



# How to Make Energy Efficiency Projects Attractive? An Analysis of EU Firms

Pauline Ravillard

STAREBEI in collaboration with Dr Brutscher (EIB) and Dr Semieniuk (SOAS University of London)

EIB, Luxembourg, 19/12/19

# Presentation outline

- Why we care
- What were our questions
- How we answered them
- Results
- Policy takeaways

# Why we care

- Climate change as a threat
- Europe's Green new Deal
- How do we get there?

# What were our questions

1. How efficient is the financial system in rewarding investments in energy efficiency?
2. What is the lost potential in terms of investments in energy efficiency because banks don't care?
3. What role for technical assistance and energy audits in promoting investment in energy efficiency?
4. How can we promote more energy audits?

# How we answered them

## EIB Group Survey on Investment and Investment Finance (EIBIS)

- Initiative of the Economics Department of the Bank
- Annually since 2016
- Designed to be representative by country, firm size and firm sector
- Firms can be either micro, small, medium or large, and in the manufacturing, construction, infrastructure or services sector
- Data can be matched to the firms' profit and loss and balance sheet data
- The survey consists of two parts:
  - i) the general module
  - ii) an online follow-up

# How we answered them

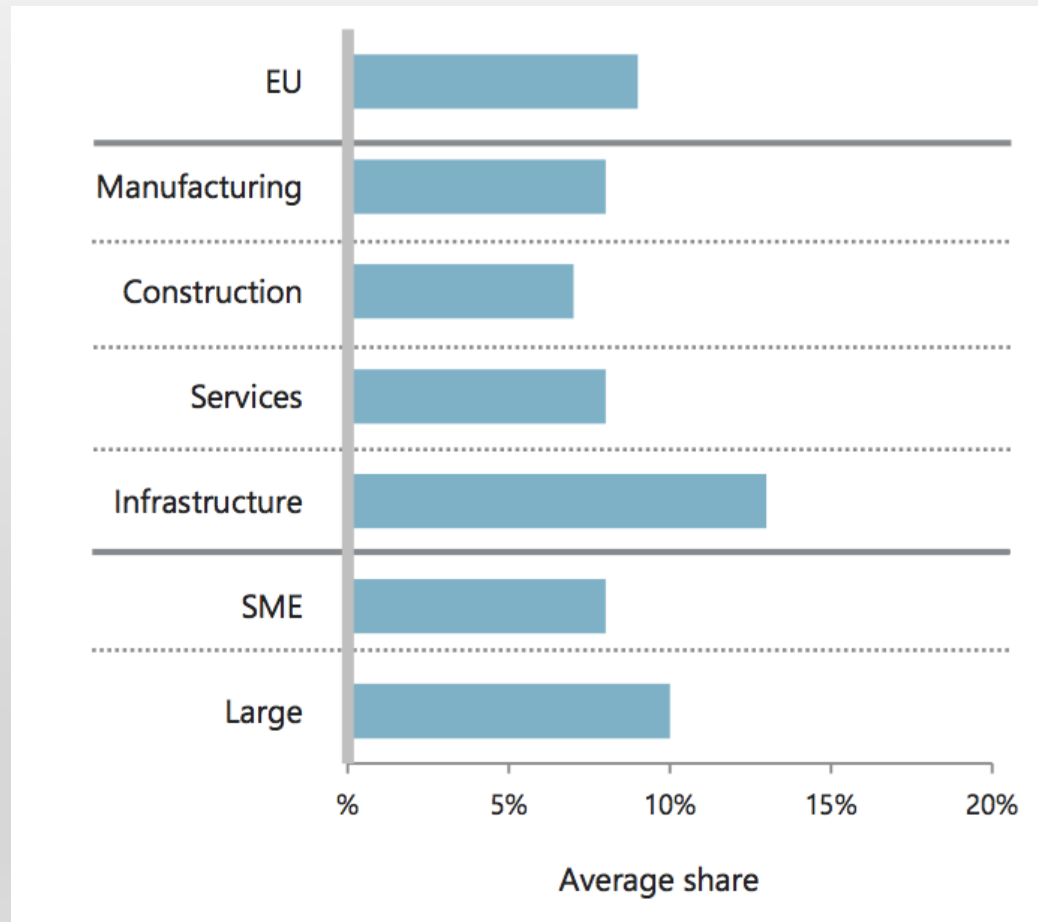
	General module	Online module
<b>Mode of implementation</b>	Telephone interview	Online
<b>N° of observations</b>	12,500	1,650
<b>Focus</b>	Investment and investment finance	Energy efficiency
<b>Type of questions</b>	Descriptive	Choice experiment

# How we answered them

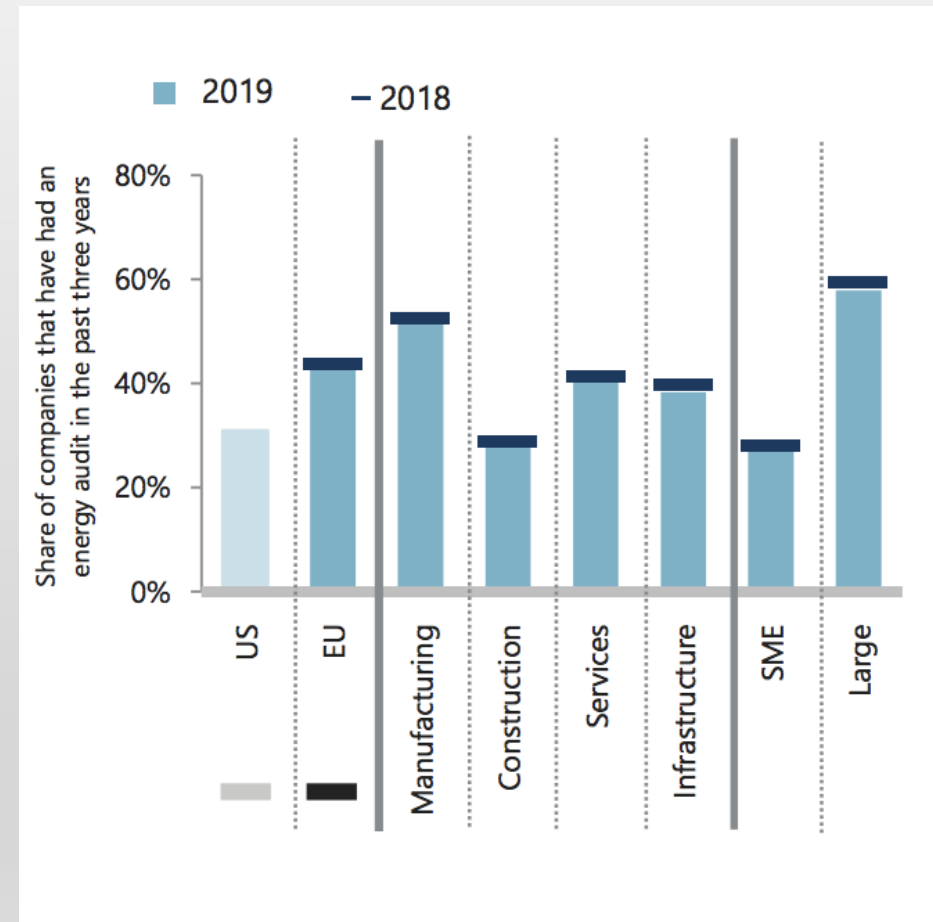
	General module	Online module
<b>Type of questions</b>	<p>Amount of overall investment</p> <p>Investment by type of assets (including tangible and intangible assets)</p> <p>Investment by type of purpose</p> <p>Firm performance (turnover, profits, productivity etc.)</p> <p>Obstacles to investment (including access to finance)</p> <p>...and a few questions on energy</p>	<p>Some background questions</p> <p>Given a specific choice situation,</p> <p><u>“How likely are you to invest?”</u></p> <p><u>“How likely are you to carry out an energy audit?”</u></p>

# How we answered them

We have a unique dataset that provides us with the information we need on firms' investment in energy efficiency so that we can estimate **how much has been done**, and **how much remains to be done...**



Base: all firms who have invested in the last financial year (excluding don't know/refused)  
Q: What proportion of total investment in the last financial year was primarily for measures to improve energy efficiency in your organisation?  
Source: EIBIS 2018



Base: all firms excluding companies that didn't exist three years ago  
Q: In the past three years has your company had an energy audit (an assessment of the energy needs and efficiency of your company's buildings?)  
Source: EIBIS 2019



# To recall our questions...

1. How efficient is the financial system in rewarding investments in energy efficiency?
2. What is the lost potential in terms of investments in energy efficiency because banks don't care?
3. What role for technical assistance and energy audits in promoting investment in energy efficiency?
4. How can we promote more energy audits?

# To recall our questions... **a quick teaser**

1. How efficient is the financial system in rewarding investments in energy efficiency? **Not at all.**
2. What is the lost potential in terms of investments in energy efficiency because banks don't care? **They're substantially lower than otherwise.**
3. What role for technical assistance and energy audits in promoting investment in energy efficiency? **They both matter.**
4. How can we promote more energy audits? **By increasing the level of support in the form of a grant.**

# How we answered them

We carried out three different research projects using EIBIS:

1. **"Do Firms With Higher Energy Efficiency Have Better Access to Finance?"**
2. **"How Can Favourable Financing Improve Energy Efficiency Investments? Evidence From New Experimental Data"**
3. **"Experiment-Based Evidence on the Effectiveness of Policy Interventions in Promoting Energy Audits"**

1. Do Firms With Higher Energy Efficiency  
Have Better Access to Finance?

# 1. Data

- **Matched EIBIS-ORBIS data** for the years 2016, 2017 and 2018.
- **Energy efficiency:** firm's share of building stock that satisfies high or highest energy efficiency standards.
- Two variables to measure **access to finance**:
  - 1) whether the firm is financially constrained (*actual*);
  - 2) whether firms perceive that the availability of finance is an obstacle to investment (*perceived*).
- Determinants of access to finance are **firm characteristics** (i.e. size, sector and age) and the **5 C's**: Character, Capacity, Collateral, Conditions and Capital.

# 1. Descriptive Statistics

<b>Variable</b>	<b>N° of observations</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Access to finance	24,575	0.938	0.241	0	1
High energy efficiency stock (%)	25,739	0.496	0.500	0	1
Innovation	25,107	0.383	0.486	0	1
SOA machinery (%)	25,335	0.450	0.317	0	1
Labour productivity	11,634	10.878	0.788	2.166	15.502
Operating at full capacity	25,495	0.523	0.499	0	1
Investment in R&D	21,728	0.084	0.191	0	1
Current ratio	16,348	2.030	2.539	0	49.391
Return on assets	15,043	0.106	0.107	-0.993	0.834
Financial leverage	13,949	0.206	0.217	0	1.468
Foreign-owned	25,739	0.181	0.385	0	1
Size	25,739	3.149	0.982	1	4
Age	17,691	33.124	25.821	1	313
Sector	25,739	0.386	0.487	0	1

# 1. Results

VARIABLES	(1) Energy efficiency	(2) Firm characteristics	(3) Operational health	(4) Financial health	(5) Foreign- owned	(6) Energy efficiency & large
Energy efficiency	0.0123** (0.00515)	0.00735 (0.00588)	0.00503 (0.00807)	0.00620 (0.00864)	0.00656 (0.00855)	0.00130 (0.00911)
Innovation			-0.00488 (0.00588)	-0.0141** (0.00615)	-0.0134** (0.00608)	-0.0137** (0.00609)
SOA machinery			0.0239** (0.00945)	0.0293*** (0.0101)	0.0293*** (0.00999)	0.0278*** (0.0100)
Labour productivity			0.0228*** (0.00390)	0.0220*** (0.00479)	0.0197*** (0.00478)	0.0233*** (0.00475)
Operating at full capacity			0.0233*** (0.00547)	0.0218*** (0.00585)	0.0217*** (0.00578)	0.0221*** (0.00580)
Investment in R&D			-0.0699*** (0.0150)	-0.0658*** (0.0158)	-0.0649*** (0.0156)	-0.0654*** (0.0157)
Current ratio				0.00237* (0.00125)	0.00236* (0.00123)	0.00202* (0.00122)
Return on assets				-0.0220 (0.0249)	-0.0160 (0.0247)	-0.0267 (0.0248)
Financial leverage				-0.0403*** (0.0152)	-0.0329** (0.0153)	-0.0287* (0.0153)
Small		-0.00268 (0.00636)	0.00843 (0.00892)	0.00896 (0.0103)	0.00828 (0.00991)	
Medium		0.0264*** (0.00624)	0.0298*** (0.00892)	0.0337*** (0.0102)	0.0304*** (0.00989)	
Large		0.0240*** (0.00750)	0.0232** (0.0106)	0.0289** (0.0117)	0.0220* (0.0117)	
Construction		-0.000394 (0.00616)	-0.00913 (0.00817)	-0.0123 (0.00882)	-0.00945 (0.00871)	-0.0142* (0.00860)
Services		0.0137** (0.00577)	0.00797 (0.00753)	0.00520 (0.00791)	0.00649 (0.00788)	0.00128 (0.00774)
Infrastructure		0.0153*** (0.00569)	0.00479 (0.00761)	0.00308 (0.00799)	0.00548 (0.00792)	0.00139 (0.00777)
Age		0.000264* (0.000137)	0.000161 (0.000183)	9.46e-06 (0.000186)	2.31e-05 (0.000185)	0.000133 (0.000185)
Foreign-owned					0.0407*** (0.0118)	0.0439*** (0.0118)
Energy efficiency*Large						0.0478** (0.0231)
Large						-0.0147 (0.0108)
Observations	24,735	16,939	9,351	7,841	7,841	7,841

Standard errors in parentheses

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

## 2. How Can Favourable Financing Improve Energy Efficiency Investments? Evidence From New Experimental Data



## 2. Online experiment

- Firms were shown **eight screens** with different combinations of an energy efficiency investment project's characteristics along with a financing offer.
- Firm were then asked whether they would **go ahead with the investment** under these conditions.
- A total of **1,654 firms** participated in the online module.

## 2. Online experiment

Below you can see an energy efficiency project with a particular project cost and annual cost saving, along with a financing offer that is linked to this project. Please assume that you have undertaken an energy audit, and that the savings below come from that report.

Given the two elements, and taking them at face value, how likely are you to go ahead with the project under the given conditions?

*Please Note - The project would necessarily come with this financing, and the financing cannot be used for anything else but the project.*

### Investment Project

Total Investment Cost / GBP	2,000
Annual Cost Saving in terms of energy usage / GBP	375
Corresponding IRR (Internal Rate of Return)	12%
Corresponding Payback Period	6 Years

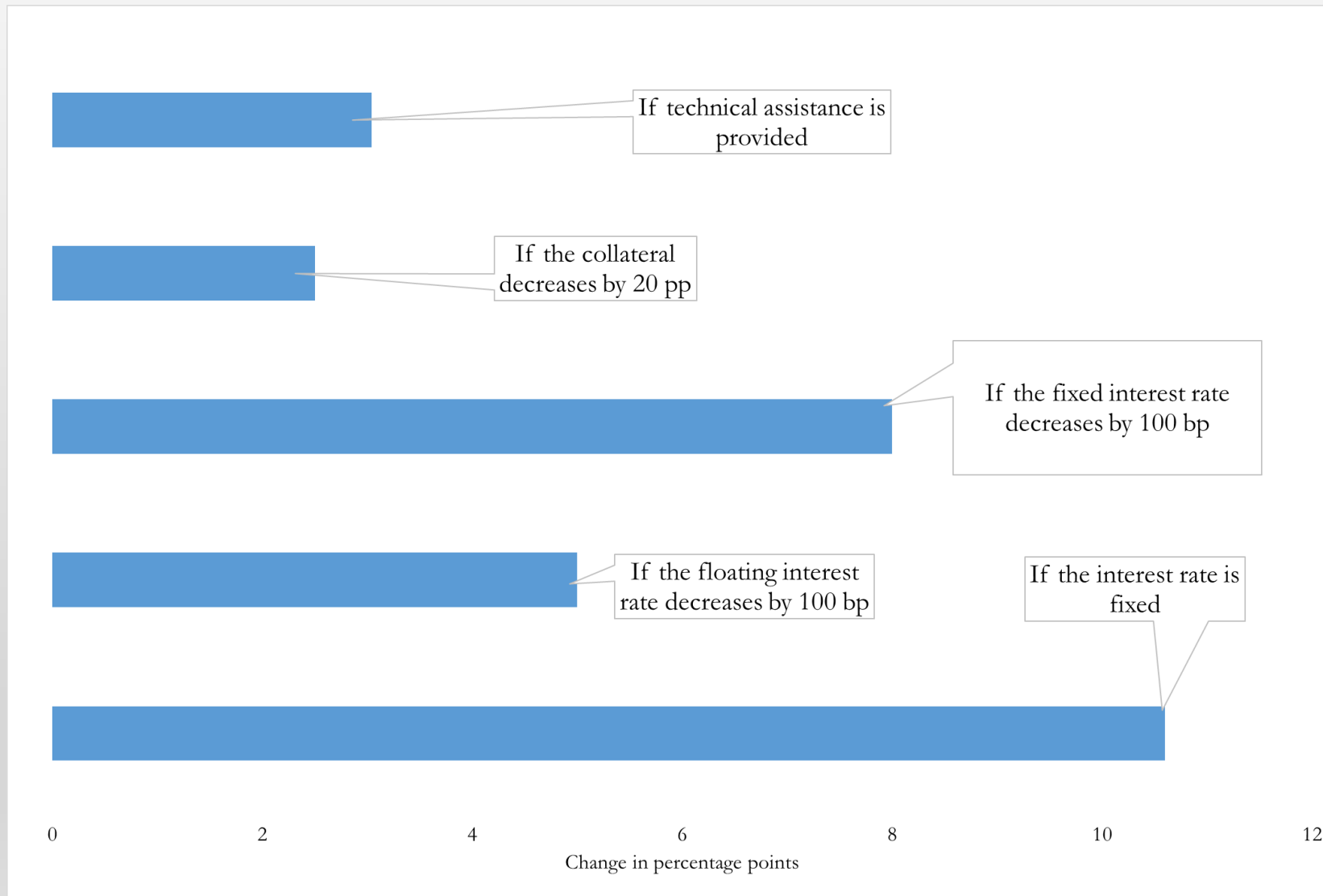
### Financing Offer

Loan Amount / GBP	1,000
Maturity	4 Years
Interest Rate	7.09 %
Interest Rate Type	Fixed Interest Loan
Collateral Requirement (which may include personal, bank and other types of guarantees)	Assets to value of 60%
Technical Assistance	None

How likely would you be to go ahead with this project under the given conditions?

- Definitely would go ahead
- Probably would go ahead
- Might or might not go ahead
- Probably would not go ahead
- Definitely would not go ahead

## 2. Results



- TA is more important for large firms.
- Firms in services are more sensitive to collateral requirements.
- Manufacturing and infrastructure firms are more sensitive to whether interest rate is fixed or floating.

## 2. Simulation tool

Country: France

Firm size: Large

**Investment project**

**Conservative Offer**

**More Favourable Offer**

Invest cost in €

400000

Internal Rate of Return

8

Payback period

6

**Financing offer**

Loan amount in €

200000

400000

Maturity years

3

10

Interest Rate in %

2.50%

0.50%

Interest Rate Type

Floating

Fixed

Collateral in % of assets

80%

20%

Technical assistance

No

Yes

Implementation Probabilities

46%

80%

### 3. Experiment-Based Evidence on the Effectiveness of Policy Interventions in Promoting Energy Audits

### 3. A bit of context

The literature has shown that carrying out an energy audit increases the probability that the firm invests in energy efficiency:

- Kalantzis et al. (2018) on EU firms
- Kalantzis and Revoltella (2019) on EU
- Anderson and Newell (2016)
- Schleich et al. (2015) on Germany companies in tertiary sector

### 3. Online experiment

Each firm was presented with **four screens** with different combinations of policy interventions supporting an energy audit, with some more favourable than others.

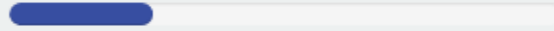
Then, firms were asked whether they would **go ahead in carrying out the energy audit** under these conditions.

A total of **1,178 firms** participated in this online module.

Policy interventions included:

- A financial support covering **10, 30, 50, 70 or 90%** of audit costs
- The support type coming as a **grant** or as a **tax deduction**
- The support being **conditional** or **unconditional** on the firm investing after

### 3. Online experiment



Still thinking about that energy audit, which would cost your company GBP 1,500.

**Suppose that 10% of the cost for the energy audit is tax deductible if it leads to an investment in energy efficiency improvements**

How likely would you be to go ahead with the audit in this case?

*Please select one option only*

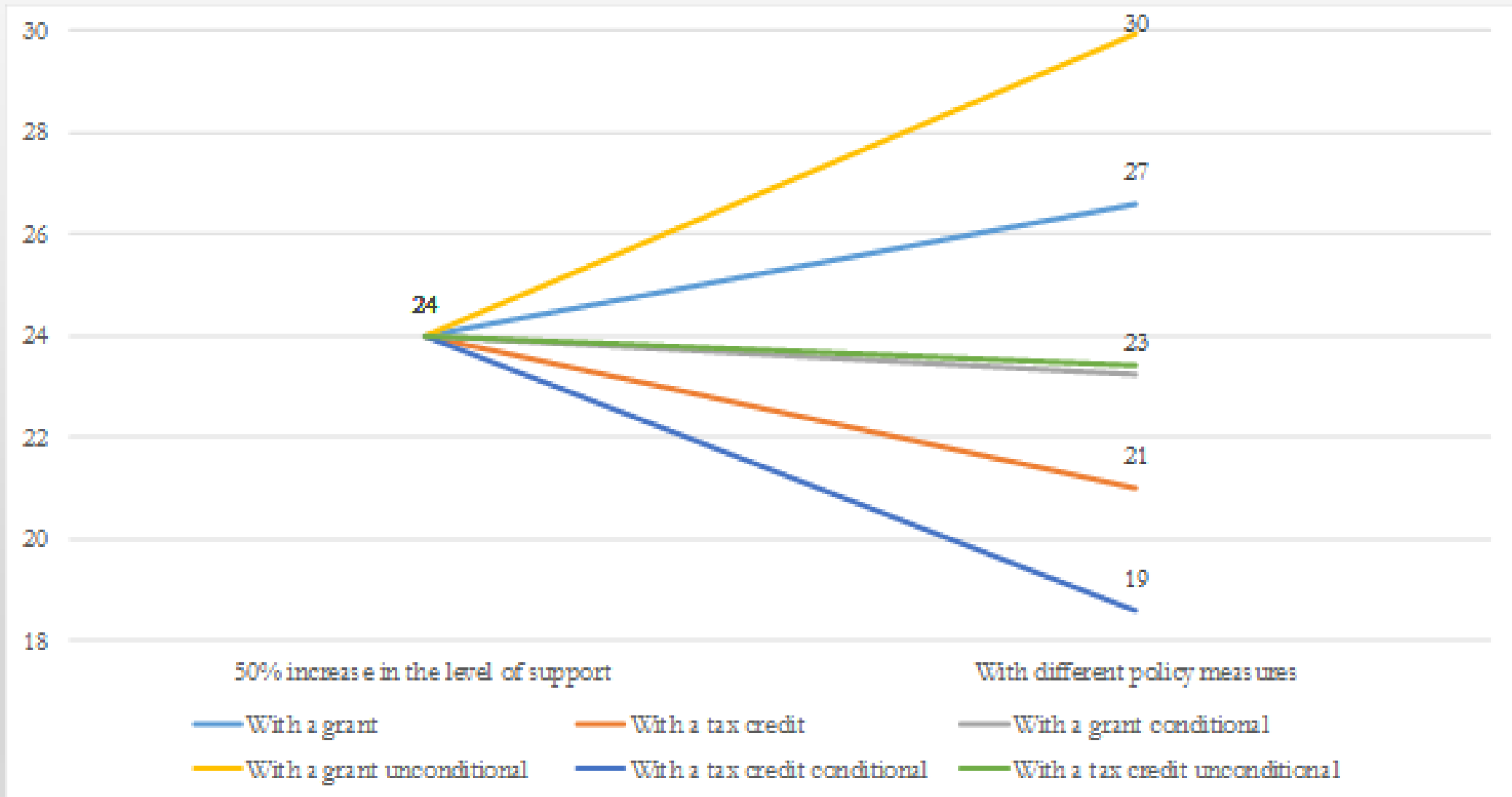
- Definitely would go ahead
- Probably would go ahead
- Might or might not go ahead
- Probably would not go ahead
- Definitely would not go ahead

Back

Next



### 3. Results



# Policy takeaways

- Banking system so far not geared towards channelling funding directed to investments in energy efficiency.
- Taking energy efficiency performance into account in credit approval could lead to triple win:
  1. Banks
  2. Firms
  3. Environment
- Experiments show that various measures can be effective in incentivising firms to invest more in energy efficiency:
  - Funding
  - TA
  - Energy audits
- Energy audits themselves are relatively responsive to policy intervention: our experiment allows to us to quantify trade-off between conditional vs unconditional support.

# References

Anderson, Soren T., and Richard G. Newell. “Information Programs for Technology Adoption: The Case of Energy-Efficiency Audits.” *Resource and Energy Economics* 26, no. 1 (2004):27-50

Kalantzis, Fotios, Brutscher Philipp-Bastian and Ravillard, Pauline. “Investment in Climate Change Mitigation.” In *Investment Report 2018-9: Re-tooling Europe’s Economy*, European Investment Bank. Luxembourg, 2018.

Kalantzis, Fotios, and Debora Revoltella. “How energy audits promote SMES’ energy efficiency investment”. *EIB Working Paper Series* (2019)

Schleich, Joachim, Tobias Fleiter, Simon Hirzel, Barbara Schlomann, Michael Mai, and Edelgard Gruber. “Effect of Energy Audits on the Adoption of Energy-Efficiency Measures by Small Companies.” Toulon, 2015.

**Thank you for your attention**

Any questions/comments welcome!