

Bennett (2020): Changes in Persistence of Performance over Time

Persistent Dominance and Automation

Bennett (2020): Automation and Market Dominance

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Increasing dominance of large firms:

- **Decreasing competition**
 - Gutiérrez and Philippon (2017a, 2017b)
 - De Loecker, Eeckhout, and Unger (2020)
- **Indicator of competition**
 - Autor, Dorn, Katz, Patterson, Van Reenen (2017)
 - Bessen (2017)
 - Van Reenen (2018)

More markets (each of which might be more competitive):

- Rossi-Hansberg, Sarte, Trachter (2020)
- Rossi-Hansberg and Hsieh (2020)
- Rinz (2020)
- Hendwerker and Dey (2020)



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Persistence of performance

Cardinal

$$y_t = \alpha + \beta * y_{\{t-1\}} + \varepsilon$$

Estimated with Arellano-Bover/Blundell-Bond DPD

$$\text{convergence interval} = \frac{\ln(1 - 0.95)}{\ln(\beta)}$$

Ordinal

$$RF = 1 - \frac{D}{E(D)}$$

Actual shuffling
Expectation under random sorting

$$D = \sum_{r=1}^n |r_{t1} - r_{t2}| \quad E(D) = \frac{n^2 - 1}{3}$$

Sample: Compustat non-financial or unclassifiable with segment-level data

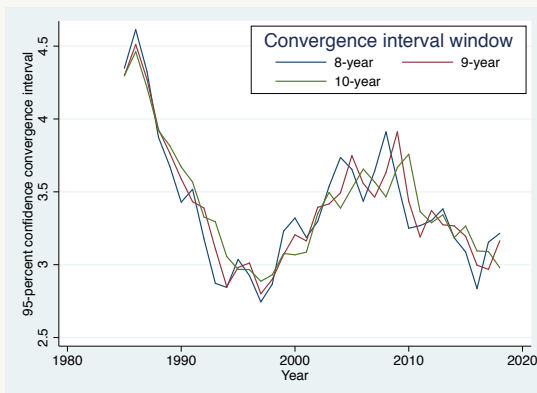
Performance: Industry-demeaned aggregated segment performance



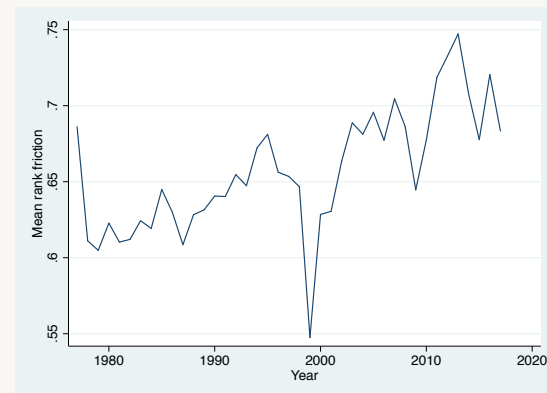
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Persistence of performance: Outcomes

Cardinal



Ordinal

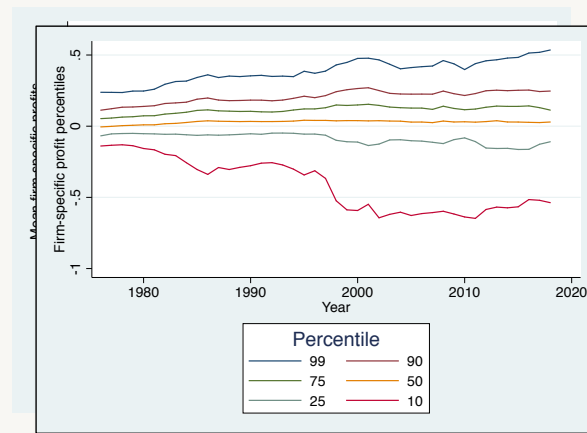
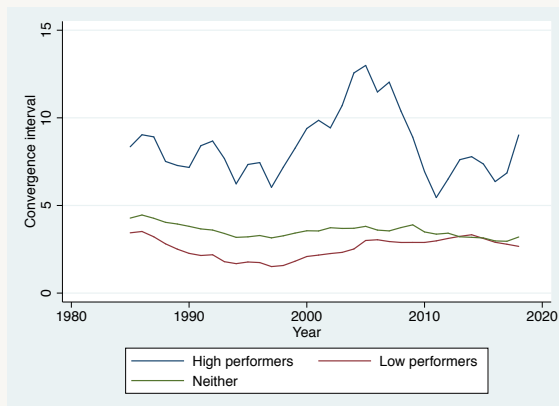


Note: Robust to accounting for sector mix and listing and delisting trends



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Persistence of performance: Explanation?

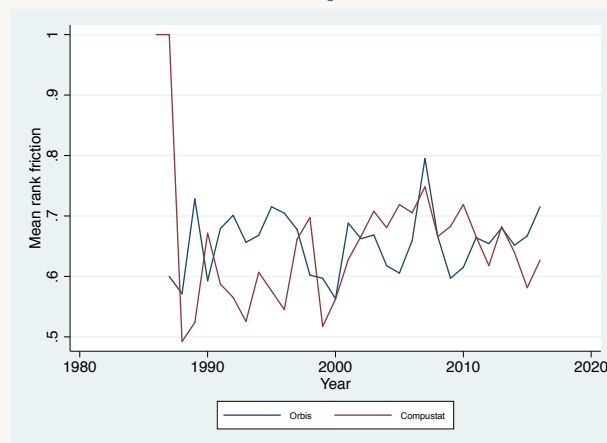
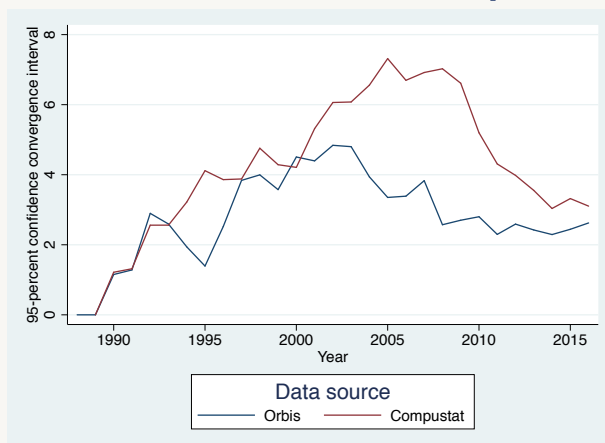


Change in autocorrelation is for the highest performers, but lowest performance levels drop so much that high performers ranks don't change



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Persistence of performance: US specific?



Western European matched sample doesn't seem to have **markedly** different patterns



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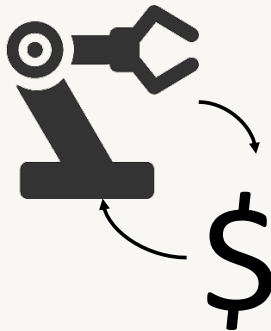
Candidate explanations

- **Anti-trust**
 - Grullon et al. (2019)
- **Assortative talent matching**
 - Potentially implied by Song, Price, Guvenen, Bloom, von Wachter (2019)
- **Higher scale economy technology**
 - Autor, Dorn, Katz, Patterson, Van Reenen (2017)
 - Bessen (2017)
 - Van Reenen (2018)

Bennett (WP):
Dig in here



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If bigger firms adopt first

- Cohen and Klepper (1996)
- Schumpeter (1950)

...but they might later...

- Arrow (1962)
- Blair (1972)
- Mansfield (1983)
- Geroski and Pomroy (1990)

...or it might depend?

- Flaherty (1980)
- Budd, Harris, and Vickers (1993)
- Athey and Schmutzler (2001)

For **commonly-available non-exclusive cost**
reducing automation capital, empirically...

Which firms automate?

What are the implications for concentration?



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Draw marginal cost of production, c'_i
 Call 2 leader WLOG

→

Choose to invest $f d_i$ to reduce
 marginal cost by $\gamma(d_i)$

→

Compete in
 asymmetric cost
 Cournot

$$g \equiv \frac{p(c'_2)q(c'_2) - p(1)q(1)}{p(c'_2)q(c'_2)}$$

$$\frac{\partial \pi_2}{\partial d_2 \partial g} < 0, \quad \frac{\partial \pi_1}{\partial d_1 \partial g} > 0$$

Predictions


Automation expenditure by:

- Laggard is increasing in gap
- Leader is decreasing in gap

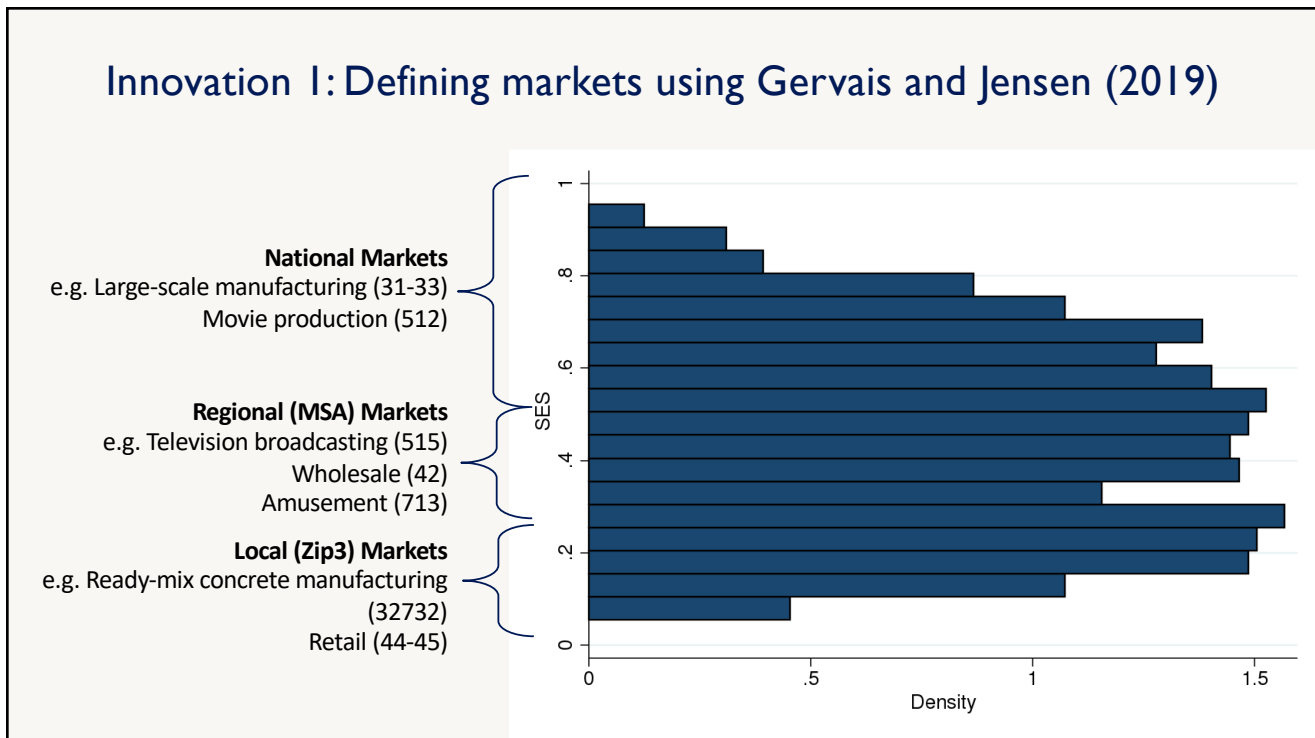
Implications

Availability of automation technology

- Makes markets **LESS** concentrated, *unless they are growing*
- Biggest difference for **MOST** concentrated markets



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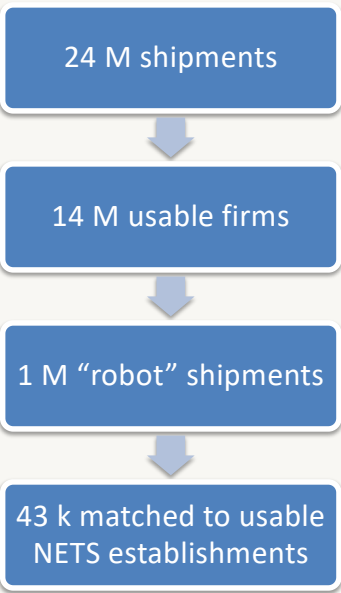
Innovation 2: Establishment-level automation data

commodity	name	city	vdate	pounds	usport	fcountry	teus	street	zipcode	value
CARTONS LABELS	HANESBRANDS INTIMATES DIVISION	WINSTON SALEM	2006-10-26 00:00:00.0	16453	MIAMI	COLOMB	565	1000 E HANES MILL RD	28105	194240
PRINTING MACH	HANESBRANDS INC	KINGS MTN	2006-12-20 00:00:00.0	219	MIAMI		1	219 COMMERCE BLVD	28006	1485
TEXTILES KM	HANESBRANDS	WINSTON SALEM	2015-09-02	17211	MIAMI	EL SALV	.58	1325 IVY AVE	27105	119826
TIGHTS KNEE HIGH	HANESBRANDS	WINSTON SALEM	2012-06-11	9094	LONG BEACH	CHINA P	2	1000 E HANES MILL RD	27105	49293
ELECTRIC BOARDING MACHIN TOE CLOSST	HANESBRANDS	WINSTON SALEM	2010-11-11	8783	PT EVERGLADES	C RICA	2	1000 E HANES MILL RD	27105	108733
CAS CONT ADULT HYVWHT BEEFY TURNED	HANESBRANDS	WINSTON SALEM	2007-07-12	42931	MIAMI	ZZ	2	1000 E HANES MILL RD	27105	320548
BOARDING TEXTILE MACH AUTO ROBOT UN	HANESBRANDS	WINSTON SALEM	2015-06-15	38916	PT EVERGLADES	HONDURA	2.23	1000 E HANES MILL RD	27105	199330
FRONT CLOSE PUSH MICROFIBER BRAS	HANESBRANDS	WINSTON SALEM	2008-06-23	23613	NORFOLK	INDNSIA	1.19	1000 E HANES MILL RD	27105	109688
HIGH KNEE	HANESBRANDS	WINSTON SALEM	2014-08-22	577	LONG BEACH	CHINA P	.33	1000 E HANES MILL RD	27105	4099
FRONT CLOSE PUSH UP BRA	HANESBRANDS	WINSTON SALEM	2008-02-15	12200	LOS ANGELES	INDNSIA	2.18	1000 E HANES MILL RD	27105	20403
BOARDING MACH	HANESBRANDS	WINSTON SALEM	2014-12-12	615	GULFPORT	HONDURA	.03	1000 E HANES MILL RD	27105	3153
FUNNEL NECK	HANESBRANDS	WINSTON SALEM	2015-08-01	12987	LOS ANGELES	CHINA P	2	1325 IVY AVE	27105	107163

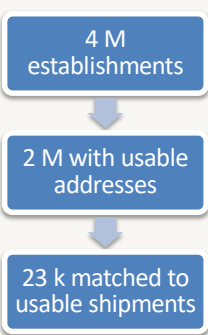


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PIERS data



NETS data



- Sub-national markets
- No monopolies
- Barnatchez, Crane, Decker (2017) restrictions

Table 1: Summary statistics from matched data				
	Mean	Std. Dev.	Min.	Max.
Value of automation capital shipments in year	3314.813	(180816)	0	7.06e+07
Stock of automation capital shipmentsin year	11730.54	(541629)	0	2.08e+08
Sales in year (\$M)	8.614493	(85.6418)	0	45496
Employees in year	66.02781	(104.0592)	11	1000
Sales leader [0,1]	.2106741	(.4077875)	0	1
Observations	1375024			

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Establishment-level regressions I would like to run

$$\ln(\text{Automation_Capital_Stock}_{it} + 1) =$$
$$\alpha + \beta_1(\text{gap}_{it-1}) + \beta_2(\text{gap}_{it-1} \times \text{Leader}) + \beta_3 \text{Leader}$$
$$+ \nu(\text{Controls}_{it-1}) + \gamma_i + \eta_{mt} + \epsilon_{it}$$

Where η are NAICS X year fixed effects and γ are establishment fixed effects

...but, if there is an “automation capability” it would bias everything

$$\text{gap}_{et} = a + b \left(\frac{1}{M-1} \sum_{j \in M \setminus m} \text{HHI}_{tj} \right) + \epsilon_{et}$$

Where M is the set of markets in T
 m is the market e is in

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VARIABLES	(1)	(2)
	Ln(1+ Automation capital stock value)	
Revenue gap [lag]	11.20*** (3.197)	2.052** (0.869)
Leader x Revenue gap [lag]	-19.30*** (5.525)	-3.551** (1.502)
Leader [lag]	7.720*** (2.203)	1.423** (0.599)
Ln(1+sales) [lag]	2.116*** (0.601)	0.392** (0.163)
Ln(1+employees) [lag]	-0.0107 (0.0257)	-0.00220 (0.00726)
Ln(1+ Automation capital stock value) [lag]		0.842*** (0.00275)
Observations	1,358,765	1,358,765
Model	2SLS	2SLS
Establishment FE	Yes	Yes
NAICS6 x Year FE	Yes	Yes
Markets	Subnational	Subnational
Kleibergen-Paap rk Wald F	7.24	7.24

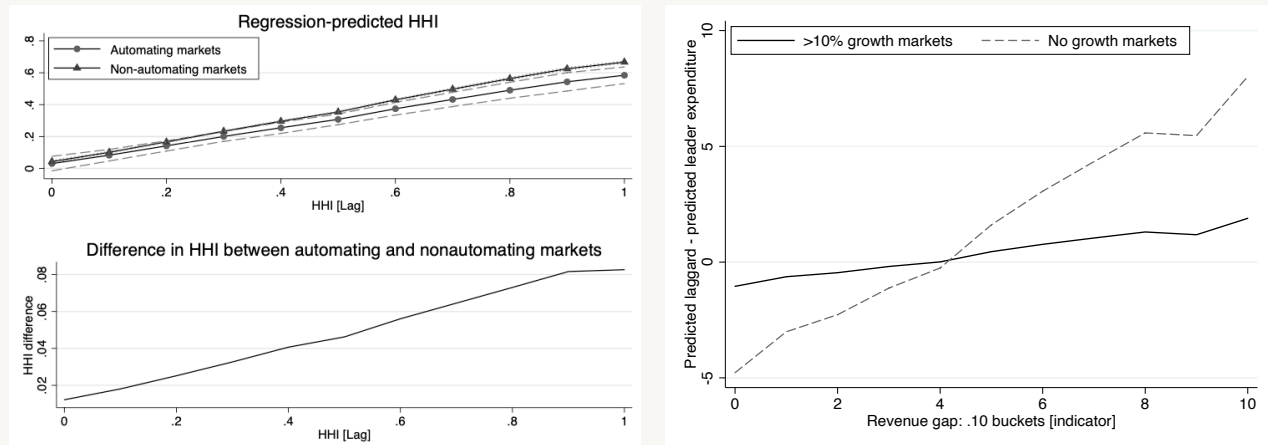
Note: Errors clustered at market-by-year level. Using the critical values from Stock and Yogo (2005), the instruments are strong enough that the Wald would reject at less than 10 percent if the true power were 5 percent. *** p<0.01, ** p<0.05, * p<0.1

Establishment results

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Market-level results



Endogenous automation reduces market dominance,
primarily in stagnant markets



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What I take away

- Declining performance of low performing **public** companies enough that changes in returns to scale don't lead to changes in rank
 - Patterns **potentially** consistent with technological and/or assortative talent matching
- Market dominance in catchment areas is trending up all else equal in manufacturing
 - Automation not responsible
 - in fact, probably **the opposite** because of endogenous expenditures

Bennett (2020):
reconcile measures

Bennett (WP): New
data, new measure,
reconcile theories



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