Final Presentation
Capstone Project

The impact of energy prices on SME investment and profitability

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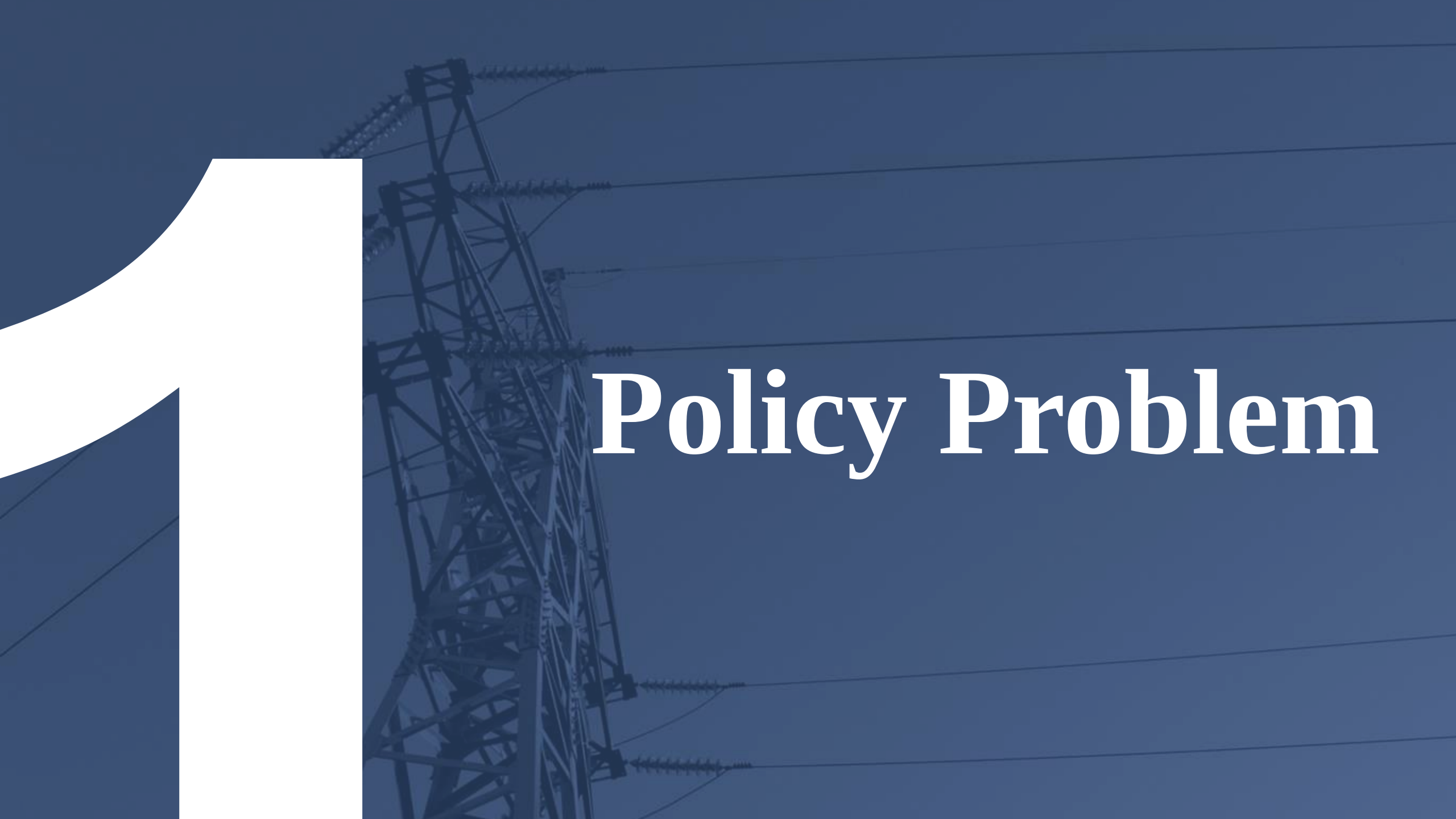
Our agenda today

1. Policy Problem
2. Context: EU-27 Energy Market
3. Empirical Approach & Data Description
4. Study Results
5. Conclusion & Policy Implications

? Q&A



1 Policy Problem

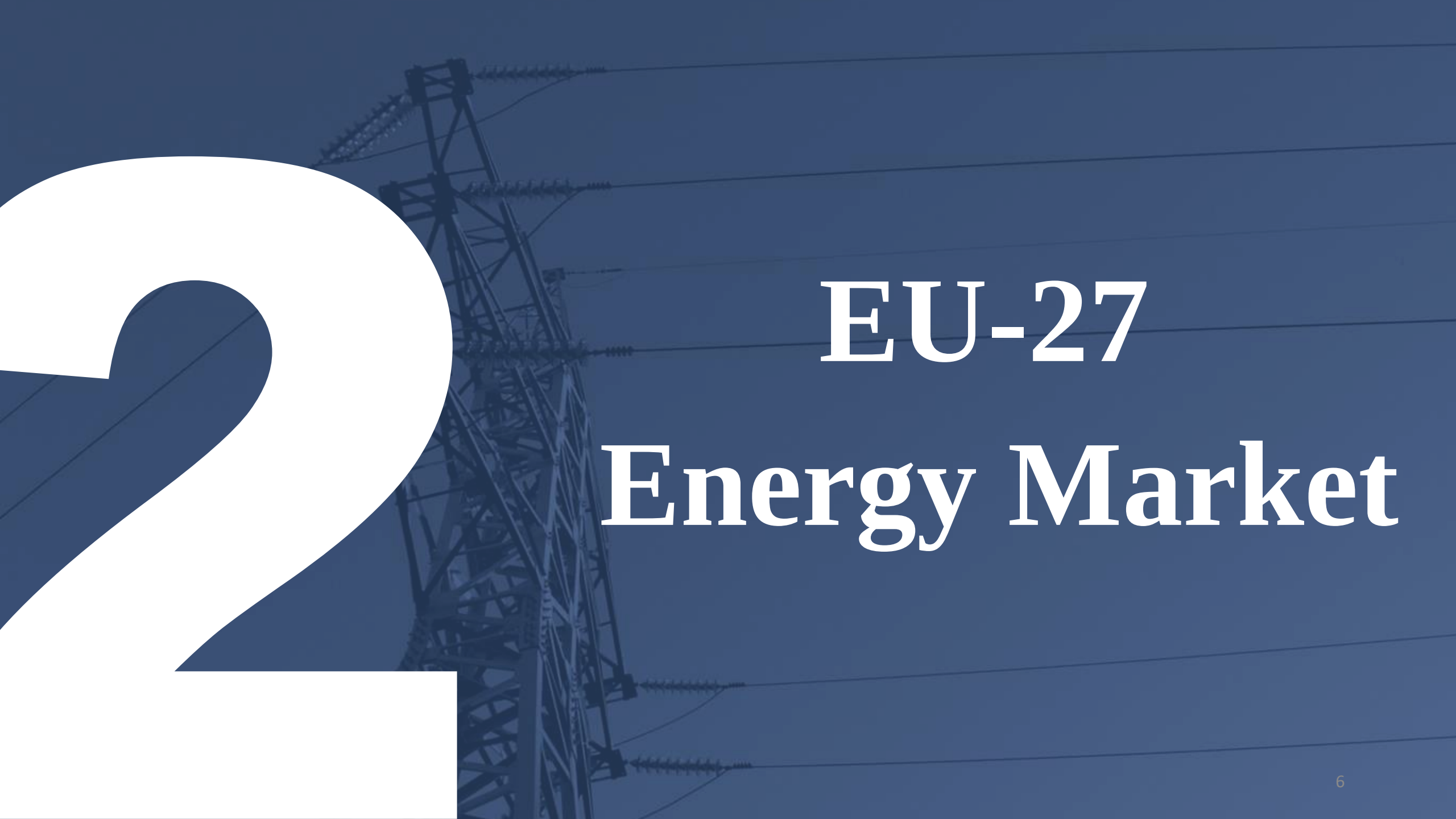
European energy market is currently experiencing a price shock that goes beyond the usual fluctuations in energy prices (wholesale electricity prices: +87% from ‘21 to ‘22)

The European Investment Fund (EIF) is particularly interested in how these price rises affect firms’ decisions and economic outcomes, especially SMEs

A thorough understanding of the relationship between energy prices and firm outcomes is crucial for the design of effective assistance measures

Therefore, we analyse this relationship using firm level data to quantify the historic response of firms investment to changes in energy prices

Source: Eurostat



2

EU-27 Energy Market

Global energy markets are highly sensitive to external shocks

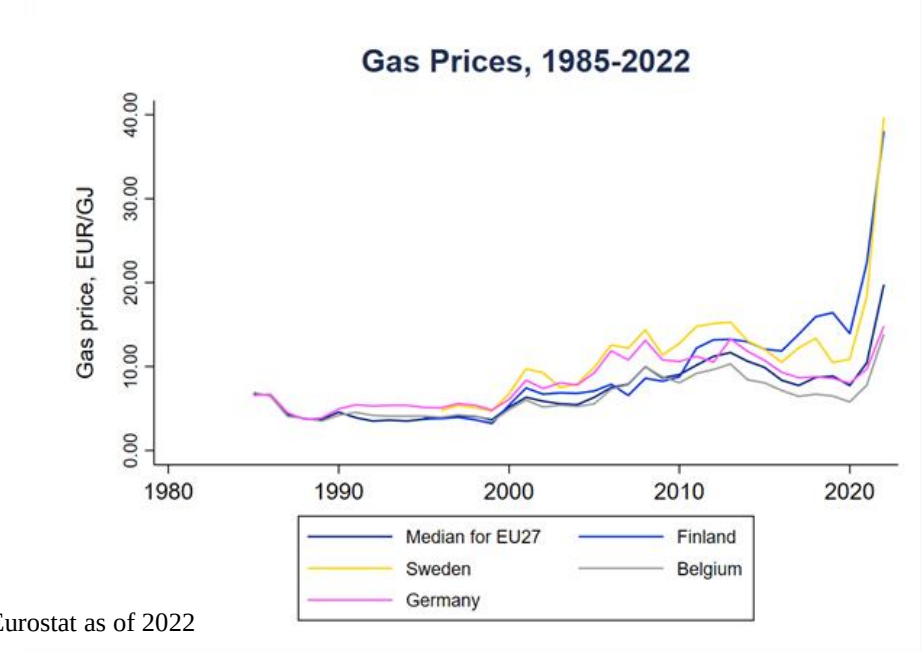
Industrial tariffs for energy prices

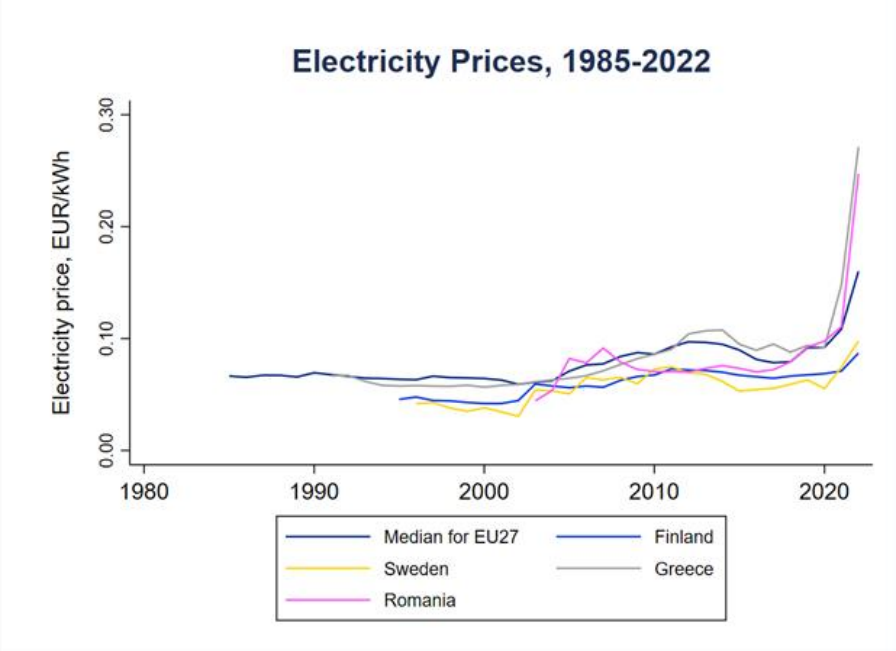
- Wholesale prices
- Transmission and distribution cost
- Taxes and levies (incl. environmental)
- Margins for energy suppliers

Energy prices are exogenous to the individual firm

Current shock unprecedented, but energy prices increased in past

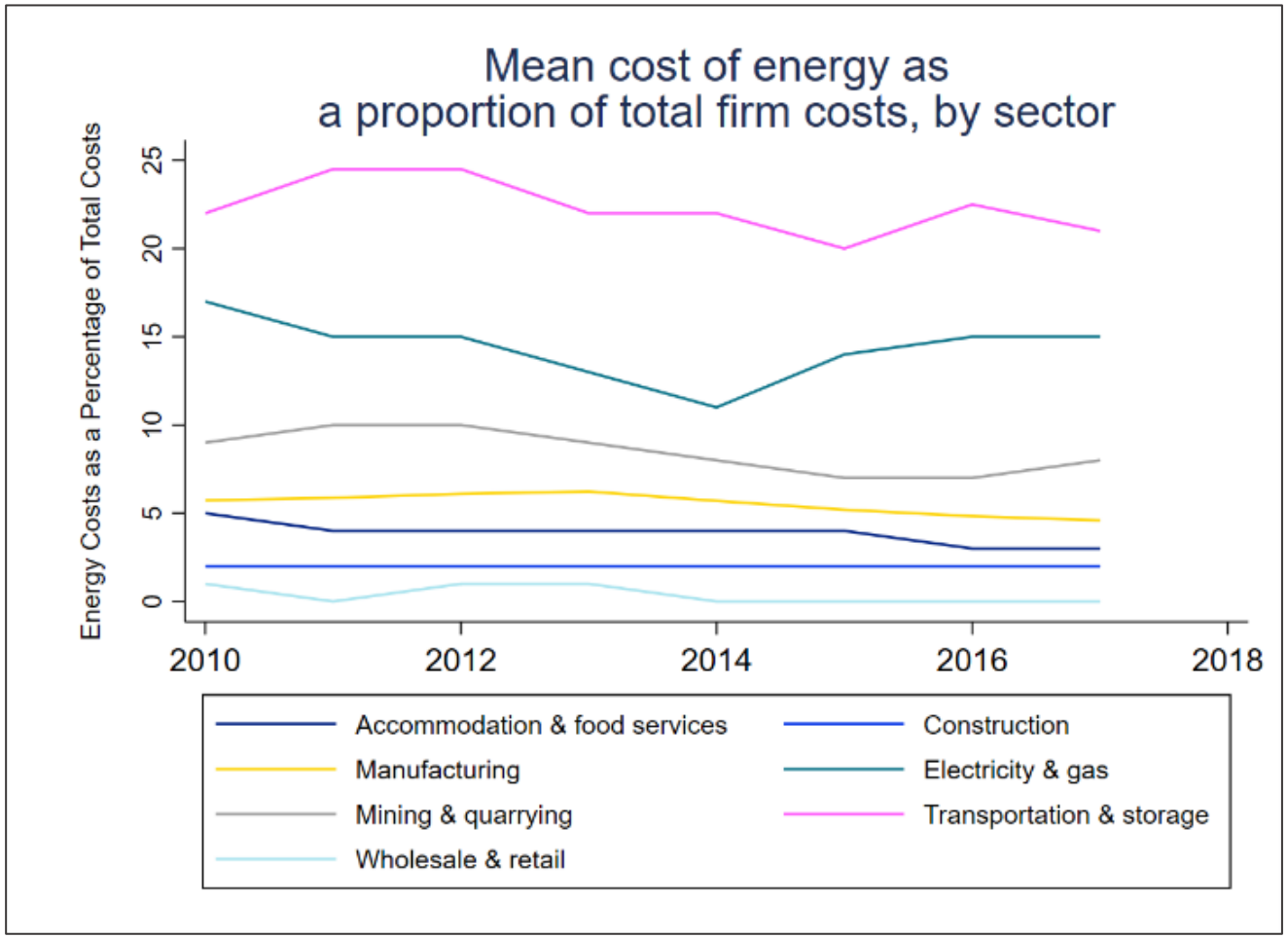
- Europe is experiencing record-high energy prices, mainly driven by Electricity and Gas price hikes
- EU-27 firms are heavily reliant in energy consumptions for their daily operations:
  - Increasing in prices directly affect their production costs and operational efficiency
  - Reducing firms profit margins and competitiveness
- External financing is crucial for SMEs to maintain competitiveness, efficiency, and output levels.





Source: Eurostat as of 2022

Adverse effects of energy price increases vary by sector



In the EU-27, the impact of energy costs on total production costs varies across economic sectors:

- Industries with low energy demand, such as wholesale and retail, have total costs attributed to energy, of less than 2%
- Energy-intensive sectors like transportation and storage have total costs attributed to energy, of more than 25%

Source: European Commission as of 2022

Companies have instruments to partially lower exposure

Market Strategies

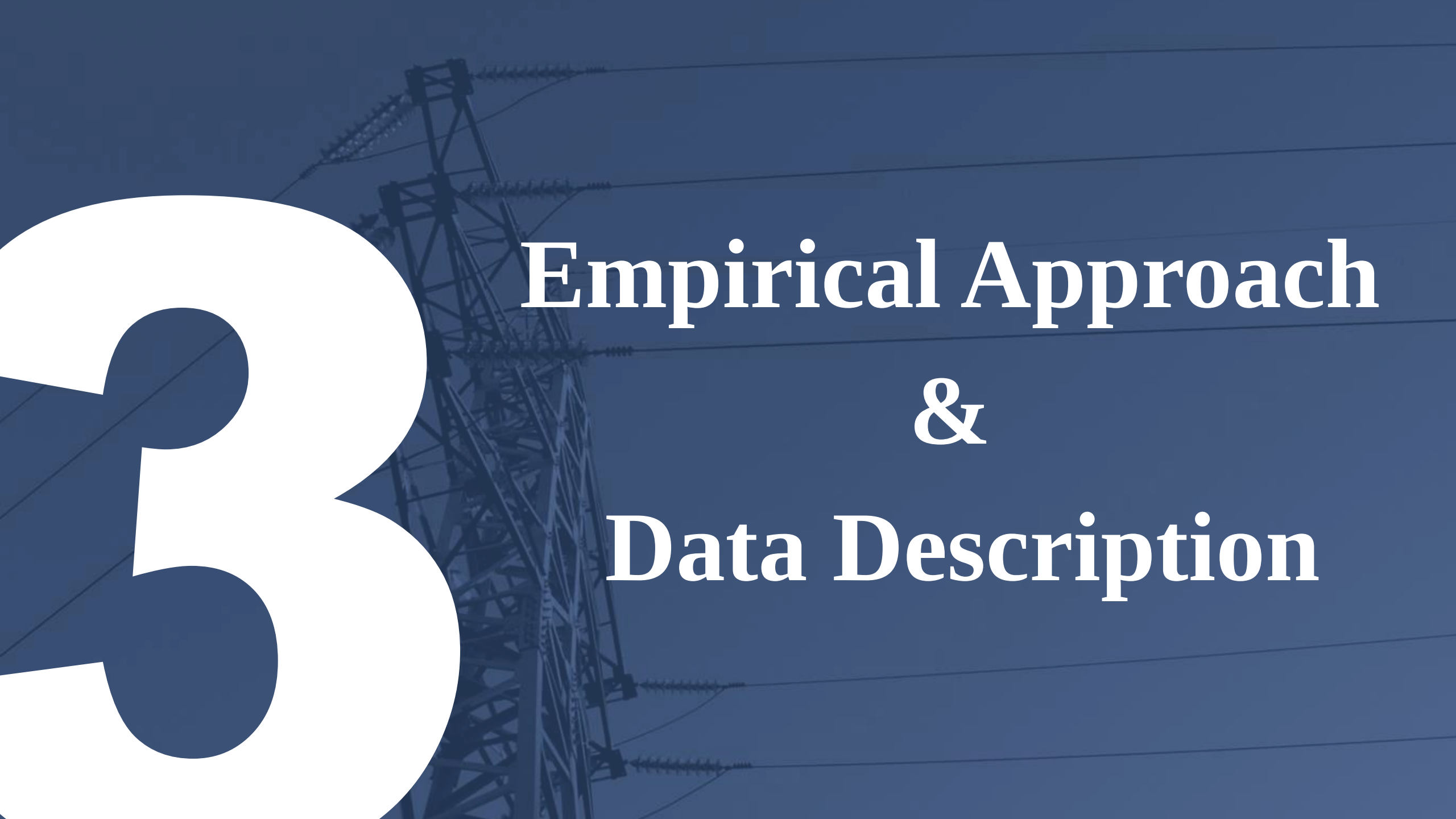
- Choice of energy provider
- Hedging strategies
- Fix long term contracts

Not necessarily available to SMEs

Government Intervention

- Retail price caps
- Regulated tariffs
- Support programs for energy intensive companies
- Liquidity provisions

Source: Own Analysis



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Empirical Approach & Data Description

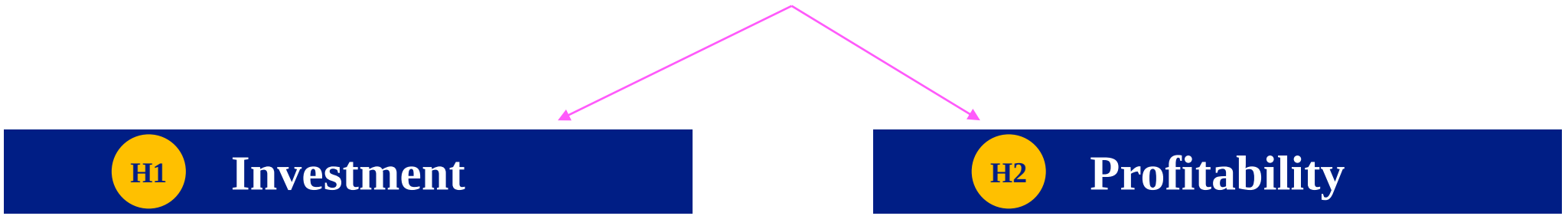
During an energy price rise, firms adjust their production function, although their bottom line will likely still be hit…

1 Firms produce an output using capital, labour, and energy
→ Profit maximisers = cost minimisers[1]

2 During price shocks, firms may adjust production to attempt to re-maximise profit and re-minimise costs:

- Substitute factors of production: e.g., swap energy for labour
- Substitute fuels: e.g., swap gas for electricity
- Lower output: due to lower real income

3



Note: [1] At fixed level of output
Source: Own Analysis

… so profitability and investment will likely decline, and we expect financially constrained firms will be worse affected

3

H1 Investment ⟷ **H2 Profitability**

Demand for investment may increase or decrease because capital may be a substitute or a complement for energy

→ Mixed evidence, but overall we believe investment will decrease

Despite adjustments, firms are likely to face higher overall costs and declining profitability

4

H3 Financially constrained firms have less capital, including internal capital, and therefore experience exacerbated negative impacts on profitability and investment

Source: Own Analysis

Our key dependent variables are firm-level, but most explanatory and control variables are country-level

Outcome Variables – firm level

- **Investment**: Investment measured by change in assets versus last year
- **Profitability**: A measure of profit margin, which scales profitability by firm size

Explanatory Variables[1] – country/year level

- **Gas Price:** Median non-household gas price for that country & year
- **Electricity Price:** Median non-household electricity price for that country-year

Subgroup analyses

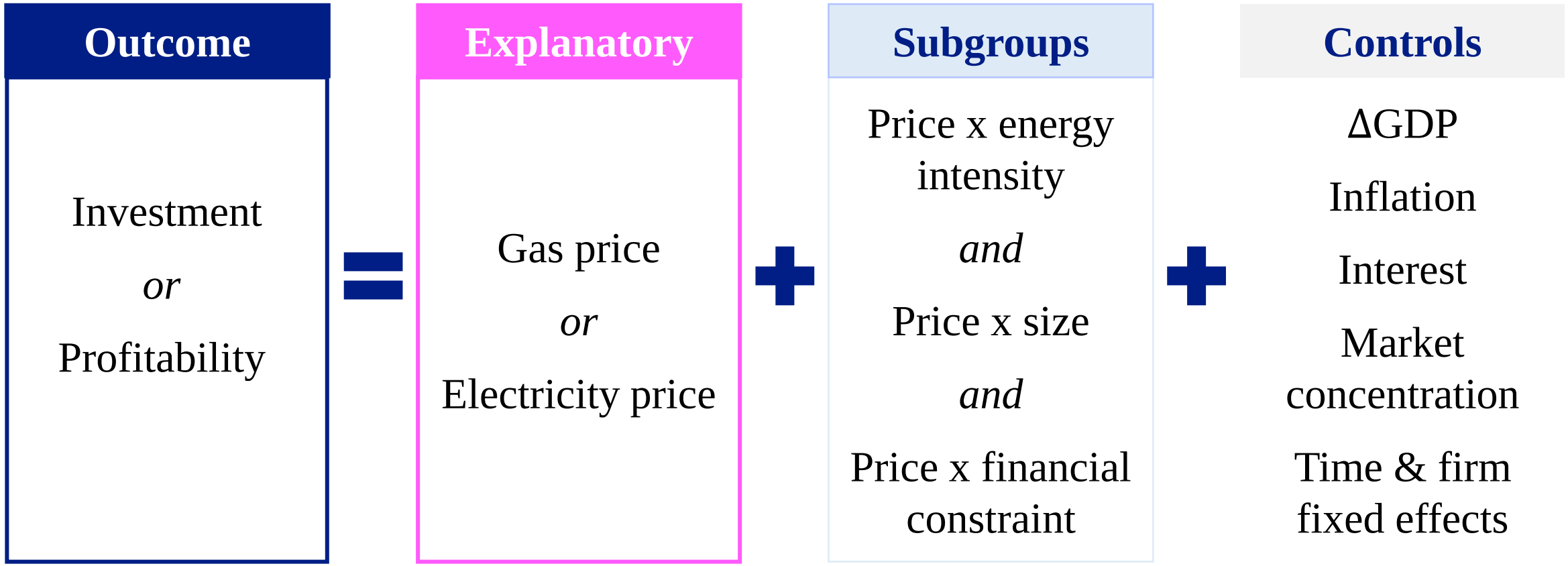
- Firm Size – micro, small, medium
- Financial Constraint – measured by resources to cover their obligations / debt
- Energy intensity – defined on a sector level[2]

Control Variables

- ΔGDP
- Inflation
- Interest
- Market concentration

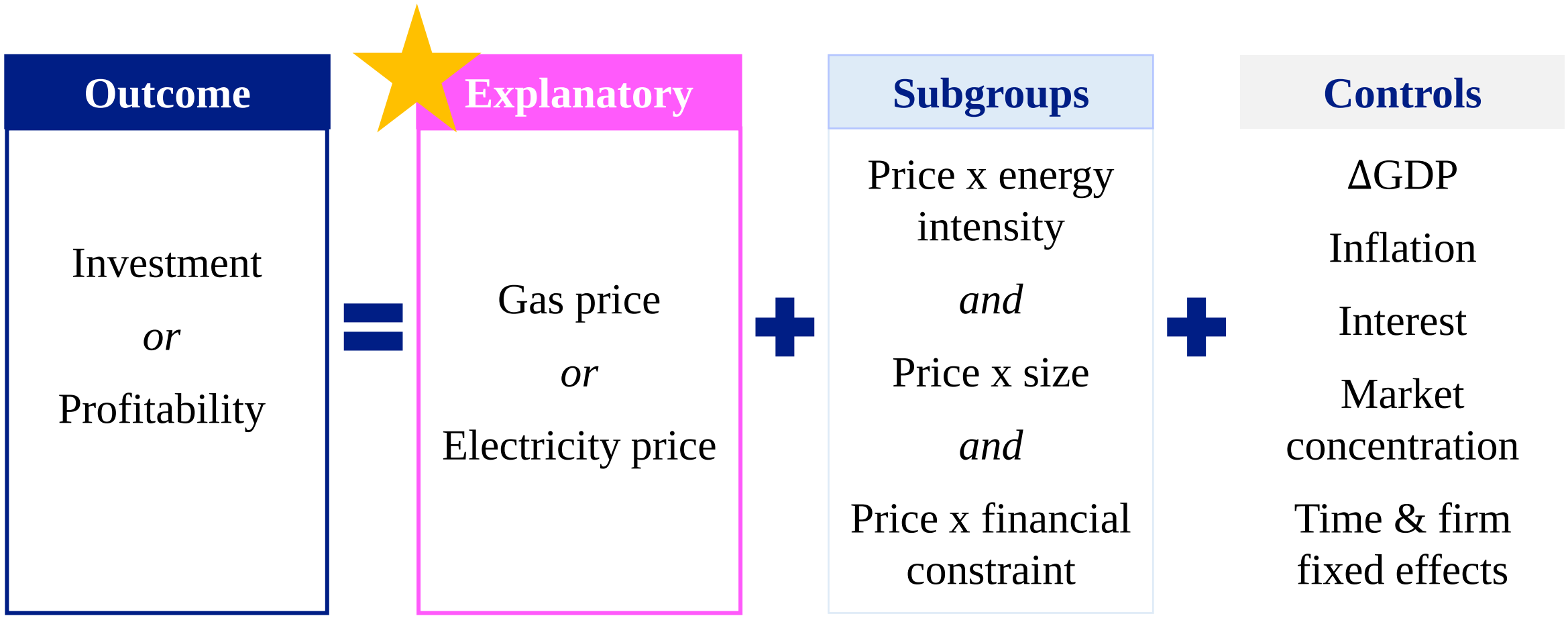
Source: Own Analysis
Note: [1] Prices are in current year for profitability, and lagged by one year for investment [2] In energy intensive firms, energy is at least 20% of their costs and the firm is exposed to international competition

We regress profitability or investment on energy prices, interaction terms, macroeconomic controls, and fixed effects



Note: We used clustered standard errors at the sector level
Source: Own Analysis

We regress profitability or investment on energy prices, interaction terms, macroeconomic controls, and fixed effects



Note: We used clustered standard errors at the sector level
Source: Own Analysis

Model specification

Investment:

$$\text{Ln}\, I_{it} =$$

$$\beta_1 \ln Price_{ct-1} + \beta_2(\ln Price_{ct-1} * EI_s) + \beta_3(\ln Price_{ct-1} * Size_{it}) + \beta_4(\ln Price_{ct-1} * FinConstr_i) +$$
$$\beta_5 Inflation_{ct} + \beta_6 \Delta GDP_{ct} + \beta_7 Interest_{ct} + \beta_8 HHI_{it} + \alpha_i + \alpha_t + \varepsilon_{it}$$

Profitability:

$$\text{Ln}\, \pi_{it} =$$

$$\beta_1 \ln Price_{ct} + \beta_2(\ln Price_{ct} * EI_s) + \beta_3(\ln Price_{ct} * Size_{it}) + \beta_4(\ln Price_{ct} * FinConstr_i) +$$
$$\beta_5 Inflation_{ct} + \beta_6 \Delta GDP_{ct} + \beta_7 Interest_{ct} + \beta_8 HHI_{it} + \alpha_i + \alpha_t + \varepsilon_{it}$$

Source: Own Analysis

Data sources and cleaning

Data Sources (1999-2019)

Firm-level data: Orbis

Energy intensity data: European Commission

Interest rate data: European Central Bank

Energy price and other macro data: Eurostat

Data Cleaning

Keep

Keep observations within the research scope

Remove

Remove the data based on plausibility of data

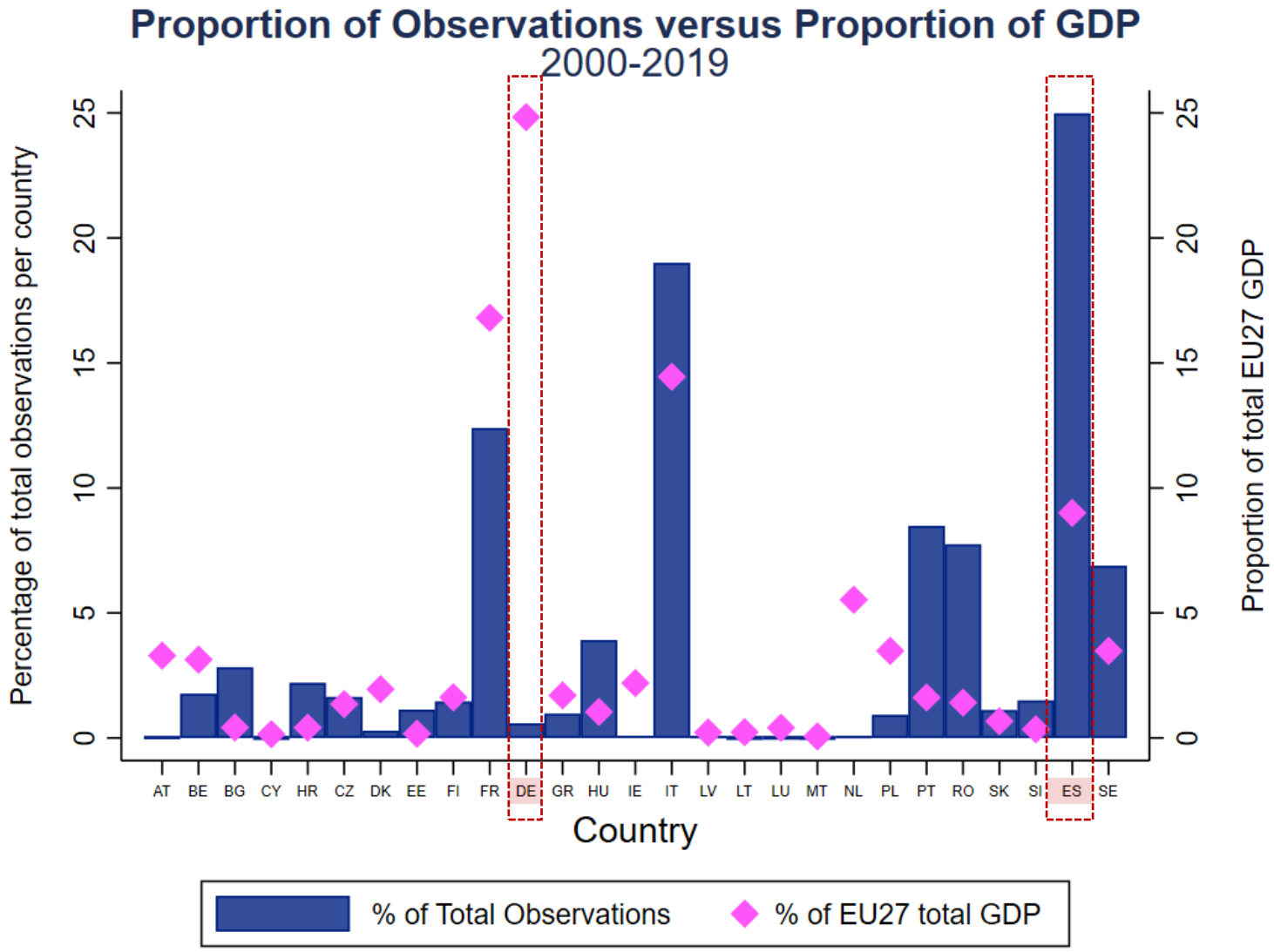
Drop

Drop observation missing core variables

Observation size of the clean dataset : 19,477,837 **(-70.73%)**

Source: Own Analysis

Missing rates of key variables are >40%, and not completely random

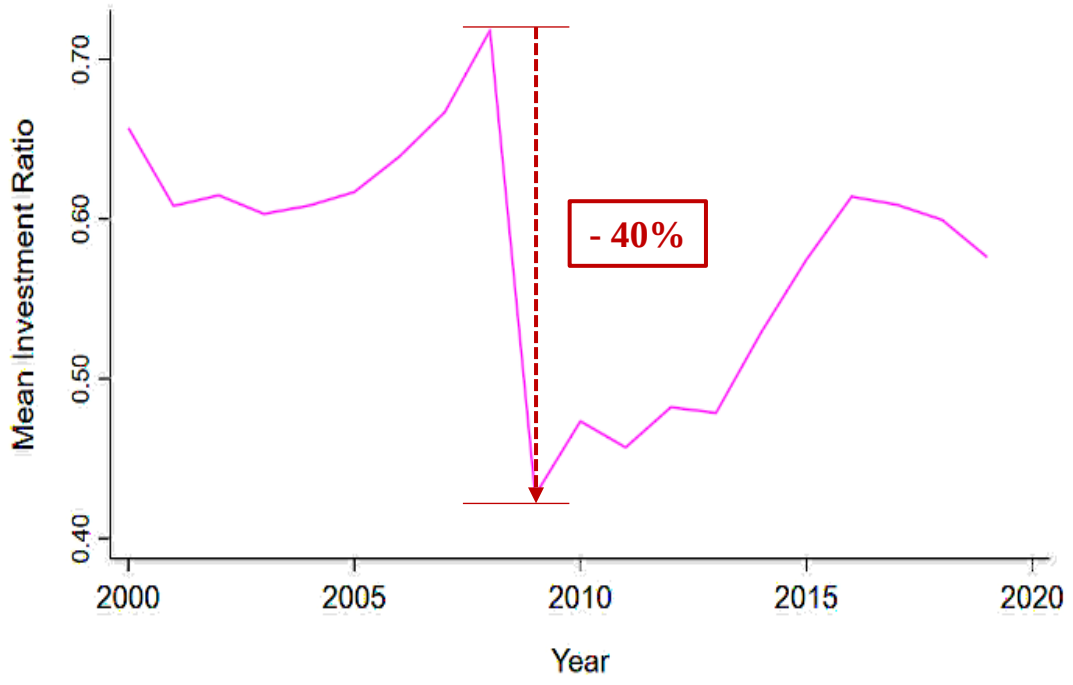


Source: Own Analysis

Investment and profitability of observations

Outcome variable: Investment

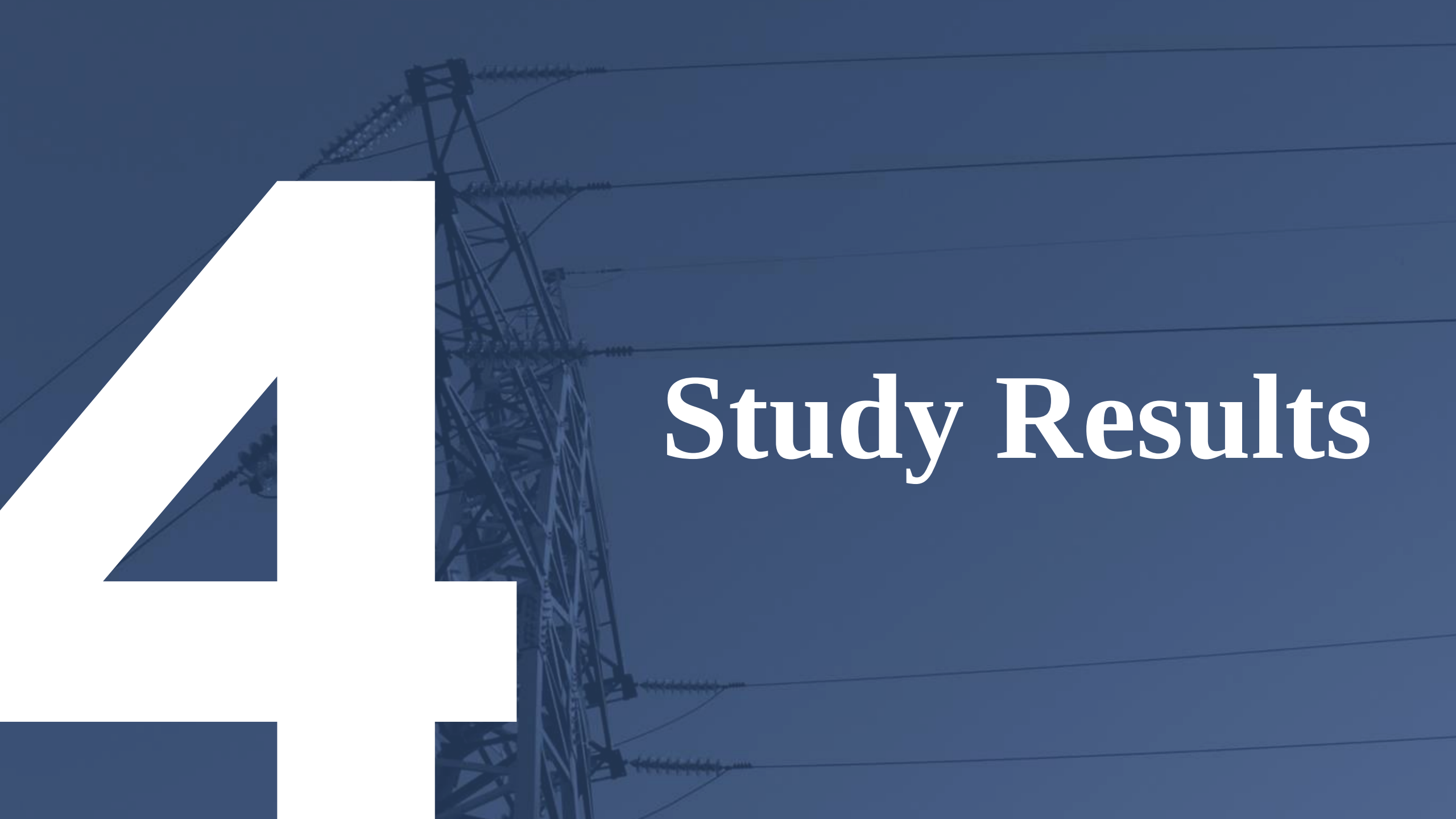
Mean Investment for Observations across Firms in the EU-27



Outcome Variable: Profitability

Mean Profitability for Observations across Firms in the EU-27

Source: Own Analysis



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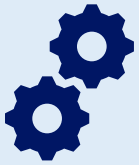
Study Results

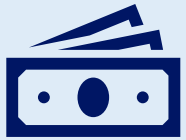
We study three hypotheses based on the literature review

H1



Negative impact on **Investment**, esp. for SMEs and energy intensive firms.

H2



Negative but smaller impact on **profitability**. Larger for SMEs.

H3

Lack of **access to finance** magnifies negative impacts

Effect magnitude most likely varies by energy carrier and sector

Ensure results are robust to macroeconomic controls, different reporting thresholds and ownership types

Source: Own Analysis

We find large, negative impacts on investments

Subgroup analyses

Lagged

Electricity price (ln)

Gas price (ln)

×

Energy Intensity

Size (Micro, Small, Medium)

Macroeconomic Controls & Fixed Effects

Sector Disaggregated Analysis

Findings

Large negative impacts on investment, varying magnitude by energy carrier

A doubling in electricity prices (gas prices) is associated with a decrease in investment by 18% (9%)

Energy-intensive firms are relatively **less affected**, especially for electricity prices

A doubling in electricity prices (gas prices) is associated with a decrease in investment by 4% (6%)

Electricity price shocks **disproportionally affect SMEs**, impacts vary by size

Large firms' investment decreases by 13%, micro firms are more affected by electricity (20%) than gas (9%)

Source: Own Analysis

The impacts on profitability are less conclusive and vary by sector

Subgroup Analyses

Same period

Electricity price (ln)

Gas price (ln)

×

Energy Intensity

Size (Micro, Small, Medium)

Macroeconomic Controls & Fixed Effects

Sector Disaggregated Analysis

Same model, different dependent variable

Findings

Small and partially insignificant impacts of energy prices on profitability

Electricity prices do not significantly impact profitability, gas prices decrease profitability by 1%.

Impact varies **by sector**, some with large negative and other with positive impacts

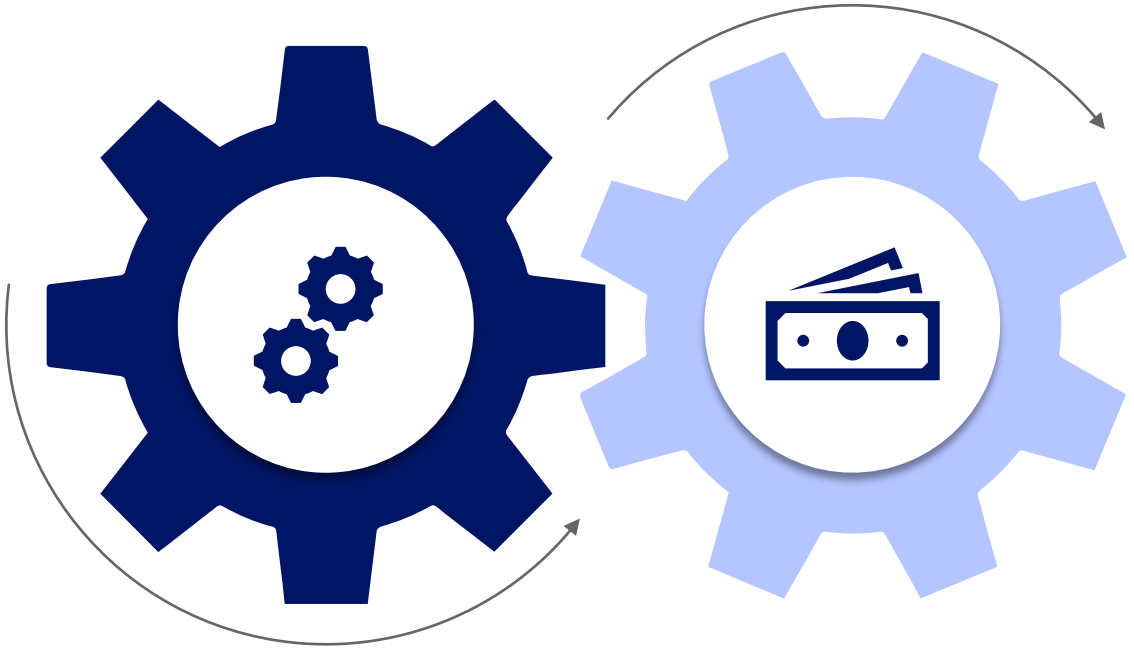
Mining is most impacted (electricity: -30%, gas: -10%), transport, agriculture and retail positively impacted.

Not all firm sizes impacted, impact is split by energy carrier

Medium and large firms impacted by electricity prices, micro firms impacted by gas prices

Source: Own Analysis

Findings capture relationship between investment & profitability



Source: Own Analysis

Financial constraints hinder the firms' adjustment process

Interactions

Electricity price (ln)

Gas price (ln)

×

Energy Intensity

Firm Size

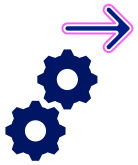
Financial Constraint

Macroeconomic Controls & Fixed Effects

Sector Disaggregated Analysis

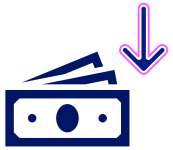
Run for both dependent variables

Findings



Investment in constrained firms is **not significantly lower**, varying by energy carrier

Financial constraints decrease their investment more than unconstrained firms for gas, less for electricity

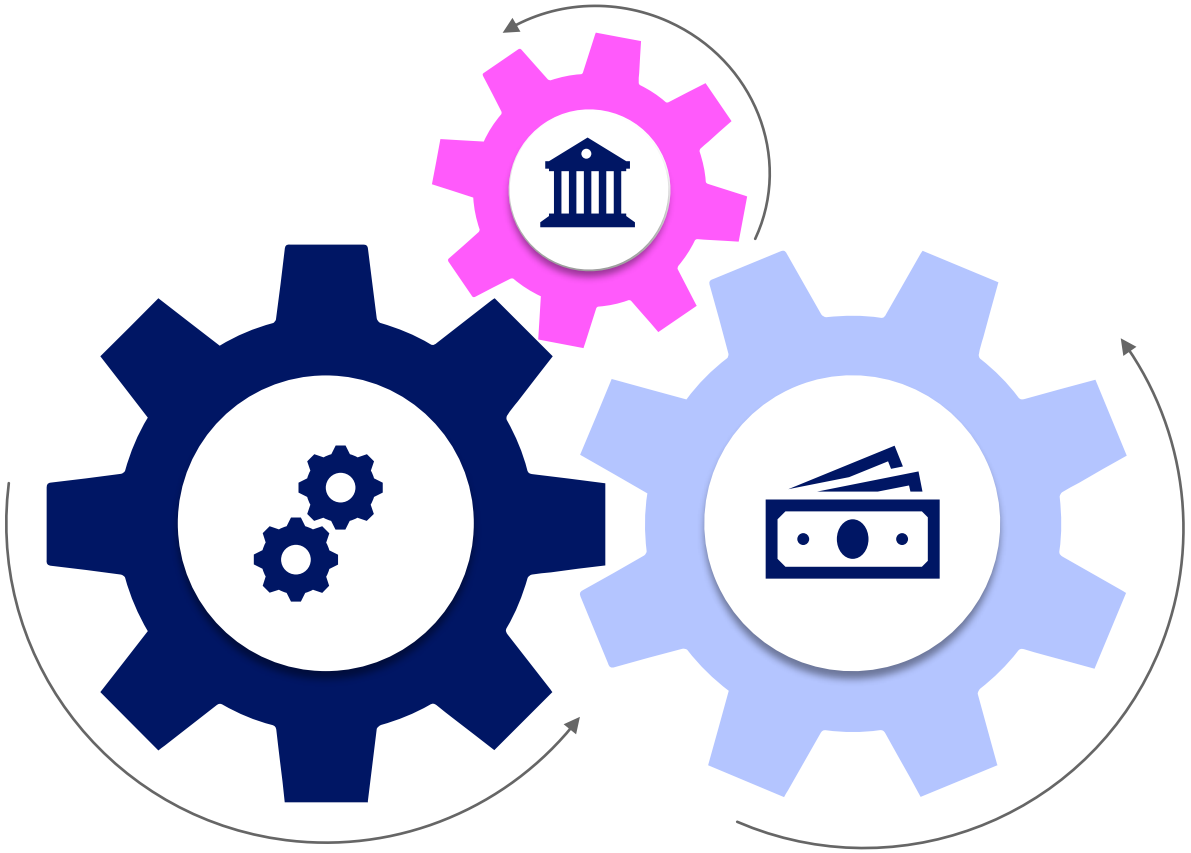


Profitability is **more negatively impacted** in financially constrained firms

Profitability decreases an additional 10% for an electricity price shock, additional 4% for a gas shock

Source: Own Analysis

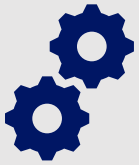
Access to finance appears to mediate the relationship



Source: Own Analysis

Initial hypotheses partially confirmed

H1

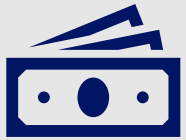


Negative impact on **Investment**, esp. for SMEs and energy intensive firms.

✓

Finding: large negative impacts, smaller for energy intensive firms

H2



Negative but smaller impact on **profitability**. Larger for SMEs.

≈

Finding: small and partially insignificant impacts

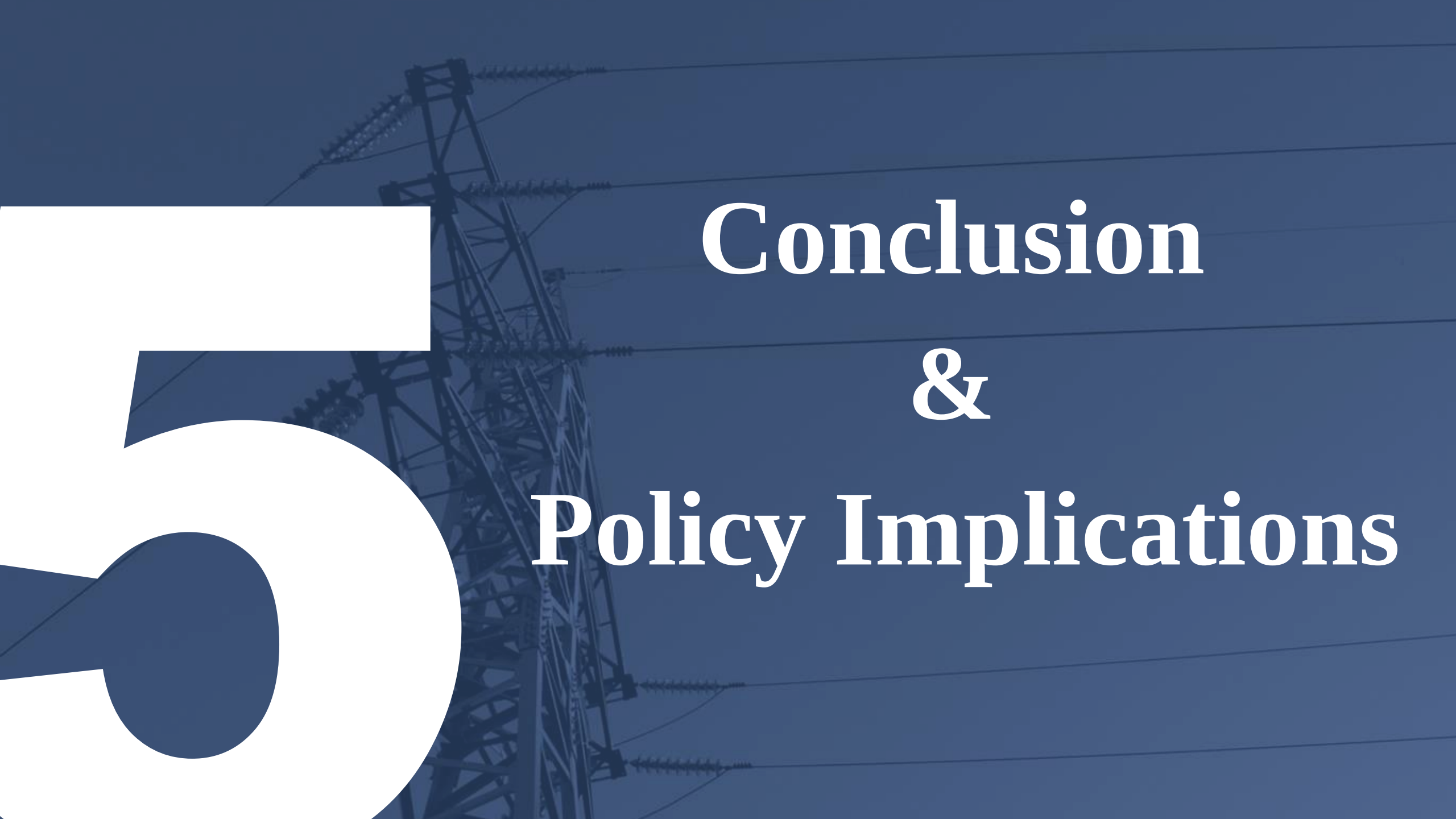
H3

Lack of **access to finance** magnifies negative impacts

≈

Finding: financial constraints increase impact on profitability

Source: Own Analysis



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Conclusion & Policy Implications

Two conclusions from study results

Prioritizing profitability misses the larger picture

- Firm resilience regarding profitability, but large effects on profit levels and investment
- Trade-off between short-term survival vs. long-term impact on firm resilience

Heterogeneous effects require tailored interventions

- Effect variation across energy carriers, firm sizes and sectors – sometimes even variation in effect direction
- Nuanced policies key to avoid distorting effects of general support programmes

Source: Own Analysis

Policy recommendations from analysis

01

02

03

Continue to support targeted relief policies

Examples include InvestEU, REPowerEU and the State Aid Temporary Framework

Improve EU-27 firm-level data collection

Improve the aggregation of data provided by national agencies and links to other micro-level data

Research firms' trade-offs between investment & profitability

Gather qualitative and micro-level quantitative data and monitor long-term impacts

Source: Own Analysis

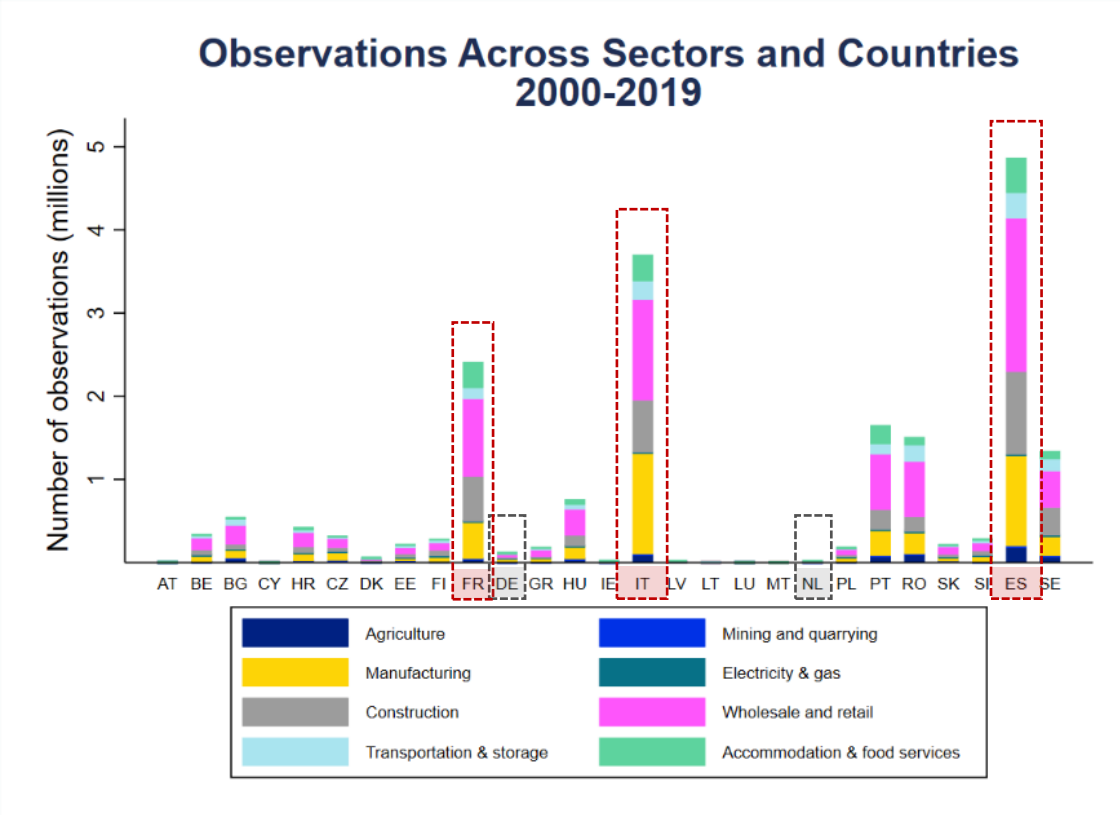
Thank you

Annex

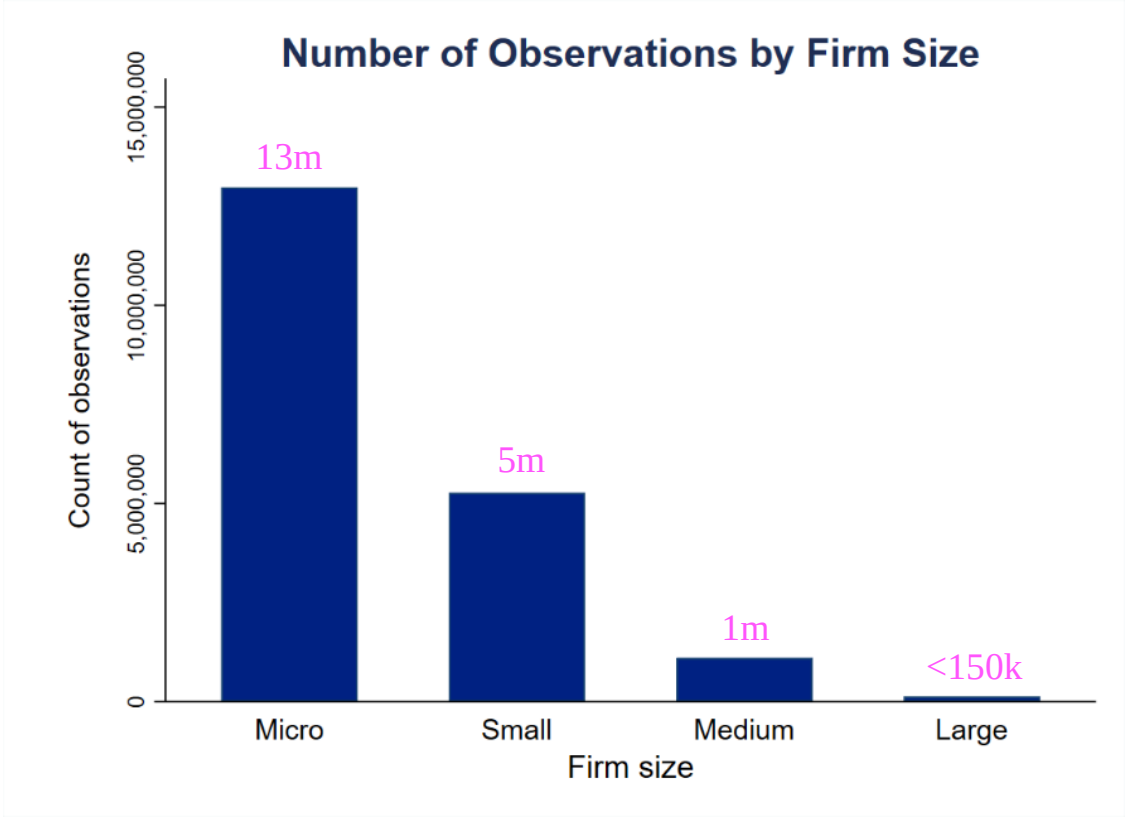
Type of Variable	Variable Name	Definition	Source
Outcome Variables	ln_ebitda_margin, $\ln \pi_{it}$	Natural logarithm of EBITDA margin	Orbis
	ln_invest_ratio, $\ln I_{it}$	Natural logarithm of investment ratio	Orbis
Explanatory Variables	ln_gas_price, $\ln Price_{ct}$	Natural logarithm of the gas price at the country-year level, EUR/GJ	Eurostat
	ln_electricity_price, $\ln Price_{ct}$	Natural logarithm of the electricity price at the country-year level, EUR/kWh	Eurostat
Interaction Terms	ln_price_EI, $\ln Price_{ct} * EI_s$	Natural logarithm of energy price (electricity or gas respectively) multiplied by a dummy variable =1 for firms in energy intensive sectors	Eurostat/ EC
	ln_price_size, $\ln Price_{ct} * Size_{it}$	Natural logarithm of energy price (gas or electricity respectively) multiplied by a dummy variable = 1 for firms of different sizes (micro, small, and medium respectively, leaving out large firms as the reference group)	Orbis/ Eurostat
	ln_price_finconstr, $\ln Price_{ct-1} * FinConstr_i$	Natural logarithm of energy price (gas or electricity respectively) multiplied by a dummy for firms which are financially constrained. We define different levels of financial constraint, please see description in variable section	Orbis/Eurostat/ EC
Control Variables	Delta_GDP, ΔGDP_{ct}	Change in country's GDP versus the year before	Eurostat
	Inflation, $Inflation_{ct}$	Harmonised index of consumer prices across EU-27 at the country-year level	Eurostat
	Interest_rate, $Interest_{ct}$	Government 10-year bond average yield	ECB
	HHI, HHI_{it}	Herfindahl–Hirschman Index	Orbis
Fixed Effects	Firm: α_i	Allows for each firm to have an individual level of average profitability or investment	Orbis
	Year: α_t	Allows for common shocks to all observations in certain years, e.g., EU-wide recession	Orbis
Other Variables	Ln_ebitda (not shown)	Natural logarithm of EBITDA (a measure of profitability not scaled to the firms' costs)	Orbis
	Young_firm (not shown)	Firms with fewer than or equal to 10 years since date of incorporation	Orbis
	Reporting_periods	Number of periods for which the firm has reported in the 20 year period of analysis	Orbis

Characteristics of observations/ observed firms

Countries & Sectors



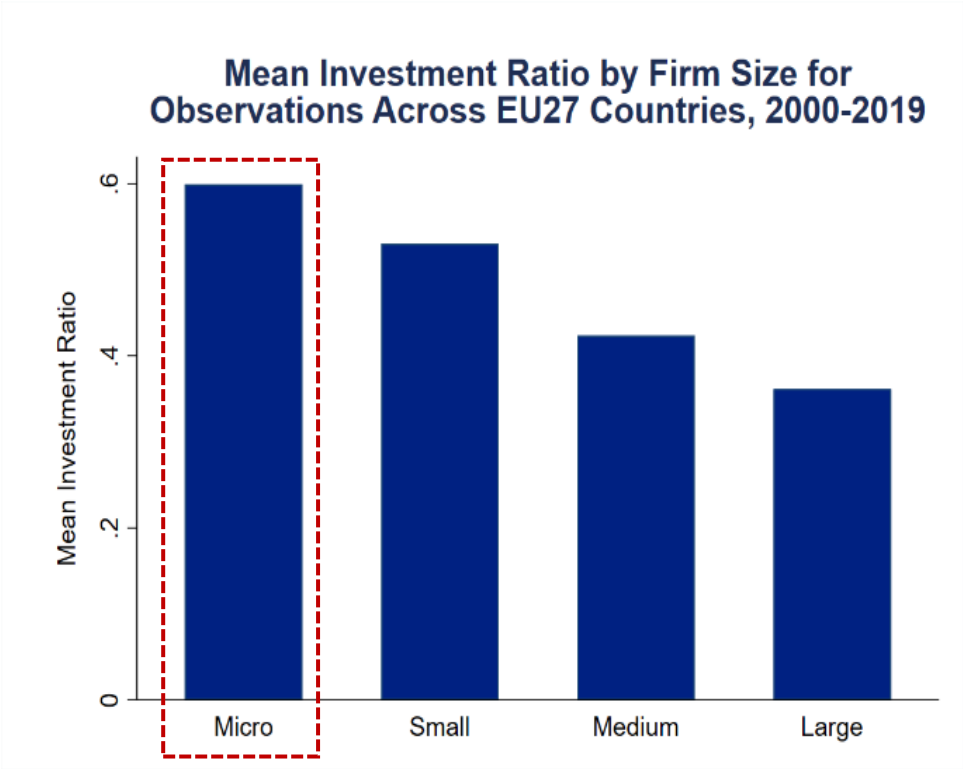
Firm Size



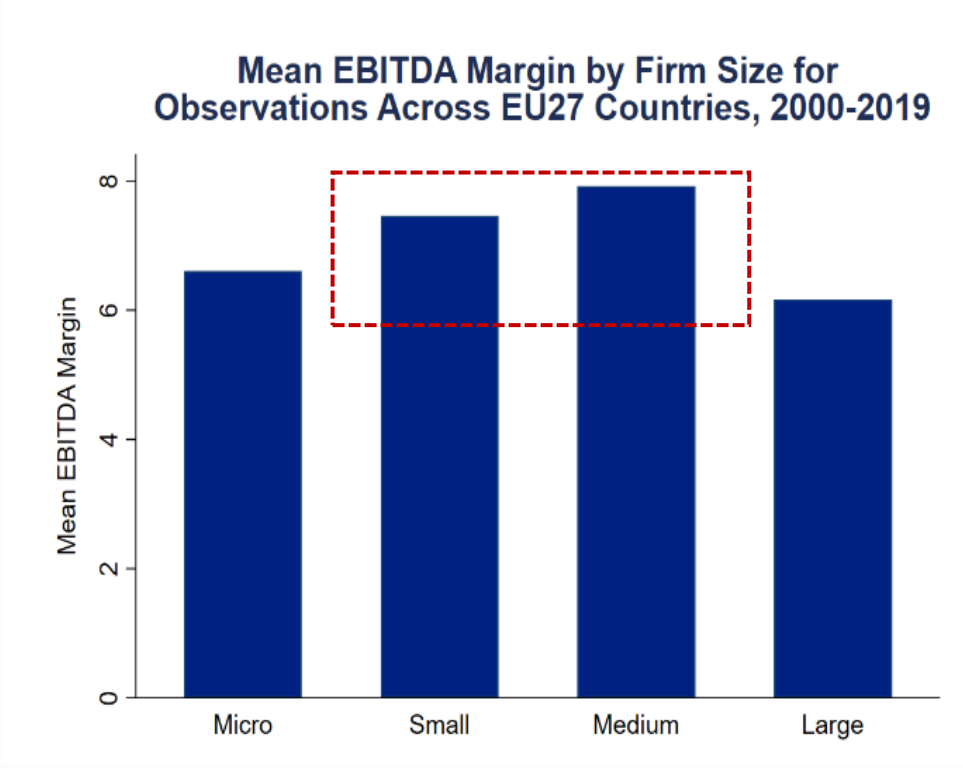
Source: Own Analysis

Investment and profitability of observations by firm size

Outcome variable: Investment



Outcome Variable: Profitability



Source: Own Analysis

Regression of natural logarithm of investment ratio on natural logarithm of electricity price

	(1)	(2)	(3)	(4)	(5)
L.ln_el_price	0.034**	-0.183***	-0.188***	-0.133***	-0.119***
	(0.017)	(0.022)	(0.023)	(0.023)	(0.024)
L.ln_el_price x EI			0.147***	0.135***	0.159***
			(0.039)	(0.040)	(0.042)
Size Interactions					
L.ln_el_price x micro				-0.069***	-0.070***
				(0.004)	(0.004)
L.ln_el_price x small				-0.048***	-0.049***
				(0.003)	(0.003)
L.ln_el_price x medium				-0.025***	-0.025***
				(0.002)	(0.002)
Macroeconomic Controls					
Change in GDP					0.619***
					(0.026)
Herfindahl-Hirschman index					0.013**
					(0.007)
Interest Rate					-0.007***
					(0.001)
Inflation					-0.001***
					(0.000)
Constant	0.120***	-0.246***	-0.247***	-0.255***	-0.125**
	(0.027)	(0.037)	(0.037)	(0.037)	(0.059)
Fixed Effects	No	Yes	Yes	Yes	Yes
F	4.186	67.899	34.323	89.849	295.316
R-squared	0.000	0.263	0.263	0.264	0.266
Adjusted R-squared	0.000	0.127	0.127	0.128	0.130
N	14,652,598	14,131,307	14,131,307	14,131,307	13,956,449

* p≤0.1, ** p≤0.05, *** p≤0.01

Notes: ln_el_price refers to the natural logarithm of the electricity price, EI refers to a dummy which is one for energy intensive firms. (1) is the simple regression, (2) adds fixed effects, (3) adds the interaction between energy intensity and price, (4) adds size interactions, (5) adds size and energy intensity interactions.

Regression of natural logarithm of investment ratio on natural logarithm of gas price

	(1)	(2)	(3)	(4)	(5)
L.ln_gas_price	-0.084***	-0.091***	-0.092***	-0.130***	-0.101***
	(0.007)	(0.006)	(0.006)	(0.006)	(0.005)
L.ln_gas_price x EI			0.034***	0.038***	0.043***
			(0.012)	(0.012)	(0.012)
Size Interactions					
L.ln_gas_price x micro				0.042***	0.041***
				(0.003)	(0.003)
L.ln_gas_price x small				0.028***	0.028***
				(0.002)	(0.002)
L.ln_gas_price x medium				0.016***	0.015***
				(0.002)	(0.002)
Macroeconomic Controls					
Change in GDP					0.603***
					(0.025)
Herfindahl-Hirschman index					0.017***
					(0.006)
Interest Rate					-0.009***
					(0.001)
Inflation					-0.001**
					(0.000)
Constant	0.240***	0.255***	0.255***	0.259***	0.301***
	(0.017)	(0.013)	(0.013)	(0.013)	(0.035)
Fixed Effects	No	Yes	Yes	Yes	Yes
F	157.630	237.492	124.650	143.471	204.427
R-squared	0.002	0.264	0.264	0.264	0.266
Adjusted R-squared	0.002	0.127	0.127	0.127	0.130
N	14,551,892	14,030,566	14,030,566	14,030,566	13,860,601

* p≤0.1, ** p≤0.05, *** p≤0.01

Notes: ln_gas_price refers to the natural logarithm of the gas price, EI refers to a dummy which is one for energy intensive firms. (1) is the simple regression, (2) adds fixed effects, (3) adds the interaction between energy intensity and price, (4) adds size interactions, (5) adds size and energy intensity interactions.

Regression of natural logarithm of ebitda margin on natural logarithm of electricity price

	(1)	(2)	(3)	(4)	(5)
ln_el_price	-0.050***	-0.009	-0.009	-0.017**	-0.029***
	(0.013)	(0.008)	(0.008)	(0.008)	(0.008)
ln_el_price x EI			-0.021	-0.015	-0.007
			(0.034)	(0.033)	(0.034)
Size Interactions					
ln_el_price x micro				0.016***	0.015***
				(0.001)	(0.001)
ln_el_price x small				0.002***	0.002**
				(0.001)	(0.001)
ln_el_price x medium				-0.003***	-0.004***
				(0.001)	(0.001)
Macroeconomic Controls					
Change in GDP					0.142***
					(0.012)
Herfindahl-Hirschman index					-0.022***
					(0.003)
Interest Rate					-0.004***
					(0.001)
Inflation					-0.000
					(0.000)
Constant	4.072***	4.142***	4.143***	4.148***	4.164***
	(0.021)	(0.013)	(0.013)	(0.012)	(0.025)
Fixed Effects	No	Yes	Yes	Yes	Yes
F	14.445	1.528	1.058	51.006	37.106
R-squared	0.001	0.423	0.423	0.423	0.425
Adjusted R-squared	0.001	0.322	0.322	0.322	0.324
N	19,476,757	18,842,665	18,842,665	18,842,665	18,616,586

* p≤0.1, ** p≤0.05, *** p≤0.01

Notes: ln_el_price refers to the natural logarithm of the electricity price, EI refers to a dummy which is one for energy intensive firms. (1) is the simple regression, (2) adds fixed effects, (3) adds the interaction between energy intensity and price, (4) adds size interactions, (5) adds size and energy intensity interactions.

Regression of natural logarithm of ebitda margin on natural logarithm of gas price

	(1)	(2)	(3)	(4)	(5)
ln_gas_price	-0.018***	-0.014**	-0.014**	0.001	0.005
	(0.005)	(0.006)	(0.006)	(0.005)	(0.005)
ln_gas_price x EI			-0.007	-0.010	-0.009
			(0.011)	(0.010)	(0.011)
Size Interactions					
ln_gas_price x micro				-0.018***	-0.017***
				(0.001)	(0.001)
ln_gas_price x small				-0.006***	-0.005***
				(0.001)	(0.001)
ln_gas_price x medium				0.001**	0.001***
				(0.000)	(0.001)
Macroeconomic Controls					
Change in GDP					0.138***
					(0.011)
Herfindahl-Hirschman index					-0.020***
					(0.003)
Interest Rate					-0.005***
					(0.001)
Inflation					-0.000
					(0.000)
Constant	4.195***	4.187***	4.187***	4.185***	4.216***
	(0.010)	(0.012)	(0.012)	(0.012)	(0.026)
Fixed Effects	No	Yes	Yes	Yes	Yes
F	11.948	5.613	3.612	79.982	76.141
R-squared	0.000	0.423	0.423	0.424	0.426
Adjusted R-squared	0.000	0.322	0.322	0.322	0.324
N	19,362,809	18,728,854	18,728,854	18,728,854	18,508,188

* p≤0.1, ** p≤0.05, *** p≤0.01

Notes: ln_gas_price refers to the natural logarithm of the gas price, EI refers to a dummy which is one for energy intensive firms. (1) is the simple regression, (2) adds fixed effects, (3) adds the interaction between energy intensity and price, (4) adds size interactions, (5) adds size and energy intensity interactions.

Regression of natural logarithm of investment ratio on natural logarithm of electricity price

	(1)	(2)	(3)	(4)
	Unrestricted	Bottom 10%	Bottom 5%	Bottom 1%
L.ln_el_price	-0.133***	-0.142***	-0.137***	-0.134***
	(0.023)	(0.023)	(0.023)	(0.023)
L.ln_el_price x EI	0.135***	0.129***	0.132***	0.135***
	(0.040)	(0.040)	(0.040)	(0.040)
Size Interactions				
L.ln_el_price x micro	-0.069***	-0.072***	-0.071***	-0.069***
	(0.004)	(0.004)	(0.004)	(0.004)
L.ln_el_price x small	-0.048***	-0.050***	-0.049***	-0.048***
	(0.003)	(0.003)	(0.003)	(0.003)
L.ln_el_price x medium	-0.025***	-0.026***	-0.025***	-0.025***
	(0.002)	(0.002)	(0.002)	(0.002)
Financial Constraints				
Bottom 10%		0.088***		
		(0.006)		
L.ln_el_price x Bottom 10%		0.103***		
		(0.004)		
Bottom 5%			0.055***	
			(0.005)	
L.ln_el_price x Bottom 5%			0.088***	
			(0.004)	
Bottom 1%				0.003
				(0.004)
L.ln_el_price x Bottom 1%				0.059***
				(0.003)
Constant	-0.255***	-0.267***	-0.260***	-0.256***
	(0.037)	(0.037)	(0.037)	(0.037)
Fixed Effects	Yes	Yes	Yes	Yes
F	89.849	552.875	376.856	208.815
R-squared	0.264	0.267	0.265	0.264
Adjusted R-squared	0.128	0.132	0.129	0.128
N	14,131,307	14,131,307	14,131,307	14,131,307

* p<0.1, ** p<0.05, *** p<0.01

Notes: ln_el_price refers to the natural logarithm of the electricity price, EI refers to a dummy which is one for energy intensive firms.

Regression of natural logarithm of investment ratio on natural logarithm of gas price

	(1)	(2)	(3)	(4)
	Unrestricted	Bottom 10%	Bottom 5%	Bottom 1%
L.ln_gas_price	-0.130***	-0.124***	-0.128***	-0.130***
	(0.006)	(0.006)	(0.006)	(0.006)
L.ln_gas_price x EI	0.038***	0.036***	0.037***	0.037***
	(0.012)	(0.012)	(0.012)	(0.012)
Size Interactions				
L.ln_gas_price x micro	0.042***	0.045***	0.044***	0.043***
	(0.003)	(0.003)	(0.003)	(0.003)
L.ln_gas_price x small	0.028***	0.030***	0.029***	0.028***
	(0.002)	(0.002)	(0.002)	(0.002)
L.ln_gas_price x medium	0.016***	0.016***	0.016***	0.016***
	(0.002)	(0.002)	(0.002)	(0.002)
Financial Constraints				
Bottom 10%		0.087***		
		(0.006)		
L.ln_gas_price x Bottom 10%		-0.082***		
		(0.004)		
Bottom 5%			0.054***	
			(0.005)	
L.ln_gas_price x Bottom 5%			-0.069***	
			(0.003)	
Bottom 1%				0.003
				(0.004)
L.ln_gas_price x Bottom 1%				-0.046***
				(0.003)
Constant	0.259***	0.249***	0.255***	0.258***
	(0.013)	(0.012)	(0.012)	(0.013)
Fixed Effects	Yes	Yes	Yes	Yes
F	143.471	282.402	226.167	165.490
R-squared	0.264	0.267	0.265	0.264
Adjusted R-squared	0.127	0.131	0.129	0.127
N	14,030,566	14,030,566	14,030,566	14,030,566

* p<0.1, ** p<0.05, *** p<0.01

Notes: ln_gas_price refers to the natural logarithm of the gas price, EI refers to a dummy which is one for energy intensive firms.

Regression of natural logarithm of ebitda margin on natural logarithm of electricity price
*

	(1)	(2)	(3)	(4)
	Unrestricted	Bottom 10%	Bottom 5%	Bottom 1%
ln_el_price	-0.017**	-0.006	-0.010	-0.016**
	(0.008)	(0.008)	(0.008)	(0.008)
ln_el_price x EI	-0.015	-0.022	-0.020	-0.016
	(0.033)	(0.032)	(0.033)	(0.033)
Size Interactions				
ln_el_price x micro	0.016***	0.012***	0.012***	0.015***
	(0.001)	(0.001)	(0.001)	(0.001)
ln_el_price x small	0.002***	-0.000	-0.000	0.001*
	(0.001)	(0.001)	(0.001)	(0.001)
ln_el_price x medium	-0.003***	-0.005***	-0.005***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Financial Constraints				
Bottom 10%		-0.288***		
		(0.023)		
ln_el_price x Bottom 10%		-0.103***		
		(0.013)		
Bottom 5%			-0.340***	
			(0.031)	
ln_el_price x Bottom 5%			-0.120***	
			(0.018)	
Bottom 1%				-0.307***
				(0.065)
ln_el_price x Bottom 1%				-0.085**
				(0.039)
Constant	4.148***	4.172***	4.161***	4.149***
	(0.012)	(0.012)	(0.012)	(0.012)
Fixed Effects	Yes	Yes	Yes	Yes
F	51.006	117.426	105.383	103.607
R-squared	0.423	0.430	0.429	0.425
Adjusted R-squared	0.322	0.330	0.328	0.324
N	18,842,665	18,842,665	18,842,665	18,842,665

* p<0.1, ** p<0.05, *** p<0.01

Notes: ln_el_price refers to the natural logarithm of the electricity price, EI refers to a dummy which is one for energy intensive firms.

Regression of natural logarithm of ebitda margin on natural logarithm of gas price

	(1)	(2)	(3)	(4)
	Unrestricted	Bottom 10%	Bottom 5%	Bottom 1%
ln_gas_price	0.001	0.003	0.001	0.001
	(0.005)	(0.005)	(0.005)	(0.005)
ln_gas_price x EI	-0.010	-0.011	-0.011	-0.010
	(0.010)	(0.010)	(0.010)	(0.010)
Size Interactions				
ln_gas_price x micro	-0.018***	-0.015***	-0.015***	-0.017***
	(0.001)	(0.001)	(0.001)	(0.001)
ln_gas_price x small	-0.006***	-0.004***	-0.004***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
ln_gas_price x medium	0.001**	0.002***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Financial Constraints				
Bottom 10%		-0.026**		
		(0.012)		
ln_gas_price x Bottom 10%		-0.042***		
		(0.006)		
Bottom 5%			-0.052***	
			(0.015)	
ln_gas_price x Bottom 5%			-0.040***	
			(0.006)	
Bottom 1%				-0.103***
				(0.024)
ln_gas_price x Bottom 1%				-0.028***
				(0.010)
Constant	4.185***	4.187***	4.186***	4.185***
	(0.012)	(0.011)	(0.011)	(0.012)
Fixed Effects	Yes	Yes	Yes	Yes
F	79.982	136.119	129.380	118.808
R-squared	0.424	0.430	0.429	0.426
Adjusted R-squared	0.322	0.330	0.328	0.324
N	18,728,854	18,728,854	18,728,854	18,728,854

* p<0.1, ** p<0.05, *** p<0.01

Notes: ln_gas_price refers to the natural logarithm of the gas price, EI refers to a dummy which is one for energy intensive firms.