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Experience alters response: Patterns in Energy Efficiency Investments from Industrial Firms

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Extended Abstract

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Abstract Summary

Dutch industrial firms face a significant energy efficiency investment gap, despite rising energy costs and carbon taxes. This paper investigates how energy costs and investment history jointly shape firms' decisions to invest in energy efficiency measures. Using ten years of firm-level panel data (2012–2022) from Statistics Netherlands, covering over 8,000 industrial firms, we estimate a series of dynamic panel models using system GMM to account for endogeneity and firm heterogeneity.

Our key finding is that the effect of rising energy costs on energy efficiency investments is conditional on prior investment experience. For firms without prior experience, a 10% increase in energy costs is associated with a statistically significant 2.4–5.1% decrease in energy efficiency investments, suggesting that higher energy costs act as a financial constraint rather than an incentive for first-time adopters. In contrast, experienced firms show no evidence of reduced investment and, in several specifications, respond positively to rising energy costs. These results are consistent with learning effects and path dependency: experienced firms have already overcome information barriers and sunk costs, enabling them to act on improved investment returns when energy prices rise.

These findings have direct policy implications. Energy and carbon pricing policies alone are insufficient to trigger first-time energy efficiency adoption and may even slow it down. Complementary support instruments — such as targeted subsidies, low-interest loans, or energy management training for inexperienced firms — are needed to unlock the majority of Dutch industrial firms (approximately 72%) that have not yet invested in energy efficiency.