

WINTER IS COMING: MANAGEMENT STYLE AND FIRM SUCCESS DURING THE ENERGY CRISIS

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Introduction

The current study analyses different managerial styles and firm adjustment to an energy crisis. It provides evidence for the link between productivity differentials during turbulent times and firm management practices.

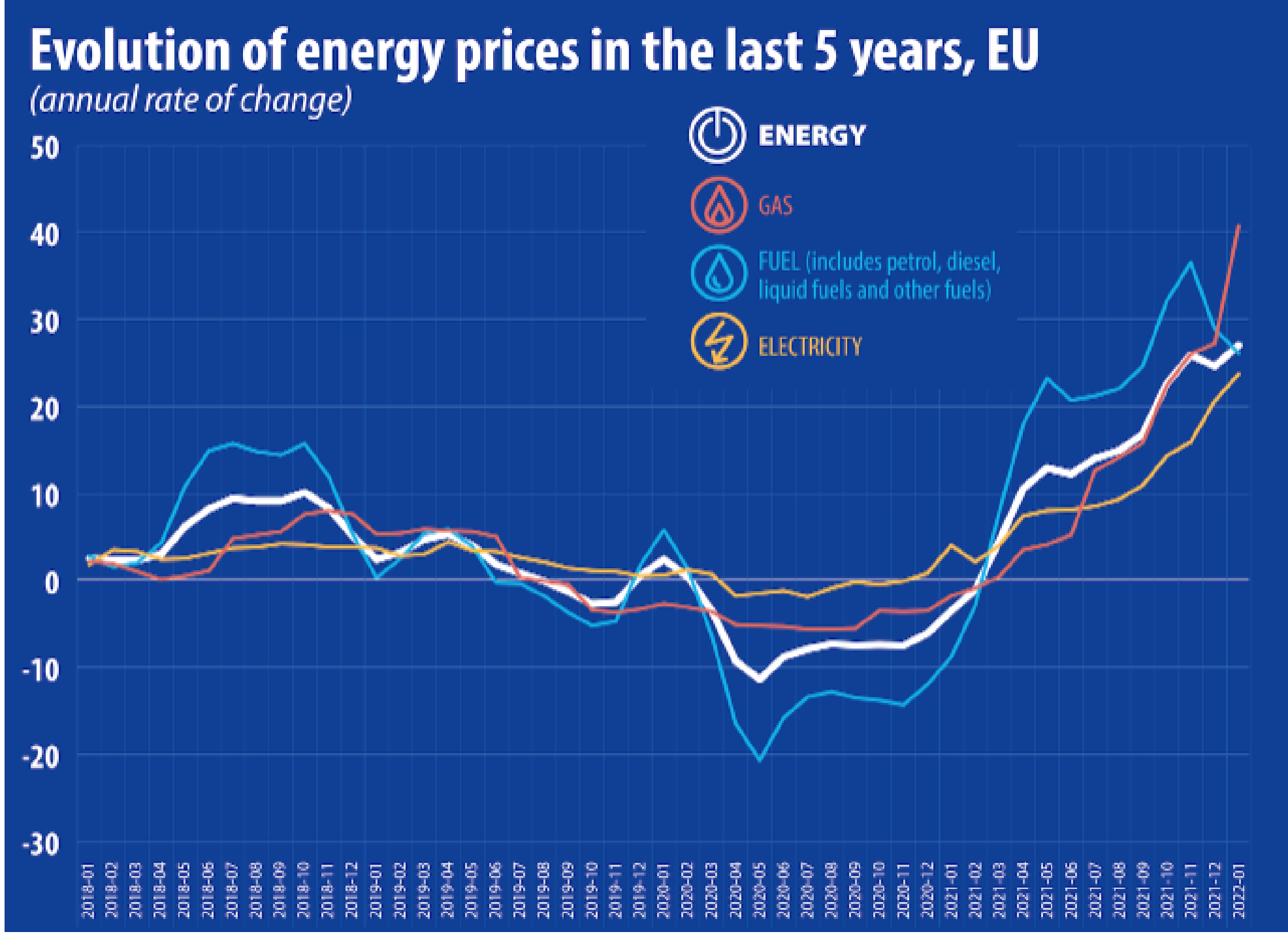


Figure 1. Evolution of energy prices in EU (Eurostat)

Previous studies (**Financial and Health**) crises (Alfaro & Chen, 2012; Aghion et al., 2021; Englmaier et al., 2020; Collings et al., 2021; Bradley et al., 2011; Chatzopoulou et al., 2022); however, to the best of my knowledge, no thorough study in **energy crisis**.

Californian Energy Crisis (2000-2001)

- May, 2000:** A drought in Pacific Northwest significantly decreased the amount of available hydroelectricity
→ wholesale power costs soar, consumer bills tripled
- June, 2000:** California suffers its largest blackout since World War II - 97,000 customers
- January - March 2001:** State-wide rolling blackout - 1.5 million customers
- April 2001:** Pacific Gas & Electric Co. went to bankruptcy
- May 2001:** Blackouts affected upwards of 167,000 customers
- September 2001:** After involvement of the Federal Energy Regulatory Commission (FERC), prices normalized

⇒ **Market Demand Shock rather than Market Supply Shock**

- Corporations were on “Time-of-use Meters” no high energy bills
- Corporations had to cope with unplanned rolling blackouts
- Winners: produce efficiently with limited energy

Measurement and Data

Evaluate the **management styles** using Principal Component Analysis (PCA) with two dimensions:

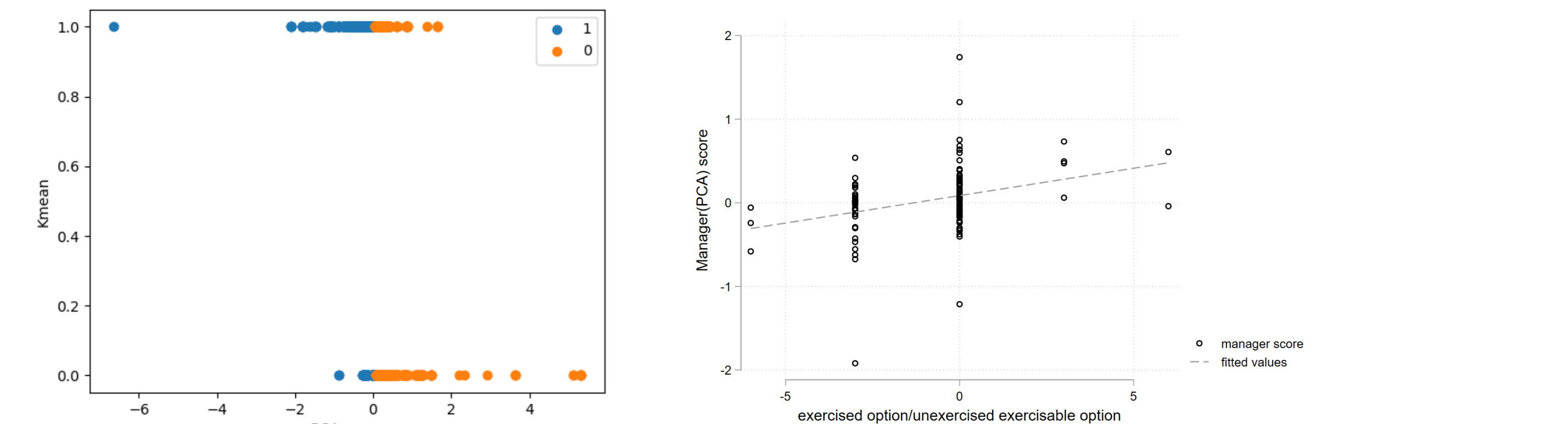
- Financial Decision (Compustat Historical Segments)
- Personal Attributes (Biography from Compustat, Capital IQ, People Intelligent)

⇒ (**PLS**) Present focus and **Less** confident about the future; therefore, **Short-term** goals
⇒ (**FCL**) Future focus and **Confident** about the future; therefore, **Long-term** goals

Financial Ratio	Category	Formulas	Loadings
Negative			
Total Liabilities/Equity	Solvency	Total Liabilities to Shareholders' Equity (common and preferred)	-0.39328578
Total Debt/Total Assets	Solvency	Total Debt as a fraction of Total Assets	-0.37923115
Long-term Debt/Total Liabilities	Financial Soundness	Long-term Debt as a fraction of Total Liabilities	-0.26390222
Total Debt/Capital	Solvency	Total Debt as a fraction of Total Capital, where Total Debt is defined as the sum of Accounts Payable and Total Debt in Current and Long-term Liabilities, and Total Capital is defined as the sum of Total Debt and Total Equity (common and preferred)	-0.22662327
Positive			
Current Ratio	Liquidity	Current assets as a fraction of current liabilities	0.30770525
Cash Balance/Total Liabilities	Financial Soundness	Cash balance as a fraction of total liabilities	0.2989338
Current Liabilities/Total Liabilities	Financial Soundness	Current liabilities as a fraction of total liabilities	0.29389569
Cash Ratio	Liquidity	Cash and Short-term Investments as a fraction of Current Liabilities	0.27511629

Table 1. Top four negative and positive loadings: Higher value describes a management style closer to PLS type

For robustness check of PCA outcome, I conduct K-mean cluster and confidence measure (Malmendier & Tate, 2005)

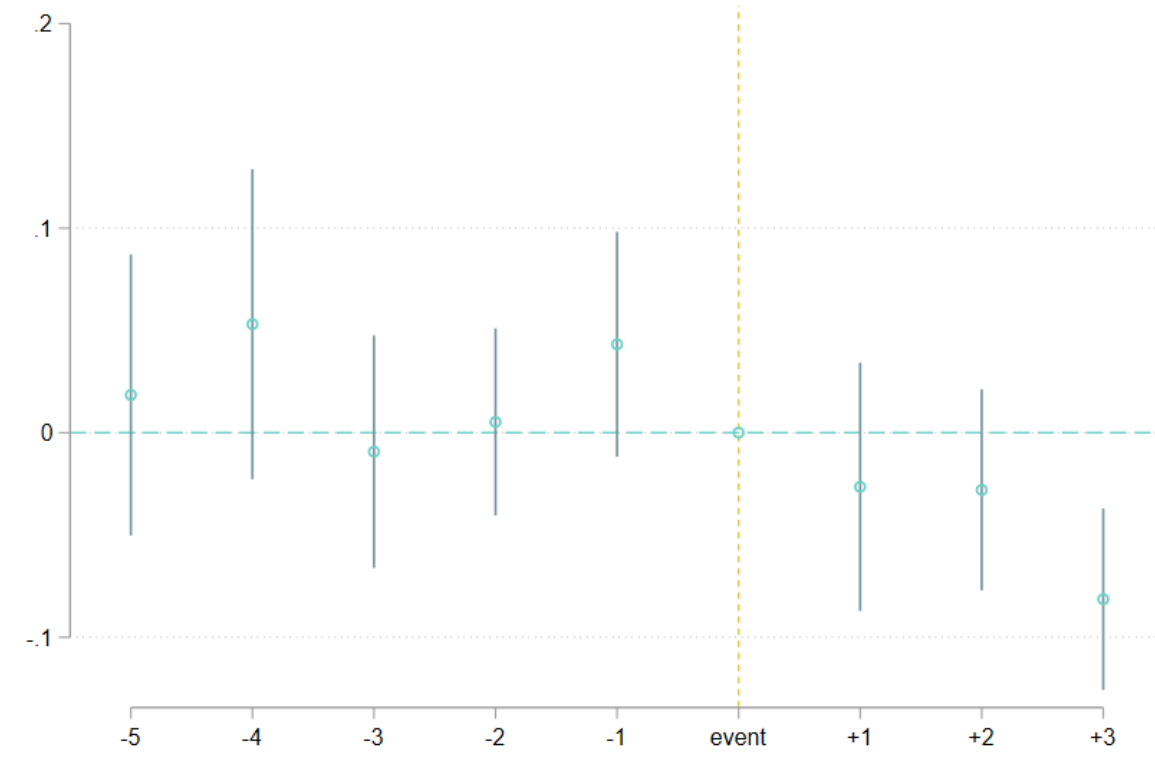


Lastly, **firm performance** is observed based on firm profitability (Gross Profit Margin from Compustat)

Methodology

$$\ln Y_{i,j,t} = \beta_0 + \theta_1(PLS_MANAGE_i \times CRISIS_t) + \omega x_{i,t} + \gamma_i + \zeta_t + \epsilon_{i,j,t} \quad (1)$$

- $\ln Y_{i,j,t}$: Firms' gross profit margin
- PLS_MANAGE_i : Dummy equals 1 if PLS (higher than median → PLS)
- $CRISIS_t$: A dummy equals 1 if year 2000-2001 (Observation period: 1994-2001(2002))
- $x_{i,t}$: Controls: firms founding year, size, capital expenditure
- γ_i : Firm fixed effect
- ζ_t : Year fixed effect
- $\epsilon_{i,j,t}$: Error term clustered in county and industry level
- θ_1 : Coefficient of interest
→ Relative outcomes of firms in California under different managerial styles before/after the energy crisis



Main Outcome and Mechanism

Ln. Gross profit margin	(1)	(2)	(3)	(4)	(5)
$PLS_MANAGE_i \times CRISIS_t$	0.006 (0.037)	-0.022 (0.033)	-0.006 (0.021)	-0.049 (0.012)	-0.060 (0.020)
PLS_MANAGE_i	0.087 (0.077)	0.060 (0.075)	0.015 (0.075)		
$CRISIS_t$	0.001 (0.035)	-0.001 (0.033)		0.019 (0.027)	
Observations	1676,000	1618,000	1676,000	1673,000	1614,000
Mean DV	-1.03	-1.02	-1.03	-1.02	-1.02
sd DV	0.60	0.60	0.60	0.60	0.59
R ²	0.005	0.691	0.489	0.807	0.813
Controls	No	Yes	No	Yes	Yes
Firm FE	No	No	No	Yes	Yes
Year FE	No	No	Yes	No	Yes

Note: The standard errors in brackets are clustered at the district and industry level. PLS_MANAGE_i is a dummy equals to 1 if it is the PLS Management style. The observation period covers from 1994 to 2001. Controls include firms' size, age and their capital expenditure.

	(1) Ln.GPM	(2) Ln.GPM	(3) Ln.Revenue	(4) Ln.Revenue	(5) Ln.COGS	(6) Ln.COGS
$PLS_MANAGE_i \times CRISIS_t$	-0.022 (0.033)	-0.000 (0.020)	0.055 (0.080)	-0.006 (0.027)	0.040 (0.081)	-0.028 (0.030)
PLS_MANAGE_i	0.090 (0.075)	0.089 (0.075)	0.010 (0.228)	-0.164 (0.147)		
$CRISIS_t$	-0.001 (0.033)		0.245 (0.122)		0.326 (0.071)	
Observations	1618,000	1614,000	1658,000	1654,000	1677,000	1675,000
Mean DV	-1.02	-1.02	5.01	5.02	4.11	4.11
sd DV	0.60	0.59	2.02	2.02	2.11	2.11
R ²	0.491	0.813	0.582	0.955	0.613	0.917
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	Yes	No	Yes
Year FE	No	Yes	No	Yes	No	Yes

Note: The standard errors in brackets are clustered at the district and industry level. PLS_MANAGE_i is a dummy that equal to 1 for a PLS management style. The observation period covers from 1994 to 2001. Controls include firms' size, age as their capital expenditure. GPM stands for gross profit margin. COGS stands for cost of good sold (including the cost of lab materials, and manufacturing overhead).

All results are stable with two alternative treatment variables

FCL management style performed better than PLS during the energy crisis by incurring less COGS



The standard errors are stable after controlling the firm size

FCL managers could perform better during the energy crisis because they could reduce their **input cost** (labor expense) thanks to their previous **investment** (machinery)

Conclusion

- A *good* management style requires a flexible input composition, allowing firms to achieve equi-finality in terms of their production
- A *good* manager is one who comprehends the marginal rate of technical substitution between their inputs and adjust their production function
- A *good* robotization may play a significant role in enhancing firm performance especially during a situation with limited resources

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