EINAUIDI INSTITUTE OF ECONOMICS AND FINANCE-LUISS

RoME Master Thesis

The joint impact of policy uncertainty and demand uncertainty on firms' investment decisions and the channels the transmissions: evidence from Italian firms

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Abstract

The existing empirical literature on the relationship between uncertainty and investment predominantly focuses on individual types of uncertainty, neglecting the interplay between different sources of uncertainty. This study aims to bridge this gap by examining how economic policy uncertainty (macro-uncertainty) and demand uncertainty (micro-uncertainty) interact and jointly affect the investment decisions of a sample of Italian manufacturing firms. Using a newspaper-based measure of economic policy uncertainty and a constructed measure of demand uncertainty based on managers' expectations of future sales, the study finds that economic policy uncertainty interacted with firm-level uncertainty depresses firms' investments. By disaggregating economic policy uncertainty into its constituent components, the findings elucidate that the interplay between economic policy uncertainty and demand uncertainty primarily operates through fiscal policy channels. Additionally, this study uncovers significant heterogeneity in the relationship between uncertainty and investment: the negative effect of the interplay of aggregate and firm-level uncertainty is more pronounced for firms that are highly exposed to government, employ less flexible labor input, and have smaller size.

1 Introduction

Does economic policy uncertainty streghten the impact of firm-level uncertainty on firm investment decisions? This question is of significant importance for policymakers since during periods of economic crisis when demand uncertainty upsurges, such as the Great Recession (2008-2014), the sovereign debt crisis (2010-2012), the Ukraine war and the Coronavirus Pandemic, inter alia, there is a concern that policy uncertainty could dampen economic activity, exacerbating the effect of the crisis. This thesis addresses the above posed question by focusing on Italy, a European country with substantial political uncertainty stemming from both Eurozone upheavals and frequent changes in Prime Minister leadership.

There are two compelling aspects that make Italy particularly intriguing in the context of this study. First, Italy stands out among European countries with the highest number of Prime Ministers. Given that elections introduce significant uncertainty, examining how Economic Policy Uncertainty (referred to as EPU) interacts with firm-level uncertainty to impact investments can provide valuable insights into whether Italian firms are exposed to an "electoral business cycle" (Baker et al., 2020).

Second, Italy has consistently pursued policy reforms aimed at fostering competition, promoting labor flexibility, and stimulating innovation over the past decade. These reform efforts may have positively influenced firms' expectations regarding future economic conditions. Additionally, as an economically developed country, Italy is expected to implement policies that stabilize the economy, foster growth, and mitigate factors that hinder investments. Consequently, an increase in government policy uncertainty may not necessarily lead to a decline in firms' investment activities. Thus, an increase in government policy uncertainty may not necessarily result in a decline in firms' investments, as evidenced by Ghoboui (2021) who suggests that heightened policy uncertainty accompanied by positive fiscal policy shocks can increase private investments[1]. These unique characteristics of Italy underscore the need for a comprehensive investigation into the interplay between EPU and firm-level uncertainty, and its impact on investment decisions.

The existing literature has mainly focused on separate impact of EPU and demand uncertainty on investments, overlooking the possibility of their simultaneous effects, which can reinforce or offset each other. To address this limitation, the paper contributes to the literature by analyzing the interplay between micro-level uncertainty (demand uncertainty) and macro-level uncertainty (economic policy uncertainty) on Italian small and medium-sized enterprises (SMEs). Notably, this is the first analysis of the interplay between demand and policy uncertainty on investment decisions

[1]See "Uncertainty and Public Investment Multipliers: The Role of Economic Confidence" by William Gbohoui (2021), *International monetary fund* working papers.

specifically for Italian firms, which are mainly SMEs. To date there, the only evidence of the interplay of these two types of uncertainty is provided, for US listed companies, by Kang et al.(2014), who show that policy uncertainty in interaction with firm-level uncertainty depresses firms' investment decisions and the effect is stronger for smaller firms.

The paper employs various news-based indices to examine the individual components of EPU and their specific effects when interacted with demand uncertainty. It highlights that uncertainty measures capturing different types of uncertainty, both micro and macro, are necessary to comprehensively explore the uncertainty-investment relationship.

Theoretical literature suggests that, under irreversibility, higher level of uncertainty could lead firms to adopt a "wait-and-see" strategy (Bernanke, 1983; Bachmann et al.,2013).The intuition is that, when decisions cannot be easily reversed and firms are not racing to launch new products, there is an option value in waiting until more is known which is extinguished when the investment is undertaken. Empirical studies support the belief that rise in uncertainty would reduce the effective- ness of economy policy because it makes firms more cautions in responding to price changes (Bloom, 2013; Gulen and Ion,2014; Bloom et al., 2018). Nonetheless, beside the (even partial) irreversibility of investment projects, other motives such as managerial risk aversion (Panousi and Papanikolaou,2012), precautionary spending behavior (Gilchrist et al., 2010), and higher cost of finance (Pastor and Veronesi, 2012) during periods of high uncertainty have been identified as potential drivers of the negative impact. Building on these insights, this study seeks to enhance understanding of the intertwined effects of fiscal policy uncertainty and demand uncertainty on firms' investment decisions.

The results obtained can be summarized as follows. First, in line with irreversible investment models and previous empirical research on Italian firms, it is observed that the demand threshold that triggers investment rises with uncertainty (indirect effect). Furthermore, a novel finding for Italian firms, is that demand uncertainty has also a direct effect (not passing through the demand dampening effect) on investment decisions. Second, the negative impact of demand uncertainty is amplified by EPU. Indeed, the importance of considering uncertainty related to broader economic conditions and policies as factors influencing firms' investments has been emphasized by Baker et al. (2013) and Alfaro et al. (2021). However, this analysis goes beyond previous studies by providing evidence that policy uncertainty, in conjunction with idiosyncratic uncertainty, significantly impacts investment decisions.

The study attempts to shed light on the mechanisms through which uncertainty influences firms' investment decisions. It reveals that the interplay between demand uncertainty and EPU primarily operates through a fiscal policy channel, suggesting that government policies related to fiscal matters play a significant role in influencing the impact of uncertainty on investment. After acknowledging which sources of

EPU have a more significant negative impact on firms' investments, this study pays attention to the way the negative effect manifests itself differently across firms. It acknowledges that the influence of EPU on investment decisions can vary based on firm-level characteristics and contextual factors. Exposure to government, degree of labor flexibility, and firm size, degree of act as crucial moderators, shaping the strength and direction of the uncertainty-investment relationship for different firms.

The paper has the following structure: Section II provides a brief summary of the theoretical background and existing empirical evidence. Section III presents the data set and the two measures of uncertainty, along with supporting evidence for the sentiment-based EPU measure. Section IV outlines the empirical methodology and specification of the baseline equation. Section V presents the results of the baseline equation, demonstrating that the effect of economic policy uncertainty on firm-level investment is stronger for firms with higher demand uncertainty. Section VI explores possible channels through which the interplay of EPU and demand uncertainty influences firms' investments. Section VII presents a robustness check of the results and, finally, Section VIII concludes.

2 State of the literature

The subject of economic uncertainty has a long tradition in economics, and, on the heels of the theoretical contributions of Hartman(1972), Bernanke (1983) and Caballero(1991), theoretical and empirical contributions have improved our understanding of its nature and economic consequences.

This research project intersects two bodies of literature: one pertaining to the impact of firm-level uncertainty and the other relating to the effects of economic policy uncertainty on growth and investment. An overview of the theoretical framework and empirical findings in both areas is presented below.

Theoretical Framework

Early contributions highlighted that uncertainty can increase the value of capital and lead to more capital accumulation. Assuming competitive firms with constant returns to scale and convex adjustment costs, greater uncertainty has a positive effect on firms' investments (Hartman, 1972; Abel,1983). The assumption of constant returns to scale implies a profit function convex in prices, which, by Jensen's inequality, results in higher investments with increased uncertainty[2].

A significant body of theoretical literature on uncertainty focuses on the "perpetual call option" value of investment plans (Bernanke,1983; Schwartz 1985). This perspective suggests that firms view investment decisions as a series of options, and

[2]Empirical evidence of this affirmation is provided by Abel and Blanchard (1986)

the value of delaying an investment is higher when uncertainty is also high. The "real option effect" emphasize the importance of investment reversibility, as delaying investment becomes more valuable when investment decisions are not easily reversible.

Notwithstanding that asymmetry in adjustment costs is a key ingredient in determining the sign of the investment-uncertainty relationship, other and more subtle assumptions have been shown to be equally important. For instance, Caballero(1991) highligths the importance of the interplay between irreversibility and the structure of the product market in shaping the uncertainty-investment relationship: under perfect competition and constant returns to scale, the Hartmann-Abel approach may prevail, resulting in a non-negative relationship between investment and uncertainty but, as firms become less competitive, the link weakens because the marginal profitability of capital depends on the level of capital through the product demand function. The idea is that under perfect competition current investment thus has no effect on the future profitability of the firm since the marginal revenue product of capital does not depend on the capital stock. However, as the firm becomes less competitive, the marginal profitability of capital will depend on the level of capital via product demand function and given irreversibility.

Another important contribution is given by Lee and Shin (2000), who demonstrate that labor variability can counteract the negative impact of irreversibility on investment. Variability of labour tends to 'convexify' the firm profit function so that uncertainty may raise investment. In other words, the 'convexity effect' occurs when labor flexibility compensates for the irreversibility of capital, leading to increased investment in the presence of uncertainty.Variability of on purely theoretical grounds since it is complex and context-dependent, requiring detailed empirical analysis to understand its nuances.

Even from this very concise overview of the literature it is clear that the relationship cannot be settled on purely theoretical grounds since it is complex and context-dependent, requiring detailed empirical analysis to understand its nuances.

Empirical Evidence A general result of the empirical literature is that the effect of uncertainty on investment decisions is negative and significant

In the context of Italy, Guiso and Parigi (1999) find evidence that uncertainty negatively impacts investment, and this effect is stronger for firms with limited investment reversibility and substantial market power. Unlike the cross-sectional analysis of Guiso and Parigi (1999), this study employs a panel of firms, addressing potential selection biases and provides insights into the dynamic relationship between firm-level and aggregate policy uncertainty, and investment decisions during turbulent years.

The hypothesis put forth by Lee and Shin (2000) regarding labor flexibility is empirically validated by Bontempi et al. (2007), who find that the relationship between uncertainty and investment weakens when firms have more flexible labor

inputs. Moreover, Bontempi et al. demonstrate that the negative relationship between uncertainty and investment became less pronounced during the period 1996-2004, suggesting that increased competition influenced investment decisions in Italian manufacturing firms.

A number of studies have highlighted the detrimental effects of policy uncertainty on the economy, specifically in relation to monetary, fiscal, and regulatory policies. Conway (1988), Rodrik (1991), and Hassett and Metcalf (1999) are among the early contributors to this literature, shedding light on the negative impact of policy uncertainty on investment and economic growth. More recently, Fernandez-Villaverde (2011) found that when firms are uncertain about the future policy environment, they may reduce their investment plans due to the increased risks and difficulties in assessing potential returns on investment. Nevertheless, Tajaddini and Gholipour (2020) find positive associations between expenditures, innovation outputs, and economic policy uncertainty in a set of developed and developing countries, contradicting the notion of a negative uncertainty-investment relationship.

Bloom (2013) develops a more comprehensive measure of economic policy uncertainty, which encompasses fiscal, regulatory, monetary and trade policies by firms, and shows that EPU leads to a reduction in investments and the effect is stronger in policy-sensitive sectors (healthcare, finance etc.). The EPU index developed by Baker, Bloom and Davis (2013) is constructed by quantifying the frequency and types of 'uncertainty-inducing' and 'economic' words printed over time. Assuming that the public consults newspapers for political and fiscal issues, then news itself becomes an indicator to assess uncertainty.

Gulen and Ion (2016), using the EPU index developed by Baker et al. (2013), also demonstrate a strong negative relationship between firm-level capital investment and uncertainty associated with future policies. This effect is more pronounced for firms with higher investment irreversibility and those heavily reliant on government spending.

To summarize, this very concise literature review points out two main findings regarding the uncertainty-investment relationship: a) the empirical evidence suggests a negative relationship, although the theoretical understanding remains ambiguous and depends on the interplay of different factors, and b) previous research has predominantly examined demand uncertainty and policy uncertainty as separate factors, without fully exploring their interaction and combined impact on firm investment decisions. Against this backdrop, this study aims to provide new evidence on the uncertainty-investment relationship by considering the combined influence of subjective and idiosyncratic uncertainty (demand uncertainty) and uncertainty common to all firms (economic policy uncertainty) on firms' investment decisions.

3 Data and descriptive statistics

The INVIND Survey conducted by the Bank of Italy serves as the main data source for this research. It is an annual survey that captures information from a representative sample of firms operating in industrial sectors such as manufacturing, energy, and extractive industries, as well as non-financial private services, with administrative headquarters in Italy. The survey collects a wide range of data on firm characteristics, including the year of foundation, industry sector, ownership structure, and other unique information in the context of this study[3]. The latter encompass investment and employment plans, sales, including those to the Government and those in the form of exports, access to the credit market and expected demand one year ahead. The information on expected demand is crucial for constructing the demand-uncertainty measure

To measure EPU and, its subtopic, This study emplys the EPU index developed by Aprigliano et al. (2021) which relies on a news-based methodology similar to the index developed by Baker et al. (2013). The EPU index developed by Baker et al. (2013), for Italy, is not used as the main index since it is not available for subtopics. Nonetheless it is used as a robustness check since methodology allows for comparability in terms of the underlying approach.

This section proceeds by elucidating on the two uncertainty measures used in the analysis.

3.1 Uncertainty measures

Demand uncertainty Measure
Coherently with the existing literature, in this paper demand uncertainty refers to the subjective ex-ante uncertainty that managers have on firms' product demand at constant price. It is idiosyncratic and,in this respect, it is regarded as a firm-level uncertainty.

INVIND survey containes three crucial varibale to construct the demand uncertainty measure, that are managers' maximum (${}_tg^{max}_{i,t+1}$) and minimum (${}_tg^{min}_{i,t+1}$) expected future sales growth. Building on Bontempi and Parigi (2007) and Fiori and Scoccianti (2021), this paper uses the range between the maximum and the minimum growth of sales (${}_tg^{max}_{i,t+1}$ - ${}_tg^{min}_{i,t+1}$) to measure demand uncertainty.

Economic Policy Uncertainty Index
Economic policy uncertainty captures the lack of knowledge about *who* will make economically relevant policy decisions, *what* and *when* policy actions will be undertaken,

[3]See Banca d'Italia, 2005

and their relative economic consequences (Steven J. Davis, 2014).

EPU and its subtopics are measured with monthly indexes, based on the sentiment of the newspapers so that a higher level of articles expressing "uncertainty" indicates a rise in the level of policy uncertainty. Notably, news-based measure of economic policy uncertainty is especially reliable in Italy, inasmuch, Italian firms consider newspapers a relevant and trustworthy source of information [4].

Specifically, the set of Italian newspapers used to construct the EPU index includes *Corriere della Sera*, *La Stampa*, (*Il Sole 24 ore* and *La Repubblica*).

The index is computed as:

$$EPU_t = \frac{\sum_i^N {}_t[EPU\,Article]_i}{N_t}$$

Where Nt is the number of articles published at time t and "EPU Article" refers to any article which contains at least one 'uncertainty-related' word and one 'policy-related' word. Finally, the EPU index is the share of articles satisfying these criteria. A visual inspection of the index, in Figure 1, reveals that hat tone of the newspapers articles gets more negative after bad episodes associated with a slowdown of the economic growth. The index, indeed, spikes during events that are ex ante likely to cause increases in policy uncertainty, such as Global Financial Crisis and elections periods and exhibits considerable time-series variation between those major events.

[4]Survey on Inflation and Growth Expectations conducted by the Bank of Italy (SIGE)

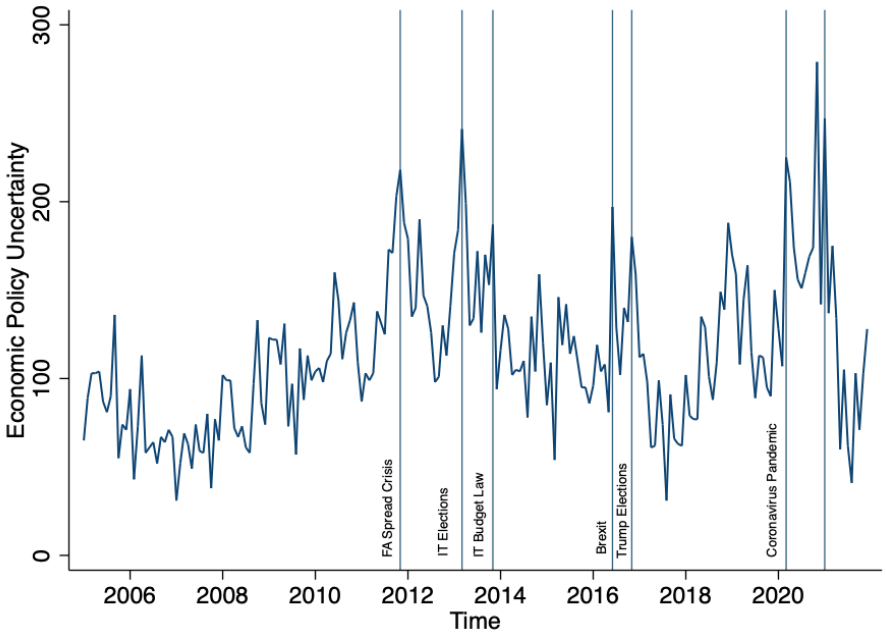


Figure 1: Figure 1:EPU 2006-2021

The subtopic-specific indexes within the broader Economic Policy Uncertainty (EPU) framework are constructed by applying a filtering mechanism to select words that are specifically related to each subtopic, such as 'fiscal' and 'monetary'. This filtering process helps to capture the nuances and variations in uncertainty pertaining to different aspects of economic policy.

In the context of this research project, Section 5 focuses specifically on government policy uncertainty (referred to as UGP). It is argued that UGP has a more direct impact on firms' investment decisions compared to other subtopics. To illustrate the dynamics of UGP, Figure 2 provides a visual representation of the UGP index.

Upon observing Figure 2, it becomes apparent that the UGP index exhibits significant spikes during periods of contested national elections, such as the Italian elections in 2013, as well as major leadership transitions, such as the year 2016. These spikes indicate heightened levels of uncertainty regarding government policies, and they are of particular interest due to their potential influence on firms' investment decisions.

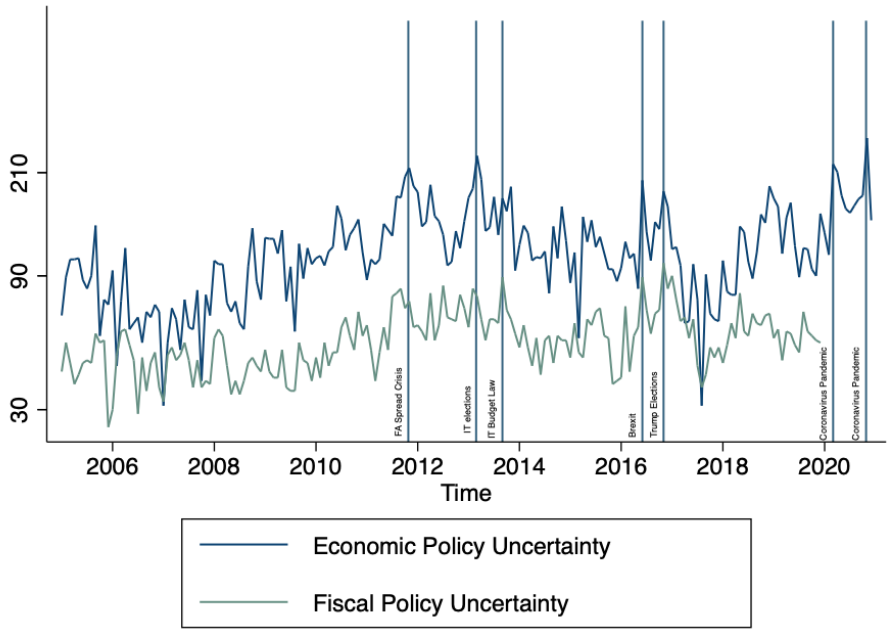


Figure 2: UGP-EPU

3.2 EPU Measure: supporting evidence

A potential concern when using the EPU index, an aggregate measure of uncertainty, is that it may include other aggregate temporal shocks. To address this reliability concern, this subsection provides supporting evidence that EPU is a psychological mechanism correlated with firms' expectations about future economic outcomes.

The relevance of EPU for economic purposes can be tested by examining the Granger causality relationship between EPU and firm confidence, as well as between EPU and GDP. Firm confidence represents a positive sentiment about future economic outcomes, and an index for business confidence is constructed using monthly data from ISTAT, which conducts a national-level survey on business sentiment. The underlying idea of this test is explained as follows.

According to economic theory, shifts in expectations play a significant role in driving economic fluctuations. Studies by Guimaraes et al. (2016) and Barsky and Sims (2012), among others, demonstrate that shocks to economic confidence have positive and persistent effects on output[5]. For instance, during the Great Recession, the prolonged period of low economic activity was largely attributed to the collapse of consumer confidence, which can be understood as a strong belief in positive future

[5]See Benhabib and Farmer (1999) for a review on the effects of expectations on economic fluctuations

economic developments. EPU, on the other hand, captures changes or lack of knowledge about future economic outcomes, making it another psychological mechanism that is measured using *sentiment*.

The idea behind the Granger causality test is that, for the EPU index to be a reliable measure, it should be able to predict firms' confidence. If newspapers truly influence enterprises' sentiments, then the EPU index should Granger-cause, in the sense of Granger (1969), changes in firms' confidence. This is precisely what the results of the Granger causality test (Figure 4) demonstrate: the null hypothesis that EPU does not Granger-cause firms' confidence, three, six, and twenty months ahead, can be rejected. Importantly, the indexes for firms' confidence and EPU are derived from two different data sources and constructed using different methodologies, indicating that their correlation is not driven by their construction process.

To assess the broader relevance of sentiment indicators based on newspaper data for economic purposes, irrespective of their influence on firms' confidence, the causality, in the sense of Granger (1969), between EPU and GDP is examined. Table 2 presents very similar results to Table 1, suggesting that EPU is indeed relevant for macroeconomic fluctuations.

	H_0: EPU does not Granger cause Confidence		H_0: Confidence does not Granger cause EPU	
Standard VAR F-test	Statistics	p-value	Statistic	p-value
3 months lag	8.509	.004	.220	.636
6 months lag	6.890	.009	1.107	.999
12 months lag	3.444	.034	1.453	.236

Table 1: Granger Causality test:EPU-Confidence

	H_0: EPU does not Granger cause GDP		H_0: GDP does not Granger cause EPU	
Standard VAR F-test	Statistics	p-value	Statistic	p-value
3 months lag	3.086	.081	4.268	.605
6 months lag	7.421	.007	.879	.349
12 months lag	13.518	.001	.001	.978

Table 2: Granger Causality test:EPU-GDP

3.3 Descriptive Statistics

This subsection provides an overview of several variables for the sample used in the estimation. The sample is divided into two subsamples: the high uncertainty group and the low uncertainty group, based on whether their demand uncertainty coefficient is above or below the sample mean. Table I reveals that firms with higher demand uncertainty plan lower investment in proportion of the firm size, proxied with the number of employees. This suggests an unconditional negative correlation between uncertainty and investment. Nonetheless, it is important to consider other factors that could directly or indirectly impact investment.

Interestingly, high uncertainty firms, on average, plan less investment despite having lower credit constraints, which are measured by the share of firms that applied for credit but were turned down[6]. This preliminary evidence indicates that uncertainty is not simply a proxy for credit constraints. Additionally, firms in the high uncertainty group tend to have higher expected demand, which may indicate a dampening effect of uncertainty on the expected growth of sales. Furthermore, Table 3 highlights that low uncertainty firms are more likely to be state-owned, and this might indicate a potential role for the government as an economic stabilizer.

To explore the role played by these different factors and test the theoretical predictions, an empirical analysis that accounts for all these factors is necessary. To this the paper now turns.

[6]See Appendix 1

Variables	High Uncertainty	Low Uncertainty	Total selected Sample
Planned Invest./Num. Employees	0.004	0.0371	0.041
Exp.Demand growth	0.01	-0.1	0.00
Dem. Unc.	0.54	-0.30	0.00
North(0,1)	0.44	0.40	0.43
Center(0,1)	0.21	0.26	0.22
South(0,1)	0.34	0.34	0.34
Employees>100(0,1)	0.41	0.47	0.42
Employees<=100(0,1)	0.59	0.53	0.58
Private firms(0,1)	0.85	0.84	0.845
State owned firms(0,1)	0.021	0.045	0.033
Credit rationed firms(0,1)	0.04	0.05	0.04
N	3925	7672	11597

Table 3: Firms with low and high demand uncertainty. Sample Means of Selected Variables

4 Empirical Methodology

The empirical work in the literature builds on the micro-foundations provided by the theoretical work on investment by Abel and Eberly (1996), who show that demand threshold that triggers investment is equal to the user cost of capital, which is defined to properly reflect irreversibility and uncertainty. The model predicts that investment only occurs when a firm's marginal revenue product (m) of capital (k) is above the user cost of capital ($c(u)$) which under irreversibility, depends positively on uncertainty (u). Following Abel and Eberly (1996), let the marginal value product of capital be $m = a(K/y)^{\frac{-1}{\gamma}}$ which is evaluated at the current level of the stock of capital and in correspondence with the level of demand (y); a is a constant and γ a parameter between 0 and 1. Ignoring depreciation and assuming no adjustment costs, if $m > c(u)$ or $K < y(c(u)/a)^{-\gamma}$, then the optimal capital stock is $K^* = y(c(u)/a)^{-\gamma}$ and the corresponding investment is $I = K^* - K > 0$. In case $m \leq c(u)$ or $K \geq y(c(u)/a)^{-\gamma}$, and assuming no depreciation, then $K^* = K$ and $I^* = 0$.

An important feature of this model set-up is that irreversibility of capital generates a negative effect of uncertainty on firms' decision to invest and amount of investment decided.

Testing the second case of the irreversibility theory ($m \leq c(u)$) is extremely complicated and strongly depends on the notion of investment employed. In this paper,

the variable investment embraces different types of investments (capital goods, structures, equipment and so on) and, as a consequence, there are virtually few observations of firms planning 0 investment. The analysis, hence, focuses on the case in which $m > c(u)$.

The effect of the interplay of economic policy uncertainty and demand uncertainty is empirically analyzed using the following empirical specification:

$$\begin{aligned}\log(\frac{I_{i,t+1}}{Size_{i,t}}) = \beta_1 \Delta y_{it} + \beta_2 u({}_t g_{i,t+1}) + \beta_3 u({}_t g_{i,t+1}) * \Delta y_{it} \\ + \beta_4 u({}_t g_{i,t+1}) * UGP_t + \\ + \beta_5 CreditConstr. + \lambda_i + \lambda_t + \epsilon_{i,t+1}\end{aligned} \tag{1}$$

where $I_{i,t+1}$ is investment planned in year t for the following year, $Size_{i,t}$ denotes firm size at time t, proxied with the number of employees; Δy_{it} is the expected sales growth, at constant prices, that firms have at time t for the following year; $u({}_t g_{i,t+1}) =_t g^{max}_{i,t+1}$ - ${}_t g^{min}_{i,t+1}$ denotes the demand uncertainty measure; $CreditConstr$ is a control for credits constraints; λ_i and λ_t are firm and time fixed effects. Fixed effects allow to account for firms unobservable characteristics, potentially affecting the investment-uncertainty relationship, such as enterpreneurs' risk aversion, and for the exposure to collectively significant macroeconomic effects, invariant for all the firms, such as industry-wide shocks and macroeconomic cyclical effects. To account for extreme observations and departures of the residuals from normality, the parameters of standard errors have been always estimated using the robust estimator (White, 1980).

Notice that the coefficient of main interest is β_4, namely the interaction between demand and EPU and that we can test for the role played by EPU only through its interaction with firm-level uncertainty since, the variable EPU alone, in the above equation, would be collinear with time fixed effects. Nonetheless, excluding EPU is not a limitation in this analysis since the objective of the paper is to investigate the joint effect of EPU and demand uncertainty.

A final note before moving on to the results is that the coefficients in the right hand side of the above regression have been standardized with respect to the mean and standard deviation, in order to facilitate the comparison of economic magnitudes across covariates and, hence, each coefficient can be interpreted as the change in percentage terms of investment (as a proportion of each firm size) associated with a one-standard-deviation increase in the independent variables.

5 Results

Table 4 presents the parameter estimates of Equation 1 using separate models: one excluding the interplay of EPU and demand uncertainty (first column), and another model incorporating this interplay(second and third columns).

The results of the first column align with existing research on the effects of demand uncertainty on Italian firms. Expected demand growth has a positive and highly significant impact on investment plans, but this effect is attenuated by an increase in demand uncertainty. Therefore, the direction and significance of the β_3 coefficient, confirms the irreversibility theory, which predicts that demand uncertainty rises the demand threshold triggering investment. A novel finding, as documented in Table 4, is that demand uncertainty has an additional direct effect on investments that is independent of its influence on dampening demand. Specifically, an increase of one standard deviation in demand uncertainty leads to a 0.7% decrease in investment relative to the size of the firm. This represents the first evidence of the direct effect of demand uncertainty on Italian firms.

The main finding of this study emerges in the second column, which introduces the interplay between EPU and demand uncertainty into the basic equation. It reveals that firms' investments are significantly and negatively impacted by the interaction between external aggregate economic policy uncertainty and internal individual firm uncertainty: an increase of one standard deviation in demand uncertainty, when coupled with an increase of one standard deviation in EPU, leads to a decrease of 0.006 in investment relative to firm size. The statistical significance of the β_4 coefficient supports the hypothesis that examining only one type of uncertainty, such as demand or policy uncertainty, and neglecting the potential interplay between different types of uncertainty can result in a limited understanding of the uncertainty-investment relationship.

The third column tests for a non-linear relationship between investment plans and expected demand by adding a coefficient for the squared expected demand growth. This is done to address concerns that the β_2 coefficient, which indicates the dampening effect of demand uncertainty on expected demand growth, may actually be capturing a second-order term in the non-linear relationship between investment plans and expected demand. However column three alleviate this concern by providing evidence that the parameter estimate for the expected demand growth square is not statistically significant. Moreover, the other parameter estimates in the model remain largely unchanged.

One possible objection to the observed negative effect of the interplay between demand and policy uncertainty on investment is that this interplay might serve as a proxy for credit constraints. It is plausible to argue that riskier firms, particularly during periods of higher economic policy uncertainty, may face greater difficulties in

Planned Inv.	(1)	(2)	(3)
Δy_{it}	.053***	.053***	.061***
	(.024)	(.006)	(.006)
$\mathrm{u}({}_t g_{i,t+1})$	-.005*	-.007**	-.007**
	(.002)	(.003)	(.002)
$\mathrm{u}({}_t g_{i,t+1}) * \Delta y_{it}$	-.002*	-.002*	-.008***
	(.001)	(.001)	(.002)
$\mathrm{EPU}_t * u({}_t g_{i,t+1})$		-.006*	-.009*
		(.003)	(.004)
Δy_{it}^2			-.010
			(.009)
Credit Rationed Firms	-.081***	-.105***	-.083***
	(.012)	(.014)	(.012)
Firm FE	yes	yes	yes
Time FE	yes	yes	yes
N	89,124	74,376	74,376
R^2	0.85	0.86	.85

Table 4: Baseline results

accessing credit, which in turn could lead to reduced investment.

However, Table 3 provides suggestive evidence that contradicts this proposition by showing that low-uncertainty firms are actually more likely to experience credit rationing compared to firms in the high uncertainty group. Nevertheless, to further assess the validity of this interpretation, we directly incorporate an indicator for access to credit. Specifically, we include a dummy variable that takes a value of one if firm i was rationed in the credit market at time t (see Appendix 1 for details). By incorporating this credit constraint indicator into the model, we find that all specifications continue to indicate a significant effect of the interplay between demand and economic policy uncertainty on investment, even after accounting for credit constraints. This suggests that the observed interplay effect on investment is independent of credit constraints, strengthening the validity of our findings.

6 Channels of the interplay

This section aims to provide a deeper understanding of the economic mechanisms that underlie the impact of the interplay between demand uncertainty and economic policy uncertainty (EPU) on firms' investment choices. To achieve this, the section takes two main steps.

First, it disaggregates the broad measure of EPU into its individual components, allowing for a more nuanced analysis of which specific aspects of EPU interact with demand uncertainty to have a more significant influence on firms' investment decisions. By examining these individual components, we can gain insights into the specific factors that contribute to the observed effects outlined in Table 4.

Second, the study exploits the cross-section heterogeneity of firms present in the sample to uncover the varying effects of uncertainty on investment decisions based on different firm characteristics. By considering factors, such as their exposure to government, the flexibility of labor as a variable input, and firm size, the study explores how they moderate the impact of uncertainty on investment outcomes.

6.1 Decomposing EPU

The noteworthy relationship observed between the interplay of EPU and demand uncertainty calls for additional investigation into the specific subtopics that contribute to the negative relationship between the interplay of demand uncertainty and EPU, and investment. TTo address this, Table 5 presents the reinforcing effect of policy uncertainty, particularly focusing on monetary, fiscal, domestic, and foreign policies, when interacted with demand uncertainty[7].

The findings suggest that firms are less inclined to make investments when their idiosyncratic uncertainty is coupled with high levels of monetary, fiscal, foreign, or domestic policy uncertainty. However, the effect is particularly pronounced when fiscal policy uncertainty is considered. This can be intuitively explained by the broader and more pervasive impact of uncertainty regarding fiscal policy on the business environment.

Uncertainty surrounding fiscal policy raises concerns about long-term government commitments, stability of regulations, and overall economic policy direction. These uncertainties increase the option value of waiting until more information becomes available before making investment decisions. Moreover, fiscal policy uncertainty has a more direct and immediate effect compared to other subtopics of EPU, such as monetary and foreign policy uncertainty, on domestic demand and consumer confidence since fluctuations in government spending and taxation policies can influence

[7]Table 5 reports the results only for the subtopics of EPU that have a significant impact, when interacted with demand uncertainty, on firms' investments

Planned Inv.	EPU	Monetary PU	Fiscal PU	Domestic PU	Fiscal PU
Δy_{it}	.053**	.052***	.063***	.051***	.052***
	(.024)	(.006)	(.006)	(.005)	(.006)
$\mathrm{u}({}_t g_{i,t+1})$	-.007**	-.018***	.001	-.010***	-.010***
	(.011)	(.004)	(.002)	(.003)	(.003)
$\mathrm{u}({}_t g_{i,t+1}) * \Delta y_{it}$	-.002*	.004***	-.009***	.004***	.004**
	(.001)	(.001)	(.002)	(.001)	(.002)
$EPU_t * u({}_t g_{i,t+1})$	-.006*	-.019***	-.022***	-.022***	-.020***
	(.003)	(.003)	(.007)	(.004)	(.004)
Credit Rationed Firms	-.104***	-.079***	-.104***	-.079***	-.079***
	(.014)	(.012)	(.014)	(.012)	(.012)
FIRM FE	yes	yes	yes	yes	yes
TIME FE	yes	yes	yes	yes	yes
N	89,124	74,376	74,376	74,376	
R^2	0.85	0.85	0.86	0.85	.85

Table 5: EPU Channels

disposable income and consumer spending patterns, which in turn can impact firms' investment decisions.

These findings align with previous research by Fernandez-Villaverde et al. (2015), who demonstrate that plausible shocks to fiscal volatility can have a substantial adverse effect on economic activity, comparable to the effects of a 25-basis-point innovation in the federal funds rate. More recent research by Bloom et al. (2013) using the same methodology also provides evidence that fiscal policy uncertainty is the largest source of policy uncertainty, particularly in the last decade.

Empirical evidence reveals that fiscal policy uncertainty is a persistent factor not only in Italy but also in many countries worldwide. However, Italy, in particular, stands out due to its history of political instability, which has generated even greater uncertainty. From 1946 to 2022, there have been 68 government mandates in Italy, significantly exceeding the expected 15 mandates that should have alternated normally. This indicates a high degree of political instability throughout Italian history, with the average duration of a government being only 23% of the normal duration of five years and, clearly, denotes strong political instability throughout Italian history.

In summary, the analysis highlights the specific subtopics of EPU that interact with demand uncertainty to influence investment decisions and demonstrates that fiscal policy uncertainty, in particular, has a significant impact on firms' investment choices, reflecting its broader effects on the business environment.

6.2 Firms' cross-sectional heterogeneity

The investigation now turns to examine whether there is heterogeneity in the effects of uncertainty on investment across firms in order to shed light on the mechanisms through which micro-level and macro-level uncertainty propagate in the economy. Specifically, the firms are divided into sub-samples based on their exposure to government, labor flexibility, and size.

The first source of cross-sectional heterogeneity explored is firms' exposure to government, which is proxied by their government spending and export share. The hypothesis tested is as follows:

Hypothesis 1: Holding everything else constant, if policy uncertainty has a reinforcing negative effect in the presence of demand uncertainty, it is expected to have a more pronounced impact on firms with a higher exposure to government.

The rationale behind this hypothesis is that firms that rely more on the government for their sales or have a higher proportion of domestic market sales are more vulnerable to fluctuations in government policy uncertainty. Table 6 and Table 7 present the results of firms' investments based on their median export share and direct sales to the government.

Table 6 shows that investments of firms that have a higher share of sales to the government are more significantly affected by fiscal policy uncertainty compared to firms with a lower share of sales to the government, which confirms the intuition presented earlier.

As an alternative measure of government exposure, Table 7 examines the impact of the interaction between EPU and demand uncertainty for firms with varying levels of export shares. The results indicate that firms with lower import dependence are more sensitive to the interplay of EPU and demand uncertainty. Another contributing factor to the lower impact of the interplay of demand and policy uncertainty on firms that export more is that such firms tend to be more competitive, productive, and less likely to face financial constraints compared to firms with lower export shares (Correa-López and Doménech, 2012). These characteristics may help mitigate the negative effects of uncertainty on firms' investments.

Moving on to Hypothesis 2, the study examines the relationship between the interplay of EPU and demand uncertainty and labor flexibility. The hypothesis tested is the following:

Table 6: Firms' exposure to government: sales to government

Variables	Baseline	Low Sales to gov.	High Sales to gov.
$\text{UGP}_t * u({}_t g_{i,t+1})$	-.022**	.020	-.090***
	(.007)	(.015)	(.022)
Controls	yes	yes	yes
Firm FE	yes	yes	yes
Time FE	yes	yes	yes
N obs.	74,376	36,900	37,476
R^2	0.86	.90	.90

Table 7: Firms' exposure to government: export share

Variables	Baseline	Low Export Share	High Export Share
$UGP_t * u({}_t g_{i,t+1})$	-.022**	-.026***	.051
	(.007)	(.013)	(.040)
Controls	yes	yes	yes
Time FE	yes	yes	yes
Firm FE	yes	yes	yes
N obs.	74,376	34,440	39,936
R^2	0.86	.90	.83

Hypothesis 2: Holding everything else constant, the depressing effect of EPU-demand uncertainty interplay is weaker(stronger) for companies with a higher (lower) labour flexibility.

The intuition behind Hypothesis 2 comes from the work of Lee and Shin (2000), who show that more can be understood about the investment-uncertainty relationship by explicitly considering the flexibility of the labour input. Building on Eberly and Van Mieghen (1997), who show that when a production factor is more flexible it is more exploited than other more rigid inputs so that its share increases, Lee and Shin (2000) analyze the effects of higher labour flexibility by looking at the impact of an increase in the labour share and demonstrate that the variable labour input tends to convexify the profit function. Hence , taking into account the role of labour input allows to test which effect, the 'convexity effect' and the 'option-value effect', is predominant.

In order to empirically test the implications of Lee and Shin's analysis in the context of this study, information from the INVIND survey is used. The survey collects

data on several features of the labour input employed by the sampled companies. Specifically, firms are asked to provide information on the number of workers hired and fired throughout the year, as well as the total number of employees during the year. Using these data points, a measure of worker turnover can be constructed as the sum of the number of workers hired and fired divided by the total stock of employment in the given year. Table 8 presents the estimates of the baseline equation for firms with higher and lower than median labor turnover. The results support Hypothesis 2, indicating that firms with higher labor turnover are not significantly impacted by the interplay of demand and policy uncertainty in their investment decisions.

Table 8: Firms' Labour Flexibility

Variables	Baseline	Low Flexibility	High Flexibility
$\text{UGP}_t * u({}_t g_{i,t+1})$	-.022***	-.026***	-.022
	(.007)	(.015)	(.019)
Controls	yes	yes	yes
Time FE	yes	yes	yes
Firm FE	yes	yes	yes
N obs.	74,376	36,900	37,476
R^2	0.864	.90	.90

Lastly, Hypothesis 3 focuses on the impact of uncertainty on investment across different firm sizes. The hypothesis tested is the following:

Hypothesis 3: Holding everything else constant, larger businesses, which, on average, tend to have higher political influence and to be less susceptible to financial constraints due to information asymmetry issues, are less affected by uncertainty

One of the primary benefits of utilizing firm-level data is the ability to investigate the potential variations in the impact of uncertainty on investment across different firm sizes. The observed relationship between EPU and demand uncertainty in suppressing firms' investment may be attributed to undisclosed o undisclosed risk factors specific to individual firms, including information asymmetries associated with firm sizes (Kumar et al., 1999) and political connections (Faccio, 2005).

On one hand, smaller firms, being more susceptible to financial constraints due to information asymmetry issues, may experience a more severe negative impact from

Table 9: Firms' Size

Variables	Baseline	Small Firms	Large Firms
$UGP_t * u({}_t g_{i,t+1})$	-.022***	-.019***	-.005
	(.007)	(.010)	(.010)
Controls	yes	yes	yes
Time FE	yes	yes	yes
Firm FE	yes	yes	yes
N obs.	74,376	42,300	28,956
R^2	0.864	.84	.90

the interplay of demand and policy uncertainty. This implies that smaller firms are disproportionately affected by uncertainty compared to larger firms, even when considering the impact of demand uncertainty alone on their investment decisions. Moreover, smaller firms generally have lower political influence, rendering them more vulnerable to fluctuations in government policy uncertainty. In contrast, larger firms possess a buffer against the negative effects of uncertainty due to their stronger political connections and greater resources (Chong and Gradstein, 2010; Faccio, 2006). This alternative explanation necessitates including policy uncertainty in the analysis of firms' investment decisions.

On the other hand, it is plausible that political connections serve as a proxy for firms' exposure. In this case, similar to hypothesis 1, larger firms would be more impacted by the interplay of demand and policy uncertainty. This is because, for a given level of demand uncertainty, an increase in policy uncertainty would have a more pronounced depressive effect on investments made by larger firms. Furthermore, larger firms might be more susceptible to uncertainty due to their reliance on external funding sources for investment projects, even though they are less likely to face financial constraints stemming from information asymmetry problems.

The estimates of the parameters presented in Table 9 demonstrate a significant and negative impact of the interplay between EPU and demand uncertainty on smaller firms, thus providing support for hypothesis 3. However, it is important to note that this result does not necessarily imply that political connections solely serve as a proxy for political influence rather than exposure to government. An alternative explanation could be that information asymmetry issues are intensified during periods of high uncertainty, disproportionately affecting smaller firms and leading to more pronounced effects on their investment decisions.

7 Robustness Check

Alternative EPU measure: BBD-EPU index

The estimates presented thus far have utilized the EPU measure and its subtopics developed by Aprigliano et al. (2021). As mentioned in Section 2, this index is derived from newspaper sentiment, following a similar methodology employed by Baker et al. (2013). However, there are some differences, such as a larger set of newspapers being considered and a broader filtering process to select articles specifically related to economics[8].

To assess the robustness of the results, I examine the use of an alternative measure of EPU, namely the newspaper-sentiment index developed by Baker et al. (2013) known as BBD-EPU. In column (3) of Table 10, the analysis is conducted using the BBD-EPU index. The coefficient of the interaction between demand uncertainty and EPU is observed to be smaller when employing the BBD-EPU index. Column 3 also provides evidence that the interaction between demand uncertainty and expected growth rate of sales is not statistically significant and the other parameter estimates are smaller when the BBD-EPU index is employed. Nonetheless, despite these variations, the main findings regarding the impact of the interplay between demand uncertainty and EPU on firms' investments remain unchanged.

Sectors-size-location fixed effects

To further check the robustness of the results, I incorporate sectors-size-location fixed effects as a combined control instead of firm fixed effects employed in the primary analysis.

Incorporating these combined fixed effects,allows to account for confounding factors that may arise from sector-level dynamics, differences in firm size, and regional influences on investment decisions.

Table 11 presents compelling evidence that the interplay of demand and EPU significantly depresses firms' investments even after accounting for sector-specific dynamics, variations in firm size, and geographic location rather than firm specific unobservable factors.This indicates that our findings are not sensitive to potential confounding factors and reinforce the reliability of the results.

[8]Specifically, the set of newspapers in Aprigliano et al.(2021) includes *Il Corriere della Sera, Il Sole 24 Ore, La Repubblica* and *La Stampa* whereas the one in Baker et al. (2013) includes *La Stampa* and *Il Corriere della sera*

Planned Inv.	(1)	(2)	(3)
Δy_{it}	.053***	.053***	.052***
	(.024)	(.006)	(.006)
$\mathrm{u}({}_t g_{i,t+1})$	-.005*	-.007**	-.005**
	(.002)	(.003)	(.002)
$u({}_t g_{i,t+1}) * \Delta y_{it}$	-.002*	-.002*	-.001
	(.001)	(.001)	(.001)
$\mathrm{EPU}_t * u({}_t g_{i,t+1})$		-.006*	-.002*
		(.003)	(.001)
Credit Rationed Firms	-.081***	-.105***	-.103***
	(.012)	(.014)	(.014)
FIRM FE	yes	yes	yes
TIME FE	yes	yes	yes
N	89,124	74,376	74,376
R^2	0.85	0.86	0.86

Table 10: Robustness Check: BBD-EPU index

Planned Inv.	(1)	(2)	(3)
Δy_{it}	.128***	.049***	.050**
	(.008)	(.006)	(.023)
$\mathrm{u}({}_t g_{i,t+1})$	-.018**	.048**	-.045**
	(.007)	(.006)	(.020)
$u({}_t g_{i,t+1}) * \Delta y_{it}$	-.007***	-.002*	-.002*
	(.002)	(.001)	
$\mathrm{EPU}_t * u({}_t g_{i,t+1})$		-.146***	-.078**
		(.008)	(.001)
Credit Rationed Firms	-.33***	-.27***	-.078
	(.014)	(.016)	(.047)
S-S-L FE	yes	yes	yes
TIME FE	yes	yes	yes
N	89,124	74,376	74,376
R^2	0.18	0.17	0.17

Table 11: Robustness Check: sectors-size-location fixed effects

8 Conclusions

At least since Keynes, it has been widely acknowledged that uncertainty plays a pivotal role in shaping investment choices. Consistent with the theory that predicts a negative relationship between investment and uncertainty, which is primarily driven by the irreversibility of investments, market power, and limited labor flexibility, empirical studies have indicated a depressive impact of demand uncertainty on firms' investments. However, existing evidence on the negative relationship between uncertainty and investment is mostly based on separate types of uncertainty, with limited consideration of the interplay between different sources of uncertainty.

This study bridges this gap by examining the impact of the interplay between demand uncertainty and economic policy uncertainty (EPU) on firms' investments. To capture the overall level of policy uncertainty and its components, we employ a newspaper sentiment-based index developed by Aprigliano et al. (2021), providing supporting evidence on the reliability of the index. Our findings demonstrate that firms facing higher idiosyncratic uncertainty tend to reduce their investments during periods of high economic policy uncertainty. This result aligns with the study by Kang et al. (2014) whho analyzes the impact of the interplay between demand uncertainty and EPU on US listed companies.

Notably, the analysis carried in this paper is based on a sample of Italian which are mainly small and medium Italian enterprises and for which there is, hence, much less information available.

The main finding of this thesis is that, other things being equal, firms with higher idiosyncratic uncertainty reduce their investments during periods of high economic policy uncertainty. This result is, hence, in line with Kang et al.(2014).

The depressing effect of the interplay of demand and EPU uncertainty on firm investments remains robust, even when using an alternative index of economic policy uncertainty and accounting for unobservable time-invariant factors at the sector-region-size level, rather than the firm level.

Furthermore, this study sheds light on the economic mechanisms through which EPU, in interaction with firm-level uncertainty, affects firms. Specifically, the interaction between EPU and firm-level uncertainty operates primarily through a fiscal policy channel, indicating that government instabilities, frequent elections, and uncertainty regarding future fiscal reforms can adversely impact firms' investment decisions by exacerbating the negative effect of firm-level uncertainty.

Our estimates also reveal significant heterogeneity in the effects of fiscal policy uncertainty and demand uncertainty when firms are categorized based on their exposure to government, labor flexibility, and size. Firms that are more vulnerable to government fluctuations, as evidenced by higher sales to government or lower import share, as well as firms with limited labor flexibility and smaller firms, experience a

substantially stronger negative influence of fiscal policy uncertainty interacting with demand uncertainty on their investment decisions.

These findings have two main implications. First, they suggest that ambiguity in communicating policy decisions even if can protect policymakers' credibility in case their decisions prove to be incorrect ex-post, it can also be detrimental, similar to making the wrong decision. Therefore, increasing transparency and adopting more rule-based public policies could help mitigate the negative effects of policy uncertainty interacting with demand uncertainty on firms' investments. Second, this study underscores the significance of taking into account firm-specific characteristics, such as reliance on government spending, flexibility of production factors, and size, when assessing the potential impact of policy-related uncertainty on corporations. It is crucial to recognize that when uncertainty increases, different firms will be affected to varying degrees, depending on their unique features and contexts.

9 Summary

Does economic policy uncertainty streghten the impact of firm-level uncertainty on firm investment decisions? This question is of significant importance for policymakers since during periods of economic crisis when demand uncertainty upsurges there is a concern that policy uncertainty could dampen economic activity, exacerbating the effect of the crisis. This thesis addresses the above posed question targeting Italy, a European country with substantial political uncertainty stemming from both Eurozone upheavals and frequent changes in Prime Minister leadership.

This research project intersects two bodies of literature: one pertaining to the impact of firm-level uncertainty and the other relating to the effects of economic policy uncertainty (EPU) on growth and investment. The existing literature, however, has mainly focused on the separate impact of EPU and demand uncertainty on investments, neglecting the possibility that they can reinforce or offset each other. This study seeks to overcome this limitation by investigating the interplay between EPU (macro-uncertainty) and demand uncertainty (micro-uncertainty) and their joint influence on the investment decisions of a sample of Italian manufacturing firms.

There are two factors that make Italy particularly intriguing in this regard. First, Italy has witnessed the highest number of Prime Ministers among European countries, and elections serve as a significant source of uncertainty. Exploring the extent to which EPU can amplify or mitigate the impact of firm-level uncertainty on investments provides insights into whether Italian firms are exposed to an "electoral business cycle" (Baker et al., 2020). Second, while it is widely accepted that EPU strengthens the negative impact of firm-level uncertainty on investments, it is essential to consider that Italy has consistently focused on implementing policy reforms

aimed at enhancing competition, promoting labor flexibility, and fostering innovation over the past decade. These reform efforts may have positively influenced enterprises' expectations regarding future economic outcomes. Furthermore, as an economically developed country, Italy is expected to intervene through policies aimed at stabilizing the economy, promoting growth, and mitigating factors that hinder investments. Therefore, an increase in government policy uncertainty may not necessarily result in a decline in firms' investments.

Consistent with existing literature, this paper defines demand uncertainty as the subjective ex-ante uncertainty that managers have regarding firms' product demand at a constant price. It is regarded as a firm-level uncertainty. The study utilizes the INVIND survey as the primary dataset, which provides crucial variables for constructing the demand uncertainty measure based on managers' maximum and minimum expected future sales growth. Drawing from previous studies (Bontempi and Parigi, 2007; Fiori and Scoccianti, 2021), this paper measures demand uncertainty using the range between the maximum and minimum growth of sales.

Regarding EPU, it refers to lack of knowledge about *who* will make economically relevant policy decisions, *what* and *when* policy actions will be undertaken and is measured using a newspaper-sentiment based index developed by Aprigliano et al.(2021).

Before delving into the empirical investigation of the interplay between micro and macro uncertainty on firms' investments, this study provides supporting evidence that the EPU index, as an aggregate measure of uncertainty, is not a proxy for other aggregate temporal shocks. Specifically, it demonstrates that EPU causes, in the sense of Granger (1969), firms' confidence, representing positive sentiment about the future economic outlook, using data from a national-level survey conducted by ISTAT on business sentiment. Notably, the indexes for firms' confidence and EPU are derived from different data sources and constructed using different methodologies, indicating that their correlation is not driven by their construction process. Furthermore, the study shows that EPU also causes,in the sense of Granger (1969), GDP, highlighting the broader relevance of sentiment indicators based on newspaper data for economic purposes.

Having addressed potential reliability concerns, the study focuses on the central point of investigating the interplay between EPU and demand uncertainty.

The empirical methodology builds on the micro-foundations provided by the theoretical work on investment by Abel and Eberly (1996), who show that demand threshold that triggers investment is equal to the user cost of capital, which is defined to properly reflect irreversibility and uncertainty. In this study, the investment rate is specified as a function of expected sales growth, demand uncertainty, and the interplay between demand and policy uncertainty. Additionally, a dummy variable for credit constraints is included to demonstrate that uncertainty is not merely a

proxy for credit constraints. The longitudinal dimension of the data allows to account for unobservable firm characteristics that may impact the relationship between investment and uncertainty, such as entrepreneurs' risk aversion, through firm fixed effects. It also accounts for collectively significant macroeconomic effects that are invariant for all firms, such as industry-wide shocks and macroeconomic cyclical effects, through time fixed effects.

The main finding of this thesis is that, all else being equal, firms with higher idiosyncratic uncertainty decrease their investments during periods of high economic policy uncertainty. The negative effect of the interplay between demand and economic policy uncertainty on firm investments remains robust even when using an alternative index of economic policy uncertainty and accounting for unobservable time-invariant factors at the sector-region-size level instead of the firm level.

To shed light on the economic mechanisms underlying the impact of the interplay between economic policy uncertainty and demand uncertainty on firms' investment decisions, the analysis takes two additional main steps. First, it disaggregates the broad measure of economic policy uncertainty into its individual components, allowing for a more nuanced analysis of which specific components interact with demand uncertainty, contributing to the significant negative effect of economic policy uncertainty. The study finds that the interaction between economic policy uncertainty and firm-level uncertainty primarily occurs through a fiscal policy channel. This suggests that government instabilities, frequent elections, and uncertainty regarding future fiscal reforms can adversely affect firms' investment decisions.

Second, the study exploits the cross-section heterogeneity of firms present in the sample to uncover the varying effects of uncertainty on investment decisions based on different firm characteristics. The estimates reveal significant heterogeneity in the effects of fiscal policy uncertainty and demand uncertainty when firms are categorized based on their exposure to government, labor flexibility, and size. Firms that are more vulnerable to government fluctuations, as evidenced by higher sales to the government or lower import share, as well as firms with limited labor flexibility and smaller firms, experience substantially stronger negative influences of fiscal policy uncertainty interacting with demand uncertainty on their investment decisions.

The study concludes presenting the main implication of the findings. First, the results suggest that ambiguity in communicating policy decisions even if can protect policymakers' credibility in case their decisions prove to be incorrect ex-post, it can also be detrimental, similar to making the wrong decision. Therefore, increasing transparency and adopting more rule-based public policies could help mitigate the negative effects of policy uncertainty interacting with demand uncertainty on firms' investments. Second, this study underscores the significance of taking into account firm-specific characteristics, such as reliance on government spending, flexibility of production factors, and size, when assessing the potential impact of policy-related

uncertainty on corporations. It is crucial to recognize that as both demand uncertainty (micro uncertainty) and EPU (macro uncertainty) increase, different firms will be affected to varying degrees based on their unique features and contexts.

10 Appendix

Appendix 1: Variables Definitions from INVIND

Credit rationed Firms. This variable is a dummy constructed as an indicator of credit constraints of firms. It is constructed using the answers to three questions on access to credit provided by the firms in the INVIND sample. Specifically, Invind survey contains questions regarding to whether (i) at the current market interest rate firms desire greater credit; (ii) they would be willing to accept a small increase in the interest rate charged for the purpose of obtaining more credit; (iii) they have applied for credit but it has been denied. A firm is ranked as credit-constrained if, it answers "yes" to either question (i) or (ii), and also to question (iii).

Size. Firm size is defined on the basis of the number of its employees. Specifically a *small* firm is defined as a firm with less than 100 employees, whereas a *large* firm has more than 100 employees.

Type of ownership. Firms are classified according to two types of ownership, namely private and public ownership. The dummy variable private is equal to 1 if the ownership is private, zero if it is public.

Location. Location of a firm is defined by three dummies representing the North, the Centre and the South of Italy. *Sectors.* Classification variables based on the economic activity sector are constructed on the basis of aggregations of divisions of the ATECO 2007 classification.

Exported revenues. In INVIND survey, firms are asked to report their total sales and revenues that come from sales to Public Administration, Ministers, Regions and municipalities. This paper refers to *Exported revenues* as the share of exported sales and *Sales to Governments* as the sales to Public Administration and Ministers.

Labour Turnover Indicator. This indicator is constructed summing up the number of hired and fired workers and dividing it over the average number of workers effectively employed by the company in the same year.

Appendix 3: Firms' cross-section heterogeneity

Firms' sales to government

Variable	BASELINE	Low Sales to Gov.	High sales to Gov.
Δy_{it}	.063***	.081***	.022
	(.006)	(.020)	(.022)
$\mathrm{u}({}_t g_{i,t+1})$	-.001	-.042**	-.097***
	(.002)	(.021)	(.014)
$\mathrm{u}({}_t g_{i,t+1}) * \Delta y_{it}$	-.009***	-.003***	-.019***
	(.001)	(.001)	(.003)
$\mathrm{UGP}_t * u({}_t g_{i,t+1})$	-.022**	.020	-.090***
	(.007)	(.015)	(.022)
Credit Rationed Firms	-.104***	-.101***	-.091**
	(.014)	(.034)	(.037)
TIME FE	yes	yes	yes
FIRM FE	yes	yes	yes
N obs.	74,376	36,900	37,476
R^2	0.864	.90	.90

Firms' sales to government

Variable	BASELINE	Low Export share	High export share
Δy_{it}	.063***	.088***	.059***
	(.006)	(.009)	(.009)
$\mathrm{u}({}_t g_{i,t+1})$	-.001	-.003	.044***
	(.002)	(.004)	(.012)
$\mathrm{u}({}_t g_{i,t+1}) * \Delta y_{it}$	-.009***	-.011	-..009***
	(.001)	(.008)	(.002)
$\mathrm{UGP}_t * u({}_t g_{i,t+1})$	-.022**	-.026***	.051
	(.007)	(.013)	(.040)
Credit Rationed Firms	-.104***	-.030	-.091**
	(.014)	(.019)	(.037)
TIME FE	yes	yes	yes
FIRM FE	yes	yes	yes
N obs.	74,376	34,440	39,936
R^2	0.864	.90	.83

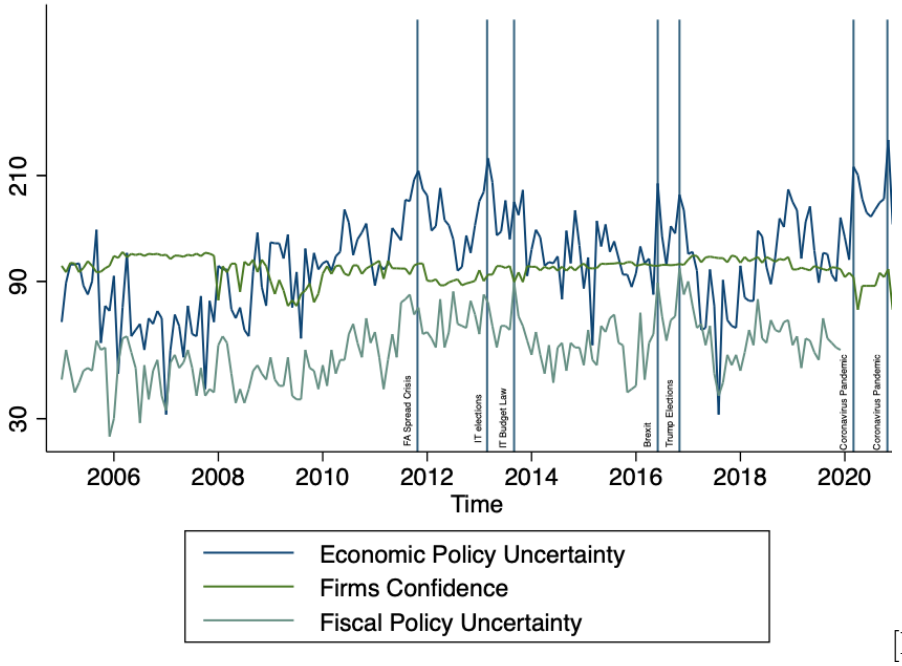
Firms' labour flexibility

Variable	BASELINE	Low Flexibility	high Flexibility
Δy_{it}	.063***	.055***	.092***
	(.006)	(.004)	(.008)
$\mathrm{u}({}_t g_{i,t+1})$	-.001	-.033**	-.016
	(.002)	(.015)	(.010)
$\mathrm{u}({}_t g_{i,t+1}) * \Delta y_{it}$	-.009***	-.013***	-.031***
	(.001)	(.002)	(.004)
$\mathrm{UGP}_t * u({}_t g_{i,t+1})$	-.022**	-.026*	-.022
	(.007)	(.015)	(.019)
Credit Rationed Firms	-.104***	-.099***	-.020
	(.014)	(.024)	(.020)
Firm FE	yes	yes	yes
time FE	yes	yes	yes
N obs.	74,376	36,900	37,476
R^2	0.864	.90	.90

Firm Size

Variable	BASELINE	SMALL	LARGE
Δy_{it}	.063***	.056***	.063
	(.006)	(.008)	(.011)
$\mathrm{u}({}_t g_{i,t+1})$	-.001	-.002	-.041***
	(.002)	(.004)	(.009)
$\mathrm{u}({}_t g_{i,t+1}) * \Delta y_{it}$	-.009***	-.009***	.002
	(.001)	(.001)	(.004)
$\mathrm{UGP}_t * u({}_t g_{i,t+1})$	-.022**	.019*	-.005
	(.007)	(.010)	(.010)
Credit Rationed Firms	-.104***	-.052***	-.175***
	(.014)	(.020)	(.021)
Firm FE	yes	yes	yes
Time FE	yes	yes	yes
N obs.	237,900	42,300	28,956
R^2	0.864	.90	.84

Appendix 2: Confidence, EPU and Government Policy uncertainty



[h!]

Figure 3: Confidence and EPU indexes

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