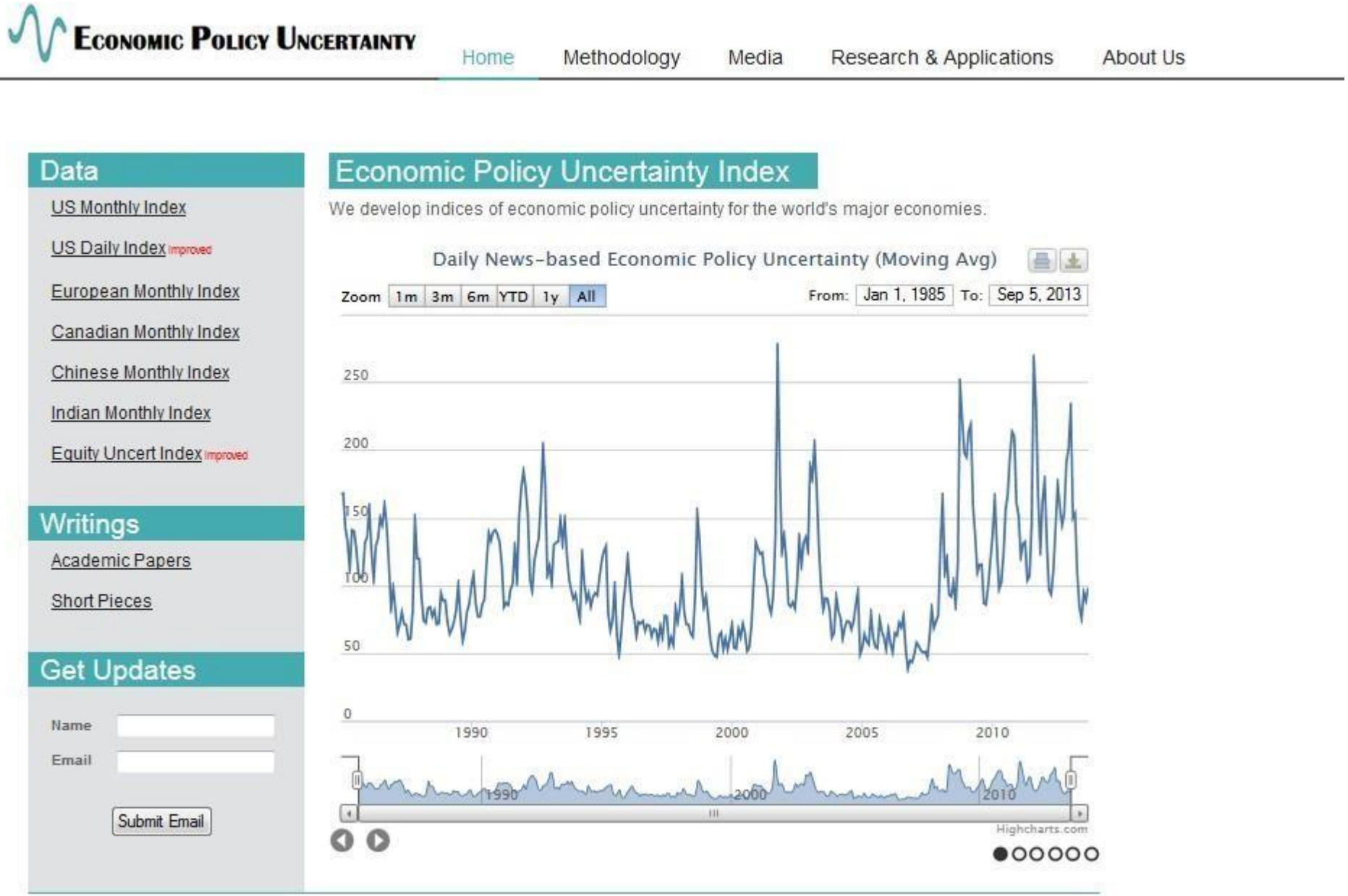
Summary

- **Factual Claim:** U.S. EPU levels are at historically high levels from 2008-2012.
- **Methodology:** New methods to construct, evaluate and refine measures of economic uncertainty based on frequency counts of newspaper articles.
- **Data Products:** New monthly indices of EPU for U.S., China, Germany, Japan, Spain, France, Italy, U.K., India, and Canada. A new daily EPU index for the United States

Summary

- **Evidence of EPU Effects:**
  - Firm-level regressions: high levels of EPU reduce investment rates and employment growth at firms with high exposure to government contract awards.
  - Simple VAR models: increases in EPU foreshadow declines in output, investment and employment.
- **Correlates of Rising EPU:** Secular growth in U.S. EPU tracks the expansion of government spending relative to GDP.

More on Economic Policy Uncertainty



Data available at: www.policyuncertainty.com

U.S. Daily EPU Index

Source: www.PolicyUncertainty.com

End of Slides for Prepared Remarks

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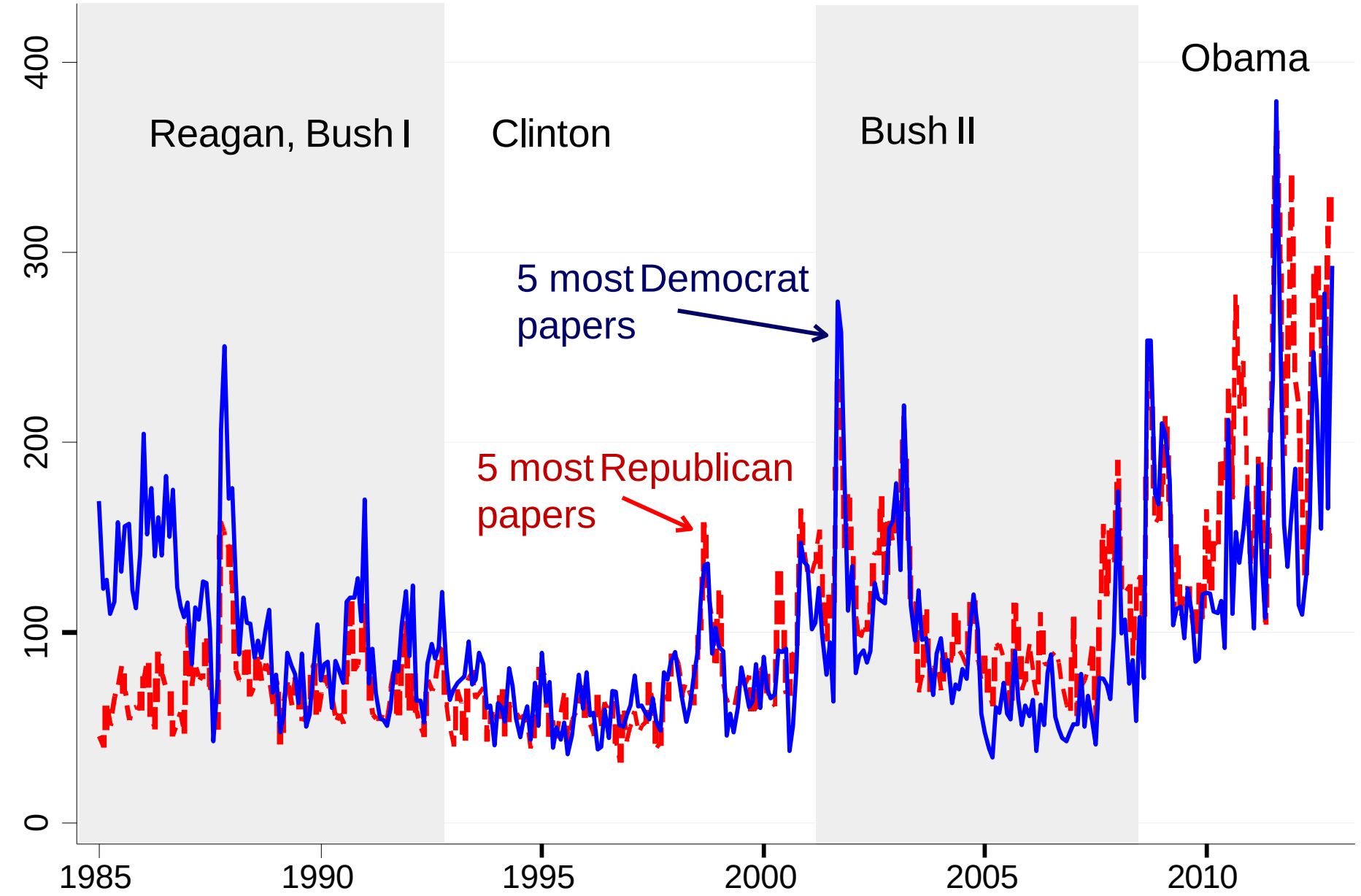
Why Measure Policy Uncertainty?

We need sensible measures to:

- Evaluate claim that policy uncertainty is at historically high levels
- Assess the effects of policy uncertainty on economic performance
- Test theories and quantify mechanisms that relate policy uncertainty to performance
- Understand what drives policy uncertainty

Political Slant in Newspaper Coverage of Economic Policy Uncertainty

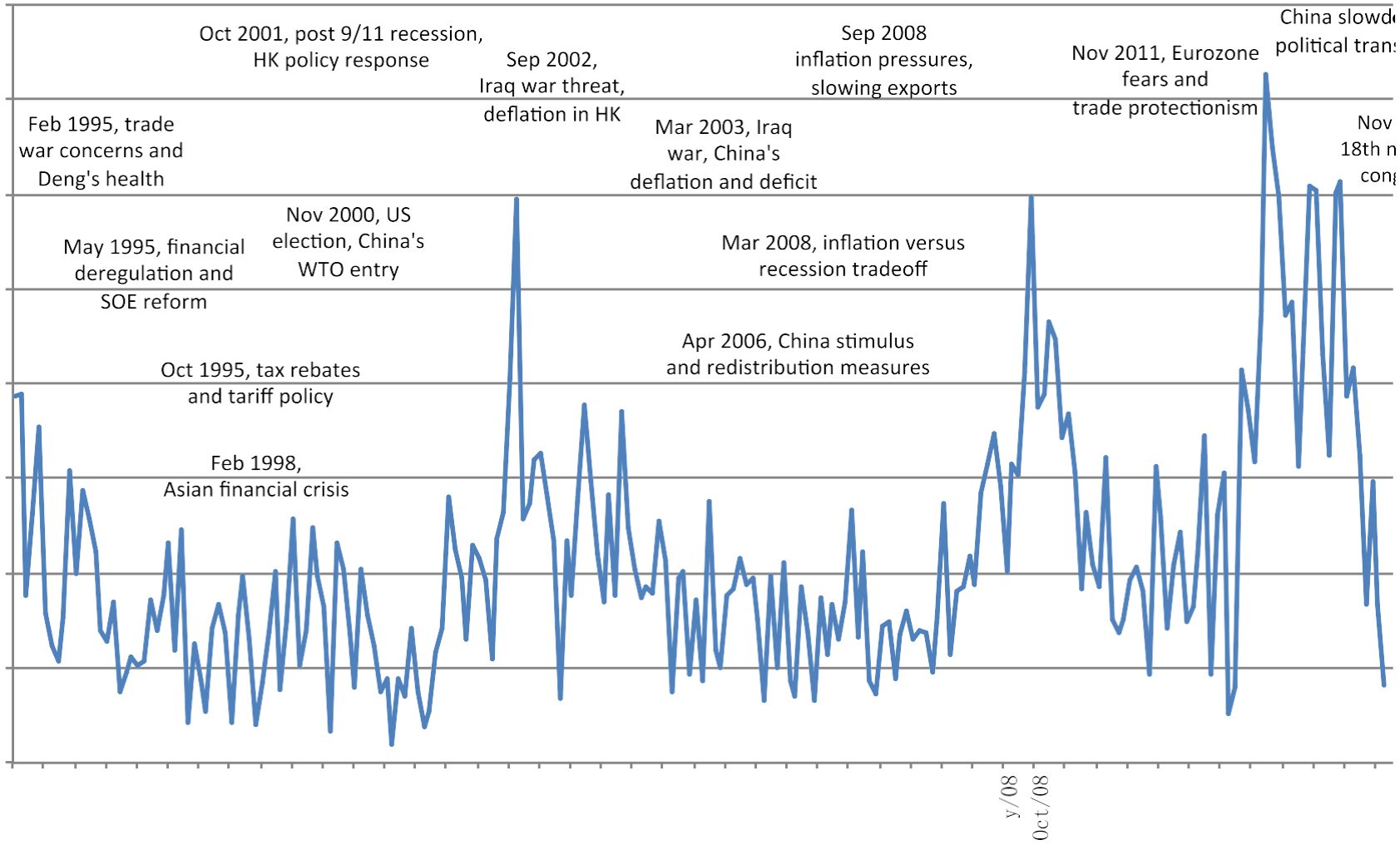
Figure 9: Political slant plays little role in time-series behavior of news-based EPU index



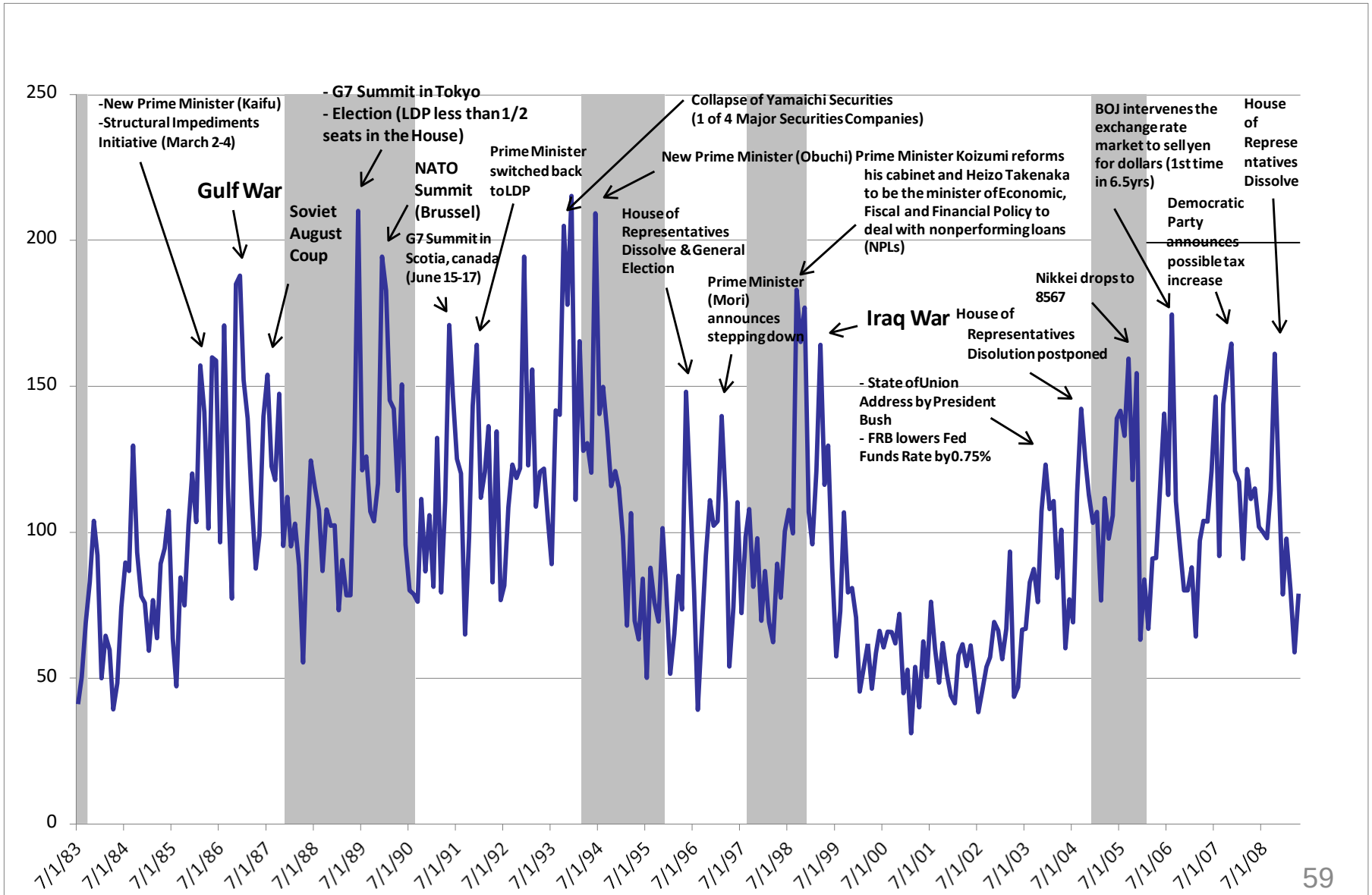
Source: Papers sorted into 5 most 'Republican' and 5 most 'Democratic' groups using the media slant measure from Gentzkow and Shapiro (2010).

Economic Policy Uncertainty Indexes for Other Countries

China EPU Index, Jan1995-Jun2013, Based o South China Morning Post

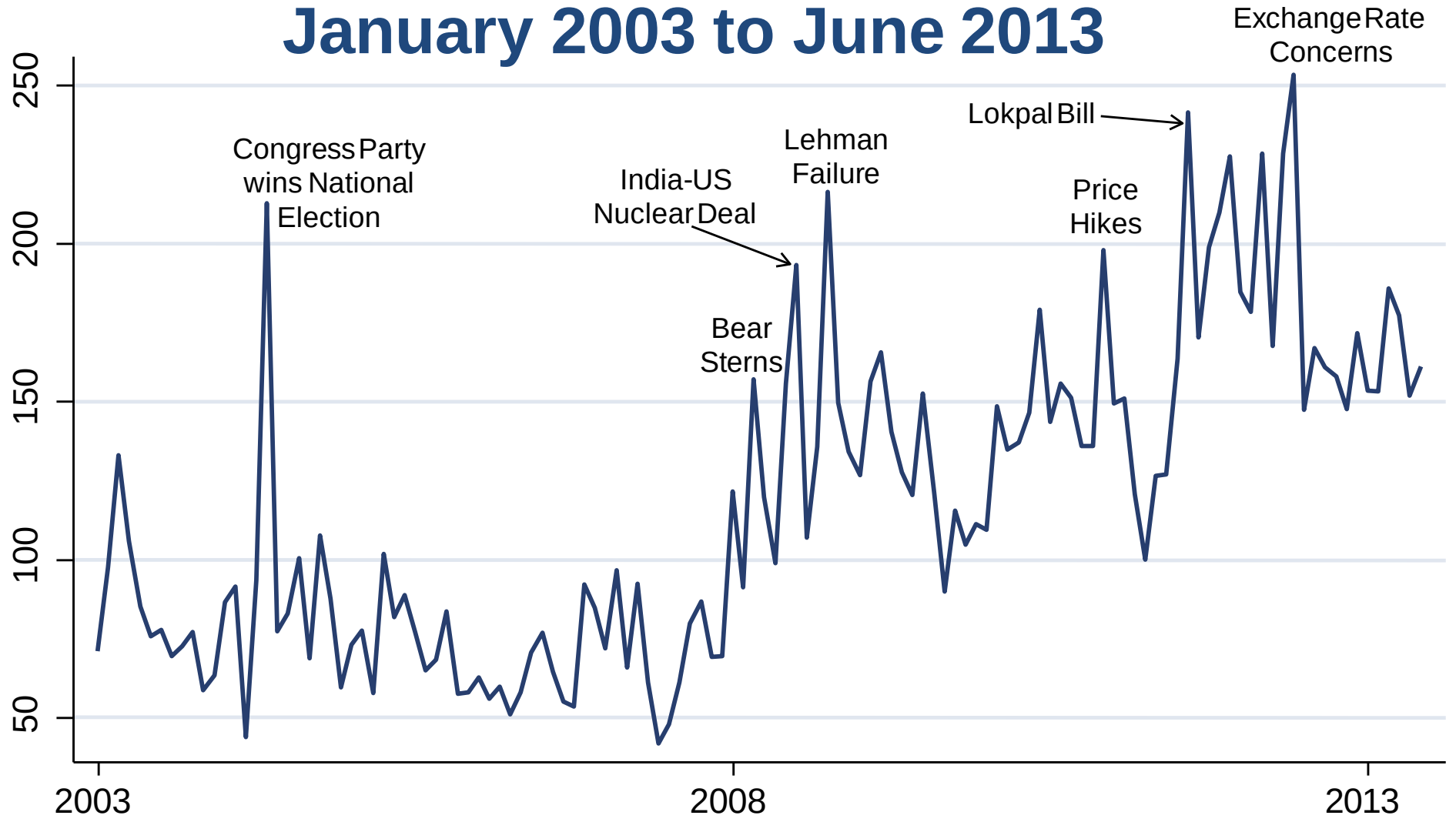


Japan EPU Index, Sep. 1983 to June 2013, B on Yomiuri and Asahi



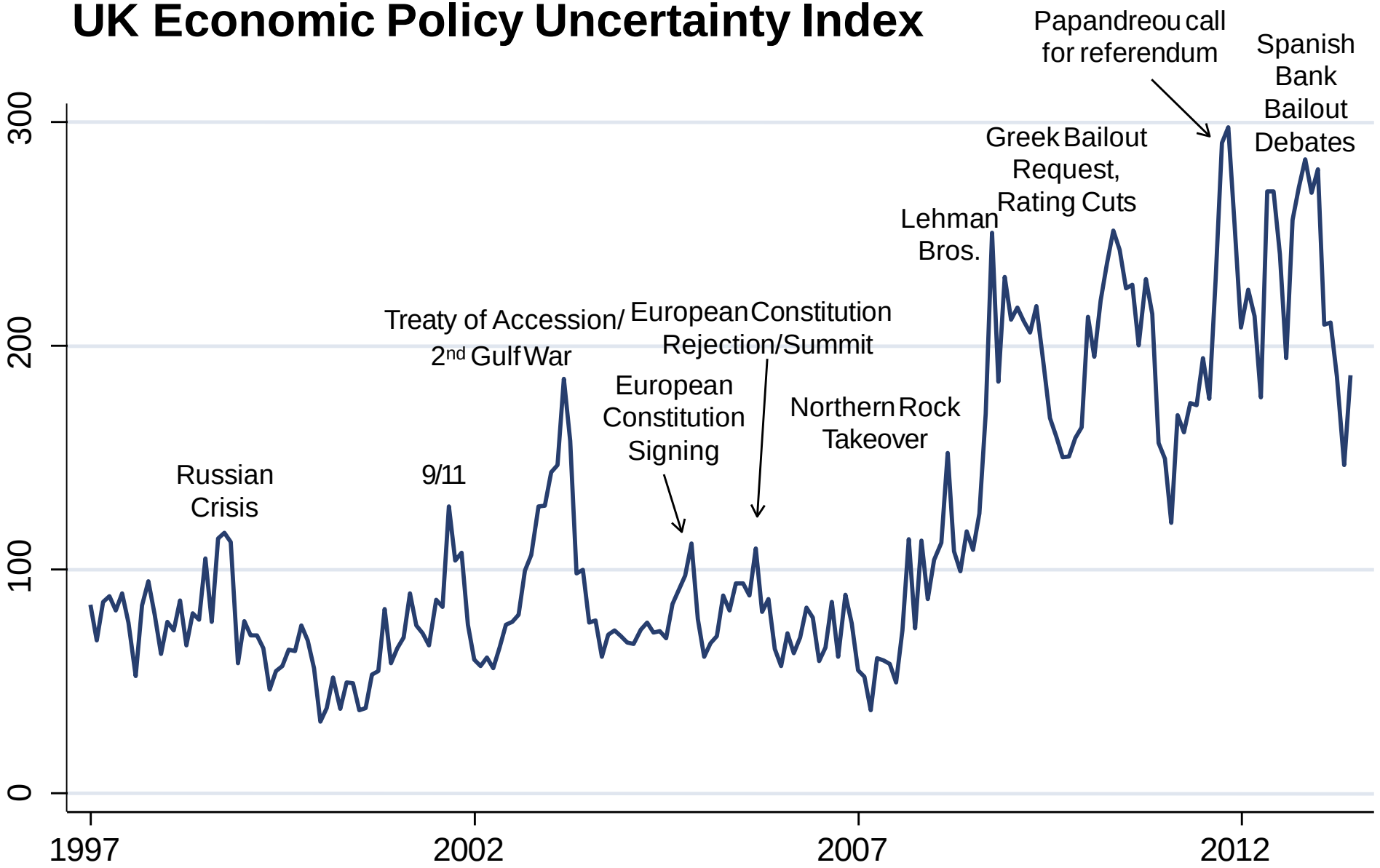
India Policy Uncertainty Index

January 2003 to June 2013



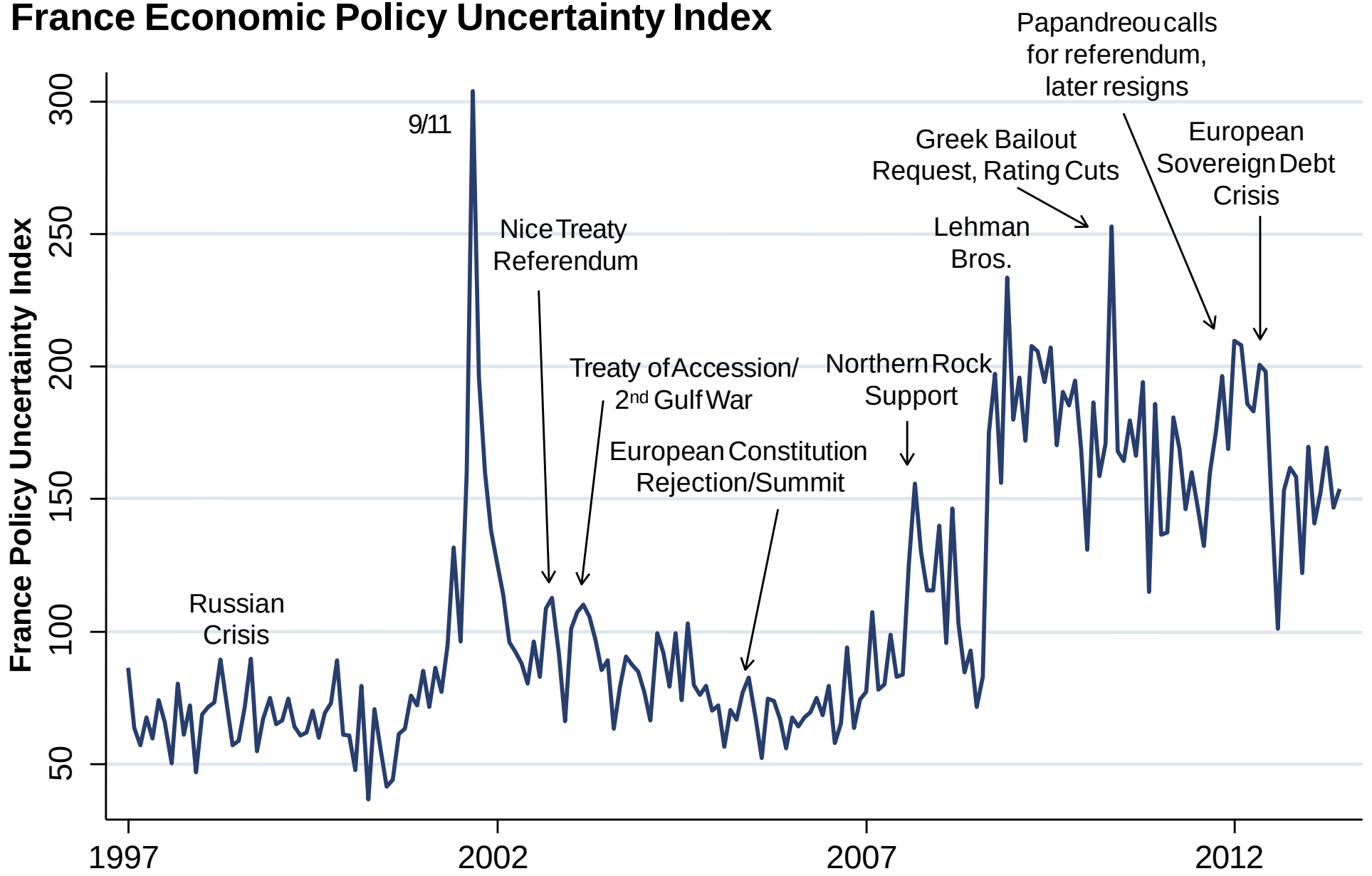
Using a 50% weight on six major Indian newspapers and a 50% weight on forecaster disagreement measures. Constructed in collaboration with Sanjai Bhagat, Pulak Ghosh and Srivivasan Rangan. Downloaded from www.PolicyUncertainty.com on 7 July 2013

UK Economic Policy Uncertainty Index



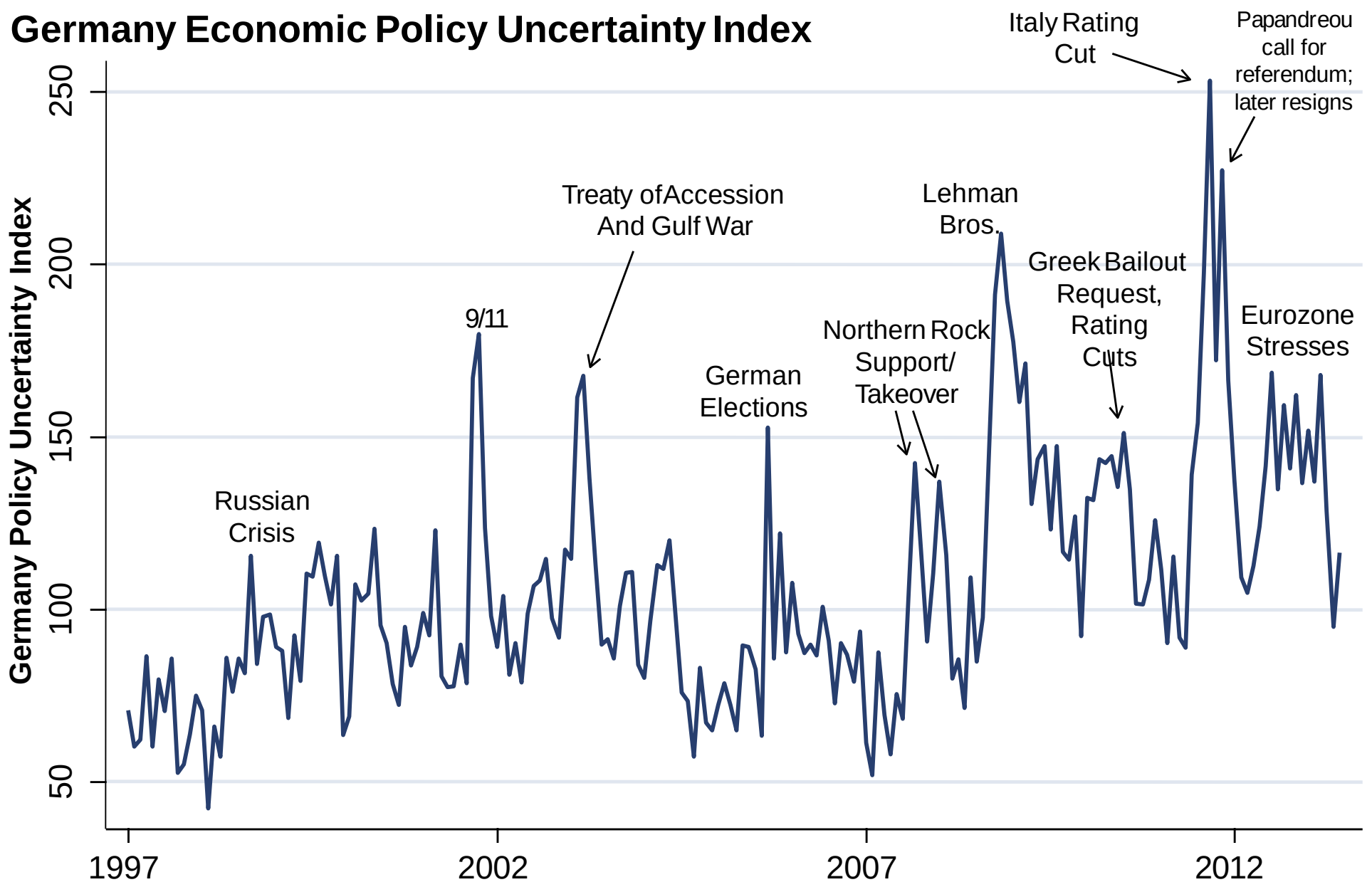
Notes: UK Policy Uncertainty Index composed of news component and dispersion measures regarding budget balance and consumer prices forecasts. News measure composed of the monthly number of news articles containing uncertain or uncertainty, economic or economy, as well as policy relevant terms (scaled by the smoothed number of articles containing the word 'today'). Policy relevant terms include: 'policy', 'tax', 'spending', 'regulation', 'Bank of England', 'budget', and 'deficit'. Index covers January 1997 to June 2013. Papers include the Financial Times and the Times of London. Forecast dispersion component data from Consensus Economics forecasts.

France Economic Policy Uncertainty Index



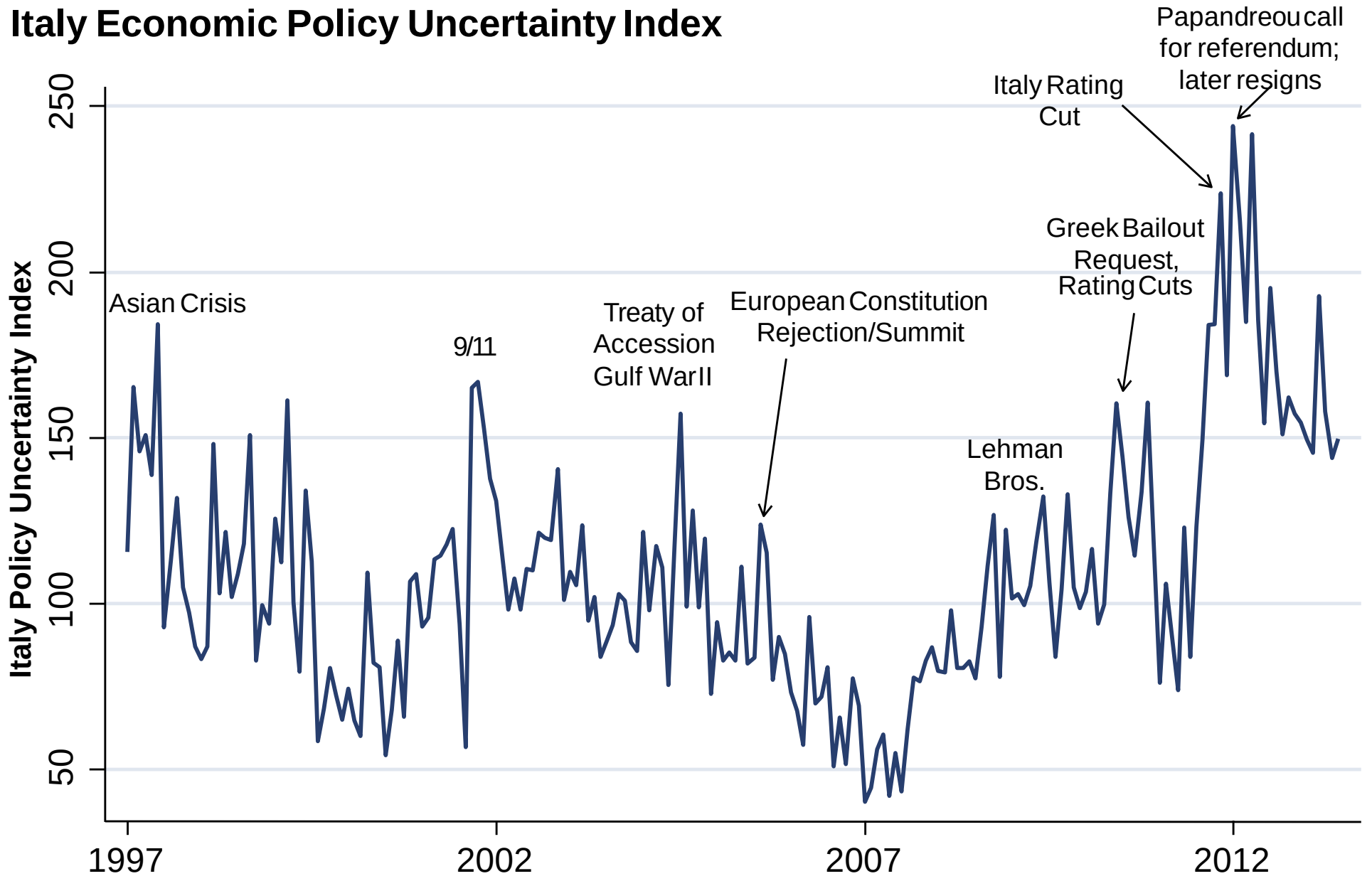
Notes: France Economic Policy Uncertainty Index composed of news component and dispersion measures regarding budget balance and consumer prices forecasts. News measure composed of the monthly number of news articles containing uncertain or uncertainty, economic or economy, as well as policy relevant terms (scaled by the smoothed number of articles containing 'today'). Policy relevant terms include: 'policy', 'tax', 'spending', 'regulation', 'central bank', 'budget', and 'deficit'. Index covers Jan 1997 – June 2013. Papers include the Le Monde and Le Figaro. Searches done in native language of country. Forecast dispersion component data from Consensus Economics forecasts.

Germany Economic Policy Uncertainty Index



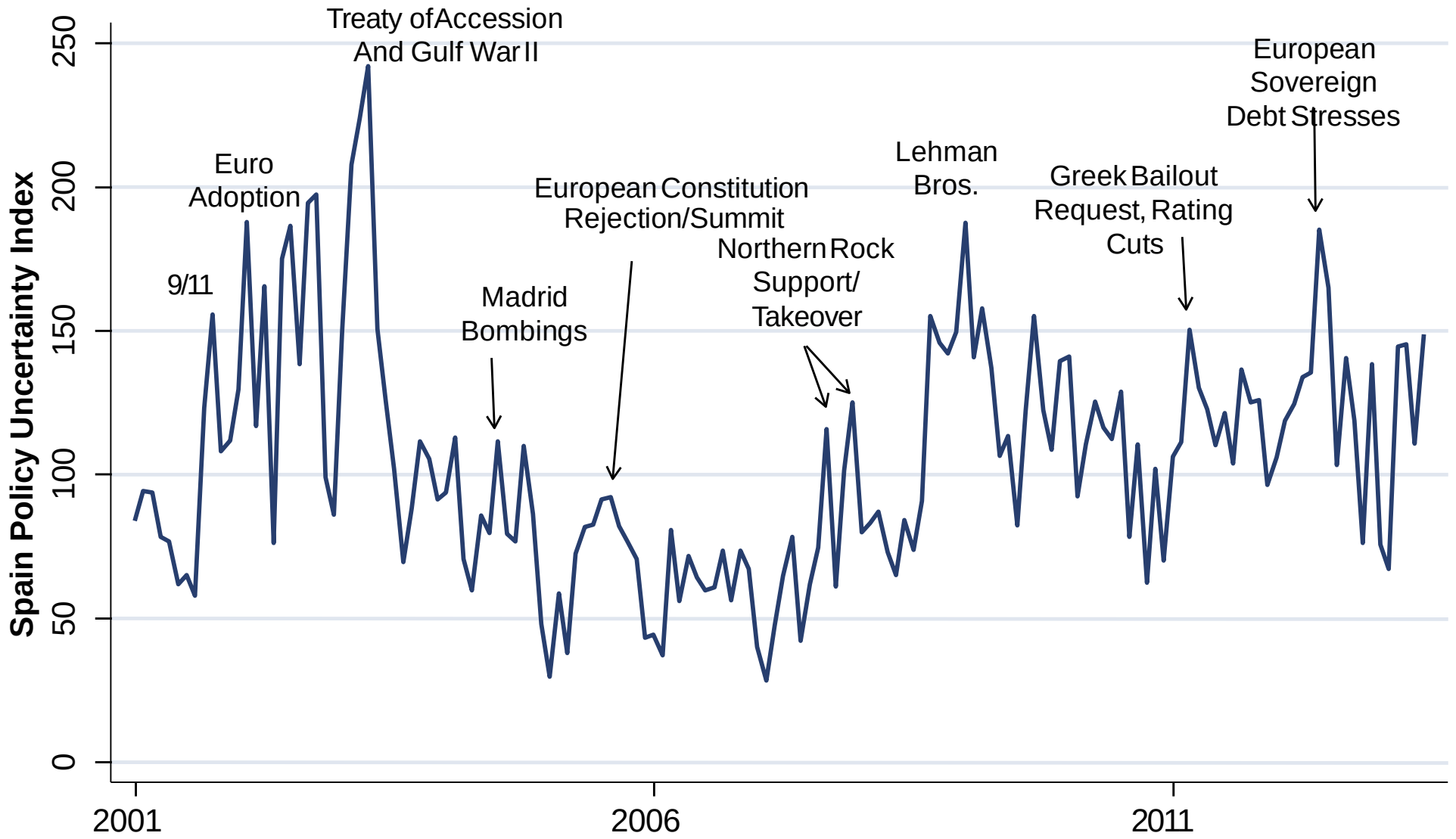
Notes: Germany Economic Policy Uncertainty Index composed of news component and dispersion measures regarding budget balance and consumer prices forecasts. News measure composed of the monthly number of news articles containing uncertain or uncertainty, economic or economy, as well as policy relevant terms (scaled by the smoothed number of articles containing 'today'). Policy relevant terms include: 'policy', 'tax', 'spending', 'regulation', 'central bank', 'budget', and 'deficit'. Index covers Jan 1997 – Jun 2013. Papers include the FAZ and Handelsblatt. Searches done in native language of country. Forecast dispersion component data from Consensus Economics forecasts.

Italy Economic Policy Uncertainty Index



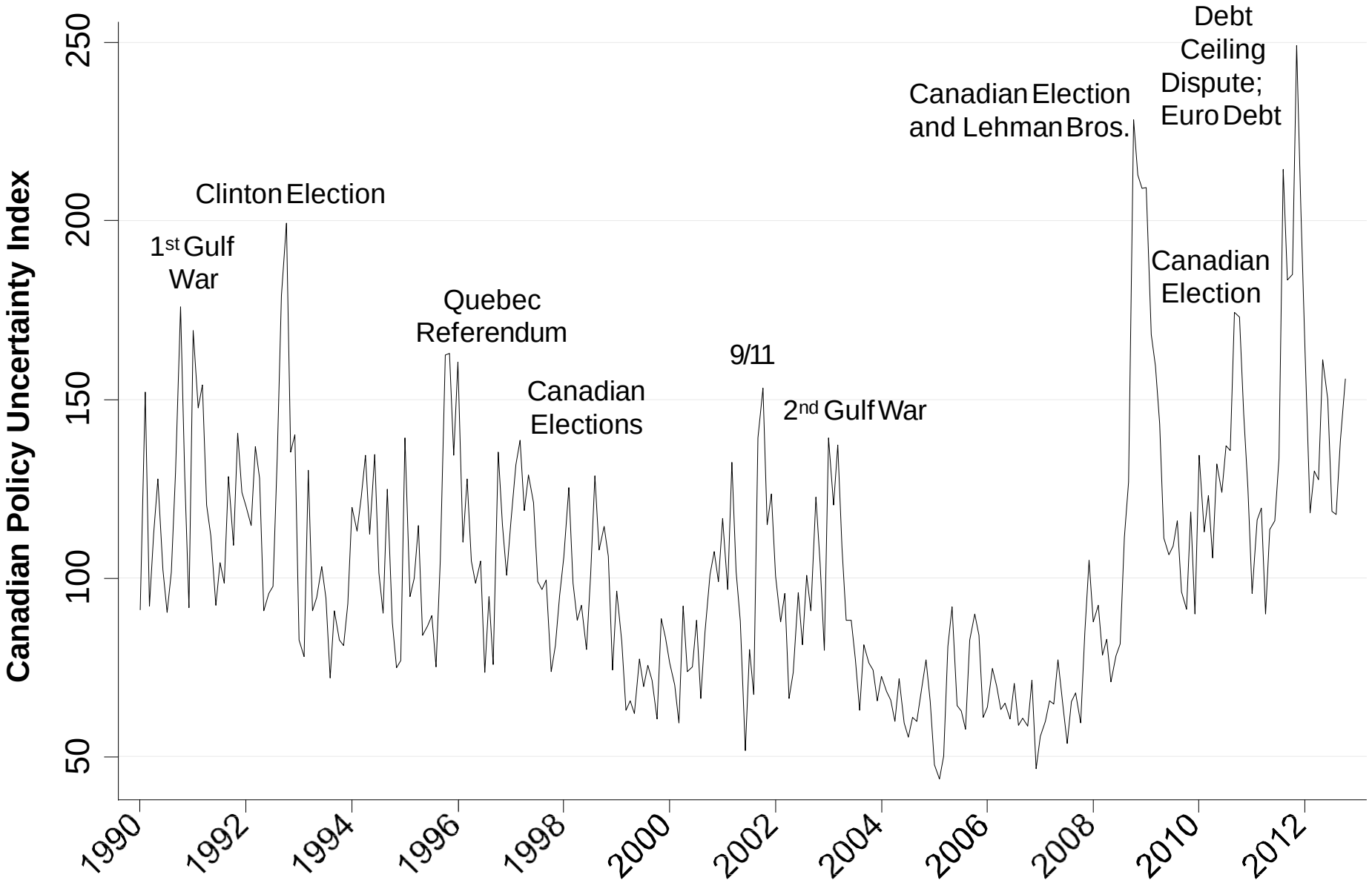
Notes: Italy Economic Policy Uncertainty Index composed of news component and dispersion measures regarding budget balance and consumer prices forecasts. News measure composed of the monthly number of news articles containing uncertain or uncertainty, economic or economy, as well as policy relevant terms (scaled by the smoothed number of articles containing 'today'). Policy relevant terms include: 'policy', 'tax', 'spending', 'regulation', 'central bank', 'budget', and 'deficit'. Index covers Jan 1997 – Jun 2013. Papers include the Corriere della Serra and La Repubblica. Searches done in native language of country. Forecast dispersion component data from Consensus Economics forecasts.

Spain Economic Policy Uncertainty Index



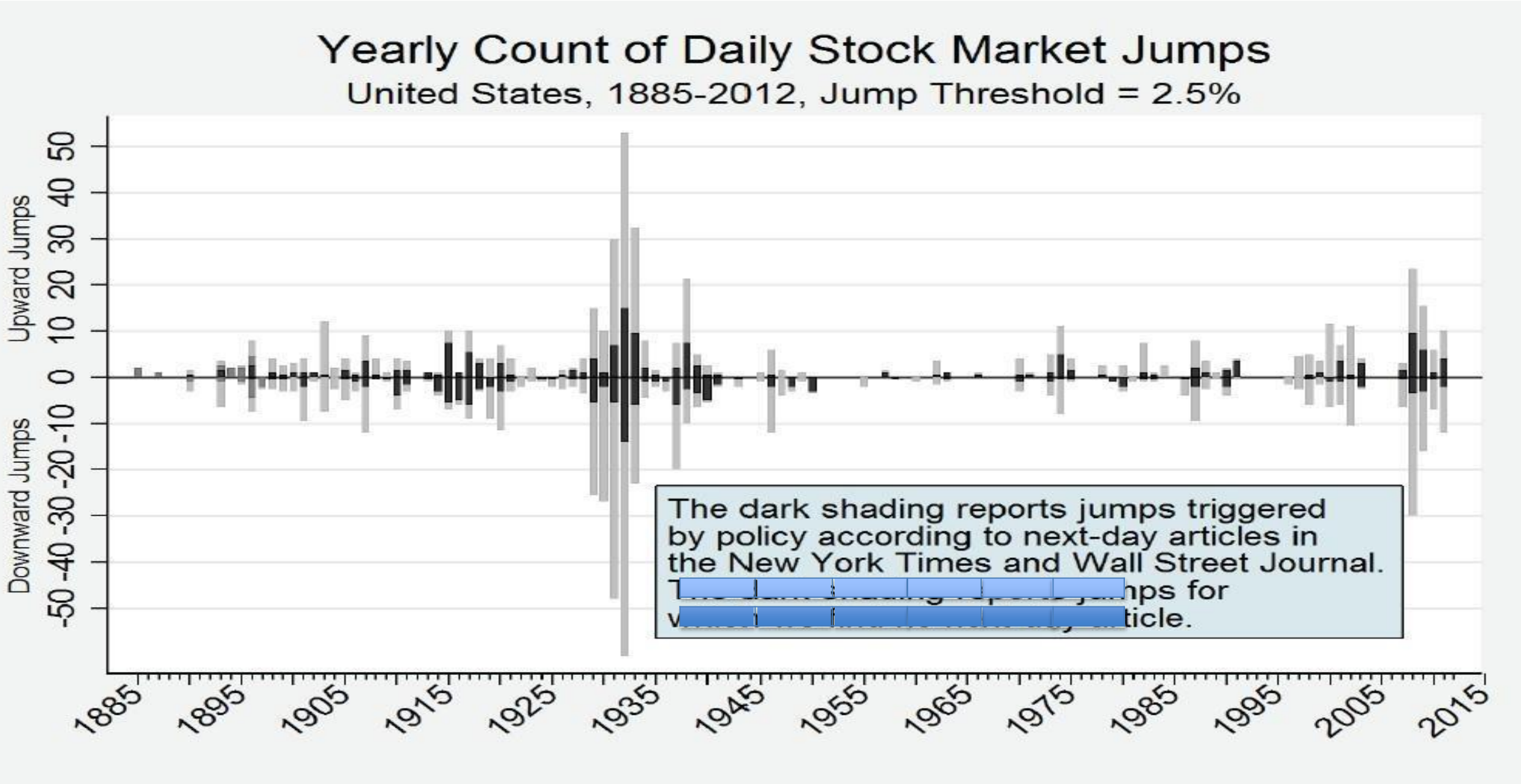
Notes: Spain Economic Policy Uncertainty Index composed of news component and dispersion measures regarding consumer prices forecasts. News measure composed of the monthly number of news articles containing uncertain or uncertainty, economic or economy, as well as policy relevant terms (scaled by the smoothed number of articles containing 'today'). Policy relevant terms include: 'policy', 'tax', 'spending', 'regulation', 'central bank', 'budget', and 'deficit'. Index covers Jan 2001 – Jun 2013. Papers include El Mundo and El Pais. Searches done in native language of country. Forecast dispersion component data from Consensus Economics forecasts.

Canadian Economic Policy Uncertainty Index



Source: www.policyuncertainty.com. Created with help from Dorinda So from the Institute for Competitiveness & Prosperity www.competeprosper.ca

Policy News and Stock Market Jumps



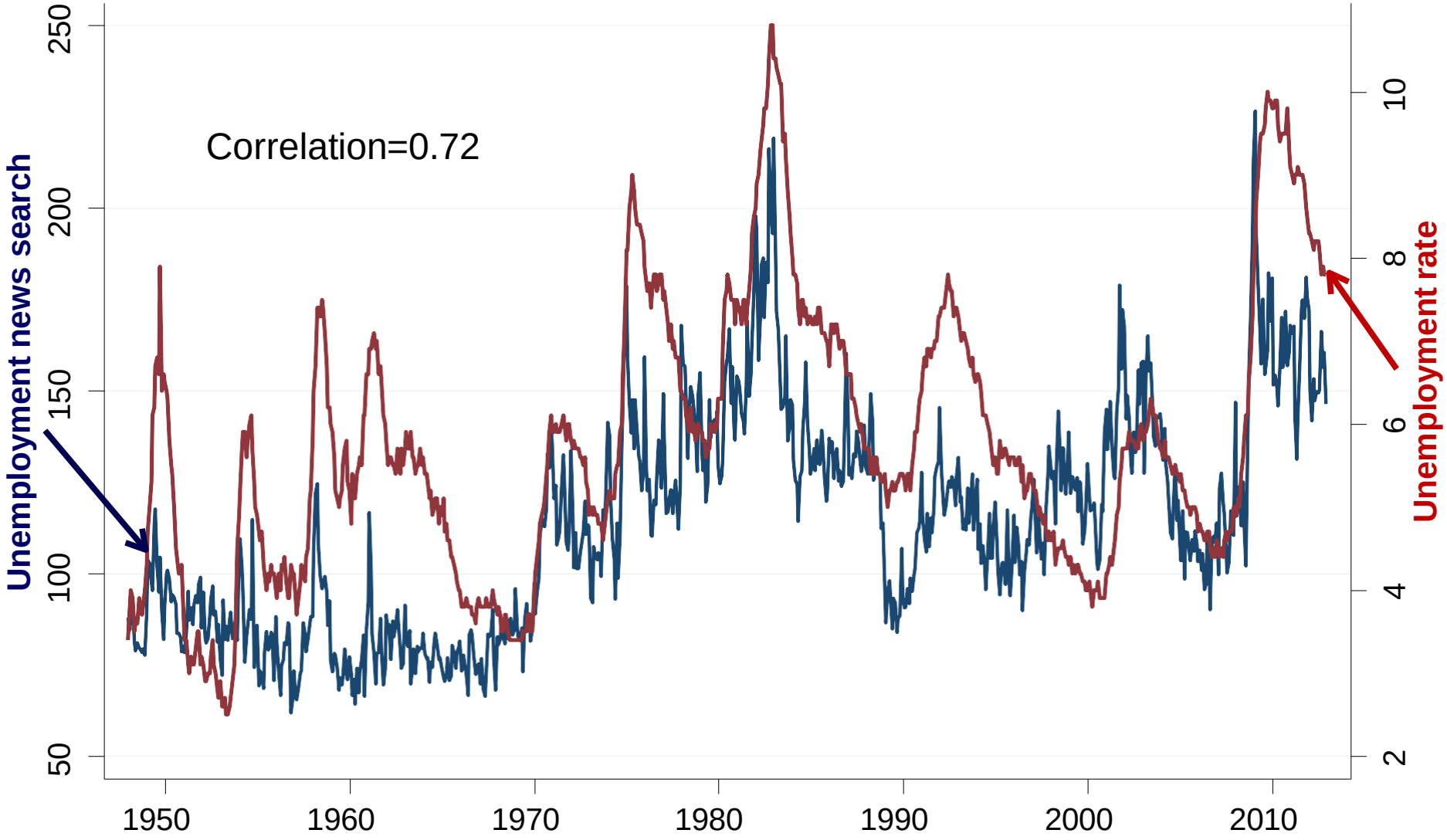
Reproduced from “What Triggers Equity Market Jumps?” by Baker, Bloom and Davis. Work in progress.

More on the Audit and Another Suitability Check

Running the Newspaper Article Audit

1. Design, evaluate, and refine audit template
2. Define the Audit Universe: All articles coded EU=1 by automated search
3. Sample Audit Universe and manually read articles
   - Randomly sample 3 articles per month for 5 of the newspapers; 45 articles per quarter
4. Code each article: EU, EPU, type of EPU, etc.
5. Compare manually read 'truth' to results from automated search with various permutations of policy terms

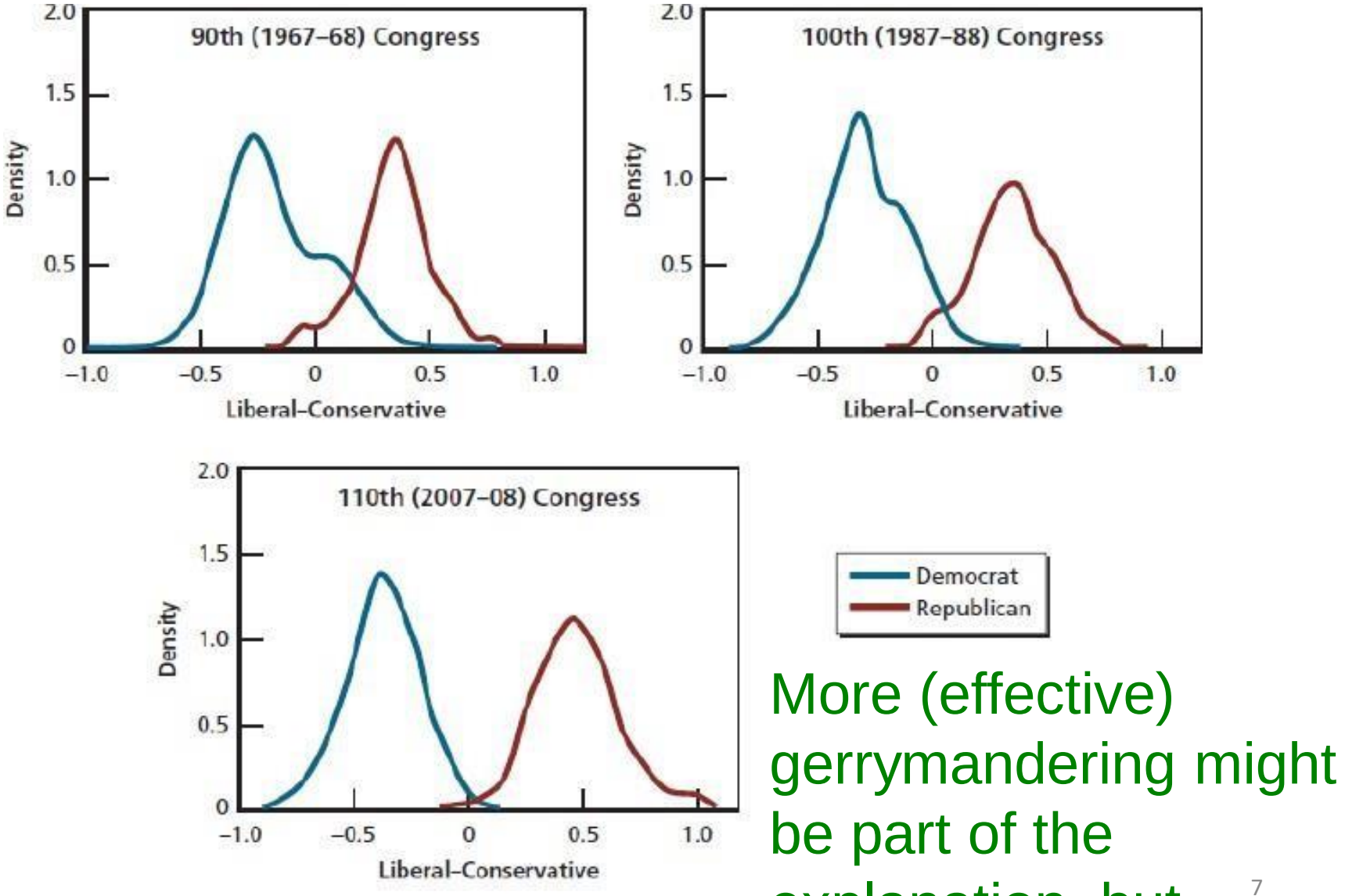
Suitability check: news based indices for tracking unemploy also seem to work well



Notes: Index of Unemployment News composed of quarterly news articles containing terms like 'unemployment', 'layoffs', or 'job loss' (scaled by the smoothed total number of articles) in 5 newspapers (WP, BG, LAT, WSJ and CHT). Data normalized to 100 from Jan 1900-Dec 2011. Unemployment data is overall seasonally adjusted unemployment rate taken from the BLS.

Political Polarization and Policy Gridlock

Political Polarization in the U.S. Congress Has Greatly Intensified in Recent Decades



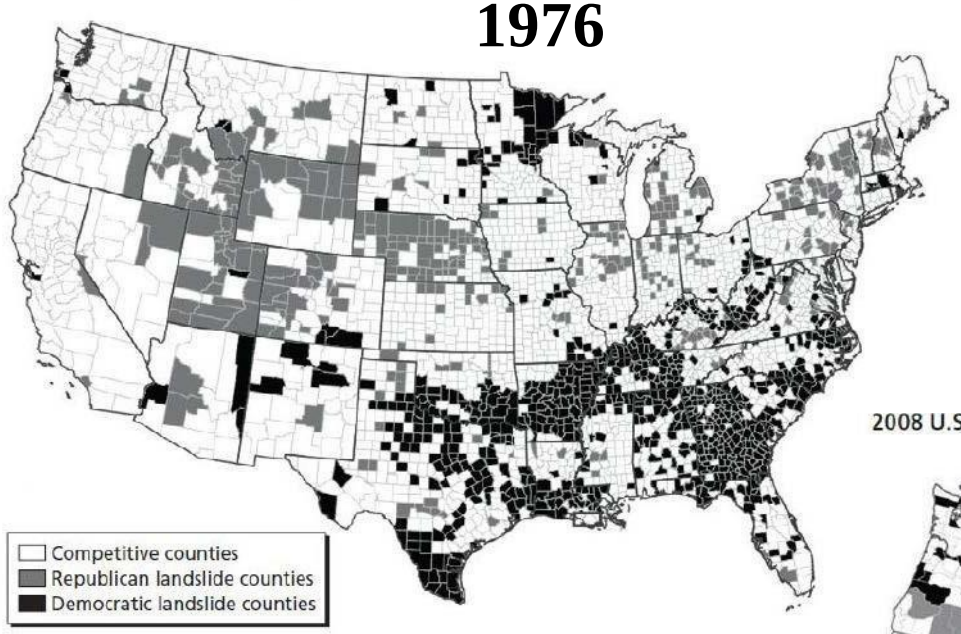
SOURCE: Carroll et al., 2008.

More (effective) gerrymandering might be part of the explanation, but …

The U.S. Has Become More Politically Segregated With Res
Where People Choose to Live

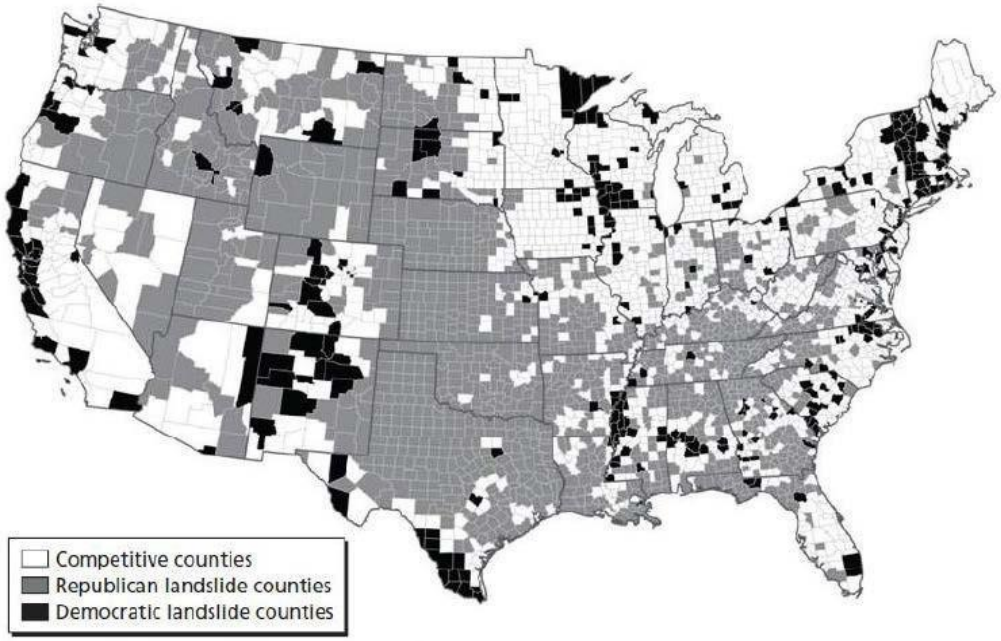
1976 U.S. Election, by County

1976



2008 U.S. Election, by County

2008



More on the Sources and Composition of U.S. Economic Policy Uncertainty

The Intensity and Composition of Policy- Related Economic Uncertainty over Time

Drilling into the news articles about EPU, we find:

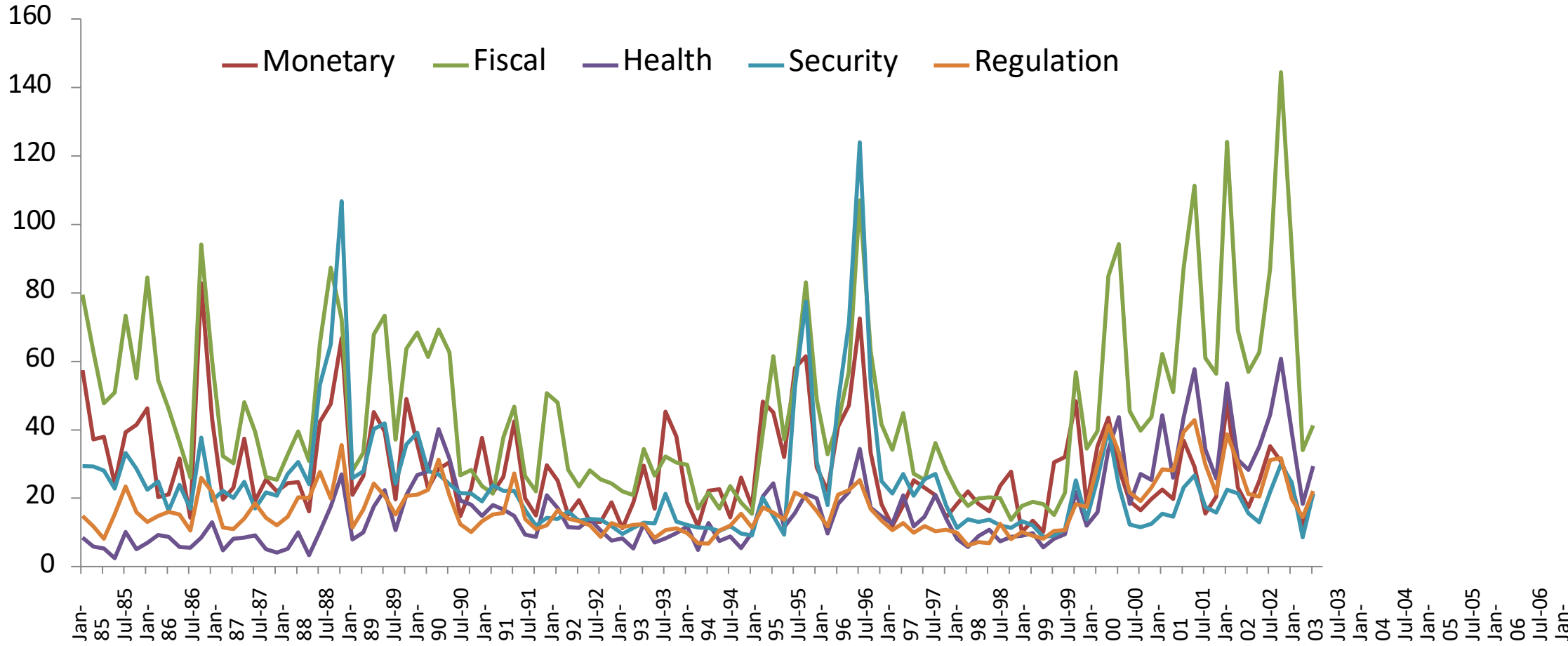
- Big role for uncertainty related to national security issues around the time of Gulf War I and in the wake of 9-11.
- Uncertainty related to taxes and government spending policies are the biggest factors responsible for historically high levels of policy uncertainty in 2010-2012
- Although less pronounced, we also find elevated levels of uncertainty in 2010-2012 in several other policy categories: entitlement programs, healthcare, and regulation.
- Many of the same categories are elevated in 2008-09.

Fiscal policy matters and health care are the most important sources of policy uncertainty in 2010-2012, according to our news-based analysis.

	1985:1-1990:6	1990:7-1991:12	1992:1-2001:8	2001:9-2002:12	2003:1 2007:6	2007:7-2008:8	2008:9-2009:12	2010:1-2012:10	Average
Economic Policy Uncertainty	109	141.2	87.7	127.8	71	83	131.5	127.8	100
Monetary policy	32.5	41.6	25.9	44.9	22.1	31.5	27.6	26.8	28.8
Taxes	39.7	48.1	31.7	50.9	30	31.3	56.6	67.9	39.7
Government spending	22.6	26.7	12.1	17.2	8.5	6.6	17	30.6	16.5
Health care	7	15.3	14.9	18.3	13.1	13.4	29.2	39.2	16.3
National security	24.9	53.4	17.9	54.5	25.3	15.8	21.2	19.3	24.4
Entitlement programs	7.2	12.5	11.4	18.6	8.8	8.2	15.2	23.4	11.8
Regulation	15.7	22.9	14.5	19.5	11.1	15.4	29.1	30.4	17.2
Trade policy	3.8	4	6.3	2.6	1.7	2	1.4	2.3	3.9
Sovereign debt, currency	1.4	0.6	2.3	0.5	0.4	0.3	0.4	4.5	1.7
Overall Economic Uncertainty	217.1	348	185	325.3	159	183.8	369	262.8	219.3

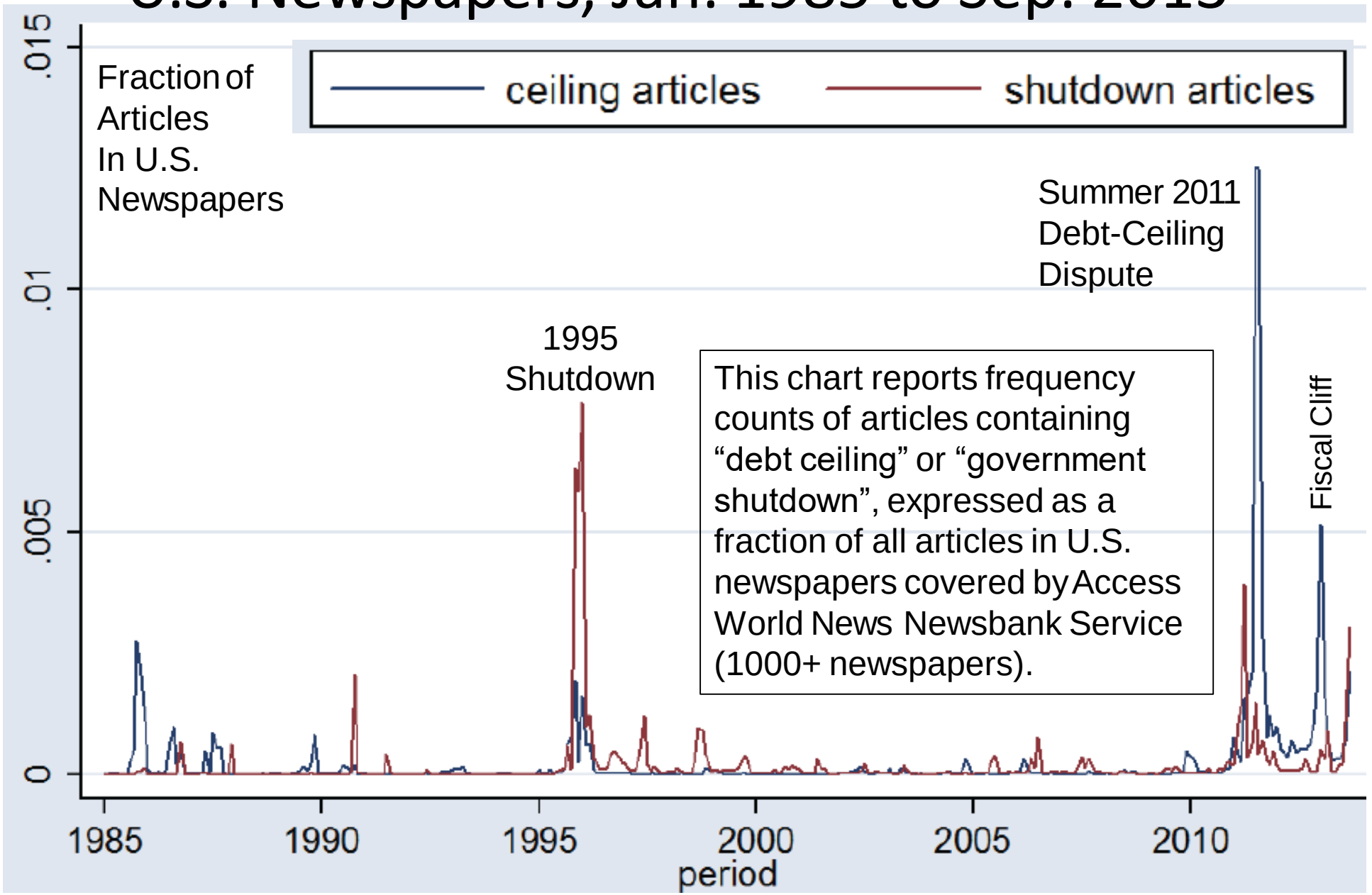
Note: This analysis uses Newsbank data to obtain a greater density of news articles.

Big 5 Sources of Economic Policy Uncertainty, 1985Q1 t 2013Q3



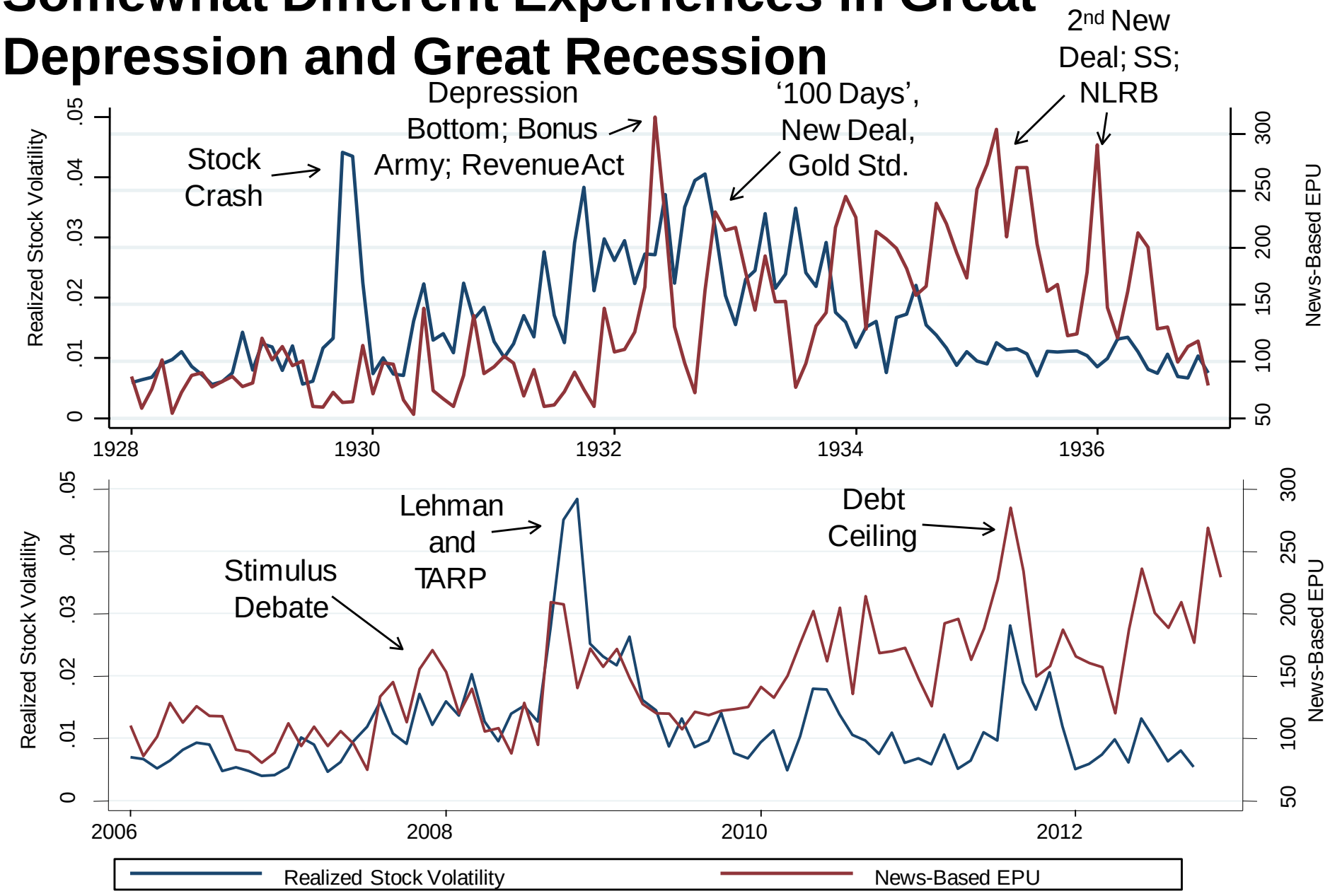
Note: This chart is a quarterly version of Table 1 in "Measuring Economic Policy Uncertainty" by Baker, Bloom and Davis. It shows the 5 most important sources of economic policy uncertainty based on frequency counts of newspaper articles.

“Debt Ceiling” and “Government Shutdown” in U.S. Newspapers, Jan. 1985 to Sep. 2013



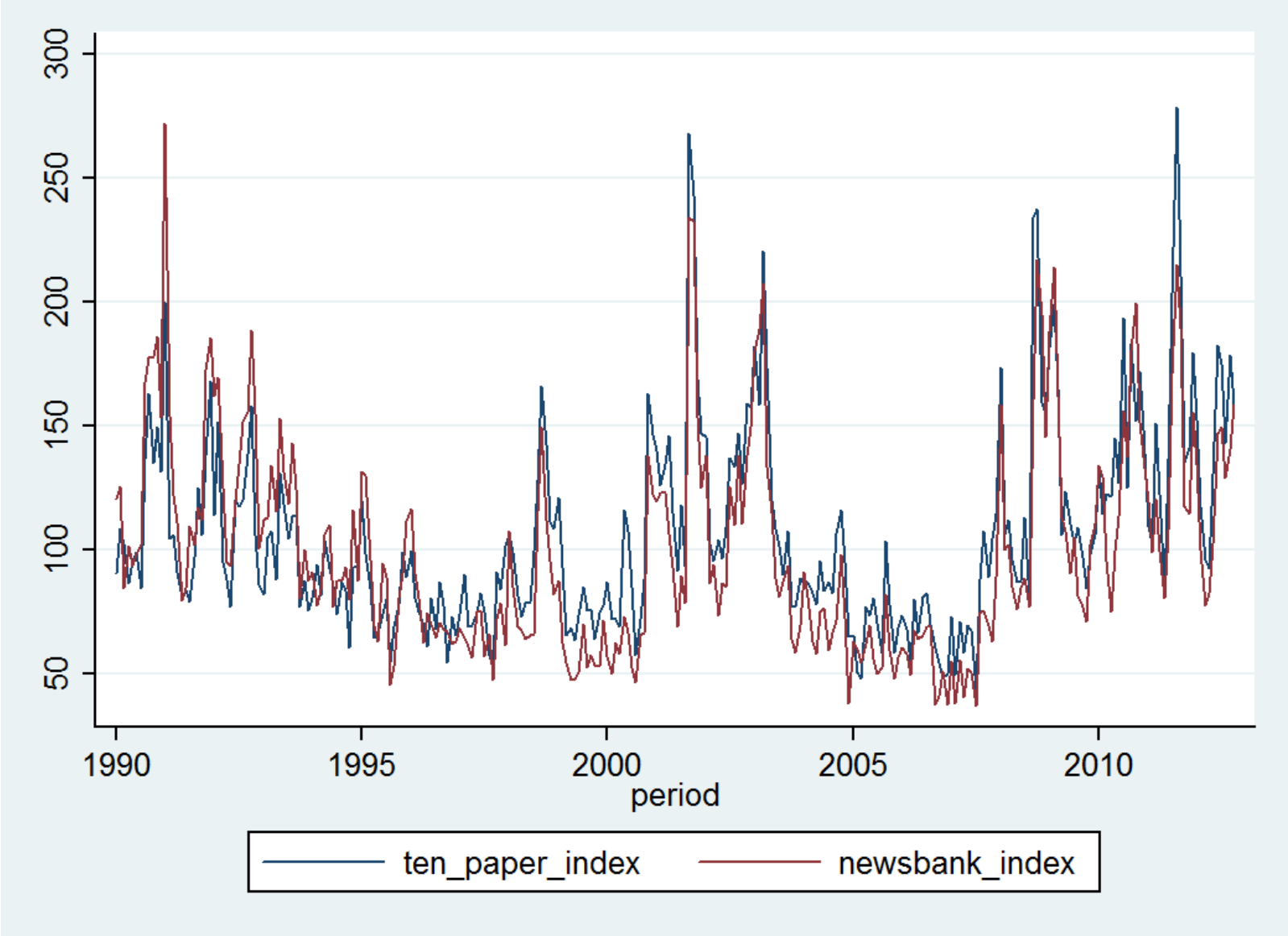
More Checks and Comparisons

Somewhat Different Experiences in Great Depression and Great Recession

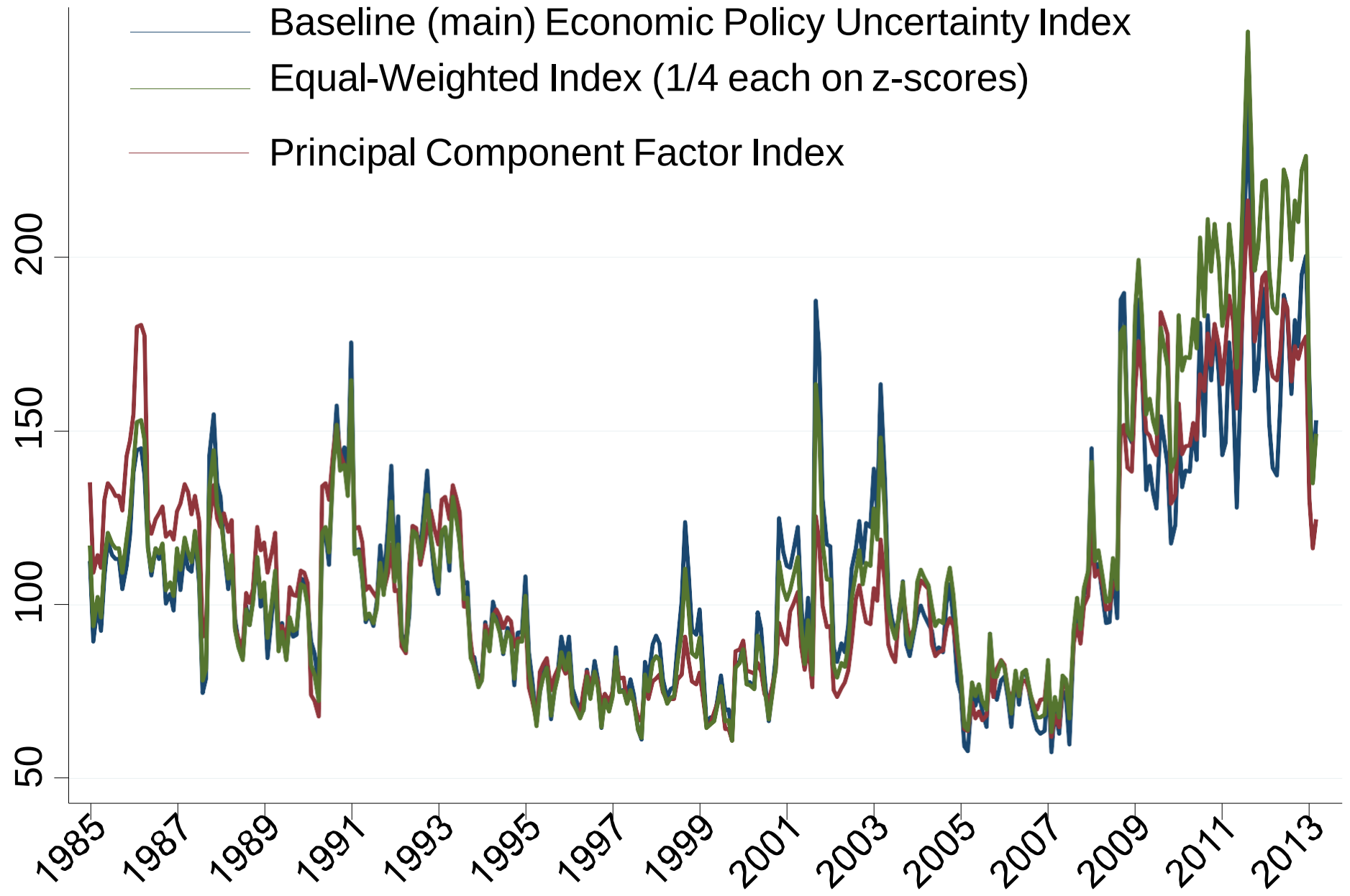


Notes: Index of Policy-Related Economic Uncertainty composed of quarterly news articles containing uncertain or uncertainty, economic or economy, and policy relevant terms (scaled by the smoothed total number of articles) in 5 newspapers (WP, BG, LAT, WSJ and CHT). Data normalized to 100 from 1900-2011.

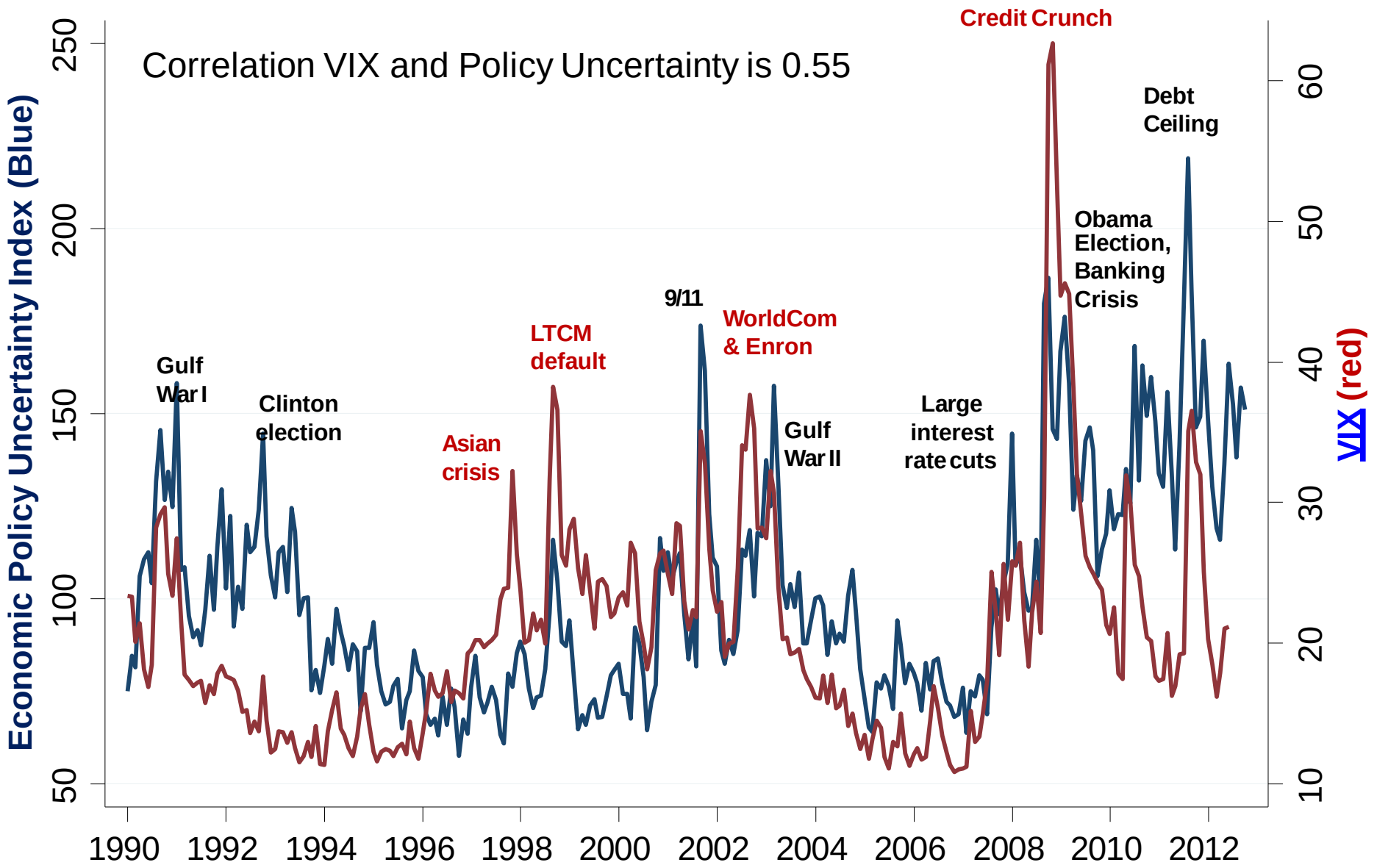
Comparison Newsbank (daily data summed to the monthly level) wi 10 paper series



Different weighting schemes give similar results



US index is similar to the VIX index of 1 month implied S&P500 stock mark volatility, but not the same



Source: www.policyuncertainty.com. Data until October 2012