

Venting Out: Exports During a Domestic Slump

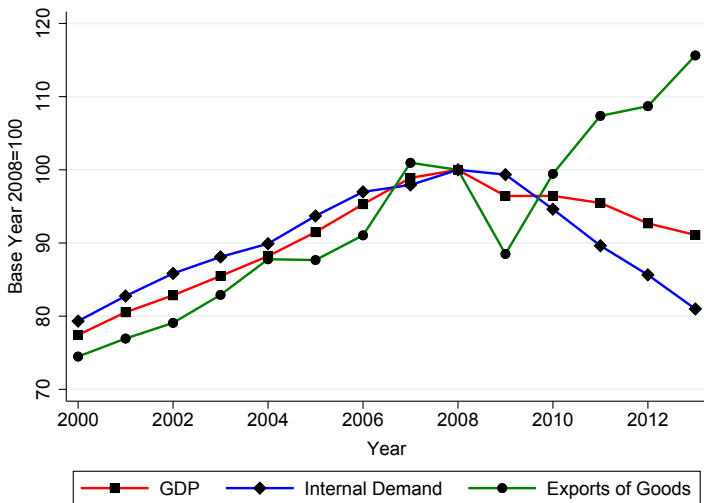
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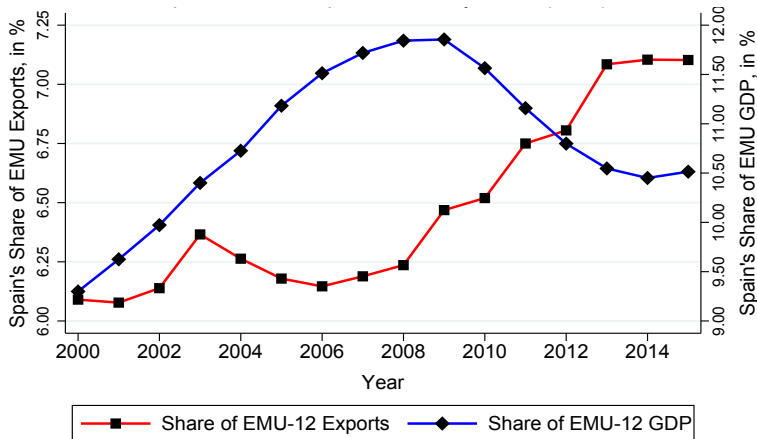
The Spanish Economy During the Great Recession

- Few countries experienced the Great Recession as intensively as Spain did...



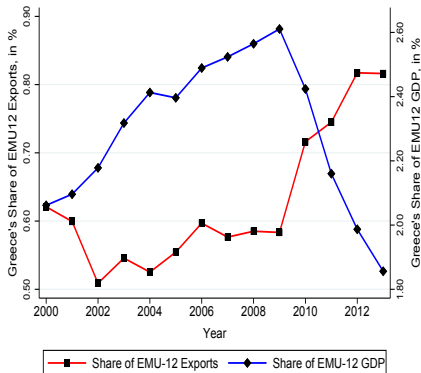
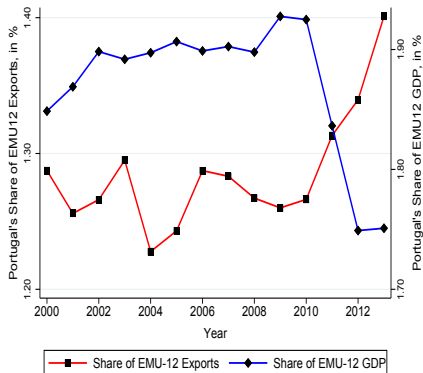
The Spanish Economy During the Great Recession

- ... and few euro area countries experienced export growth during the downturn as intensively as Spain did.



Other European Economies

- Spain is (not) different.



Explanations for the Spanish “Export Miracle”

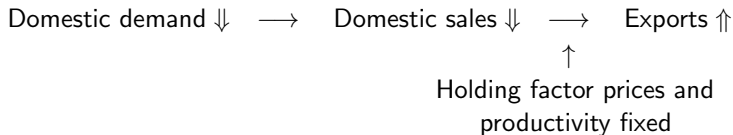
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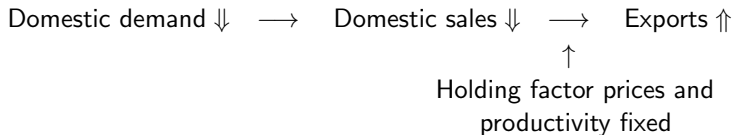
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- “Vent-for-surplus” mechanism is a *firm-level partial equilibrium* relationship.
- **Contribution of this paper**: test for the presence and quantify the contribution of the vent-for-surplus mechanism to the Spanish “export miracle”.

Identification Strategy

- Main identification strategy:
 - Divide sample into a “boom” (2002-08) and a “bust” period (2009-13).
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 - Control for firm-specific wages, financial costs and proxy for productivity.
- As alternative instruments, we exploit differences across Spanish regions in exposure to factors believed to have caused the Great Recession:
 - differences in share of “buildable” urban land;
 - differences in importance of construction sector in employment;
 - differences in importance of tourism in overall economic activity.

Main Results

- Intensive margin results:
 - Robust negative causal relationship between firms' demand-driven changes in domestic sales and exports, controlling for firms' marginal cost shifters.
 - Elasticity of exports with respect to domestic sales is approximately -1.6.
 - A firm with a 25% initial export share will recoup €53.3 via exports for every €100 of lost domestic sales.

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- Quantification:
 - “Vent-for-surplus” mechanism accounts for more than half of the 2009-13 increase in Spanish exports.

- “Vent-for-surplus” theory:
 - Adam Smith (1776), Williams (1929), Myint (1958), Fisher and Kakkar (2004)
 - **Contribution:** we apply the “vent-for-surplus” intuition at the firm level and illustrate its importance as a mechanism to smooth out local shocks.
- Firm-level interdependencies across markets:
 - Trade models with increasing marginal costs: Vannoorenberghe (2002), Blum et al. (2013), Soderbery (2014), Blanchard and Portugal (2016), Ahn and McQuoid (2017), Liu (2017).
 - Impact of export demand on domestic sales: Berman et al. (2015).
 - Extensive margin complementarities: Antràs et al (2017), Morales et al (2017)
 - **Contribution:** study export impact of a large domestic demand shock.
- Exploiting spatial variation in the impact of the Great Recession:
 - Mian and Sufi (2009, 2014), Mian, Rao and Sufi (2013).
 - **Contribution:** exploit link between housing net worth and consumption shown in this prior work to look at impact of domestic demand on firms’ exports

- Potential Outcomes Framework
- Baseline Model: Partial-equilibrium Version of Melitz (2003)
- Data
- Identification Approach
- Results
- Robustness
- Model with Increasing Marginal Costs
- Quantification
- Summary

POTENTIAL OUTCOMES FRAMEWORK

Potential Outcomes Framework

- We want to measure the importance of the “vent-for-surplus” mechanism.
- To make it precise what we mean,

$$\widehat{R}_{ix}(\widehat{q}_{id}) = \widehat{R}_{ix}(0) + \beta \widehat{R}_{id}(\widehat{q}_{id})$$

where \widehat{x} denotes $\ln(x_{boom}/x_{bust})$ for all variables x .

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- \widehat{q}_{id} are changes in domestic demand.
- $\widehat{R}_{id}(\widehat{q}_{id})$ are demand-driven changes in domestic output.
- We consider two estimators of β :

$$\widehat{\beta}_{ols} = \frac{\text{cov}(\widehat{\mathcal{R}}_{ix}, \widehat{\mathcal{R}}_{id})}{\text{var}(\widehat{\mathcal{R}}_{id})} \quad \text{and} \quad \widehat{\beta}_{iv} = \frac{\text{cov}(\widehat{\mathcal{R}}_{ix}, \widehat{\mathcal{Z}}_i)}{\text{cov}(\widehat{\mathcal{R}}_{id}, \widehat{\mathcal{Z}}_i)},$$

where $\widehat{\mathcal{Y}}$ denotes the residual of projecting \widehat{Y} on a set of control variables \widehat{X} .

Potential Outcomes Framework

- Different models have different implications for
 - the true value of β ;
 - the properties of $\hat{\beta}_{ols}$ and $\hat{\beta}_{iv}$ for given vectors \hat{X}_i and \hat{Z}_i .
- We explore the implications of two models:
 - 1 baseline model: partial-equilibrium version of Melitz (2003);
 - 2 generalization of baseline model to allow for increasing marginal costs.

BASELINE MODEL:
PARTIAL-EQUILIBRIUM VERSION OF MELITZ (2003)

Market-Specific Sales Revenue

- CES demand, constant marginal costs, monopolistic competition. ▶ Environment
- Model predicts that log-changes in sales between two periods are given by

$$\widehat{R}_{ij} = (\sigma - 1) [\widehat{\xi}_{ij} + \widehat{\varphi}_i - \widehat{\omega}_i] - (\sigma - 1) (\widehat{\tau}_{sj} - \widehat{P}_{sj}) + \widehat{E}_{sj},$$

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- To understand properties of $\widehat{\beta}_{ols}$ and $\widehat{\beta}_{iv}$, useful to decompose

$$\widehat{\xi}_{ij} = \xi_{sj} + \xi_{lj} + u_{ij}^{\xi},$$

$$\widehat{\varphi}_i = \varphi_s + \varphi_l + \delta_{\varphi} \widehat{\varphi}_i^* + u_i^{\varphi},$$

$$\widehat{\omega}_i = \omega_s + \omega_l + \delta_{\omega} \widehat{\omega}_i^* + u_i^{\omega},$$

and, thus, we can rewrite

$$\widehat{R}_{ij} = \gamma_{sj} + \gamma_{lj} + (\sigma - 1) \delta_{\varphi} \widehat{\varphi}_i^* - (\sigma - 1) \delta_{\omega} \widehat{\omega}_i^* + \underbrace{(\sigma - 1) (u_{ij}^{\xi} + u_i^{\varphi} - u_i^{\omega})}_{\varepsilon_{ij}}.$$

Properties of OLS Estimator

- Consider using OLS to estimate the parameter β in a regression of \widehat{R}_{ix} on \widehat{R}_{id} controlling for sector fixed effects, region fixed effects, and our proxies for productivity and production factor costs.
- Given this model, the probability limit of the OLS estimator of β is

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$$plim(\widehat{\beta}_{ols}) = \frac{cov(\widehat{\mathcal{R}}_{ix}, \widehat{\mathcal{R}}_{id})}{var(\widehat{\mathcal{R}}_{id})} = \frac{cov(u_{ix}^{\xi} + u_i^{\varphi} - u_i^{\omega}, u_{id}^{\xi} + u_i^{\varphi} - u_i^{\omega})}{var(u_{id}^{\xi} + u_i^{\varphi} - u_i^{\omega})}.$$

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 - productivity and production factor costs are not perfectly observable; and/or
 - market- and firm-specific residual demand positively correlated across markets.
- The OLS estimator $\widehat{\beta}_{ols}$ is likely to be upward biased; thus
 - $\widehat{\beta}_{ols} > 0$ is not very informative about the true value β .
 - $\widehat{\beta}_{ols} < 0$ is informative: it suggests the need for a different model.

Properties of IV Estimator

- Consider an instrumental variable approach with an instrument \widehat{Z}_i for the log change in domestic sales \widehat{R}_{id} .
- We then have

$$plim(\widehat{\beta}_{iv}) = \frac{cov(\widehat{\mathcal{R}}_{ix}, \widehat{Z}_i)}{cov(\widehat{\mathcal{R}}_{id}, \widehat{Z}_i)} = \frac{cov(u_{ix}^{\xi} + u_i^{\varphi} - u_i^{\omega}, \widehat{Z}_i)}{cov(u_{id}^{\xi} + u_i^{\varphi} - u_i^{\omega}, \widehat{Z}_i)}.$$

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- Note that $plim(\widehat{\beta}_{iv}) = 0$ if \widehat{Z}_i is:
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- If \widehat{Z}_i satisfies these three conditions, $\widehat{\beta}_{iv} \neq 0$ is informative in that it suggests the need for a different model as framework to understand the properties of our estimators.

DATA

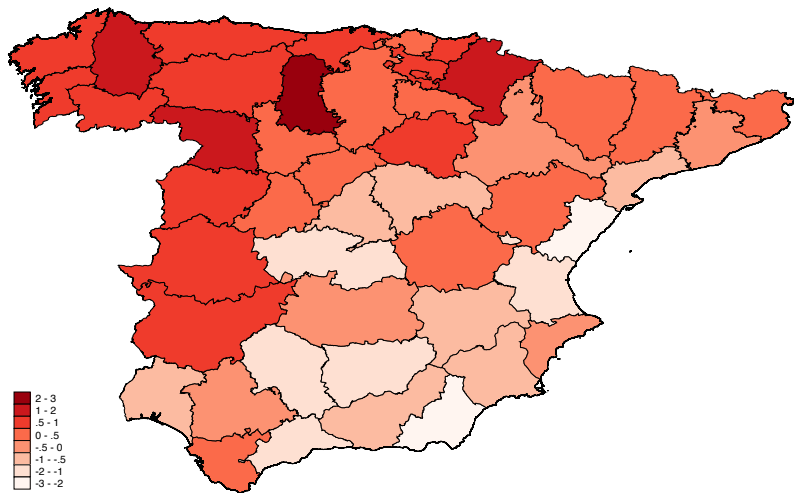
Data Sources

- Period: 2002-2013.
- Sample: Spanish manufacturing firms.

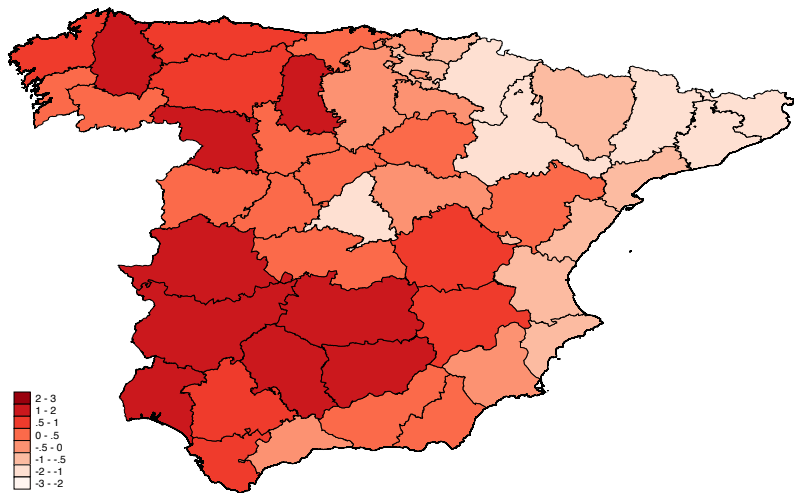
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- For each firm and year, we observe
 - Sector of activity (4-digit) and 5-digit zip code of location;
 - Total sales revenue and aggregate export revenue;
 - Input measures: labor expenditures (including social security contributions); number of workers, material expenditures, total value of fixed assets.

Average Log Change in Domestic Sales by Province

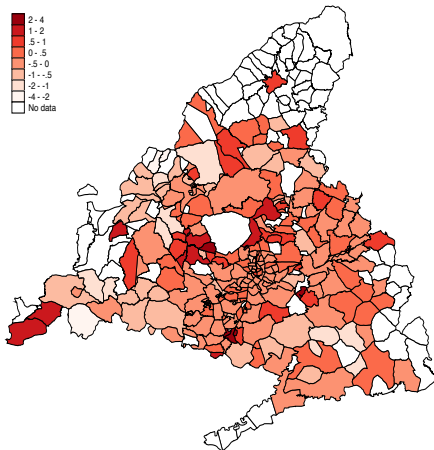


Average Log Change in Stock of Cars per Capita

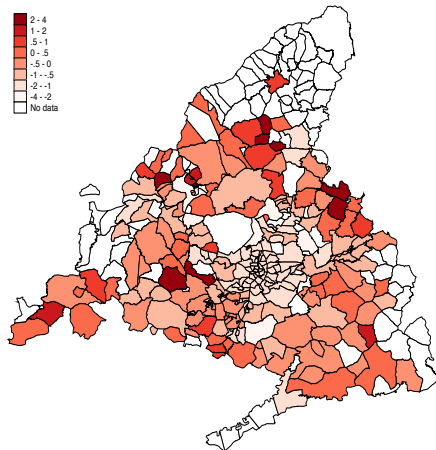


Variation Across Zip Codes: Madrid

Relative Change in Domestic Sales

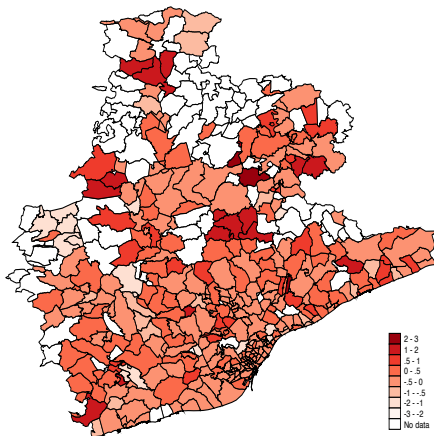


Relative Change in Vehicles per Capita

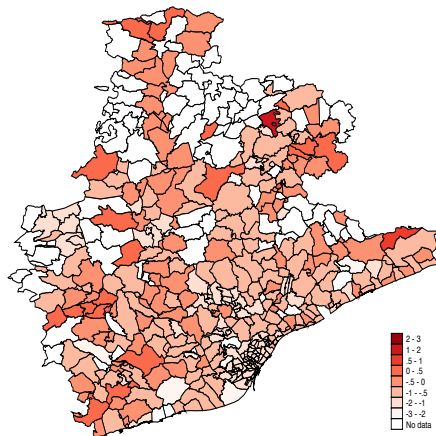


Variation Across Zip Codes: Barcelona

Relative Change in Domestic Sales



Relative Change in Cars per Capita



EXPORTS AND DOMESTIC SALES:
EXPLOITING A PROXY FOR LOCAL DEMAND

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 - ③ changes in the local stock of vehicles per capita are not correlated with firms’ unobserved supply or export demand shocks.
- First two requirements: stock of vehicles per capita is a relevant instrument.
- Last requirement: stock of vehicles per capita is a valid instrument.

Intensive-Margin OLS Estimates

Dependent Variable:	$\Delta \ln(\text{Exports})$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \ln(\text{Domestic Sales})$	0.131^a (0.025)	-0.147 ^a (0.028)	-0.228 ^a (0.027)	-0.217 ^a (0.027)	-0.204^a (0.027)	-0.186^a (0.030)
$\Delta \ln(\text{TFP})$		1.057 ^a (0.045)	1.298 ^a (0.052)	1.375 ^a (0.051)	1.357 ^a (0.051)	1.336 ^a (0.053)
$\Delta \ln(\text{Avg. Wages})$			-0.590 ^a (0.047)	-0.540 ^a (0.051)	-0.525 ^a (0.051)	-0.482 ^a (0.054)
Observations	8,018	8,018	8,018	8,018	8,018	7,507
R-squared	0.005	0.088	0.106	0.146	0.158	0.265
Sector FE	No	No	No	Yes	Yes	Yes
Province FE	No	No	No	No	Yes	No
Municipality FE	No	No	No	No	No	Yes

2SLS with Municipality Stock of Vehicles p.c. as IV

Dependent Variable:	$\Delta\text{Ln}(\text{Domestic Sales})$				$\Delta\text{Ln}(\text{Exports})$			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$\Delta\text{Ln}(\text{Domestic Sales})$					-2.185^a (0.622)	-1.346 ^a (0.359)	-1.393 ^a (0.350)	-1.602^a (0.437)
$\Delta\text{Ln}(\text{Vehicles p.c. in municipality})$	0.336^a (0.060)	0.447 ^a (0.066)	0.437 ^a (0.065)	0.363^a (0.068)				
$\Delta\text{Ln}(\text{TFP})$		0.785 ^a (0.025)	0.948 ^a (0.029)	0.936 ^a (0.030)		1.991 ^a (0.286)	2.396 ^a (0.339)	2.657 ^a (0.409)
$\Delta\text{Ln}(\text{Avg. Wages})$			-0.544 ^a (0.031)	-0.447 ^a (0.036)			-1.225 ^a (0.205)	-1.149 ^a (0.206)
F-statistic	31.17	46.39	45.00	28.32				
Observations	8,018	8,018	8,018	8,018	8,018	8,018	8,018	8,018
Sector FE	No	No	No	Yes	No	No	No	Yes
Province FE	No	No	No	Yes	No	No	No	Yes

Magnitude of Results

- Elasticity of -1.6 does not imply a more-than-complete substitution of exports for domestic sales.
- If domestic demand falls by €100:
 - a firm with 25% export share recoups €53.3;
 - a firm with 33% export share recoups €80.
- Median export share in the sample is 16.5%.

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- If domestic demand falls by €100:
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 - a firm with 33% export share recoups €80.
- Median export share in the sample is 16.5%.
- Estimates are incompatible with the implications of the model with constant marginal costs: an alternative model is needed to explain the relationship between demand-driven changes in domestic sales and exports.

Extensive Margin

Dependent Variable:	Export Dummy			Proportion of Years	
	1st Stage (1)	OLS (2)	2nd Stage (3)	OLS (4)	2nd Stage (5)
Ln(Domestic Sales)		0.040 ^a (0.003)	-0.107 (0.181)	0.021 ^a (0.002)	-0.071 (0.094)
Ln(Vehicles p.c. in municipality)	0.089^a (0.023)				
Ln(TFP)	1.075 ^a (0.016)	0.038 ^a (0.005)	0.196 (0.195)	0.050 ^a (0.003)	0.148 (0.101)
Ln(Average Wages)	-0.408 ^a (0.011)	-0.024 ^a (0.004)	-0.084 (0.074)	-0.031 ^a (0.003)	-0.068 ^c (0.038)
Observations	125,808	125,808	125,808	125,808	125,808
Firm FE	Yes	Yes	Yes	Yes	Yes
Sector-Period FE	Yes	Yes	Yes	Yes	Yes
Province-Period FE	Yes	Yes	Yes	Yes	Yes
F-statistic on IV	14.49				
Mean of Dep. Var.		0.183	0.183	0.113	0.113
Ext-Margin Elasticity		0.221	-0.584	0.181	-0.622

ROBUSTNESS

- 1 Eliminate zip codes exposed to supply shocks in the motor vehicles industry.
- 2 Heterogeneous Effects.
- 3 Alternative instruments.
- 4 Confounding Factors: Controls for additional marginal cost shifters.
- 5 Confounding Factors: Alternative measure of productivity
- 6 Placebo exercise for first stage regression.

Excluding Zip Codes Linked to Auto Industry

	<i>Panel A: Exclude zipcodes w/ high auto employment share</i>			<i>Panel B: Exclude zipcodes with at least one sizeable auto maker</i>		
Dependent Variable:	$\Delta\text{Ln}(\text{Exp})$	$\Delta\text{Ln}(\text{DSales})$	$\Delta\text{Ln}(\text{Exp})$	$\Delta\text{Ln}(\text{Exp})$	$\Delta\text{Ln}(\text{DSales})$	$\Delta\text{Ln}(\text{Exp})$
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	1st Stage	2nd Stage	OLS	1st Stage	2nd Stage
$\Delta\text{Ln}(\text{Domestic Sales})$	-0.218 ^a (0.030)		-2.382 ^a (0.535)	-0.235 ^a (0.038)		-2.787 ^a (0.694)
$\Delta\text{Ln}(\text{Vehicles p.c. in municipality})$		0.328 ^a (0.075)			0.318 ^a (0.088)	
$\Delta\text{Ln}(\text{TFP})$	1.349 ^a (0.057)	0.936 ^a (0.032)	3.361 ^a (0.501)	1.348 ^a (0.072)	0.898 ^a (0.043)	3.624 ^a (0.630)
$\Delta\text{Ln}(\text{Avg. Wages})$	-0.487 ^a (0.052)	-0.436 ^a (0.037)	-1.428 ^a (0.253)	-0.526 ^a (0.071)	-0.408 ^a (0.047)	-1.561 ^a (0.322)
F-statistic	-	19.04	-	-	13.11	-
Observations	7,178	7,178	7,178	4,613	4,613	4,613

Excluding Zip Codes Linked to Auto Industry

Dependent Variable:	<i>Panel C: Exclude zipcodes neighboring' those in Panel A</i>			<i>Panel D: Exclude sectors w/ I-O links to automakers</i>		
	$\Delta\text{Ln}(\text{Exp})$	$\Delta\text{Ln}(\text{DSales})$	$\Delta\text{Ln}(\text{Exp})$	$\Delta\text{Ln}(\text{Exp})$	$\Delta\text{Ln}(\text{DSales})$	$\Delta\text{Ln}(\text{Exp})$
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	1st Stage	2nd Stage	OLS	1st Stage	2nd Stage
$\Delta\text{Ln}(\text{Domestic Sales})$	-0.204 ^a (0.033)		-2.487 ^a (0.632)	-0.179 ^a (0.031)		-2.443 ^a (0.579)
$\Delta\text{Ln}(\text{Vehicles p.c. in municipality})$		0.332 ^a (0.085)			0.339 ^a (0.067)	
$\Delta\text{Ln}(\text{TFP})$	1.324 ^a (0.062)	0.928 ^a (0.032)	3.428 ^a (0.583)	1.298 ^a (0.063)	0.933 ^a (0.035)	3.396 ^a (0.538)
$\Delta\text{Ln}(\text{Avg. Wages})$	-0.471 ^a (0.058)	-0.404 ^a (0.037)	-1.390 ^a (0.276)	-0.520 ^a (0.060)	-0.413 ^a (0.037)	-1.448 ^a (0.252)
F-statistic	-	15.42	-	-	25.32	-
Observations	6,137	6,137	6,137	6,080	6,080	6,080

Heterogeneous Effects

Sample	Small Firms $L \leq 25$ (1)	Medium Firms $L \in (25, 50)$ (2)	Large Firms $L > 50$ (3)	Low prov/sec X share (4)	High prov/sec X share (5)	Low labor elasticity (6)	High labor elasticity (7)
OLS Elasticity	-0.201 ^a (0.042)	-0.282 ^a (0.054)	-0.175 ^a (0.045)	-0.239 ^a (0.040)	-0.162 ^a (0.037)	-0.169 ^a (0.038)	-0.249 ^a (0.037)
IV Elasticity	-1.221 ^a (0.449)	-2.271 ^b (1.037)	-1.247 ^b (0.625)	-3.034^b (1.177)	-0.839^c (0.460)	-1.606^a (0.684)	-1.350^b (0.645)
1st Stage Coef.	0.520^a (0.117)	0.294^a (0.113)	0.331^a (0.095)	0.235^a (0.073)	0.477^a (0.095)	0.372 ^a (0.084)	0.333 ^a (0.095)
1st Stage <i>F</i> -Stat.	19.86	6.71	12.19	10.23	24.98	19.76	12.22
Observations	2,657	2,183	3,190	4,005	4,009	3,914	3,914

Alternative Instruments

Dependent Variable:	$\Delta \text{Ln}(\text{Domestic Sales})$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \text{Ln}(\text{Vehicles p.c. in province})$	0.853^a (0.223)					
$\Delta \text{Ln}(\text{Distance-Population weighted vehicles p.c. in other zip codes})$		0.260 ^a (0.028)	0.184^a (0.040)			
$\Delta \text{Ln}(\text{Vehicles p.c. in municipality})$			0.296^a (0.086)			
$\text{Ln}(\text{Urban land supply ratio in 1996})$				0.029 ^b (0.012)		
$\Delta \text{Ln}(\text{construction wage bill}) \times$ 2002 wage bill share in municipality					0.331 ^a (0.054)	
$\Delta \text{Ln}(\text{foreign tourists}) \times$ 2002 foreign tourists p.c. in province						0.280 ^a (0.098)
F-statistic	14.61	86.02	43.02	6.36	38.33	8.18
	$\Delta \text{Ln}(\text{Exports})$					
$\Delta \text{Ln}(\text{Domestic Sales})$	-1.425^a (0.400)	-1.628^a (0.527)	-1.336^a (0.395)	-1.595^c (0.927)	-1.568^a (0.535)	-1.179^a (0.257)
p-value for Sargan Overid test	0.46	0.34	0.34	0.51	0.99	0.97
Observations	8,018	7,949	7,949	6,940	7,928	8,018

Confounding Factors: Labor Markets

Dependent Variable:	$\Delta \ln(\text{Exports})$				
	(1)	(2)	(3)	(4)	(5)
$\Delta \ln(\text{Domestic Sales})$	-1.602 ^a (0.437)	-1.443 ^a (0.434)	-1.655 ^a (0.480)	-1.657 ^a (0.484)	-1.677 ^a (0.478)
Δ Share of Temporary Workers (firm-level)		-0.302 ^b (0.118)			
Δ Share of Temporary Workers (municipality-level)			-0.068 (0.194)		
Δ Manufacturing Average Wages (municipality-level)				0.083 (0.140)	
Δ Manufacturing Employment p.c. (municipality-level)					-0.266 ^a (0.057)
F-Statistic	28.32	25.83	25.34	25.16	24.82
Observations	8,018	7,649	7,746	7,748	7,748

Confounding Factors: Financial Costs

Dependent Variable:	$\Delta \text{Ln}(\text{Exports})$				
	(1)	(2)	(3)	(4)	(5)
$\Delta \text{Ln}(\text{Domestic Sales})$	-1.602 ^a (0.437)	-1.457 ^a (0.455)	-1.424 ^a (0.440)	-1.606 ^a (0.472)	-1.667 ^a (0.481)
$\Delta \text{Ln}(\text{Financial Costs})$ at firm level		-0.024 (0.015)			
Financial Costs in Boom at firm level			0.002 (0.015)		
$\Delta \text{Ln}(\text{Financial Costs})$ at municipality level				-0.038 (0.032)	
Financial Costs in Boom at municipality level					0.023 (0.035)
F-Statistic	28.32	23.22	23.90	24.70	25.26
Observations	8,018	6,924	6,994	7,742	7,743

Alternative TFP Measures

Dependent Variable:	$\Delta \ln(\text{Exports})$			
	(1)	(2)	(3)	(4)
	OLS	IV	OLS	IV
$\Delta \ln(\text{Dom. Sales})$	-0.204 ^a (0.027)	-1.602 ^a (0.437)	0.105 ^a (0.026)	-1.285 ^a (0.486)
$\Delta \ln(\text{Avg. Wages})$	-0.525 ^a (0.051)	-1.149 ^a (0.206)	-0.514 ^a (0.064)	-0.873 ^a (0.152)
$\Delta \ln(\text{TFP Sales})$	1.357 ^a (0.051)	2.657 ^a (0.409)		
$\Delta \ln(\text{TFP Value Added})$			0.807 ^a (0.060)	1.218 ^a (0.161)
F-Statistic		28.32		24.99
Observations	8,018	8,018	8,018	8,018

1st Stage Placebo

Dependent Variable:	$\Delta\text{Ln}(\text{Domestic Sales})$			
	Boom firms		Bust firms	
Sample:	Within Boom	Boom vs. Bust	Within Bust	Boom vs. Bust
	(1)	(2)	(3)	(4)
$\Delta\text{Ln}(\text{Vehicles p.c. in municipality})$	-0.041 (0.080)	0.184 ^b (0.074)	-0.009 (0.071)	0.277 ^a (0.070)
Observations	5,344	5,344	5,245	5,245
F-statistic	0.27	6.19	0.02	15.63

MODEL WITH INCREASING MARGINAL COSTS

Increasing Marginal Costs

- Prior results are inconsistent with a model with constant marginal costs.
- Maintain CES demand function and monopolistic competition.
- More general cost structure: total variable cost of producing Q_{id} for the domestic market and Q_{ix} for the foreign market is equal to

$$\frac{1}{\varphi_i} \omega_i \frac{1}{\lambda + 1} (\tau_{sd} Q_{id} + \tau_{sx} Q_{ix})^{\lambda+1}, \quad \lambda \geq 0.$$

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- This model leads to the following expression for market-specific sales:

$$\widehat{R}_{ij} = d_s + d_\ell + \frac{(\sigma - 1)}{1 + \lambda} \delta_\varphi \widehat{\varphi}_i^* - \frac{(\sigma - 1)}{1 + \lambda} \delta_\omega \widehat{\omega}_{it}^* - \frac{(\sigma - 1) \lambda}{1 + \lambda} \widehat{R}_i + \varepsilon_{ij},$$

where $R_i \equiv R_{id} + R_{ix}$ and $\varepsilon_{ix} \equiv u_{ix}^\xi + \frac{(\sigma - 1)}{1 + \lambda} (u_i^\varphi - u_i^\omega)$.

- Specification identical to that in prior regressions but introducing the change in total sales \widehat{R}_i (instead of domestic sales \widehat{R}_{id}) as RHS variable.

Estimation: Relevant Elasticity

Dependent Variable:	Intensive Margin		
	$\Delta \ln(\text{Exp})$	$\Delta \ln(\text{TotSales})$	$\Delta \ln(\text{Exp})$
	(1)	(2)	(3)
	OLS	1st Stage	2nd Stage
$\Delta \ln(\text{Total Sales})$	0.785 ^a (0.037)		-2.624 ^a (0.916)
$\Delta \ln(\text{Vehicles p.c. in municipality})$		0.221 ^a (0.046)	
$\Delta \ln(\text{TFP})$	0.397 ^a (0.053)	0.985 ^a (0.024)	3.741 ^a (0.900)
$\Delta \ln(\text{Avg. Wages})$	-0.095 ^b (0.047)	-0.432 ^a (0.031)	-1.567 ^a (0.408)
F-statistic	-	23.42	-
Observations	8,018	8,018	8,018

QUANTIFICATION

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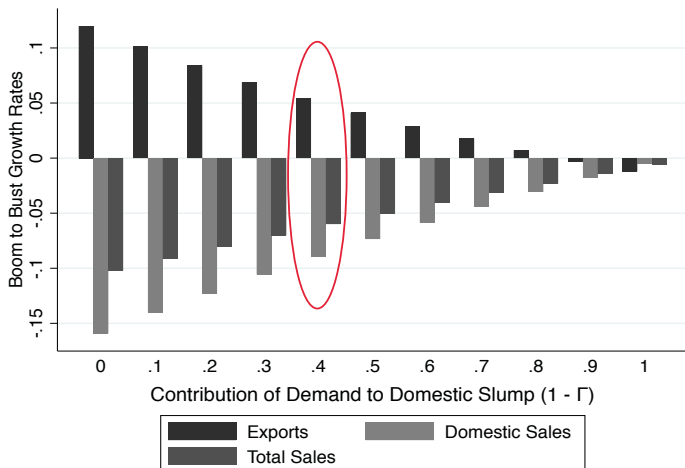
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- ③ Finally, we perform a variance decomposition of the observed change in firms' total sales with the aim of informing the degree to which the boom-to-bust observed changes in Q_{sd} are truly due to demand or supply shocks

Quantification: Results



- We explain about 55% of growth in exports

Summary and Next Steps

- We have provided evidence for the substitutability between domestic and foreign markets at short/medium-term horizons.
- If a model with constant marginal costs does not fit the data, perhaps trade economists should embrace models with variable marginal costs (e.g., due to capacity constraints).
- Quantification: the vent-for-surplus channel can explain a substantial part of the Spanish “export miracle” of 2009-13.

EXTRA SLIDES

Environment

- Each firm i in sector s faces the following demand in market $j = \{d, x\}$,

$$Q_{ij} = \frac{P_{ij}^{-\sigma}}{P_{sj}^{1-\sigma}} E_{sj} \xi_{ij}^{\sigma-1}, \quad \sigma > 1.$$

- Firm i 's total cost of producing Q_{ij} for market j is,

$$c_{ij} Q_{ij} \quad \text{with} \quad c_{ij} \equiv \tau_{sj} \frac{1}{\varphi_i} \omega_i.$$

- Firm i needs to pay an exogenous fixed cost F_{ij} to sell in market j .
- Firm i chooses optimally the quantity offered in each market j , Q_{ij} , taking the price index, P_{sj} , as given.
- As marginal production costs are constant and per-market fixed costs are independent of the firm's participation in other markets, the optimization problem of the firm is separable across markets.