Multinationals, Markets, and Mark-ups

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Market Power: Where, When and Who?

- Labor's share of global income has fallen
  - Is **weaker** product market **competition** to blame?
    - If yes, may have big policy implications

- **Data on global operations of U.S. multinationals**:

1. **Where** do these firms wield strong **market power**?
2. **When** has this power been strongest?
3. **Who** among U.S. firms enjoys greatest market power?

A Global Account of Market Power

- Why study multinationals (MNEs)?
  - Large, productive, and geographically mobile
  - Firm present in multiple countries: identify country effects
- **Theory**: multiple countries, endog entry w/ variable mark-ups
- **Empirics**: all US MNE parents and affiliates
  - Data: **Comparable** across countries, over time
    - Global geography of mark-ups, 1999 - 2014
  - New methodology: Cross **firm-country comparisons** of mark-ups

Results

Theory

- **Top firms** enter competitive, **weaker** niche markets
- Mark-up response to prod differences **yields market competitiveness**

Empirics

- **Rising ... but least** in most competitive markets
- **Within**: Mark-ups rise within country, within firm
- **Across-market variation** within firm: theory $\surd$
- **Sorting** of firms to countries: theory $\surd$

Mark-ups and Data: Overview

- Mark-up of **affiliate** of firm f in country i in year t (De Loecker-Warzynski 2012):

$$\mu_{ift} = \theta_{ift} \frac{S_{ift}}{W_{it} L_{ift}},$$

- US Outward FDI Data 1999, 2004, 2009, and 2014
  - Consistent cross-country data on **US parent (9,000+)** and **all** affiliates in **50 countries**
  - Parent Data: US sales, capital intensity
  - Affiliates Data: Country, industry, **sales**, **labor compensation**, capital intensity

U.S. Affiliate Labor Shares Mirror Host Country's



- Labor shares **fall in step**
- Regression results imply same **country by country**

Decomposition of Mark-up Changes, 1999-2014

Overall Change	Within	Between: Change in Size		
	Firms	*Firm Market Share*	*Countries within Firms*	*Market Share Strong Sorting Firms*
0.89	1.69	-0.28	-0.24	-0.20
100%	181%	-32%	-27%	-23%

- Mark-up increase mostly **within firm**
- Mostly negative between components
  - Driver of market power increase: **Not** mainly something leading to **market share increase** of high mark-up firms

Model

- **Endowments**: Countries, indexed by i, differ only in size, L_i
- **Preferences**: Linear-quadratic, as in Melitz-Ottaviano '08
  - With monopolistic comp, yields demand q_i

$$q_i(p) = \frac{L_i}{\gamma}\left(p_i^{max} - p\right)$$

- p_i^{max} (choke price): endogenous measure of ***competition in i***
  - γ: preference parameter

Technology

- Firms are **heterogeneous** in
  - Marginal cost c
  - Managing a plant f
    - Negative correlation plausible (e.g., Yeaple 2005)
- **All** firms have
  - Per-unit shipping cost t
  - Entry cost f^e
- Market structure: monopolistic competition

Equilibrium: Proximity-Concentration and Free Entry

- **Cutoff**: Firm will operate affiliate in country i if:

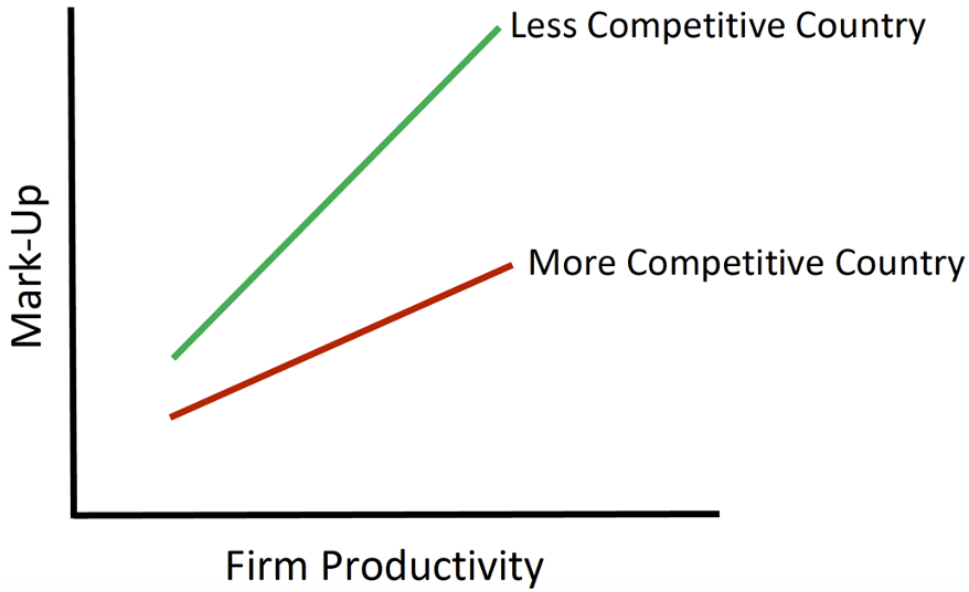
$$\left(p_i^{max} - \frac{t}{2}\right) - \frac{2\gamma}{tL_i} f > c$$

- Free entry in each country: In equilbrium

$$corr(L_i, p_i^{max}) < 0$$

Large countries are **more competitive**

Markup-Productivity Gradient: Country Competitiveness

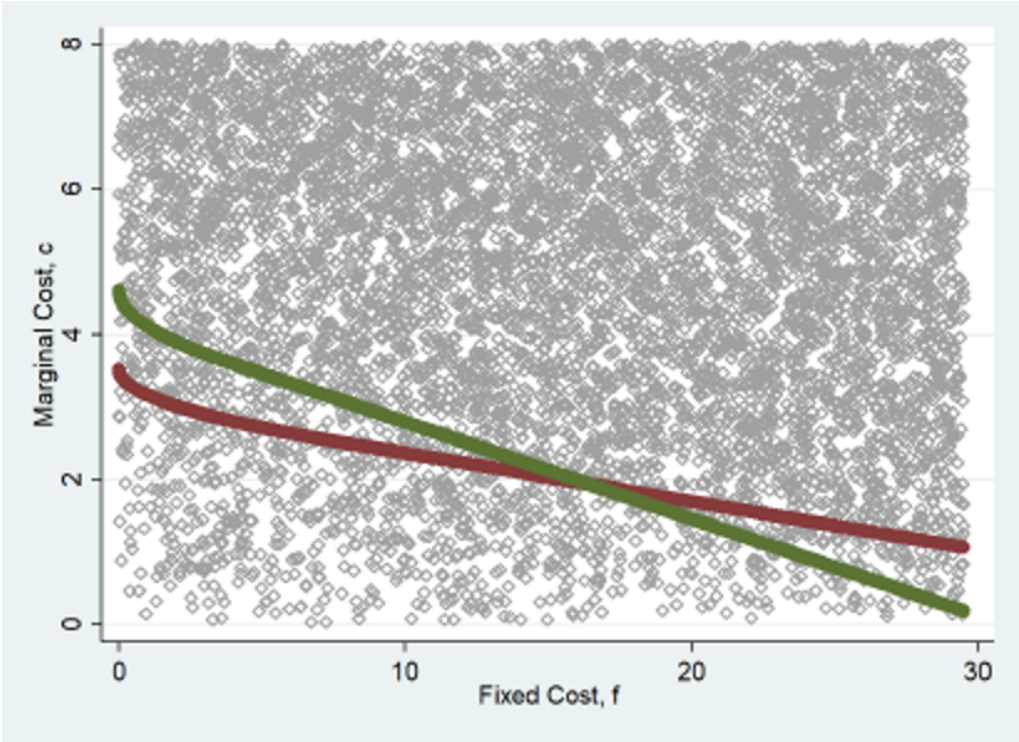


- A firm's mark up in country i is

$$\mu = \frac{1}{2}\left(\frac{p_i^{max}}{c} + 1\right)$$

- More **competitive countries and times** periods have lower mark-up gradient

Sorting of Firms into Countries



- **High** Mark-up **Firms** $\Longrightarrow$ **Low** Mark-up **Countries**
  Low Mark-up **Firms** $\Longrightarrow$ **High** Mark-up **Countries**
  - Sorting **lowers cross-country variation** in market power
  - Red (Green) line: Cut-off for MP in large (small) country
    - Firms below cut-off do MP

Sorting, Competitiveness, and Mark-ups: An Example

	Foreign	Home
Choke Price	**3.53**	**5.63**
∅ Mark-up All Entrants	3.21	2.89
∅ Mark-up Firms Entering **H and F**	**2.69**	**3.37**

- Choke Price: Foreign more competitive than Home
- Average Mark-up suggests the opposite: $3.21 > 2.89$
  - Competitiveness of Foreign revealed only once **sorting is un-done**

Regression Evidence w/ 50 Countries, 1999-2014

- Mark-up of affiliate of firm f in country i in year t

$$\mu_{ift} = \theta_{ift} \frac{S_{ift}}{W_{it} L_{ift}}$$

- Explain variation in **BEA sales over wage bill**—**equals mark-up**, conditional on elasticity θ_{ift}:

$$log \frac{S_{ift}}{W_{it} L_{ift}} = log\, \mu_{ift} - log\, \theta_{ift}$$

  - $log\, \theta_{ift}$: Instrumented affiliate **capital-intensity**, industry/firm and year FE
- Regression error reflects measurement error in mark-up
  - Allowing for tax havens, tech transfer costs, etc.

Model Predictions

- **Firm productivity** given by firm's US sales (PS)
- Mark-up depends on
  - firm productivity
  - **country competitiveness**
    - log GDP per worker ($GDPW$) or log employment (EMP)
- **Baseline** w/ firm productivity and country competitiveness

$$log\,\mu_{ift} = \beta_P log PS_{ft} + \beta_Y GDPW_{it} + \beta_E EMP_{it}$$

- **Additional specifications** allow for heterogeneity by
  - (1) Firm (2) Country (3) Time

Mark-Up Regression Results - Manufacturing

Dep. var.: $log \frac{S}{WL}$	(1)	(2)
Productivity	**0.069**	**0.050**
GDP/Worker	**-0.175**	**-0.106**
Employment	-0.021	-0.010
US Industrial Concentration		**0.421**
Fixed Effects	Ind-Yr	Firm,Yr
N	42,821	42,821

- Mark-ups **increasing in Productivity**
- Mark-ups **lower in large, advanced countries**
- Mark-ups higher as industry U.S. 4-firm ratio rises

Mark-ups and Country Competitiveness

Dep. var.: $\frac{S}{WL}$	Ind-Yr	Firm, Yr
Productivity	**0.452**	**0.414**
GDP/Worker	**0.346**	**0.409**
Productivity x GDP/Worker	**-0.034**	**-0.032**
Employment	0.048	0.068
Productivity x Employment	-0.004	-0.005

- Productivity **increases mark-ups by less** in competitive countries
  - Theory $\surd$
  - Competitiveness (GDP/Worker), not pure size (Employment)
- Typically **same** qualitative results for **Services** multinationals
  - All control var's included; industry x year fixed effects

Market Power over Time

Dep. var.: $log\frac{S}{WL}$	Ind-Yr	Firm,Yr
Productivity	**0.047**	**0.041**
Productivity x [2009/2014]	**0.035**	**0.034**
GDP/Worker	**-0.131**	0.011
GDP/Worker x [2009/2014]	**-0.081**	**-0.117**
Employment	-0.002	-0.019
Employment x [2009/2014]	-0.018	**-0.020**

- High productivity gives **more market power in later years**
  - Consistent w/ rising mark-ups
- **Lid** on mark-ups **thru Competitiveness gets stronger too**

Entry, Productivity, and Country Competitiveness

Dep. var.: Affiliate Indicator	Ind-Yr	Firm,Yr
Productivity	**-0.108**	**-0.125**
GDP/Worker	**-0.113**	**-0.118**
Productivity x GDP/Worker	**0.012**	**0.012**
N	941,532	941,532

- **High productivity** firms: drawn to **competitive markets**
- **Weaker** firms: prefer **less competitive** ('niche') markets
  - Theory sorting: $\surd$
    - OLS w/ industry x year fixed effects; no K/L, Vert Integ

Evolution of Manufacturing MNE Entry

Dep. var.: Affiliate Indicator	Ind-Yr	Firm,Yr
Productivity	**0.021**	**0.032**
Productivity x [2009/2014]	**-0.003**	**0.003**
GDP/Worker	**0.032**	**0.005**
GDP/Worker x [2009/2014]	**-0.003**	**-0.003**

- **Firms**: Within industries, increasingly **low mark-up** firms enter
- **Countries**: Increasingly, entry into **high mark-up countries**

Evolution of Local Manufacturing Sales

Dep. var.: $log\ AS_{fct}$	Ind-Yr	Firm,Yr
Productivity	**0.325**	**0.169**
Productivity x [2009/2014]	0.044	0.045
GDP/Worker	**0.735**	**0.644**
GDP/Worker x [2009/2014]	**-0.217**	**-0.204**

- Over time **more productive firms** grab market share
- Over time, firms refocus activity toward **less competitive countries**

Conclusions

- **Geography of Market Power**: must account for **firm** differences and **country** differences
  - Competition stronger in advanced countries
  - **Sorting** of firms **dampens** difference in average market power
- Cross-country inferences require **comparable set** of firms
  - MNE dataset: **within-firm**, across markets variation
  - **Markup-productivity relation** controls for alt factors
- Over time **competition weakens**, less so in developed world
  - Competition drives U.S. firms to higher mark-up locations
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Supporting Material

- Related Literature
- Correlation of U.S. Affiliate Labor Share and Aggregate Country Labor Share
- Additional Theory Results
- Additional Decompositions
- Service Regression Results

Related Literature

- Market Power
  - Measurement: Loecker-Warzynski '12
  - Reasons for low US investment: Gutierrez-Philippon '17
  - Firm/Aggregate Survey: Syverson '19
- Global Trends
  - De Loecker, Eekhout, and Unger '20, Criscuolo et al. '18
    - Labor Share: Autor, Dorn, Katz, Patterson, Van Reenen '20
- Theory
  - Heterogeneous productivity, variable mark-up: Melitz-Ottaviano '08
  - Sorting: Nocke '06, Baldwin-Okubo '06
  - Proximity vs Concentration w/ CES: Helpman, Melitz, Yeaple '04

US Affiliate Labor Share vs KLEMS Labor Share

	(1)	(2)
US MNE Labor Share	0.432	0.103
	(0.026)	(0.031)
Fixed Effects	Year	Country, Year
N	281	281
R-Squared	0.57	0.93

Notes: Dependent variable is logarithm of aggregate manufacturing labor share for 15 KLEMS countries. Independent variable is logarithm of manufacturing labor share for the affiliates of U.S. multinationals. Sample period: 1998 to 2015. Robust standard errors in parentheses.

Support Material: Decomposition of Mark-up, 1999-2014

Overall Change	Within	Between: Change in Size		
	Country	*Country Market Share*	*Firms within Countries*	*Market Share Strong Sorting Countries*
0.89	2.00	-0.25	-1.20	0.33
100%	226%	-28%	-135%	37%

- Mark-ups rose overall - mostly within
  - Not b/o growing size of high mark-up countries
  - Offset by reallocation to low mark-up firms within countries

Melitz-Ottaviano vs CES: Interaction Prediction

- **CES**: Cutoff condition $A(1-\tau^{1-\sigma})\,c^{1-\sigma} > f$. Taking logs of l.h.s. supplies index function

$$logA + log(1-\tau^{1-\sigma}) - (\sigma-1)log\,c$$

  - **No interaction** of competitiveness and firm productivity

- **M-O**: In our model, cutoff condition can be written

$$\frac{Lt}{2\gamma}\left(p^{max} - \frac{t}{2} - c\right) > f$$

- Taking logs, l.h.s. yields index function, with total diff

$$\left(L\frac{\partial p^{max}/\partial L}{p^{max} - \frac{t}{2} - c} + 1\right) dlogL - \frac{c}{p^{max} - \frac{t}{2} - c} dlogc$$

  where $\partial p^{max}/\partial L < 0$. **Interaction implied**.

Modeling the Output Elasticity of Labor

- Assume

$$log\theta_{ift} = log\theta_{jt} + \alpha log\left(K_{ift}/L_{ift}\right),$$

- Time-varying industry fixed effects capture θ_{jt}
- Firm-component captured by **capital-labor ratio**
  - Instrumented by **capital-labor ratio of MNE parent**, country K/L endowment, their interaction
- Additionally:
  - Gravity variables for tech transfer
  - Vertical integration, interacted w/ tax haven indicator

Extended Mark-Up Regressions: Manufacturing

Dep. var.: $log\frac{S}{WL}$	(1)	(2)
Productivity	**0.069**	**0.050**
GDP/Worker	**-0.175**	**-0.106**
Employment	-0.021	-0.010
Capital-Labor Ratio	**0.788**	**0.134**
Vertical Integration	**0.778**	-0.239
Tax Haven	0.035	0.011
Vertical Integration x Tax Haven	**1.950**	**2.056**
US Industrial Concentration		**0.421**
Fixed Effects	Ind-Yr	Firm,Yr

Baseline Mark-Ups: Services Multinationals

Dep. var.: $log \frac{S}{WL}$	(1)	(2)
Productivity	**0.057**	**0.091**
GDP/Worker	**-0.093**	**-0.140**
Employment	**-0.022**	**-0.026**
Capital-Labor Ratio	**0.150**	**0.332**
Vertical Integration	**0.680**	**0.717**
Tax Haven	0.070	0.051
Vertical Integration x Tax Haven	**1.119**	**1.187**
US Industrial Concentration		**0.356**
Fixed Effects	Ind-Yr	Firm,Yr
N	59,017	59,017

Mark-Up With Country-Firm Interaction: Services

Dep. var.: $\frac{S}{WL}$	Ind-Yr	Firm, Yr
Productivity	**0.173**	**0.459**
GDP/Worker	0.060	**0.342**
Productivity x GDP/Worker	-0.010	**-0.031**
Employment	-0.008	**0.110**
Productivity x Employment	-0.001	**-0.009**

Mark-Up over Time: Services MNEs

Dep. var.: $log\frac{S}{WL}$	Ind-Yr	Firm,Yr
Productivity	**0.038**	**0.086**
Productivity x [2009/2014]	**0.035**	0.014
GDP/Worker	**-0.094**	**-0.128**
GDP/Worker x [2009/2014]	-0.003	-0.010
Employment	**-0.032**	**-0.038**
Employment x [2009/2014]	0.019	**0.021**

Baseline Entry: Services MNEs

Dep. var.: Affiliate Indicator	Ind-Yr	Firm,Yr
Productivity	**-0.041**	**-0.046**
GDP/Worker	**-0.030**	**-0.033**
Productivity x GDP/Worker	**0.004**	**0.005**
N	1,218,176	1,218,176

Local Sales: Services MNEs

Dep. var.: $logAS_{fct}$	Ind-Yr	Firm,Yr
Productivity	**0.345**	**0.207**
Productivity x [2009/2014]	0.014	0.059
GDP/Worker	**0.830**	**0.622**
GDP/Worker x [2009/2014]	−0.082	0.065