Measuring Economic Policy Uncertainty

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Abstract: We develop a new index of economic policy uncertainty (EPU) based on newspaper coverage. Our index spikes near tight presidential elections, after both Gulf wars, the 9/11 attacks, and during government shutdowns and debt ceiling debates. Several pieces of evidence – including a human audit of 10,000 newspaper articles – indicate that our EPU index proxies movements in policy-related economic uncertainty. Using firm-level micro data, we show that policy uncertainty increases stock-price volatility and reduces investment and employment in government dependent sectors like defense, healthcare, and infrastructure construction. At the macro-level, increases in policy uncertainty foreshadow declines in investment, output, and employment, both in the US and in our 12 country panel. Extending our US data back to 1900, we find that the EPU index rose dramatically during the Great Depression and has trended slowly upwards since the 1960s.

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1. INTRODUCTION

Interest in economic policy uncertainty has increased over the last decade because of concerns that it played an important role in shaping the Global Financial Crisis. For example, the Federal Open Market Committee (FOMC) (2009) and IMF (2012 and 2013) claim that uncertainty about European and US fiscal, regulatory, and monetary policies were factors leading to the steep economic decline and slow recovery from 2008-2013.[1]

To investigate the role of policy uncertainty, we develop a measure of economic policy uncertainty (EPU) for the US and examine its evolution since 1985.[2] The index is constructed by measuring the frequency of articles in 10 leading US newspapers mentioning the triple of words "economic (or economy)", "uncertain (or uncertainty)" and policy (defined as one of "congress", "deficit", "Federal Reserve", "legislation", "regulation" or "White House"). Figure 1 plots this post-1985 US monthly index, which displays spikes near tight presidential elections, Gulf Wars I and II, the 9/11 attacks, the debt-ceiling debates and government shutdowns. We extend the news based measure of policy uncertainty in three other dimensions: back in time, across countries and sectors.

To expand the series back in time in the United States, we use 6 national newspapers that were available throughout the last century, extending our measure back to 1900, as shown in Figure 2. This highlights pre-war political and economic shocks, such as the Gold Standard Act, the Versailles conference, and the assassination of President McKinley, alongside the surge in policy uncertainty during the Great Depression, which began in 1931 when Hoover introduced a rash of new economic policies and was followed by a policy-active Roosevelt. The index also shows an upward trend from the 1960s, potentially driven by factors including rising political polarization and expanding government.

We also extend our policy uncertainty index to twelve countries in total, including the rest of the G10 economies. These policy uncertainty indices are particularly helpful in countries without developed financial markets, where other indicators of uncertainty – such as the VIX in the US – are not available.

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[1] For example, the FOMC minutes in December 2009 noted "*Widespread reports from business contacts noted that uncertainties about health-care, tax, and environmental policies were adding to businesses' reluctance to commit to higher capital spending*", FOMC (2009).

[2] Our data are available at a monthly and daily frequency on www.policyuncertainty.com, Bloomberg, FRED and Reuters. We also develop measures for 11 other countries and for the US and UK back to 1900.

Finally, we developed sector-level indices in the US, which target sector-specific terms as well as our triplet of words about the economy, policy, and uncertainty. For example, the health care and defense indices in Figure 3 plot the frequency of articles that also contain words like "healthcare", "hospital" or "health insurance" and "war", "terrorism" or "department of defense" respectively. As we can see, sector-specific events – like the attempted Clinton health-care reform and the fall of the Berlin Wall, which were relevant to the healthcare and defense industries – are clearly visible.

There are a number of potential problems with this approach, including concerns over newspaper reliability, accuracy, bias, and consistency. To ameliorate these concerns, we evaluate our EPU index in several ways. First, we show a strong link between our measure of economic policy uncertainty and other measures of *economic uncertainty* like implied and realized indices of stock-market volatility. Second, we evaluate our indices against other measures of *policy uncertainty*, such as word searches for policy uncertainty in the Federal Reserve Beige book and forecaster disagreement for US federal expenditure, again finding a tight connection.

Third, we carry out a detailed human audit of over 10,000 US newspaper articles. A group of University of Chicago students carefully read through overlapping panels of articles, guided by a 64 page training manual and weekly audit meetings, to evaluate whether articles mentioned policy-uncertainty. Comparing the indices generated from detailed human-audits to those generated by our computer directed search, we find a close time-series correlation (0.721 for quarterly data and 0.837 for annual data). Moreover the difference between these two indices – which captures any potential errors in our EPU indices – is uncorrelated with any real variables we examined, like GDP growth rates. Hence, our computerized news search appears to yield a similar index for EPU to a human reading of the same sets of articles.

Finally, our indices have a market-use validation in that they are carried by a range of commercial data providers, like Bloomberg, Reuters, Haver, and FRED, due to demand from banks, hedge funds, corporates and policy-makers. This suggests our indices have useful informational content for a range of commercial decision makers.

In the final part of the paper, we turn to assessing the effects of EPU on the real economy through two separate methods. First, we exploit firm-level differences in

exposure to a particular aspect of policy – federal government contracts - to estimate one channel of impact of policy uncertainty. In particular, using the Federal Registry of Contracts to assign every Federal contract from 1999-2012 to a SIC 4-digit industry, we develop industry-level measures of the share of revenue derived from Federal contracts. This government contract revenue share varies from over 75% in some defense industries to 0% in some retail industries. We find, in regressions including full time and firm fixed-effects, that sectors with higher government exposure are significantly more responsive to policy uncertainty in terms of both heightened stock volatility and reduced investment and employment. Moreover, while the VIX has the best predictive power for overall sector stock-volatility, for the government exposed sectors the EPU index has strong additional predictive power, suggesting it is identifying a policy uncertainty channel. We also show firms in the defense, healthcare and financial sectors are particular sensitive to their own sector-specific policy-uncertainty measures, suggesting additional information in the sector-level indices.

These firm-level micro data results point to a causal impact of policy uncertainty on investment and hiring in sectors reliant on government contracts, but they provide little guidance about the magnitude of aggregate effects because they capture only one specific policy channel (government contracting).

A second approach is to estimate simple vector autoregressive (VAR) models using both our US data and for the entire 12 country international panel. The VAR results indicate that an innovation in policy uncertainty equivalent to the actual EPU increase from 2006 to 2011 foreshadows a decline of about 2% in industrial production and a rise of 1% unemployment. These results are not necessarily causal as policy is forward looking, but they suggest that the magnitude of deleterious policy uncertainty effects may be non-trivial.[3] One interpretation of the micro and macro evidence is that policy uncertainty is harmful for investment and growth in policy sensitive sectors like defense, healthcare and construction, and these sectors are large enough for this to generate moderate aggregate impacts.

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[3] Stock and Watson (2011) use our EPU index to investigate the factors behind the 2007-2009 recession and slow recovery and come to a similar conclusion – namely, that policy uncertainty is a strong candidate for accounting for the poor economic performance, but again identifying causality is hard.

This paper relates to at least three literatures. The first is research on the impact of uncertainty on growth and investment. Theoretical work on this topic dates at least to Bernanke (1983), who points out that high uncertainty gives firms an incentive to delay investment and hiring when investment projects are expensive to cancel or workers are costly to hire and fire.[4] Of course, once uncertainty falls back down, firms start hiring and investing again to address pent-up demand. Other reasons for a depressing effect of uncertainty include precautionary spending cutbacks by households, upward pressure on the cost of finance (e.g., Gilchrist et al., 2010, and Pastor and Veronesi, 2011a), and increased managerial risk-aversion (e.g. Panousi and Papanikolaou, 2011).

Second, there is a literature focused explicitly on policy uncertainty. Friedman (1968), Rodrik (1991), Higgs (1997) and Hassett and Metcalf (1999), among others, consider the detrimental economic effects of monetary, fiscal, and regulatory policy uncertainty. More recently, Bonn and Pfeifer (2011) and Fernandez-Villaverde at al. (2011) study policy uncertainty in DSGE models, finding moderately negative effects, while Pastor and Veronesi (2011a, 2011b) model the theoretical links among the business cycle, policy uncertainty, and stock market volatility.[5]

Finally, there is a rapidly growing literature on using text search – and particularly newspaper search – to measure a variety of outcome variables (e.g. Boudoukh, et al (2013) and Hoberg and Phillips (2010)). Our paper suggests newspaper text search can yield useful proxies for US and international economic and political conditions stretching back over several decades, which could be particularly helpful in earlier periods or in countries where other economic data is less readily available.

The paper proceeds as follows. Section 2 describes the data we use to construct our policy uncertainty indices. Section 3 evaluates our EPU measures in several ways and develops additional evidence about movements in policy-related uncertainty over time.

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[4] Dixit and Pindyck (1994) offer a good and detailed review of the early theoretical literature. Recent empirical papers include Bloom (2009), Alexopolous and Cohen (2011), Bloom, Floetotto, Jaimovich, Saporta and Terry (2012), Bachman et al. (2013) and Scotti (2014).

[5] See also recent work including Julio and Yook (2010) find that investment falls around national elections, Durnev (2010) finds that corporate investment is 40 percent less sensitive to stock prices in election years, Brogaard and Detzel (2012) who show that policy uncertainty reduces asset returns, Handley and Limao (2012) find that trade-policy uncertainty delays firm entry, and Gulen and Ion (2012) who find negative responses of corporate investment to our EPU index.

Section 4 estimates the firm-level effects of policy uncertainty and the dynamic responses of aggregate economic outcomes to policy uncertainty shocks. Finally, section 5 concludes and discusses some directions for future research.

2. MEASURING ECONOMIC POLICY UNCERTAINTY

To measure policy-related economic uncertainty, we build an index from newspaper coverage of policy-related economic uncertainty.[6] This aims to capture uncertainty about *who* will make economic policy decisions, *what* economic policy actions will be undertaken, and the economic *effect*s of policy actions (and inaction). This policy uncertainty will also span a time-frame from months ahead (e.g. short-run monetary policy) to decades into the future (e.g. long-run reforms to social security). As such, the index represents a broad proxy of the level of policy uncertainty as perceived by newspapers.

We summarize (with details in Appendix A) the: (i) construction of the modern (monthly and daily post-1985) US index, (ii) the historic (1900 to 2010) US and UK indices, (iii) the international indices, and (iv) the US sector-specific indices.

2.1 US economic policy uncertainty indices

The main US monthly index from 1985 onwards is built from text-searching 10 large newspapers: the USA Today, Miami Herald, Chicago Tribune, Washington Post, Los Angeles Times, Boston Globe, San Francisco Chronicle, Dallas Morning News, New York Times, and the Wall Street Journal. To construct the news-based index, we search the archives of each paper from January 1985 for articles containing the triple of: 'uncertainty' or 'uncertain'; 'economic' or 'economy'; and one of the following six policy terms: 'congress', 'deficit', 'Federal Reserve', 'legislation', 'regulation' or 'white house' (including related terms like 'regulatory' or 'the Fed').

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[6] In earlier versions of the index we also included components measuring: (a) the value of scheduled tax code expirations; and (b) disagreement between professional forecasters over federal expenditure and the consumer price index. However, to facilitate the extension of our index across time and across countries we now focus on the newspaper component only, although still provide the combined index at www.policyuncertainty.com

In other words, to meet our criteria, an article must include terms in all three categories pertaining to uncertainty, the economy, and policy. The goal is to select articles in major U.S. newspapers that discuss something about uncertainty over economic policy. Based on our search criteria, we obtain a monthly article count for each newspaper.

A difficulty with this raw Economic Policy Uncertainty (EPU) article count is that the overall volume of articles produced by and archived for each newspaper varies over time. Thus, we scale the raw counts by the total number of articles in the same newspaper and month. This process yields a monthly EPU series for each newspaper, each of which we normalize to unit standard deviation over the 1985-2010 period. Using these normalized values, we sum across the ten newspapers in each month. Finally, we rescale this 10-paper series to an average value of 100 from 1985 to 2009. This index was plotted in Figure 1, showing clear spikes around the Gulf Wars, close presidential elections, 9/11, the 2009 stimulus debate, the Lehman Brothers bankruptcy and the debt-ceiling dispute and shutdown, among other events.[7]

In addition to the main monthly economic policy uncertainty index we also produce a daily index using the Newsbank news aggregator, which covers around 1,500 national and local newspapers. We use Newsbank because the greater volume of papers provides enough articles to generate a meaningful daily count. When we aggregate this daily index from Newsbank to a monthly level it correlates at 0.853 with our 10-paper monthly index, suggesting both are picking up similar trends. However, because the Newsbank index has individual papers entering and exiting, longer-run trends are potentially distorted by compositional changes. Hence, in the rest of this paper we will use our 10-paper monthly index for analysis, but note that the daily index provides a high-frequency alternative (which is also posted daily at 9am EST for real-time use).

2.2 Historic Policy Uncertainty Indices

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[7] Some notable political events do not generate high levels of economic policy uncertainty according to our news-based index. For instance, we find no large spike around the time of the federal government shutdowns from November 1995 to January 1996. While we found more than 8,000 articles mentioning these government shutdowns, less than 25% also mention the economy, less than 2% mention uncertainty, and only 1% mentions both. This suggests that politically tumultuous episodes do not necessarily raise economic policy uncertainty.

We utilize data from historical newspaper archives for both the United States and the United Kingdom to develop EPU indices that extend back to 1900.

For the United States, this historical index includes data from six papers which existed back to 1900: the Wall Street Journal, the New York Times, the LA Times, the Boston Globe, the Chicago Tribune, and the Washington Post. We utilized a similar methodology for the historical index as for our main US index (post-1985), searching for articles written regarding economic policy uncertainty throughout these newspaper archives. However, given the potential changes in language over the last 100 years ago, we undertook an expanded human audit (further described in Section 3) of newspapers from 1900 to 1984. This historical audit highlighted we needed to expand our set of policy-relevant terms to include "tariff" and "war". The historical index for the United Kingdom likewise has the policy terms extended to also include the words "tariff" and "war", with this applied to the Financial Times and the Guardian back (which are the two national UK papers we have available back to 1900). The UK historical index is shown in Appendix A1, and interestingly shows many of the same features as the US (wars, great depression etc), but does not show the same gradual upward trend since the 1960s displayed in the US index.

2.3 International Measuring Economic Policy Uncertainty

We also construct EPU indices for eleven other major countries.[8] As with our American newspaper index, we count the number of articles containing the terms uncertain or uncertainty, economic or economy, as well as the following policy relevant terms: 'policy', 'tax', 'spending', 'regulation', 'central bank', 'budget', and 'deficit'.[9] We perform all news searches in the native language of the paper, and we scale by the smoothed number of articles containing the word 'today' or by all articles in the

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newspaper.[10] We rescale the resulting series for each newspaper to unit standard deviation prior to 2011 and then sum across papers (where we have multiple papers for a given country) by month. We normalize the resulting sum to a mean value of 100 prior to 2011.

For Europe, the news-based components draw on two newspapers for each of the five largest European economies: Handelsblatt and Frankfurter Allgemeine Zeitung for Germany, El Pais and El Mundo for Spain, Corriere della Sera and La Repubblica for Italy, Le Monde and Le Figaro for France, and the Financial Times and The Times of London for the United Kingdom.

For Canada, we take data from 6 sources: The Gazette, the Globe and Mail, the Ottawa Citizen, the Toronto Star, the Vancouver Sun, and the Canadian NewsWire. For India we use seven papers: the Economic Times, the Times of India, the Hindustan Times, the Hindu, the Financial Express, the Indian Express, and the Statesman. In Japan, we restrict our news-based measure to two newspapers, the Yomiuri and the Asahi. For Russia, Korea, and China we only have one newspaper each with accessible online archives that also appears sufficiently independent from the government: the South China Morning Post, Kommersant, and Chosun respectively.[11]

The Japanese index is shown as an example in Figure 4 and the Russian index as an example in Figure 5, while the rest of the indices are shown in Appendix Figures A2 to A10. As can be seen these indices rise and fall with major national and international bouts of policy uncertainty. We provide regular monthly EPU updates for all our international indices on www.policyuncertainty.com, with start dates from 1985 or later depending on data availability. We believe this kind of data is particularly valuable in countries like Russia and India, where good financial market proxies for uncertainty are not available.

2.4 Sector-level policy uncertainty indices

Finally, we also extend our measure of economic policy uncertainty to cover uncertainty about particular types of policy. To do this we developed sets of terms (detailed in Appendix A) related to each category, for example the words "Federal Reserve

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[10] Some newspaper archives have technical barriers that make it impossible to scale by precise counts of all articles, so we take the number of articles containing a common, neutral word as the denominator, instead..

[11] The South China morning post operates from Hong Kong and is seen as moderately independent, while Kommersant operates from Moscow but as a financial broadsheet has been able to avoid heavy censorship.

Board", "the Fed, "interest rate" or "inflation" for our Monetary Policy category. We use Newsbank for these sub-indices due to its larger sample size of 1,500 newspapers so we can drill down on individual policy areas.

As can be seen in Figure 3 which provides examples for defense and healthcare, these indices appears to respond to major policy initiatives like the Gulf wars and the Clinton/Obama healthcare reform policies respectively. Table 1 reports the results for nine categories and sub-categories of policy uncertainty. The first row reports average values of our EPU index expressed as a percentage of the average index value for the entire sample period from 1985:1 to 2014:12. For example, the value of 109.6 for Economic Policy Uncertainty from 1985:1 to 1990:6 says that the value of the index in that period is 109.6% of its average value over the full sample period. The second rows down report the values for each subcomponent, noting these can add up to more than 100 if multiple types of uncertainty categories are mentioned in the same article. For example, the value of 61.5 for fiscal policy in 2008:9 to 2009:12 means that 46.6% (=61.5/132.1) of articles in this period mentioning economic policy uncertainty also mentioned fiscal policy. The final column includes the 1985-2014 average, so for example the 46.1 for fiscal policy highlights how there was 33% (=61.5/46.1) more articles on fiscal policy uncertainty during the 2008:9 to 2009:12 period compared to the 1985-2014 average.

One key finding is that during the global financial crisis (2008-2012) fiscal policy – both tax and spending – and health care and entitlement policies have been the big drivers of the recent overall increase in policy uncertainty. Monetary policy uncertainty does not appear to have increased, presumably because the typical paper in the Newsbank is a regional newspaper, and so did not consider monetary policy uncertainty to have increased given relatively low and stable inflation and interest rates. We also see that both "financial regulation" policy uncertainty rose three-fold post 2008, and "foreign sovereign debt and currency crisis" policy uncertainty rises ten-fold post 2010. However, both categories how low absolute levels so these increases do not have much impact on the overall index. Looking at earlier periods, we also "national security and war" policy uncertainty looms large around Gulf War I and after 9/11, and healthcare during the Clinton era reforms.

A number of other researchers have developed measures of various aspects of uncertainty as related to government policy. To measure partisan conflict in the federal

government, Marina Azzimonti (2014) constructs a news-based index modeled on our index. She finds both a significant correlation with our measure (0.48 at a monthly level) but also significant departures (e.g. periods of war produce declines in partisan conflict but increases in policy uncertainty). Shoag and Veuger (2015), derive state-based indices of policy uncertainty based on a multitude of state policy indicators, finding a strong negative link with state-level economic activity. Villaverde, et al (2013) measure policy uncertainty by estimating a stochastic volatility process for US capital taxes, labor taxes and government expenditures, finding correlations with our policy uncertainty index of 0.44, 0.31, and 0.67 respectively. Jurado, Ludvigson, and Ng (2013) derive measures based on the common variation in the unforecastable component of macroeconomic indicators, attempting to develop an index more tightly linked to the underlying variable of interest, which is correlated at 0.421 with our index.

3. EVALUATING OUR POLICY UNCERTAINTY MEASURES

There are several obvious concerns with using newspaper reports to build indices of economic policy uncertainty. In this section we try to address these, arguing that our news index, while noisy, is nevertheless an informative indicator of economic policy uncertainty. We start by comparing our computer generated search index to an index generated by a group of well-trained Chicago university students that evaluated over 10,000 newspaper articles to generate a "human policy uncertainty index". Next we compare our newspaper index to other measures of uncertainty, like the VIX index of implied volatility, disagreement measures for Federal expenditure forecasts, and word counts of "uncertainty" in the Beige Book. Finally, we turn to addressing concerns over potential political bias in the coverage, investigating how our index looks using more Republican or Democrat papers.

3.1 Comparisons to a Human Reading Based Policy Uncertainty Index

To evaluate the ability of computer searches to evaluate the economic policy uncertainty focus of newspaper articles we spent 18 months running a human audit of 10,463 articles in the Los Angeles Times, New York Times, Dallas Morning News, San

Francisco Chronicle, and Miami Herald (the five papers that provide free on-line full-article access).[12]

We began the audit process with a pilot-audit during which we read around 2,000 articles to refine our concept of policy uncertainty, and developed a detailed 64 page human audit guide defining what is and what is not classified as policy uncertainty, including numerous FAQs, examples, and instructions.[13] For example, this guide explained that if a central bank was following the Taylor Rule, then uncertainty about the parameters in the rule would be *economic policy uncertainty* (EPU=1) and *economic uncertainty* (EU=1), but uncertainty about inflation or unemployment would just be *economic uncertainty* (EU=1) but not *economic policy uncertainty* (EPU=0). We also used this pilot to train a team of seven Chicago undergrad and graduate students to run the formal audit.

With this guide completed and audit team trained up with started the main audit on the sample of 10,463 articles.[14] To maximize the efficiency of the audit we selected only articles that contained the words "uncertain" or "uncertainty" and "economic" or "economy", and then randomly selected 15 articles on average per month from January 1985 to June 2012, and 5 articles per month from January 1900 to December 1984. With these human audits we ran two pieces of analysis.

Selecting the lowest error term-set: First, we constructed all 32,193 permutations of four or more policy-relevant term sets drawn from the following list of 15 possible policy terms selected during the pilot-audit: "regulation", "budget", "spending", "policy", "deficit", "tax", "federal reserve", "war", "white house", "house of representatives", "government", "congress", "senate", "president", and "legislation". These terms were chosen during the pilot-audit as good indicators that the article was discussing policy. We evaluated these term sets for their rate of false-positives and false-negatives in searching for articles about EPU. A false positive was defined as when the computer coded an article as being about economic policy uncertainty but a human did not ($EPU^C=1$, $EPU^H=0$). A false-positive was the reverse ($EPU^C=0$, $EPU^H=1$).

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[12] For the word counts in the index we only need the search results on the count of articles per month containing our key words. But for the audit we need the full underlying text of the articles.

[13] The audit guide is available at www.policyuncertainty.com/Audit_Guide.pptx

[14] So including the pilot we read about 12,500 articles in total, 2000 in the pilot and 10,500 in the main audit

We then calculate the gross false-positive and false-negative error rates for each of the 32,193 term sets on the 1985 to 2012 articles, and used this to select the baseline term set "regulation", "deficit", "federal reserve", "white house", "congress", and "legislation" used in Figure 1. In Appendix Figures B1 to B6 we also plot our baseline index after dropping each one of these six words in turn, highlighting how our results do not hinge critically on any one term.

We also ran this false-negative/false-positive evaluation on the 1900 to 2012 data and used this to select our preferred term-set used in the US historical analysis shown in Figure 2, which extends the main term-set by adding "war" and "tariff".

Evaluating the index time-series: Using the human audit, we generated an EPU index based on the human coding of articles. Then we compare the resultant index to the computer-derived EPU index on the same set of articles. The results are shown in Figures 6 for the post-1985 series and in C1 for the 1900 to 2010 series. In both cases we see that the news-based EPU index generated by computer implementation of our preferred term set closely tracks the news-based EPU index derived from human readings (correlations of 0.709 and 0.837). Second, for econometric purposes we also care about the time-series properties of net error rates in the automated news-based EPU index. Calculating this net error rate from the series in Figure 6, we find that it is not correlated with quarterly real GDP growth rates (correlation of -0.02) and is not correlated with the true EPU rate in the audit sample (correlation of 0.004). Third, our human audit finds that only 1.8% of articles about EPU discuss low or declining policy uncertainty. That is, newspapers publish articles about EPU almost entirely when it is high or rising (stories low or falling uncertainty is apparently not particularly newsworthy). In summary, our computer-generated EPU index closely tracks EPU movements derived from human readings, and the differences between these – which will combine the computer and human coding errors - are uncorrelated with the business cycle or time trends.

Our human audit also uncovers other interesting results. First, 21% of EPU=1 articles in our audit sample discuss uncertainty about *who* will make future economic policy decisions, 69% discuss uncertainty about *what* economic policies will be undertaken and *when*, and 40% discuss uncertainty about the economic *effects* of past, present or future policy actions (allowing for articles which discuss multiple sources). Second, the

percentage of articles discussing *who* will make future economic policy decisions nearly doubles in presidential election years, indicating that the nature of policy uncertainty shifts substantially over the election cycle. Third, the majority of EPU discussions in American newspapers pertain mostly or entirely to U.S. developments and policy matters. Only 29% of the EPU=1 articles mention policy matters in other countries (often alongside domestic policy).

3.2 Comparison of the EPU index to other proxies for uncertainty

A second way to evaluate our index is to compare it to alternative measures of uncertainty. Figure 7 plots our index against three alternative measures of economic policy uncertainty, showing that all of these display a strong correlation.

VIX: The most obvious comparison is to the VIX, which is the index of 30-day implied volatility on the S&P500 index. This is only available since 1990, since when it displays a strong connection to the EPU index, with a correlation of 0.578. While the VIX and our EPU index generally move together they also have substantial independent variation. In particular, the VIX appeared to rise far more after the Asian and Russian financial crises of 1997 and 1998, the stock-market scandals of early 2002 and after Lehman's collapsed in 2008. These are all clearly events that have a strong financial and stock-market connection. In contrast the policy-uncertainty index spiked relatively more after Gulf Wars, the Clinton and Obama Election, and from 2009 onwards especially during the debt-ceiling dispute during the summer of 2011. These are more policy relevant events, in that while they have financial implications (for example, the impact of the Gulf Wars on oil prices) they also had a much broader policy implications.

These differences could also reflect differences in measurement, since the VIX is based on traded put and call options while the EPU index is based on newspaper coverage. To investigate whether this matters, we created an "equity market uncertainty" news index, which calculates an index of the fraction of articles in our 10 newspapers that contain the words "uncertain" or "uncertainty", "economic" or "economy", and words referring to financial markets ("stock price" or "equity price" or "stock market"). That is, a news-based measure of equity market uncertainty created in the same way as our policy uncertainty index. This equity market uncertainty index – shown in Appendix Figure C2 - has a

correlation with the VIX of 0.743 (compared to 0.578 for our main EPU index), highlighting how about half of the difference between the VIX and EPU is due to a difference in focus (stock-market versus policy uncertainty respectively) rather than the use of financial vs newspaper proxies.

Beige-Book: Another comparison is with the frequency of "uncertainty" in the so-called Beige Books released before each regularly scheduled meeting of the Federal Open Market Committee (FOMC) since 1983. Each Beige Book summarizes in roughly 15,000 words the views and concerns expressed by business contacts of the twelve regional Federal Reserve Banks to Fed staff members. We count the frequency of "uncertain" or "uncertainty" in each Beige Book. A research assistant read each passage about "uncertainty" in the Beige Books to determine whether they pertained to policy-related matters and, if so, recording the specific policy area discussed. The correlation between this and the EPU index is 0.486, highlighting the close nature of these measures.

Stock-Jumps: Finally, we also plot the frequency of large (+/- 2.5%) stock market jumps that are caused by policy or political factors, following the approach in Baker, Bloom and Davis (2013). The idea is that higher policy uncertainty should lead to a greater frequency of large policy induced equity market moves, and indeed we see this with the EPU correlated at 0.575 with the policy induced stock-jumps count.

3.3 Political Slant in Newspaper Coverage of EPU

A third possible concern is the potential for political slant to skew newspaper coverage of EPU. If right-leaning (left-leaning) newspapers seriously overplay EPU when Democrats (Republicans) are in power, political slant could distort measured changes in our news-based index. To investigate this issue, we split our 10 newspapers into the 5 most 'Republican' and 5 most 'Democratic' papers using the Gentzkow and Shapiro (2010) media slant index. They assign slant values based on the frequency with which newspapers use words used more heavily by one party in Congress. For example, a newspaper that frequently uses "death tax", "personal accounts" and "war on terror" (terms often used by Republicans) falls on the right side of their slant index, and a newspaper that frequently uses "estate tax", "private accounts" and "war in Iraq" (terms often used by Democrats) falls on the left side.

These two indices have a correlation of 0.921 – and are plotted in appendix Figure C3 – highlighting how the two index versions move together over time. So while political slant is an interesting issue, it does not appear to be a major measurement concern for our EPU index using major US newspapers.

4. THE POTENTIAL EFFECTS OF POLICY UNCERTAINTY

To investigate whether policy uncertainty matters we take two complementary approaches. The first uses *firm-level* data, yielding better causal identification, but examines only one channel of impact (government contracts). The second uses *macro data* from an international, yielding an aggregate relationship covering multiple channels of influence for policy uncertainty but using VAR estimations which struggle to identify causal relationships. Combining the results of both exercises we conclude that there is evidence for a negative impact of policy uncertainty on stock volatility, hiring and investment in government exposed sectors like defense, healthcare and construction and that these negative impacts may have moderate aggregate effects on employment and growth.

4.1 Firm-level Analysis of Policy Uncertainty

Our firm-level analysis focused on two types of outcomes – stock market implied volatility as a proxy for firm-level uncertainty, and real activity measures like investment and employment growth. For both approaches we use US panel data on publicly listed firms, and an identifications strategy that uses the industry-level intensity of federal contracts to identify the differential exposure of firms to policy uncertainty. In particular, we take the Federal Registry of Contracts, which contains all Federal contracts from 2000-2013, and analyze this data in two steps.

The first step matches this federal contracts database to Compustat firms using the DUNS numbers and names of the parent firm and all their US subsidiaries.[15] This delivers an indicator for each firm in Compustat of the share of their total global revenue across

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[15] This was done using Dunn & Bradstreet's US database of all public and private firms, which includes a firm name, DUNS number, industry and ownership information. This way we can match contracts taken out both with the parent publicly listed firm (e.g. "General Electric") and also those taken out by their privately held subsidiaries (e.g. "General Electric Capital Services" and "USA Instruments").

their entire US business that comes from Federal contracts. To smooth out high-frequency variations from lumpy contracts we take the average over the period. This is then allocated to 4-digit SIC industries using the Compustat line-of-business data (also averaged over the same 2000-2013 period), to deliver an industry level measure of Government contract intensity. This is reported for the ten most contract intensive industries in Table 2, which shows high government contract intensity in defense, healthcare and construction.

In the second step we calculate each firm's government contract intensity measure by taking the weighted average across 4-digit SIC industries, using the 2000-2013 average firm-specific 4-digit SIC industry sales breakdown from the Compustat line of business data. We use this approach, rather than use the firms direct contract exposure measure (calculated in the first step), to obtain variation from firm's industry mix to minimize reverse causality. As we show in our robustness table, however, the results are similar for the direct and other exposure measures like using the industry input-output matrices.

4.1.1 Implied Volatility

Table 3 displays results from investigating the impact of policy uncertainty on firms' 30-day implied stock-volatility. This 30-day implied volatility is calculated from firm level equity options prices by Options Metrics (a financial data provider). Individual equity options have been traded since the mid-1990s on the Chicago Board of Options and Exchange (CBOE), with our data available from 1996. We use this in quarterly regressions to match up with quarterly company accounts, with our implied volatility measure averaged over all the trading days in each quarter.

In column (1) we start with a very basic specification which regresses logged 30-day implied volatility against our policy uncertainty index. We also include government expenditure/GDP as a control for the first moment of policy. We see that log(EPU) is highly significantly with a coefficient of 0.432, suggesting a 1% increase in EPU is associated with a 0.4% increase in firm-level 30-day implied volatility. To give some sense of this magnitude, log(EPU) increased between 2005/06 (the pre-crisis average) and 2008/2009 (the peak of the global financial crisis) by 64 points, which would imply an increase of 27 log points (31%) in firm-average implied volatility, which about one-half of the actual 57 log point increase. The other explanatory variable (federal expenditure/GDP)

has a coefficient of -19.30, implying that government exposed firms have lower business uncertainty when government expenditure is higher, presumably because revenue from government contracts is relatively more predictable than non-government revenue.

Column (2) is the key result. We add a full-set of firm and year-by-quarter fixed-effects to control for any general time or firm variations. As a result the log(EPU) and federal expenditure/GDP terms drop out as they are collinear with the time fixed-effects. But we can include these measures interacted with our firm-level government contract intensity measures. This tests if firms with a greater exposure to government contracting are more responsive to policy uncertainty. Intriguingly, we find very strong evidence for this, with the coefficient of 0.215 on the log(EPU)*intensity measure suggesting that for every 1% increase in our policy uncertainty index a firm with, for example, a 50% exposure to government contracts would see its stock volatility rise by 0.11%.

Column (3) evaluates to what extent our EPU measure is telling us anything different from the VIX index, which is the most commonly used proxy for overall economic uncertainty (and as we know from section 3.1 correlated with our EPU measure with a coefficient of 0.578). We find that, indeed, including the VIX in a specification without firm or time fixed-effects knocks-out our EPU term (it actually becomes negative), while the coefficient on the VIX is large (at 0.734) and highly significant. This is not surprising – the VIX is the 30-day implied volatility on the S&P500 index, so it should be highly correlated with the average 30-day implied volatility on our sample of publicly listed US firms.

Column (4) again adds in time and firm fixed-effects, and as before we have to interact our EPU, FedExp/GDP and VIX measures with firms' government contract intensity. Strikingly, we now find that the EPU index has a large and significant coefficient while the VIX drops out entirely. Combining columns (3) and (4) together this reveals that, for the average firm the 30-day implied volatility is best explained by the VIX index. But for firms in sectors with high government exposure – like defense, healthcare and heavy construction – the EPU index provides additional explanatory power for implied volatility.

Columns (5) and (6) run a similar evaluation on the economic uncertainty (EU) index, yielding similar results. In column (5) we run a regression with the EPU, EU and FedExp/GDP expenditure measures, but not time or firm fixed-effects. We find the EU

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index dominates with a large and highly-significant coefficient, knocking out the EPU measure (in fact turning the EPU term is negative due to high collinearity with the EU index). Again, this is not surprising – this EU index is a measure of the frequency of newspaper articles about economic uncertainty, without any stipulation that these articles also discuss policy. Column (6) adds time and firm fixed effects, so again we need to scale our EPU, EU and fed/GDP expenditure measures by each firms' government exposure. As before we find that after doing this the EPU measure dominates and the general uncertainty measure - the EU index - measure drops out (in fact takes on the wrong sign). Hence, while our EU index of newspaper articles about economic uncertainty has the best explanatory power for the 30-day implied volatility of the average firm, our EPU measure outperforms when explaining the volatility for firms in government exposed sectors.

Finally, in column (7) we include our sector specific measures we discussed in section 2.3 for firms in defense, healthcare and construction. Reassuringly, we see that all three of these measures are positive, and (weakly) significant. This tells us that, for example for firms in the defense sector their stock market volatility is most strongly linked to the defense category index (which from Figure 3 we know jumped up in both Gulf wars and around 9/11) while for healthcare firms they appear particularly responsive to the healthcare index (which increased around the Clinton and Affordable Care Act reforms).

In Table A1 in the appendix we also run a series of robustness tests on these results. In columns (1) and (2) we used realized volatility and 182-day implied volatility to look at even longer-run and shorter run uncertainty horizons, and find very similar results. In columns (3) and (4) we add in forecasted government expenditure/GDP[16] and the next 12 quarter of realized government expenditure/GDP respectively as proxies for future government expending, and again find very robust results. In columns (5) and (6) as a government intensity measure we instead use: (i) the firm's own contract intensity taken directly from the government contracts, and (ii) the recursive input-output measure from Belo et al. (2011), and again find similar results for both. Finally, in column (7) we restrict the analysis to large firms defined by those with $500m+ of annual sales again finding similar results. So overall the relationship between higher implied volatility in government exposed firms and increased economic policy uncertainty appears robustly significant.

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[16] These forecasts come from the Philadelphia Federal Reserve's Survey of Professional Forecasters.

4.1.2 Investment and Employment

We also use the firm-level micro data to analyze how policy uncertainty impacts firm-level economic decisions on investment and hiring, shown in Table 4. Column (1) displays the result from regressing firm-level investment on log(EPU) and (federal expenditure/GDP), both scaled by contract intensity. The log(EPU) variable shows a significant negative coefficient of -0.032, while government expenditure shows a positive coefficient of 8.20. Both coefficients are in line with the standard predictions of investment-under-uncertainty models, for example, Bernanke (1983), Dixit and Pindyck (1994) and Bloom, Bond and Van Reenen (2007), which suggest that first-moment shocks (government spending) should have a positive impact on investment, but second moment shocks (policy uncertainty) should have a negative impact.

The magnitude of this uncertainty effect is also substantial. For example, the increase in logged policy uncertainty during the global financial crisis (the rise from 2005/06 to 2008/09) was about 0.84, so for a firm with a 25% exposure to government contracting this would lead to a reduction in investment of about 0.7%, about one tenth of the average investment rate of 6.6%. Hence, for government exposed sectors like defense, healthcare and construction the increase in policy uncertainty experienced during periods like the global financial crisis would induce notable drops in investment.

In column (2) we add in controls for one-year-ahead forecasts for federal expenditure/GDP because of forward looking nature of investment expenditure, and find very similar results. In column (3) we include the next 12 quarters of realized federal expenditure/GDP, as an alternative control for future expectations, and again find a significant negative coefficient on investment. Finally, in column (4) we use the sector specific measures, finding that in the health and finance sectors the frequency of policy uncertainty news articles relating to these sectors provides additional predictive power for lower investment rates (the defense sector has a positive sign but is insignificant).

Columns (5) to (8) examine the impact of increases in EPU on firms' rates of net employment growth using yearly data because of the lack of quarterly employment information. As with investment we find large and significant impacts of policy uncertainty on government contract intensive firms across all the specifications. For

example, for a firm with a 25% exposure to government contracting the rise in log(EPU) during the financial crisis of 0.84 would imply a cut in employment growth of 4.5%.The only difference between the investment and employment results are the sector specific measures in column (8), which are insignificant for employment except for the financial sector measure which is actually positive. This is somewhat surprising, but potentially could be because the increase in uncertainty over financial regulation post 2008 increased firms regulatory employment.

Finally, in column (9) we examine the impact on sales as a placebo test. While the real-options literature highlights how uncertainty should suppress demand of *input factors* with adjustment costs – the short-run impact on *output* should be smaller. Consistent with this we see that the impact of log(EPU)×intensity in column (9) is negative, but not statistically significant (while the direct Federal Expenditure/GDP variable remains positive and significant). Hence, while economic policy uncertainty appears to be damaging to short-run investment and hiring behavior in defense, healthcare and construction sectors, it appears to have a more limited immediate impact on sales after controlling for government expenditure.

4.2 Policy Uncertainty and Aggregate Economic Activity

An alternative approach to for evaluating the potential impact of policy uncertainty is to estimate VARs. However, an obvious issue with VARs is that they provide little guidance on causality. In particular, since policy is forward looking, it will respond to predictable current and future changes in economic conditions, making the policy process endogenous. Despite this, VAR estimations are helpful for getting a sense of the potential magnitudes of policy uncertainty effects, and what other factors are correlated with this.

We start by estimating a VAR and recovering orthogonal shocks using a Cholesky decomposition of the following variables: the policy uncertainty index, the log of the S&P 500 index to control for broader economic conditions, the federal funds rate to control for interest rates, log employment, and log industrial production. In our baseline specification, we run the VAR on monthly data from 1985M1 to 2012M12, with three lags.

Looking at Figure 8, we see that a 90 point innovation in policy uncertainty - the rise in our policy uncertainty index from the 2005/2006 average (the pre-crisis period) to

2011/2012 (the peak of the index during the fiscal cliff and Government shutdown) - is followed by a fall in real industrial production of up -1.2%, and a fall in employment of up to -0.3%. These dynamic responses are statistically significant (the 90% confidence intervals for +/- 1.65 standard deviations are shown), but are moderate in size being about one third of the typical business cycle sized fluctuation.

These estimated impulse response functions are robust to a range of modifications to the VAR specification. Figure 9 shows the results of including six months of lags (compared to three months in the baseline), a bivariate estimation (EPU and industrial production), a reverse bivariate estimation (industrial production and EPU), including the VIX (after the EPU index), including the EU index (after the EPU index), dropping the S&P index, and including a time-trend. We also run a test estimating the VAR relationship using the historic EPU shown in Figure 2 and log(industrial production) from 1920 (when the industrial production data becomes available) until 1984, with again a reasonably similar result. Our VAR results are also very much in line with the estimated effects of election uncertainty in Julio and Yook (2010) and Durnev (2010), despite their distinct empirical approach.

Another question is to what extent our estimated impact of uncertainty reflects the response of economic activity to an increase in uncertainty (a mean preserving increase in the variance of policy) versus the response to increased uncertainty alongside bad news. This is important as periods of increased economic policy uncertainty also tend to be periods of bad economic news. So our changes in "uncertainty" could be reflecting changes in "confidence", a term which often implies both mean and variance effects.

To control for this we first include the level of the S&P500 stock-market index in all our VAR estimations. Given stock-markets are forward looking this should hopefully reflect future expectations of business conditions. But as a second robustness test we also try including the index of consumer confidence from the Michigan Consumer Sentiment Index.[17] We also test the VAR estimates after including this consumer confidence index as

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[17] This index is constructed through phone surveys of consumers and seeks to determine how consumers view the short-term economy, the long-term economy, and their own financial situation. It takes the difference between the percent answering positively and that answering negatively for each of 5 questions, then averages these differences and normalizes by the base period (December 1968) total. This has a correlation with our uncertainty index of -0.742. We chose the Michigan index as the more commonly used consumer confidence index, but other indices give similar results as they are highly correlated with the

the second measure after uncertainty and as the first measure before uncertainty. In both cases the estimated impact is about 20% lower, suggesting that consumer confidence does proxy for part of the predictive power of our economic policy uncertainty measure. But, nevertheless we still get a drop and recovery in production after an economic policy uncertainty shock, suggesting EPU has significant additional predictive power over and above consumer confidence.

In Figure 10 we repeat this VAR estimation using our international data in a panel VAR on the twelve countries, including country, year and month fixed effects. This yields very similar results to the US estimations, albeit with smaller standard errors due to the larger sample size. In particular, the international panel VAR suggests the rise in policy uncertainty from 2005/2006 to 2011/2012 would foreshadow on average a drop in industrial of up to -0.9%, and a rise in unemployment of up to 0.3%. As with the US results, this is a moderate reduction in output and employment. Finally, we run a series of robustness tests on the VAR, including changing the set of variables, variable ordering, removing country and time fixed-effects, dropping stock-price levels, adding stock-price volatility and moving to size lags, and find the results appear to be reasonably stable as seen in figure C4 in the Appendix.

5. CONCLUSION

There has recently been a surge in interest around the measurement and potential impact of heightened policy uncertainty after the wide range of policy initiatives around the world during the global financial crisis. We develop a new index of economic policy uncertainty (EPU) based on newspaper coverage in leading US and international newspapers.

The US policy uncertainty index spikes near tight presidential elections, after the Gulf wars, the 9/11 attack, and during government shutdowns and debt ceiling debates. Several pieces of evidence – including a human audit of 10,000 newspaper articles – indicate that this EPU index captures movements in policy-related economic uncertainty.

Michigan Index – for example, the Bloomberg Confidence index has a correlation of 0.943 with the Michigan index and the Conference Board Confidence index has a correlation of 0.912 with the Michigan index.

We then investigate whether policy uncertainty has any causal impact on economic activity. To do this, we first use firm-level micro data, demonstrating that policy uncertainty increases stock-price volatility and reduces investment and employment in government dependent sectors like defense, healthcare, and heavy construction. We also run VAR estimates on macro data, finding, both in the US and also a twelve country panel, that increases in policy uncertainty foreshadow declines in investment, output, and employment.

Finally, we extend our US policy uncertainty index data back to 1900, finding that the EPU index rose dramatically during the Great Depression. Notably, this rise from 1932 onwards coincided with the more interventionist stance of Hoover and then Roosevelt. US economic policy uncertainty also appears to have trended slowly upwards since the 1960s.

In terms of future work, we want to continue to extend our measurement of policy uncertainty across countries, time-periods and categories. In addition, we want to refine the methodology using information on the location of terms about economic policy uncertainty within news articles, such as whether all our key search terms are in the same sentence or paragraph, or appear in the title. Importantly, we also want to try and extend our research to improve the identification of the causal impact of policy uncertainty on the economy. Right now it is hard to empirically distinguish cause and effect because of the forward looking nature of policy making, but we are working on developing more exogenous policy-shocks to try to deal with this which our intentional extension should help to provide, like the political shocks arising from North Korea and Russia.

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Data Appendix

A. **Newspaper search details:**

US Newspaper Data: The LA Times, USA Today, Chicago Tribune, Washington Post, Boston Globe, and Wall Street Journal searches are conducted using the Proquest Archiver service. The Miami Herald, Dallas Morning News, and San Francisco Chronicle searches are done using the Access World News Newsbank service. Searches in the New York Times are conducted on the New York Times' own online archive. The full set of policy-related terms is: regulation, deficit, legislation, Congress, white house, Federal Reserve, the Fed, regulations, regulatory, deficits, congressional, legislative, and legislature.

We chose to utilize a constant set of 10 newspapers for our primary index instead of a broader measure of newspapers from an aggregator Google News due to a number of failings on the part of the Google News service. Results from Google News were highly unstable, with results for a given month often changing based on when a query was conducted. Moreover, the universe of papers and sources contained within Google News was uncertain and could not be fully described due to limitations on the number of results that the Google News service would allow a reader to directly observe. Finally, frequent changes to the search algorithms and the structure of the website made automation a difficult task relative to other, more stable, newspaper archives.

Our current audit sample contains 12 articles per month from 1992-94 and 9 per month from 1985-91, because our online access to full articles starts in 1995 for the San Francisco Chronicle and 1992 for the Dallas Morning News. We are seeking to extend our audit sample for these two newspapers back to 1985.

India Newspaper Data: Indian data are obtained from Access World News. The papers include The Economic Times, the Times of India, the Hindustan Times, the Hindu, the Financial Express, the Indian Express, and the Statesman. The Times of India is searched from August 2001 to the present. Hindustan Times is indexed from October 2004 to the present. The Statesman is used from January 2002 to the present. All other papers span January 2003 to the present. Searches for India, unlike other non-English-speaking countries, are done in English. Policy-relevant terms used for India were developed in conjunction with a team of researchers in India and include regulation, deficit, legislation, reform, "fiscal policy", "monetary policy", "central bank", "RBI", "Reserve Bank", "parliament", "finance, ministry", "policymakers", "finance minister", "lawmakers", "planning commission", "economic advisor", "Prime Minister's Office", "PM Office", "PMEAC", "PMO", "Lok Sabha", "tax", "taxes", "taxation", "excise duties", and "customs duties".

China Newspaper Data: Newspaper data from China are taken from the South China Morning Post using the Proquest news archive. This data extends back to January 1995. For China, terms include policy, spending, budget, political, "interest rates", reform, government, Beijing, authorities, tax, regulation, regulatory, "central bank", "People's Bank of China, "PBOC", deficit, and WTO.

United Kingdom Newspaper Data: Newspapers from the United Kingdom include the Times of London and the Financial Times since 1985, obtained from the Access World News Newsbank database. For historical newspaper data, the Guardian and the Times of London are utilized from 1900 to 2010 using the Proquest Historical Newspaper Archive. Policy-relevant terms include regulation, legislation, parliament, "prime minister", "Bank of England", "BOE", regulations, regulatory, parliamentary, legislative, legislature, deficits, deficit, "Downing Street", "Downing St" and Whitehall.

France Newspaper Data: Newspapers from France include Le Monde and Le Figaro. Le Monde data are obtained from Lexis Nexis, going back to 1987. Le Figaro's results are obtained from Factiva, extending back to 1997. Policy-relevant terms include taxe, taxes, impot, impots, politique, politiques, regulation, regulations, reglementation, loi, lois reglementations, depense, depenses, deficit, deficits, "banque centrale", "BCE", "Reserve federale", budget, and budgetaire.

Italy Newspaper Data: Data for Italy is taken from Corriere Della Serra, from 1997, and La Repubblica since 1985. Both sets of articles are obtained from Factiva. Policy-relevant terms for Italy are tassa, tasse, politica, regolamento, regolamenti, spesa, spese, spesa, deficit, "Banca Centrale", "Banca d'Italia", budget, bilancio.

Germany Newspaper Data: German Newspapers incdlue Handelsblatt from 1986 and FAZ from 1993. Both sets of newspaper article results are obtained from the newspapers' own archives. Policy-relevant terms include steuer, wirtschaftspolitik, regulierungsma nahmen, ausgaben, bundesbank, EZB, zentralbank, haushalt, defizit, and haushaltsdefizit.

Spain Newspaper Data: El Mundo, since 2000, and El Pais, since 2001, compreise the newspapers for the Spanish policy uncertainty index. Data are obtained from Factiva. Policy-relevant terms include impuesto, tarifa, regulacion, politica, gastar, gasta, gasto, presupuesto, deficit, and "banco central".

Russia Newspaper Data: Data for Russia is taken from the Kommersant's own online archive since 1994. For "uncertain" and "uncertainty", we use "неопределённый" or "неопределённость". We use "Ekonomika" as a translation for "economy", and "politika" as a translation for policy. "Tax" is translated as "nalog". For "spending", there are several corresponding Russian words. For spending by the government, we consider a set of three terms: "rashody byudzheta" (budget outflows), "gosudarstvennye rashody" (government spending), and "rashodovanie" (spending). We translate "Regulation" as "regulirovanie"; Central Bank of Russia or CBR as "Centralnyj Bank Rossii" or "CBR"; and "Senate" as as "Gosudarstvennaya Duma" (or "Gosduma" or "Duma"). The Russian counterpart to "White House" is "Kreml". For "bill", we use "zakon" or "zakonodatelnyj akt", which is a synonym of "zakon" but used in more formal context. We translate "legislation" as 'zakonodatelstvo'; "monetary policy" as "denezhnaya-kreditno politika"; trade policy as "torgovaya politika"; and "interest rate" as "procentnaya stavka".

South Korea Newspaper Data: South Korean papers are taken from Mediagon from 1990. Newspapers include Donga, Kyunghyang, Hankook, Maeil, and Hankyoreh. Policy related

terms include jungchaek or bangchim or shichaek, segeum or "-se", jichul or sobi, gyujae or tongje or gyujung, hankookeunhaeng or haneun, joongangeunhaeng, yaesan, jeokja or bujok, gukhwae, jejung or jejungbub or ipbub, cheongwadae, and jeongbu.

<u>Canada Newspaper Data</u>: All Canadian newspaper data are taken from Proquest Newspaper Archives. Newspapers include the Gazette, The Globe and Mail, the Canadian Newswire, the Ottawa Citizen, the Toronto Star, and the Vancouver Sun. The Gazette, the Globe, and the Toronto Star cover 1985 to the present. The Vancouver Sun goes back to 1987. The Ottawa Citizen ranges from 1986 to the present, and the Canadian Newswire goes back to 1999. Policy-relevant terms include spending, policy, deficit, budget, tax, regulation, and "central bank".

B. Newspaper evaluation tests
Generating a newspaper measure of financial uncertainty.

Our news-based measure of policy uncertainty raises a basic question: Can frequency counts of newspaper articles serve to quantify economic uncertainty in a useful manner? To shed light on this question, we create a separate news-based index of equity market uncertainty and compare it to the market-based VIX, a widely used measure of uncertainty in equity returns that is firmly grounded in option pricing theory.

To construct a news-based measure of equity market uncertainty, we parallel the approach in Section 2.1 above. Specifically, we use the same newspapers, scaling methods and search criteria – except for dropping the policy-related term set and, instead, requiring an article to contain 'stock price', 'equity price' or 'stock market'. Figure 7 plots the resulting news-based index of equity market uncertainty against the monthly average of daily VIX values from 1990 to 2012. The two series are highly correlated. While the news-based index is clearly noisier, it picks up every major move in the VIX during the sample period.[18]

C. Federal Contract Data

The federal contracts data are taken from the federal contracts registry at USAspending.gov. The site was developed as a condition of the Federal Funding Accountability and Transparency Act. It contains data on all federal contracts from 1999-2013 to both private and public entities. The data encompasses many aspects of each contract, including the originating agency, the recipient of the award, location of performance, amounts, various characteristics of the contract and the recipient, and a number of other fields.

We primarily utilize identifying information about the recipient of each contract and their parent company, if applicable, as well as the date and the amount of the each contract. Unfortunately, the data for each contract generally does not have unique company identifiers such as GV keys, stock tickers, or other firm codes that can be easily matched to external data regarding firm characteristics. Because of this, we try to match contract recipients to firm characteristics using DUNS numbers, when available (<10% of contract

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[18] The VIX reflects implied volatility over a 30-day look-ahead period. In contrast, our news-based policy uncertainty index involves no explicit horizon. This conceptual difference is one source of discrepancies between the two measures. We return to this matter in Section 4 below.

recipients have a DUNS number associated with them), and the standardized names of the contract recipient or their parent company.

To standardize firm names for matching, we perform cleaning operations like removing punctuation and abbreviations, deleting excess spacing, replacing common misspellings, removing parentheticals, and other techniques to simplify firm names. We perform this operation both on the universe of contract recipients as well as the universe of ORBIS firms. After these cleanings, we match to ORBIS firm data by, in sequence, own DUNS number, parents' DUNS number, own firm name, and parents' firm name.

We are then are able to use stock ticker data from ORBIS to match to quarterly Compustat data on public firms. After this matching procedure, we are left with quarterly data on the universe of public American firms from Compustat matched with the total amount of federal contracts that they receive by quarter. In total, we are able to match about 45% of the total number contracts containing over 65% of the contract value awarded. Some of the residual is due to error in the matching procedure, but the majority comes from not matching to private firms or other government entities (for instance, public universities, states, and cities are some of the largest recipients of federal contracting dollars).

From these matched firm-contract data, we are able to construct 2 separate measures of 'contract-intensity' (hereafter, 'intensity') to provide cross-sectional variance in exposure to policy uncertainty. The first is a measure at the three-digit SIC code level. Here we simply take the overall sum of contracts and sum of revenue by three-digit SIC code by year and take the ratio of the total contracts to total revenue, yielding an annual intensity measure. Finally, we take the average of these values by three-digit SIC code over time and apply the long-run average to that industry for all firms and years in the sample.

The second method uses firm segment data from Compustat in order to distribute both firm revenue and firm contracts to each of their component segments (defined by four-digit SIC codes). For instance, if one segment of a firm produces 50% of its revenue, we assign that segment 50% of contracts, as well. With this distribution completed, we sum contract dollars and revenue across four-digit SIC codes by year, obtaining four-digit SIC code level intensity measures, as in the three-digit SIC code approach. Using the four-digit SIC code intensities, we reconstruct a firm's intensity based on their composition by firm segments (so a firm with 50% of its revenue in one four-digit SIC code and 50% in another takes the simple average of the two SIC codes' intensity levels). This approach yields firm-level variation in cross-sectional intensity of government contracting based on the four-digit SIC code makeup of each firm.

D. FOMC Beige Books Data

Beige Books were used to create an index of economic uncertainty and economic policy uncertainty for the period July 1983 to June 2013, spanning 240 issues. A total word count for each issue is calculated, as well as a count for the number of times the word uncertain/uncertainty came up in each book was tabulated. Then, a human auditor went through each of these mentions of uncertainty and determined the cause attributed to each mention.

The possible causes were categorized as follows: monetary policy, fiscal policy, tax policy, government spending, healthcare regulation, financial regulation, labor regulation, environmental regulation, sovereign debt (along with exchange rate policy and foreign

reserves in one category), election uncertainty abroad, election uncertainty in the US, national security and war, other policy (including trade and legal policy), unspecified political issues, entitlement programs (including social safety net and welfare programs), and lastly other specified policy matters. Whether or not the uncertainty had to do with Europe was also recorded. These categories were derived from the categorical analysis of the EPU Index (seen in Table 2) with additional categories added to better distinguish political uncertainty and general unnamed uncertainty.

For categorization, if a mention of uncertainty attributed any or all parts of the uncertainty to policy of any type (or multiple types), that mention was coded as a 1 for economic policy uncertainty. In addition to this policy/non-policy indicator, each individual category of policy uncertainty was also tracked, with results seen in Table 3. Since a given mention of uncertainty can contain references to multiple categories of policy uncertainty, the sum of policy categories seen in Table 3 can be higher than the overall frequency counts for economic policy uncertainty for a given time period.

Lines 1 and 2 of Table 3 describe two series which represent weighted averages created from this economic uncertainty (EU) and economic policy uncertainty (EPU) data. To construct these series, each Beige Book's count of EU and EPU mentions were divided by that issues' total word count. Then these new numbers were multiplied by a scaling factor so that the all-time average of the normalized EU and EPU was equal to the average of the raw counts. Thus, the scaling factor is equal to the average of the raw counts divided by the average of the semi-normalized counts (the raw frequency counts divided by the word counts). All of this data was then averaged at the quarterly and annual levels.

Table A1: Robustness of Cross-Firm Effects of Policy Uncertainty on Stock Volatility

Specification	(1) Realized Vol	(2) 182 day implied vol	(3) Add Fed forecasts	(4) Add 12 qtrs future Fed Expenditure	(5) Firm level Intensity	(6) Belo et al. (2011) intens	(7) $500m+ sales firms
Log(EPU)×Intensity	0.346***	0.178***	0.175***	0.258***	0.274***	0.211***	0.237***
	(0.089)	(0.073)	(0.070)	(0.086)	(0.063)	(0.051)	(0.071)
Federal Exp/GDP×Intensity	-23.72	-27.47***	-58.28***	-7.05	-20.25	-6.31	-31.03
	(14.71)	(11.77)	(15.35)	(16.74)	(14.31)	(12.82)	(12.40)
Forecast Federal Expenditure/GDP×Intensity			32.61***				
			(6.27)				
Firm and Time Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	136,742	136,742	136,742	73,822	136,742	134,544	42,785
Number of Firms	5,624	5,624	5,624	3,189	5,624	5,537	1,070

Notes: Data is for 1996-2012. The dependent variable is the average 30-day ahead implied volatility for the firm (averaged over each day in the quarter), except in column (1) which uses the realized daily volatility over the quarter, and column (2) which uses the average 182 day implied volatility. **Log(EPU)** is the log of the economic policy uncertainty index. **Intensity** is the firms' exposure to Federal contracts, as measured by the industry make-up of each firm in all columns except (5) which uses firm-specific intensity weights and column (6) which uses the input-output weights from Belo, Gala and Lin (2011). **Federal Expenditure/GDP** is the level of actual Federal Expenditure over GDP from NIPA tables. **Forecast (1-year) Federal Expenditure/GDP×Intensity** uses the mean forecast level of federal expenditure/GDP for the next quarter. Regressions are weighted by the average sales for each firm over the regression sample to focus on larger firms with actively traded individual equity options, except for column (7) **$500m+ sales firms** which has no weights but uses only firms with $500m+ average sales to focus on larger firms. **Add 12 qtrs future Fed Expenditure** in column (4) means the next 12 quarters of actual federal expenditure are included as a control for future Federal Expenditure expectations. Standard errors clustered at the firm level.

Table 1: The Intensity and Composition of Economic Policy Uncertainty in the News Index, by Time Period

Time period	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	2010:1-2013:10	1985:1-2014:12
	Mid 1980s to Gulf War I	Gulf War I	1990s boom until 9/11	9/11 attacks	2000s boom	Beginning of Credit Crunch	Lehman collapse to 'recovery' start	Fiscal Policy Battles	Overall Average
Overall Economic Uncertainty	218.2	349.8	185.9	326.9	159.8	184.8	370.9	252.1	219.3
Economic Policy Uncertainty	109.6	141.9	88.1	128.5	71.4	83.4	132.1	127.5	100.0
Fiscal Policy	49.6	59.6	35.9	55.4	32.3	33.1	61.5	78.3	46.1
- Fiscal Policy: Taxes	39.9	48.4	31.9	51.2	30.2	31.4	56.9	68.1	40.3
- Fiscal Policy: Spending	22.7	26.8	12.1	17.3	8.5	6.6	17.1	33.2	17.1
Monetary policy	32.7	41.8	26.1	45.2	22.2	31.6	27.8	26.1	28.1
Health care	7.0	15.4	14.9	18.4	13.1	13.4	29.3	39.3	17.3
National security & war	25.0	53.6	18.0	54.8	25.4	15.9	21.3	19.8	23.8
Regulation	15.7	23.0	14.5	19.6	11.2	15.5	29.2	28.1	17.4
- Regulation: financial regulation	3.3	7.0	1.3	5.3	1.7	3.6	10.2	6.1	3.3
Foreign sovereign debt, currency crises	1.4	0.6	2.3	0.5	0.4	0.3	0.4	3.9	1.6
Entitlement programs	7.3	12.6	11.5	18.7	8.8	8.2	15.3	24.7	12.4
Trade policy	3.8	4.0	6.3	2.6	1.7	2.0	1.4	2.1	3.8
Sum of Policy Categories	142.5	210.7	129.5	215.1	115.2	120.0	186.3	222.2	150.6
Ratio of Economic Policy Uncertainty To Overall Economic Uncertainty	0.50	0.41	0.47	0.39	0.45	0.45	0.36	0.51	0.47

Notes: The second row reports average values of our Newsbank Index of Economic Policy Uncertainty in each indicated period (scaling by the total number of articles in a period), expressed as a percentage of the average index value for the entire sample period from 1985:1 to 2014:12. For example, the value of 109.6 for Economic Policy Uncertainty from 1985:1 to 1990:6 says that the value of the index in that period is 109.6% of its average value over the full sample period. The top row reports the value of our Newsbank Index of Overall Economic Uncertainty, also expressed as a percentage of the average value of the news-based policy uncertainty index. Entries in Rows 1 to 12 index report analogous values for narrower policy categories based on news article references to specific policy-related terms. For example, the value of 26.1 for "Monetary Policy" from 2010:1 to 2013:10 says that the number of scaled references to monetary policy uncertainty in this period is 26.1 percent of the average number of scaled references to ALL forms of policy-related uncertainty during the 1985:1 to 2013:10 sample period. The categories in Rows 1 through 12 are not mutually exclusive in two respects. First, a given news article may discuss multiple distinct sources of uncertainty such as monetary policy and entitlement reforms. Some category boundaries overlap. For example, Medicaid is an entitlement program and a part of the U.S. health care system. News queries run Feb 12, 2015.

Specific search terms by row:

-**Fiscal policy**: "taxes" OR "tax" OR "taxation" OR "taxed" OR "government spending" OR "federal budget" OR "budget battle" OR "balanced budget" OR "defense spending" OR "military spending" OR "entitlement spending" OR "fiscal stimulus" OR "budget deficit" OR "federal debt" OR "national debt" OR "Gramm-Rudman" OR "debt ceiling" OR "fiscal footing" OR "government deficits" OR "balance the budget";

-**Monetary Policy**: "federal reserve" OR "the fed" OR "money supply" OR "open market operations" OR "quantitative easing" OR "monetary policy" OR "fed funds rate" OR "overnight lending rate" OR "the fed" OR "Bernanke" OR "Volker" OR "Greenspan" OR "central bank" OR "interest rates" OR "fed chairman" OR "fed chair" OR "lender of last resort" OR "discount window" OR "European Central Bank" OR "ECB" OR "Bank of England" OR "Bank of Japan" OR "BOJ" OR "Bank of China" OR "Bundesbank" OR "Bank of France" OR "Bank of Italy";

-**Health care**: "health care" OR "Medicaid" OR "Medicare" OR "health insurance" OR "malpractice tort reform" OR "malpractice reform" OR "prescription drugs" OR "drug policy" OR "food and drug administration" OR "FDA" OR "medical malpractice" OR "prescription drug act" OR "medical insurance reform" OR "medical liability" OR "part d" OR "affordable care act" OR "Obamacare";

-**National security and war**: ""national security" OR "war" OR "military conflict" OR "terrorism" OR "terror" OR "9/11" OR "defense spending" OR "military spending" OR "police action" OR "armed forces" OR "base closure" OR "military procurement" OR "saber rattling" OR "naval blockade" OR "military embargo" OR "no-fly zone" OR "military invasion";

-**Regulation**: "regulation" OR "banking supervision" OR "Glass-Steagall" OR "tarp" OR "bank supervision" OR "thrift supervision" OR "Dodd-frank" OR "financial reform" OR "commodity futures trading commission" OR "cftc" OR "house financial services committee" OR "Basel" OR "capital requirement" OR "Volcker rule" OR "bank stress test" OR "securities and exchange commission" OR "sec" OR "deposit insurance" OR "fdic" OR "fslic" OR "ots" OR "occ" OR "firrea" OR "truth in lending" OR "union rights" OR "card check" OR "collective bargaining law" OR "national labor relations board" OR "nlrd" OR "minimum wage" OR "living wage" OR "right to work" OR "closed shop" OR "wages and hours" OR "workers compensation" OR "advance notice requirement" OR "affirmative action" OR "at-will employment" OR "overtime requirements" OR "trade adjustment assistance" OR "davis-bacon" OR "equal employment opportunity" OR "eeo" OR "osha" OR "antitrust" OR "competition policy" OR "merger policy" OR "monopoly" OR "patent" OR "copyright" OR "federal trade commission" OR "ftc" OR "unfair business practice" OR "cartel" OR "competition law" OR "price fixing" OR "class action" OR "healthcare lawsuit" OR "tort reform" OR "tort policy" OR "punitive damages" OR "medical malpractice" OR "energy policy" OR "energy tax" OR "carbon tax" OR "cap and trade" OR "cap and tax" OR "drilling restrictions" OR "offshore drilling" OR "pollution controls" OR "environmental restrictions" OR "clean air act" OR "clean water act" OR "environmental protection agency" OR "epa" OR "immigration policy";

-**Foreign sovereign debt and currency crisis**: "sovereign debt" OR "currency crisis" OR "currency crash" OR "currency devaluation" OR "currency revaluation" OR "currency manipulation" OR "euro crisis" OR "Eurozone crisis" OR "european financial crisis" OR "european debt" OR "asian financial crisis" OR "asian crisis" OR "Russian financial crisis" OR "Russian crisis" OR "exchange rate";

-**Entitlement programs**: "entitlement program" OR "entitlement spending" OR "government entitlements" OR "social security" OR "Medicaid" OR "medicare" OR "government welfare" OR "welfare reform" OR "unemployment insurance" OR "unemployment benefits" OR "food stamps" OR "afdc" OR "tanf" OR "wic program" OR "disability insurance" OR "part d" OR "oasdi" OR "Supplemental Nutrition Assistance Program" OR "Earned Income Tax Credit" OR "EITC" OR "head start program" OR "public assistance" OR "government subsidized housing";

-**Trade policy**: "import tariffs" OR "import duty" OR "import barrier" OR "government subsidies" OR "government subsidy" OR "wto" OR "world trade organization" OR "trade treaty" OR "trade agreement" OR "trade policy" OR "trade act" OR "doha round" OR "uruguay round" OR "gatt" OR "dumping";

The authors welcome suggestions for improving the foregoing category-specific search terms.

Table 2: The Ten Highest Contract Intensities by SIC Code

SIC Code	Industry Description	Contracts Total $B	Contract Intensity
376	Guided Missiles And Space Vehicles And Parts	16.1	0.767
379	Miscellaneous Transportation Equipment	6.2	0.472
800	Health services	77.7	0.438
348	Ordnance And Accessories, Except Vehicles And Guided Missiles	0.7	0.384
381	Search, Detection, Navigation, Guidance & Aeronautical Systems	5.8	0.261
871	Engineering Services	1.9	0.224
160	Heavy Construction Other Than Building Construction Contractors	3.1	0.152
372	Aircraft And Parts	16.2	0.147
162	Water, Sewer, Pipeline, & Communications & Power Line Construction	1.0	0.138
278	Blankbooks, Looseleaf Binders, And Bookbinding	0.2	0.110
All	All Industries	257.4	0.013

Notes: Total contracts is in $Billion. Contract intensity refers to the average yearly ratio of federal contracts given to all firms relative to total revenue across all firms in a 3 digit SIC code, except health services which is defined as the average yearly share of federal and state healthcare expenditure to all expenditure.

Table 3: Cross-Firm Effects of Policy Uncertainty on Stock Volatility

Dep Var: Log(30 day impl vol)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log(EPU)	0.432***		-0.044***		-0.752***		
	(0.010)		(0.013)		(0.027)		
Log(EPU)×Intensity		0.215**		0.228**		0.545***	0.082
		(0.069)		(0.100)		(0.202)	(0.117)
Log(VIX)			0.734***				
			(0.016)				
Log(VIX)×Intensity				-0.020			
				(0.117)			
Log(EU)					1.080***		
					(0.027)		
Log(EU)×Intensity						-0.301**	
						(0.177)	
Federal Exp/GDP	-19.30***		-7.75***		-17.40***		
	(1.50)		(1.49)		(1.49)		
Federal Exp/GDP×Intensity		-29.45*		-29.70**		-29.93*	-31.08
		(12.72)		(12.36)		(12.66)	(13.24)
Defense EPU*Defense Firm							0.048***
							(0.012)
Health EPU*Health Firm							0.071*
							(0.043)
Finance EPU*Finance Firm							0.144***
							(0.030)
Firm and Time Fixed-Effects	No	Yes	No	Yes	No	Yes	Yes
Observations	136,742	136,742	136,742	136,742	136,742	136,742	136,742
Number of Firms	5,624	5,624	5,624	5,624	5,624	5,624	5,624

Notes: Data is for 1996-2012, spanning 113,335 observations and 5,140 firms in every column. The dependent variable is the average 30-day ahead implied volatility for the firm (averaged over each day in the quarter). **Log(EPU)** is the log of the economic policy uncertainty index. **Intensity** is the firms' exposure to Federal contracts, as measured by the industry make-up of each firm. **Federal Expenditure/GDP** is the level of actual Federal Expenditure over GDP from NIPA tables. **Log(VIX)** is log of the VIX implied volatility index, and **Log(EU)** log of the economic uncertainty index. **Defense EPU*Defense Firm** is the category specific defense policy uncertainty index from Table 2 scaled by 1 for defense firm (SIC 348, 372, 376, 379 , 381 and 871) and 0 otherwise. **Health EPU*Health Firm** is the healthcare EPU scaled by being a health firm (SIC 800 to 809), and **Finance EPU*Finance Firm is** the financial regulation EPU scaled by being a financial firm (SIC 600 to 699). Regressions weighted by the average sales for each firm over the regression sample to focus on larger firms with actively traded individual equity options. Standard errors clustered at the firm level.

Table 4: Cross-Firm Effects of Policy Uncertainty on Investment and Hiring

	(1) I/K Firm Seg.	(2) I/K Firm Seg.	(3) I/K Firm Seg.	(4) I/K Firm Seg.	(5) Δemp Firm Seg.	(6) Δemp Firm Seg.	(7) Δemp Firm Seg.	(8) Δemp Firm Seg.	(9) ΔRev Firm Seg.
Intensity Measure:									
Log(EPU) ×Intensity	-0.032***	-0.032***	-0.024**	-0.031***	-0.213**	-0.227**	-0.220**	-0.207**	-0.128
Current EPU*intensity	(0.010)	(0.010)	(0.011)	(0.010)	(0.084)	(0.089)	(0.118)	(0.084)	(0.096)
ΔFederal Expenditure/ GDP×Intensity	8.20***	8.04***	12.12***	8.23***	10.79	15.60***	3.19	11.58	20.39**
	(2.86)	(2.86)	(3.18)	(2.87)	(7.41)	(8.04)	(12.56)	(7.58)	(9.43)
ΔForecast Federal Expend./GDP×Intensity		1.01				-4.65***			
		(0.828)				(2.89)			
Defense EPU *Defense Firm[a]				0.094				-2.53	
				(0.314)				(1.60)	
Health EPU *Health Firm[a]				-0.422*				1.16	
				(0.231)				(1.42)	
Finance EPU *Finance Firm[a]				-0.270***				0.636*	
				(0.076)				(0.353)	
Periodicity	Quarterly	Quarterly	Quarterly	Quarterly	Yearly	Yearly	Yearly	Yearly	Yearly
Firm and Time FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3 Years Fed Exp leads	No	No	Yes	No	No	No	Yes	No	No
Observations	709,120	709,120	411,832	709,120	162,006	162,006	108,718	162,006	151,653
Number of Firms	22,358	22,358	14,190	22,358	17,151	17,151	13,018	17,151	15,929

Notes: Data is for 1985-2012. All columns include a full set of firm and time fixed effects (year by quarter in columns 1 to 4, and yearly in columns 6 to 9). **I/K** is the investment rate defined as $Capex_t/(Net Plant, Property and Equipment)_{t-1}$. **Δemp** is the change in employment defined as $(emp_t - emp_{t-1})/ (0.5 \times emp_t + 0.5 \times emp_{t-1})$, and **Δrev** is the change in sales defined as $(sales_t - sales_{t-1})/ (0.5 \times sales_t + 0.5 \times sales_{t-1})$. **Intensity** is the firms' exposure to Federal contracts, as measured by the industry make-up of each firm. **ΔFederal Expenditure/GDP×Intensity** is the differenced level of actual Federal Expenditure over GDP from NIPA tables in the next quarter in col (2) and next year in col (6). **ΔForecast Federal Expenditure/GDP×Intensity** uses the differenced mean forecast level of federal expenditure/GDP for the next quarter in cols (1) to (4) and next year in cols (5) to (9). Denotes point estimate and standard-error scaled by 100 for presentational purposes. Standard errors clustered at the firm level.

Figure 1: Index of US Economic Policy Uncertainty
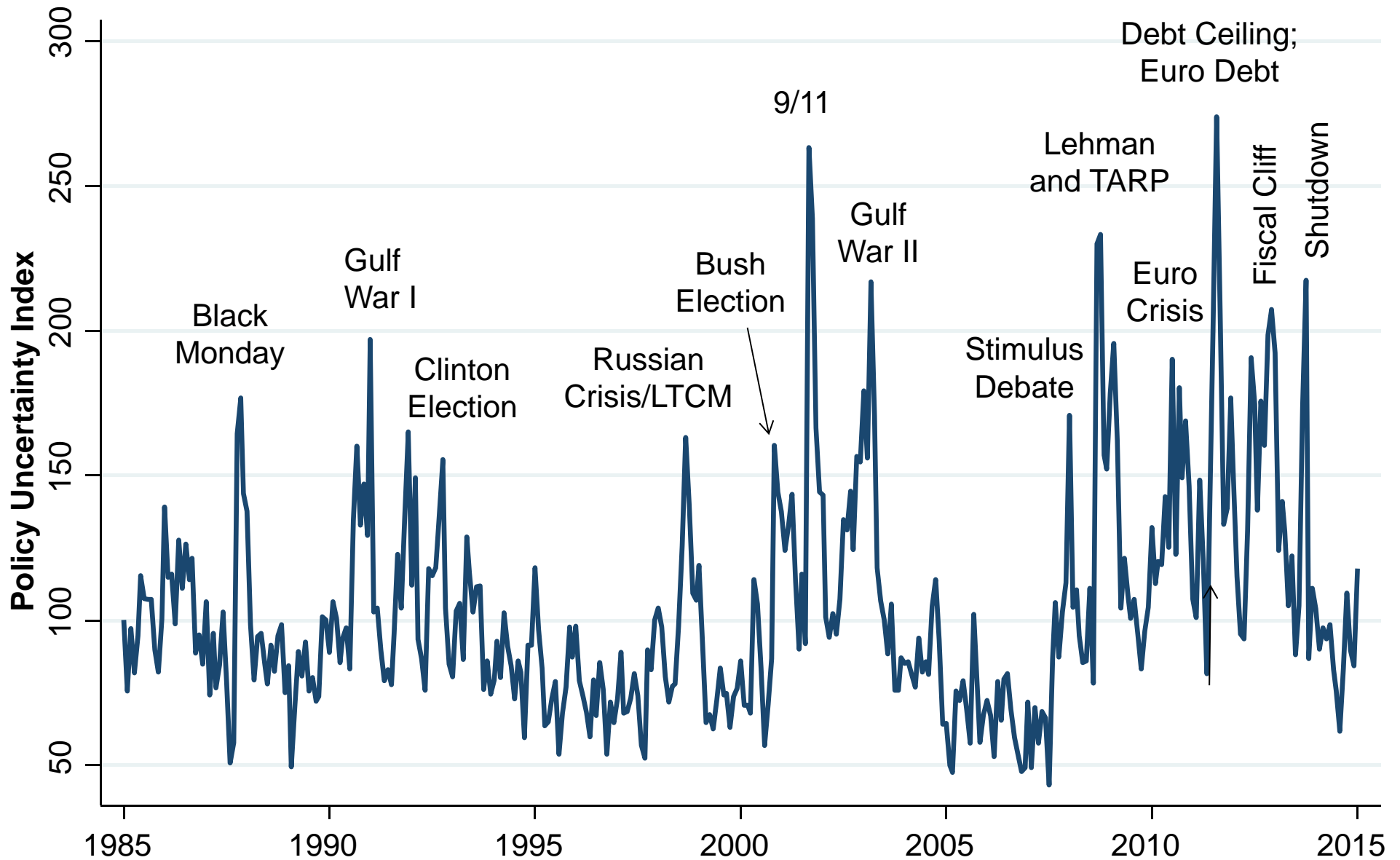
Notes: Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'regulation', 'federal reserve', 'deficit', 'congress', 'legislation', and 'white house'. The series is normalized to mean 100 from 1985-2009 and based on queries run on 2 February, 2015 for the USA Today, Miami Herald, Chicago Tribune, Washington Post, LA Times, Boston Globe, SF Chronicle, Dallas Morning News, NY Times, and the Wall Street Journal.

Figure 2: Historical Index of US Economic Policy Uncertainty
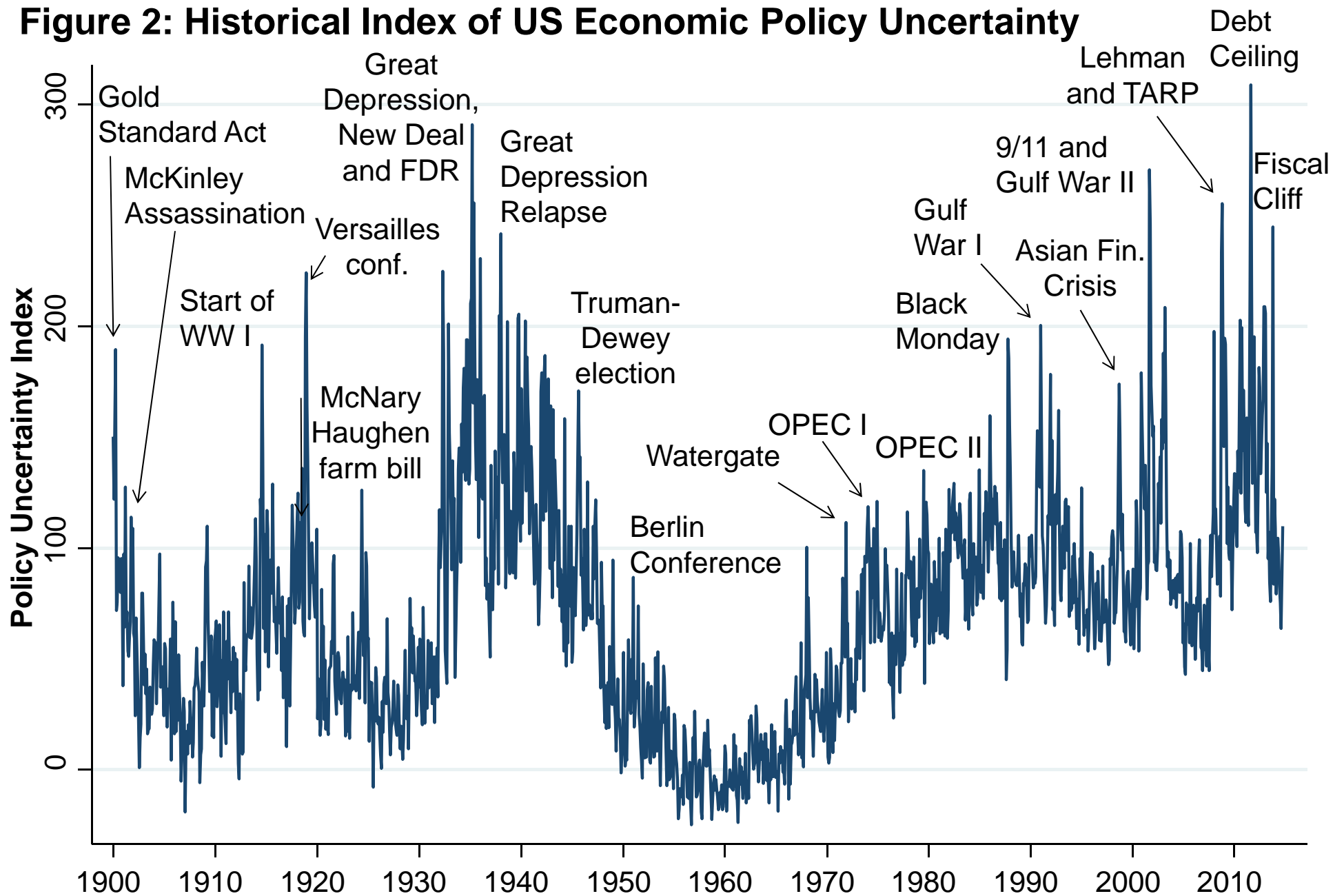
Notes: Index of Policy-Related Economic Uncertainty composed of quarterly news articles containing uncertain or uncertainty, economic or economy or business or commerce, and policy relevant terms (scaled by the smoothed total number of articles) in 6 newspapers (WP, BG, LAT, NYT, WSJ and CHT). Data normalized to 100 from 1900-2011.

Figure 3: Defense and Healthcare policy uncertainty indices
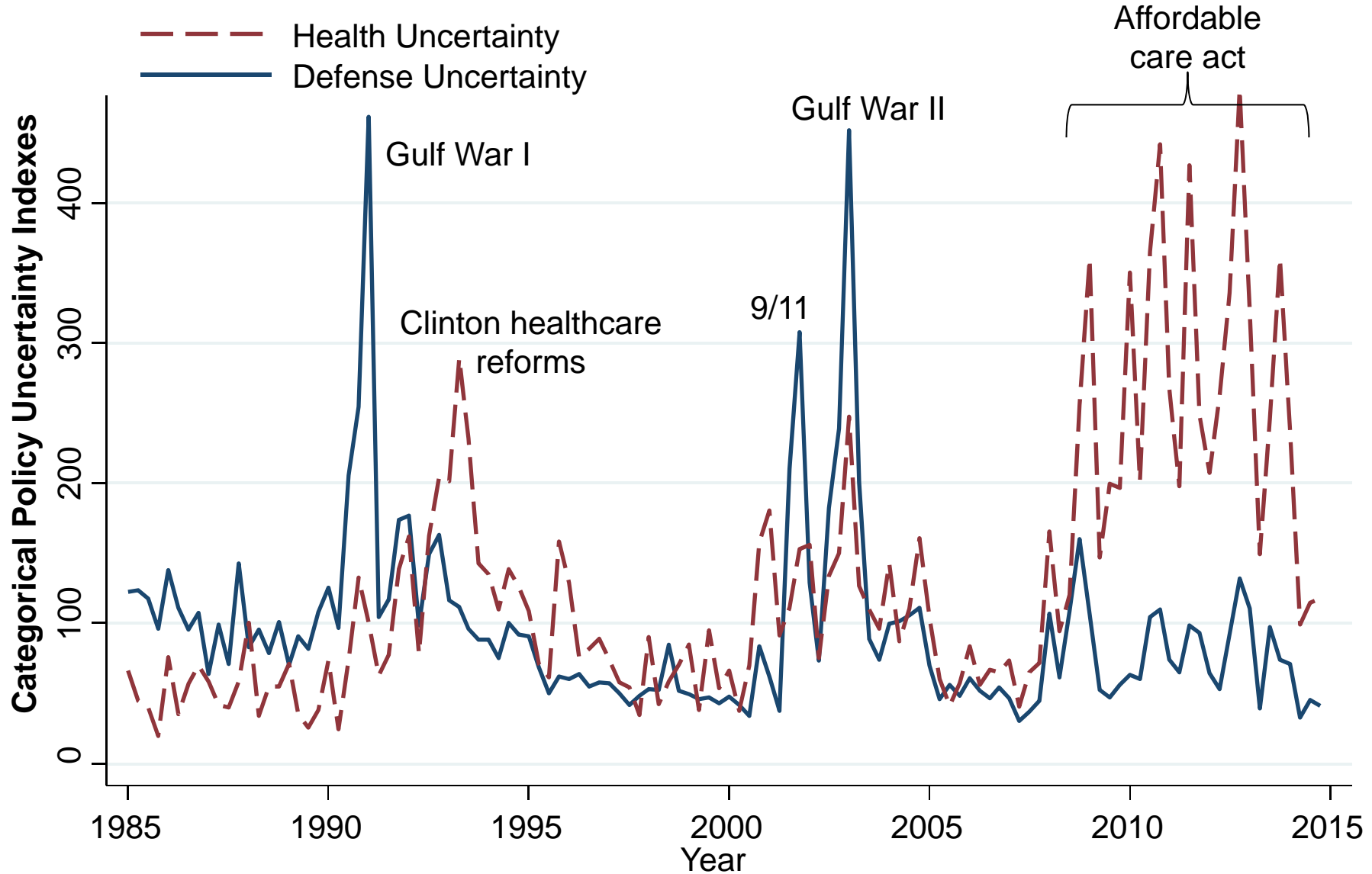
Notes: These news-based Categorical EPU Indexes reflect scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', one or more policy relevant terms: 'regulation', 'federal reserve', 'deficit', 'congress', 'legislation', and 'white house', and one or more terms from a set of terms regarding Defense (eg. war, terrorism, department of defense) or Healthcare (eg. healthcare, hospital, health insurance), respectively. The series is normalized to mean 100 from 1985-2009 and based on queries run

Figure 4: Index of Japanese Economic Policy Uncertainty

Japan Economic Policy Uncertainty Index, June 1988 to January 2015
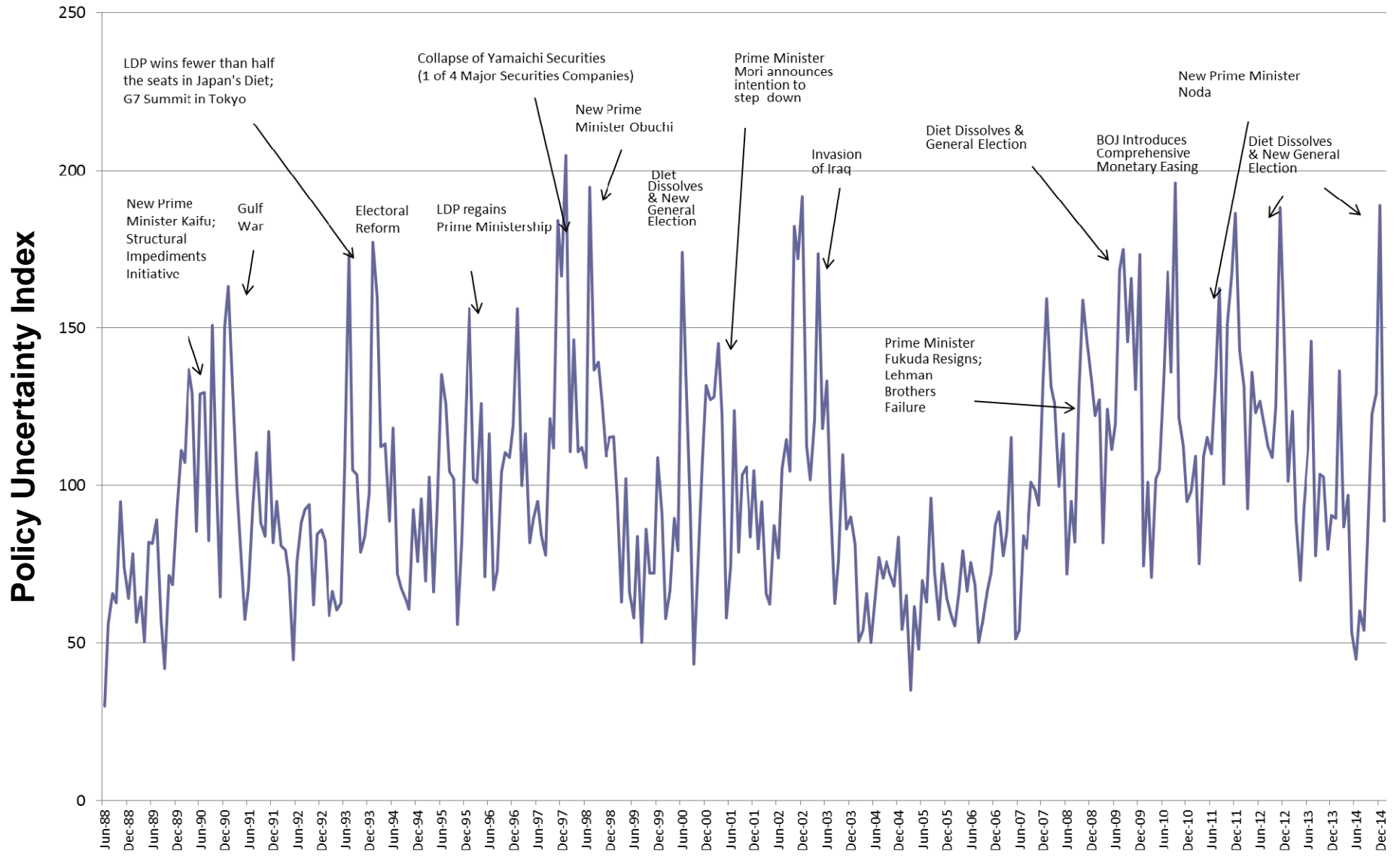
Notes: The news-based EPU Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'tax', 'policy', 'regulation', 'spending', 'deficit', 'budget', or 'central bank'. Each query is done in the native language of the country. The series is normalized to mean 100 from 1985-2009 and based on queries in the following newspapers: Yomiuri and Asahi

Figure 5: Index of Russian Economic Policy Uncertainty
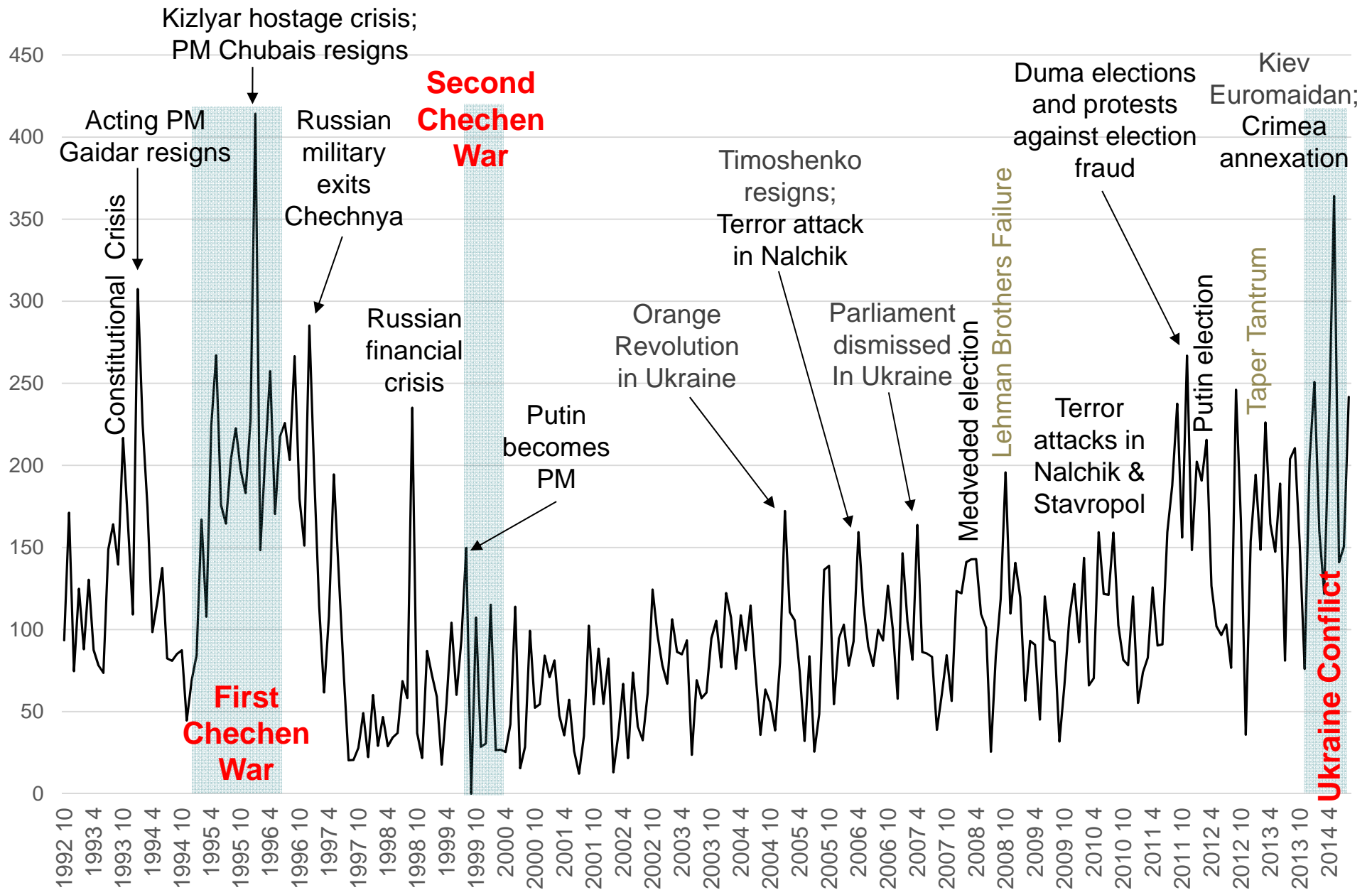
Notes: Data from Kommersant daily newspaper (1992-2014).

Figure 6: Human versus Computer EPU index
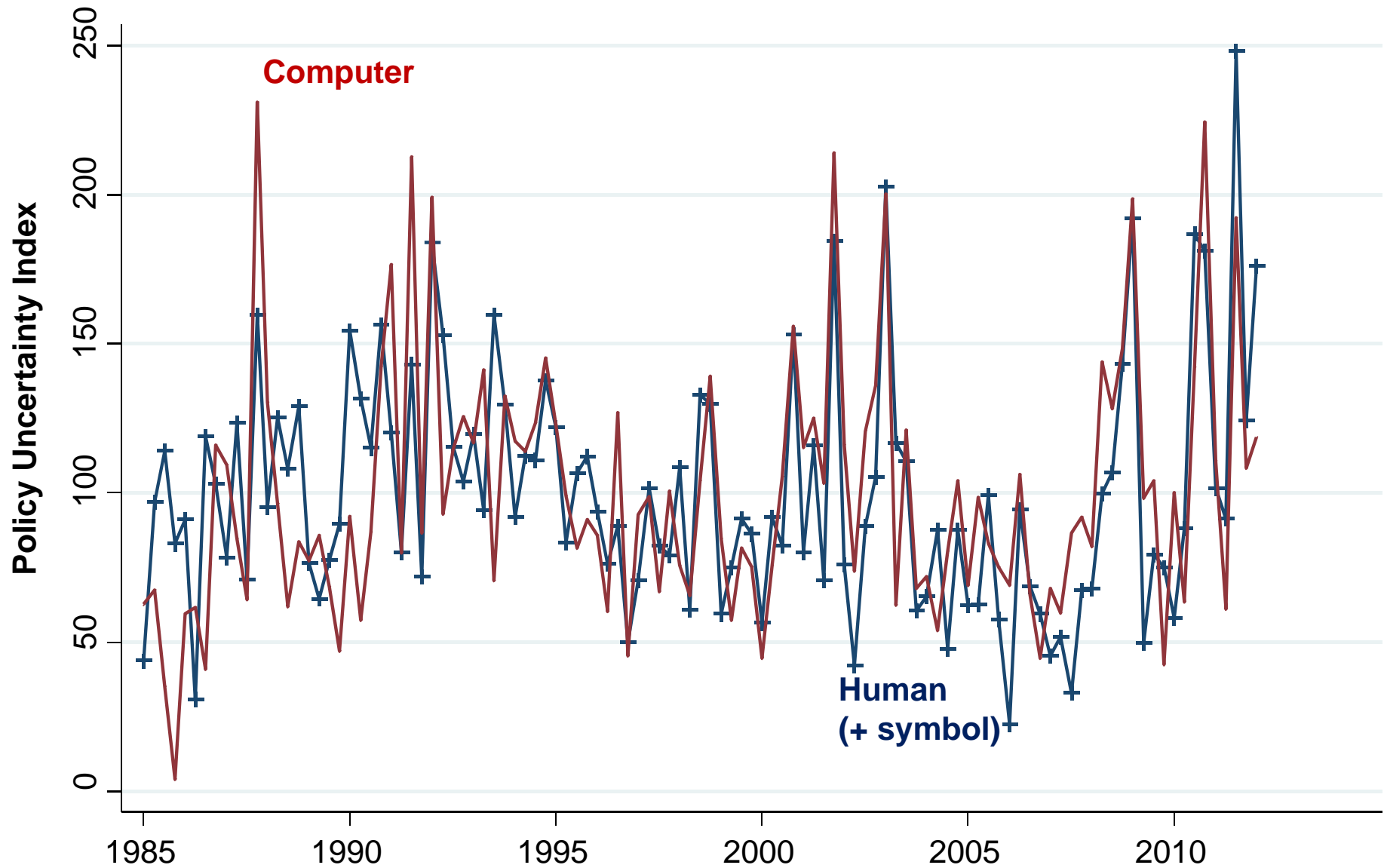
Notes: Human index based on audit of 4.567 articles in the LA Times, New York Times, Miami Herald and SF Chronicle (the five papers we could audit from 1985 to 2012). Both series are plotted quarterly (to ensure sufficient sample size).

Figure 7: EPU index versus alternative measures of uncertainty
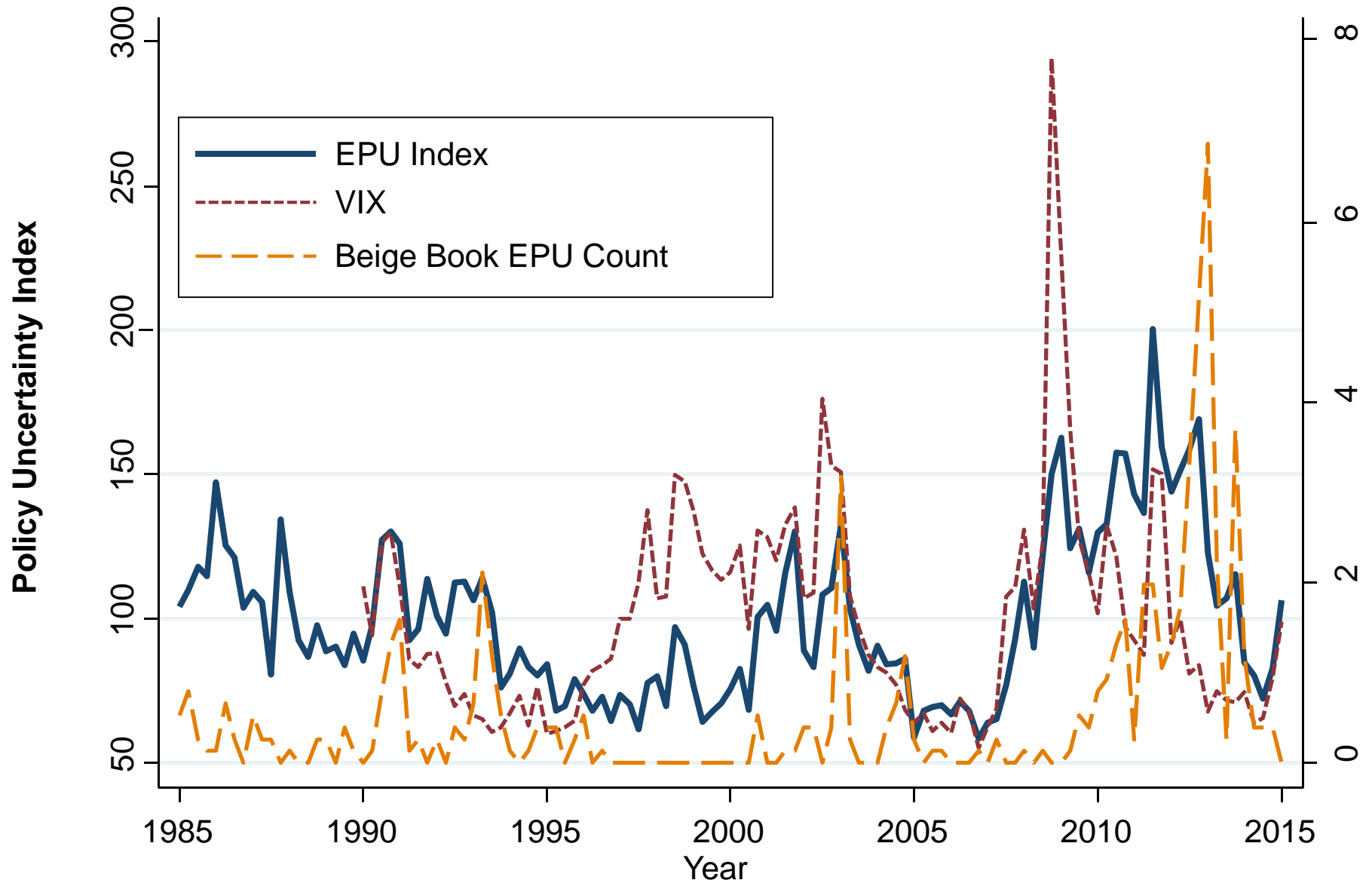
Notes:

Figure 8: Estimated Industrial Production and Employment after a Policy Uncertainty Shock
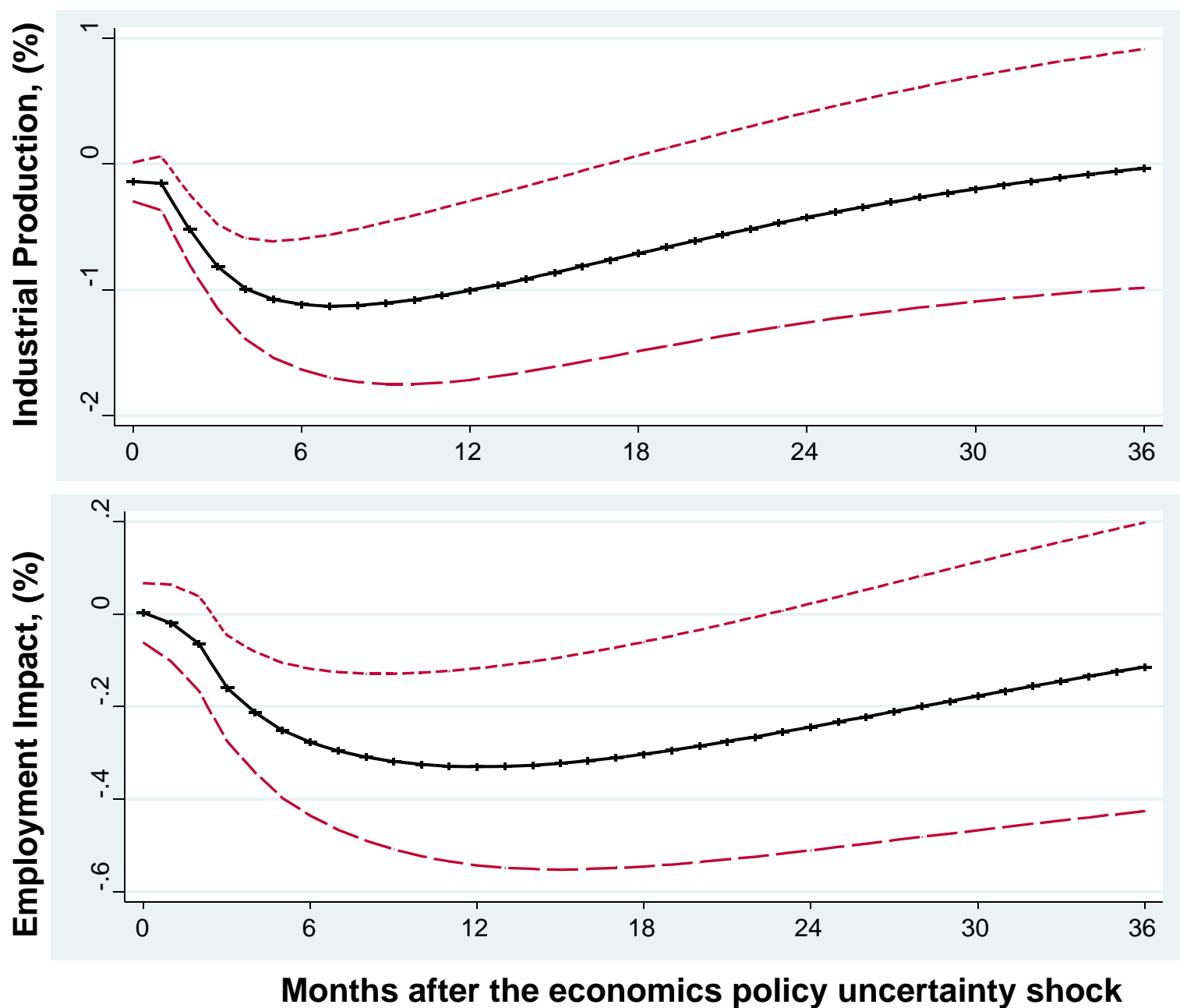
Notes: This shows the impulse response function for Industrial Production and employment to an increase in the policy-related uncertainty index from the 2005-2006 average value to the 2011-2012 average value. The central (black) solid line is the mean estimate while the dashed (red) outer lines are the 90% confidence interval 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. Fit to monthly data from 1985M1 to 2012M12, using 3 lags.

Figure 9: Robustness of Estimates to Different VAR Specifications
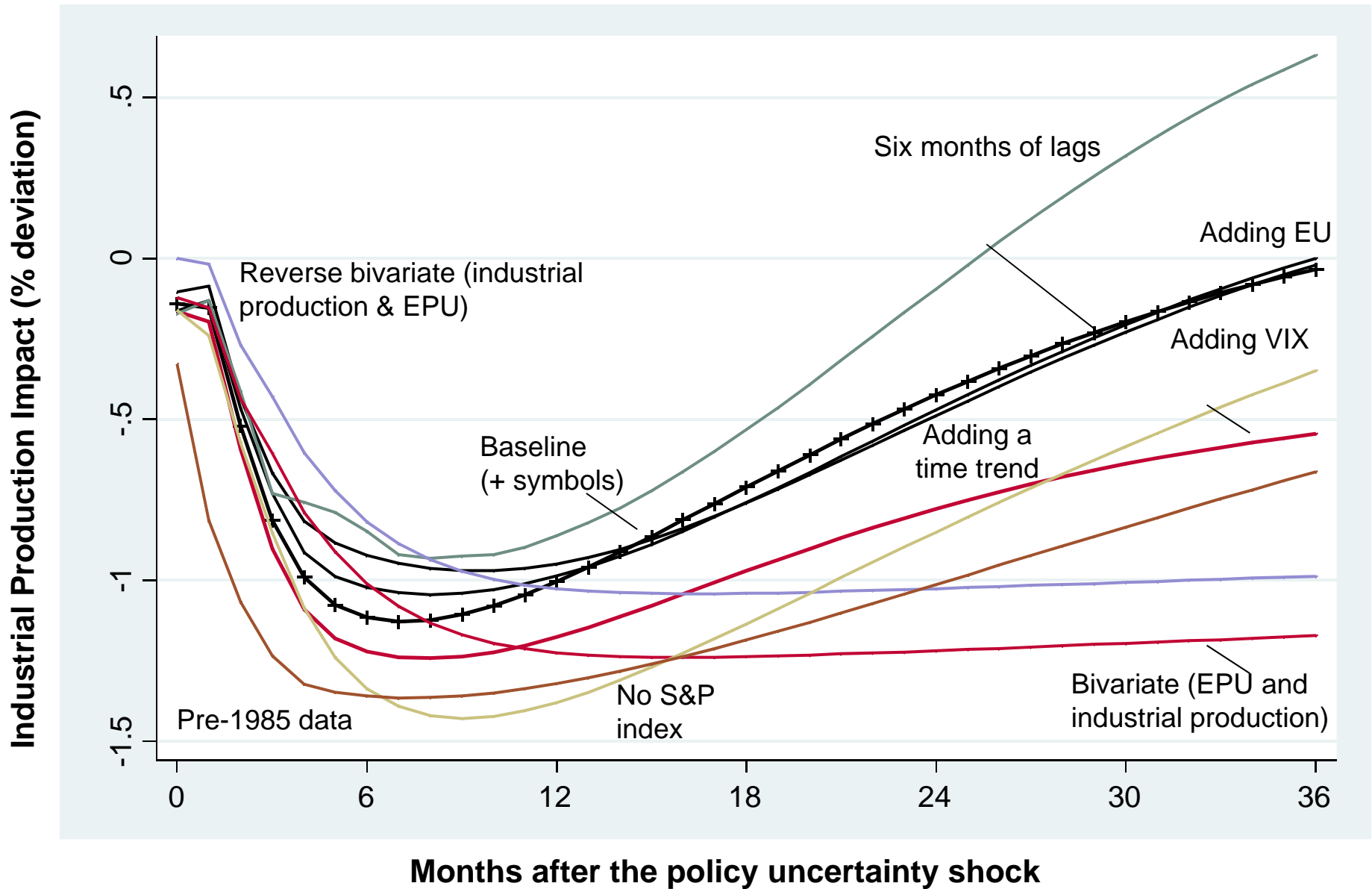
Notes: This shows the impulse response function for GDP and employment to an increase in the policy-related uncertainty index from the 2005-2006 average to the 2011-2012 average. Estimated using a monthly Cholesky Vector Auto Regression (VAR) of the uncertainty index, log(S&P 500 index), federal reserve funds rate, log employment and log industrial production with 3 lags unless otherwise specified. Data from 1985 to 2012, except for the pre-1985 data spec which uses EPU and IP data from 1920 to 1984.

Figure 10: Twelve Country VAR Panel
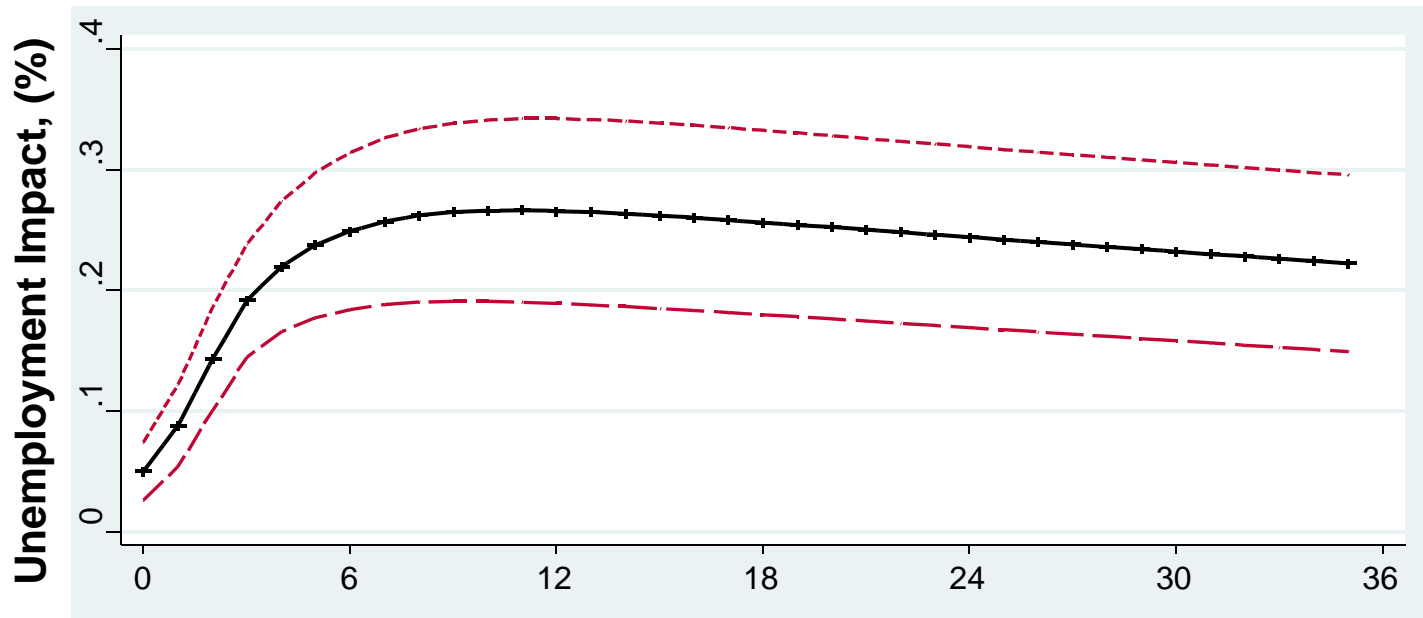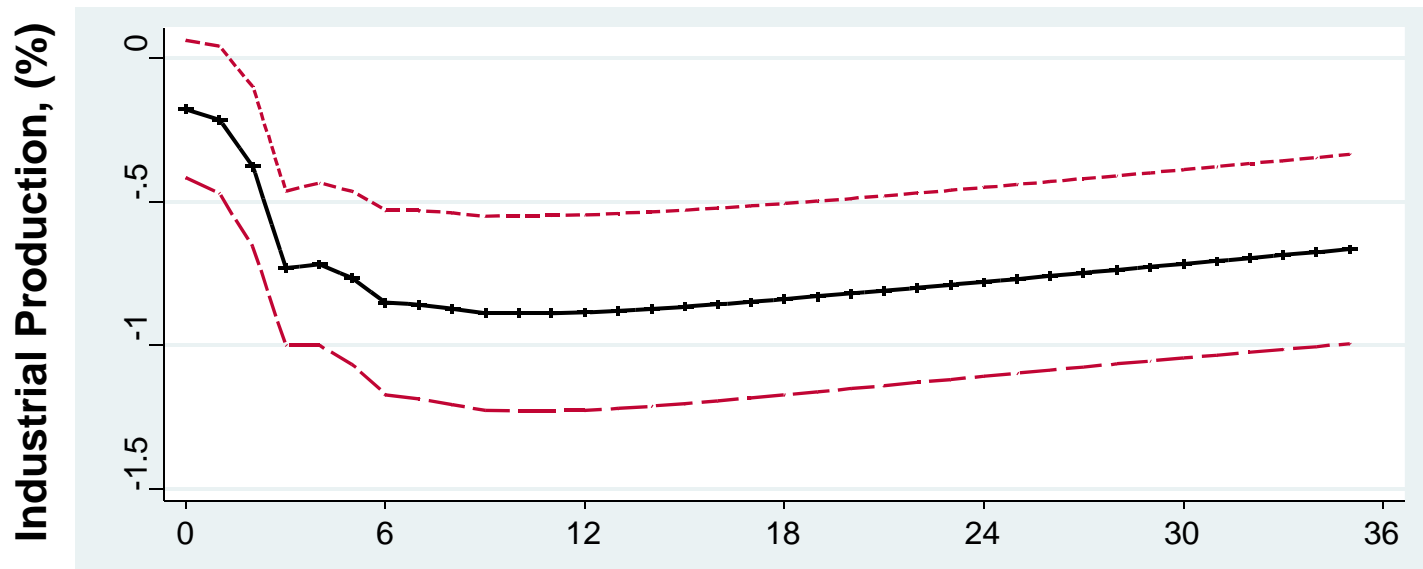
Notes: Plots the impulse response function for Industrial Production and employment to an increase in the policy-related uncertainty index from the 2005-2006 average value to the 2011-2012 average value. The central (black) solid line is the mean estimate while the dashed (red) outer lines are the 90% confidence bands. Estimated using a monthly Cholesky Vector Auto Regression (VAR) with 3 lags on the EPU index, log(S&P 500 index), unemployment rate, and log industrial production, plus a full set of country, year and month fixed-effects. Country data weighted by the number of newspapers used to make the EPU series. Fit to monthly data from 1985M1 to 2012M12 where available. Estimated on data from Canada, China, France, Germany, India, Italy, Japan, Korea, Russia, Spain, UK and the USA.

Appendix Figures

Note:
A figures for countries
B figures for word robustness
C figures for everything else

All figures ordered according to when they appear in the
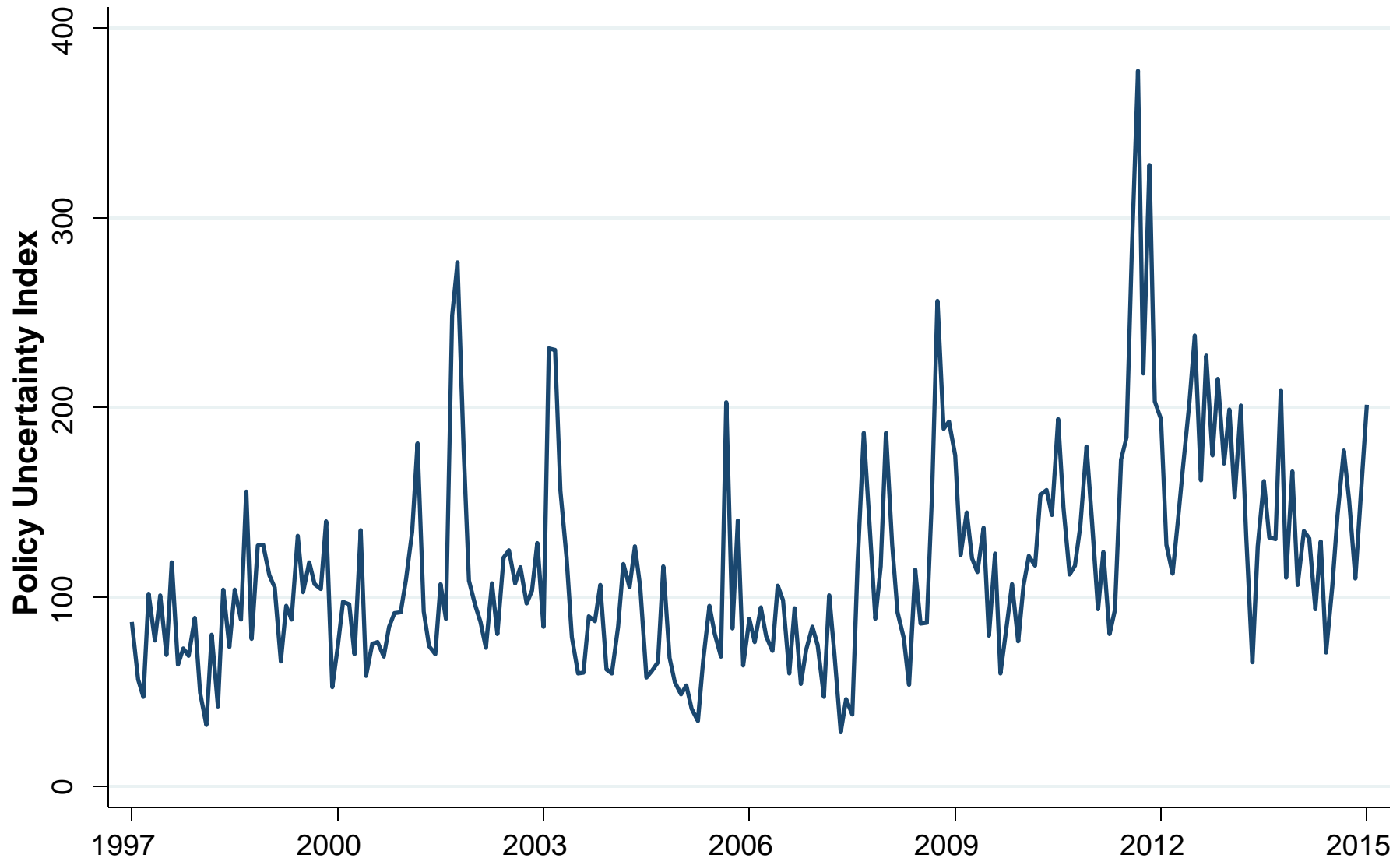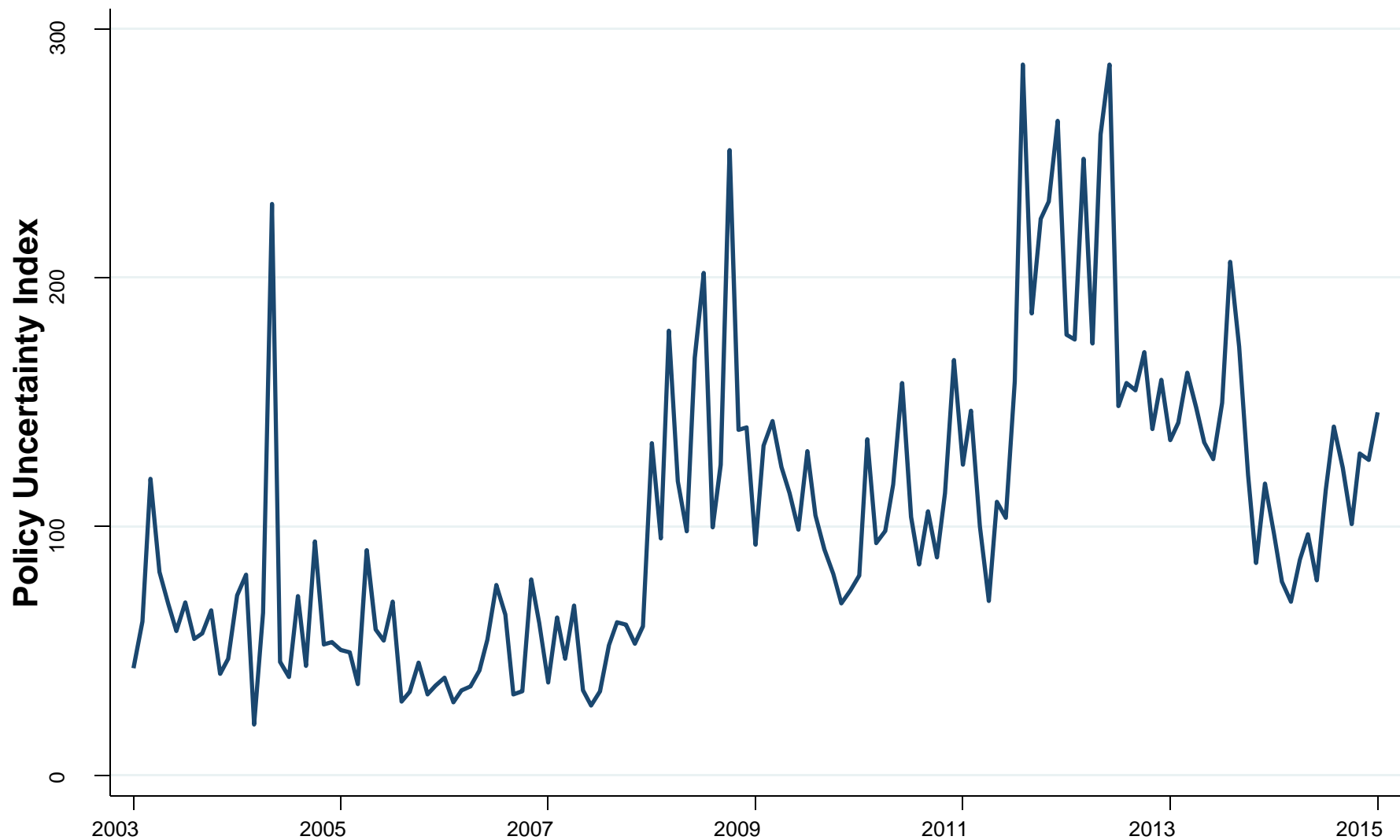
Figure A1: UK Historical Index
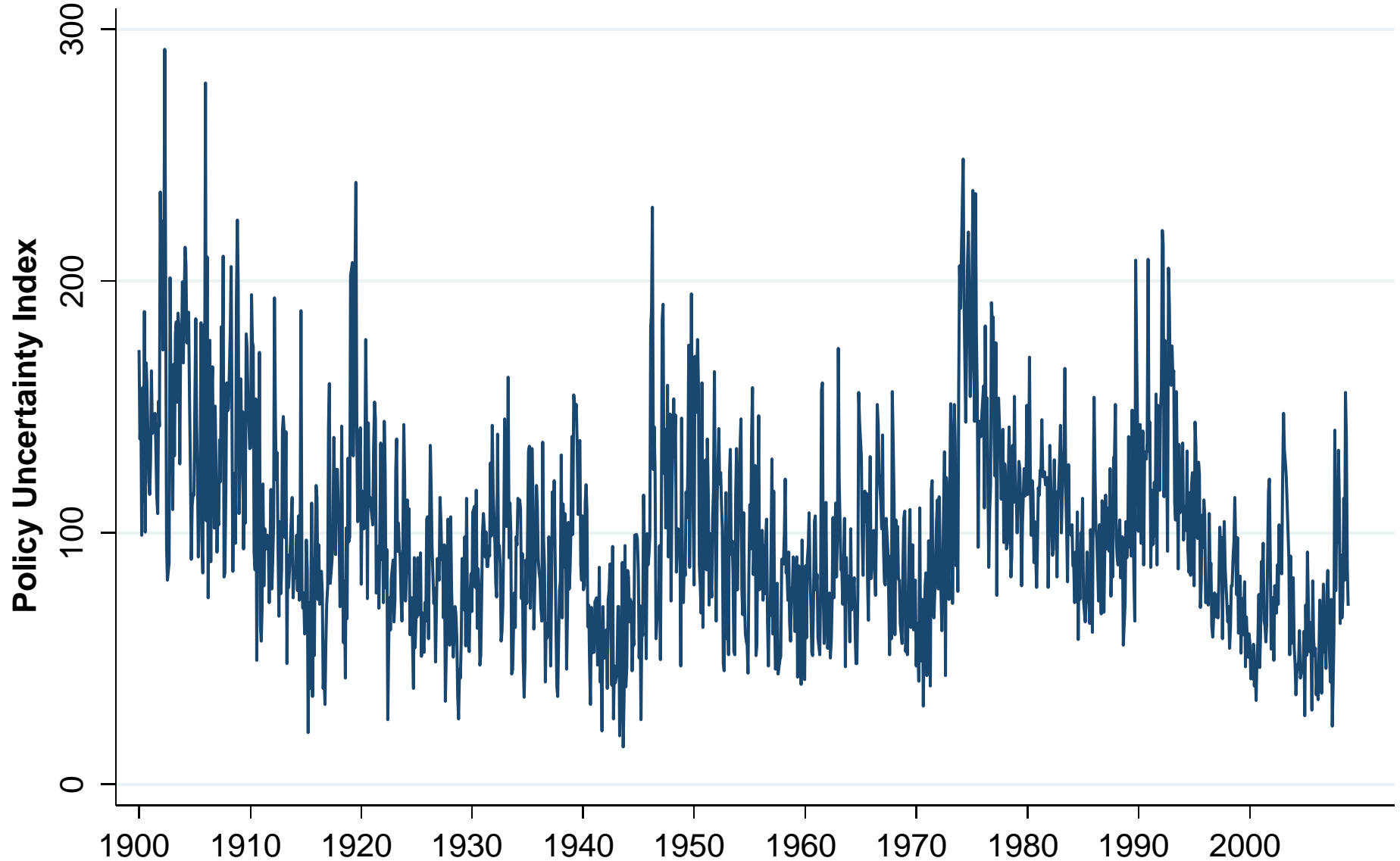
Notes: The news-based EPU Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'tax', 'policy', 'regulation', 'spending', 'deficit', 'budget', or 'Bank of England'. The series is normalized to mean 100 from 1900-2010 and based on queries in the following newspapers: The Times and The Guardian.
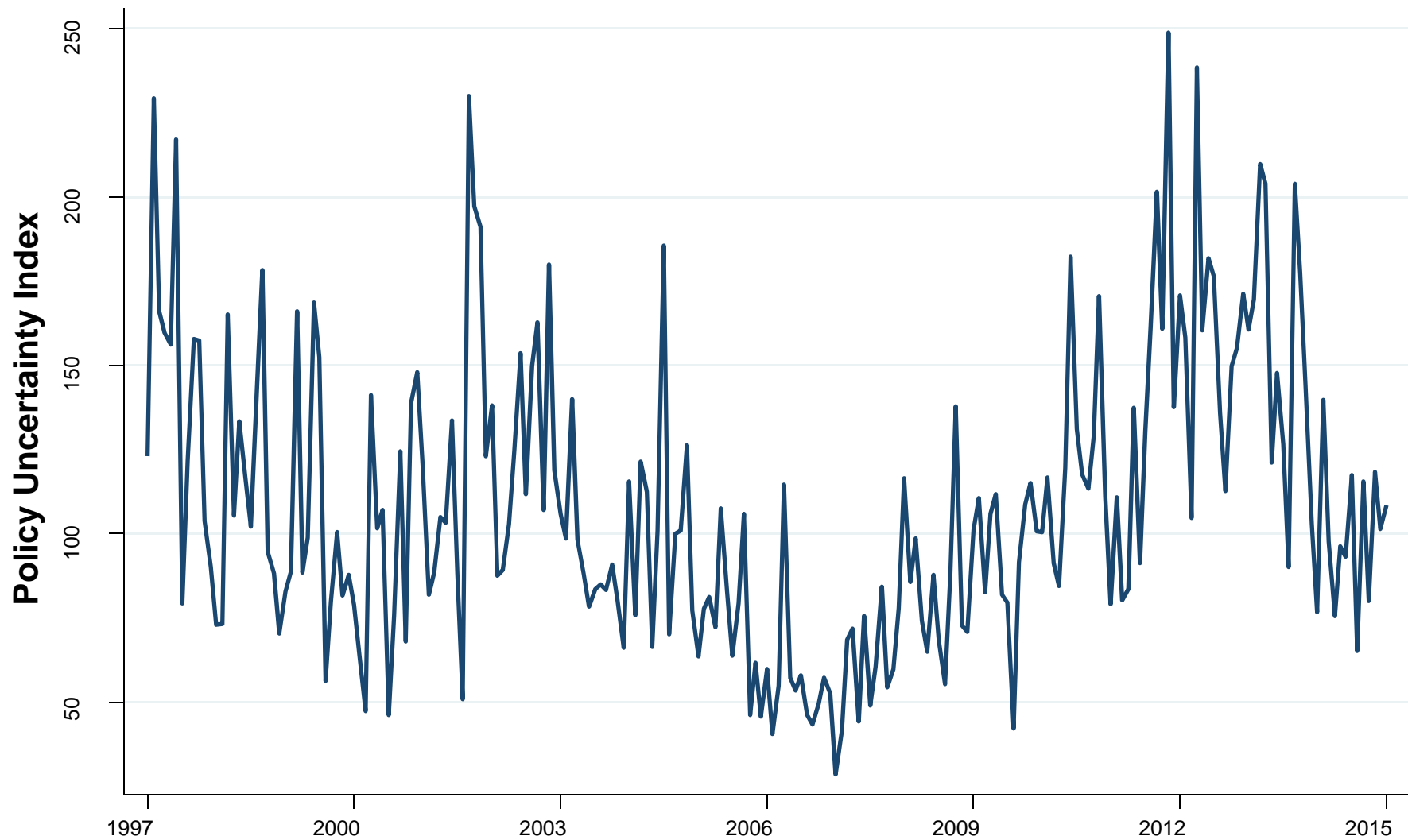
Figure A2: EPU series for Canada
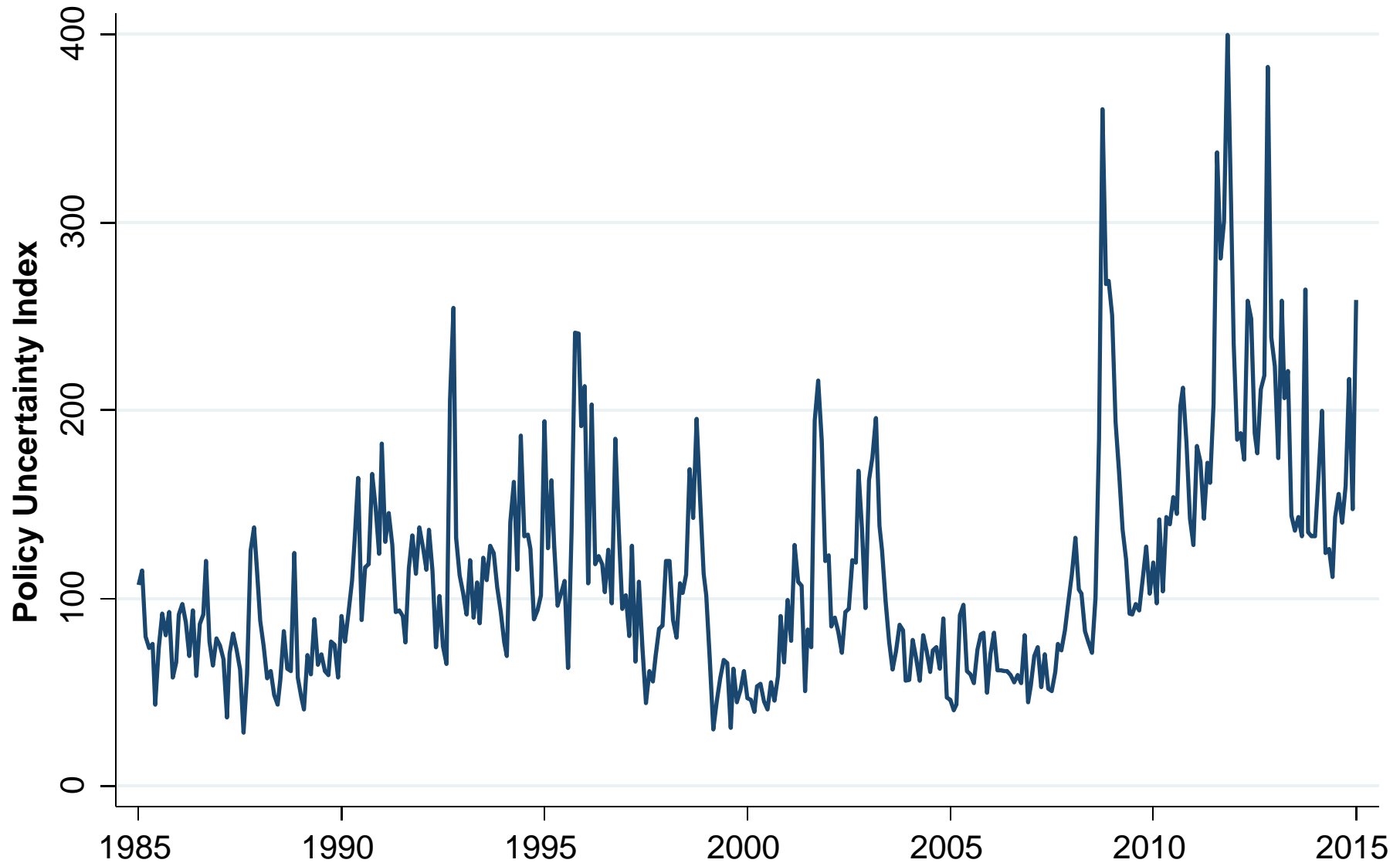
Notes: The news-based EPU Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'tax', 'policy', 'regulation', 'spending', 'deficit', 'budget', or 'central bank'. Each query is done in the native language of the country. The series is normalized to mean 100 from 1985-2009 and based on queries in the following newspapers: The Gazette, The Globe and Mail, Canadian Newswire, the Ottawa Citizen, Toronto Star, and the Vancouver Sun
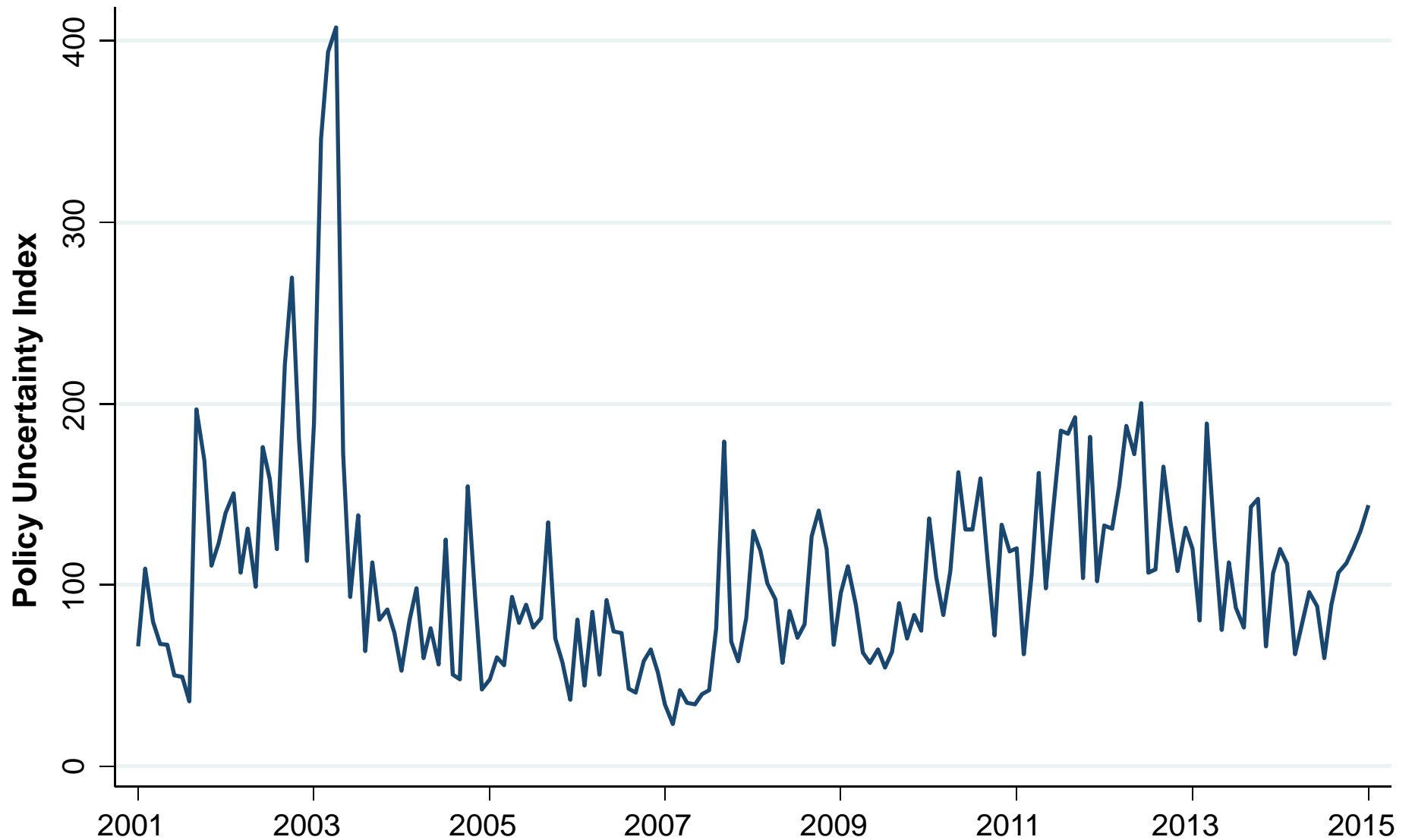
Figure A3: EPU series for China
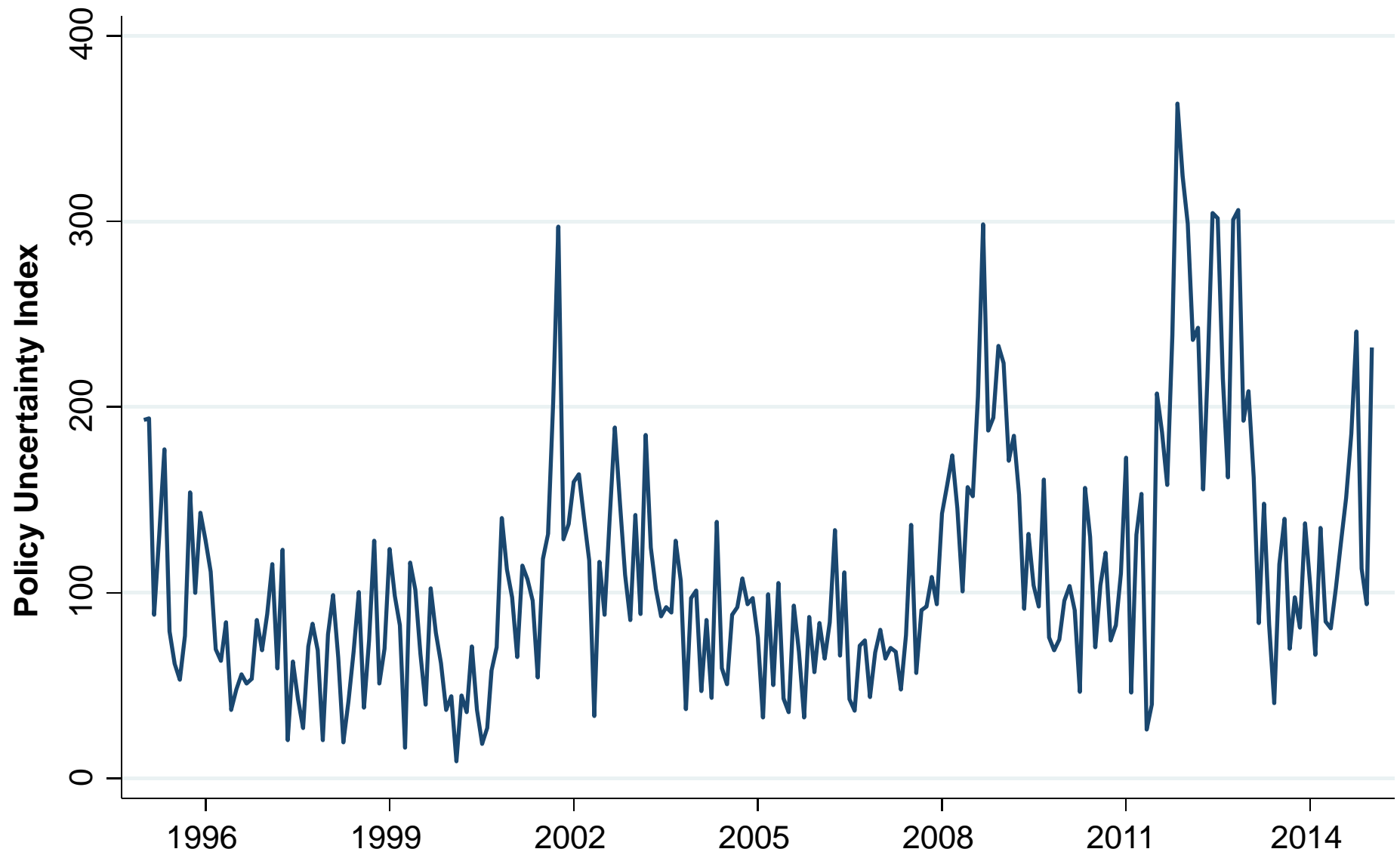
Notes: The news-based EPU Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'tax', 'policy', 'regulation', 'spending', 'deficit', 'budget', or 'central bank'. Each query is done in the native language of the country. The series is normalized to mean 100 from 1985-2009 and based on queries in the following newspapers: South China Morning Post

Figure A4: EPU series for France
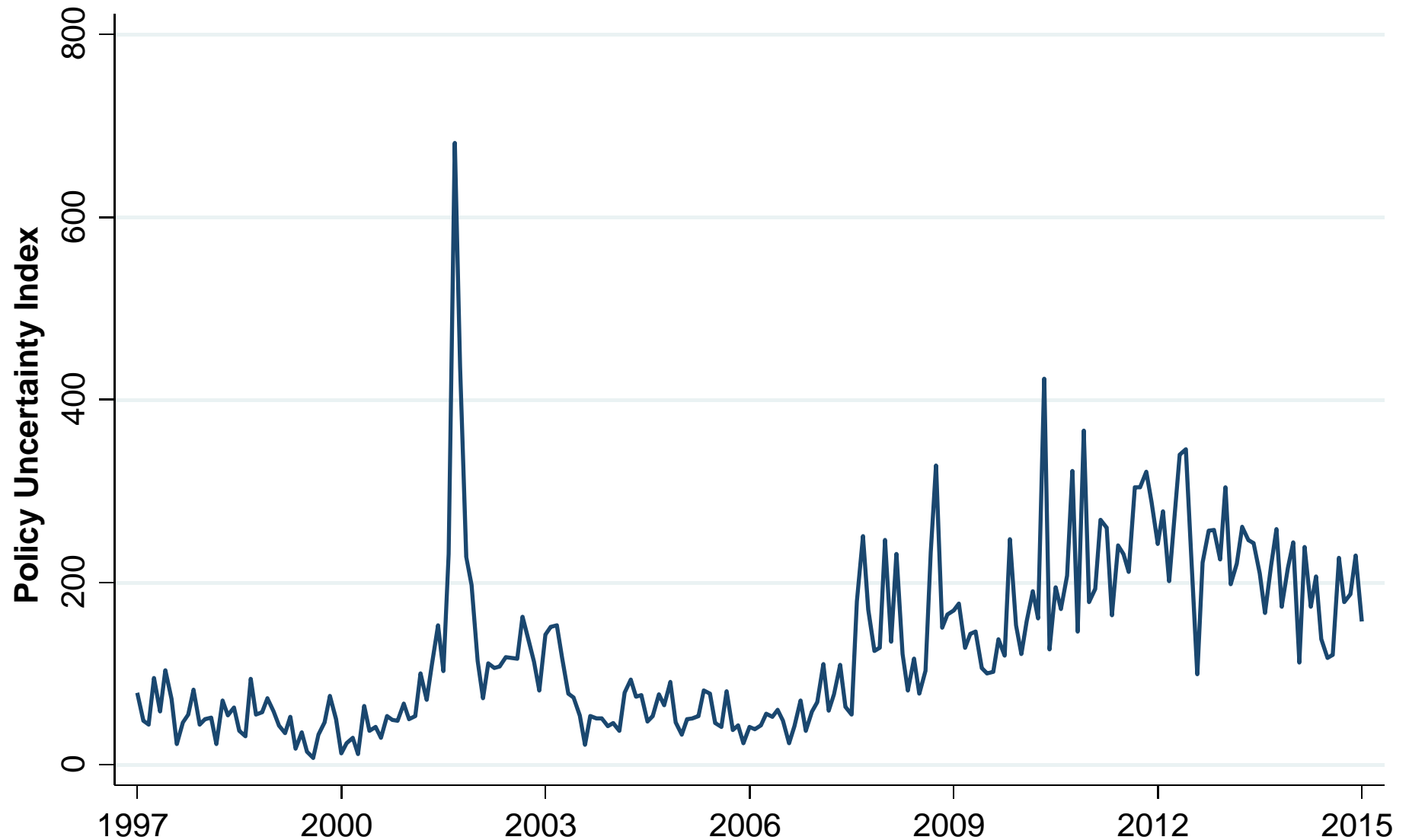
Notes: The news-based EPU Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'tax', 'policy', 'regulation', 'spending', 'deficit', 'budget', or 'central bank'. Each query is done in the native language of the country. The series is normalized to mean 100 from 1985-2009 and based on queries in the following newspapers: Le Monde and Le Figaro

Figure A5: EPU series for Germany

Notes: The news-based EPU Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'tax', 'policy', 'regulation', 'spending', 'deficit', 'budget', or 'central bank'. Each query is done in the native language of the country. The series is normalized to mean 100 from 1985-2009 and based on queries in the following newspapers: FAZ and Handelsblatt
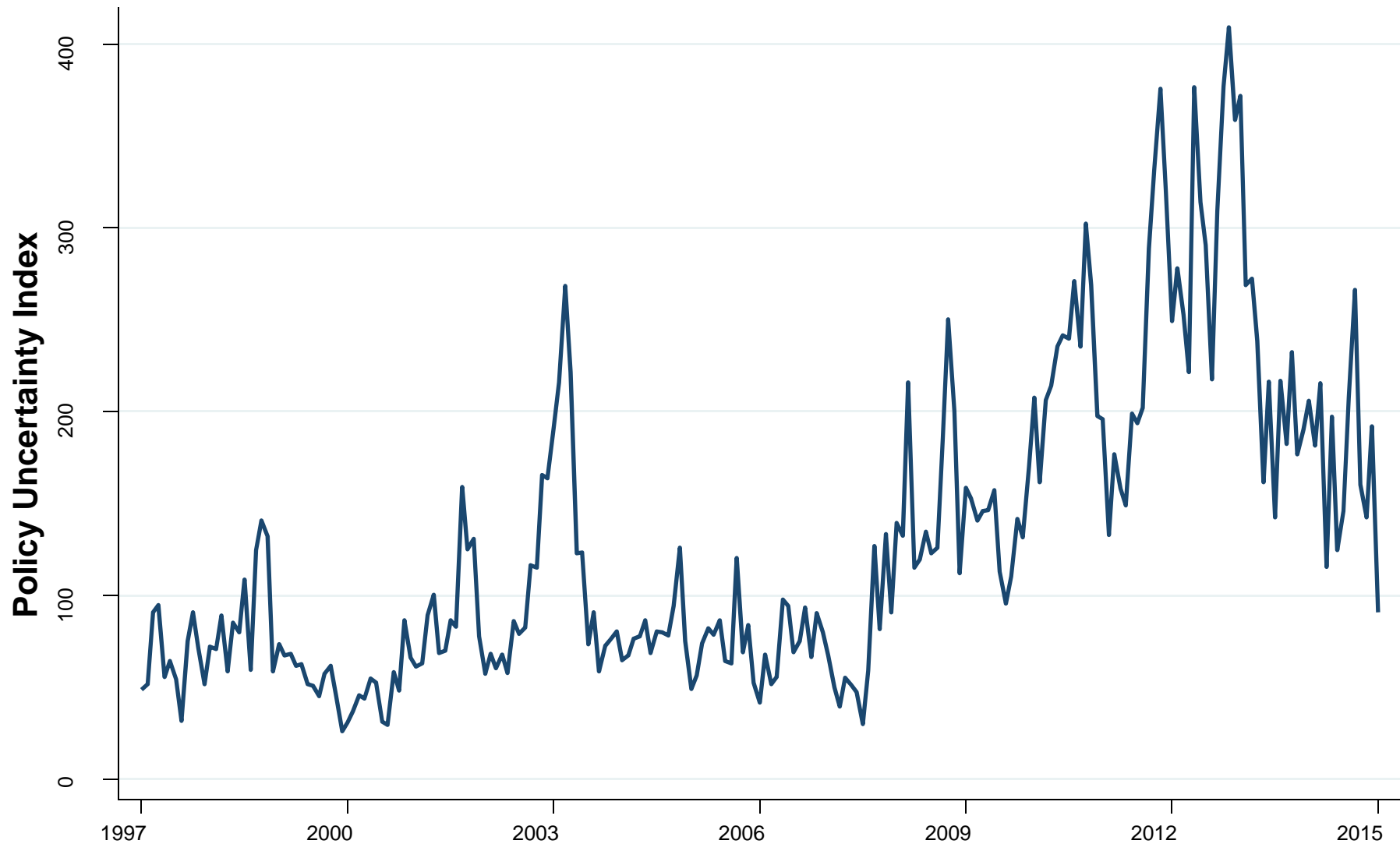
Figure A6: EPU series for India

Notes: The news-based EPU Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'tax', 'policy', 'regulation', 'spending', 'deficit', 'budget', or 'central bank'. Each query is done in the native language of the country. The series is normalized to mean 100 from 1985-2009 and based on queries in the following newspapers: The Economic Times, the Times of India, Hindustan Times, The Hindu, Financial Express, Indian Express, and the Statesman
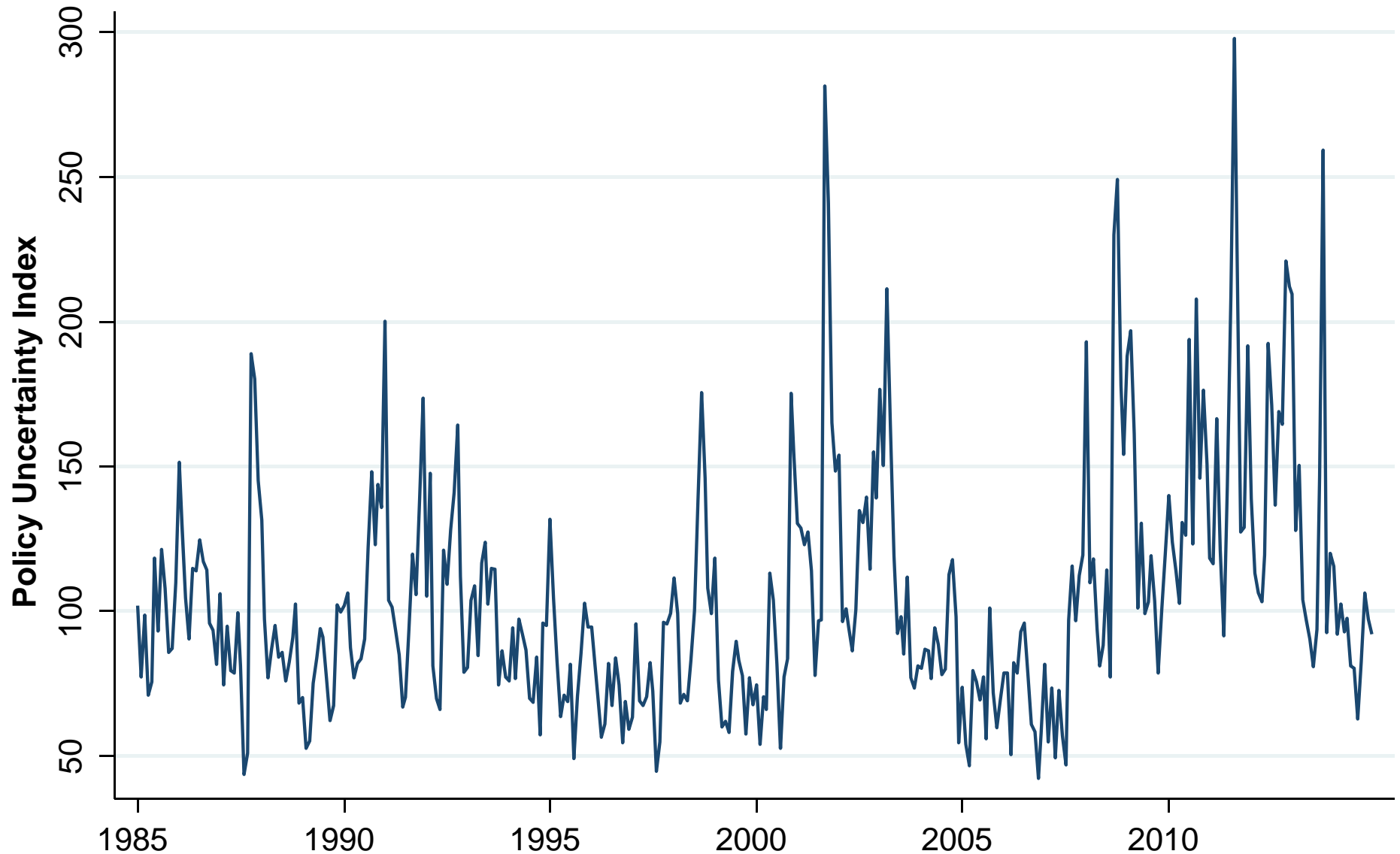
Figure A7: EPU series for Italy

Notes: The news-based EPU Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'tax', 'policy', 'regulation', 'spending', 'deficit', 'budget', or 'central bank'. Each query is done in the native language of the country. The series is normalized to mean 100 from 1985-2009 and based on queries in the following newspapers: La Repubblica and Corriere Della Serra
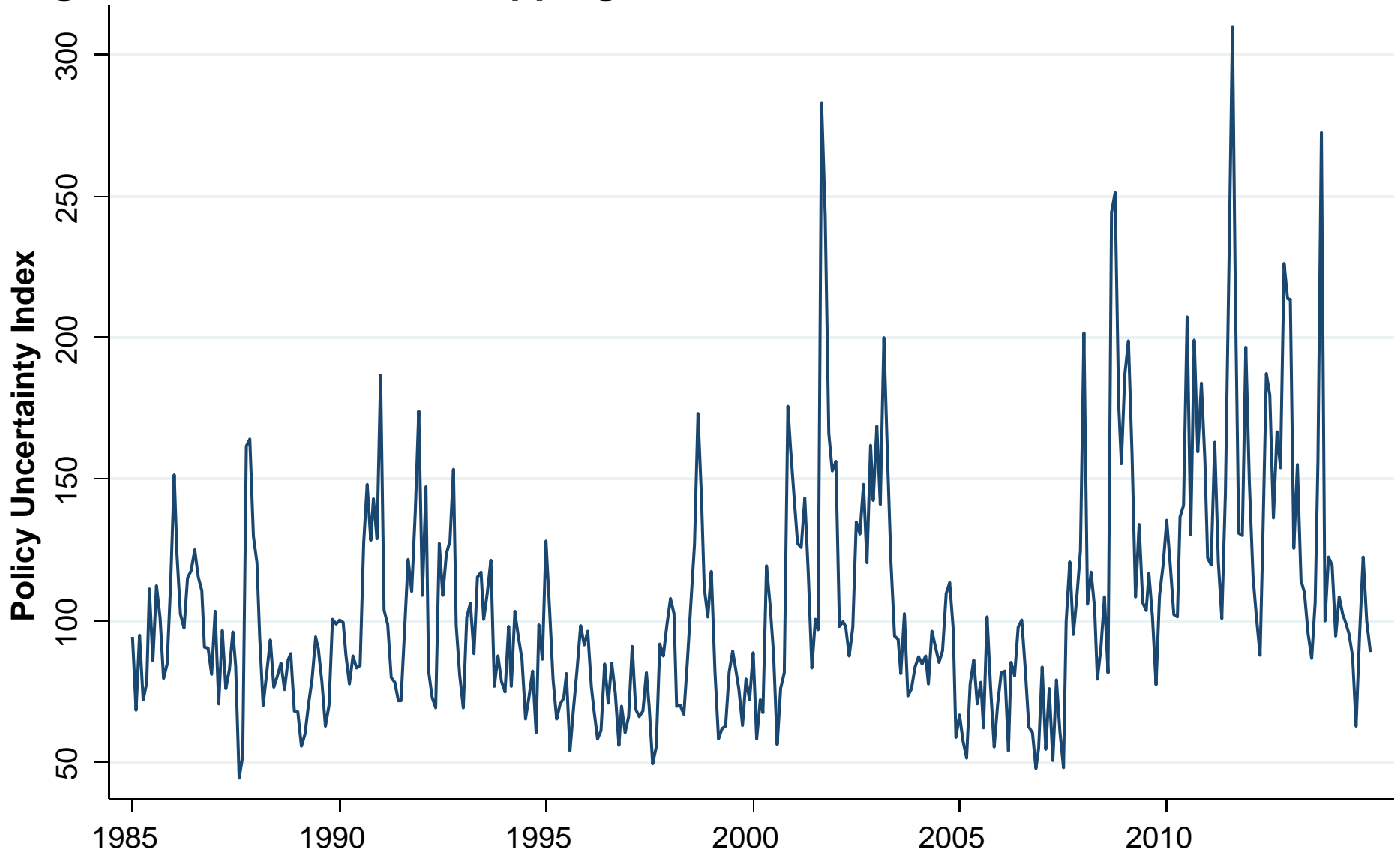
Figure A8: EPU series for Spain

Notes: The news-based EPU Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'tax', 'policy', 'regulation', 'spending', 'deficit', 'budget', or 'central bank'. Each query is done in the native language of the country. The series is normalized to mean 100 from 1985-2009 and based on queries in the following newspapers: El Pais and El Mundo

Figure A9: EPU series for the United Kingdom

Notes: The news-based EPU Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'tax', 'policy', 'regulation', 'spending', 'deficit', 'budget', or 'central bank'. Each query is done in the native language of the country. The series is normalized to mean 100 from 1985-2009 and based on queries in the following newspapers: The Times and the Financial Times

Figure A10: EPU series for the South Korea
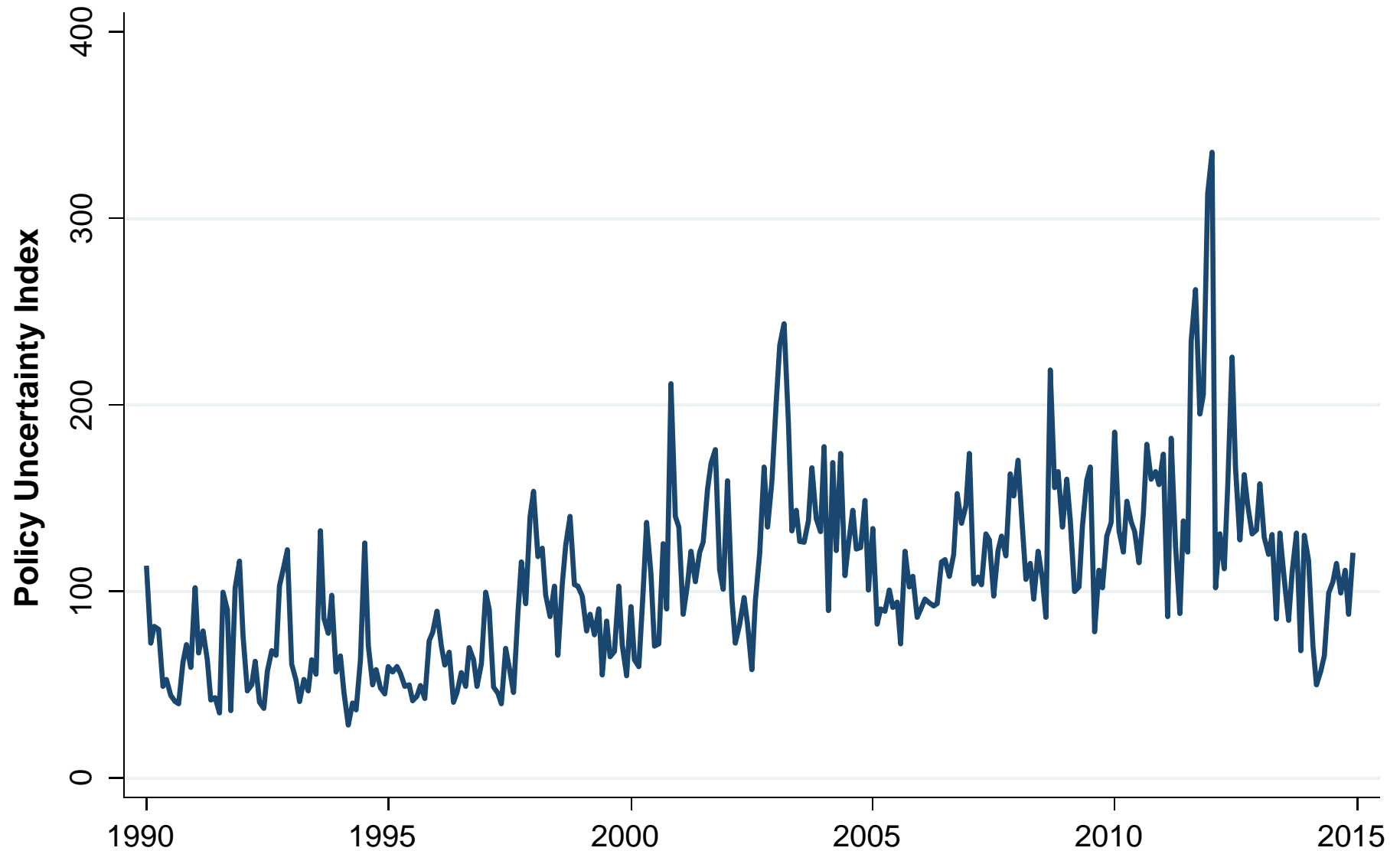
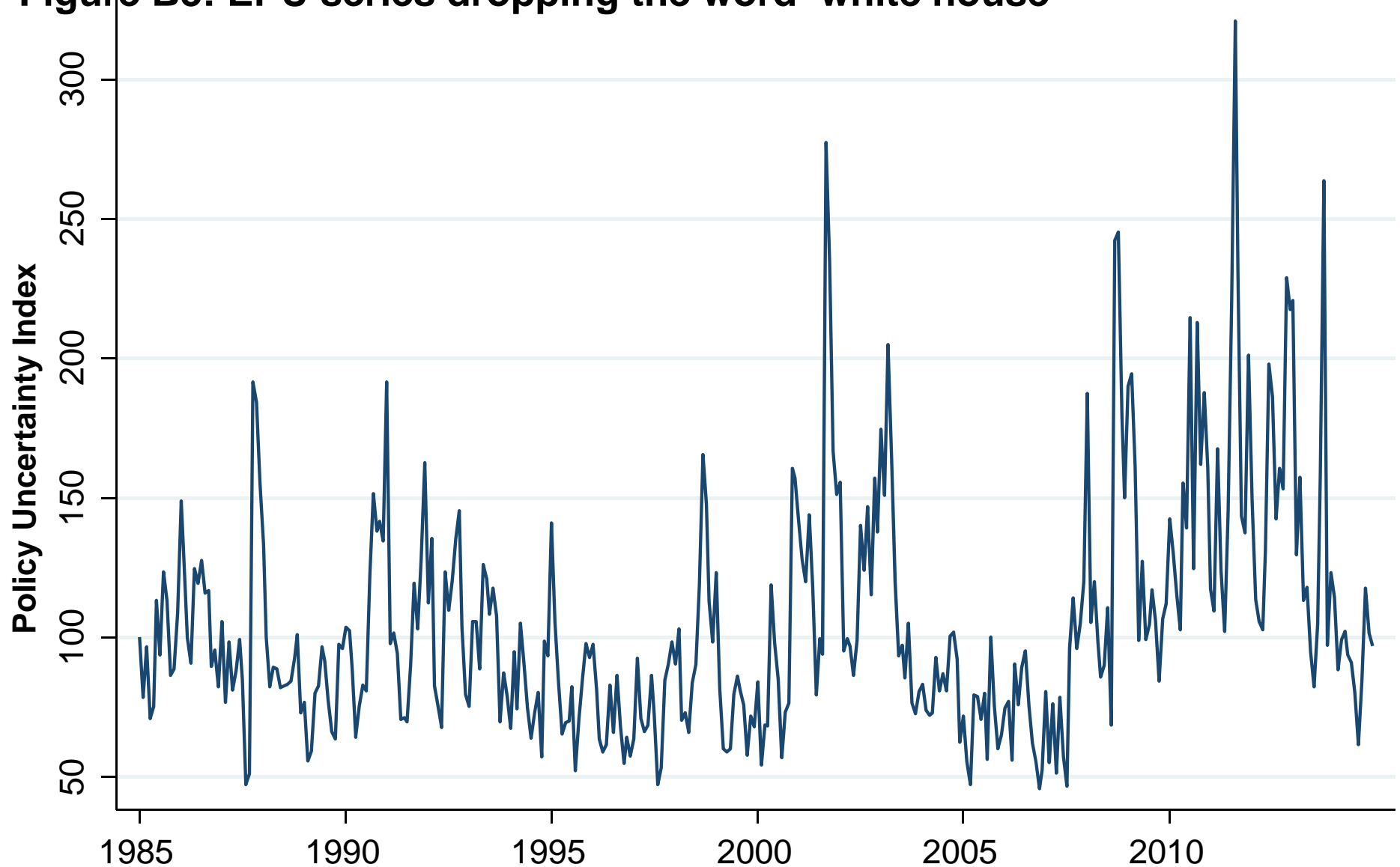**Notes:** The news-based EPU Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'tax', 'policy', 'regulation', 'spending', 'deficit', 'budget', or 'central bank'. Each query is done in the native language of the country. The series is normalized to mean 100 from 1985-2009 and based on queries in the following newspapers: The Times and the Financial Times

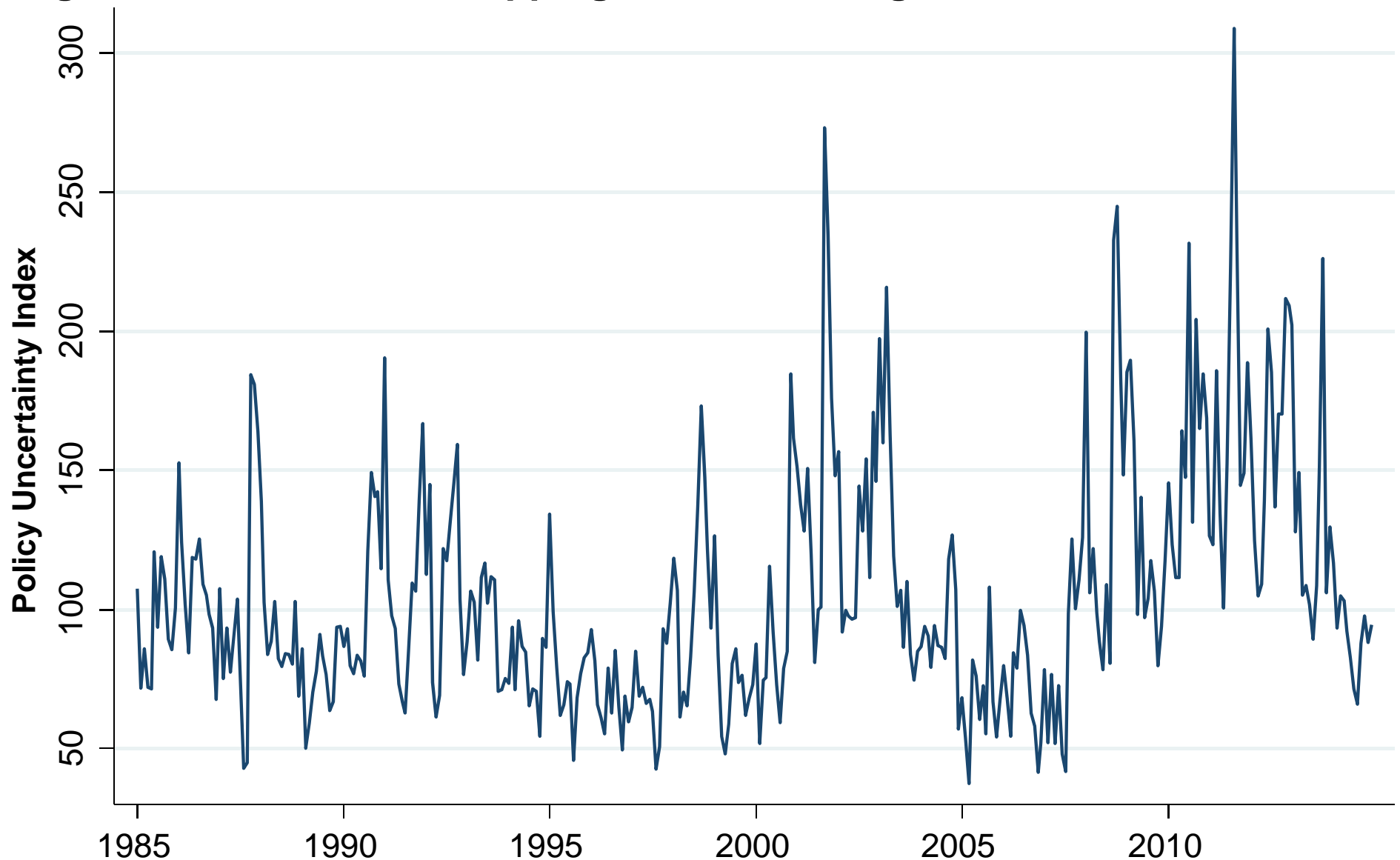# Figure B1: EPU series dropping the word 'regulation'

Notes: Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'federal reserve', 'deficit', 'congress', 'legislation', and 'white house'. The series is normalized to mean 100 from 1985-2009 and based on queries run on 28 February, 2015 for the USA Today, Miami Herald, Chicago Tribune, Washington Post, LA Times, Boston Globe, SF Chronicle, Dallas Morning News, Houston Chronicle, and the Wall Street Journal.

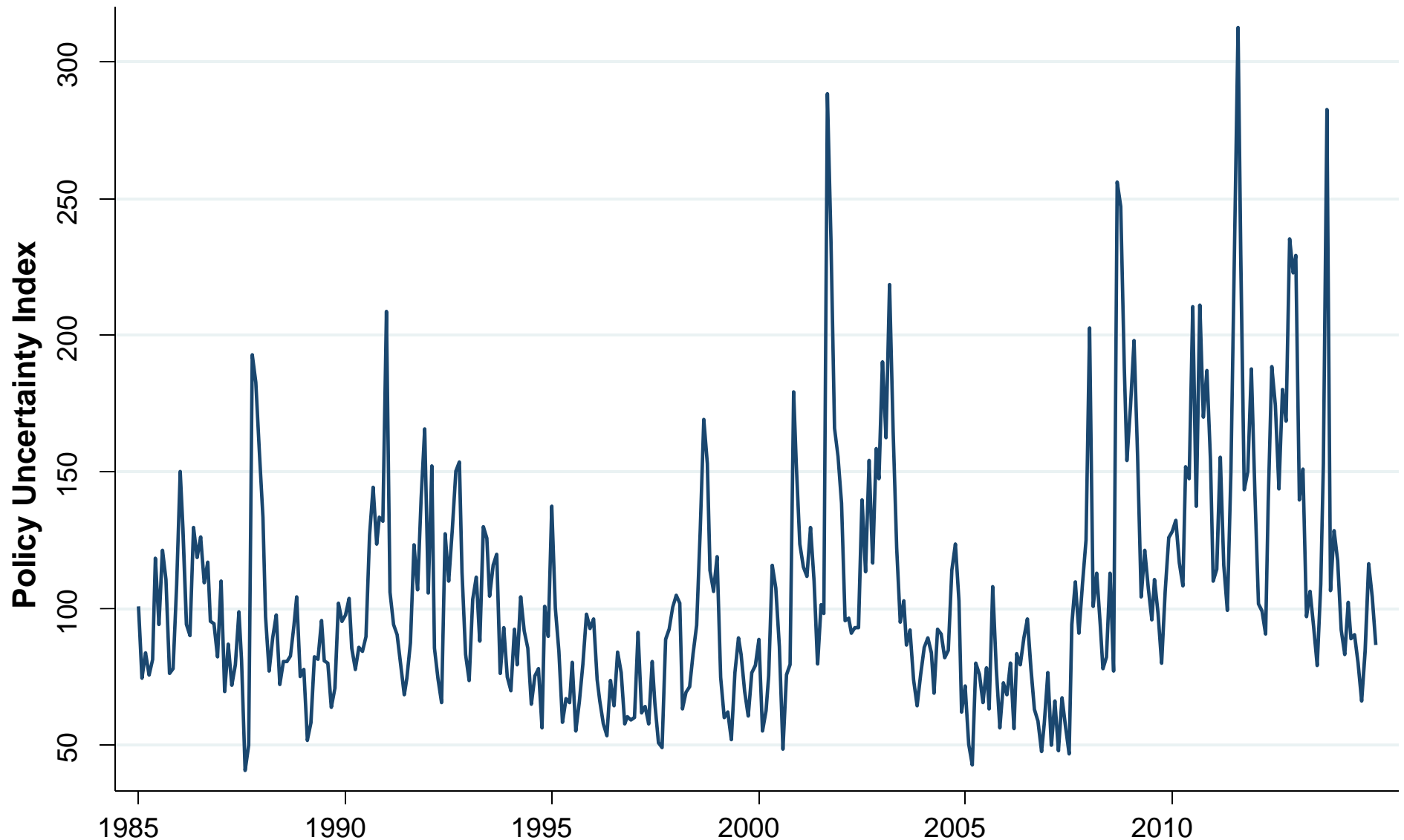# Figure B2: EPU series dropping the word 'deficit'

Notes: Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'regulation', 'federal reserve', 'congress', 'legislation', and 'white house'. The series is normalized to mean 100 from 1985-2009 and based on queries run on 28 February, 2015 for the USA Today, Miami Herald, Chicago Tribune, Washington Post, LA Times, Boston Globe, SF Chronicle, Dallas Morning News, Houston Chronicle, and the Wall Street Journal.

Figure B3: EPU series dropping the word 'white house'

Notes: Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'regulation', 'federal reserve', 'deficit', 'congress', 'legislation'. The series is normalized to mean 100 from 1985-2009 and based on queries run on 28 February, 2015 for the USA Today, Miami Herald, Chicago Tribune, Washington Post, LA Times, Boston Globe, SF Chronicle, Dallas Morning News, Houston Chronicle, and the Wall Street Journal.

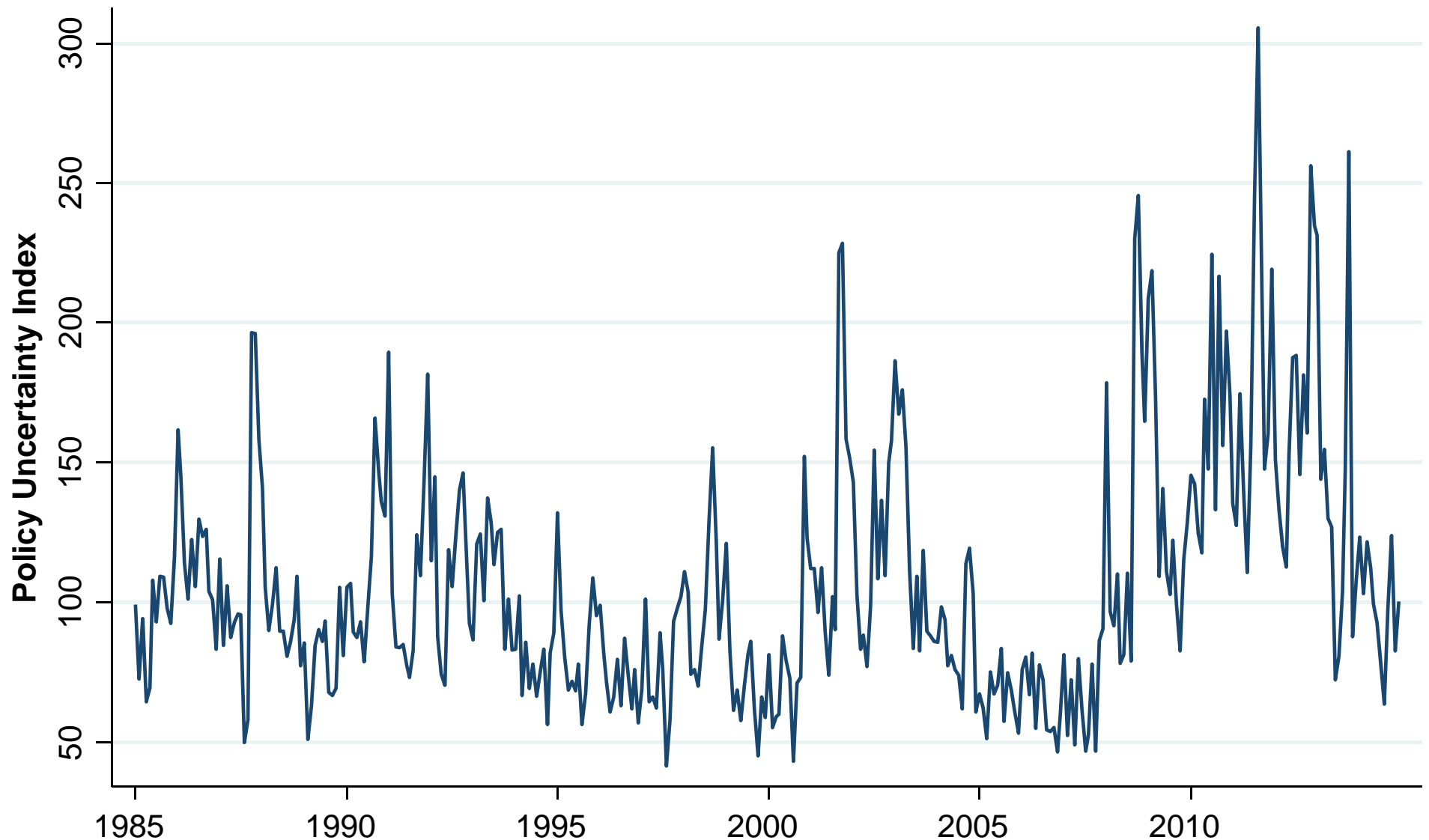# Figure B4: EPU series dropping the word 'Congress'

Notes: Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'regulation', 'federal reserve', 'deficit', 'legislation', and 'white house'. The series is normalized to mean 100 from 1985-2009 and based on queries run on 28 February, 2015 for the USA Today, Miami Herald, Chicago Tribune, Washington Post, LA Times, Boston Globe, SF Chronicle, Dallas Morning News, Houston Chronicle, and the Wall Street Journal.

Figure B5: EPU series dropping the word 'legislation'

Notes: Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'regulation', 'federal reserve', 'deficit', 'congress', and 'white house'. The series is normalized to mean 100 from 1985-2009 and based on queries run on 28 February, 2015 for the USA Today, Miami Herald, Chicago Tribune, Washington Post, LA Times, Boston Globe, SF Chronicle, Dallas Morning News, Houston Chronicle, and the Wall Street Journal.

Figure B6: EPU series dropping the word 'Federal Reserve'

Notes: Index reflects scaled monthly counts of articles containing 'uncertain' or 'uncertainty', 'economic' or 'economy', and one or more policy relevant terms: 'regulation', 'deficit', 'congress', 'legislation', and 'white house'. The series is normalized to mean 100 from 1985-2009 and based on queries run on 28 February, 2015 for the USA Today, Miami Herald, Chicago Tribune, Washington Post, LA Times, Boston Globe, SF Chronicle, Dallas Morning News, Houston Chronicle, and the Wall Street Journal.
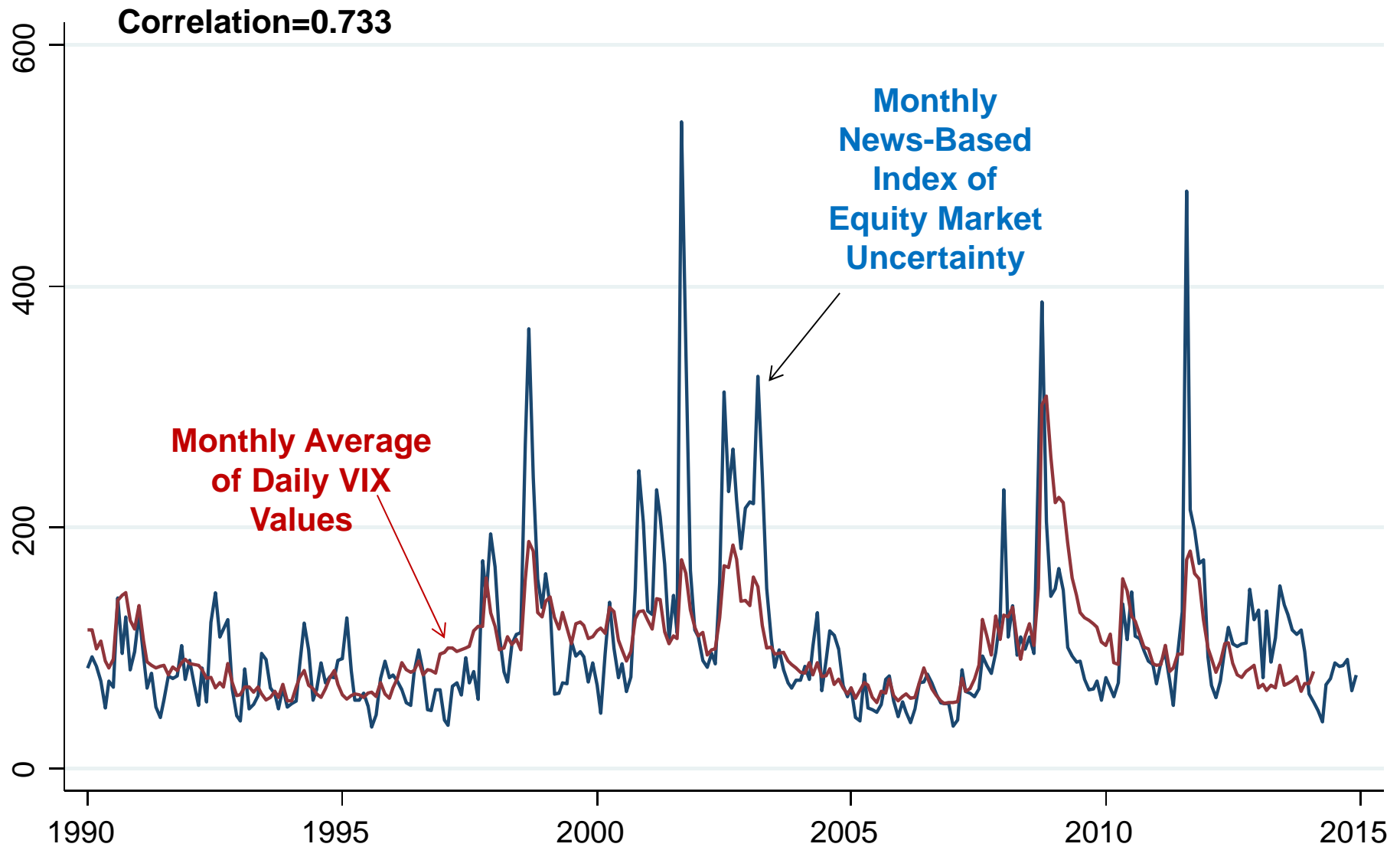
Figure C1: Historical Human versus Computer EPU index
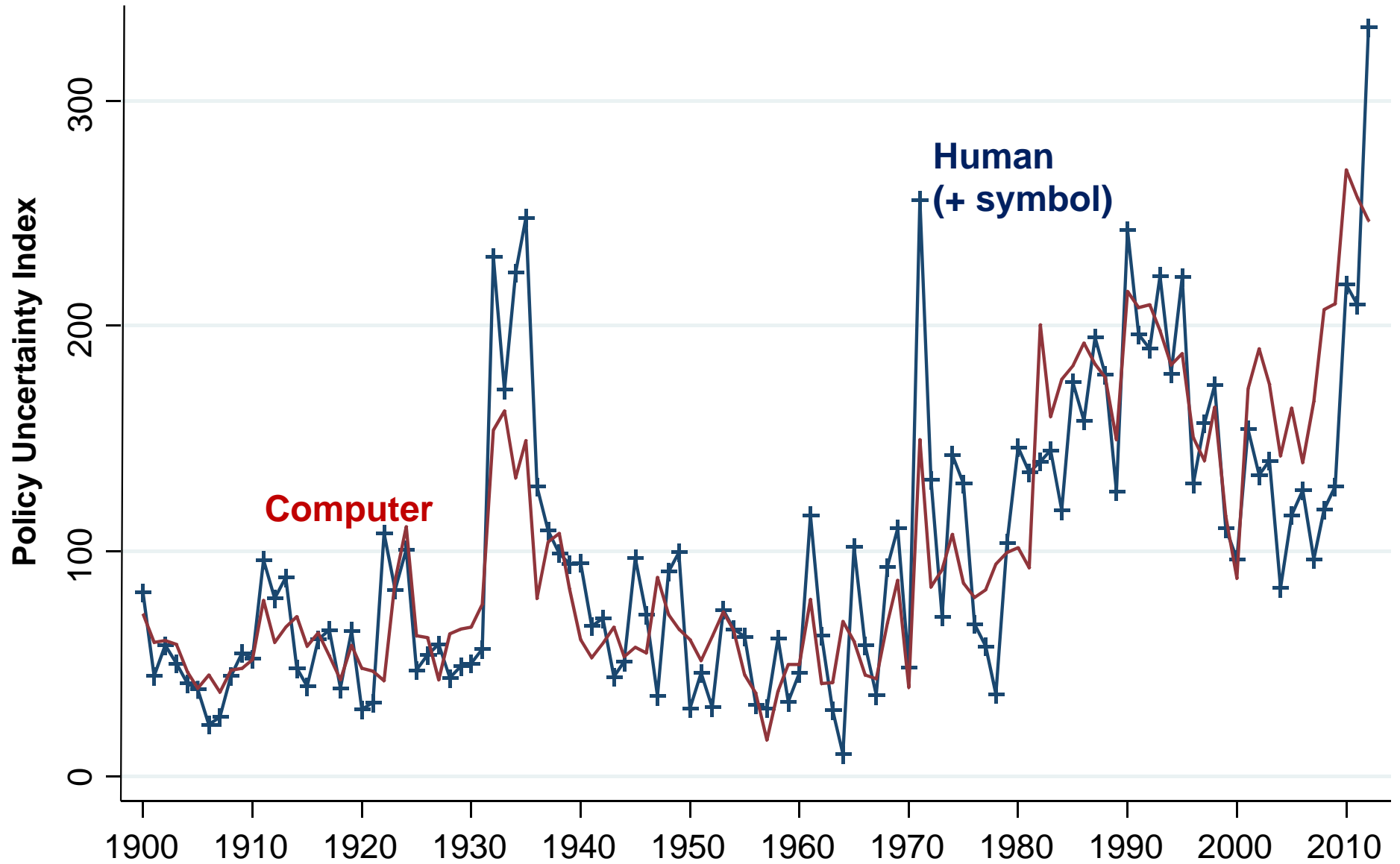
Figure C2: News-based index of equity market uncertainty compared to market-based VIX, January 1990 to December 2014

Correlation=0.733

Monthly News-Based Index of Equity Market Uncertainty

Monthly Average of Daily VIX Values

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 the period.

Figure C3: Political slant plays little role in our news-based EPU index

Reagan, Bush I   Clinton   Bush II   Obama

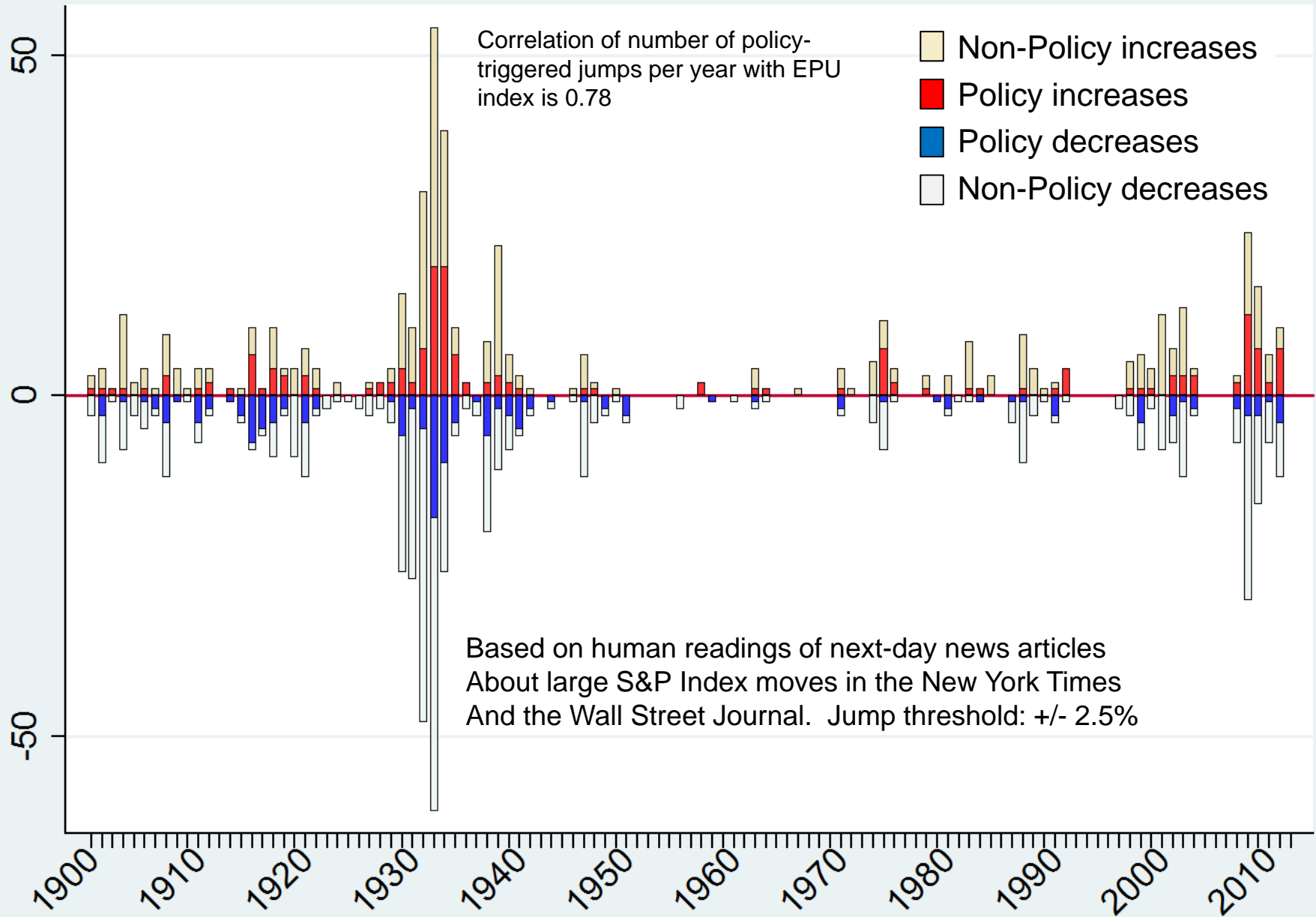5 most Democrat papers

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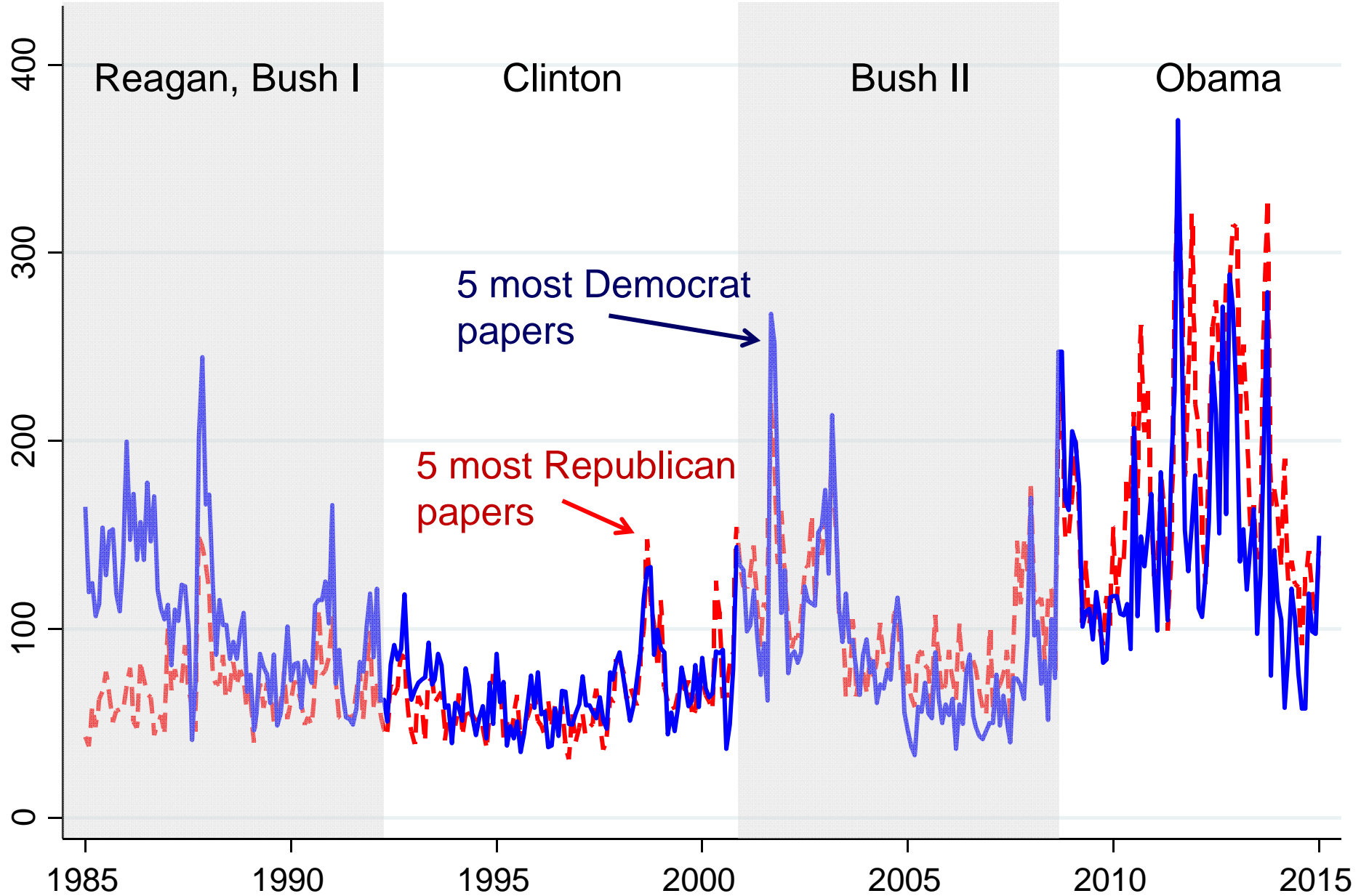
Source: Papers sorted into 5 most 'Republican' and 5 most 'Democratic' groups using the media slant measure from Gentzkow and Shapiro (2010).

Figure C4: Robustness of International VAR
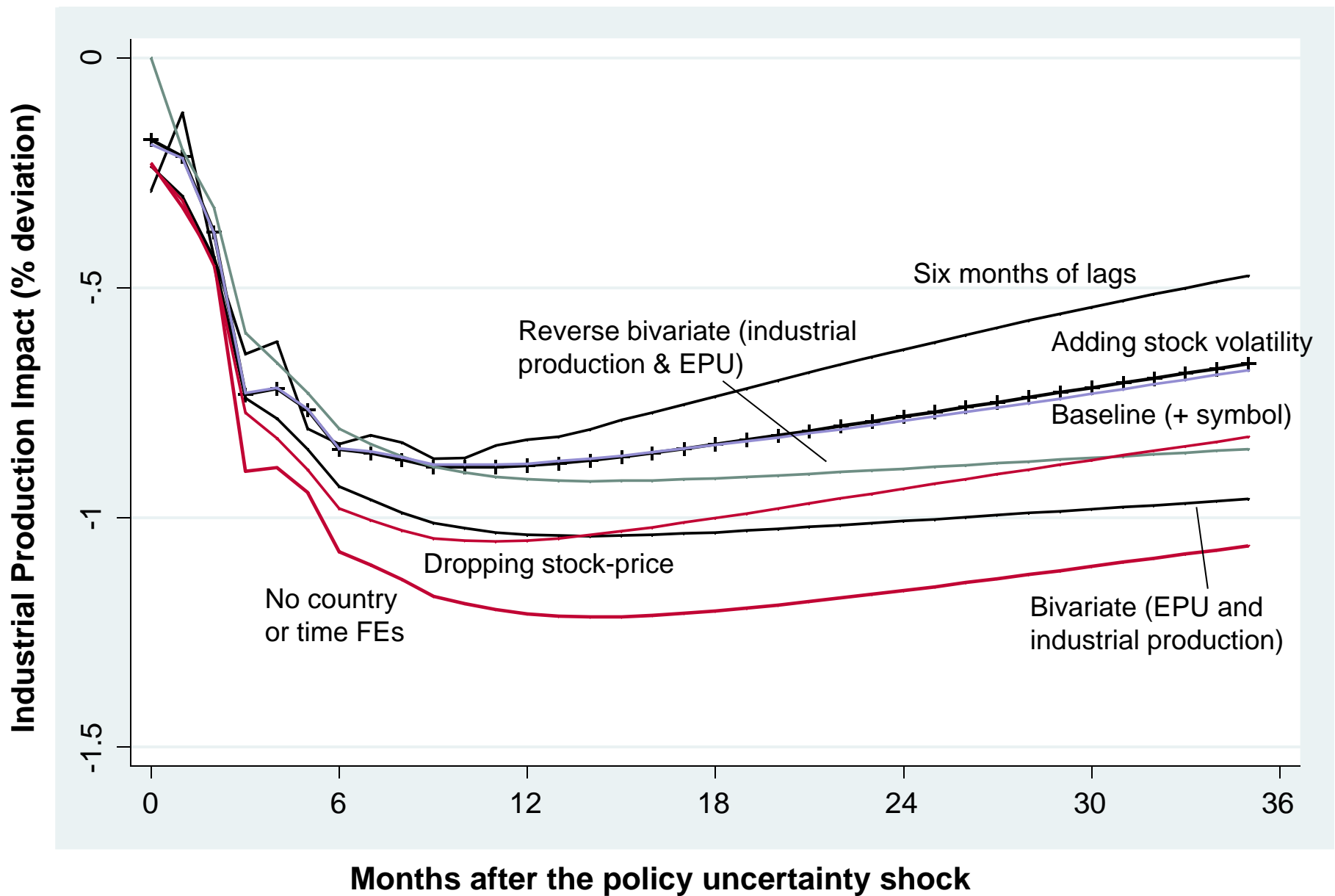
Notes: his shows the impulse response function for GDP and employment to an increase in the policy-related uncertainty index from the 2005-2006 average to the 2011-2012 average. Estimated using a monthly Cholesky Vector Auto Regression (VAR) of the uncertainty index, log(S&P 500 index), federal reserve funds rate, log employment and log industrial production with 3 lags unless otherwise specified. Data from 1985 to 2012, except for the pre-1985 data spec which uses EPU and IP data from 1920 to 1984.

Another Approach: What triggers large daily stock market moves? 1900-2012

Correlation of number of policy-triggered jumps per year with EPU index is 0.78

Legend:
- Non-Policy increases
- Policy increases
- Policy decreases
- Non-Policy decreases

Based on human readings of next-day news articles About large S&P Index moves in the New York Times And the Wall Street Journal. Jump threshold: +/- 2.5%

Reproduced from "What Triggers Large Stock Market Jumps?" by Baker, Bloom & Davis