Economic Policy Uncertainty for Armenia

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Abstract

This paper presents an economic policy uncertainty (EPU) index in Armenia based on newspaper coverage frequency. Newspaper articles are collected from websites of two Armenian news agencies. The constructed monthly EPU shows clear correlation with state elections, and also captures the two crisis: global financial crisis and Russian crisis. The EPU index is also consistent with the country risk premium, exchange rate, bank lending tightening indicator and also with one proxy of economic uncertainty: Forecast Errors of economic agents, which is constructed based on micro data of Business Climate Surveys.

JEL classification: C5, C8, D80, O3

Keywords: economic policy uncertainty, news coverage, text mining

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1 Introduction

Problems related to policy uncertainty have intensified in USA and European countries in the beginning of the global financial crisis (2008-2009). According to the Federal Open Market Committee minute (2009)[1], uncertainties about health-care, tax, and environmental policies were adding to businesses' reluctance to commit to higher capital spending.

Economic policy uncertainty is a type of uncertainty related to economic risk where the future path of government policy is uncertain, raising risk premia and leading businesses and individuals to delay spending and investment until this uncertainty has been resolved. As it was pointed out by Bernanke (1983), increases in uncertainty lead firms to defer investment, creating short, sharp recessions. More recently Baker, Bloom & Davis (2016) have shown large uncertainty shocks in the US can lead to sharp recessions as firms and consumers put spending plans on hold. This occurs both because uncertainty makes firms more cautious about investing and hiring, but also because it make it harder to raise finance. Banks are less willing to lend to firms in uncertain periods, squeezing the ability of companies to invest.

Researchers use a range of proxies of uncertainty such as stock-market and GDP volatility, forecaster disagreement, which measures how close the individual forecasters' projections in business surveys are to each other (Sill et al. (2012)), news mentions of "uncertainty", etc.

From macro-forecasting perspective Karnizova & Li (2014) showed that EPU (Baker's et al index) can be used as a robust predictor in forecasting future US recessions. The authors mentioned that the possible use of the EPUs in forecasting provides a rationale for publishing these indexes on a continuous basis.

The EPU methodology is extended to other fields as well. For example Husted, Rogers & Sun (2017) proposed a news-based index of monetary policy uncertainty, which is constructed to capture the degree of uncertainty that the public perceives about central

[1] https://www.federalreserve.gov/monetarypolicy/fomcminutes20091216.htm

bank policy actions and their consequences. The authors found that shocks, which increase uncertainty about monetary policy, robustly raise credit spreads and reduce output.

Yakovleva (2017) developed a news index to monitor the dynamics of economic activity on a daily basis as well as to develop other indicators that will make it possible to react more promptly to the current economic situation and make appropriate decisions.

I use Baker, Bloom & Davis (2016) methodology to construct EPU index for Armenia based on newspapers coverage frequencies. For this purpose a web scraping algorithm is developed using R software functionality to collect historical articles of two Armenian news portals: arka and armenpress[2].

I also define a numerical proxy of economic uncertainty: **forecast errors of economic agents** based on Business Climate surveys of the Central Bank of Armenia, and investigate its relationship with EPU index. The idea behind this indicator is directly related to Knight (1921) definition of uncertainty. According to Knight, the uncertainty is the peoples' inability to forecast the likelihood of events happening.

To validate the constructed EPU index, I investigated and found consistent relationship between it and country risk premium, exchange rate, and bank lending tightening indicators.

2 Data and Methodology

I implement EPU methodology suggested by Baker, Bloom & Davis (2016). The authors use newspapers articles frequencies containing a list of keywords related to different aspects of uncertainty. They propose the following triple of terms to measure the economic policy uncertainty:

1. **Economic**: "economic" or "economy";
2. **Uncertainty**: "uncertain" or "uncertainty";
3. **Policy**: one or more of "congress", "deficit", "Federal Reserve", "legislation",

[2]www.arka.am, https://armenpress.am/eng/

"regulation" or "White House".

According to EPU methodology, a given news article is considered a source of uncertainty, if it contains one keyword from above three components simultaneously, for instance "economic", "uncertain", and "Federal Reserve".

I use above keywords as benchmarks for developing appropriate terms for Armenia considering specifics of Armenian economy.

Two issues raised while deploying the Baker's et al. methodology for Armenia:

1. The representativeness of the newspapers articles in terms of the historical availability and the content.

2. The language of the news.

I choose **arka** as a private and **armenpress** as a state-owned agency for the current research[3].

The daily archives of these news agencies are available on their websites. Currently there are more popular digital media sources in Armenia, however because of the lack of long historical archives, they are not used in the current study.

An automated web scraping algorithm is developed in R software environment to collect news articles from the internet, clean the text corpus, and store the information in the final database. According to table 1, the final database contains around 30000 articles both arka and armenpress sources.[4] A difficulty with these raw counts is that the overall volume of articles varies across newspapers and time. This is not a issue for EPU index construction, as the components of EPU are measured as relative and not absolute coverage frequencies. I rely on this hypothesis while calculating EPU index.[5]

EPU index, based on newspaper coverage frequency is calculated with the following formula:

[3] $http://ejc.net/media_landscapes/armenia$

[4] For arka the articles are available since march 2008 to October 2017. Armenpress articles start from January 2008 to October 2017

[5] The analysis of the effect of instability of volume of articles on final EPU indicators is out of the scope of the current research

$$EPU_t = \frac{1}{2}\left(\frac{{n_t}^{arka}}{{N_t}^{arka}} + \frac{{n_t}^{armenpress}}{{N_t}^{armenpress}}\right) \quad (1)$$

Where

EPU_t – Economic Policy Uncertainty index in the period t,

n_t – The number of articles containing at least one combination of keywords in period t,

N_t – The total number of articles in the period t.

Table 1: Number of articles collected from websites

Year	Arka	Armenpress
2008	1989	2592
2009	3327	2393
2010	2960	5280
2011	3562	3969
2012	3043	1236
2013	3138	1847
2014	3494	3398
2015	3669	2689
2016	4630	2936
2017	1826	3625
Total	**31638**	**29965**
source:	www.arka.am	www.armenpress.am

I address the concern of representativeness explicitly by revealing correlations of EPU index with uncertainty proxies, such as country risk premium, bank lending tightening[6].

The second issue is related to the language of the news: Arka and Armenpress use Russian an Armenian languages for news respectively. This creates extra uncertainties for the study.

[6]This issue is not solved completely. There is a need for more comprehensive analysis of online news coverage in Armenia, which is out of scope of the current study

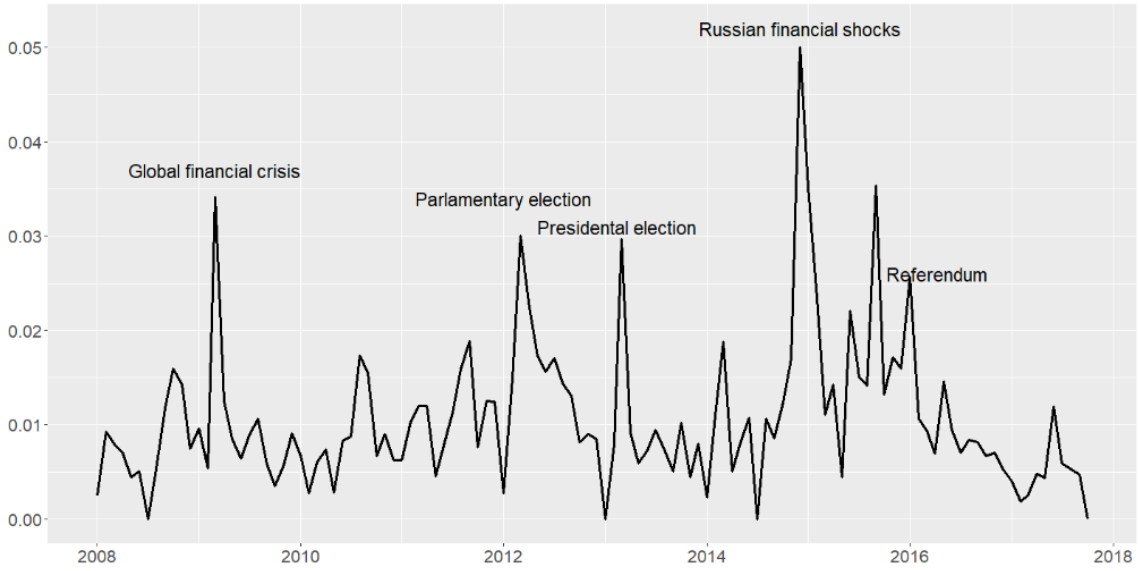
The first source of uncertainty is the hypothesis that the audiences are not homogeneous in terms of number of users and sociodemographic and educational factors.

Second is the linguistic differences in selection of right Armenian and Russian keywords for exploring economic phenomenons needed for policy uncertainty analysis. For this I conducted preliminary text mining analysis on news articles database and used personal judgments to reveal the most used Armenian and Russian terms/keywords corresponding to English terms of Baker's et al (Table 2). Table 2 shows that the policy component of economic policy uncertainty index for Armenia contains new keywords, such as inflation, exchange rate, bankruptcy, and monetary.

Table 2: EPU components and keywords

EPU components	Arka and Armenpress keywords
Economy	economy, economic
Uncertainty	uncertainty, uncertain
Policy	policy, tax, regulation, CB, deficit, inflation, exchange rate, bankruptcy, monetary

In the EPU index construction process Russian and Armenian equivalents of keywords and their different variations are used. For instance to find in how many articles the "Central bank" term appeared, I searched and "central bank", and "CB".



Source: Author's calculation

Figure 1: EPU index for Armenia

Figure 1 depicts two most obvious peaks captured by EPU index corresponding to global financial crisis and Russian crisis of 2014. Taking into account the effect of Russian shocks on policy uncertainty in Armenia, and also considering the connectedness of Armenian and Russian economies, I investigate the relationship between policy uncertainty of Armenia and Russia. Among many developed and developing countries Baker, Bloom, and Davis measure economic policy uncertainty for Russia using the same methodology.[7]

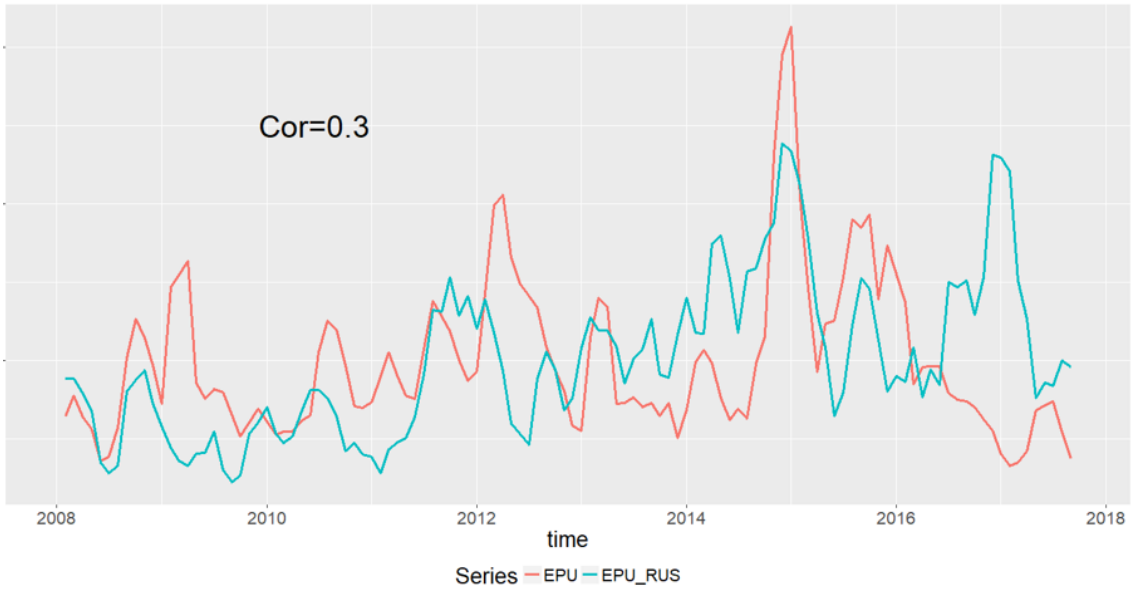
One of the channels of dependency of Armenian economy from Russia is the money transfers, Armenian migrants or seasonal workers send to their families or relatives. Another important channel is that the big part of Armenian FDI comes from Russia. All above mentioned facts suggests that there should be a positive relationship between policy uncertainties between two countries as well. Russia faced a number of economic challenges in 2014 and 2015, including capital flight, rapid depreciation of the ruble, exclusion from international capital markets, inflation, and domestic budgetary pressures. The extent to which US and EU sanctions drove the downturn is difficult to disentangle

[7] http://policyuncertainty.com

from the impact of a drop in the price of oil (Nelson 2017). During this time (end of 2014), Armenia also faced national currency depreciation. In comparison, the US dollar exchange rate in Armenia went from 420 dram on November to 463 on December 2014 (by almost 10 percent)[8].

Figure 2 shows that there is a positive correlation (0.3) between EPU of Armenia and Russia.[9]

The obvious pick of uncertainty in two countries comes to the end of 2014.



Source: Author's calculation and http://policyuncertainty.com

Figure 2: EPU of Russia (green) and Armenia (red)

The second obvious peak of policy uncertainty in Russia was in the end of 2016. One of possible reasons of the uncertainty shock can be new sanctions from US. In December 2016, the Obama Administration imposed additional sanctions on Russian individuals and entities in response to malicious cyber activity, including relating to the election

[8]https://www.cba.am/am

[9]There are methodological differences between my calculation of EPU for Armenia and Baker's and others calculation for Russian EPU. In the Figure 2 two countries standardized and smoothed EPU indicies are presented (by simple moving average method with 3 months window).

process[10]. Unlike the Russia, in Armenia the decreasing trend of policy uncertainty continued untill the first quarter of 2017.

3 EPU and volatility of economic variables in Armenia: Stylized facts

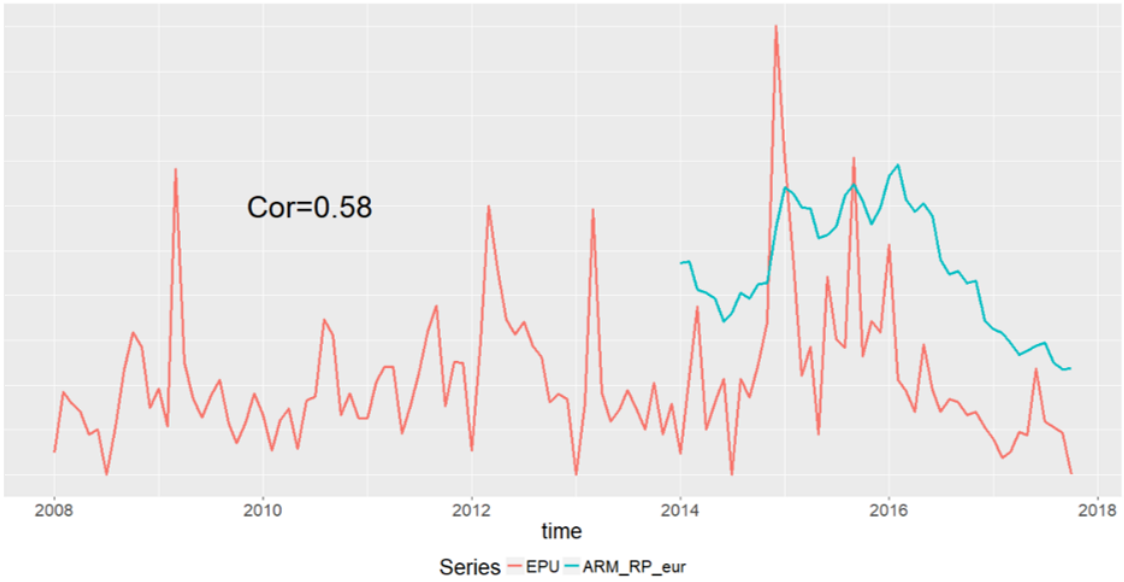
In the current section to validate the EPU index I investigate the EPU index and indirect measures of uncertainty: country risk premium, exchange rate, and bank lending tightening.

3.1 EPU and Armenian Eurobond Risk Premium

Government policy uncertainty has important implications for asset pricing including equity risk premium. In general, countries with developed stock markets use volatility indicators as numerical proxies of risk and uncertainty. Due to lack of developed financial market and unavailability of VIX indicators, I define eurobond risk premium as a proxy of country risk premium and use it to analyze the relationship between EPU and country risk. Risk premiums are calculated taking the difference of Armenian eurobond and the US treasury bonds yields[11].

[10] https://obamawhitehouse.archives.gov/the-press-office/2016/12/29/fact-sheet-actions-response-russian-malicious-cyber-activity-and

[11] Data on Eurobond and US treasury bills yields are taken from bloomberg



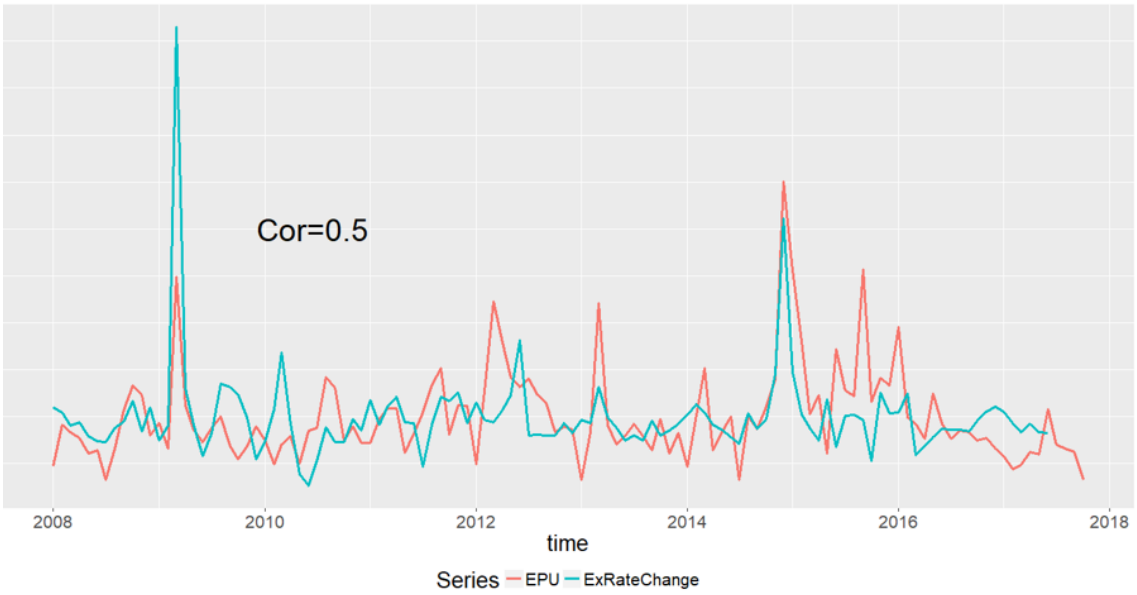
Source: Author's calculation

Figure 3: EPU of Armenia and country Risk Premium

According to the Figure 3, the EPU and Risk Premium is highly consistent (correlation is 0.58), which means that the policy uncertainty in Armenia and the country's risk move in the same direction, thus I can conclude that the proposed EPU index can provide a valuable information not only to policy makers, but also to the foreign investors.

3.2 EPU and Exchange Rate change

Uncertainty is reflected in asset prices (Bekaert et al. (2009)). In small open economies exchange rate is the most important assets price. The figure 4 shows that EPU is positively correlated with exchange rate fluctuations. Armenian currency had two depreciation periods during last decade (March 2009 and December 2014) which are captured by EPU index.



Source: Central Bank of Armenia

Figure 4: EPU and AMD/USD Exchange Rate change

3.3 EPU and BLT (Bank Lending Tightening)

Chi & Li (2017) investigated the relationship between Economic policy uncertainty, credit risks and banks' lending decisions using Chinese commercial banks data from 2000 to 2014. In their paper the authors examine the effects of economic policy uncertainty (EPU) on banks' credit risks and lending decisions. The results reveal positive connections among EPU and non-performing loan ratios, thus increasing banks' credit risks and strengthening lending decisions of commercial banks.

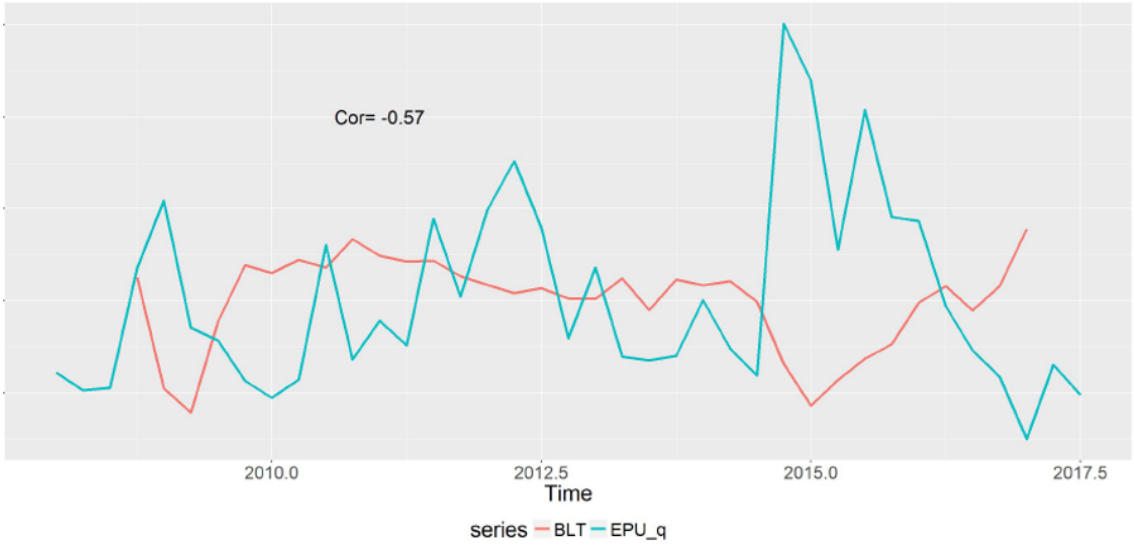
Central Bank of Armenia conducts bank lending survey since 2009 and the main purpose of these surveys is the investigation of changes in bank lending policies. An aggregated index of Bank Lending Tightening (BLT) is constructed based on the survey data.

$BLT =$ **Net % of Banks Tightening Credit Conditions**[12]

The relationship between EPU of Armenia and BLT index reveals strong negative

[12]BLT = % of Banks with Eased standards - % of Banks with Tightened standards

correlation (-0.57), which means that in periods of increasing economic uncertainty the commercial banks are tightening the lending standards. The figure 5 shows that the main part of the negative correlation is explained by the two periods of shocks happened in 2009 and 2014-2015.



Source: Author's calculation and Central Bank of Armenia

Figure 5: Quarterly EPU and Index of BLT (Bank Lending Tightening)

4 Uncertainty in Business Climate Surveys

Business survey data are well-suited to measure the uncertainty of actual decision makers.

The main purpose of these business tendency surveys is to estimate the current stance, plans and expectations of non-financial organizations based on the answers of top managers. Central Bank of Armenia conducts two types of quarterly sentiment surveys to assess perceptions and expectations of households (Consumer confidence Survey) and non-financial Businesses (Business Climate Survey) since 2005. Two composite indices are constructed using the surveys data: Business Climate Index (BCI) and Consumer Confidence Index (CCI), which are related not only to the sectoral economic activity

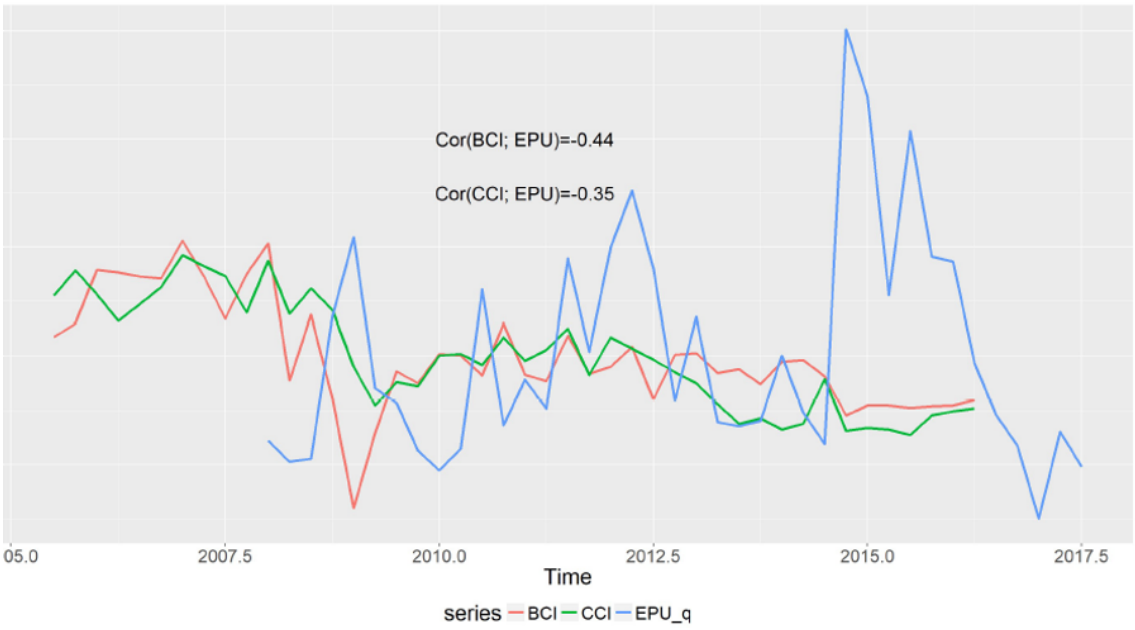
indicators but also with country's GDP (Galstyan & Movsisyan 2017).

In the current paper Armenian business sentiment surveys data is used to address two questions:

1. Macro level analysis: Is news based EPU index consistent with aggregated BCI and CCI?

2. Micro level analysis: Is news based EPU index consistent with non-financial companies expectations?

Figure 6 shows negative correlations between EPU index and aggregated macro BCI and CCI.



Source: Author's calculation and Central Bank of Armenia

Figure 6: Quarterly EPU and Business Climate and Consumer Confidence indices

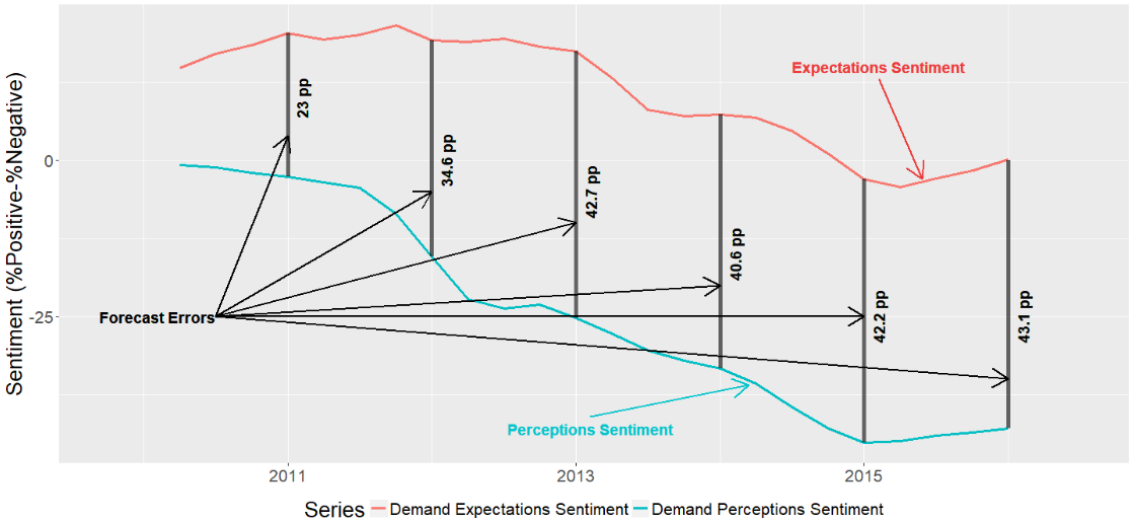
As was mentioned earlier, economic agents forecast errors can be treated as a proxy for overall economic uncertainty. Business climate surveys of Armenia allows to construct such proxy of uncertainty based on row data of the surveys:

Forecast Errors of economic agents: The short term (one quarter) predicting ability of companies is worsening (Forecast Errors increase) in periods of uncertainties.

The questionnaire of the business climate surveys of Armenia contains the expectations (expected changes in the quarter $t+1$ compared to quarter t) and perceptions (changes in the current quarter t compared to previous quarter $t-1$) of economic agents on several characteristics:

1. Production volume change (VOL)
2. Production demand change (DEM)
3. Production price change (DEM)
4. Number of employee change (EMPL)
5. Wage change (WAGE)
6. Sectors/sub sectors economic situation change (ECCON)

Figure 7 depicts three indicators related to shot-term *demand* changes: Forecast errors; Expectations Sentiment; Perceptions Sentiment[13].



Source: Author's calculation

Figure 7: Forecast Errors: averaged by Industry, Trade, and Services sectors

ForecastErrors = ExpectationsSentiment – PerceptionsSentiment

ExpectationsSentiment = %PositiveExpectations - %NegativeExpectations[14]

[13]Quarterly time series are seasonally adjusted and trend components are presented in the figure 7

[14]% of companies expecting increase of demand - % of companies expecting decrease of demand

PerceptionsSentiment = %PositivePerceptions - %NegativePerceptions[15]

Forecast errors of economic agents on short term demand changes started to increase since 2011 in parallel with worsening of actual and expectations sentiments. From 2013 to 2016 the forecast errors remained almost unchanged on its highest level (40-43 pp). High level of forecast errors of companies on their products/services demand shows companies inability of making accurate predictions even on 3 months horizon especially when their overall sentiment of perceptions and expectations of demand changes getting more negative. One of possible explanations of the above results is that companies cannot make good predictions because they are uncertain on economic development, so there should be a positive correlations between Forecast errors and Economic policy uncertainty. This hypothesis is analyzed with correlations of EPU index and forecast errors of 6 variables of business climate surveys.

[15]% of companies with actual increase of demand - % of companies with actual decrease of demand

Source: Author's calculation

Figure 8: Forecast Errors and EPU: Correlation Matrix

The last column of the correlation matrix shows that EPU index is positively correlated with all 6 variables forecast errors. The correlation is specifically high for economic conditions, employment, demand variables forecast errors. This means that high forecasting errors of companies in different sectors of economy (based on business climate surveys) coincided with increase of policy uncertainty based on news frequency coverage.

Summarizing I can say that forecast errors (forecast disagreement) of economic agents

is a good proxy of uncertainty. At the same time it was shown that signals of uncertainty coming from different sources (news, business surveys) can be assessed quantitatively, and thus be helpful for policy makers and macro forecasters.

5 Conclusion

The EPU index, constructed from newspaper reports related to economic policy uncertainty, is significantly correlated with macro, financial market variables, and also with qualitative indicators of business and households surveys. Although these stylized facts reveal only "correlation", not "causality" between policy uncertainty and economic variables, however it proves the claim, that signals, coming from newspapers can be used as an alternative source of valuable information for policy makers and researchers to understand potential risks and uncertainty for economy and country. Such indices are becoming more attractive especially because of being "real time" indicators, which can be updated automatically on daily basis.

Conventional business climate and household sentiment surveys provides useful qualitative information for constructing proxies for economic uncertainty. One of such proxy is a Forecast Errors of economic agents, which shows that during economic uncertainties companies managers forecasting abilities are worsening significantly.

From a methodological perspective, the study shows how to tap newspaper archives to develop and evaluate new measures of interest to macroeconomists, financial economists, economic historians and other researchers. To improve the reliability of newspapers based uncertainty indicators, it is worth to investigate the possibility of including new online news agencies archives thus enlarging and updating the articles database.

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