The Credit Channel of Public Procurement

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How? → Revenues!

In a nutshell

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- Web scraping 1 million procurement contracts in Portugal:
  → explore contracts *unanticipatedly* awarded after a public contest
- **firms use procurement contracts as collateral to increase access to credit**
- allowing them to invest more and grow
- with consequences at the regional level → fiscal multiplier above 1

Literature Review

- **Public procurement and firm performance:** Gugler et al. (2020); Lee (2021); Hebous and Zimmermann (2021); Ferraz et al. (2021); Bonfim et al. (2022); di Giovanni et al. (2022)

  → focus on credit and firm **heterogeneities**

- **Cash-flow based lending:** Lian and Ma (2021); Ivashina et al. (2021); Drechsel (2022)

  → procurement contracts act as **collateral**

- **Regional Multipliers:** Nakamura and Steinsson (2014); Dupor and Guerrero (2017); Chodorow-Reich (2019); Auerbach et. al (2020); Juarros (2021)

  → focus on regional **procurement** multipliers (direct effect of spending)

Procurement Contracting in Portugal

Portuguese Public Procurement Law applies to all public entities

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Publication date	07-06-2022
Description	Concurso Público nº 1030/2022 - Aquisição de desinfetantes - Álcool e Acetona
Contracting entities	Centro Hospitalar Universitário do Porto, EPE. (CHP) (508331471)
Contracted entities	Proclinica.Eq.Pr.Clinicos, Lda (500222665)
CPVs	33690000-3
Contract date	01-06-2022
Contract value	46.116,48 €
Execution deadline	365 dias
Execution place	Portugal, Porto, Porto
Competing entities	DIMOR LUSITANA, LDA (500730741), ENZYMATIC, S.A. (510662625), ESTERIPLAS (502020776), PROCLINICA (500222665), PMH,SA (502376899), VWR INTERNATIONAL - MATERIAL DE LABORATÓRIO, SOC. UNIPESSOAL, LDA. (503842770)

Procurement Contracting in Portugal

Type I - **Direct Awards** (90% of contracts)

→ hiring entity announces the project and the hired entity

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Type I - **Direct Awards** (90% of contracts)

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Type II - **Public Contests** (10% of contracts ≈ **50% of value**)

→ hiring entity announces the project

→ firms apply **once** with a fully fleshed **costly** proposal

→ third party ruler ensures **anonymity** and applies contest's rules

→ firm with **lowest bid** wins the contract ($> 90\%$)

- *ex ante* **no** predictable winner ▸ Are winners and runner-ups similar?

Data

Data - overview

- **Public Procurement** - official data web scraped from BASE

  → 1 mn contracts over 2009-2019, from which **70,000** were public contests

Procurement as % of GDP | Procurement by firm size | Procurement by industry | Contracts Statistics

Data - overview

- **Public Procurement** - official data web scraped from BASE
  → 1 mn contracts over 2009-2019, from which **70,000** were public contests

- Annual **Firm-level** and **Credit registry data**
  → Private non-financial corporations in activity, with total assets above €500 and at least 1 paid worker based in Portugal Summary Statistics

- Final merged dataset of 2mn observations with **20,000 winner-year observations**

Firm-level Effects

Empirical Strategy

$$\frac{\text{DEP}_{i,t+h} - \text{DEP}_{i,t-1}}{\text{Assets}_{i,t-1}} = \beta^h \frac{\text{Award}_{i,t}}{\text{Assets}_{i,t-1}} + \psi^h \text{Controls}_{i,t-1} + \alpha_i^h + \delta_{s,t}^h + \varepsilon_{i,t}^h \quad \forall_{h \in \{-3,\dots,4\}}$$

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- Control for previous awards and other firm characteristics
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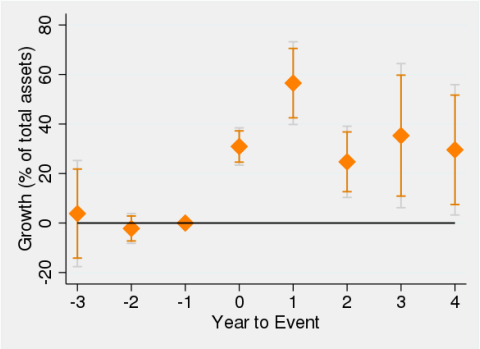
Identification:

$$E\left(\varepsilon_{i,t} | \alpha_i, \delta_{s,t}, \text{Award}_{i,t}, \text{Controls}_{i,t-1}\right) = 0$$

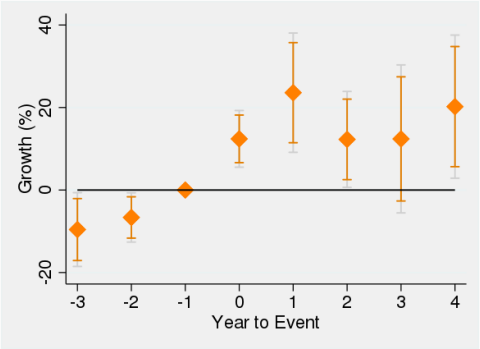
▸ Are winners and runner-ups similar?

Results

Results - revenues increase by 40% of total assets

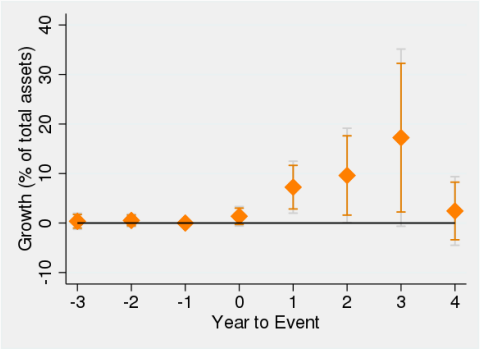


(a) **Turnover**

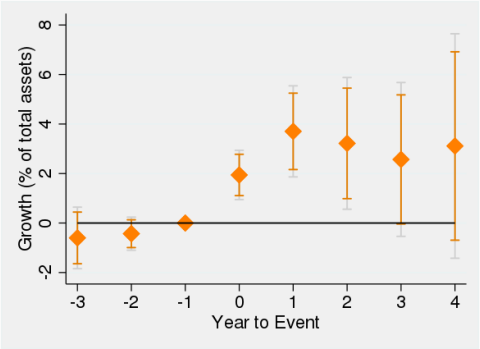


(b) Number of paid **employees**

Results - credit increases by 10% of total assets



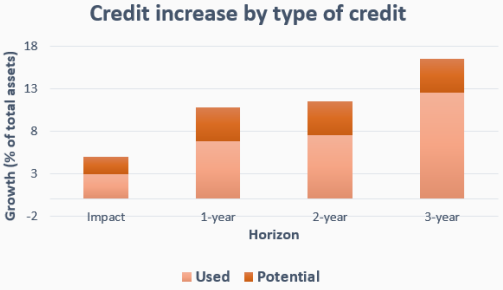
(a) Credit **effectively** used

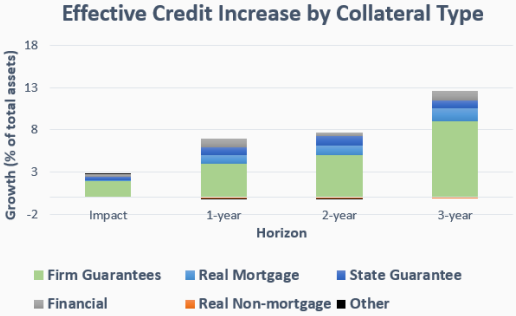


(b) Credit for **potential** access

Results ≈ 70% backed by Firm Guarantees

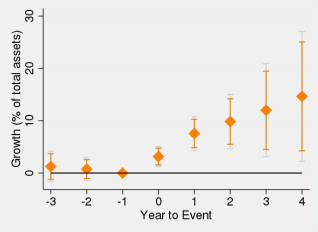
LPs





Results - Capital increases by 5% of total assets

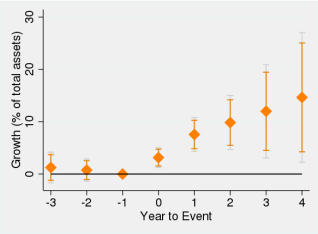
▸ Other Results ▸ Matching Exercise



(a) Total non-current assets

Results - Capital increases by 5% of total assets

▸ Other Results ▸ Matching Exercise



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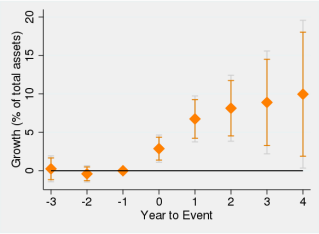
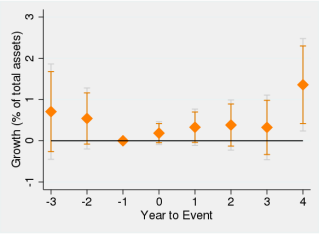


(b) PPE: fixed tangible assets



(c) Financial investments

Heterogeneous Effects

Investment and Credit Elasticities to the Award Value

	Investment				Credit			
	Impact	1 Year	2 Years	3 Years	Impact	1 Year	2 Years	3 Years
Elasticity	0.03**	0.07**	0.10**	0.11**	0.04***	0.13***	0.16**	0.21**
	(0.01)	(0.03)	(0.03)	(0.05)	(0.01)	(0.05)	(0.07)	(0.11)
Small Firms	0.02**	0.06**	0.10**	0.12*	0.03**	0.11**	0.12*	0.17*
	(0.01)	(0.03)	(0.05)	(0.07)	(0.01)	(0.05)	(0.07)	(0.09)
Big Firms	0.01*	0.01	0.00	- 0.01	0.01**	0.02	0.04	0.04
	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)	(0.03)	(0.05)	(0.06)
Year × Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,000,811	1,625,949	1,315,607	1,051,461	965,374	740,537	564,550	418,678

Notes: The unit of observation is the firm-year level i, t. The sample period is 2010-2019. In Panel A, I present the baseline results for the coefficient β^h for each horizon $h = 0, 1, 2, 3$. β^h can be interpreted as the **cumulative** response of either investment in non-current assets (first 4 columns) or total credit (last 4 columns) from period $t + h$ relative to period $t - 1$. In Panel B, I study the differences in the same two dependent variables between small and big firms defined as firms being below or above the median in terms of total assets across the entire sample. Robust standard errors clustered at the firm-level are in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Heterogeneous Effects - Discussion

Different investment and credit responses can be rationalized together:

- **smaller** firms are financially **constrained** (Beck et al. 2005)
- **financial accelerator hypothesis:** they will react more to the same demand shock because they were sub-optimally investing (Bernanke et al. 1996)
- increase in credit against procurement contracts alleviates constraints
- lasting effects coming from **longer maturity contracts**

Conclusion

Conclusion - Fiscal Policy Micro to Macro

Public procurement:

- alleviates financial frictions (liquidity and credit lines)

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Public procurement:

- alleviates financial frictions (liquidity and credit lines)
- increases **private credit**
- increases **corporate investment** and **production** (for **small** firms)
- promotes **direct economic growth**
  → regional procurement multiplier above 1

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Thank you!

Appendix

Public Procurement in OECD Countries

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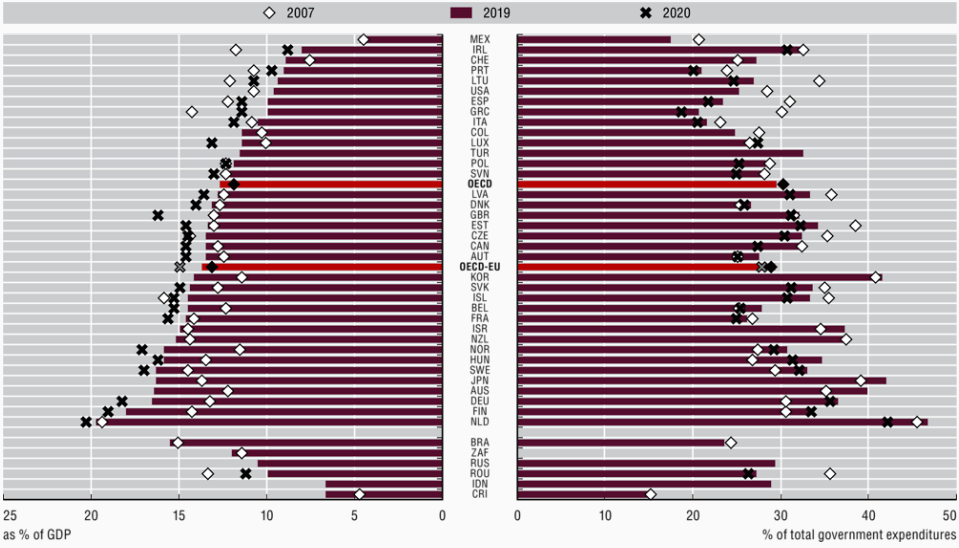

Decent coverage of procurement in Portugal

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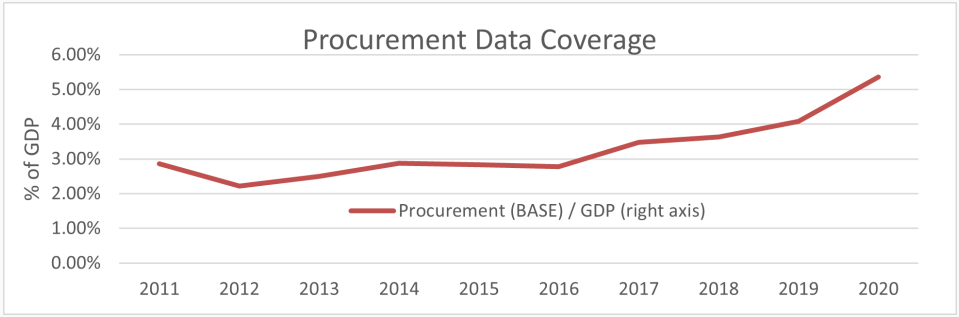

Public Contests as important as Direct Awards

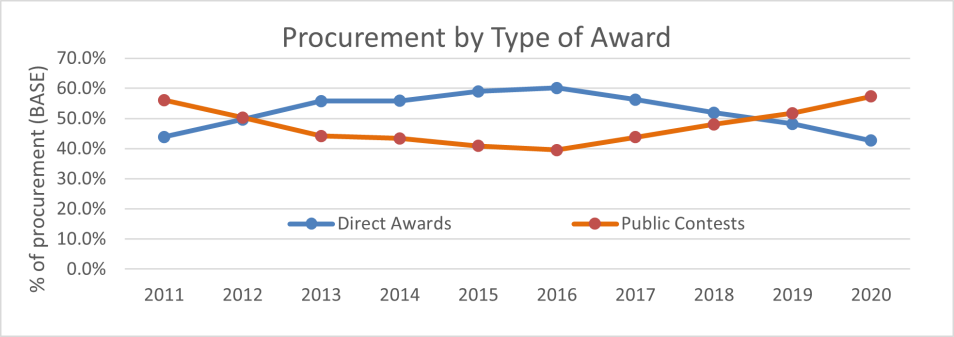

Table 1: Who received procurement contracts in 2019?

Firm Size	Number	Value
Micro	28.3%	9.9%
Small	31.0%	21.1%
Medium	22.7%	28.6%
Big	18.1%	40.4%

Notes: This table presents statistics for the award of public procurement contracts by firm size. Micro firms have at most 10 workers and €2 million in revenues; Small firms up to 50 workers and €10 million; Medium firms up to 250 workers and €50 million in revenues; Big firms comprise all the others.

Table 2: Which industries received procurement contracts in 2019?

		2019		2018
CPV	Description	Number	Value	Value
45	Construction	12.9%	42.5%	32.5%
33	Medical equipment, pharmaceuticals and personal care products	40.1%	17.7%	18.6%
9	Petroleum products, fuel, electricity and other sources of energy	2.2%	7.1%	6.2%
79	Business services: law, marketing, consulting, recruitment, security	12.3%	7.0%	5.9%
90	Sewage, refuse, cleaning and environmental services	4.0%	5.9%	4.2%
72	IT services: consulting, software development, Internet and support	6.4%	4.7%	3.9%
34	Transport equipment and auxiliary products to transportation	3.9%	4.4%	2.5%
50	Repair and maintenance services	8.0%	3.9%	3.1%
71	Architectural, construction, engineering and inspection services	7.9%	3.7%	3.3%
55	Hotel, restaurant and retail trade services	2.3%	3.1%	5.1%

Notes: This table presents statistics for the award of public works by firm industry in 2019 and 2018.

Contracts Summary Statistics

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	Mean	Std. Dev.	P5	Median	P95	Obs
Public Contests						
Award (€)	291,031	1,473,640	634	73,279	1,027,066	76,358
Duration (Days)	348	402	28	257	1,095	76,358
# Contestants	4	5.1	1	1	15	76,358
Public Contests $(n > 1)$						
Award (€)	296,911	1,518,677	967	78,052	1,009,989	35,202
Duration (Days)	353	384	26	245	1,095	35,202
# Contestants	7.6	5.8	2	6	19	35,202
Direct Awards						
Award (€)	35,897	425,979	154	9,700	94,030	957,122
Duration (Days)	181	256	1	60	730	957,122
# Contestants	0.4	1.4	0	0	3	957,122

Summary Statistics

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	Procurement Firms						No Procurement Firms					
	Mean	Std. Dev.	P10	Median	P90	Obs	Mean	Std. Dev.	P10	Median	P90	Obs
Total fixed assets	14,100	248,000	11	287	6,053	20,406	837	45,000	0	14	392	3,049,057
Turnover	21,600	208,000	237	1,927	3,391	20,406	963	17,700	15	115	1,059	3,049,057
Liquidity	14.7%	17.4%	0.6%	7.7%	39.5%	20,406	19.7%	30.0%	0.5%	9.4%	57.1%	3,049,057
Total liabilities	16,100	205,000	111	1,052	13,200	20,406	954	36,100	9	86	817	3,049,057
Employees	120	577	3	20	169	20,404	9	87	1	3	13	3,048,990
Wages per worker	21.8	16.3	9.8	17.9	37.3	20,404	12.8	11.7	5.8	10.6	21.3	3,048,990
Award	405	791	15	50	1,015	20,406						
Total Credit	4,401	26,300	21	475	7,018	13,734	472	6,381	2	31	477	1,659,673
Used Credit	2,137	12,400	1	208	3,607	13,734	359	4,496	0	23	382	1,659,673
Potential Credit	2,264	15,600	3	137	2,821	13,734	112	3,165	0	2	68	1,659,673
Non-performing Credit	46	1,268	0	0	0.3	13,734	18	8,741	0	0	0.2	1,659,673
Real Col. Mortgaged	344	4,919	0	0	250	13,734	106	1,754	0	0	63	1,659,673
Real Col not Mortgaged	160	2,877	0	0	23	13,734	32	1,542	0	0	3	1,659,673
Financial Col.	308	4,332	0	0	138	13,734	62	2,469	0	0	12	1,659,673
Personal guarantee Col.	865	5,268	0	70	1,620	13,734	153	1,569	0	8	190	1,659,673
State guarantee Col.	182	1,155	0	0	416	13,734	23	600	0	0	20	1,659,673
Other Col.	307	3,545	0	0	78	13,734	36	1,361	0	0	0	1,659,673
Implicit interest rate	7.4%	7.4%	1.5%	4.9%	20.6%	11,873	6.6%	6.4%	1.0%	4.8%	13.9%	1,227,784

Notes: This table presents the summary statistics for the key firm-level variables in this paper dividing them in firm-year observations when a firm won a public contest vs when a firm lose or did not participate in public contests. All economic variables are in thousand euros. **Variables are not winsorized**.

Are winners and runner-ups really similar? Yes!

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	Winners		Losers		T-test	
	Mean	Median	Mean	Median		Obs
Firm Balance Sheet						
Assets	€ 240,000	€ 4,466	€ 198,000	€ 4,172	0.20	3,068
Sales	€ 199,000	€ 4,790	€ 156,000	€ 4,127	0.06	3,068
Value Added	€ 35,800	€ 1,208	€ 34,300	€ 1,129	0.86	3,068
Employees	312	31	328	30	0.49	3,067
Sales per Employee	€ 4,037	€ 138.4	€ 4,020	€ 126.4	0.87	2,948
Value Added per Employee	€ 83.5	€ 37.1	€ 81.0	€ 33.5	0.94	2,948
Firm Age	24	20	23	20	0.07	3,068
Liquidity	13.8%	6.6%	13.8%	6.9%	0.61	3,068
Total Hours Worked	552,628	54,208	575,205	51,072	0.58	3,047
Liabilities	€ 188,000	€ 2,503	€ 159,000	€ 2,320	0.28	3,068
Firm Credit Information						
Total available credit	€ 12,800	€ 807.7	€ 16,100	€ 696.7	0.42	2,100
Total used credit	€ 7,649	€ 296.1	€ 11,100	€ 256.2	0.36	2,100
Total potential credit	€ 5,118	€ 295.1	€ 5,065	€ 246.5	0.96	2,100
Overdue credit	€ 24.9	€ 0	€ 14.5	€ 0	0.05	2,100
Short maturity credit	€ 3,452	€ 42.1	€ 5,492	€ 43.8	0.35	2,100
Long maturity credit	€ 4,196	€ 138.0	€ 5,582	€ 118.8	0.47	2,100

Notes: This table compares characteristics of firms in (€thousands) that either won (winners) or lost (losers) public contests for government procurement contracts. The panel is based on the **firm-level data on public contests contracts with exactly 2 contestants** at the year before the contract award. The table reports number of observations, mean, median, and the p-value of the two-sample t-test for whether the difference on each characteristic between the winner and the loser for each contest is equal to zero. Firm-level variables are not winsorized. For completeness,

Intensive Margin

Results ≈ 70% backed by personal guarantee (cash-flow based lending)

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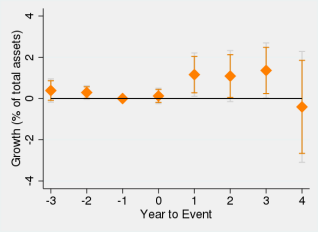
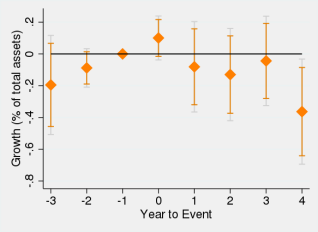
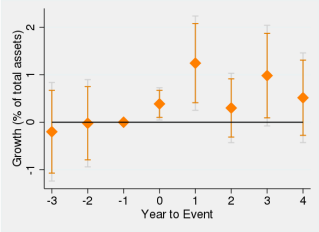


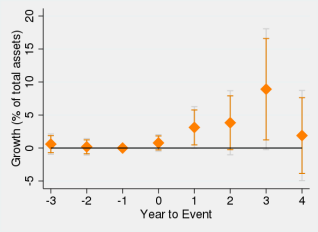
(a) Real collateral mortgaged



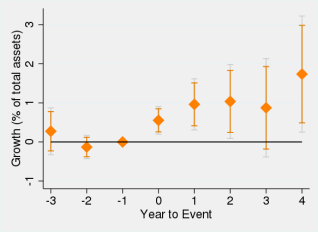
(b) Real collateral not mortgaged



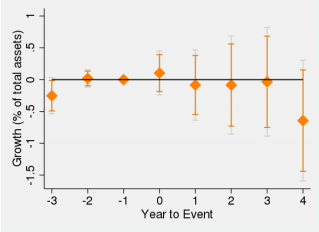
(c) Financial collateral



(d) Firm guarantees



(e) State guarantees



(f) Other guarantees

Results - cash increase by 5% and liabilities by 10% of total assets

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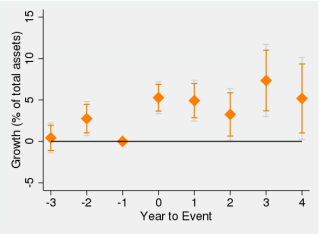
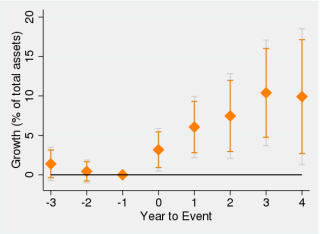
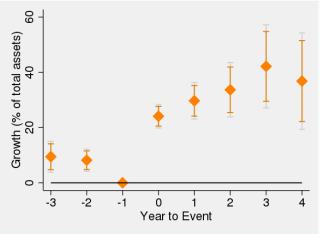


(a) Liquidity: Cash and deposits



(b) Total non-current **liabilities**



(c) Equity

Matching Counterfactual

Dif-in-Dif Results: percentage point difference in growth rates

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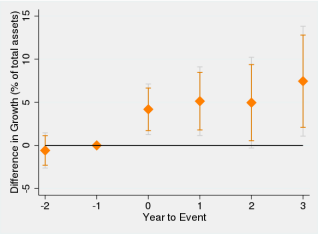
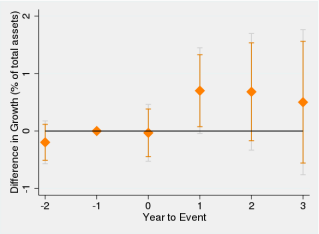
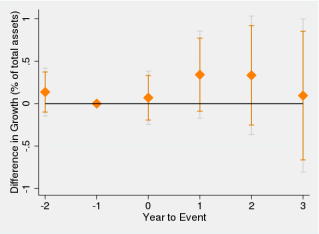


(a) Turnover 3,279 contracts



(b) Investment: 3,279 contracts



(c) Credit 1,182 contracts

Aggregation

Aggregate Effects

Regional Effects

Estimate the **real regional effects** of public procurement:

$$\frac{\text{GVA}_{i,t+h} - \text{GVA}_{i,t-1}}{\text{GVA}_{i,t-1}} = \alpha_i + \delta_t + \beta^h \frac{\text{Procurement}_{i,t}}{\text{GVA}_{i,t-1}} + \psi^h \text{Controls}_{i,t-1} + \varepsilon_{i,t+h} \quad (1)$$

- $\text{GVA}_{i,t}$ is the gross value added in region i and year t ▸ GVA Aggregation

Regional Effects

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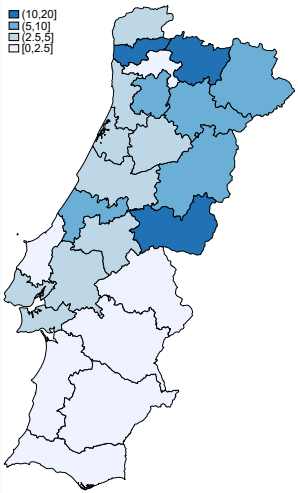
- $\text{GVA}_{i,t}$ is the gross value added in region i and year t ▸ GVA Aggregation
- 25 Nuts III regions in Portugal
- aggregate procurement shocks by region where winning **firm's HQ** is located

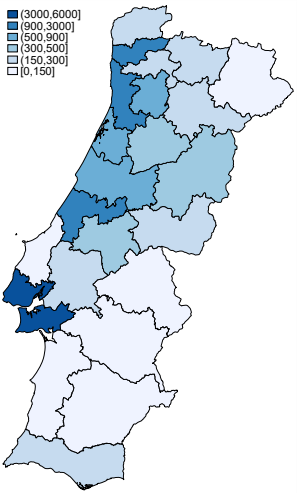
Identification: unanticipated location of the winning firm!

Cross-sectional variation in procurement spending

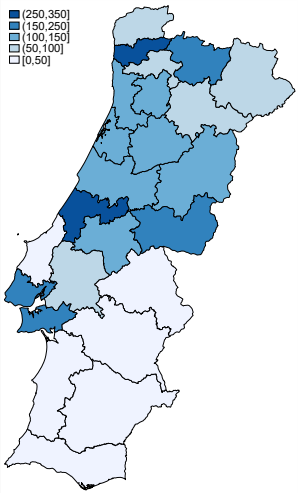
(a) $\frac{\text{Proc}_{i,t}}{\text{GVA}_{i,t-1}}$ (in %)



(b) Procurement (mio. €)



(c) Procurement (per capita €)



Aggregate Effects

▸ Agg by location

Table 3: The Regional Effects of Procurement Spending

	Horizon (Year)			
	(0)	(1)	(2)	(3)
Multiplier	1.5	2.1	2.3	2.2
	(0.4)	(0.6)	(0.8)	(0.9)

Table 3: The Regional Effects of Procurement Spending

	Horizon (Year)			
	(0)	(1)	(2)	(3)
Multiplier	1.5	2.1	2.3	2.2
	(0.4)	(0.6)	(0.8)	(0.9)
Short Maturity	1.1	1.2	0.9	0.5
	(0.6)	(0.5)	(0.8)	(1.1)
Long Maturity	0.4	0.9	1.4	1.7
	(0.4)	(0.5)	(0.7)	(0.8)
Observations	150	150	150	150

Notes: The unit of observation is the region-year level i, t. The sample period is 2010-2019 and rectangularized (25 regions $\times$ 6 years). In Panel A, I present the baseline results for the coefficient β^h for each horizon $h = 0, 1, 2, 3$. β^h can be interpreted as the **cumulative** response of regional production (proxied by gross value added) from period $t + h$ relative to period $t - 1$. In Panel B, I study the differences between shorter and longer contract maturities defined as contracts being shorter or longer then 1 year. Robust standard errors clustered at the region-level are in parentheses.

GVA Aggregation Exercise

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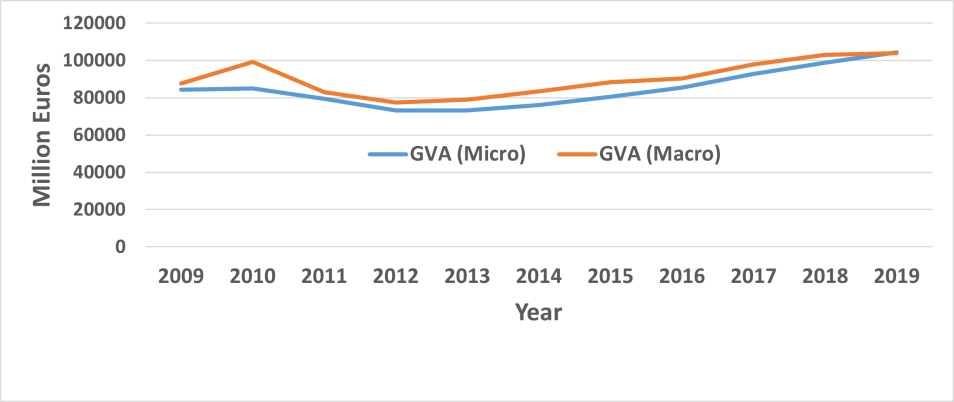

GVA (Macro) = output - intermediate consumption

GVA (Micro) = $\sum_i$ (sales$_i$ - production costs$_i$)

Aggregate Effects II

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Aggregate procurement by **spending location**:

Aggregate procurement by **spending location**:

Table 4: The Regional Spillover Effects of Procurement Spending

	Horizon (Year)			
	(0)	(1)	(2)	(3)
Spillover	0.28	0.35	0.45	0.32
	(0.32)	(0.34)	(0.35)	(0.21)
Observations	150	150	150	150

Notes: The unit of observation is the region-year level i, t. The sample period is 2010-2019 and rectangularized (25 regions $\times$ 6 years). I present the baseline results for the coefficient β^h for each horizon $h = 0, 1, 2, 3$. β^h can be interpreted as the **spillover** response of regional production (proxied by gross value added) from period $t + h$ relative to period $t - 1$ in the region where the procurement contract is being executed. Robust standard errors clustered at the region-level are in parentheses.