Seismic Markets - Geopolitical Risks and Economic Performance in Europe

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Abstract

This dissertation investigates the impact of second-moment shocks on real economic performance in the Euro Area. Building on the Common Volatility (COVOL) framework developed by Campos-Martins & Engle (2023), it contrasts volatility-based empirical Global and Regional COVOL with news-based indexes such as Geopolitical Risk, Economic Policy Uncertainty, and World Uncertainty Index. New regional EPU and GPR indexes are constructed to enhance comparability with the Regional COVOL factor. Using quarterly macroeconomic data for 19 Euro Area countries from 2000 to 2023, the analysis finds that second-moment shocks, particularly those identified by lagged Global COVOL, are systematically associated with declines in macroeconomic activity. A one-unit increase in Global COVOL is linked to an approximate 4.5 percentage point decline in Investment growth, a 10-percentage point drop in Consumption growth, and a 3percentage point reduction in Real GDP growth in the subsequent quarter, controlling for time dependence in the data. External trade growth dynamics are also significantly affected: Imports fall by around 11 percentage points and Exports by 10 points, consistent with delayed global supply chain responses. Empirical indexes, particularly Global COVOL, consistently outperform news-based uncertainty measures in explaining macroeconomic variables, due to their faster information incorporation and forward-looking nature. Transmission likely occurs through channels such as real options, smoothen household consumption and trade contagion. The dissertation's main contribution lies in jointly applying Global and Regional COVOL factors to European aggregate macroeconomic variables. While lagged Global COVOL captures systemic shocks with delayed effects, contemporaneous Regional COVOL adds Eurocentric explanatory power, notably for Industrial Production.

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Resumo

Esta dissertação investiga o impacto dos choques de segunda ordem no desempenho económico da Zona Euro. Enquadrada no índice Common Volatility (COVOL), proposta por Campos-Martins & Engle (2023), contrastam-se fatores empíricos (Global e Regional COVOL) com índices baseados em notícias, nomeadamente o Geopolitical Risk (GPR), a Economic Policy Uncertainty (EPU) e o World Uncertainty Index (WUI). São ainda construídos novos índices regionais de EPU e GPR, de forma a melhorar a comparabilidade com o fator Regional COVOL. Utilizando dados macroeconómicos trimestrais para 19 países da Zona Euro entre 2000 e 2023, verifica-se que os choques de segunda ordem, particularmente captados pelo Global COVOL desfasado, associam-se sistematicamente à desaceleração económica. Um aumento unitário no Global COVOL relaciona-se com uma redução na taxa de crescimento do: Investimento, 4,5 pontos percentuais (pp); Consumo, 10pp, e; PIB Real no trimestre subsequente (3pp), controlando-se as dependências temporais dos dados. Também a dinâmica do comércio externo é afetada, registando-se quedas nas taxas de crescimento das Importações (11pp) e Exportações (10pp), refletindo respostas tardias das cadeias globais de abastecimento. Índices empíricos, sobretudo Global COVOL, apresentam desempenho consistentemente superior aos índices baseados em notícias, dada a rápida incorporação da informação e caráter prospetivo. Os choques transmitem-se predominantemente através das opções reais, suavização do consumo e contágio comercial. Assim, a principal contribuição consiste na aplicação conjunta dos fatores Global e Regional COVOL às variáveis macroeconómicas europeias. Enquanto o Global COVOL desfasado capta choques sistémicos com efeitos temporais, o Regional COVOL contemporâneo acrescenta poder explicativo eurocêntrico, nomeadamente na Produção Industrial.

Título: “Mercados Sísmicos: Risco Geopolítico e Performance Macroeconómica na Europa”

Autor: Rodrigo Miguel Pegado Gouveia

Palavras-Chave: Choques de Incerteza, Risco Geopolítico; Performance Macroeconómica; Zona Euro; Canais de Transmissão; Common Volatility (COVOL)

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Chaos is order not yet deciphered. This dissertation is motivated by a personal and academic attempt to understand complexity, and how social sciences subjects interact with one another. It marks the end of a privileged five-year journey in higher education, or the first chapter of it. I'd like to clearly acknowledge and thank all who have contributed to it.

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AMDG

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Artificial Intelligence usage declaration

In alignment with the principles of academic honesty, authorship, and intellectual responsibility outlined in the *Católica Lisbon School of Business and Economics Academic Integrity Code*, I hereby declare that the use of artificial intelligence tools in the development of this thesis was strictly limited to auxiliary functions conventional academic writing aids. Such as:

- Assistance in refinement of grammar, syntax, and clarity in English-language academic writing, and;
- Facilitate the contextual interpretation of academic sources for the literature review, as well as more advanced empirical methods.

At no point were generative AI tools used to produce original content, conduct analysis, or formulate arguments. All theoretical reasoning, methodological choices, empirical findings, and written outputs reflect my own independent academic work and intellectual contribution.

This limited and transparent use of AI tools is fully consistent with the ethical expectations of Católica Lisbon and does not constitute a breach of the School's Academic Integrity Code.

1. Introduction

Political scientists and economists define a geopolitical system as the foundational structures for an economic system in which sovereign states interact. This dissertation metaphorically compares the geopolitical system as tectonic plates: fitted together, but constantly moving and exerting pressure on one another, colliding and creating earthquakes, in this case, geopolitical events. Following systems theory, these events disrupt economic homeostasis (that is the dynamic equilibrium between elements in a system) triggering volatility that propagates across global markets. These are systemic events.

The geopolitical events, such as pandemics, wars, and financial crises, send tremors through global financial markets, causing economic repercussions far beyond their geopolitical epicentre. Rather than simply altering asset price levels (first-moment shocks), these occurrences are better characterized as second-moment shocks: widespread increases in volatility that reprice depress economic activities including Investment, Consumption, and Trade. Recent historical examples vividly illustrate this phenomenon, notably the 2008 Great Financial Crisis (GFC), the COVID-19 pandemic, and Russia's Invasion of Ukraine. Considering current events and rising geopolitical tensions, there is a rising interest amongst financial and political economists on the real impact of shocks triggered from these events.

Most empirical analyses traditionally measure uncertainty through text-based indexes such as the Economic Policy Uncertainty (EPU) index (Baker, Bloom, & Davis, 2016)), the World Uncertainty Index (WUI) (Ahir, Bloom, & Furceri, 2022) and the Geopolitical Risk (GPR) index (Caldara & Iacoviello, Measuring geopolitical risk, 2022). While influential, these indices—derived from keyword frequencies in media sources—are inherently Anglocentric, backward-looking, and often misaligned with real-time market-perceived risks. In contrast, recent methodological advances emphasize empirical market-based volatility measures. Prominent among these is the Common Volatility (COVOL) framework developed by Campos-Martins & Engle (2023), which captures the global common component of asset return volatilities. Building on top of this, Campos-Martins & Engle (2025) have introduced a novel Regional COVOL (RCOVOL) factor that captures additional common volatility, derived from group specific shocks.

Despite these developments, no existing research has benchmarked Global and Regional COVOL factors directly against conventional news-based uncertainty indices within the Euro Area. This region has notably weathered successive volatility-inducing events over the past two decades, including the Sovereign Debt Crisis, Brexit, EU related political events and more recently the Russian-Ukrainian conflict.

This dissertation addresses this gap by examining whether second-moment shocks, have explanatory power for real macroeconomic outcomes within the Euro Area. The study also compares empirical measures such as COVOL with news-based indexes. Results are expected to reply to the last research question: what the mechanisms through which uncertainty are affects the real economic output.

Using quarterly macroeconomic data for 19 Euro Area economies from 2000 through 2023, for Real GDP growth, Investment, Consumption, Industrial Production and Trade Variables, an uncertainty index panel is constructed. It includes news-based indicators, namely GPR, EPU and WUI and empirical measures, including both Global and Regional COVOL provided by Campos-Martins & Engle (2025). Region-specific GPR and EPU indexes are constructed in this dissertation using country specific data.

The analysis yields several significant findings. A unit increase in Global COVOL systematically predicts substantial subsequent-quarter economic contractions, notably for Investment (4.5 percentage points (pp) decrease in quarter-on-quarter growth rates), Household Consumption (10 pp) and ultimately in Real GDP (3 pp). after accounting for inherent macroeconomic persistence. Trade variables also experience pronounced effects, with Imports (11 pp decrease in quarter-on-quarter growth rate) and Exports (10 pp) declining, reflecting delayed adjustments in global supply chains. Critically, when Global COVOL measures enter predictive regressions, traditional news-based indices show negligible incremental explanatory power. This is likely given due to the market-based perception of COVOL, which incorporates broader sets of risk, escapes from media bias and gains from forward looking perspective, which is implied in asset price movements.

Additionally, contemporaneous Regional COVOL uniquely captures Eurocentric shocks, and is reflected particularly in Industrial Production dynamics, while Global COVOL effectively identifies broader systemic shocks with a characteristic one-quarter lag. These empirical

findings reinforce transmission channels in theoretical frameworks such as Investment transmission channel (real-options and q-theory), Consumption channel (Income behaviour) and Trade Channels.

The remainder of this dissertation is structured as follows. Section 2 dives into the literature review on information signals in financial markets, uncertainty indexes and real economic impacts of uncertainty. Section 3 provides the research strategy, dataset and regression models. In Section 4, results are presented and main findings discussed. The theoretical implications are highlighted in Section 5 and the limitations alongside future research are presented in Section 6. Finally, the conclusion in Section 7 ends this dissertation.

2.Literature review:

Uncertainty shocks, particularly those triggered by systemic geopolitical events, have global and regional implications across asset classes. Standard economic theory assumes rational decision-making under perfect information, where agents evaluate all outcomes and probabilities to maximize utility (Von Neumann, 1944). In reality, however, decision-makers face imperfect information, bounded rationality, and behavioural biases, employing heuristics in their choices (Grossman, & Stiglitz, 1980). Crucially, the literature distinguishes between risk—where probabilities and outcomes are known—and uncertainty—where probabilities are unknown or unmeasurable (Knight, 1921). This uncertainty clouds informational clarity, impeding optimal and timely decision-making. Such an environment implies market prices are unpredictable based solely on past information and exhibit seemingly random reactions to new information, supporting the random walk hypothesis (Samuelson, 1965). These foundational concepts frame the literature review, which delves deeper into how uncertainty influences financial market volatility and real economic outcomes. In Annex A, a small literature review can be found, where volatility stylized facts and modelling literature is briefly summarized.

Efficient Markets, Information Production and Co-Movements

Fama (1970) defines an *efficient market* as one that fully reflects all available information, providing investors with accurate signals for resource allocation (capital and labour). In its *weak form,* markets reflect only historical prices. *Semi-strong form* markets adjust prices to all publicly available information, which may concern past performance (firm's annual report), or news that may affect future performance of the asset (such as interest rates announcements,

economic forecasts, or geopolitical events). *Strong form* efficient markets specify that investors have access to public and private information, which may constitute insider trading, or illegal information appropriation. Still, considering an efficient market at its *Semi-Strong* form, one may conclude that security market prices reflect all public information, always.

As news and events (information signals) begin to be analysed by investors, brokers and researchers (information production), market prices adjust accordingly. In periods of larger amounts of signals, that is., more news derived from a chain of events, trading volume increases and price variability increases (Mitchell & Mulherin, 1994). These events will trigger co-movements, magnified by the information production cycles, as explained in Veldkamp (2005), following an investor rationality approach[1] and Brockman , Lienbenberg , & Schutte (2010), complimenting with a behavioural investor approach.

On the supply side, information producers face high marginal cost, majority of which are fixed. Veldkamp (2005) specifies that in periods of economic downturn and uncertainty, when the marginal value of information is higher, investors tend to specialize their use of produced information, increasing demand for specific sets of information. Benefiting from economies of scale, and implied lower marginal cost per unit of information, the price decreases. Then, given a larger pool of investors is relying on the same pricing input, a signal will have a scaled effect, creating a co-movement.

Investors demand for information is countercyclical, meaning in periods of economic growth complacency grows. Normally, as investors are not willing to engage in research as it creates "trading noise", but in periods of economic uncertainty, market agents start panicking and become very keen on understanding market conditions (Brockman , Lienbenberg , & Schutte, 2010). As investors are more informed, they tend to react more often and more synchronized, creating co-movements, and volatility clustering. This aligns with Cont's (2001) stylized factors of returns, particularly the heavy tails behavior and clustering (which can be found in Annex A).

[1] The framework discussed abstracts from endogenous price formation complexities in real-world information market

The cross-sectional co-movements for all asset classes is one of the puzzles of modern asset pricing. In a market setting where information is costly, uncertainty leads investors to buy common cheap information, and suppliers provide the highest value information signals, creating synchronization (Veldkamp, 2005).

COVOL and other Geopolitical Risk Measures

As explained in Campos-Martins & Engle (2023), if all asset returns are linear functions of common factors, then the changes in such factors over time imply a common volatility across assets. Though these are systemic factors, there is strong evidence of common idiosyncratic volatilities (CIV) as documented by Herskovic et. al (2016). While these findings challenge the notion of idiosyncrancy (which should by nature be firm-specific) it is possible that such co-movements are due to correlations in the underlying shocks affecting the firm's fundamentals. These "earthquakes" may come from different epicentres. Carney (2016), specified Geopolitical, Economic and Policy as the three pillars of uncertainty for financial markets, and key sources of such shocks. These have become subjects of research for financial and political economists, and recently there have been several attempts in achieving an index that reflects these shocks.

One important set of contributions is made via textual analysis, that is, algorithmic frequency measuring articles related to a certain topic, using key words (for example "war"). It is argued that by analyzing decentralized databases of information impulses, it is possible to study the cross-sectional variation of social variables which are not quantifiable otherwise (Sainz & Simonsohn, 2013). Important early applications of these methods to geopolitical risks come from Baker, Bloom, & Davis (2016) and Caldara & Iacoviello (2022).

GPR

The *Geopolitical Risk* (GPR) is a monthly text-based index, constructed using a set of 11 international newspapers (US and UK based), to look for news related to geopolitical tensions (Caldara & Iacoviello, 2022). The index is more focused on the traditional set of geopolitical events, that is, wars, border tensions and terrorism, spiking during events of high geopolitical tensions, mainly those with US involvement, such as the Gulf Wars and Invasion of Iraq. It also captures terrorism wave in Europe during the early 2000's. On a later stage, the authors separate the index into Threats (GPT) and Acts (GPA). Media bias given the heavy US and UK

coverage and overreliance on press coverage, are some of short comes of GPR, increasing the potential to be measuring public fear rather than actual risk.

EPU

The *Economic Policy Uncertainty* (EPU) index is a text-based index proposed by Baker, Bloom, and Davis (2016). It signals economic policy uncertainty by capturing written references of uncertainty regarding who are the economic agents (elections), what economic policy actions will be undertaken and what will be the economic outcomes of such decisions. These are observed through three factors: 1) Frequency of references to policy related uncertainty, using leading US newspapers, 2) tax code provisions set to expire in future years and the 3) disagreement between economic forecasters over government spending and inflation. For the US, the index spikes in periods of high economic uncertainty such as Gulf Wars, Presidential Elections tensions and Great Financial Crisis.

WUI

Ahir, Bloom, & Furceri (2022) expand on this methodology with a World Uncertainty Index (WUI), using 143 country reports from The Economist Economic Intelligence database to create an unbalanced index. The authors add that though levels of uncertainty are higher in developing countries, the shocks are more synchronized in advanced economies, which is consistent with the information production, and a big driver of volatility co-movements.

There is high correlation between the EPU and GPR, given the national security component of EPU. Both indexes are compared with the VIX (Volatility Index for S&P). Unlike these two, GPR does not capture financial events unless they're related to geopolitical events (threats or acts). It also fails to capture policy uncertainty. GPR captures events that are more likely to be caused outside the business cycle and can therefore impact the financial volatility (captured by VIX) and policy uncertainty (Caldara & Iacoviello, 2022).

COVOL (Campos-Martins & Engle, 2023)

COVOL is a latent factor that explains conditional variance co-movements across assets using multiplicative decomposition. It can be interpreted as a risk measure that incorporates the investors information assimilation of an event (information impulse as per Veldkamp (2005)), which is consistent over time. Economically, COVOL represents systemic risk perception, as it captures uncertainty shocks via volatility co-movements across assets.

Empirical measure's (COVOL) predictive power is tested against text-based measures and ratings-based measures in Karagozoglu, Wang, & Zhou (2022). Using Multivariate Vector Autoregressions, their findings suggest that empirical measures incorporate risk faster than textual measures, and ratings-based measures. Contrary to other indexes , discussed above, COVOL allows for a more systematic and disciplined analysis of risk and its spill over in all asset classes, independent of media coverage (EPU, GPR mainly), or implied volatility (VIX). COVOL, as an empirical measure, is a realized risk metric and not an expected risk measure, making incorporation more efficient.

Additionally, COVOL does not categorize geopolitical events by the traditional definiton of geopolitics, which is about control over territory. This is in line with the sense that a true systemic event—a natural disaster, pandemic or a global financial crisis—can be as geopolitical as wars or terrorism. COVOL offers a real time, endogenous factor of geopolitical risk, representing market agents measure of risk, differs from media perception, found in news based indexes.

Regional COVOL (Campos-Martins & Engle, 2025)

Because of its statistical nature, COVOL captures not only a broader scope of geopolitical events when compared to the textual, but also truly global events (Campos-Martins & Engle, What are the events that shake our world? Measuring and hedging global volatility, 2023). Despite there are events which may have a more intense regional effect, an event such as Brexit, Russian Invasion of Ukraine or European Parliament Elections will have an impact of larger scale in a regional integrated European economy, leading to the motivation behind developing a Regional COVOL index.

In Campos-Martins & Engle, (2023), COVOL is measured from country equity Exchange Traded Funds (ETF) and in Campos-Martins & Engle (2025) the COVOL is extended to two factors and applied to government bond yields. It was found that a model with both a global and a regional factor has better explanatory power of the common variation in the data. This motivates the existence of a Regional COVOL factor, which appears to explain co-movements among mostly European bonds.

Impact of Volatility Spikes on Real Economy

As mentioned in Section 1, shocks to the underlying system in which economic agents act will impact decision making, and by extension macroeconomic performance. Like financial markets, business cycles reflect news regarding future events (Beaudry & Portier, 2006). Households increase consumption and firms' employment in response to news regarding future improvements of macroeconomic conditions, (Jaimovich & Rebelo, 2008). Reversely, bad news regarding future outcome delay firm-level investment.

The term *Bad news* refers to deteriorating macroeconomic fundamentals (i.e., first moment shocks), while *uncertainty* defines an increased confusion regarding future outcomes (i.e., second moment shocks). The latter is often a product of geopolitical risk, where it becomes unclear the integrity of the system, regardless of firm-level assessments (Berger, Dew-Becker, & Giglio, 2017). Though recent literature concludes that much of the uncertainty can be a byproduct of business cycles, as a response to economic shocks (Ludvigson, Ma, & Ng, 2018), this paper focus on *uncertainty* as an exogenous variable of business cycles, causing shocks to the real economy.

The next step is to assess the economic impact of shocks captured by a geopolitical index. Caldara & Iacoviello (2022) found that higher GPR is associated with higher probability of an economic disaster, using with a linear probability model. It is also associated with lower real Gross Domestic Product (GDP) growth, lower total factor productivity (incorporates Industrial Production) and firm level investment. Baker et.al (2016) estimates the impact of EPU on firm-level investment and employment for a set of industries, finding a higher shock in industries with government contracts (defense and construction). Their results are consistent with the findings in Caldara & Iacoviello (2022). An increase in EPU (meaning a positive uncertainty shock) depresses Industrial Production and employment. Increases in GPR also lead to increasing EPU, as geopolitical risk induces economic and policy uncertainty (Caldara & Iacoviello, 2022), consistent with Carney (2016). In the real economy, GPR has effects on trade, with imports and exports decreasing, as found by Caldara & Iacoviello (2022).

Campos Martins & Engle (2025) refers that when uncertainty is higher, asset prices are likely to be more extreme, depressing consumer and investor confidence about the future. Empirically, the authors analyse the impact of increases in COVOL on the probability of an economic recession, as determined by the NBER. Using linear probability models, Campos-

Martins & Engle, (2025) compares COVOL and GPR as predictors of a recession and finds that COVOL is a better predictor than GPR. This goes in line with results in Karagozoglu, Wang, & Zhou (2022), who found empirical measures such as COVOL to be quicker at capturing changes in geopolitical risk.

Geopolitical risk also increases capital flows from emerging markets toward advanced economies, as investors seek safe haven assets during periods of heightened instability (Caldara & Iacoviello, 2022). These risks also undermine business confidence and limit spending, consistent with volatility transmission channels, as in Campos-Martins & Engle (2023). Importantly, uncertainty surrounding government policy itself has been shown to significantly affect market pricing. Pastor and Veronesi (2010) argue that stock prices tend to decline in periods of elevated policy uncertainty, particularly when such uncertainty follows a downturn. Finally, Ahir, Bloom, and Furceri (2022) emphasize that the strength of institutions moderates these effects, with weaker institutional environments amplifying the real economic consequences of political and geopolitical shock.

Theory says that variables such as Investment, Employment and Industrial Production are severely impacted by geopolitical shocks. The next subsection underlines the transmission mechanisms by which geopolitical risk impacts these variables, and economic growth.

In output terms, Bloom (2009) finds that recessions are the sum of an increase in bad news regarding fundamentals, and an increase in uncertainty. More specifically, a second moment shock will lead to a "V-shaped" GDP behavior, driven by quick downward spirals of employment and productivity, followed by a strong rebound. Shocks of second moment are deemed to be short-term, and therefore its impact is also measured on a quarter to quarter basis.

Transmission Channels

Production measures of aggregate Gross Domestic Product (GDP) are computed by summing Consumption, Investment (Private), Public Spending, and Net Trade (Exports subtracted to Imports). Income-based measures of output are dependent on Salaries and Capital Flows. When assessing the impact of geopolitical risk on business cycles and real economic output, it is important to understand what are the economic variables which amplify the seismic impact of

events. Firms' investment decision making stands out as the key intermediary of geopolitical risk into the real economy.

Investment channel

Investment decisions are ultimately a cost-return analysis. In corporate finance, it is established that firms invest in projects as long as their Net Present Value is positive. In macro finance, Tobin's (1969) q-theory defines that firms will only invest if the market value of installed capital is higher than the replacement's cost of capital. Despite, firms usually operate at full capital allocation capacity, and therefore, when met with uncertainty, the best practice becomes inertia, leading to scaled back investment plans (Bloom, 2009). This "wait and see" economic game that firms play has an implied value. As the real option value of waiting increases, the valuation of other options becomes more uncertain (Bachmann & Bayer, 2013). Bernanke (1980) argues that the optimal time of real investments is when the costs of deferring the project exceed the expected value of information gained by waiting, assuming investments are irreversible and time reveals new information (which in the case of geopolitical events may lead to higher uncertainty).

Increases in GPR (meaning an increase in perceived exogenous risk) has a negative impact on investment, with drops in capital allocated levels (Caldara & Iacoviello, 2022). Likewise, Baker, Bloom, & Davis (2016) find that increases in economic policy uncertainty lead to negative investment growth, especially in government facing industries. COVOL, a better proxy variable for systemic risk, is expected to have similar impacts on investment levels.

Labour market effects

Similarly to capital, firms operate at full labour capacity regarding hiring. Hiring decisions are often associated with investment decisions, as new projects require labour inputs. Moreover, labour is considered to be irreversible (or at least has a high cost of adjustment), so decisions benefit from the same real options theory as investment suggested by Bernanke (1980). Therefore, employment decreases in the case of an uncertainty shock, as found in Leduc & Liu, (2012) using VIX and EPU as uncertainty variables. COVOL is therefore expected to have an indirect impact on employment. Though. This variable is not studied in this dissertation due to labour market complexities.

Financial constraints channel

Financial intermediaries provide a key capital allocation function to the economy, earning interest through financing consumer spending and firms investment projects, while insuring deposits. Increases in uncertainty tighten credit conditions, either through availability of credit or through spread costs, as banks become more pessimstic in their risk assessments. For firms, this increases the cost of capital. Raising leveraging costs for existing firms and projects leads to higher defaults and higher equity required returns for future projects (CAPM model by Sharpe (1964)). This, in turn, leads to a decrease in the number of projects, as internal hurdles increase. It is also plausible that a higher cost of capital increases the risk of credit failure for firms, as suggested in classical finance literature (Merton, 1974).

Uncertainty is also amplified by non-monetary effects (Bernanke (1983)). The author addresses historical financial crises in the United States, finding that financial markets can amplify shocks into real economic outcomes through bank failures, credit squeeze and a decline in overall investment sentiment. Finally, an increase in GPR can have a negative impact on spreads and reduce credit supply (Caldara & Iacoviello, 2022). COVOL is expected to produce a similar effect, as it captures systemic events which will likely raise the cost of capital.

Households channel

Uncertainty regarding the future of the economy affects consumer decision making. In classical economic theory, income uncertainty (e.g. derived from possible job losses, financial market uncertainty) can lead to changes in consumption via precautionary savings. This means that, in times of uncertainty, consumers will "save more" and "spend less" (Carrol & Samwick, 1997). Household wealth may also be affected by depressed asset prices driven by uncertainty, as acknowledged in Pastor & Veronesi (2010).

Though Campos-Martins & Engle (2025) find that COVOL shocks are associated with declines in consumer confidence, it is hard to find direct impacts of uncertainty in household spending. It is believed that COVOL impacts households indirectly, through the channel of either investment or cost of capital (or both).

Industrial Production and Trade Channel

Industrial production and trade are intrinsically linked through the global supply chain. Countries import and export intermediate and final goods that are transformed through complex

industrial processes, making trade activity a reflection of underlying production dynamics. Decisions such as placing manufacturing or shipping orders are made months in advance, reflecting the long lead times and coordination requirements across borders. Bekaert, Harvey, & Ng, (2003) document significant contagion effects in global markets due to this interdependence. Ahir, Bloom, & Furceri (2022) find however that advanced economies (given their deeper integration into global trade networks), are more exposed to uncertainty shocks, particularly those stemming from geopolitical events. Caldara & Iacoviello (2020, 2022) find that GPR has a negative trade effect, decreasing imports and exports. Trade policy uncertaity also decreases Investment levels (Caldara et. Al (2020)). COVOL is also found to capture trade-linked asset movements (Campos-Martins & Engle, 2023, 2025). Therefore, COVOL is expected to explain trade dynamics and, consequently, Industrial Production. Although Industrial Production effects are expected to be immediate, COVOL will have a lagged impact on import and export.

3. Data and Empirical strategy

Research Questions and design

This dissertation aims to add to literature insights on geopolitical risk, uncertainty and its impact on real economic performance. More precisely, research will be designed to provide answers to the following research questions:

1. ***Does second moment shocks – particularly geopolitical risk - impact aggregate macroeconomic performance in Europe?***

Literature seems to confirm that this hypothesis is true. If empirical evidence supports this hypothesis, the following adjacent questions are explored:

2. ***What uncertainty indexes have better explanatory power? How do the empirical indexes compare to news-based indexes?***
3. ***What are the transmission channels through which second moment shocks impact macroeconomic performance?***

Research novelty stems from its Euro Area focus, allied to combination of existing literature indexes for global events - (Caldara & Iacoviello, Measuring geopolitical risk, 2022); (Baker,

Bloom, & Davis, 2016) (Campos-Martins & Engle, What are the events that shake our world? Measuring and hedging global volatility, 2023) - as well as regional counterparts found by either self-estimation (Regional GPR and European EPU) or using data from working papers (Regional COVOL, provided by Campos Martins & Engle (2025) working paper [2]

The empirical strategy is to compare empirical indexes (empirical vs news based and global vs regional) regarding explanatory power for macroeconomic variables. Lag structures and autoregressive robustness checks are introduced considering theory, and implications found in the datasets. Though regressions are tested for robustness, only reduced form impact is estimated.

Data

Economic data for Euro Area 19 (EA19) countries[3] from 2000-Q1 to 2023-Q4 is retrieved from the European Comission Database (Eurostat), in the GDP datasets. Though European Union has currently 27 countries including the latest bacth of countries entering would imply a backwards induction of their economic data into the EU27 dataset. EA19 economic data was assumed to be a good proxy for EU27. Aggregate GDP of EA19 countries represents close to 95% of GDP for EU27 countries, so quarter on quarter evolution impact is deemed to be non-material. The variables considered were Real GDP (constant prices, Chain Linked Volume with reference year of 2010 (CLV10), season adjusted), Gross Fixed Capital Formation (considered a proxy for Investment), Household Consumption, Total Exports and Total Imports (both include goods and services) Industrial Production (IP) is an index retrieved from the Short

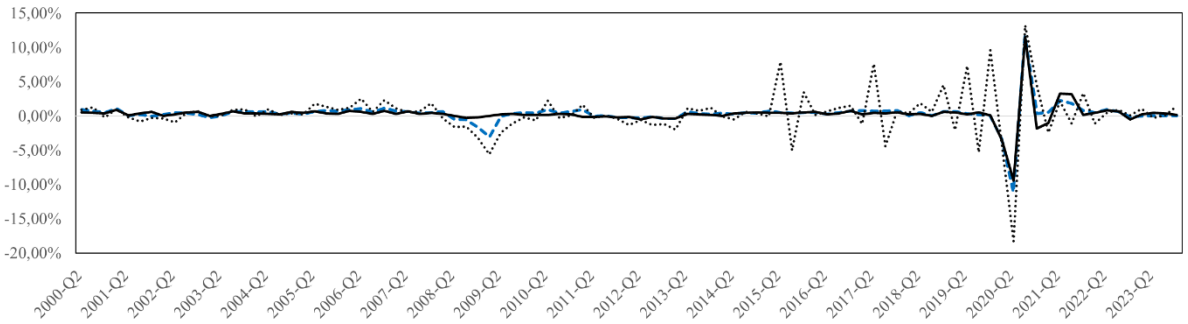

Figure 1- Evolution of selected aggregate macroeconomic variables for EA19. Left axis represents the quarter-on-quarter growth

[2] (Campos-Martins & Engle, Novelty global and regional risk factors, 2025) is a working paper, not yet peer reviewed. Paper used with the consent of authors, data for COVOL has been provided by authors

[3] Countries included in EA19: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia, Spain

Term Statistics dataset in Eurostat. Monthly data is averaged in-quarter to find quarter values. Further details, and intuition regarding economic variables can be found in Annex B2.

Regarding "news-based" Uncertainty Indexes, Global Geopolitical Risk by Caldara & Iacoviello (2022) (GGPR)[4], Global Economic Policy Uncertainty by Baker, Bloom, & Davis (2016) (GEPU)[5] and World Uncertainty Index Global by Ahir, Bloom, & Furceri (2022) (WUIG)[6] were retrieved from the respective databases, in the respective article website. GPR is found via an algorithmic text-search in US and UK newspapers for keywords regarding geopolitical conflicts (i.e. "War" or "Threats") downloaded with Global and Country Specific indexes. For GGPR, the index used was the "Recent" opposed to "Historical", and included both "Threats" and "Acts". EPU indicates the relative frequency share of own country articles containting terms related to "economy", "policy" and "uncertainty" , which is therefore indexed and GDP weighted to find GEPU. WUI follows the same method for "Global", but instead of country newspapers, it counts the percent usage of the word "uncertainty" (or similar) in The Economist Intelligence Unit country reports. For GGPR and GEPU monthly dowloaded data is averaged in-quarter and then rebased account for time series average, while WUI presents quarter data.

To find European EPU (EEPU) and Regional GPR (RGPR), a rolling quarter GDP weighted index (using CLV10 GDP) is made using country-specific GPR and EPU, for countries in EA19 with available index data (represents close to 90% of EA19 GDP). The list of countries for each constructed index can also be found in Annex B2. WUI also provides a GDP weighted index for Europe, which can be seen below in Figure 2..

In Figure 2, news based uncertainty indexes are plotted for the analysed time period (2000-Q1 to 2023-Q1). It is important to note that there is a visible "regime" shift in the EPU and WUI indexes since the 2008 Great Financial Crisis (GFC), indicating non-stationarity in the indexes and a long-term drift. Generally, the indexes display low levels of correlation (presented in Annex B1), consistent with visual findings in the plots and top deciles quarters. EPU and GPR index families display the highest levels of correlation (between 0.16-0.20), and find low correlation with WUI, which is expected given different methodologies and events reported.

[4] For more information regarding GPR, please refer to https://www.matteoiacoviello.com/gpr.htm
[5] For more information regarding EPU, please refer to https://www.policyuncertainty.com/global_monthly.html
[6] For more information regarding WUI, please refer to https://worlduncertaintyindex.com/

RGPR tracks GGPR , though shocks have different maginitudes from Iraq Invasion (2003-Q1) until Russian Ukranian conflict (2022-Q1), marking a period of geopolitical sytony in EU-US relations. Spikes in the index are accompained by main geopolitical events for Global and Regional indexes. Top decile quarters analysis can be found in Annex B3, with analysis for each index. As expected top quarters in GGPR are affected by 9/11 (2000-Q3) and Russian-Ukranian Conflict (2022-Q1), shared by RGPR. Invasion of Iraq (2003-Q1) caused spikes in RGPR, due to european involvment, regional proximity and increased energy prices.

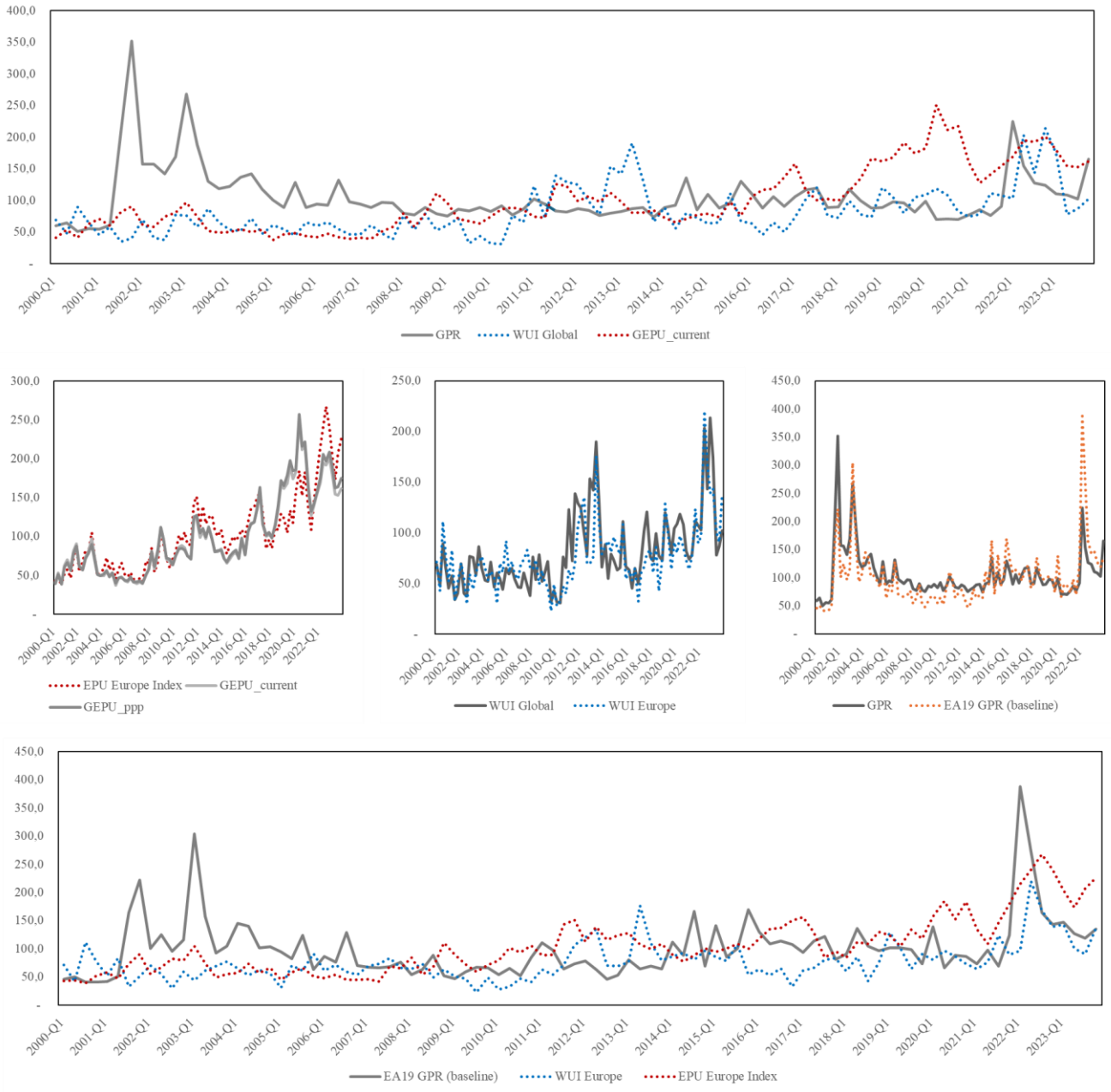

Figure 2- News based Uncertainty Indexes. Global indexes are plotted in the top pannel, regional indexes on the bottom pannel with by index comparison in the middle pannel. Left axis represents the level of index.

GEPU spikes in quarters with most intense of the Sovereign Debt Crisis (2011-Q3) and Gore-Bush post elections tensions in the US (2000-Q2), while EEPU peaks in quarters of added importance for European economic policy (2007-Q3 for example).

Common Volatility (COVOL) is an empirical measure proposed by (Campos-Martins & Engle, What are the events that shake our world? Measuring and hedging global volatility, 2023) which aims to capture cross sectional shocks to volatility coming from all assets. It is by definition a global measure, geographically and in terms of types of shocks it captures, so some events, of significant regional importance (in this case for Europe), can also be explained by an additional Regional COVOL, as proposed by Campos-Martins & Engle (2025). COVOL acts as the pricipal factor, with Regional COVOL acting as a secondary factor, with high explanatory power.

The Global COVOL (GCOVOL) and Regional COVOL (RCOVOL) data have been provided at request for the time period of 1990-Q1 to 2023-Q4 (plots can be seen in figure 3), and have been constructed using sovereign bond ETF's across countries, accounting for total bond renumeration, retrieved from Datastream. List of countries, and respective factor loading for COVOL and Regional COVOL can be found in Annex B4. The index has been provided as daily, and therefore a in-quarter average has been applied to find quarterly information. As a daily index, both COVOL and Regional COVOL are quite noisy, so quarter averages are ideal to retain information and smoothen the patterns. The index is scaled through its squared root, but instead of the shock (found by subtracting the expected value of COVOL, which is one), the level of the Index is used, as it is already stationary, and represents the increase in uncertainty against expectations.

Correlation of empirical measures against news based indexes is also generally low, but while GCOVOL has positive correlation with GEPU and GGPR, Regional Covol has negative correlation with regional counterparts, reaffirming GCOVOL as an uncertainty aggregator. Analysing at Figure 3 it is possible to acess that the Global Factor is more noisy and has higher spikes compared to Regional Factor, increasing especially in times of structural crisis: COVID-19 (2020-Q1); European Sovereign Debt C risis (2011-Q3); Post Lehman crisis financial system uncertainty (2009-Q1), Russian-Ukranian Conflict (2022-Q1). The regional factor seems to capture events more related to the internal affairs and political infrastructure of Europe. Generally, these empirical metrics tend to outweight events which create more future

uncertainty, or whose potential implications are unclear to economic agents, with potentia anticipatory behavior.

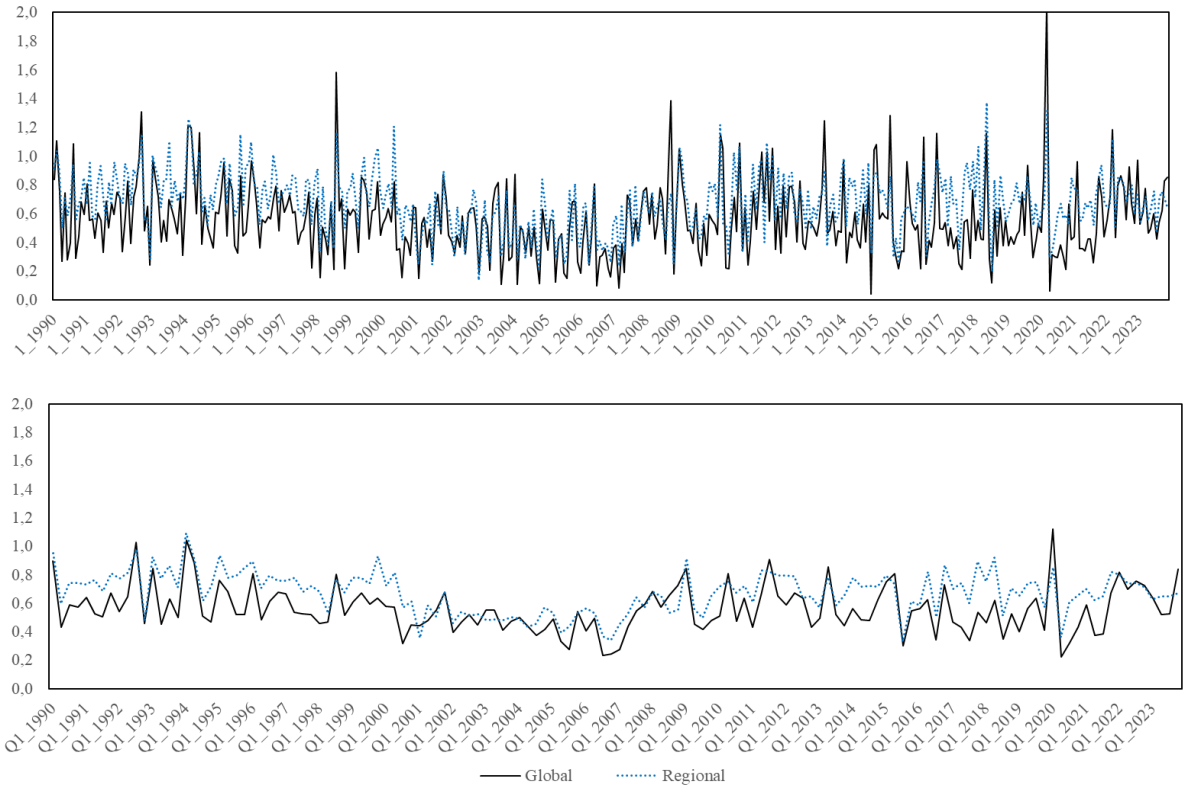

Figure 3- COVOL and Regional COVOL Indexes. (Top pannel reflects monthly data, bottom Pannel reflects in-quarter averages). Left axis represents the level of index.

On Annex B1, autocorrelation for the macroeconomic variables and indexes is included, to test for persistence on these variables. As expected, macroeconomic variables quarter on quarter growth displays high persistence, with a negative signal, indicating a mean reverting dynamic, and post shock correction in macroeconomic growth rates. Real GDP (-0.21), Investment (-0.32) and Consumption (-0.32) display the highest Autocorrelation lag 1. Controlling for these effects becomes crucial in the empirical design, as without the persistence, coefficients and their significance are biased and do not control for endogenous effects. Inversely, Industrial Production, Imports and Exports display low levels of persistence.

Methodology

Provided the empirical strategy and data, in this section the methodology is described. This dissertation does provide a structural model but some insight regarding the explanatory power of uncertainty in macroeconomic performance. In Caldara & Iacoviello (2022) and Baker, Bloom, & Davis (2016) the authors use Vector Autoregressive models (VAR) to assess the impact of the index on economic performance.

The econometric models presented below will assume that Y is a certain economic quarter variable in the Euro Area 19, and therefore ΔY is the growth rate of such variable. When a variable is mentioned hereinafter (e.g. Real GDP), it is implied that it is referring to growth rate of such variable. α is interpreted as the constant growth rate of Y and β the coefficient that measures the impact of a unit increase in *X* variables (the indexes in this case), on ΔY. If β is -0.05 then a unitary increase in X leads to a decrease of 0.05 in Y variable growth rate.

The first model is a **simple contemporaneous regression (Model 1)**, a baseline model where the vector of Y macroeconomic variables is regressed against the geopolitical uncertainty indexes. Following findings in literature, lagged terms are also included to capture any delayed effects (i.e., when h=1)

$$(1)\ \Delta Y_t = \propto + \beta_1 X_{t-h} + \varepsilon \quad with\ h \in \{0,1\}$$

This model is important to understand reduced form relations between variables, and the sign of coefficients. To split the effects of the index, but at different lags, a regression with both a contemporaneous and lagged (one time unit) factor is estimated (L1). This **lag augmented model (Model 2)** allows to understand which economic have a lagged effect. This lagged effect can be explained through the transmission channels described in the literature review.

$$(2)\ \Delta Y_t = \propto + \beta_1 X_t + \beta_2 X_{t-1} + \varepsilon$$

To test the explanatory power of COVOL and Regional COVOL, a **multivariate model (Model 3)** includes vector of variables *Z* that only contains COVOL and Regional COVOL, called empirical measures, (and their lags), while *X* contains all news-based indexes (and their

lags). Pairwise correlation between uncertainty indexes for is generally low in Global and Regional factors (see Annex B1).

$$(3)\ \Delta Y_t = \propto + \beta_1 X_{t-h} + \beta_2 Z_{t-h} + \varepsilon \qquad with\ h \in \{0,1\}$$

This can be seen as a robustness test to understand if COVOL adds explanatory power over the news-based indexes. As highlighted in the data subsection, high persistence and endogeneity in the macroeconomic variables increase the importance of an **autoregressive robustness test (Model 4)**, where the change in the macroeconomic variable can be explained by its previous values. This controls for the persistence (the momentum in economics), and all other factors that otherwise could've been impacting macroeconomic performance.

$$(4)\ \Delta Y_t = \propto + \beta_1 \Delta Y_{t-1} + \beta_2 X_{t-h} + \varepsilon \qquad with\ h \in \{0,1\}$$

All models are estimated via Ordinary Least Squares. Coefficients, test statistics, R^2 and the number of observations are reported for each regression, enabling comparison of explanatory power across models and indexes. All results can be found in the annex.

4. Results Discussion

Before presenting results from estimated regressions, it is important to visually inspect the evolution of uncertainty indexes and main macroeconomic variables (Figure 5 compares empirical indexes with Real GDP and Investment). Notably, there are clear spikes in both empirical indexes during the "earthquakes" events, followed by downturns in Real GDP and Investment. It is also clear that Investment is increasingly volatile (especially in the aftermath, of the Great Financial Crisis) and correlated to the shocks coming from uncertainty, indicating a first alignment with the real options transmission channels. Another main conclusion is the size of the crisis and rebound stemming from the COVID -19 outbreak and the uncertainty shock it caused.

Focusing on the COVID 19 outbreak time frame (as plotted in Figure 4) , a second moment shock as specified in Bloom (2009), pushes the economy to a quick economic downturn, pushed by investment, followed by "V-shaped" rebound. The shock, as seen in the dotted lines

for Global COVOL and Regional COVOL, happens during the COVID outbreak, and its economic consequences are reflected on the economic macro variables the next quarter. In fact, in 2020-Q1 COVOL registered a level of 1.12 (Regional COVOL with 0.85), and growth for 2020-Q2 dropped by 11 pp (percentual points) and Investment decreased 18 pp. The rebound in in Q3 (11 pp GDP increase), supported by a surge in Consumption and Investment (11.5 pp and 13 pp, respectively).

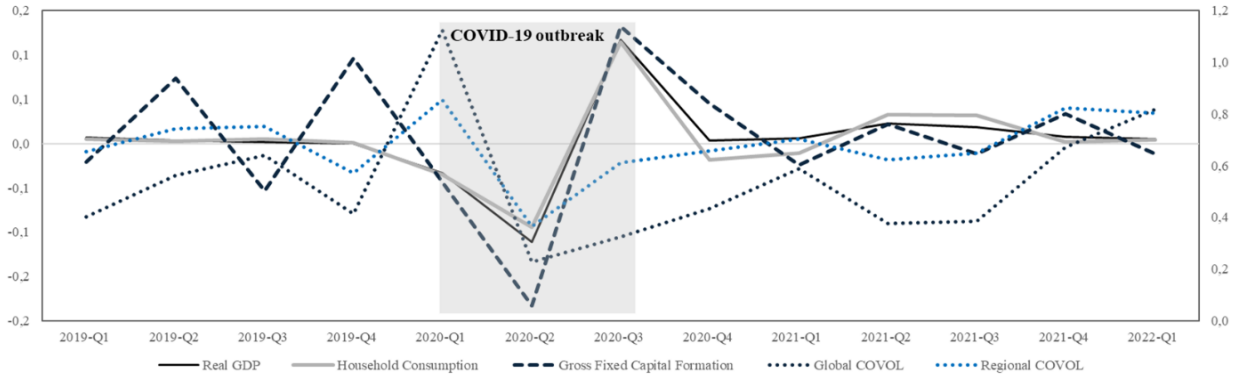

Figure 4-Evolution of empirical index and macroeconomic variables during COVID-19 outbreak. Left axis plots quarter on quarter growth (Real GDP, Household Consumption and Gross Capital Formation), Right Axis plots COVOL levels

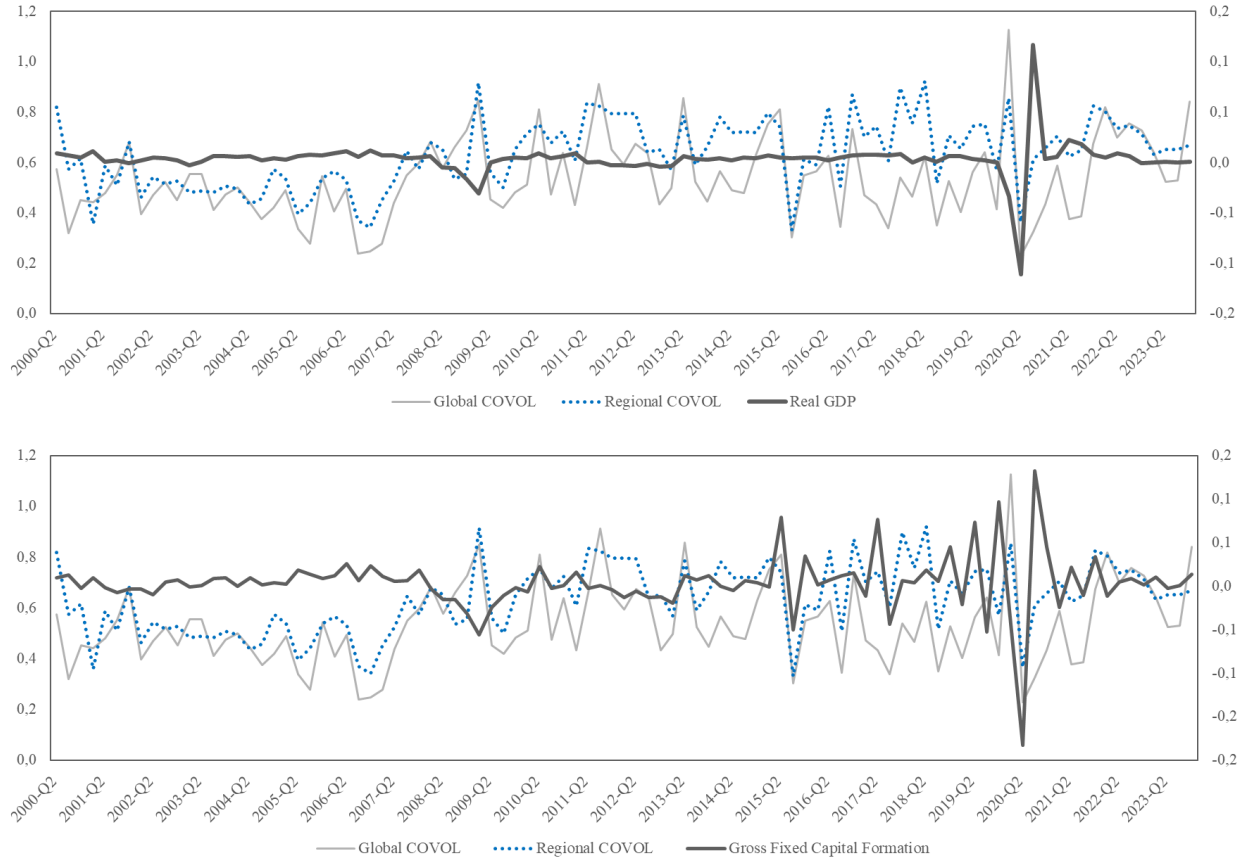

Figure 5-Evolution of empirical indexes, Real GDP (top panel) and Investment (bottom panel). Right axis plots quarter on quarter growth (Real GDP, Household Consumption and Gross Capital Formation), Left Axis plots COVOL levels

Visual inspection proves the difficulty to fully grasp the relationships between variables. To confirm the visual trends identified, **simple contemporaneous explanatory regressions (Model 1)** are used. Full tables with coefficients, test statistics, R squared for lag 0 and lag 1 can be found in Annex B5.

Analysing lag 0, empirical indexes have non-significant explanatory power, except for GEPU indexes, significant at a 10% level for Real GDP, Consumption and Investment. This likely indicates that economic policy uncertainty will inform consumption decisions and investment. There are endogenous effects given the economic uncertainty portion of the EPU index. Global COVOL has very strong (-3.94 test statistic) explanatory power over Industrial Production at lag 0, consistent with Industrial Production (IP) low persistence, and Trade/IP transmission channel.

At lag 1, empirical measures present insightful results with the global and regional factor, with significance for all economic variables and Industrial Production, except for Regional COVOL and Industrial Production. A unit increase in COVOL systematically leads to an approximate 10% drop in Investment and Exports, leading to a 5% drop in quarter GDP growth. Similarly, a unit increase in Regional COVOL is linear with a drop in GDP growth by 3% and 5% for Investment. The coefficient of Global factor is close to twice the regional factor. This outperformance of the first lagged term in comparison to the contemporaneous terms is consistent with theory that uncertainty builds up and has delayed economic repercussions. At lag 1, GEPU effects are not significant, validating it as a sentiment barometer.

For empirical measures (Global and Regional COVOL), when introducing different lag structures inside the same regression (Model 2 in methodology), it is possible to understand real transmission delay, by separating the instant effect and the past quarter effect. Global and Regional factors are also combined, allowing to compare one's explanatory power while controlling for the other. An example for Real GDP growth and Industrial Production can be found in Table 1, while the complete set of regressions can be found in Annex B5. For Real GDP growth, it is found that lagged structure holds over the contemporaneous factor, with GCOVOL L1 being significant over lag 0 measures, and sharing significance with RCOVOL L1. This ultimately means that a model with both factors enjoys the best explanatory power, as showed by the highest R^2 for Real GDP growth rate. RCOVOL L1 is also significant when controlling for the contemporaneous factor RCOVOL, differing from GCOVOL in this sense.

At lag 0, RCOVOL holds higher explanatory power over the global factor (-2.67 test statistic when controlling for GCOVOL), but this is lost when GCOVOL is lagged.

In Model 3, news-based indexes are included as well as and lagged empirical measures for Global and Regional COVOL. Results for regressions of Real GDP, IP and Investment, using news-based indices as variables and controlling for GCOVOL (IP) and GCOVOL L1 (GDP and INV) can be found in Table 2. The complete set of results for these variables, using all indices and lag terms can be found in Annex B7. The results confirm the conclusions taken from Model 1 and Model 2: GCOVOL holds explanatory power over all news-based indexes for Industrial Production, while the GCOVOL L1 has very strong explanatory power (average test statistic controlling for other indexes is around -5 for Y and -4 for INV) for Real GDP, Investment and Consumption. Moreover, for these macro variables, the additional value from adding news-based indexes to models with GCOVOL L1 is marginal (R^2 gains of around 2%). When performing the same exercise for regional factors (which can be found in Annex B7), explanatory power is lost, even at the first lag.

For all regressions in Model 3, alpha displays high level of significance (significant at 1%) for all indexes combinations of indexes indicating a high level of persistence in macroeconomic variables, especially for variables such as Real GDP, Investment and Consumption. Even though preliminary results for contemporaneous and lagged Global COVOL and the added value of its regional factor, robustness tests accounting for information persistence from recent quarters must be controlled for.

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Table 1- Main Regression Results for Models 2

This table presents the estimated coefficients and t-statistics (in parentheses) from regressions of macroeconomic variables—Real GDP growth (GDP), Industrial Production (IP), and Investment (INV)—on Global COVOL and Regional COVOL index, considering both contemporaneous and lagged terms. Variables are regressed against the macroeconomic variables, controlling for Regional COVOL for contemporaneous (left panel) and lagged terms (right panel). All models are estimated using Ordinary Least Squares and include a constant term. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. R-squared values indicate explanatory power of each model specification.

GDP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,033 **	0,0287 **	-0,0113	-0,0653 ***
	(-2,500)	(2,080)	(-0,991)	(-4,442)
RCOVOL		-0,043 ***	-0,0306 **	0,0202
		(-3,094)	(-2,267)	(1,188)
R-squared	6,32%	10,55%	7,31%	22,95%

GDP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0306 **	0,019	-0,016	-0,0517 ***
	(-2,267)	(1,377)	(-1,391)	(-4,832)
GCOVOL	-0,0113	-0,0197 *		-0,0077
	(-0,991)	(-1,684)		(-0,740)
R-squared	7,31%	4,06%	2,07%	22,21%

IP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0016	-0,0023	-0,0181 ***	-0,0182 ***
	(-0,281)	(-0,377)	(-3,935)	(-2,676)
RCOVOL		-0,0008	0,0022	0,0132 *
		(-0,131)	(0,407)	(1,692)
R-squared	0,09%	0,24%	14,58%	7,48%

IP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	0,0022	0,0022	-0,0177 ***	-0,0074
	(0,407)	(0,407)	(-3,933)	(-1,609)
GCOVOL	-0,0181 ***	-0,0181 ***		-0,0165 ***
	(-3,935)	(-3,935)		(-3,667)
R-squared	14,58%	14,57%	14,42%	16,76%

GDP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,043 ***	0,0138	-0,0197 *	-0,0571 ***
	(-3,094)	(1,015)	(-1,684)	(-5,438)
RCOVOL L1	0,0287 **		0,019	0,0259 **
	(2,080)		(1,377)	(2,158)
R-squared	10,55%	1,11%	4,06%	25,55%

GDP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	0,0202	0,0259 **	-0,0077	-0,053 ***
	(1,188)	(2,158)	(-0,740)	(-5,048)
GCOVOL_L1	-0,0653 ***	-0,0571 ***	-0,0517 ***	
	(-4,442)	(-5,438)	(-4,832)	
R-squared	22,95%	25,55%	22,21%	21,75%

IP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0008	-0,0025	-0,0181 ***	-0,0101 **
	(-0,131)	(-0,439)	(-3,935)	(-2,020)
RCOVOL L1	-0,0023		0,0022	-0,0004
	(-0,377)		(0,407)	(-0,070)
R-squared	0,24%	0,22%	14,57%	4,57%

IP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	0,0132 *	-0,0004	-0,0165 ***	-0,0102 **
	(1,692)	(-0,070)	(-3,667)	(-2,125)
GCOVOL_L1	-0,0182 ***	-0,0101 **	-0,0074	
	(-2,676)	(-2,020)	(-1,609)	
R-squared	7,48%	4,57%	16,76%	4,57%

While Models 1 to 3 are useful to understand impact of empirical indexes shocks on GDP, Investment and Consumption, Model 4 is needed to control for lagged growth (which is endogenous), isolating the exogenous uncertainty shock component. Autoregressive model results are presented in Table 3 and for all variables (news-based and empirical), with the complete regressions results found in Annex B8.

A general first conclusion is that a simple autoregressive model, with only the lagged ΔY variable, already has significant explanatory power for Real GDP, Investment, Consumption, which is consistent with the high persistence found in descriptive statistics. The sign of the coefficients reveals a difference between a stable Y variable with momentum and its components which are more volatile but mean reversing. Including the lags of the macro-variables becomes essential.

Not surprisingly, autoregressive terms remain to be significant when uncertainty indexes are added to the model. For Global and Regional uncertainty indexes, only GCOVOL L1 and RCOVOL continue to be significant when controlling for persistence in the economic variable, for GDP, Investment (INV) and Consumption (C). For Global COVOL, this reaffirms the variables explanatory power over news-based indexes, and over simple autoregressive models (7 pp increase in R^2 in GDP). For regional factor, the overperformance of the lag 0 is consistent with findings in model 2: Regional COVOL adds value by incorporating regional immediate shocks.

Table 2-- Regression Results for Models 3 , Global COVOL

This table presents the estimated coefficients and t-statistics (in parentheses) from regressions of macroeconomic variables— Real GDP growth (GDP), Industrial Production (IP), and Investment (INV)—on Global COVOL and a range of global uncertainty indices, considering both contemporaneous and lagged terms. Variables are regressed against the macroeconomic variables, controlling for Global COVOL contemporaneous (IP) and lagged terms (GDP and INV). All models are estimated using Ordinary Least Squares and include a constant term. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. R-squared values indicate explanatory power of each model specification

GDP	**GCOVOL**	**GEPU**	**GGPR**	**WUIG**	**GCOVOL_L1**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0077	-0,0143	0,0005	0,0058	-0,053 ***	0,0126	-0,0016	-0,0021
	(-0,740)	(-1,644)	(0,106)	(1,381)	(-5,048)	(1,448)	(-0,333)	(-0,512)
COVOL Variable lag 1	-0,0517 ***	-0,0513 ***	-0,0529 ***	-0,057 ***		-0,0556 ***	-0,0526 ***	-0,0533 ***
	(-4,832)	(-4,933)	(-4,991)	(-5,278)		(-5,245)	(-4,962)	(-5,076)
R-squared	22,21%	24,02%	21,76%	23,36%	21,75%	23,51%	21,85%	21,99%

INV	**GCOVOL**	**GEPU**	**GGPR**	**WUIG**	**GCOVOL_L1**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0068	-0,013	0,0004	0,0041	-0,0403 ***	0,0155 *	-0,0002	-0,0016
	(-0,667)	(-1,548)	(0,087)	(1,000)	(-3,951)	(1,845)	(-0,043)	(-0,410)
COVOL Variable lag 1	-0,0391 ***	-0,0388 ***	-0,0402 ***	-0,0431 ***		-0,0434 ***	-0,0402 ***	-0,0405 ***
	(-3,796)	(-3,842)	(-3,903)	(-4,066)		(-4,255)	(-3,903)	(-3,971)
R-squared	14,97%	16,71%	14,55%	15,47%	14,55%	17,63%	14,55%	14,69%

IP	**GCOVOL**	**GEPU**	**GGPR**	**WUIG**	**GCOVOL_L1**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0177 ***	0,0009	-0,0006	-0,0017	-0,0074	-0,0051	-0,0003	0,0029
	(-3,933)	(0,231)	(-0,286)	(-0,944)	(-1,609)	(-1,342)	(-0,143)	(1,611)
COVOL Variable		-0,0179 ***	-0,0175 ***	-0,0179 ***	-0,0165 ***	-0,0169 ***	-0,0177 ***	-0,0182 ***
		(-3,891)	(-3,804)	(-3,978)	(-3,667)	(-3,756)	(-3,933)	(-4,044)
R-squared	14,42%	14,46%	14,49%	15,22%	16,76%	16,07%	14,44%	16,87%

Table 3- Regression Results for Model 4 (Autoregressive Specification) for Global indices

This table presents results from autoregressive regressions assessing the impact of various global and regional uncertainty indices on key macroeconomic variables.. Each regression includes the first lag of the dependent variable to account for intrinsic persistence, enabling identification of the independent explanatory power of the uncertainty measures. Columns report coefficient estimates and t-statistics (in parentheses) for each uncertainty index: Global COVOL, GEPU, GGPR, WUI, and their respective first lags, along with the corresponding constant term. R-squared (R^2) values indicate model fit. Asterisks denote statistical significance at the 10%, 5%, and 1% levels.

Economic Variable	Y variable L1	GCOVOL	GEPU	GGPR	WUIG	GCOVOL_L1	GEPU L1	GGPR L1	WUIG L1
Y: GDP Growth									
	1,3157 ***	-0,0073	-0,0141 *	0,0007	0,0016	-0,0331 ***	0,0068	-0,0014	0,0009
	(6,295)	(-0,745)	(-1,720)	(0,156)	(0,410)	(-3,214)	(0,829)	(-0,311)	(0,231)
GDP lag 1		1,2929 ***	1,2851 ***	1,3139 ***	1,3219 ***	1,0315 ***	1,3222 ***	1,3093 ***	1,3196 ***
		(6,104)	(6,190)	(6,245)	(6,280)	(4,729)	(6,311)	(6,205)	(6,263)
R-squared	30,11%	30,53%	32,31%	30,13%	30,24%	37,20%	30,63%	30,19%	30,15%
Y: Industrial Production									
	0,0166	-0,0177 ***	-0,0018	-0,0017	-0,0013	-0,0101 **	-0,0069 *	-0,0011	0,0024
	(0,381)	(-3,933)	(-0,439)	(-0,773)	(-0,684)	(-2,061)	(-1,683)	(-0,478)	(1,263)
Industrial production lag 1		0,0182	0,0177	0,0169	0,0162	0,004	0,0028	0,0177	0,017
		(0,449)	(0,403)	(0,387)	(0,371)	(0,092)	(0,064)	(0,404)	(0,392)
R-squared	0,16%	14,61%	0,36%	0,78%	0,67%	4,58%	3,15%	0,41%	1,91%
Y: Investment									
	-0,3197 ***	-0,0122	-0,0144 *	0,0018	-0,0004	-0,0453 ***	0,0046	-0,0016	-0,0009
	(-3,236)	(-1,196)	(-1,674)	(0,383)	(-0,098)	(-4,819)	(0,523)	(-0,333)	(-0,225)
Investment lag 1		-0,3162 ***	-0,3096 ***	-0,3199 ***	-0,3196 ***	-0,3746 ***	-0,3101 ***	-0,3184 ***	-0,3199 ***
		(-3,207)	(-3,159)	(-3,225)	(-3,219)	(-4,185)	(-3,076)	(-3,206)	(-3,222)
R-squared	10,22%	11,61%	12,90%	10,36%	10,23%	28,35%	10,49%	10,33%	10,26%
Y: Consumption									
	-0,3119 ***	-0,0012	-0,0305 *	0,0008	-0,0021	-0,0938 ***	0,0095	-0,0042	-0,0015
	(-3,147)	(-0,058)	(-1,753)	(0,085)	(-0,256)	(-5,043)	(0,537)	(-0,442)	(-0,185)
Consumption lag 1		-0,3115 ***	-0,2886 ***	-0,3123 ***	-0,3104 ***	-0,3277 ***	-0,3006 ***	-0,3124 ***	-0,3128 ***
		(-3,118)	(-2,918)	(-3,132)	(-3,110)	(-3,715)	(-2,956)	(-3,140)	(-3,137)
R-squared	9,72%	9,73%	12,69%	9,73%	9,79%	29,43%	10,01%	9,91%	9,76%
Y: Imports									
	0,0002	-0,0227	-0,0265	0,0021	-0,0008	-0,1011 ***	-0,0091	-0,0094	0,0001
	(0,002)	(-1,135)	(-1,577)	(0,228)	(-0,101)	(-5,712)	(-0,535)	(-1,022)	(0,013)
Exports Lag 1		-0,0012	0,0105	0,0006	0,0004	-0,0591	-0,0082	0,0031	0,0002
		(-0,012)	(0,102)	(0,006)	(0,004)	(-0,654)	(-0,078)	(0,030)	(0,002)
R-squared	0,00%	1,41%	2,64%	0,06%	0,01%	26,42%	0,31%	1,13%	0,00%
Y: Exports									
	-0,0594	-0,0124	-0,0291 *	0,0004	-0,0036	-0,1109 ***	-0,0095	-0,0083	0,0044
	(-0,573)	(-0,602)	(-1,672)	(0,043)	(-0,444)	(-6,337)	(-0,543)	(-0,874)	(0,543)
Imports Lag 1		-0,0564	-0,0357	-0,0596	-0,0566	-0,0929	-0,0688	-0,0588	-0,0562
		(-0,541)	(-0,344)	(-0,571)	(-0,542)	(-1,067)	(-0,652)	(-0,566)	(-0,539)
R-squared	0,36%	0,75%	3,34%	0,36%	0,57%	30,83%	0,67%	1,18%	0,67%

These results are consistent with the transmission channels identified in literature review. GCOVOL L1 has further explanatory power for Investment (18 pp increase in R^2) and Consumption (20 pp increase in R^2) when compared to AR (1) regressions, with results for RCOVOL pointing in the same direction, but at a lower significance. A unit increase in GCOVOL L1 is to be associated with a drop Investment by c. 4.5 pp and Consumption by c.10 pp, leading to an expected decrease in Real GDP growth of c.3 pp.

For Industrial Production, the results are similar to those in model 2, presented in Table 1: This variable does not display any persistence and therefore is highly exposed to shocks in global, systemic uncertainty. In this case, both lags of GCOVOL show significance when controlling for lagged term. These results are a perfect complement to the Trade/IP transmission channel, where it states that Industrial variables are highly dependent on global dynamics, and are short term decisions, not affected by previous quarters and information.

In line with Industrial Production, trade balance variables (Exports and Imports), show low persistence (autoregressive factor is not significant). However, unlike IP, GCOVOL displays significant explanatory power at lag 1 (26% R^2 for Exports and 30% for Imports), with a less powerful RCOVOL at lag. For regional factors, the built EEPU holds explanatory power for both variables.

In sum, the results strongly validate the hypothesis that second-moment shocks, particularly those from global and regional factors of COVOL, have significant explanatory value for macroeconomic outcomes in the Euro Area. The robustness of lagged Global COVOL as an explanatory factor, with added value from both lags of Regional COVOL, across Real GDP, Investment, Trade and Consumption contrast with the marginal contributions of news-based indexes, reinforcing empirical measures of geopolitical risk as superior. The time dynamics, reflected by the lags, and the geographical reach of each factor are consistent with the transmission channels presented in the literature review.

5. Theoretical Implications

This dissertation provides a novel empirical analysis on the impact of second-moment shocks on European macroeconomic performance, contrasting news-based indexes (GPR, EPU, and WUI) with empirical volatility-based indexes (Global and Regional COVOL).

The primary finding is that second-moment shocks, as represented by uncertainty indexes, significantly impact macroeconomic performance in Europe, providing additional explanatory power beyond persistence in macroeconomic variables such as Real GDP, Investment, and Consumption, indexes may also be alternatives to persistence in variables that have low persistence, such as IP and Trade Variables. Crucially, however, these impacts are only systematically identifiable when employing empirical volatility measures (COVOL and Regional COVOL). These show superior explanatory power compared to news-based indexes (GPR, EPU and WUI, for Global and Regional factors), aligning closely with the empirical findings of Karagozoglu, Wang, & Zhou (2022). The theoretical interpretation is that COVOL indexes capture market participants' instantaneous perceptions and forward-looking assessments of systemic risk, integrating information more efficiently and rapidly. In contrast, news-based indices, being retrospective, Anglocentric, and subject to media biases and reporting inconsistencies, do not demonstrate independent explanatory power.

Using different lags of Global and Regional COVOL, it is found that lagged Global COVOL has the best explanatory power for business-cycle variables, with smoother time series while Regional COVOL can be systematically associated with Trade and Production variables. Empirically, one-unit increases in the Global COVOL measure systematically with subsequent negatively quarter Real GDP growth (approximately a 3% decline), with more pronounced impacts on Investment quarter growth (a decline of nearly 5%) and Consumption quarter growth (approximately a 10% reduction).

Another key takeaway is the outperformance of the Global factor relative to its regional counterpart in explaining variation across European macroeconomic variables. This distinction aligns with the underlying nature of the indexes: Global COVOL functions as an aggregator of systemic “earthquakes” in the global financial system, whereas Regional COVOL captures additional co-movements specific to the Euro Area, shocks that may not be fully reflected in the global measure. The lagged impact of Global COVOL underscores its structural role in

capturing far-reaching, systemic uncertainty with delayed economic repercussions. By contrast, Regional COVOL, which is by construction orthogonal to the Global factor, is more responsive to contemporaneous, region-specific shocks. These tend to produce faster, although somewhat less pronounced, effects on economic activity within the Euro Area.

The results also validate three of the reviewed uncertainty transmission channels. The first is the Investment channel. A unit increase in the previous quarter's Global COVOL strongly associates with a 5% decrease in Investment and a 3% reduction in Real GDP growth, even after controlling for the persistence of prior-quarter economic performance. The theoretical implication here is consistent with real-options theory: systemic shocks "earthquakes", and subsequent uncertainty regarding future outcomes significantly increases the value firms place on waiting, thereby postponing investment decisions.

Likewise, Consumption channel is validated by empirical findings: a lagged one-unit increase in Global COVOL corresponds with a substantial 10% contraction in Consumption and an associated 3% decline in Real GDP growth, again after accounting for economic persistence from prior quarters. This finding aligns closely with established microeconomic theory and income-based models, which predict that households cut discretionary expenditures when facing heightened economic uncertainty and delay personal investments. Despite, it is still to be determined if the impact is direct, or through other channels (Labor, Financial or Investment)

Finally, the Trade and Production transmission channels are also supported by the empirical results. For trade variables, lagged Global COVOL exhibits the strongest explanatory power: a unit increase in the index is systematically associated with an 11% decline in Imports and a 10% decline in Exports. Given the forward-looking nature of global supply chains, this lagged effect was theoretically anticipated. These trade series are notably volatile and display low persistence, making the strength and significance of this relationship particularly meaningful. In the case of Industrial Production, which is similarly exposed to global dynamics but more flexible in decision-making horizons, the immediate (contemporaneous) Global COVOL measure proves to be the most informative, as contagion effects are more pronounced in this variable. Results support the notion that production reacts more quickly than trade flows to uncertainty shocks, reflecting shorter lead times and more agile adjustment mechanisms, and

will have an impact on exports and imports, as these variables are dependent on industrial processes.

Such findings can prove helpful for economic agents. For policy makers, lagged in-quarter average of COVOL can become a regular monitored variable, acting as an early economic slowdown indicator Campos Martins & Engle (2025) finds that COVOL spikes increase the probabilty of recession). In Risk Management, financial institutions may use COVOL to model risk in their consumer and corporate credit portfolios, while Portfolio Managers may use it in market monitoring, and regional capital allocation decisions. For Corporate Finance, required equity investment return rates may have an uncertainty factor (as for example, an extended CAPM model, with a second uncertainty factor).

In summary, these theoretical implications reinforce the importance of acknowledging x\empirical volatility measures from news-based indices, highlight critical differences in timing and magnitude of economic responses to uncertainty shocks, and lend robust empirical support to theoretical transmission channels described in macroeconomic and financial theory.

6. Limitations and Future Research

While this dissertation presents robust empirical evidence on the role of second-moment shocks in shaping macroeconomic dynamics, several limitations must be acknowledged, and potential for future research is high.

First, the data employed, although comprehensive and with constructed regional proxies for completeness, may be affected by structural breaks and temporal drift. Notable breakpoints such as the 2008 Global Financial Crisis and the COVID-19 pandemic introduce possible distortions, particularly given COVID-19's heavy influence on Global COVOL. Truncating the sample or adjusting for these shocks could yield different outcomes. Additionally, while the time series spans over two decades, extending the dataset to earlier periods of geopolitical tension (e.g., the Iran-Iraq War) would enhance historical robustness. The dataset also does not capture recent geopolitical escalations in 2024–25, especially in trade, which limits the timeliness and generalization of findings.

Second, the empirical framework is reduced form in nature and does not permit strong causal inference. Although autoregressive terms and lag structures help mitigate omitted variable bias,

endogeneity remains a concern. More sophisticated techniques such as Granger causality tests, Instrumental Variable approaches, or Vector Autoregressions would help differentiate causality from correlation. Moreover, predictive validation (through out-of-sample testing) could assess the stability and forecasting potential of uncertainty indices over time.

Third, the models omit important control variables related to fiscal and monetary policy. European Central Bank interventions or fiscal stimulus often react to the same shocks driving volatility, which complicates the interpretation of uncertainty effects. Including policy rates, government spending, or sovereign Credit Default Swaps spreads could uncover complementary transmission channels and provide further robustness on existing. Financial constraints can, as seen by literature, depress economic activities. Furthermore, the exclusion of financial indicators overlooks the possibility that markets amplify or dampen the effects of uncertainty on real activity. Future work could integrate these policy and financial dynamics to help isolate the independent role of second-moment shocks.

Beyond these empirical refinements, there is room to explore alternative sources of uncertainty. High-frequency indicators such as social media sentiment, Google Trends data, or direct surveys of firms and households may capture forward-looking, behavioural components of uncertainty that precede or intensify market-based volatility. These social sentiment signals could enrich the understanding of how uncertainty builds and spreads across agents and time.

Future research may also apply this framework to individual countries, enabling comparative analyses across institutional settings, political regimes, or monetary systems. This would help identify how local factors—such as electoral cycles or institutional quality—shape the sensitivity of economies to global and regional volatility. The role of political events as uncertainty triggers, and their effects on macroeconomic decisions, remains a promising topic.

Finally, an applied financial lens offers fertile ground for further work. Sector-specific or cross-regional regressions could identify heterogeneity in exposure, with capital-intensive or policy-sensitive industries likely to display heightened sensitivity to second-moment shocks. In portfolio management incorporating lagged COVOL measures into asset allocation can improve Sharpe Ratios. In Corporate Finance, uncertainty could be embedded into cost-of-capital models—such as an extended CAPM with a volatility factor—to improve investment appraisal and valuation practices.

7. Conclusion

This dissertation provides empirical evidence that second-moment shocks measured by volatility-based uncertainty indices, have significant explanatory power over macroeconomic outcomes in the Euro Area. Among the variables tested, lagged Global COVOL demonstrates strong and robust explanatory power for Real GDP growth, Investment, Consumption, and Trade variables, even when controlling for the persistence embedded in these macroeconomic series. Regional COVOL also contributes explanatory value, though to a lesser extent and with more emphasis on contemporaneous trade and Industrial Production shocks. The empirical COVOL indices consistently outperform their news-based counterparts (GPR, EPU, and WUI), which rarely show statistical significance in the presence of more forward-looking, market-based measures. These findings validate core theoretical channels (real options and precautionary saving behavior) as mechanisms through which uncertainty influences economic outcomes, while also offering insight into the timing of these effects. Investment and Consumption, for example, respond with a lag, reflecting inertia and delay due to heightened uncertainty, whereas Industrial Production reacts more immediately, consistent with the flexible nature of short-term production decisions.

Beyond offering quantitative insights, this work contributes to the literature by applying newly available empirical indices to a regional European context and by developing GDP-weighted regional versions of widely used news-based uncertainty measures. While the study employs a reduced-form empirical approach, which limits claims of causality, its robustness to persistence and inclusion of autoregressive controls adds credibility to the findings. Nonetheless, several limitations remain. Future work should consider more structurally grounded approaches such as VARs, Granger causality testing, or predictive out-of-sample validation. Expanding the analysis to country-specific settings, incorporating monetary and financial policy variables, or linking uncertainty spikes to real political events like elections could offer deeper causal interpretation and granularity. Importantly, these findings have policy and financial applications: lagged Global COVOL could serve as a real-time early-warning indicator for policymakers, a risk management input for financial institutions, or even a macro factor in equity pricing and allocation models. In this sense, the research not only strengthens our understanding of uncertainty transmission, but also opens practical avenues for managing macroeconomic risk in a volatile global environment.

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9. Annex

Annex A – Volatility Modelling

Finance defines volatility as annualized standard deviation of returns of a financial security. (Tsay, 2005) defines it as the evolution of conditional variance over time.

Volatility exhibits well documented stylize factors, as documented by (Cont, 2001)

- Volatility Clustering: High volatility tends to cluster together
- Leverage Effects Negative asset returns lead to subsequent higher volatility
- Heavy Tails: Volatility does not follow a normal distribution
- Mean Reversion: Volatility tends to revert to a long term mean over time
- Persistence: Shocks to volatility decay slowly

Why do we model volatility

We model volatility due to its crucial role in constructing optimal portfolios, as articulated in portfolio theory, the optimal trade-off between expected return and variance, and integrates risk-free assets into the efficient frontier framework. Volatility underpins option pricing (Merton, 1974), a fundamental aspect of financial markets that remains essential, particularly in the modern era of financial engineering. Moreover, volatility and risk are pivotal in establishing the intrinsic value of assets, exemplified by Sharpe's (1964) Capital Asset Pricing Model (CAPM).

Volatility Estimation

To model future volatility, historical volatility must first be estimated. Historically, simple non-parametric estimation methods such as Historical Averages, Moving Averages, and Weighted Moving Averages have been used due to their low computational demands. However, these approaches fail to capture essential stylized facts like volatility clustering. Given, the necessity for models that effectively account for time-varying conditional volatility, clustering, and asymmetric effects, has massively increased, with autoregressive models emerging as suitable solutions.

Stationarity

According to (Tsay, 2005) volatility is conditional because future volatility depends on past values. Additionally, there exists an unconditional component—an intrinsic level of volatility independent of historical information. Therefore, conditional volatility should exhibit stationarity, meaning volatility returns to its mean without showing drift or growth. Stationarity ensures volatility has a constant mean and variance, a critical condition for meaningful modelling.

Autoregressive and Vector Autoregressive Models

Autoregressive models (AR) capture dependencies of variables on their historical values, a common characteristic in financial econometrics where variables typically rely on previous observations. AR models are consistent with the notion of an intrinsic, unconditional level of volatility. Vector autoregressive (VAR) models extend this concept to multiple variables, where each variable is modelled as a function of past values of itself and other variables. VARs are prevalent in financial economics, especially for modelling interconnected macroeconomic variables such as GDP, Consumption, and Industrial Production, as well as for complex portfolio modelling in financial markets.

Heteroskedasticity and the ARCH Model (Engle, 1982)

Heteroskedasticity (variance heterogeneity) is a widespread phenomenon in econometrics, characterized by non-constant variance of the regression error terms over time. In finance, volatility clustering—periods of high volatility followed by similarly volatile periods—is prevalent. Autoregressive models can capture these dynamics effectively. The Autoregressive Conditional Heteroskedasticity (ARCH) model, introduced by Engle, conditions the error term on all available information up to time t. However, ARCH models fall short in capturing persistence in conditional variance. The Generalized ARCH (GARCH) model overcomes this limitation by including lagged conditional variances, effectively modelling volatility persistence.

GARCH and Extensions

Generalized ARCH models allow past conditional variances to influence future variances, reflecting volatility's temporal dependence. Investors can thereby update risk forecasts based on market innovations. Moreover, GARCH models address stylized facts more comprehensively than ARCH models, particularly volatility clustering and heavy tails (Amado,

2009; Teräsvirta, 2006). However, the assumption of constant parameters in standard GARCH models has been questioned. Stationarity implies a constant mean volatility, but structural breaks from globally impactful events can invalidate this assumption (Amado & Teräsvirta, 2013). Hence, stationarity might be inappropriate under certain conditions.
The Time-Varying GARCH (TV-GARCH) model introduces adjustments to accommodate structural breaks. An early approach was Cai's (1994) Markov-ARCH model, combining Hamilton's regime-switching concept with the ARCH model.

Further developments address these limitations through various GARCH modifications. Glosten, Jagannathan, and Runkle (1993) proposed the GJR-GARCH model, accounting for seasonal volatility patterns via dummy variables, asymmetric responses to positive and negative returns, and nominal interest rates.

In their paper "Modelling volatility by variance decomposition" (2013), Amado and Teräsvirta introduce further refinements to GARCH models. Specifically, they enhance the GJR-GARCH model with time-varying parameters, decomposing variance into multiplicative components (stationary and non-stationary). This decomposition effectively smooths volatility impacts, accommodating structural breaks and improving volatility modelling robustness.

Annex B1 – Descriptive Statistics

2000-Q1 2023-Q4	Global COVOL	Global GPR	WUI Global	EPU Global (ppp)
Count	96	95	95	95
Mean	0,5352	0,0504	0,0740	0,0323
Standard Deviation	0,1615	0,3559	0,4127	0,1963
Skewness	0,6982	3,9049	1,0376	0,7103
Kurtosis	1,0301	22,3199	0,7763	1,0775
Max (Quarter)	1,1255 (2020-Q1)	2,4087 (2001-Q3)	1,4806 (2010-Q3)	0,7433 (2011-Q3)
Min (Quarter)	0,2267 (2020-Q2)	-0,5541 (2002-Q1)	-0,5562 (2009-Q3)	-0,3194 (2002-Q1)
Autocorrelation (1)	0,1656	0,0222	-0,3888	-0,1355

	Regional COVOL	EA19 GPR	WUI Europe	EPU Europe
Count	96	95	95	95
Mean	0,6340	0,0928	0,0881	0,0329
Standard Deviation	0,1376	0,4840	0,4495	0,1934
Skewness	-0,1030	2,1141	1,1844	0,8217
Kurtosis	-0,5318	6,4651	1,5456	1,3376
Max (Quarter)	0,9215 (2018-Q2)	2,2094 (2001-Q3)	1,6252 (2000-Q3)	0,755 (2011-Q3)
Min (Quarter)	0,33 (2015-Q3)	-0,581 (2014-Q4)	-0,6082 (2001-Q3)	-0,3012 (2002-Q1)
Autocorrelation (1)	0,3481	-0,1573	-0,3998	-0,2052

	Real GDP	Total Consumption	G.F.Capital Formation *	Exports	Imports	Industrial Production
Count	96	96	96	96	96	96
Mean	0,0032	0,0029	0,0033	0,0089	0,0084	0,0007
Standard Deviation	0,0181	0,0168	0,0336	0,0312	0,0320	0,0075
Skewness	-0,2166	1,0811	-0,8610	-1,9573	-2,6671	-1,7138
Kurtosis	33,0143	32,4998	11,9389	22,6255	21,2596	6,5310
Max (Quarter)	0,1168 (2020-Q3)	0,115 (2020-Q3)	0,1322 (2020-Q3)	0,1581 (2020-Q3)	0,2011 (2020-Q3)	0,127 (2020-Q3)
Min (Quarter)	-0,1113 (2020-Q2)	-0,0942 (2020-Q2)	-0,1829 (2020-Q2)	-0,189 (2020-Q2)	-0,1831 (2020-Q2)	-0,2025 (2020-Q2)
Autocorrelation (1)	-0,2167	-0,3197	-0,3118	0,0002	-0,0596	0,2753

* Gross Fixed Capital Formation acts as a proxy for Investment

Correlation matrix between independent variables - Global

	GCOVOL	GGPR	GEPU	WUIG
GCOVOL	1,0000			
GGPR	0,1347	1,0000		
GEPU	0,1691	0,1690	1,0000	
WUIG	-0,0482	-0,1070	0,0433	1,0000

Correlation matrix between independent variables - Regional

	RCOVOL	RGPR	EEPU	WUIE
RCOVOL	1,0000			
RGPR	-0,0394	1,0000		
EEPU	-0,0458	0,1991	1,0000	
WUIE	0,0640	-0,2317	-0,0280	1,0000

Correlation matrix between dependent variables

	Y	IP	INV	C	X	I
Y	1,0000					
IP	0,3187	1,0000				
INV	0,9474	0,1829	1,0000			
C	0,7454	0,1850	0,6659	1,0000		
X	0,9223	0,4455	0,7816	0,7213	1,0000	
I	0,8476	0,3566	0,7215	0,8819	0,9201	1,0000

Annex B2 – Variables Description and Information

Overview of Macro Variables Used in Empirical Analysis

Code	Variable Name	Frequency	Time period	Set of countries	Definition	Source	Transformation
Y	Agreggate Real GDP	Quarterly	(2000-Q1;2024-Q4)	EA19	Chain Linked Volume, in Million of Euros. Seasonly adjusted.	Eurostat (NAMQ_10_GDP; B1GQ)	Computed Quarter on Quarter Growth.
IP	Industrial Production	Monthly	(2000-Q1;2023-Q4)	EA19	All industries, including B (Mining and Quarrying) C (Manufacturing) and D (Eletricity and Gas supply). Euro Area 19 countries. Index in 2015 (2015=100). Seasonly adjusted.	Eurostat (STS_INPR_M; PROD)	Transformed monthly data into Quarter. Computed Quarter on Quarter Growth.
INV	Agreggate Investment	Quarterly	(2000-Q1;2024-Q4)	EA19	Chain Linked Volume, in Million of Euros. Seasonly adjusted.	Eurostat (NAMQ_10_GDP; P51G)	Computed Quarter on Quarter Growth.
C	Aggregate Consumption	Quarterly	(2000-Q1;2024-Q4)	EA19	Chain Linked Volume, in Million of Euros. Seasonly adjusted.	Eurostat (NAMQ_10_GDP; P3)	Computed Quarter on Quarter Growth.
X	Aggregate Exports	Quarterly	(2000-Q1;2024-Q4)	EA19	Chain Linked Volume, in Million of Euros. Seasonly adjusted.	Eurostat (NAMQ_10_GDP; P6)	Computed Quarter on Quarter Growth.
I	Aggregate Imports	Quarterly	(2000-Q1;2024-Q4)	EA19	Chain Linked Volume, in Million of Euros. Seasonly adjusted.	Eurostat (NAMQ_10_GDP; P7)	Computed Quarter on Quarter Growth.

*Countries included in EA19: Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovakia, Slovenia, Spain

Code	Variable Name	uenc	Time period	Set of countries	Definition	Source	Transformation
GCOVOL	Global COVOL	Daily	(1990-Q1;2023-Q4)	In Annex 4 with countries and loadings	COVOL (Common Volatility) is a common shock/innovation that is shared across all assets, found using country specific bond ETF's, using total bond renumeration. COVOL reflects second-moment shocks in asset prices. Each country then has a different factor loading, that is exposure to COVOL.	(Campos Martins & Engle, 2025)	Data supplied by authors. Used the level of the index, squared root of COVOL. Transformed daily data to quarter data by taking the in-quarter average.
RCOVOL	Regional COVOL	Daily	(1990-Q1;2023-Q4)	In Annex 4 with countries and loadings	Second factor from COVOL, which capture regional specific comovements of asset prices, in this case to the Euro Area. Reflects a European specific added volatility factor.	(Campos Martins & Engle, 2025)	Data supplied by authors. Used the level of the index, squared root of COVOL. Transformed daily data to quarter data by taking the in-quarter average.
GEPU	Global Economic Policy Uncertainty	Monthly	(1998-Q1;2025-Q1)	Australia, Brazil, Canada, Chile, China, Colombia, France, Germany, Greece, India, Ireland, Italy, Japan, Mexico, the Netherlands, Russia, South Korea, Spain, Sweden, the United	"Each national EPU (Economic Policy Uncertainty) index reflects the relative frequency of own-country newspaper articles that contain a trio of terms pertaining to the economy (E), policy (P) and uncertainty (U). In other words, each monthly national EPU index value is proportional to the share of own-country newspaper articles that discuss economic policy uncertainty in that month" [1]. Global EPU calculated as the GDP-weighted average of monthly EPU index values	(Baker, Bloom, & Davis, 2016)[1]	Transformed monthly data to quarter data by taking the in-quarter average, indexed it to the time series average. Computed the quarter on quarter growth to simulate the shocks to the index
EEPU	European Economic Policy Uncertainty	Monthly	(1998-Q1;2025-Q1)	Germany, Greece, Spain, France, Ireland, Italia	European EPU calculated as the GDP-weighted average of monthly EPU index values. Represents Economic uncertainty for aggregate European Economy.	(Baker, Bloom, & Davis, 2016)[1]; own analysis	Using country level indexes, computed a weighted average EPU (dynamically weighted per quarter by country GDP) for Euro Area countries with available data. Transformed monthly data to quarter data by taking the in-quarter average and indexed the values to the time series average. Computed the quarter on quarter growth to simulate the shocks to the index
GGPR	Global Geopolitical Risk	Monthly	(1998-Q1;2025-Q2)	List of countries below	"GPR (Global Geopolitical Risk) index reflects automated text-search results of the electronic archives of 10 newspapers: Caldara and Iacoviello calculate the index by counting the number of articles related to adverse geopolitical events in each newspaper for each month (as a share of the total number of news articles)" [2]	(Caldara & Lacoviello, 2022)	Transformed monthly data to quarter data by taking the in-quarter average, indexed it to the time series average. Computed the quarter on quarter growth to simulate the shocks to the index
RGPR	Regional Geopolitical Risk	Monthly	(1998-Q1;2025-Q2)	Belgium, Germany, Spain, Finland, France, Italia, The Netherlands, Portugal	Regional GPR is a European specific proxy, calculated using country specific GPR indexes.	(Caldara & Lacoviello, 2022); own analysis	Using country level indexes, computed a weighted average GPR (dynamically weighted per quarter by country GDP) for Euro Area countries with available data. Transformed monthly data to quarter data by taking the in-quarter average and indexed the values to the time series average. Computed the quarter on quarter growth to simulate the shocks to the index
WUIG	World Uncertainty Index Global	Quarterly	(1990-Q1;2025-Q1)	Europe (must say which countries are here)	"The WUI (World Uncertainty Index) is computed by counting the percent of word "uncertain" (or its variant) in the Economist Intelligence Unit country reports. The WUI is then rescaled by multiplying by 1,000,000. A higher number means higher uncertainty and vice versa."[3] . WUI is found via GDP weighted average.	(Ahir, Bloom, & Furceri, 2022)	Computed the quarter on quarter growth to simulate the shocks to the index
WUIE	World Uncertainty Index Europe	Quarterly	(1990-Q1;2025-Q1)	Europe (must say which countries are here)	World Uncertainty Index Europe is found by accounting only for reports on European countries.	(Ahir, Bloom, & Furceri, 2022)	Computed the quarter on quarter growth to simulate the shocks to the index

Annex B3 – Top deciles Quarters of Uncertainty

Top quarters of uncertainty per index

	COVOL	RCOVOL	GGPR	EAGPR	WUIG	WUIE	GEPU	EEPU
1	2020-Q1	2018-Q2	2001-Q3	2001-Q3	2010-Q3	2000-Q3	2011-Q3	2007-Q3
2	2011-Q3	2009-Q1	2022-Q1	2022-Q1	2002-Q4	2005-Q2	2000-Q4	2008-Q4
3	2013-Q2	2017-Q4	2001-Q4	2003-Q1	2008-Q1	2013-Q2	2008-Q1	2011-Q3
4	2009-Q1	2016-Q4	2023-Q4	2015-Q1	2022-Q2	2022-Q2	2020-Q2	2001-Q3
5	2023-Q4	2020-Q1	2003-Q1	2020-Q1	2012-Q4	2009-Q4	2001-Q3	2021-Q3
6	2022-Q1	2011-Q2	2014-Q3	2014-Q3	2011-Q3	2002-Q4	2016-Q1	2020-Q1
7	2015-Q2	2021-Q4	2005-Q3	2021-Q4	2011-Q1	2017-Q1	2015-Q3	2000-Q4
8	2010-Q2	2011-Q3	2006-Q3	2014-Q1	2000-Q3	2018-Q4	2008-Q3	2003-Q1
9	2022-Q3	2016-Q2	2015-Q4	2006-Q3	2002-Q1	2019-Q1	2008-Q4	2018-Q2
10	2015-Q1	2000-Q2	2018-Q2	2015-Q4	2015-Q3	2021-Q3	2000-Q2	2008-Q1

Top quarters and main events

Quarter	Type	Description	Main Indexes	Top10 apps
2011-Q3	Economic Crisis	Euro Area sovereign debt crisis peaks; US debt-ceiling standoff & S&P AAA downgrade	COVOL, rCOVOL, GEPU, EEPU, WUIG	5
2001-Q3	Terrorism	9/11 terrorist attacks (Sept. 11, 2001)	GGPR, EAGPR, GEPU, EEPU	4
2020-Q1	Pandemic	COVID-19 pandemic outbreak + global lockdowns	COVOL, rCOVOL,EAGPR, EEPU	4
2003-Q1	Belic Escalation	Months leading to the US-Iraq conflict	GGPR, EAGPR, EEPU	3
2008-Q1	Economic Crisis	Beggining of subprime banking stress	WUIG, GEPU, EEPU	3
2022-Q1	Belic Escalation	Russian invasion of Ukraine	COVOL, GGPR ,EAGPR	3
2000-Q2	Economic Crisis	Dotcom equities market crash	GEPU, rCOVOL	2
2000-Q4	Political Affairs	Post US election tension following Pres.Bush victory	GEPU, EEPU	2
2006-Q3	Belic Escalation	Potential Middle East tensions (Israel-Lebanon War)	GGPR,EAGPR	2
2008-Q4	Economic Crisis	Lehman Brothers declares for Bankruptcy	GEPU, EEPU	2
2014-Q3	Belic Escalation	Ukraine Crimea annexation by Russia	GGPR,EAGPR	2
2015-Q1	Belic EscalationTerrorism	Syrian civil war, ISIS terrorism escalation	COVOL, EAGPR	2

Global COVOL	Type	Descriptive interpretation
2020-Q1	Pandemic	COVID-19 pandemic outbreak + global lockdowns
2011-Q3	Economic Crisis	Euro Area sovereign debt crisis peaks;US debt-ceiling standoff & S&P AAA downgrade
2013-Q2	Economic Crisis	Chinese economic downperformance, Euroarea debt crisis
2009-Q1	Economic Crisis	Post Lehman crisis uncertainty
2023-Q4	Belic Escalation	Israel-Palestine Escalation
2022-Q1	Belic Escalation	Russian invasion of Ukraine
2015-Q2	Terrorism	Syrian civil war, ISIS terrorism escalation
2010-Q2	Economic Crisis	Greek sovereign debt crisis, "Flash crash" in US equities
2022-Q3	Economic Crisis	Inflationary risks, quantitative tightening
2015-Q1	Economic Crisis	Greek default, OPEC vol

Regional COVOL	Type	Descriptive interpretation
2018-Q2	Political Affairs	EU internal affairs
2009-Q1	Economic Crisis	Great financial crisis spill over in Europe
2017-Q4	Political Affairs	Catalonia independece tensions
2016-Q4	Political Affairs	Pres.Trump selection
2020-Q1	Pandemic	COVID-19 pandemic outbreak + global lockdowns
2011-Q2	Economic Crisis	First signs of na Euro Area sovereign debt crisis
2021-Q4	Pandemic	New COVID variant, energy price spikes
2011-Q3	Economic Crisis	Euro Area sovereign debt crisis peaks;US debt-ceiling standoff & S&P AAA downgrade
2016-Q2	Political Affairs	Brexit referendum
2000-Q2	Economic Crisis	European equity markets suffer from dotcom crisis

Annex B4- List of Countries for GCOVOL and RCOVOL

Global COVOL country list and factor loadings

Country	*Loading*	*Country*	*Loading*
Hungary	0,2614	United Kingdom	0,1551
Germany	0,2574	Switzerland	0,1478
Netherlands	0,2476	Sweden	0,1395
Austria	0,2448	Australia	0,1366
Finland	0,2436	Czech Republic	0,135
Belgium	0,2358	New Zealand	0,129
Portugal	0,2272	Norway	0,1269
France	0,2255	United States	0,1263
Greece	0,2189	South Korea	0,1254
Ireland	0,2111	Poland	0,1147
Spain	0,2081	India	0,1126
Italy	0,1887	South Africa	0,1124
Mexico	0,1858	Singapora	0,1071
Denmark	0,1851	Canada	0,1052
Indonesia	0,1693	Japan	0,0806
		China	0,0351
Average	**0,1498**		

Regional COVOL country list and factor loadings

Country	*Loading*
Germany	0,3176
Netherlands	0,3076
Austria	0,3034
Finland	0,2966
France	0,2887
Portugal	0,2881
Belgium	0,2848
Hungary	0,2847
Greece	0,2655
Spain	0,2534
Ireland	0,241
Italy	0,2279
Denmark	0,159
United Kingdom	0,1304
Sweden	0,0949
Average	**0,24957**

Annex B5- Regression Results for Model 1

Table 4-Regression Results for Model 1 – Contemporaneous Effects (Lag 0)
Table reports the estimated coefficients and t-statistics (in parentheses) for regressions of macroeconomic variables—Real GDP, Household Consumption, Investment, Exports, Imports, and Industrial Production—on a range of global and regional uncertainty indices, according to model 1 in methodology, evaluated at lag 0. The indices include Global and Regional COVOL, Global and EA19 GPR (including a baseline specification), WUI (Global and Europe), and Global and European EPU (in current prices and purchasing power parity terms). *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. All regressions include a constant term (not reported) and are based on quarterly data for the Euro Area.

lag0	Real GDP	Consumption	Investment*	Exports	Imports	Industrial Production
Global COVOL	-0,0159	-0,0131	-0,0059	-0,0224	-0,0125	-0,0177***
	(-1,392)	(-1,233)	(-0,275)	(-1,129)	(-0,614)	(-3,938)
Regional COVOL	0,0043	0,0037	0,0254	0,0169	0,0279	-0,0074
	(0,317)	(0,292)	(1,010)	(0,722)	(1,166)	(-1,316)
Global GPR	0,0022	0,0017	-0,0006	0,0021	0,0002	-0,0017
	(0,425)	(0,343)	(-0,060)	(0,234)	(0,026)	(-0,755)
EA19 GPR	0,0034	0,0024	0,0017	0,0058	0,0055	-0,0008
	(0,873)	(0,663)	(0,239)	(0,875)	(0,801)	(-0,498)
EA19 GPR (baseline)	0,0038	0,0027	0,002	0,0065	0,0062	-0,001
	(0,874)	(0,668)	(0,245)	(0,874)	(0,802)	(-0,522)
WUI Global	-0,0003	-0,0004	-0,0037	-0,0013	-0,0045	-0,0014
	(-0,060)	(-0,104)	(-0,440)	(-0,165)	(-0,557)	(-0,736)
WUI Europe	0,0003	0,0004	0,0003	0,0002	-0,0001	-0,0003
	(0,068)	(0,107)	(0,041)	(0,032)	(-0,015)	(-0,153)
EPU Global (current prices)	-0,0175*	-0,0151*	-0,0347**	-0,0246	-0,026	-0,0021
	(-1,868)	(-1,729)	(-1,996)	(-1,508)	(-1,559)	(-0,522)
EPU Global (purchase price parity)	-0,0176*	-0,0155*	-0,0361**	-0,024	-0,0273	-0,0014
	(-1,845)	(-1,754)	(-2,049)	(-1,452)	(-1,611)	(-0,339)
EPU Europe	-0,0109	-0,0096	-0,017	-0,0117	-0,0098	-0,0025
	(-1,310)	(-1,243)	(-1,096)	(-0,811)	(-0,657)	(-0,721)

Table 5- **Regression Results for Model 1 – Lagged Effects (Lag 1)**
Table reports the estimated coefficients and t-statistics (in parentheses) for regressions of macroeconomic variables—Real GDP, Household Consumption, Investment, Exports, Imports, and Industrial Production—on a range of global and regional uncertainty indices, according to model 1 in methodology, evaluated at lag 1. The indices include Global and Regional COVOL, Global and EA19 GPR (including a baseline specification), WUI (Global and Europe), and Global and European EPU (in current prices and purchasing power parity terms). *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively. All regressions include a constant term (not reported) and are based on quarterly data for the Euro Area.

lag1	Real GDP	Consumption	Investment*	Exports	Imports	Industrial Production
Global COVOL	-0,053***	-0,0403***	-0,0913***	-0,0998***	-0,1098***	-0,0102**
	(-5,06)	(3,96)	(4,60)	(5,70)	(6,27)	(2,10)
Regional COVOL	-0,033**	-0,0316***	-0,054**	-0,0472**	-0,0574**	-0,0016
	(-2,49)	(2,58)	(2,18)	(2,05)	(2,45)	(0,29)
Global GPR	-0,0041	-0,0021	-0,0038	-0,0094	-0,0083	-0,0011
	(-0,77)	(0,43)	(0,38)	(1,03)	(0,88)	(0,47)
EA19 GPR	-0,0061	-0,0053	-0,0066	-0,0108	-0,01	0,0003
	(-1,59)	(1,47)	(0,91)	(1,64)	(1,48)	0,15
EA19 GPR (baseline)	-0,0068	-0,0059	-0,0073	-0,0121	-0,0111	0,0003
	(-1,57)	(1,46)	(0,90)	(1,63)	(1,45)	0,15
WUI Global	-0,001	-0,0007	-0,0003	0,0001	0,0046	0,0024
	(-0,22)	(0,17)	(0,04)	0,02	0,57	1,28
WUI Europe	0,0015	0,0013	0,0033	0,0064	0,0099	0,0029*
	(0,365)	0,34	0,42	0,89	1,35	1,67
EPU Global (current prices)	0,0028	0,0077	0,0155	-0,0128	-0,0117	-0,0071*
	(0,288)	0,86	0,87	(0,78)	(0,69)	(1,79)
EPU Global (purchase price parity)	0,0048	0,0094	0,0204	-0,0089	-0,0076	-0,0069*
	(0,493)	1,03	1,12	(0,52)	(0,44)	(1,70)
EPU Europe	-0,0109	-0,0057	-0,0104	-0,0301**	-0,0282*	-0,0059*
	(-1,30)	(0,73)	(0,66)	(2,12)	(1,93)	(1,70)

Annex-B6 Regression Results for Model 2

Table 6- Regression Results for Models 2 – COVOL and Regional COVOL, with Lag Structures

This table presents the estimated coefficients and t-statistics (in parentheses) from regressions of macroeconomic variables—Real GDP growth (GDP), Industrial Production (IP), and Investment (INV)—on Global COVOL and Regional COVOL indices, considering both contemporaneous and lagged terms. Variables are regressed against the macroeconomic variables, controlling for Regional COVOL for contemporaneous (left panel) and lagged terms (right panel). All models are estimated using Ordinary Least Squares and include a constant term. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. R-squared values indicate explanatory power of each model specification.

GDP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,033 **	0,0287 **	-0,0113	-0,0653 ***
	(-2,500)	(2,080)	(-0,991)	(-4,442)
RCOVOL		-0,043 ***	-0,0306 **	0,0202
		(-3,094)	(-2,267)	(1,188)
Constant	0,024 ***	0,0121	0,0285 ***	0,0251 ***
	(2,791)	(1,186)	(2,938)	(3,218)
Observations	92	91	91	91
R-squared	6,32%	10,55%	7,31%	22,95%

GDP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,043 ***	0,0138	-0,0197 *	-0,0571 ***
	(-3,094)	(1,015)	(-1,684)	(-5,438)
RCOVOL L1	0,0287 **		0,019	0,0259 **
	(2,080)		(1,377)	(2,158)
Constant	0,0121	-0,0056	0,0016	0,0171 **
	(1,186)	(-0,636)	(0,165)	(1,966)
Observations	91	92	91	91
R-squared	10,55%	1,11%	4,06%	25,55%

IP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0016	-0,0023	-0,0181 ***	-0,0182 ***
	(-0,281)	(-0,377)	(-3,935)	(-2,676)
RCOVOL		-0,0008	0,0022	0,0132 *
		(-0,131)	(0,407)	(1,692)
Constant	0,0016	0,0026	0,0089 **	0,002
	(0,432)	(0,578)	(2,282)	(0,556)
Observations	92	91	91	91
R-squared	0,09%	0,24%	14,58%	7,48%

IP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0008	-0,0025	-0,0181 ***	-0,0101 **
	(-0,131)	(-0,439)	(-3,935)	(-2,020)
RCOVOL L1	-0,0023		0,0022	-0,0004
	(-0,377)		(0,407)	(-0,070)
Constant	0,0026	0,0022	0,0089 **	0,0062
	(0,578)	(0,595)	(2,342)	(1,512)
Observations	91	92	91	91
R-squared	0,24%	0,22%	14,57%	4,57%

INV	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0316 **	0,0301 **	-0,0086	-0,0416 ***
	(-2,569)	(2,370)	(-0,811)	(-2,889)
RCOVOL		-0,0422 ***	-0,0298 **	0,0022
		(-3,297)	(-2,384)	(0,132)
Constant	0,0229 ***	0,0105	0,0263 ***	0,0236 ***
	(2,899)	(1,117)	(2,922)	(3,065)
Observations	92	91	91	91
R-squared	6,74%	12,15%	7,40%	14,56%

INV	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0422 ***	0,0155	-0,017	-0,0443 ***
	(-3,297)	(1,230)	(-1,560)	(-4,343)
RCOVOL L1	0,0301 **		0,02	0,0249 **
	(2,370)		(1,563)	(2,128)
Constant	0,0105	-0,0069	-0,0007	0,0106
	(1,117)	(-0,841)	(-0,078)	(1,247)
Observations	91	92	91	91
R-squared	12,15%	1,63%	4,19%	18,60%

Table 7- Regression Results for Models 2 COVOL and Regional COVOL, with Lag Structures

This table presents the estimated coefficients and t-statistics (in parentheses) from regressions of macroeconomic variables—Consumption (C), Exports (X), and Imports (I)—on Global COVOL and Regional COVOL indices, considering both contemporaneous and lagged terms. Variables are regressed against the macroeconomic variables, controlling for Regional COVOL for contemporaneous (left panel) and lagged terms (right panel). All models are estimated using Ordinary Least Squares and include a constant term. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. R-squared values indicate explanatory power of each model specification

C	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,054 **	0,0595 **	0,0024	-0,1159 ***
	(-2,177)	(2,306)	(0,112)	(-4,154)
RCOVOL		-0,0748 ***	-0,0546 **	0,0403
		(-2,899)	(-2,158)	(1,252)
Constant	0,0375 **	0,0129	0,0365 **	0,0394 ***
	(2,344)	(0,683)	(1,995)	(2,662)
Observations	92	91	91	91
R-squared	4,92%	10,19%	4,93%	20,09%

C	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0748 ***	0,0336	-0,0131	-0,1001 ***
	(-2,899)	(1,339)	(-0,595)	(-5,081)
RCOVOL L1	0,0595 **		0,037	0,0548 **
	(2,306)		(1,429)	(2,414)
Constant	0,0129	-0,018	-0,0132	0,0217
	(0,683)	(-1,104)	(-0,725)	(1,323)
Observations	91	92	91	91
R-squared	10,19%	1,91%	2,29%	23,63%

X	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0472 **	0,0416 *	-0,016	-0,141 ***
	(-2,052)	(1,719)	(-0,804)	(-5,851)
RCOVOL		-0,0617 **	-0,0438 *	0,0675 **
		(-2,539)	(-1,872)	(2,428)
Constant	0,0386 ***	0,0214	0,0449 ***	0,0409 ***
	(2,591)	(1,202)	(2,657)	(3,195)
Observations	92	91	91	91
R-squared	4,39%	7,39%	5,06%	30,58%

X	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0617 **	0,0202	-0,028	-0,1066 ***
	(-2,539)	(0,863)	(-1,379)	(-6,091)
RCOVOL L1	0,0416 *		0,0276	0,0428 **
	(1,719)		(1,155)	(2,129)
Constant	0,0214	-0,0041	0,0062	0,0382 ***
	(1,202)	(-0,270)	(0,369)	(2,616)
Observations	91	92	91	91
R-squared	7,39%	0,80%	2,83%	29,57%

I	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0574 **	0,0534 **	-0,0042	-0,1486 ***
	(-2,453)	(2,189)	(-0,207)	(-6,166)
RCOVOL		-0,076 ***	-0,0565 **	0,0635 **
		(-3,115)	(-2,364)	(2,284)
Constant	0,0444 ***	0,0224	0,0461 ***	0,0469 ***
	(2,940)	(1,251)	(2,680)	(3,664)
Observations	92	91	91	91
R-squared	6,15%	10,84%	6,19%	33,76%

I	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,076 ***	0,027	-0,0191	-0,1181 ***
	(-3,115)	(1,130)	(-0,914)	(-6,827)
RCOVOL L1	0,0534 **		0,032	0,0521 ***
	(2,189)		(1,301)	(2,618)
Constant	0,0224	-0,009	-0,002	0,0379 ***
	(1,251)	(-0,581)	(-0,116)	(2,632)
Observations	91	92	91	91
R-squared	10,84%	1,37%	2,26%	34,88%

Table 8-- Regression Results for Models 2 – COVOL and Regional COVOL, with Lag Structures

This table presents the estimated coefficients and t-statistics (in parentheses) from regressions of macroeconomic variables—Real GDP growth (GDP), Industrial Production (IP), and Investment (INV)—on Global COVOL and Regional COVOL indices, considering both contemporaneous and lagged terms. Variables are regressed against the macroeconomic variables, controlling for Global COVOL for contemporaneous (left panel) and lagged terms (right panel). All models are estimated using Ordinary Least Squares and include a constant term. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. R-squared values indicate explanatory power of each model specification.

GDP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0306 **	0,019	-0,016	-0,0517 ***
	(-2,267)	(1,377)	(-1,391)	(-4,832)
GCOVOL	-0,0113	-0,0197 *		-0,0077
	(-0,991)	(-1,684)		(-0,740)
Constant	0,0285 ***	0,0016	0,0117 *	0,0347 ***
	(2,938)	(0,165)	(1,828)	(4,627)
Observations	91	91	92	91
R-squared	7,31%	4,06%	2,07%	22,21%

GDP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	0,0202	0,0259 **	-0,0077	-0,053 ***
	(1,188)	(2,158)	(-0,740)	(-5,048)
GCOVOL_L1	-0,0653 ***	-0,0571 ***	-0,0517 ***	
	(-4,442)	(-5,438)	(-4,832)	
Constant	0,0251 ***	0,0171 **	0,0347 ***	0,0313 ***
	(3,218)	(1,966)	(4,627)	(5,397)
Observations	91	91	91	92
R-squared	22,95%	25,55%	22,21%	21,75%

IP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	0,0022	0,0022	-0,0177 ***	-0,0074
	(0,407)	(0,407)	(-3,933)	(-1,609)
GCOVOL	-0,0181 ***	-0,0181 ***		-0,0165 ***
	(-3,935)	(-3,935)		(-3,667)
Constant	0,0089 **	0,0089 **	0,0101 ***	0,0134 ***
	(2,282)	(2,342)	(4,040)	(4,188)
Observations	91	91	92	91
R-squared	14,58%	14,57%	14,42%	16,76%

IP	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	0,0132 *	-0,0004	-0,0165 ***	-0,0102 **
	(1,692)	(-0,070)	(-3,667)	(-2,125)
GCOVOL_L1	-0,0182 ***	-0,0101 **	-0,0074	
	(-2,676)	(-2,020)	(-1,609)	
Constant	0,002	0,0062	0,0134 ***	0,006 **
	(0,556)	(1,512)	(4,188)	(2,222)
Observations	91	91	91	92
R-squared	7,48%	4,57%	16,76%	4,57%

INV	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0298 **	0,02	-0,0132	-0,0391 ***
	(-2,384)	(1,563)	(-1,234)	(-3,796)
GCOVOL	-0,0086	-0,017		-0,0068
	(-0,811)	(-1,560)		(-0,667)
Constant	0,0263 ***	-0,0007	0,0099 *	0,0273 ***
	(2,922)	(-0,078)	(1,650)	(3,792)
Observations	91	91	92	91
R-squared	7,40%	4,19%	1,62%	14,97%

INV	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	0,0022	0,0249 **	-0,0068	-0,0403 ***
	(0,132)	(2,128)	(-0,667)	(-3,951)
GCOVOL_L1	-0,0416 ***	-0,0443 ***	-0,0391 ***	
	(-2,889)	(-4,343)	(-3,796)	
Constant	0,0236 ***	0,0106	0,0273 ***	0,0243 ***
	(3,065)	(1,247)	(3,792)	(4,339)
Observations	91	91	91	92
R-squared	14,56%	18,60%	14,97%	14,55%

Table 9- Regression Results for Models 2 COVOL and Regional COVOL, with Lag Structures

This table presents the estimated coefficients and t-statistics (in parentheses) from regressions of macroeconomic variables—Consumption (C), Exports (X), and Imports (I)—on Global COVOL and Regional COVOL indices, considering both contemporaneous and lagged terms. Variables are regressed against the macroeconomic variables, controlling for Global COVOL for contemporaneous (left panel) and lagged terms (right panel). All models are estimated using Ordinary Least Squares and include a constant term. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. R-squared values indicate explanatory power of each model specification

C	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0546 **	0,037	-0,006	-0,0928 ***
	(-2,158)	(1,429)	(-0,278)	(-4,594)
GCOVOL	0,0024	-0,0131		0,009
	(0,112)	(-0,595)		(0,455)
Constant	0,0365 **	-0,0132	0,0065	0,0478 ***
	(1,995)	(-0,725)	(0,537)	(3,390)
Observations	91	91	92	91
R-squared	4,93%	2,29%	0,08%	18,90%

C	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	0,0403	0,0548 **	0,009	-0,0913 ***
	(1,252)	(2,414)	(0,455)	(-4,611)
GCOVOL_L1	-0,1159 ***	-0,1001 ***	-0,0928 ***	
	(-4,154)	(-5,081)	(-4,594)	
Constant	0,0394 ***	0,0217	0,0478 ***	0,0518 ***
	(2,662)	(1,323)	(3,390)	(4,709)
Observations	91	91	91	92
R-squared	20,09%	23,63%	18,90%	18,71%

X	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0438 *	0,0276	-0,0227	-0,0986 ***
	(-1,872)	(1,155)	(-1,146)	(-5,539)
GCOVOL	-0,016	-0,028		-0,0068
	(-0,804)	(-1,379)		(-0,389)
Constant	0,0449 ***	0,0062	0,0208 *	0,0647 ***
	(2,657)	(0,369)	(1,874)	(5,176)
Observations	91	91	92	91
R-squared	5,06%	2,83%	1,41%	26,19%

X	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	0,0675 **	0,0428 **	-0,0068	-0,0998 ***
	(2,428)	(2,129)	(-0,389)	(-5,703)
GCOVOL_L1	-0,141 ***	-0,1066 ***	-0,0986 ***	
	(-5,851)	(-6,091)	(-5,539)	
Constant	0,0409 ***	0,0382 ***	0,0647 ***	0,0617 ***
	(3,195)	(2,616)	(5,176)	(6,361)
Observations	91	91	91	92
R-squared	30,58%	29,57%	26,19%	26,07%

I	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	-0,0565 **	0,032	-0,0129	-0,1106 ***
	(-2,364)	(1,301)	(-0,629)	(-6,213)
GCOVOL	-0,0042	-0,0191		0,005
	(-0,207)	(-0,914)		(0,286)
Constant	0,0461 ***	-0,002	0,015	0,0643 ***
	(2,680)	(-0,116)	(1,316)	(5,144)
Observations	91	91	92	91
R-squared	6,19%	2,26%	0,43%	30,03%

I	**RCOVOL**	**RCOVOL L1**	**GCOVOL**	**GCOVOL_L1**
	0,0635 **	0,0521 ***	0,005	-0,1098 ***
	(2,284)	(2,618)	(0,286)	(-6,274)
GCOVOL_L1	-0,1486 ***	-0,1181 ***	-0,1106 ***	
	(-6,166)	(-6,827)	(-6,213)	
Constant	0,0469 ***	0,0379 ***	0,0643 ***	0,0665 ***
	(3,664)	(2,632)	(5,144)	(6,856)
Observations	91	91	91	92
R-squared	33,76%	34,88%	30,03%	29,97%

Annex B7- Regression Results for Model 3

Table 10- Regression Results for Models 3 COVOL and Regional COVOL, with Lag Structures

This table presents the estimated coefficients and t-statistics (in parentheses) from regressions of macroeconomic variables— Real GDP growth (GDP), Industrial Production (IP), and Investment (INV)—on Regional COVOL and Global COVOL and a range of global and regional uncertainty indices, considering both contemporaneous and lagged terms. Variables are regressed against the macroeconomic variables, controlling for Regional COVOL lagged terms. All models are estimated using Ordinary Least Squares and include a constant term. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. R-squared values indicate explanatory power of each model specification

GDP	**EEPU**	**RGPR**	**WUIE**	**EEPU L1**	**RGPR L1**	**WUIE L1**	**GEPU**	**GGPR**	**WUIG**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0107	0,0034	0,0003	-0,0105	-0,006	0,0013	-0,0182 *	0,0028	-0,0002	0,0038	-0,0041	-0,002
	(-1,274)	(0,872)	(0,071)	(-1,250)	(-1,579)	(0,310)	(-1,876)	(0,528)	(-0,043)	(0,388)	(-0,759)	(-0,426)
RCOVOL L1	0,0133	0,014	0,0138	0,013	0,013	0,0135	0,0133	0,0146	0,0138	0,0132	0,0137	0,015
	(0,985)	(1,029)	(1,015)	(0,963)	(0,963)	(0,985)	(0,993)	(1,066)	(1,015)	(0,964)	(1,007)	(1,079)
Constant	-0,0049	-0,0061	-0,0056	-0,0047	-0,0046	-0,0056	-0,0048	-0,0063	-0,0056	-0,0054	-0,0054	-0,0062
	(-0,557)	(-0,693)	(-0,636)	(-0,534)	(-0,523)	(-0,636)	(-0,552)	(-0,708)	(-0,636)	(-0,607)	(-0,614)	(-0,697)
Observations	91	91	91	91	91	91	91	91	91	91	91	91
R-squared	2,84%	1,96%	1,12%	2,78%	3,65%	1,21%	4,83%	1,42%	1,11%	1,28%	1,74%	1,31%

IP	**EEPU**	**RGPR**	**WUIE**	**EEPU L1**	**RGPR L1**	**WUIE L1**	**GEPU**	**GGPR**	**WUIG**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0026	-0,0008	-0,0002	-0,006 *	0,0002	0,003 *	-0,0017	-0,0018	-0,0013	-0,0068 *	-0,0011	0,0027
	(-0,743)	(-0,500)	(-0,111)	(-1,714)	(0,125)	(1,765)	(-0,415)	(-0,818)	(-0,684)	(-1,659)	(-0,478)	(1,421)
RCOVOL L1	-0,0027	-0,0026	-0,0025	-0,003	-0,0025	-0,0032	-0,0026	-0,003	-0,0025	-0,0015	-0,0026	-0,0041
	(-0,474)	(-0,456)	(-0,439)	(-0,526)	(-0,439)	(-0,561)	(-0,456)	(-0,526)	(-0,439)	(-0,263)	(-0,456)	(-0,707)
Constant	0,0024	0,0023	0,0022	0,0028	0,0022	0,0024	0,0023	0,0026	0,0023	0,0018	0,0023	0,003
	(0,649)	(0,622)	(0,595)	(0,757)	(0,595)	(0,649)	(0,622)	(0,703)	(0,622)	(0,486)	(0,622)	(0,811)
Observations	91	91	91	91	91	91	91	91	91	91	91	91
R-squared	0,79%	0,49%	0,23%	3,35%	0,24%	3,27%	0,40%	0,92%	0,73%	3,22%	0,46%	2,29%

INV	**EEPU**	**RGPR**	**WUIE**	**EEPU L1**	**RGPR L1**	**WUIE L1**	**GEPU**	**GGPR**	**WUIG**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0094	0,0025	0,0003	-0,0053	-0,0051	0,001	-0,0159 *	0,0023	-0,0005	0,0083	-0,0021	-0,0018
	(-1,205)	(0,694)	(0,077)	(-0,679)	(-1,417)	(0,256)	(-1,767)	(0,469)	(-0,116)	(0,922)	(-0,420)	(-0,419)
RCOVOL L1	0,015	0,0157	0,0155	0,0151	0,0148	0,0153	0,0151	0,0162	0,0155	0,0142	0,0155	0,0166
	(1,200)	(1,246)	(1,230)	(1,198)	(1,184)	(1,205)	(1,218)	(1,276)	(1,230)	(1,118)	(1,230)	(1,287)
Constant	-0,0063	-0,0073	-0,007	-0,0065	-0,006	-0,0069	-0,0062	-0,0075	-0,0069	-0,0064	-0,0068	-0,0075
	(-0,768)	(-0,890)	(-0,854)	(-0,793)	(-0,741)	(-0,841)	(-0,765)	(-0,904)	(-0,841)	(-0,780)	(-0,829)	(-0,904)
Observations	91	91	91	91	91	91	91	91	91	91	91	91
R-squared	3,16%	2,13%	1,64%	2,11%	3,79%	1,70%	4,89%	1,87%	1,64%	2,54%	1,82%	1,82%

Table 11- Regression Results for Models 3 COVOL and Regional COVOL, with Lag Structures

This table presents the estimated coefficients and t-statistics (in parentheses) from regressions of macroeconomic variables— Real GDP growth (GDP), Industrial Production (IP), and Investment (INV)—on Regional COVOL and Global COVOL and a range of global and regional uncertainty indices, considering both contemporaneous and lagged terms. Variables are regressed against the macroeconomic variables, controlling for Global COVOL lagged terms. All models are estimated using Ordinary Least Squares and include a constant term. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. R-squared values indicate explanatory power of each model specification

GDP	**EEPU**	**RGPR**	**WUIE**	**EEPU L1**	**RGPR L1**	**WUIE L1**	**GEPU**	**GGPR**	**WUIG**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0143 *	0,0011	0,0031	-0,0001	-0,0038	-0,0001	-0,0143	0,0005	0,0058	0,0126	-0,0016	-0,0021
	(-1,932)	(0,314)	(0,816)	(-0,013)	(-1,086)	(-0,026)	(-1,644)	(0,106)	(1,381)	(1,448)	(-0,333)	(-0,512)
GCOVOL_L1	-0,0547 ***	-0,0525 ***	-0,0542 ***	-0,0529 ***	-0,0514 ***	-0,053 ***	-0,0513 ***	-0,0529 ***	-0,057 ***	-0,0556 ***	-0,0526 ***	-0,0533 ***
	(-5,260)	(-4,953)	(-5,113)	(-4,809)	(-4,849)	(-5,000)	(-4,933)	(-4,991)	(-5,278)	(-5,245)	(-4,962)	(-5,076)
Constant	0,0328 ***	0,0309 ***	0,0316 ***	0,0313 ***	0,0308 ***	0,0313 ***	0,0308 ***	0,0312 ***	0,033 ***	0,0322 ***	0,0312 ***	0,0316 ***
	(5,655)	(5,237)	(5,448)	(5,217)	(5,310)	(5,305)	(5,310)	(5,288)	(5,593)	(5,552)	(5,288)	(5,356)
Observations	91	91	91	91	91	91	91	91	91	91	91	91
R-squared	24,84%	21,85%	22,32%	21,75%	22,75%	21,75%	24,02%	21,76%	23,36%	23,51%	21,85%	21,99%

IP	**EEPU**	**RGPR**	**WUIE**	**EEPU L1**	**RGPR L1**	**WUIE L1**	**GEPU**	**GGPR**	**WUIG**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0032	-0,0013	0,0003	-0,0042	0,0007	0,0026	-0,0009	-0,002	-0,0003	-0,0057	-0,0006	0,0022
	(-0,914)	(-0,813)	(0,167)	(-1,167)	(0,438)	(1,529)	(-0,220)	(-0,909)	(-0,150)	(-1,425)	(-0,273)	(1,158)
GCOVOL_L1	-0,0106 **	-0,0107 **	-0,0103 **	-0,0085 *	-0,0105 **	-0,0095 **	-0,0101 **	-0,0105 **	-0,01 **	-0,009 *	-0,01 **	-0,0099 **
	(-2,163)	(-2,184)	(-2,102)	(-1,700)	(-2,143)	(-1,979)	(-2,061)	(-2,143)	(-1,961)	(-1,837)	(-2,041)	(-2,063)
Constant	0,0064 **	0,0064 **	0,0061 **	0,0053 *	0,0061 **	0,0055 **	0,006 **	0,0063 **	0,0059 **	0,0056 **	0,006 **	0,0057 **
	(2,370)	(2,370)	(2,259)	(1,893)	(2,259)	(2,037)	(2,222)	(2,333)	(2,107)	(2,074)	(2,222)	(2,111)
Observations	91	91	91	91	91	91	91	91	91	91	91	91
R-squared	5,44%	5,20%	4,60%	5,98%	4,78%	6,91%	4,61%	5,45%	4,59%	6,62%	4,64%	6,02%

INV	**EEPU**	**RGPR**	**WUIE**	**EEPU L1**	**RGPR L1**	**WUIE L1**	**GEPU**	**GGPR**	**WUIG**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0122 *	0,0007	0,0025	0,0027	-0,0035	0,0001	-0,013	0,0004	0,0041	0,0155 *	-0,0002	-0,0016
	(-1,694)	(0,206)	(0,676)	(0,355)	(-1,029)	(0,027)	(-1,548)	(0,087)	(1,000)	(1,845)	(-0,043)	(-0,410)
GCOVOL_L1	-0,0418 ***	-0,04 ***	-0,0412 ***	-0,0413 ***	-0,0388 ***	-0,0403 ***	-0,0388 ***	-0,0402 ***	-0,0431 ***	-0,0434 ***	-0,0402 ***	-0,0405 ***
	(-4,139)	(-3,883)	(-4,000)	(-3,860)	(-3,767)	(-3,913)	(-3,842)	(-3,903)	(-4,066)	(-4,255)	(-3,903)	(-3,971)
Constant	0,0256 ***	0,0241 ***	0,0246 ***	0,0247 ***	0,0238 ***	0,0243 ***	0,0239 ***	0,0242 ***	0,0255 ***	0,0255 ***	0,0243 ***	0,0245 ***
	(4,571)	(4,155)	(4,316)	(4,259)	(4,175)	(4,263)	(4,268)	(4,246)	(4,397)	(4,554)	(4,263)	(4,298)
Observations	91	91	91	91	91	91	91	91	91	91	91	91
R-squared	17,15%	14,58%	14,97%	14,66%	15,55%	14,55%	16,71%	14,55%	15,47%	17,63%	14,55%	14,69%

Table 12- Regression Results for Models 3 COVOL and Regional COVOL

This table presents the estimated coefficients and t-statistics (in parentheses) from regressions of macroeconomic variables— Real GDP growth (GDP), Industrial Production (IP), and Investment (INV)—on Regional COVOL and Global COVOL and a range of global and regional uncertainty indices, considering both contemporaneous and lagged terms. Variables are regressed against the macroeconomic variables, controlling for Global COVOL contemporaneous terms. All models are estimated using Ordinary Least Squares and include a constant term. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. R-squared values indicate explanatory power of each model specification

GDP	**EEPU**	**RGPR**	**WUIE**	**EEPU L1**	**RGPR L1**	**WUIE L1**	**GEPU**	**GGPR**	**WUIG**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0083	0,0042	0,0001	-0,0095	-0,0057	0,0016	-0,0166 *	0,0033	-0,0004	0,0067	-0,0035	-0,0006
	(-0,954)	(1,077)	(0,024)	(-1,131)	(-1,500)	(0,381)	(-1,694)	(0,623)	(-0,087)	(0,684)	(-0,648)	(-0,130)
GCOVOL	-0,0128	-0,0177	-0,016	-0,0143	-0,0145	-0,016	-0,0127	-0,017	-0,0161	-0,0171	-0,0154	-0,0159
	(-1,067)	(-1,526)	(-1,379)	(-1,233)	(-1,261)	(-1,379)	(-1,104)	(-1,466)	(-1,388)	(-1,474)	(-1,328)	(-1,371)
Constant	0,0103	0,0122 *	0,0117 *	0,0111 *	0,0114 *	0,0116 *	0,0104	0,012 *	0,0117 *	0,012 *	0,0115 *	0,0117 *
	(1,561)	(1,906)	(1,800)	(1,734)	(1,781)	(1,785)	(1,625)	(1,846)	(1,800)	(1,846)	(1,769)	(1,800)
Observations	91	91	91	91	91	91	91	91	91	91	91	91
R-squared	3,02%	3,30%	2,07%	3,41%	4,33%	2,21%	5,07%	2,47%	2,08%	2,58%	2,53%	2,09%

IP	**EEPU**	**RGPR**	**WUIE**	**EEPU L1**	**RGPR L1**	**WUIE L1**	**GEPU**	**GGPR**	**WUIG**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	0,0012	0	-0,0006	-0,0043	0,0008	0,0029 *	0,0009	-0,0006	-0,0017	-0,0051	-0,0003	0,0029
	(0,353)	-	(-0,375)	(-1,303)	(0,533)	(1,813)	(0,231)	(-0,286)	(-0,944)	(-1,342)	(-0,143)	(1,611)
GCOVOL	-0,0182 ***	-0,0177 ***	-0,0178 ***	-0,0169 ***	-0,0179 ***	-0,0177 ***	-0,0179 ***	-0,0175 ***	-0,0179 ***	-0,0169 ***	-0,0177 ***	-0,0182 ***
	(-3,872)	(-3,848)	(-3,956)	(-3,756)	(-3,978)	(-4,023)	(-3,891)	(-3,804)	(-3,978)	(-3,756)	(-3,933)	(-4,044)
Constant	0,0103 ***	0,0101 ***	0,0102 ***	0,0098 ***	0,0101 ***	0,0098 ***	0,0101 ***	0,01 ***	0,0103 ***	0,0098 ***	0,0101 ***	0,0101 ***
	(3,962)	(4,040)	(4,080)	(3,920)	(4,040)	(3,920)	(4,040)	(4,000)	(4,120)	(3,920)	(4,040)	(4,040)
Observations	91	91	91	91	91	91	91	91	91	91	91	91
R-squared	14,53%	14,42%	14,54%	15,97%	14,68%	17,39%	14,46%	14,49%	15,22%	16,07%	14,44%	16,87%

INV	**EEPU**	**RGPR**	**WUIE**	**EEPU L1**	**RGPR L1**	**WUIE L1**	**GEPU**	**GGPR**	**WUIG**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0075	0,003	0,0002	-0,0045	-0,0049	0,0013	-0,0146	0,0025	-0,0006	0,0111	-0,0016	-0,0004
	(-0,926)	(0,833)	(0,051)	(-0,570)	(-1,361)	(0,333)	(-1,604)	(0,510)	(-0,140)	(1,233)	(-0,320)	(-0,095)
GCOVOL	-0,0103	-0,0144	-0,0131	-0,0124	-0,0118	-0,0132	-0,0103	-0,0139	-0,0133	-0,0149	-0,0129	-0,0131
	(-0,920)	(-1,333)	(-1,213)	(-1,148)	(-1,103)	(-1,222)	(-0,954)	(-1,275)	(-1,231)	(-1,380)	(-1,194)	(-1,213)
Constant	0,0087	0,0103 *	0,0099	0,0097	0,0096	0,0098	0,0088	0,0102 *	0,01 *	0,0105 *	0,0098	0,0099 *
	(1,426)	(1,717)	(1,623)	(1,617)	(1,600)	(1,633)	(1,467)	(1,700)	(1,667)	(1,750)	(1,633)	(1,650)
Observations	91	91	91	91	91	91	91	91	91	91	91	91
R-squared	2,53%	2,37%	1,62%	1,97%	3,60%	1,74%	4,31%	1,90%	1,64%	3,22%	1,73%	1,63%

Table 13- Regression Results for Models 3 COVOL and Regional COVOL

This table presents the estimated coefficients and t-statistics (in parentheses) from regressions of macroeconomic variables— Real GDP growth (GDP), Industrial Production (IP), and Investment (INV)—on Regional COVOL and Global COVOL and a range of global and regional uncertainty indices, considering both contemporaneous and lagged terms. Variables are regressed against the macroeconomic variables, controlling for Regional COVOL contemporaneous terms. All models are estimated using Ordinary Least Squares and include a constant term. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. R-squared values indicate explanatory power of each model specification

GDP	**EEPU**	**RGPR**	**WUIE**	**EEPU L1**	**RGPR L1**	**WUIE L1**	**GEPU**	**GGPR**	**WUIG**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0119	0,003	0,0012	-0,0088	-0,0055	0,0013	-0,0162 *	0,0021	0,0022	0,0053	-0,0038	-0,0012
	(-1,469)	(0,789)	(0,293)	(-1,073)	(-1,447)	(0,317)	(-1,705)	(0,404)	(0,478)	(0,558)	(-0,731)	(-0,273)
RCOVOL	-0,0338 **	-0,0326 **	-0,0333 **	-0,0315 **	-0,0316 **	-0,0329 **	-0,0307 **	-0,0329 **	-0,0344 **	-0,0331 **	-0,0327 **	-0,033 **
	(-2,561)	(-2,451)	(-2,504)	(-2,368)	(-2,394)	(-2,474)	(-2,326)	(-2,474)	(-2,529)	(-2,489)	(-2,459)	(-2,481)
Constant	0,025 ***	0,0234 ***	0,024 ***	0,0234 ***	0,0236 ***	0,0238 ***	0,023 ***	0,0238 ***	0,0247 ***	0,0239 ***	0,024 ***	0,0241 ***
	(2,941)	(2,721)	(2,791)	(2,721)	(2,776)	(2,767)	(2,706)	(2,767)	(2,839)	(2,779)	(2,791)	(2,802)
Observations	91	91	91	91	91	91	91	91	91	91	91	91
R-squared	8,45%	6,96%	6,40%	7,48%	8,44%	6,43%	9,23%	6,49%	6,57%	6,64%	6,87%	6,40%

IP	**EEPU**	**RGPR**	**WUIE**	**EEPU L1**	**RGPR L1**	**WUIE L1**	**GEPU**	**GGPR**	**WUIG**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0026	-0,0008	-0,0001	-0,0059 *	0,0003	0,0029 *	-0,0016	-0,0017	-0,0013	-0,0069 *	-0,001	0,0024
	(-0,722)	(-0,500)	(-0,056)	(-1,686)	(0,188)	(1,706)	(-0,381)	(-0,773)	(-0,650)	(-1,725)	(-0,435)	(1,263)
RCOVOL	-0,0018	-0,0017	-0,0016	-0,0006	-0,0017	-0,0014	-0,0014	-0,0017	-0,0008	-0,0015	-0,0016	-0,0015
	(-0,316)	(-0,298)	(-0,276)	(-0,105)	(-0,293)	(-0,246)	(-0,241)	(-0,298)	(-0,136)	(-0,263)	(-0,281)	(-0,263)
Constant	0,0019	0,0018	0,0016	0,0012	0,0017	0,0013	0,0016	0,0018	0,0013	0,0018	0,0017	0,0014
	(0,514)	(0,486)	(0,432)	(0,324)	(0,459)	(0,351)	(0,432)	(0,486)	(0,342)	(0,486)	(0,459)	(0,378)
Observations	91	91	91	91	91	91	91	91	91	91	91	91
R-squared	0,67%	0,37%	0,10%	3,06%	0,12%	3,00%	0,24%	0,71%	0,55%	3,22%	0,32%	1,82%

INV	**EEPU**	**RGPR**	**WUIE**	**EEPU L1**	**RGPR L1**	**WUIE L1**	**GEPU**	**GGPR**	**WUIG**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0106	0,002	0,0012	-0,0036	-0,0047	0,0011	-0,0139	0,0015	0,0019	0,0099	-0,0018	-0,0009
	(-1,395)	(0,571)	(0,316)	(-0,468)	(-1,343)	(0,289)	(-1,580)	(0,313)	(0,452)	(1,138)	(-0,375)	(-0,220)
RCOVOL	-0,0324 ***	-0,0314 **	-0,0319 **	-0,031 **	-0,0305 **	-0,0316 **	-0,0297 **	-0,0316 **	-0,0328 ***	-0,0319 ***	-0,0315 **	-0,0317 ***
	(-2,656)	(-2,553)	(-2,573)	(-2,500)	(-2,480)	(-2,569)	(-2,434)	(-2,569)	(-2,603)	(-2,593)	(-2,561)	(-2,577)
Constant	0,0238 ***	0,0225 ***	0,023 ***	0,0226 ***	0,0226 ***	0,0228 ***	0,0221 ***	0,0228 ***	0,0235 ***	0,0227 ***	0,0229 ***	0,023 ***
	(3,013)	(2,813)	(2,875)	(2,825)	(2,861)	(2,850)	(2,797)	(2,850)	(2,901)	(2,873)	(2,863)	(2,875)
Observations	91	91	91	91	91	91	91	91	91	91	91	91
R-squared	8,70%	7,08%	6,84%	6,97%	8,53%	6,83%	9,23%	6,85%	6,95%	8,03%	6,89%	6,80%

Annex B8- Regression Results for Model 4

Table 14- Regression Results for Model 4 (Autoregressive Specification) for Global indices in GDP, IP and INV

This table presents results from autoregressive regressions assessing the impact of various global and regional uncertainty indices on key macroeconomic variables: Real GDP growth (GDP), Industrial Production (IP), and Investment (INV). Each regression includes the first lag of the dependent variable to account for intrinsic persistence, enabling identification of the independent explanatory power of the uncertainty measures. Columns report coefficient estimates and t-statistics (in parentheses) for each uncertainty index: Global COVOL, GEPU, GGPR, WUI, and their respective first lags, along with the corresponding constant term. R-squared values indicate model fit. Asterisks denote statistical significance at the 10% (), 5% (), and 1% () levels.

GDP	**GDP L1**	**GCOVOL**	**GEPU**	**GGPR**	**WUIG**	**GCOVOL_L1**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	1,3157 ***	-0,0073	-0,0141 *	0,0007	0,0016	-0,0331 ***	0,0068	-0,0014	0,0009
	(6,295)	(-0,745)	(-1,720)	(0,156)	(0,410)	(-3,214)	(0,829)	(-0,311)	(0,231)
Economic Variable lag 1		1,2929 ***	1,2851 ***	1,3139 ***	1,3219 ***	1,0315 ***	1,3222 ***	1,3093 ***	1,3196 ***
		(6,104)	(6,190)	(6,245)	(6,280)	(4,729)	(6,311)	(6,205)	(6,263)
Constant	0,0024	0,0063	0,0028 *	0,0023	0,0022	0,0201 ***	0,0021	0,0024	0,0023
	(1,500)	(1,145)	(1,750)	(1,438)	(1,375)	(3,526)	(1,313)	(1,500)	(1,438)
Observations	92	91	91	91	91	91	91	91	91
R-squared	30,11%	30,53%	32,31%	30,13%	30,24%	37,20%	30,63%	30,19%	30,15%

IP	**IP L1**	**GCOVOL**	**GEPU**	**GGPR**	**WUIG**	**GCOVOL_L1**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	0,0166	-0,0177 ***	-0,0018	-0,0017	-0,0013	-0,0101 **	-0,0069 *	-0,0011	0,0024
	(0,381)	(-3,933)	(-0,439)	(-0,773)	(-0,684)	(-2,061)	(-1,683)	(-0,478)	(1,263)
Economic Variable lag 1		0,0182	0,0177	0,0169	0,0162	0,004	0,0028	0,0177	0,017
		(0,449)	(0,403)	(0,387)	(0,371)	(0,092)	(0,064)	(0,404)	(0,392)
Constant	0,0006	0,01 ***	0,0006	0,0006	0,0007	0,006 **	0,0008	0,0006	0,0004
	(0,750)	(4,000)	(0,750)	(0,750)	(0,875)	(2,143)	(1,000)	(0,750)	(0,500)
Observations	92	91	91	91	91	91	91	91	91
R-squared	0,16%	14,61%	0,36%	0,78%	0,67%	4,58%	3,15%	0,41%	1,91%

INV	**INV L1**	**GCOVOL**	**GEPU**	**GGPR**	**WUIG**	**GCOVOL_L1**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,3197 ***	-0,0122	-0,0144 *	0,0018	-0,0004	-0,0453 ***	0,0046	-0,0016	-0,0009
	(-3,236)	(-1,196)	(-1,674)	(0,383)	(-0,098)	(-4,819)	(0,523)	(-0,333)	(-0,225)
Economic Variable lag 1		-0,3162 ***	-0,3096 ***	-0,3199 ***	-0,3196 ***	-0,3746 ***	-0,3101 ***	-0,3184 ***	-0,3199 ***
		(-3,207)	(-3,159)	(-3,225)	(-3,219)	(-4,185)	(-3,076)	(-3,206)	(-3,222)
Constant	0,0038 **	0,0103 *	0,0042 **	0,0037 **	0,0038 **	0,0281 ***	0,0036 **	0,0039 **	0,0039 **
	(2,235)	(1,807)	(2,471)	(2,176)	(2,235)	(5,302)	(2,118)	(2,294)	(2,294)
Observations	92	91	91	91	91	91	91	91	91
R-squared	10,22%	11,61%	12,90%	10,36%	10,23%	28,35%	10,49%	10,33%	10,26%

Table 15-- Regression Results for Model 4 (Autoregressive Specification) for Global indices in C, X and I

This table presents results from autoregressive regressions assessing the impact of various global and regional uncertainty indices on key macroeconomic variables: Consumption (C), Imports (I), and Exports (X). Each regression includes the first lag of the dependent variable to account for intrinsic persistence, enabling identification of the independent explanatory power of the uncertainty measures. Columns report coefficient estimates and t-statistics (in parentheses) for each uncertainty index: Global COVOL, GEPU, GGPR, WUI, and their respective first lags, along with the corresponding constant term. R-squared values indicate model fit. Asterisks denote statistical significance at the 10% (), 5% (), and 1% () levels.

C	**C L1**	**GCOVOL**	**GEPU**	**GGPR**	**WUIG**	**GCOVOL_L1**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,3119 ***	-0,0012	-0,0305 *	0,0008	-0,0021	-0,0938 ***	0,0095	-0,0042	-0,0015
	(-3,147)	(-0,058)	(-1,753)	(0,085)	(-0,256)	(-5,043)	(0,537)	(-0,442)	(-0,185)
Economic Variable lag 1		-0,3115 ***	-0,2886 ***	-0,3123 ***	-0,3104 ***	-0,3277 ***	-0,3006 ***	-0,3124 ***	-0,3128 ***
		(-3,118)	(-2,918)	(-3,132)	(-3,110)	(-3,715)	(-2,956)	(-3,140)	(-3,137)
Constant	0,0043	0,0049	0,0051	0,0042	0,0044	0,0542 ***	0,0039	0,0045	0,0044
	(1,303)	(0,426)	(1,545)	(1,235)	(1,294)	(5,262)	(1,147)	(1,324)	(1,294)
Observations	92	91	91	91	91	91	91	91	91
R-squared	9,72%	9,73%	12,69%	9,73%	9,79%	29,43%	10,01%	9,91%	9,76%

X	**X L1**	**GCOVOL**	**GEPU**	**GGPR**	**WUIG**	**GCOVOL_L1**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	0,0002	-0,0227	-0,0265	0,0021	-0,0008	-0,1011 ***	-0,0091	-0,0094	0,0001
	(0,002)	(-1,135)	(-1,577)	(0,228)	(-0,101)	(-5,712)	(-0,535)	(-1,022)	(0,013)
Economic Variable lag 1		-0,0012	0,0105	0,0006	0,0004	-0,0591	-0,0082	0,0031	0,0002
		(-0,012)	(0,102)	(0,006)	(0,004)	(-0,654)	(-0,078)	(0,030)	(0,002)
Constant	0,0087 **	0,0208 *	0,0094 ***	0,0086 **	0,0087 **	0,0629 ***	0,009 **	0,0091 ***	0,0087 **
	(2,559)	(1,857)	(2,765)	(2,529)	(2,559)	(6,354)	(2,571)	(2,676)	(2,559)
Observations	92	91	91	91	91	91	91	91	91
R-squared	0,00%	1,41%	2,64%	0,06%	0,01%	26,42%	0,31%	1,13%	0,00%

I	**I L1**	**GCOVOL**	**GEPU**	**GGPR**	**WUIG**	**GCOVOL_L1**	**GEPU L1**	**GGPR L1**	**WUIG L1**
	-0,0594	-0,0124	-0,0291 *	0,0004	-0,0036	-0,1109 ***	-0,0095	-0,0083	0,0044
	(-0,573)	(-0,602)	(-1,672)	(0,043)	(-0,444)	(-6,337)	(-0,543)	(-0,874)	
Economic Variable lag 1		-0,0564	-0,0357	-0,0596	-0,0566	-0,0929	-0,0688	-0,0588	-0,0562
		(-0,541)	(-0,344)	(-0,571)	(-0,542)	(-1,067)	(-0,652)	(-0,566)	(-0,539)
Constant	0,0086 **	0,0152	0,0093 ***	0,0086 **	0,0089 **	0,0679 ***	0,009 **	0,009 **	0,0083 **
	(2,529)	(1,322)	(2,735)	(2,457)	(2,543)	(6,929)	(2,571)	(2,571)	(2,371)
Observations	92	91	91	91	91	91	91	91	91
R-squared	0,36%	0,75%	3,34%	0,36%	0,57%	30,83%	0,67%	1,18%	0,67%

Table 16-- Regression Results for Model 4 (Autoregressive Specification) for Regional indices in GDP, IP and INV

This table presents results from autoregressive regressions assessing the impact of various global and regional uncertainty indices on key macroeconomic variables: Real GDP growth (GDP), Industrial Production (IP), and Investment (INV). Each regression includes the first lag of the dependent variable to account for intrinsic persistence, enabling identification of the independent explanatory power of the uncertainty measures. Columns report coefficient estimates and t-statistics (in parentheses) for each uncertainty index: Regional COVOL, EEPU, RGPR, WUIE, and their respective first lags, along with the corresponding constant term. R-squared values indicate model fit. Asterisks denote statistical significance at the 10% (), 5% (), and 1% () levels.

GDP	**GDP L1**	**RCOVOL**	**EEPU**	**RGPR**	**WUIE**	**RCOVOL L1**	**EEPU L1**	**RGPR L1**	**WUIE L1**
	1,3157 ***	-0,0235 **	-0,0087	0,0021	0,0009	0,0158	-0,0075	-0,005	0,0021
	(6,295)	(-2,080)	(-1,225)	(0,636)	(0,257)	(1,386)	(-1,056)	(-1,563)	(0,600)
Economic Variable lag 1		1,2563 ***	1,3028 ***	1,3073 ***	1,3168 ***	1,3238 ***	1,2987 ***	1,2987 ***	1,3189 ***
		(6,057)	(6,242)	(6,222)	(6,267)	(6,364)	(6,199)	(6,253)	(6,286)
Constant	0,0024	0,0172 **	0,0027 *	0,0022	0,0023	-0,0077	0,0027 *	0,0028 *	0,0022
	(1,500)	(2,324)	(1,688)	(1,375)	(1,438)	(-1,041)	(1,688)	(1,750)	(1,375)
Observations	92	91	91	91	91	91	91	91	91
R-squared	30,11%	33,24%	31,26%	30,42%	30,16%	31,57%	30,95%	31,92%	30,38%

IP	**IP L1**	**RCOVOL**	**EEPU**	**RGPR**	**WUIE**	**RCOVOL L1**	**EEPU L1**	**RGPR L1**	**WUIE L1**
	0,0166	-0,0017	-0,0027	-0,0008	-0,0002	-0,0021	-0,0059 *	0,0002	0,0029 *
	(0,381)	(-0,293)	(-0,750)	(-0,500)	(-0,111)	(-0,356)	(-1,686)	(0,125)	(1,706)
Economic Variable lag 1		0,0171	0,0209	0,0162	0,0167	0,0126	0,007	0,0162	0,016
		(0,390)	(0,475)	(0,370)	(0,381)	(0,279)	(0,161)	(0,368)	(0,370)
Constant	0,0006	0,0016	0,0007	0,0006	0,0006	0,0019	0,0008	0,0005	0,0003
	(0,750)	(0,432)	(0,875)	(0,750)	(0,750)	(0,487)	(1,000)	(0,625)	(0,375)
Observations	92	91	91	91	91	91	91	91	91
R-squared	0,16%	0,25%	0,80%	0,42%	0,17%	0,30%	3,08%	0,17%	3,08%

INV	**INV L1**	**RCOVOL**	**EEPU**	**RGPR**	**WUIE**	**RCOVOL L1**	**EEPU L1**	**RGPR L1**	**WUIE L1**
	-0,3197 ***	-0,0305 ***	-0,0059	0,0023	0,0006	0,0059	-0,0089	-0,0045	0,0015
	(-3,236)	(-2,607)	(-0,776)	(0,676)	(0,162)	(0,472)	(-1,187)	(-1,324)	(0,405)
Economic Variable lag 1		-0,312 ***	-0,3071 ***	-0,3193 ***	-0,3198 ***	-0,3072 ***	-0,3347 ***	-0,3107 ***	-0,3201 ***
		(-3,257)	(-3,062)	(-3,222)	(-3,221)	(-2,991)	(-3,367)	(-3,151)	(-3,227)
Constant	0,0038 **	0,0231 ***	0,004 **	0,0036 **	0,0038 **	0	0,0042 **	0,0042 **	0,0037 **
	(2,235)	(3,039)	(2,353)	(2,118)	(2,235)	-	(2,471)	(2,471)	(2,176)
Observations	92	91	91	91	91	91	91	91	91
R-squared	10,22%	16,47%	10,82%	10,67%	10,24%	10,44%	11,59%	11,92%	10,37%

Table 17- **Regression Results for Model 4 (Autoregressive Specification) for Regional indices in C, X and I**

This table presents results from autoregressive regressions assessing the impact of various global and regional uncertainty indices on key macroeconomic variables: Consumption (C), Imports (I), and Exports (X). Each regression includes the first lag of the dependent variable to account for intrinsic persistence, enabling identification of the independent explanatory power of the uncertainty measures. Columns report coefficient estimates and t-statistics (in parentheses) for each uncertainty index: Regional COVOL, EEPU, RGPR, WUIE, and their respective first lags, along with the corresponding constant term. R-squared values indicate model fit. Asterisks denote statistical significance at the 10% (), 5% (), and 1% () levels.

C	**C L1**	**RCOVOL**	**EEPU**	**RGPR**	**WUIE**	**RCOVOL L1**	**EEPU L1**	**RGPR L1**	**WUIE L1**
Index	-0,3119 ***	-0,0467 *	-0,0112	0,0026	0,0008	0,0177	-0,0159	-0,0061	0,0033
	(-3,147)	(-1,954)	(-0,742)	(0,377)	(0,107)	(0,714)	(-1,060)	(-0,884)	(0,440)
Economic Variable lag 1		-0,2921 ***	-0,3024 ***	-0,3134 ***	-0,3121 ***	-0,2958 ***	-0,324 ***	-0,3098 ***	-0,312 ***
		(-2,978)	(-3,018)	(-3,147)	(-3,134)	(-2,903)	(-3,250)	(-3,123)	(-3,136)
Constant	0,0043	0,0337 **	0,0047	0,004	0,0042	-0,007	0,005	0,0048	0,004
	(1,303)	(2,188)	(1,382)	(1,176)	(1,235)	(-0,435)	(1,471)	(1,412)	(1,176)
Observations	92	91	91	91	91	91	91	91	91
R-squared	9,72%	13,35%	10,26%	9,86%	9,73%	10,23%	10,82%	10,49%	9,91%

X	**X L1**	**RCOVOL**	**EEPU**	**RGPR**	**WUIE**	**RCOVOL L1**	**EEPU L1**	**RGPR L1**	**WUIE L1**
Index	0,0002	-0,0475 **	-0,0118	0,0058	0,0008	0,0211	-0,0303 **	-0,0109	0,0064
	(0,002)	(-2,047)	(-0,803)	(0,866)	(0,110)	(0,879)	(-2,119)	(-1,627)	(0,877)
Economic Variable lag 1		0,016	0,0096	0,0042	-0,0002	0,0191	-0,0179	0,0155	-0,0003
		(0,156)	(0,092)	(0,040)	(-0,002)	(0,180)	(-0,175)	(0,150)	(-0,003)
Constant	0,0087 **	0,0386 **	0,0091 ***	0,0081 **	0,0086 **	-0,0048	0,0101 ***	0,0095 ***	0,0081 **
	(2,559)	(2,573)	(2,676)	(2,382)	(2,457)	(-0,304)	(2,971)	(2,794)	(2,382)
Observations	92	91	91	91	91	91	91	91	91
R-squared	0,00%	4,41%	0,71%	0,82%	0,01%	0,84%	4,68%	2,87%	0,85%

I	**I L1**	**RCOVOL**	**EEPU**	**RGPR**	**WUIE**	**RCOVOL L1**	**EEPU L1**	**RGPR L1**	**WUIE L1**
Index lag 1	-0,0594	-0,0565 **	-0,0085	0,0056	0,0007	0,0251	-0,0289 **	-0,0098	0,01
	(-0,573)	(-2,384)	(-0,559)	(0,812)	(0,093)	(1,012)	(-1,966)	(-1,420)	
Economic Variable lag 1		-0,03	-0,0494	-0,0618	-0,0597	-0,0333	-0,073	-0,0472	-0,0595
		(-0,294)	(-0,468)	(-0,594)	(-0,572)	(-0,312)	(-0,713)	(-0,456)	(-0,576)
Constant	0,0086 **	0,0442 ***	0,0089 **	0,0081 **	0,0086 **	-0,0075	0,0099 ***	0,0094 ***	0,0078 **
	(2,529)	(2,908)	(2,543)	(2,314)	(2,457)	(-0,460)	(2,912)	(2,686)	(2,229)
Observations	92	91	91	91	91	91	91	91	91
R-squared	0,36%	6,24%	0,70%	1,07%	0,36%	1,47%	4,42%	2,54%	2,30%