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Google Trends for Public Sentiment on Internal Control in Greece in the Face of Economic Policy Uncertainty

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Abstract

This study employs publicly available Google Trends data to construct an internal audit people perception index for the Greek public sector and investigates the influence of economic policy uncertainty on this index. Findings reveal positive correlations between various proxies for uncertainty in Greece and the proposed index, indicating that economic policy uncertainty negatively impacts people's attitudes, fostering increased interest in mismanagement, incompetent internal audit practices, and corruption. Notably, the EPU index and its sub-indices demonstrate statistically significant relationships with the Google Trends-based index. Analysis of indices related to Fiscal Policy (EPUF), Monetary Policy (EPUM), and Economic Policy Uncertainty (EPU), along with the broader Economic Uncertainty (EU) index, indicates a significant positive association with the Google Trends uncertainty index. This study contributes to a deeper understanding of the impact of economic uncertainty on individuals in the Greek public sector, offering insights that may shape policy discussions and strategies for enhancing economic decision-making.

Keywords

Internal Audit, Economic Uncertainty, Greece, Google Trends, Public Sector

1. Introduction

The evolution of macroeconomic outcomes is significantly influenced by uncertainty regarding the current state and future prospects of the economy. When economic agents are uncertain about the expected outcome of the economy, they find it difficult to make judgments. For this reason, decisions are made diffe-

rently; consumers may be forced to postpone purchasing goods and services (Kimball, 1990; Eberly, 1994), or businesses may be influenced to invest in capital projects or hire labor (Bernanke, 1983; Pindyck, 1993; Bertola & Caballero, 1994; Christiano et al., 2014; Arellano et al., 2010). Political economy considerations can also lead to uncertainty because they eventually seep into economic policy, in addition to having a detrimental impact on macroeconomic and financial outcomes (Thanasas & Lampropoulos, 2023). Policymakers' statements, actions, and choices about structural, monetary, fiscal, and regulatory policies can also have an impact on the larger economy and its prospects (Panagiota et al., 2023).

One general problem in assessing uncertainty's impact on the economy is measuring it. Typically, stable economic conditions that allow the economy to flourish to its full potential describe a time of minimal uncertainty. On the contrary, high levels of uncertainty, particularly those that follow a recession, often hinder economic activity and cause the economy to underperform. However, as uncertainty cannot be observed directly, finding alternative methods to measure uncertainty becomes crucial. In the past, surveys of intentions and opinions, high-frequency financial market data, and hard indicators like retail sales and industrial production have all been taken into account for macroeconomic nowcasting (Pratap & Priyaranjan, 2023; Szczygielski et al., 2023; Bantis et al., 2022; Bortoli & Combes, 2015, among many others). However, recent developments in computer technology and the emergence of internet information-gathering services have made other data sources—often referred to as big data—available. Google Trends is a valuable and widely utilized source of big data for macroeconomic forecasting, primarily due to its capability to provide insights into the frequency and patterns of searches for specific terms on the Google search engine. This platform aggregates and anonymizes search data, allowing researchers and analysts to examine the relative popularity of search queries over time. The underlying assumption is that changes in search behavior can reflect shifts in public interest, concerns, or priorities, offering a real-time glimpse into evolving trends.

In the context of macroeconomic forecasting, the analysis of Google Trends data can be particularly insightful (Antonopoulou et al., 2022). By monitoring the fluctuations in search volumes for relevant economic indicators, keywords, or topics, researchers can gain a more immediate and dynamic understanding of public sentiment and interest. For instance, spikes in searches related to unemployment, inflation, or economic policies may indicate heightened public awareness or concern about these issues. The strength of Google Trends as a big data source lies in its ability to capture the collective intelligence of a vast number of individuals engaging with the online sphere. The data is not only broad in scope, but also provides a global perspective, allowing researchers to observe trends at various geographic levels.

Researchers often leverage advanced analytics and statistical models to extract

meaningful insights from Google Trends data. This information can then be integrated into broader economic models or used to complement traditional data sources, enhancing the overall accuracy and timeliness of macroeconomic forecasts. The real-time nature of Google Trends data makes it a valuable tool for policymakers, businesses, and analysts seeking to stay abreast of evolving economic dynamics in an increasingly digital and interconnected world. Data from Google searches may reveal plans and intentions of users and other agents, possibly most notably those related to user expenditure. Customers might use Google's search engine to gather information prior to making financial and economic decisions about purchases, for instance. As a result, Google Search data could be a useful source of knowledge for macro-variable nowcasting.

Governments are shielded from fraud, corruption, waste, and abuse by internal audit procedures. They support governments in determining value for money, evaluating risk, and guaranteeing adherence to rules, laws, and policies. The first people in charge of internal audit operations are managers. According to Abd Aziz et al. (2015), internal controls are the policies, practices, and processes that a business puts in place to guarantee the accuracy of its accounting and financial data, encourage responsibility, and prevent and detect fraud. The public sector in the EU provides significant financial contributions to meet economic needs at all levels, and as a result, it is responsible for the prudent and effective management of the money that taxpayers in Member states entrust to it. The public sector in the EU must show that its output and results are effective and that it uses resources wisely. In light of this, Public Internal Control (PIC) adds value by helping to establish a framework for financial management and the control of the use of public funds that complies with international standards (see Vijayakumar & Nagaraja, 2012). The model, which is widely regarded as best practice, covers the fundamentals that could make a big difference in reducing the likelihood of fraud and corruption. Following the European Commission's implementation of PIC in 2002 as a framework for the efficient and successful management of the resources under its purview, European nations have gradually redesigned their regulatory control models to incorporate PIC principles. An effective public budget is a shared goal that can be attained with the help of information sharing amongst EU public administrations. The European Commission established a PIC network in 2012 at the request of the Member States, which convenes through periodic conferences. A plan outlining the PIC Network's future development was presented and approved by the attendees in Budapest in June 2017. Furthermore, the outcomes of a later survey emphasized the necessity of enhancing the influence of Network operations (refer to Schneider et al., 2009). The concept of establishing a new and improved PIC Network was introduced since it is imperative that higher-level management be more closely involved in order to guarantee that the Network's outputs are utilized and promoted inside Member States.

In this study, we construct a sentiment index for public internal audit in Greece

using Google Trends data and study how economic policy uncertainty affects this index. This index is based on public internal audit-related keywords frequently mentioned. Examples of the search keywords in Greek include "διαφθορά", "ελληνικό δημόσιο", "γραφειοκρατία", "εσωτερικός έλεγχος" and "αποτελεσματική διοίκηση". The selected keywords represent mainly public sector-related policies in Greece. We utilize Google Trends to determine the search frequency of each of these terms in the sample of interest, with a focus on the particular geographic region of Greece. Next, we assemble the results of every single search each week to create our Google Trends index. With Google Trends, users can find the volume of searches conducted online for a specific keyword. This is represented by a search volume intensity measure, which has a range of 0 to 100. The relative search volume of a given keyword relative to the total search volume over the given period is reflected in this intensity measure, which is a relative measure. The maximum value of 100 designates a specific moment in time during the entire sample when the volume of searches for the given keyword reaches its maximum. A higher index value is the outcome of more people being interested in a given topic, which in turn leads to more people searching the internet about it. This serves as the fundamental idea behind building a perception index for public internal audit using Google Trends. These search terms pertain to policy choices that have the potential to undermine public confidence in government, undermine transparency protocols, and create uncertainty within the political system. We fixed the geographical area to Greece because our study is focused on that country, and this allowed us to obtain the keyword-wise search volume intensity. In order to deal with the initial set of scaling and aggregation limitations, we employ the methodology suggested by Castelnuovo and Tran (2017). Using this method, we take our chosen list of keywords and utilize Google Trends to extract the search frequency for each term. We adopt an iterative approach. Since Google Trends allows users to enter a maximum of five words per instance, the fifth word is used as the benchmark. The benchmark word, which in our case is "διαφθορά", needs to be a keyword that receives a lot of searches. In order to address the comparison and aggregation problem, this step makes sure that the search volume intensity of each keyword is calculated in relation to the search volume intensity of the benchmark word. We then aggregate the search volume intensity for individual search terms at the all-Greek level to obtain an aggregate uncertainty index.

Google Trends data represents a case of big data. Big data, which is defined by its volume, velocity, variety, veracity, and value, generally signifies a significant change in the way we obtain and analyze data. In the digital age, the rapid growth in data production is largely driven by the widespread use of technology, such as smartphones, social media platforms, digital transactions, IoT devices, and many more. These technologies leave vast digital footprints, resulting in a wealth of data that can be harnessed for various purposes. Economics, a discipline traditionally reliant on official statistics and carefully controlled studies, is now experiencing a paradigm shift due to the emergence of big data. Big data provides a

new dimension of raw, often real-time data, vastly expanding the scope and depth of economic analysis. One of the most transformative impacts of big data in economics is the ability to provide new insights. By analyzing big data, economists can extract significant information and trends that were previously inaccessible. For example, economists can use social media data to gauge consumer sentiment, search engine data to predict economic indicators, or e-commerce data to track spending patterns. These real-time, granular insights can help economists better understand economic behavior, trends, and phenomena. Moreover, big data also brings improvements to decision-making in economics. Both microeconomic and macroeconomic decisions can benefit from big data analysis. On a microeconomic level, businesses can leverage big data to optimize their operations, improve their marketing strategies, and enhance their decision-making processes. On a macroeconomic level, policymakers can use big data to monitor and respond to economic developments, inform policy decisions, and evaluate policy impacts more accurately. Big data is also reshaping traditional economic frameworks. Traditional economic models are often based on assumptions and aggregate statistics. Big data, with its granularity and timeliness, allows economists to test these assumptions, refine existing models, and even create new models that better capture the complexity of the real world. This has the potential to revolutionize economic theories and practices, making them more data-driven, precise, and relevant. In summary, the intersection of big data and economics is transforming the discipline by offering new insights, enhancing decision-making, and reshaping economic frameworks. This transformation is opening up new avenues for research, practice, and policy in economics, promising a future where economic insights are more accurate, timely, and nuanced. However, this transformation also presents challenges, such as data quality, privacy, and ethical concerns, which must be carefully addressed to harness the full potential of big data in economics.

In this work, we investigate the potential impact of economic policy uncertainty on our index. Several indices of Economic Policy Uncertainty and related concepts for Greece are employed in this process. The analysis specifically looks at several category-specific EPU sub-indices pertaining to Fiscal Policy (EPUF), Monetary Policy (EPUM), Currency Policy (EPUC), Banking Policy (EPUB), and Pension Policy Uncertainty (EPUP), in addition to Economic Policy Uncertainty (EPU), a broader index of Economic Uncertainty (EU). The newspaper-based techniques outlined in "Measuring Economic Policy Uncertainty" (see Baker et al., 2016) are utilized to construct the indices mentioned above.

The remainder of the paper is organized as follows. First, we give an overview of the data used in this paper. Then, we present the empirical results. Finally, we conclude the paper.

2. Data

As already mentioned, for Greece, we use various indices of Economic Policy

Uncertainty along with related concepts. The analysis takes a particular look at several category-specific EPU sub-indices including Fiscal Policy (EPUF), Monetary Policy (EPUM), Currency Policy (EPUC), Banking Policy (EPUB), and Pension Policy Uncertainty (EPUP), in addition to Economic Policy Uncertainty (EPU), a broader index of Economic Uncertainty (EU). The aforementioned indices were created using Hardouvelis et al.'s (2018) newspaper-based methodologies. They created multiple indices of Economic Policy Uncertainty for Greece spanning the period from January 1998 to the present. Specifically, they created an index of Economic Policy Uncertainty (EPU) for Greece from 1/1998 to the present, similar to other global EPU indices, using textual analysis. These indices have a positive correlation but still have a significant amount of idiosyncratic variability. All of them, with the exception of EPUM, rose during the global crisis and the Greek crisis that followed. Additionally, there is a positive correlation between EPU and international EPU indices, which increased during the global crisis before declining during the Greek crisis. A subsequent drop in investment, industrial production, GDP, employment, household deposits, economic sentiment, the stock market, and bond yields is linked to positive shocks to the EPU and the other indices. These shocks play a major role in explaining the changes in macro and financial variables during the crisis, both in terms of direction and magnitude.

Figure 1 and Figure 2 present our constructed Google Trends index based on the abovementioned keywords (Figure 1), as well as the values of the selected uncertainty indices for Greece (Figure 2).

3. Empirical Results

We now investigate the relationship between the suggested Google-Trends-based index and each of these uncertainty indices. Table 1 shows the outcomes of the robust linear regression. According to the results in Table 1, we find that there is

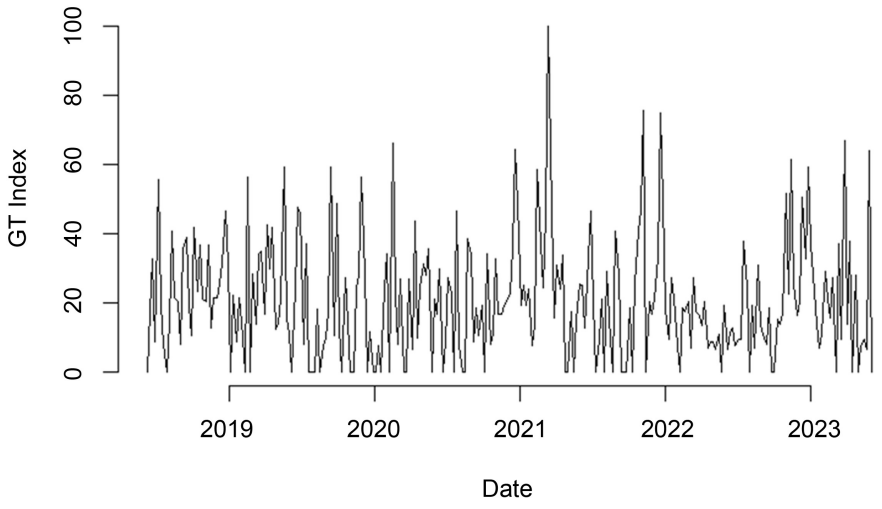

Figure 1. Public internal control index based on Google trends data.

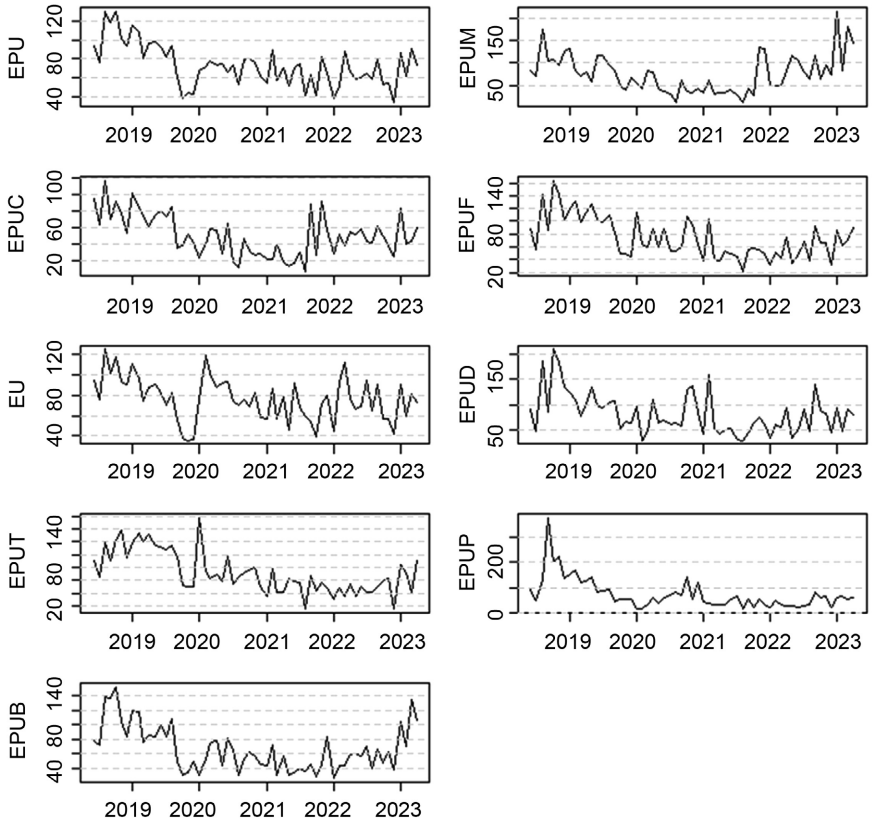

Figure 2. Economic policy uncertainty indices for Greece.

Table 1. The impact of EPU on the public internal control index.

Index	Coefficient Estimate	Adj. R-squared
EPU	0.03819***	0.3584
EU	0.009743**	0.2738
EPUC	−0.07483**	0.3661
EPUB	0.03292	0.1356
EPUF	0.006603*	0.1738
EPUM	0.02383*	0.1378
EPUP	−0.03598**	0.1241

Note: Level of significance: "***": 0.001, "**": 0.01, "*": 0.05, ".": 0.1.

a statistically significant relationship between the Google Trends-constructed uncertainty index and the EPU index, along with several EPU sub-indices. In particular, the findings suggest that the Google Trends uncertainty index has a statistically significant negative relationship with the EPUP and EPUC indices, while the broader index of Economic Uncertainty (EU), Fiscal Policy (EPUF), and Monetary Policy (EPUM) related indices, as well as Economic Policy Uncertainty (EPU), show a significant positive relationship with the Google Trends uncertainty index.

4. Future Work

Future research endeavors could leverage big data methodologies to enhance the depth and precision of our understanding of the relationship between economic policy uncertainty and the internal audit people perception index. A more granular temporal analysis using advanced big data analytics could unveil intricate patterns and dependencies over distinct economic periods. Cross-country comparative studies, augmented with big data insights, might uncover commonalities or divergences in how economic policy uncertainty impacts public perceptions in various national contexts. The integration of qualitative methods, informed by big data findings, could provide a comprehensive understanding of the nuanced factors influencing the observed correlations. Exploring big data-driven policy implications and interventions for mitigating the impact of economic policy uncertainty on public perceptions would offer a forward-looking perspective for policymakers. Additionally, employing big data in a longitudinal study would enable the tracking of dynamic trends and shifts over time. Sensitivity analyses on big data-driven construction of the people perception index, sector-specific big data investigations, and validation against external big data indicators could fortify the study's reliability and relevance. Incorporating big data into dynamic modeling would further capture the intricate interplay of economic policy uncertainty, internal audit perceptions, and public attitudes. Finally, examining big data-driven communication strategies during periods of economic policy uncertainty could guide proactive measures for government agencies and internal audit departments in effectively managing public sentiment.

5. Concluding Remarks

Using publicly available Google Trends data, we create an internal audit people perception index for the Greek public sector and examine the impact of economic policy uncertainty on this index. Our results show that a number of different proxies for uncertainty that are available for Greece have positive correlations with our proposed index. This further indicates that uncertainty about economic policy tends to have a negative impact on people's attitudes and increases their interest in mismanagement, incompetent internal audits in the public sector, and corruption. In particular, the EPU index and a number of EPU sub-indices have a statistically significant relationship with the index constructed using Google Trends data. The analysis of the indices related to Fiscal Policy (EPUF), Monetary Policy (EPUM), Economic Policy Uncertainty (EPU) and the broader index of Economic Uncertainty (EU) indicates a significant positive relationship with the Google Trends uncertainty index. Overall, this study offers a better understanding of policymakers and the ways in which individuals are impacted by economic uncertainty. As a result, policy discussions regarding how to improve economic decisions may be influenced by the findings.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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