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International Conference on Regional Science

Tackling with societal, technological and climate challenges
in peripheral territories

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ABSTRACT

Title: Granularity in regional exports: Evidence for Spain, 1997-2017

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Subject area: S20 - Regiones e internacionalización

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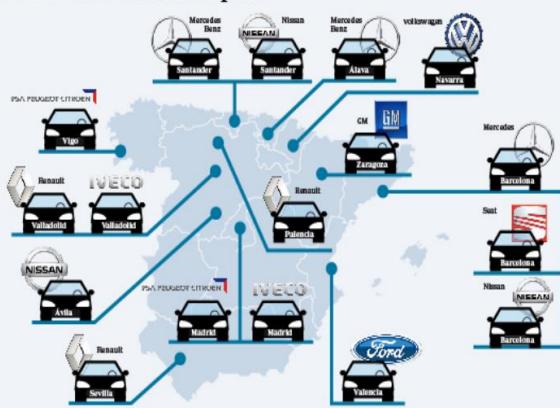
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Motivation: some of our superstars ...

Fábricas de vehículos en España



Campeones de exportación 2010

(incluye todas las ventas de exportación, con independencia de que hayan sido desde fuera de España)

1. Grupo Telefónica
2. Grupo Repsol-YPF
3. Iberdrola
4. Grupo Endesa
5. Grupo Industria de Diseño Textil
6. Grupo Ferrovial
7. Gas Natural Fenosa
8. Compañía Española de Petróleos
9. Grupo Fomento, Construcción y Contratas
10. Ford España
11. Peugeot Citroën España
12. Renault España
13. Grupo Acerinox
14. Mondragón Cooperación Cooperativa
15. General Motors España

Fuente: Fomento de la producción , 2011

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Motivation

DE VALENCIA A EEUU.

Ford trasladará la producción de motores de Almussafes a Norteamérica

Si no llega una alternativa a partir de 2024 que supla la falta de esta dos mecánicas, la planta "no será viable"



Ford inicia la fabricación del Mondeo Hybrid en la planta de Almussafes (Ford)

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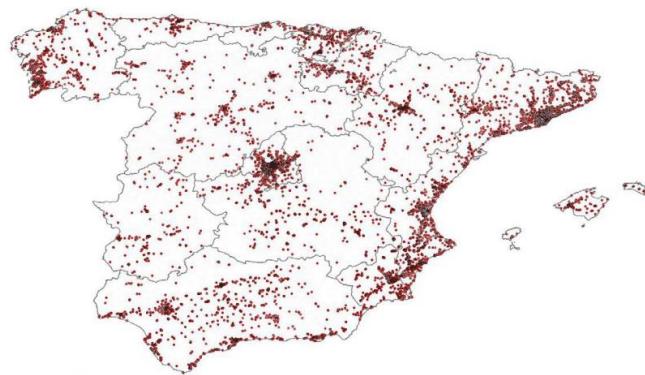
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Motivation: Where are the “superstars”?

Universe of exporters (>50.000 eur) in 1997



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Outline

- Introduction

Macro-granularity and micro-granularity

- Empirical part. Using Spanish firm-province data over the period 1997-2017

Part 1. How concentrated are exports at firm level?

Part 2. Does granularity affect aggregate exports over time?

Part 3. Does granularity affect comparative advantage?

Part 4. Does granularity affect persistence of comparative advantage?

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Granularity

- Granularity is the extent to which a material or system is composed of distinguishable pieces or *grains* (Wikipedia)
- Use of the term leads to confusion
 - In investing, more granular means more positions of smaller size
 - In other areas (photography), more granular means fewer and larger grains
- In Economics, Gabaix (Econometrica 1997) popularized the term by analyzing **the importance of large firms** (the *fewer and larger incompressible grains* of economic activity) in the US economic growth

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(Macro-)granularity, aggregate fluctuations and international business cycle comovements

- Gabaix (2011) "The Granular Origin of Aggregate Fluctuations", Econometrica
 - Shocks to the biggest firms have an impact on macroeconomic fluctuations
- di Giovanni and Levchenko (2012) "Country Size, International Trade, and Aggregate Fluctuations in Granular Economies", Journal of Political Economy
 - Granularity can account for the stylized fact that smaller and more open countries are more volatile
- Acemoglu et al (2012) "The network origins of aggregate fluctuations". Econometrica.
 - Firms' networks magnify the aggregate impact of the shock of a big firm
- di Giovanni, Levchenko and Mejean (2014) "Firms, Destinations, and Aggregate Fluctuations", Econometrica, France
- Stella (2015) "Firm dynamics and the origins of aggregate fluctuations". Journal of Economic Dynamics and Control, US
- Friberg R. and Sanctuary, M. (2016) "The contribution of firm-level shocks to aggregate fluctuations: The case of Sweden," Economics Letters
- Magerman, De Bruyne, Dhyne, van Hove (2016), "Heterogeneous firms and the micro origins of aggregate fluctuations". National Bank of Belgium WP, Belgium
- di Giovanni, Levchenko and Mejean (2018) "The Micro Origins of International Business Cycle Comovements", American Economic Review, France

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(Micro)-granularity and exports

- Freund and Pierola (2015) "Export superstars" Rev Econ Stat
 - Revealed comparative advantage in a sector can be created by a single firm.
- Gaubert and Itsikhoki (2018) "Granular Comparative Advantage", mimeo
 - France: Granularity accounts for about 20% of the variation in realized export intensity across sectors, and is more pronounced in the most export-intensive sectors
- De Lucio et al (2019) "The contribution of granular and fundamental comparative advantage to European Union countries' export specialization", The World Economy
 - Granular comparative advantage may explain export specialization in 29% of industries, affecting to 45% of EU exports.
- Del Rosal (2013) "The granular hypothesis in EU country exports", Economic Letters
 - Idiosyncratic shocks to the main product may have significant effects on total exports for the smaller EU countries
- De Lucio et al (2017) "The granularity of Spanish exports", SERIES
 - If top exporters disappeared, Spain would lose its revealed comparative advantage in 60% of industries, which accounts for 45% of all Spanish exports

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The granularity of (regional) exports

- Three empirical questions
 1. Concentration of exports by firm
 2. The link between the variation of aggregate exports and the variation of large exporters' exports
 3. The link between comparative advantage and granularity
- Data: Spanish firm-level merchandise exports, 1997-2017.
- Source: AEAT-Customs and COMTRADE

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Part 1

Concentration of exports by firm

Share of top exporters in Spanish exports (%)

	1997	2017
Top 1	3	3
Top 5	13	10
Top 200	45	48
Top 1000	65	67

Importance of top exporters by product (consistent CN 8 digits) (%) (N = 7133)

	1997	2017
Products with at least two exporting firms	6659	7037
... whose top firm has at least 50 % of total exports	3562	3251

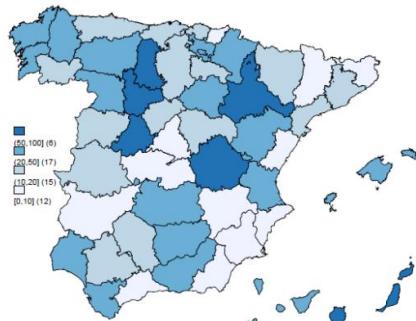
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Part 1

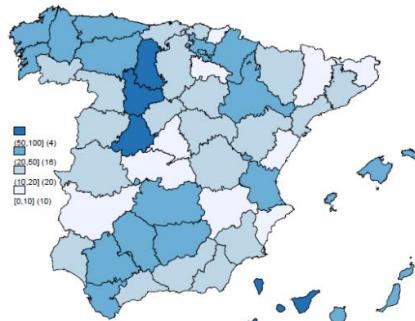
Concentration of exports by province

Top 1

1997



2017



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Part 1

Concentration of exports by province

Top 5

1997



2017



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Part 1

Concentration of exports by province

Top 10

1997



2017



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Part 2

Contribution of “grains” (firms) to explain variation of province aggregate exports over time

References

Gabaix (Ectrice 2011), De Giovanni & Levchenko (JPE 2012, JIE 2013)

$$g_{f,t} = \log(x_{f,t}) - \log(x_{f,t-1})$$

$$\overline{g_{f,t}} = \frac{\sum_f g_{f,t}}{N_{f,t-1}}$$

$$ic_{f,t} = g_{f,t} - \overline{g_{f,t}}$$

$$gres_t = \sum_{f \in TOP-X} ic_{f,t} * share_{f,t}$$

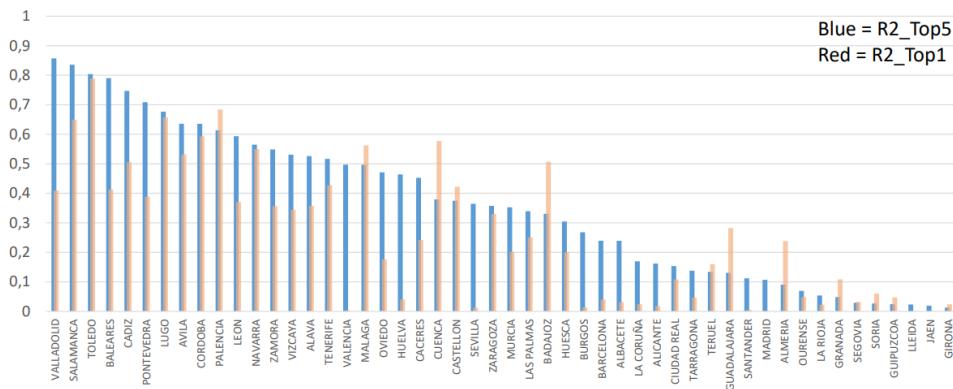
$$g_{prov,t} = \alpha + \beta gres_{TOP-X} + \epsilon_{prov,t}$$

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Part 2

Contribution of “grains” (firms) to explain variation of province aggregate exports over time

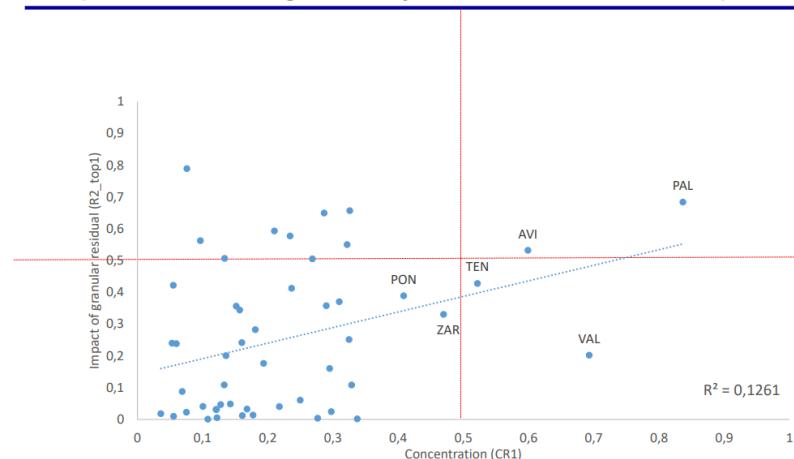
$$g_{prov,t} = \alpha + \beta gres_{TOP-X} + \epsilon_{prov,t}$$



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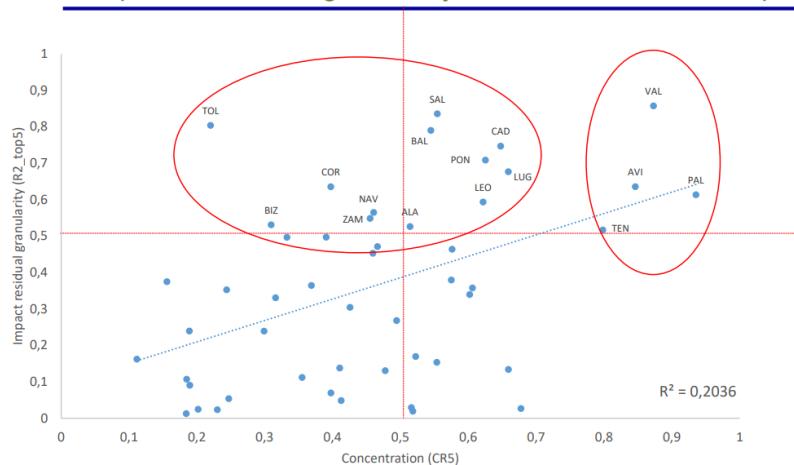


Part 2
Correlation between
impact of residual granularity and concentration in exports



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Part 2
Correlation between
impact of residual granularity and concentration in exports



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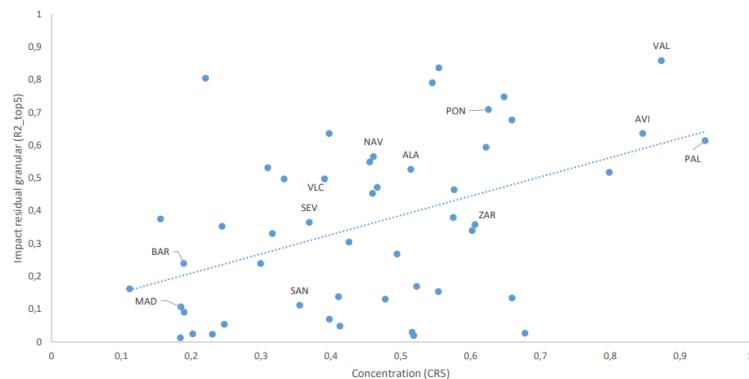
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Part 2

Correlation between impact of residual granularity and concentration in exports

Automobile provinces



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Part 3

Does granularity affect comparative advantage?

Methodology proposed by Freund & Pierola (RESTAT, 2015)

- Contribution of top firms to comparative advantage
- Balassa index as measures of CA:

$$RCA_{prov,k} = \frac{x_{prov,k}/X_{prov}}{x_{world,k}/X_{world}}$$

$$RCA_{prov,k} = \frac{x_{prov,k}/X_{prov}}{x_{ESP,k}/X_{ESP}} * \frac{x_{ESP,k}/X_{ESP}}{x_{world,k}/X_{world}}$$

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Part 3

Does granularity affect comparative advantage?

50% of HS2 industries in which Spain has CA are affected by granularity

Contribution of top firms to comparative advantage.
Based on Balassa index. **96** HS2 “industries”

Chapters with RCA-Balassa > 1.1	With all firms	Eliminate Top 1	Eliminate Top 5
Year 2017	40	29	17
Year 1997	38	28	17

Industries (HS2) whose CA is affected by granularity (with export share>0,5%)

Top 1: Apparel and clothing knitted (1.7%), Miscellaneous chemical products (1,2%), Railway (0,5%)

Top 5: Plastic products (4.5%), Pharmaceutical products (4.2%), Iron and Steel (2.6%),

Apparel and clothing not knitted (2.5%), Miscellaneous chemical products (1.2%),

Top 10: Vehicles other than railways (18.4%), Paper (1.4%), Footwear (1.3%), Aluminium (1.3%),

Preparations of cereal (0.6%), Soap (0.5%)

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Part 3

Does granularity affect comparative advantage?

- Year 2017

NUTSIII	Name	# HS Chapter	RCA with all firms		RCA without top1	
			Total	B>1.1	% exp	B*>1.1
Almeria		79	11	91.4	8	17.6
Cordoba		82	16	80.7	11	7.2
Alicante		95	38	83.7	21	16.5
Castellon		91	16	84.8	11	20.8
Lleida		85	23	78.5	16	17.1
Barcelona		96	40	70.7	23	38.3
Madrid		96	21	52.8	18	34.1
Valencia		96	26	73.2	17	53.2
Valladolid		82	8	90.8	7	89.0
Avila		58	14	90.5	14	90.5
Palencia		65	4	95.2	4	95.2
Soria		53	17	89.0	17	89.0
Zaragoza		92	19	66.4	19	66.4

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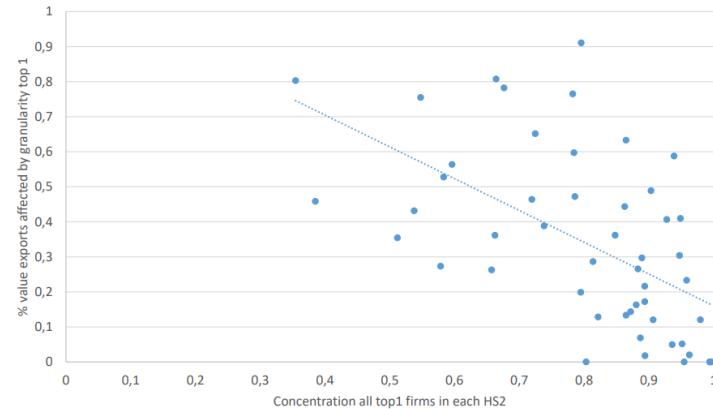
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Part 3 Does granularity affect comparative advantage?

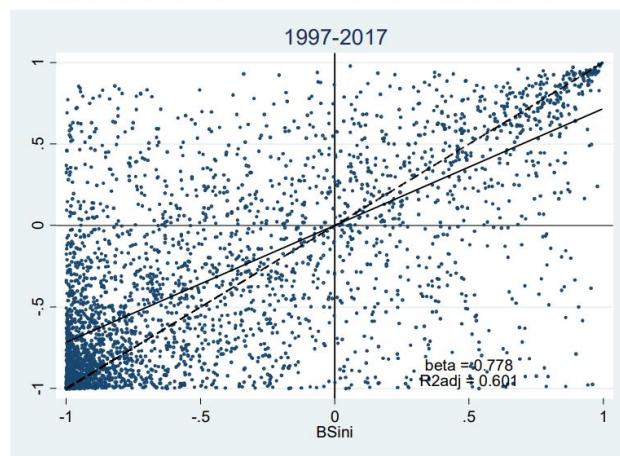
Year 2017



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Part 4 Does granularity affect persistence of comparative advantage?



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Part 4

Does granularity affect persistence of comparative advantage?

VARIABLES	top1	top1	top5	top5	top1	top1	top5	top5
BSini	0.912*** [0.0880]	0.963*** [0.0764]	0.921*** [0.0960]	0.921*** [0.0936]	0.995*** [0.0687]	1.003*** [0.0622]	1.056*** [0.0762]	1.101*** [0.0800]
Dummy granularity	0.0478 [0.0736]	0.0763 [0.0829]	0.0226 [0.0741]	-0.0290 [0.0730]	0.0269 [0.0572]	-0.0218 [0.0583]	-0.0105 [0.0563]	0.0778 [0.0584]
BSini * Dummy granularity	-0.387*** [0.139]	-0.617*** [0.223]	-0.233* [0.125]	-0.133 [0.148]	-0.299*** [0.110]	-0.235*** [0.153]	-0.184** [0.0950]	-0.141 [0.103]
Constant	-0.143*** [0.0545]	-0.0805* [0.0440]	-0.0750 [0.0655]	-0.0351 [0.0611]	-0.136*** [0.0421]	-0.0815** [0.0353]	-0.126** [0.0499]	-0.149*** [0.0523]
Observations	817	309	621	309	926	404	748	404
R-squared	0.407	0.730	0.510	0.722	0.488	0.762	0.605	0.761
# loss RCA	241	70	153	70	220	69	156	69
#granularity	348	59	433	174	371	85	543	246
Period	1997-2017	1997-2017	1997-2017	1997-2017	2007-2017	2007-2017	2007-2017	2007-2017
FE province	YES	YES	YES	YES	YES	YES	YES	YES
FE sector	YES	YES	YES	YES	YES	YES	YES	YES
Min #firms prov/sector	1	20	5	20	1	20	5	20

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Conclusions

- We search for evidence of “granularity” in export behaviour at regional level
 1. In some provinces, top exporters concentrate a significant percentage of exports
 2. In some provinces, shocks to the largest firm affect aggregate exports
 3. In some provinces, if top firms disappear they loss a significant number of sectors with CA, representing a large percentage of aggregate exports
 4. Granularity reduces the persistence in comparative advantage: a large proportion of the province-sectors that had CA and change to CD have top firms that affect CD

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