EU Subsidies Shape Governmental Spending: Evidence from Spain

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August 18, 2021

The EU Cohesion Policy in Numbers

1. One of the biggest policies featuring international transfers.
2. Yearly budget of 50bn Euros.
3. 34% of EU budget, second biggest policy of the EU.
4. All regions with income lower than 75% of the EU average are eligible for subsidies.
5. Important source of funding, especially in poorer EU countries. Lithuania and Bulgaria receive transfers of almost 3% of their GDP.

A subsidy to the poorer regions in the EU

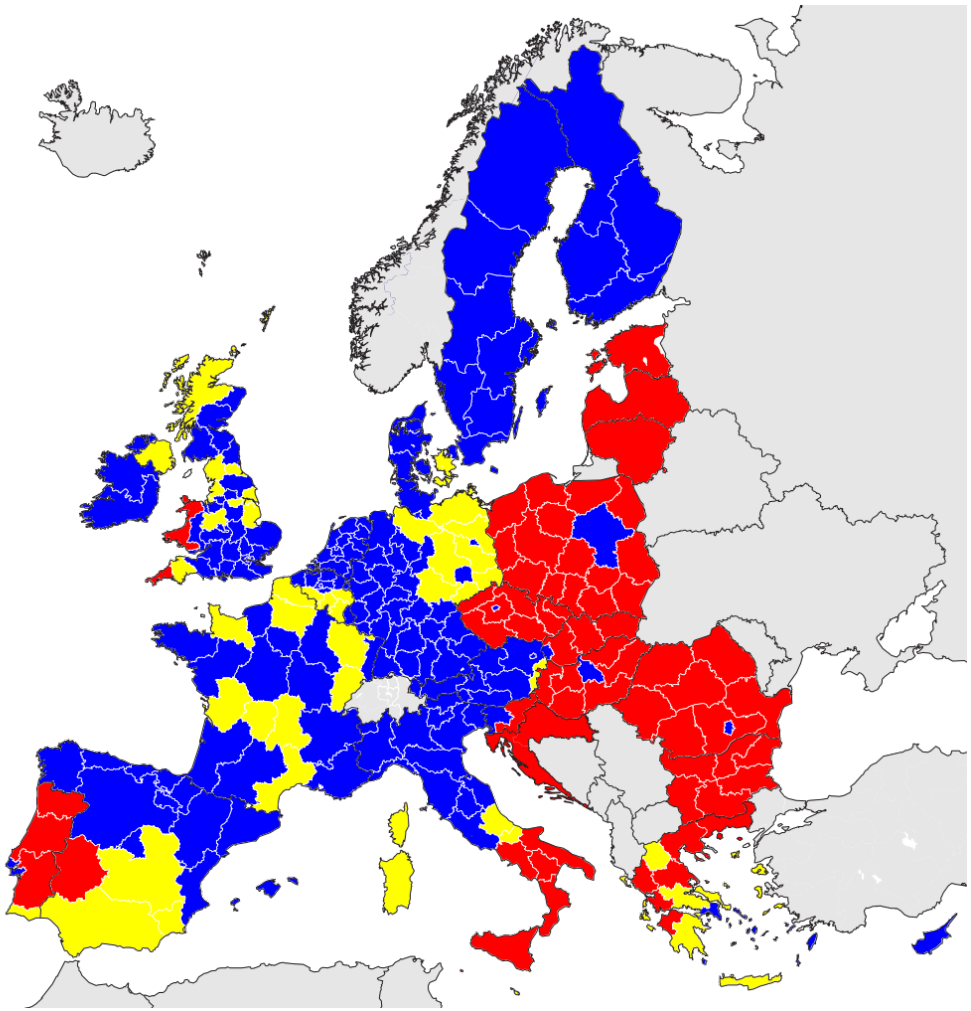


Figure: Latest regional classification: **below 75%**, **75%-90%**, **above 90%** of EU average gdppc

Goals of the policy

1. Enhance development of poorer regions via significant transfers.
2. Subsidize specific areas of the economy:
   - 2007-2013: focus on infrastructure (broadly defined)
   - 2014-2020: focus on the 'smart economy' (*sustainable and inclusive growth*, R&D, education)

Big picture: What level of the government should decide policies?

- Public investment is the primary target of the Cohesion Policy.
- Local governments have an informational advantage over preferences and needs of their constituency.
- Higher levels of government are able to incorporate possible externalities but lack exact knowledge of local preferences.

An extreme example: EU funds might be misallocated

- EU air transport policy aimed at overcoming capacity problems by building additional infrastructure
  - 666 million euro spent during the 2000–06 and 2007–13
- According to the audit of the European Court of Auditors from 2014, *"EU-funded investments in airports produced poor value for money"*

EU wasted money on new airports, say auditors

Spain and Greece spent millions of euros in EU funding on ghost airports which are not being fully used, the European Court of Auditors has found.

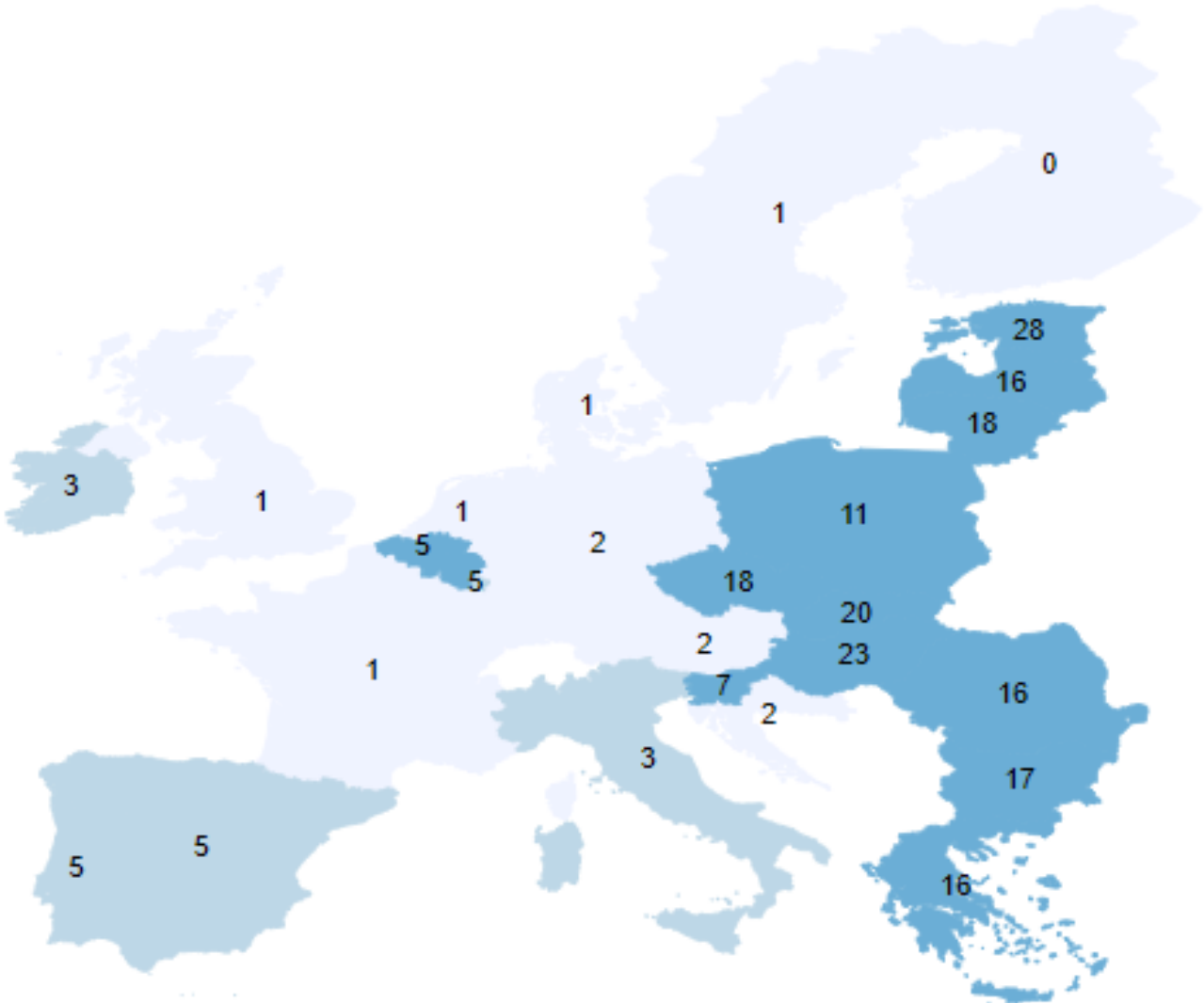
EUROPEAN VOICE
By **DAVE KEATING** | 12/16/14, 11:43 AM CET | Updated 12/16/14, 7:05 PM CET

The European Union wasted millions of euros on investments in airport infrastructure that was not needed from 2000-13, according to a damning report issued today (16 December) by the European Court of Auditors.

- Only 1/2 of the 20 audited airports *"succeeded in increasing their passenger numbers* and "improvements in customer service... not measured or not evidenced".

Local governments are most important recipients of subsidies

Share of subsidized public procurement:



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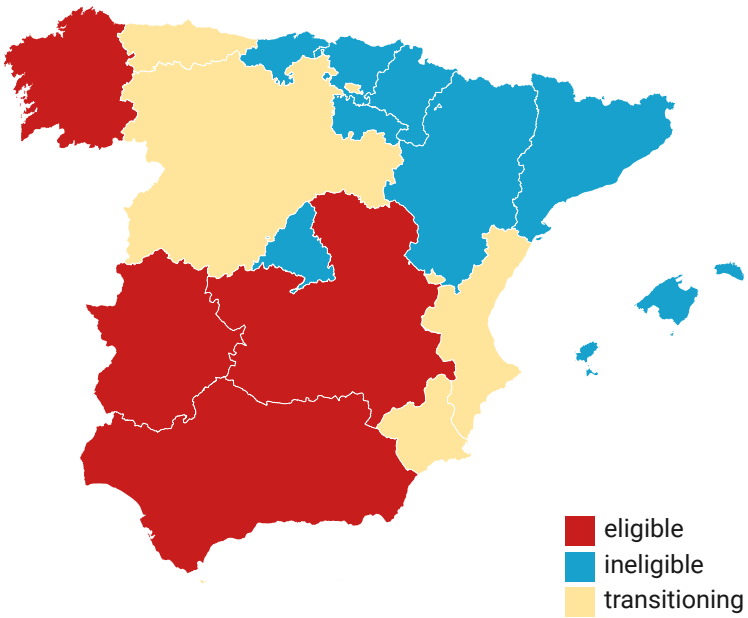
- Cohesion Policy induces a large re-allocation of procurement spending.
- Limited effect on investment in high-externality projects.
- Less than 10% of subsidies are allocated to such projects and we only find effects after re-formulation of goals in 2014.
- Would a direct transfer dominate the current state? What are the benefits of a policy better targeting externalities?
  - Developing a general model of procurement demand.
  - To be done: empirical specification and estimation

Changing landscape in Spain:

- Between 2004-2007, admission of 12 countries into EU lowered average GDP and 75% threshold for access to funds.
- 2007-2013 was a transitional period where funding was awarded according to prior classification.
- From 2014 onwards, new thresholds for eligibility made effective.
- Spain is a unique setting that can be used for identification. Other countries had little within-country variation over time.

Policy change in 2014

2007-2013



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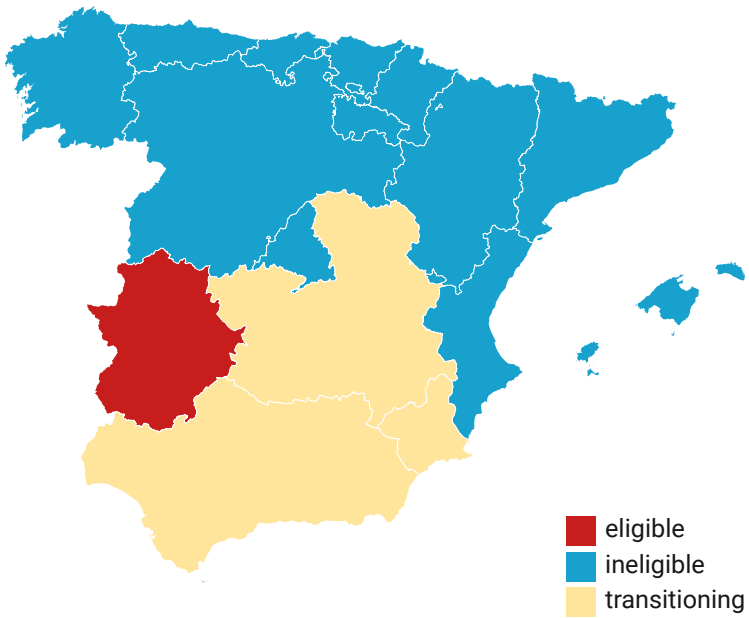
2014-2020



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Procurement data from Spain

- Evidence from over 600.000 contracts from Spain between 2011 and 2018, two funding periods.
- Includes all levels of Spanish government.
- Indicator whether the contract received subsidy from the EU.
- Complemented with dataset on subsidy amounts awarded to individual projects.

How does the allocation of subsidies work?

- EU pre-allocates funds for each region and funding period (7 years)
- Local EU authority reviews individual projects from firms or public agencies.
- Approved projects are cofinanced at rates between 50% and 80%.
- Administrative costs are significant, estimated by the EU to be at least 2bn Euros a year.

EU subsidies target specific industries

Type	Non-cofunded	EU-cofunded	Total
Transport	8.82	2.90	8.65
Energy	2.43	0.39	2.36
IT and telecommunication	9.78	14.19	9.92
Others	1.36	0.51	1.34
Office equipment	4.55	3.00	4.50
Forestry and agriculture	0.91	0.36	0.90
Medical equipment	5.61	4.67	5.59
Clothes, shoes and similar	3.91	0.41	3.80
Legal and other advisory	10.61	8.44	10.55
Natural resources	6.81	2.60	6.69
Construction	17.83	27.99	18.14
Industrial machinery	4.41	26.84	5.09
Technical services	12.32	1.59	12.00
Health, social care and educ.	10.62	6.12	10.49
Total	100.00	100.00	100.00

Reduced form analysis - difference-in-differences

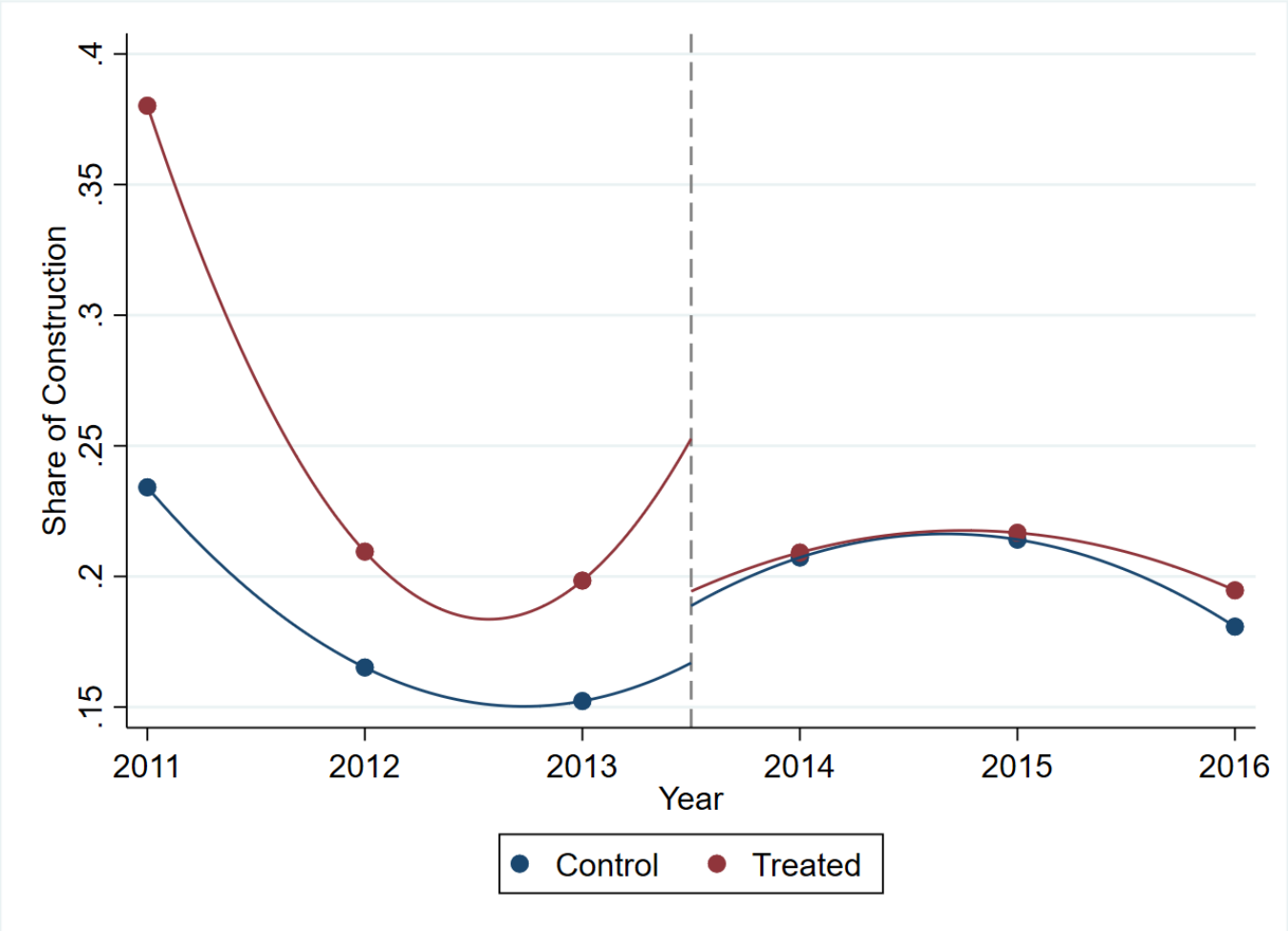
$$share\_construction_{i,t} = \alpha + \delta_i + \delta_t + \beta * after2013_t * policy\_change_i + \epsilon_{i,t}$$

Where:

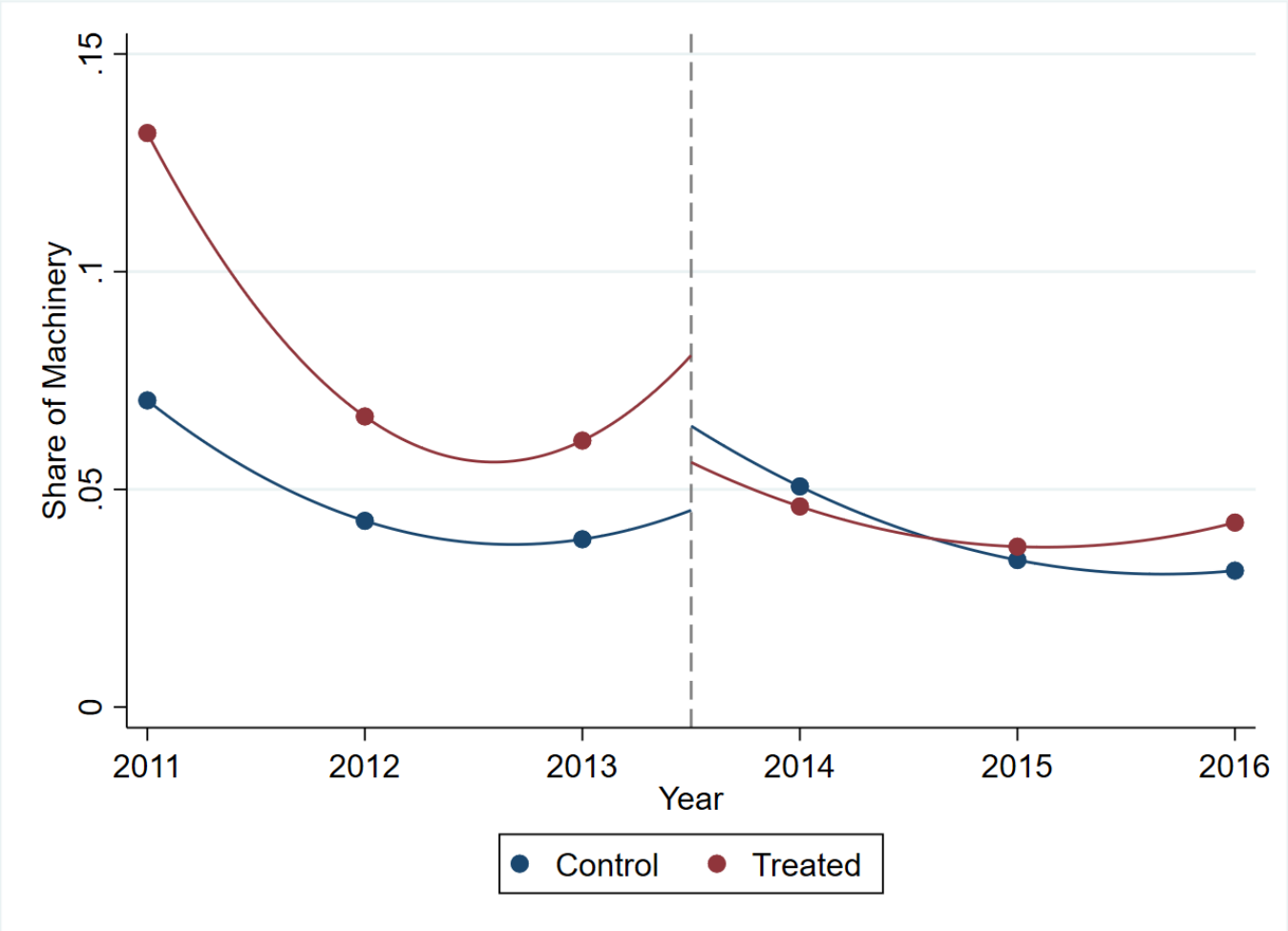
- i is the specific agency, t is year
- δ are the corresponding fixed effects
- $share\_construction$ is the share of construction works on total spending of the agency
- $after2013_t$ is a dummy variable equal to 1 after 2013 and 0 before
- $policy\_change_i$ is a dummy variable equal to 1 for regions that were reclassified

The β in this setup would give us the answer to: "How did the share of spending of construction change after losing eligibility".

Drop in construction spending



Drop in machinery spending



Response to policy change – construction and machinery

	(1) Construction	(2) Machinery
Treatment	-0.0313**	-0.0258***
	(0.0154)	(0.0083)
Authority FE	Yes	Yes
Year FE	Yes	Yes
N	3453	3453

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Reduced form analysis – sector out-of-pocket spending

$$spending_{i,t,s} = \alpha + \delta_{i,t} + \delta_{t,s} + \delta_{s,i} + \beta * subsidy_{i,t,s} + \epsilon_{i,t,s}$$

Where:

- i is the specific agency, t is year, s is sector of spending (i.e. constructions, materials, ...)
- δ are the corresponding fixed effects
- spending is the aggregate spending for agency/year/sector, measured in Euros
- subsidy is the total subsidy for agency/year/sector, measured in Euros

Reduced form analysis – sector out-of-pocket spending

- $\beta = 1$: 1 Euro of subsidies in a sector does not affect out-of-pocket spending
- $\beta > 1$: 1 Euro of subsidies is accompanied by extra out-of-pocket spending.
- $\beta < 1$: 1 Euro of subsidies decreases out-of-pocket spending
- We estimate this coefficient by OLS and IV for agency subsidies: total subsidies allocated to the same sector-year in its region.
- EU regional budgets are predetermined by sector and year.

Higher out of pocket spending in subsidized industries

	(OLS) Spending	(IV) Spending
Subsidy	2.421***	2.621***
	(0.0686)	(0.6246)
Year-sector FE	Yes	Yes
Local authority-sector FE	Yes	Yes
Year-local authority FE	Yes	Yes
Detailedness of sector	4	4
N	43260	46928

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Response to policy change - investing in externalities

- We create a measure by comparing the targeted externalities by EU with description of procurement project.
- We isolate 'high externality key-words': environmental, research, social and infrastructure among others.
- Then we look for projects with a description containing these key-words. We mark such projects as likely having high-externalities.
- 7% of subsidized projects are high-externality and 2.7% non-subsidized ones are high-externality.

First wave of subsidies not effective in targeting externalities

	(1) Externality	(2) Externality Infrastructure
Treatment	0.00391	0.00183
	(0.0096)	(0.0058)
Authority FE	Yes	Yes
Year FE	Yes	Yes
N	3453	3453

Standard errors in parentheses

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Reformulating the treatment group

- In preceding analysis, the treatment involves losing eligibility.
- The policy goals after 2014: 'Smart economy'.
- To understand better the effect of the change of policy, we redefine the treatment group to be regions that remained eligible.
- The treatment consists of the EU's change in focus.
- The control group remains the same, the regions that remains rich/ineligible for most subsidies.

Some evidence of second's wave positive impact

	(1) Externality	(2) Externality Infrastructure
New Policy	0.0426	0.0360*
	(0.0367)	(0.0203)
Authority FE	Yes	Yes
Year FE	Yes	Yes
N	2088	2088

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Why structural model?

1. Descriptive evidence:
   - Cohesion policy impacts procurement spending.
   - Limited evidence of impact on high-externality spending.
   - Possibly inefficient design.
2. Structural model:
   - Evaluation of counterfactual policy designs.
   - Lump sum subsidy: reduced misallocation of spending, lower transaction cost.
   - What is the welfare gain of an equally expensive lump-sum policy?
   - How much do we need to value externalities to justify do current design?
   - Evaluate a policy better targeting externalities.

Features of procurement model

- We look at the spending by a procurer r in each year t of our sample.
- Spending is allocated across product types k in modules m.
- Procurement is durable consumption: realized projects add to a pre-existing stock of each product type.

Timing

At each t, procurer starts with stock $\tilde{y}_{rmkt}$ of each product

- r adds q_{rmkt} units to each stock: $y_{rmkt} = \tilde{y}_{rmkt} + q_{rmkt}...$
- ...by spending $p_{rmkt}q_{rmkt}$. Reimbursed at a predetermined effective cofinancing rate s_{rmkt}, net price $\hat{p}_{rmkt}$.
- Period utility realized from updated stocks and outside good:

$$u\left(\mathbf{y_{rt}}, B_{rt} - \hat{\mathbf{p}}'_{rt}\mathbf{q}_{rt}\right)$$

- Procurement stocks depreciate (observed by procurer):

$$y_{rmk,t+1} = (1 - \delta_{mk})y_{rmkt} + \varepsilon_{rmkt}$$

Value function

$$V_{rt}(\tilde{\mathbf{y}}_{rt}) = \max_{\mathbf{q}_{rt}} u_{rt}(\mathbf{y}_{rt}) + u_r^B(B_{rt} - \hat{\mathbf{p}}'_{rt}\mathbf{q}_{rt}) + \beta V_{r,t+1}(\tilde{\mathbf{y}}_{r,t+1})$$

$$\text{s.t.} \quad y_{rmkt} = \tilde{y}_{rmkt} + q_{rmkt} \quad \forall m, k,$$

$$\tilde{y}_{rmk,t+1} = (1 - \delta_{mk}) y_{rmkt} + \varepsilon_{rmkt} \quad \forall m, k$$

$$\text{and} \quad q_{rmkt} > 0 \quad \forall m, k.$$

Sketch of estimation strategy

- Estimation would iterate between updating parameters of the period utility function and dynamic features:
  - A terminal payoff, assumed as coming from a stationary environment: depreciation, cofinancing rates deterministic.
  - Terminal value function reduced to $V(\mathbf{p}_r, \tilde{\mathbf{y}}_r)$
  - A terminal stock $\tilde{\mathbf{y}}_{r,T+1}$
  - A sequence of value functions V_{rt}
- We model the procurement component of period utility as two-level nested CES functions.
- TBD: appropriate simplifying assumptions for durable spending.

Conclusion

1. EU subsidies cause a large reallocation of procurement spending.
2. 1.0 Euro of subsidies cause additional 2.4 Euro of spending within its product category.
3. Limited evidence of achieving higher spending in high-externality product types.
4. Structural model allows us to quantify alternative policy designs