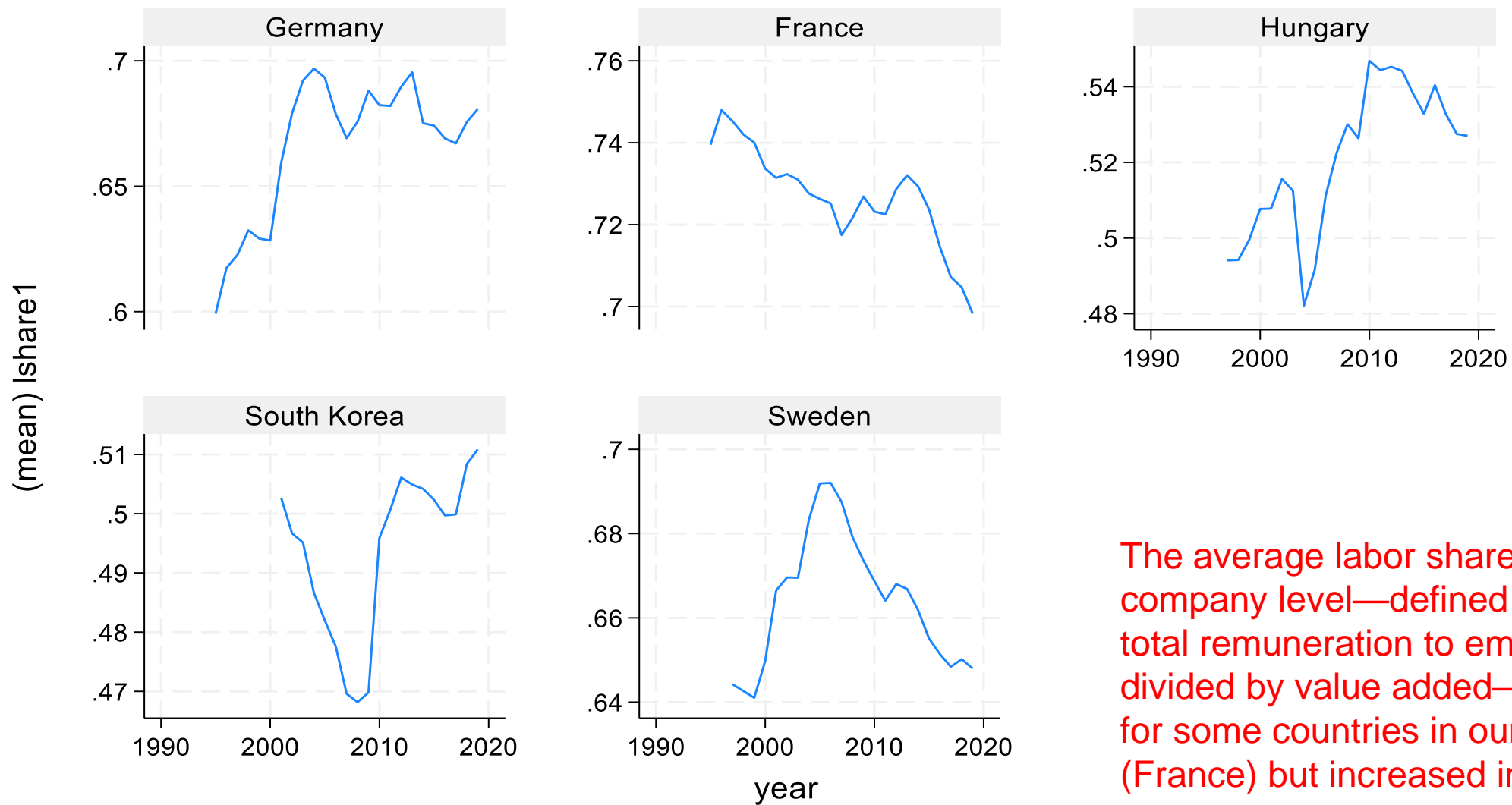




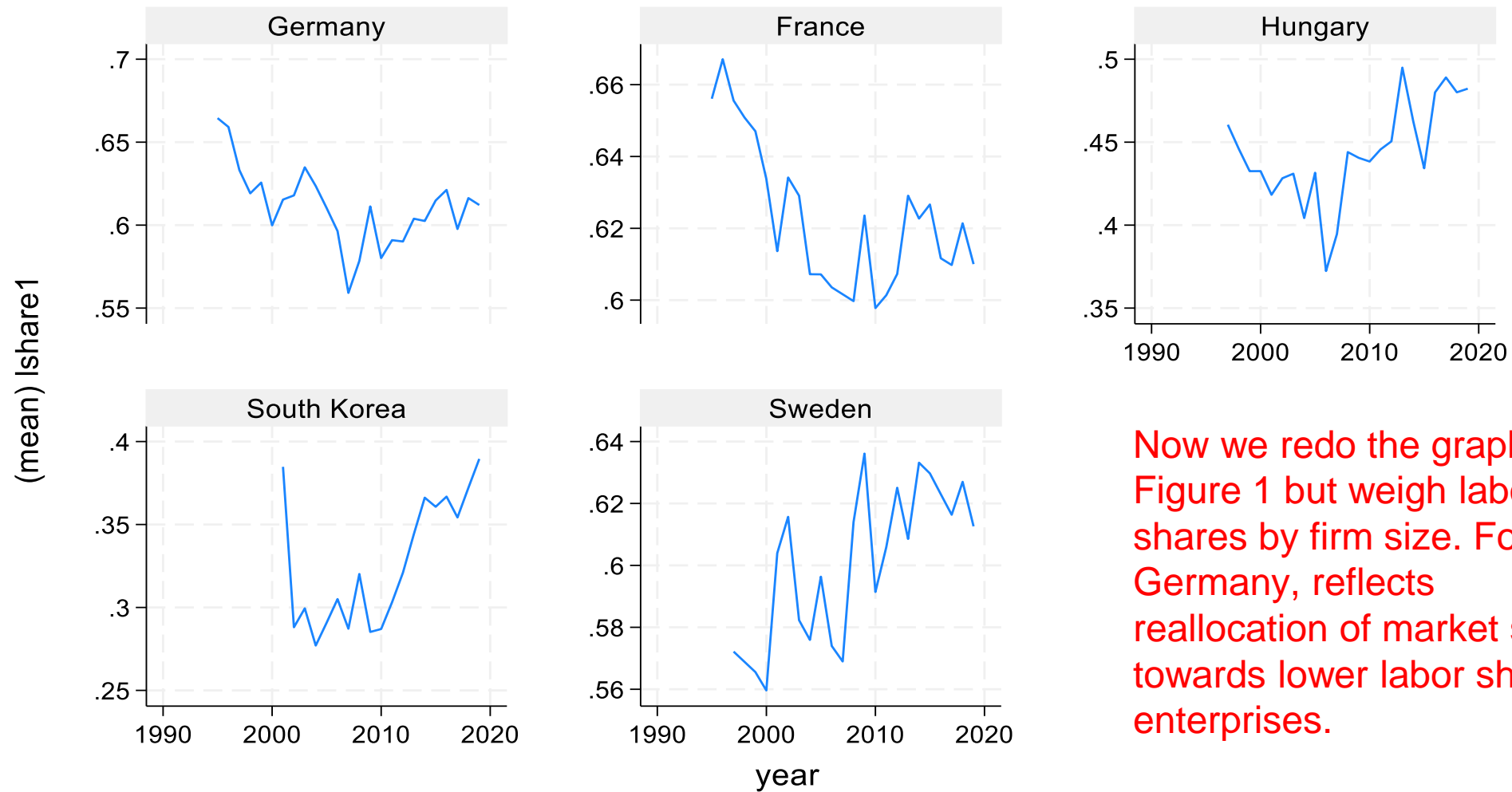
# Disentangling Various Explanations for the Declining Labor Share: Evidence from Millions of Firm Records

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Graphs by ISO code for Country (From BVDID)

The average labor share at the company level—defined as total remuneration to employees divided by value added—declined for some countries in our sample (France) but increased in others.



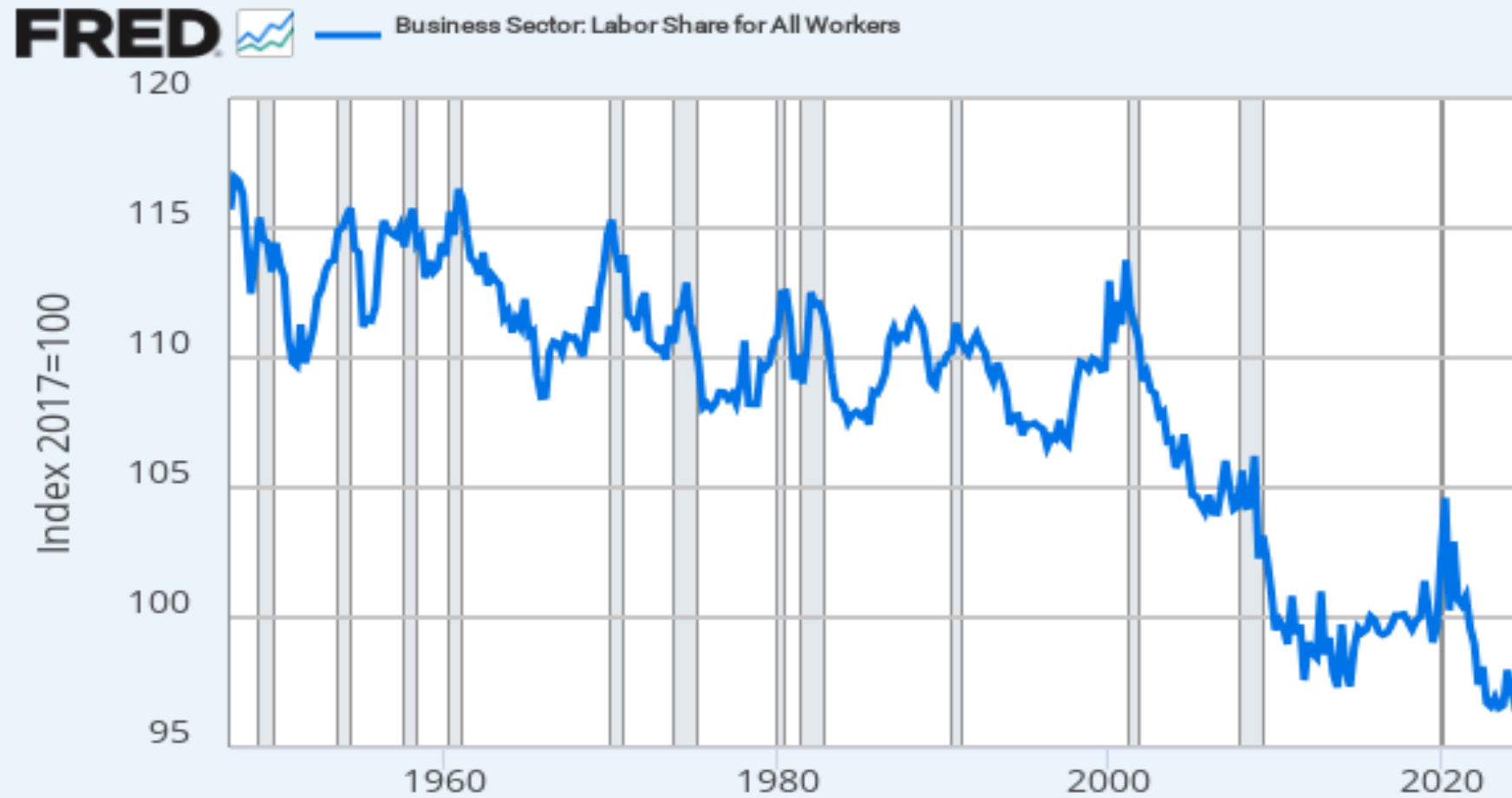
Graphs by ISO code for Country (From BVDID)

Now we redo the graphs in Figure 1 but weigh labor shares by firm size. For Germany, reflects reallocation of market share towards lower labor share enterprises.

# Why Should we care?

- Direct Link between falling labor shares and rising inequality
- $Gini = LS \times \text{concentration of labor income} + KS \times \text{concentration of capital income}$ .
- Jacobson and Occhino (2012): every 1 percent fall in the labor share leads to a 0.33 rise in the Gini Coefficient. 8 percent labor share decline raises US Gini by 2 to 3 percentage points.

Decline  
remarkable  
for USA but  
extensive  
data not  
easily  
available to  
explore  
possible  
explanations



Source: U.S. Bureau of Labor Statistics via FRED®

*Shaded areas indicate U.S. recessions.*



# Overview for this paper:

1. Identifies impact of four major factors driving labor share changes across 5 countries: France, Sweden, Germany, Hungary, South Korea
2. Focus on market power, technological change, intangible asset investments and globalization
3. Determinants of labor shares, employment, and wages
4. Utilization of Orbis database for comprehensive firm-level data

# Contribution of Today's Paper

- Most analyses focus on one single explanation:
  - Autor et al (2020): market power
  - Acemoglu and Restrepo (2020): technological change
  - Autor et al (2014), Pierce and Schott (2016): globalization
- Classic Omitted Variable bias: induces “over explaining” the labor share according to Grossman and Oberfield (2022)
- Heterogeneity across countries: Model gives intuition and Empirics confirm this

# Key Findings

- **Market Power:** Increased concentration ratios are associated with lower labor shares (except in Sweden) and lower employment. But in Sweden, strong labor institutions capture rents.
- **Technological Change:** investments in technology, particularly R&D, lead to a significant decline in labor shares and employment.
- **Globalization I:** export activity correlates with labor shares differently across countries; positive impact in South Korea, Hungary, (China) but negative impact for rich European countries.
- **Globalization II:** export activity positively associated with employment growth everywhere: trade spurs employment BUT is associated with large wage declines.



# Theory in Autor et al:(2020)

- Firms have market power in product markets
- In labor market, firms have all the bargaining power so capture entire rents
- With these two assumptions increases in markups automatically lead to lower labor shares. If production technology is of the form  $Y = A_i L^\alpha K^\beta$  then with market power

$$\frac{\alpha}{\mu} = \frac{w_0 L^v}{PY}$$

# Theory in this paper is different:

- ***Bargaining Over Rents***
- Labor and capital bargain to determine their share of the rents. The outcome of bargaining, if we assume Nash bargaining, can be derived from finding the solution to maximizing—over  $w_L$  and  $w_K$ —the following, which is the product of the surplus each player receives over their so-called threat point:

$$(w_L v_L - U_{L0}) (w_K v_K - U_{K0})$$

We can define the threat points as:

$$U_{L0} = w^* v_L - f_L v_L \quad (5a)$$

$$U_{K0} = w^* v_K - f_K v_K \quad (5b)$$

So our maximization problem becomes:

$$\max_{(6)} \{w_L v_L - w^* v_L + f_L v_L\} \{w_K v_K - w^* v_K + f_K v_K\}$$

over  $w_L$  and  $w_K$  and subject to:

$$w_L v_L + w_K v_K = G(R)$$

The first-order conditions with respect to  $w_L$  and  $w_K$  are (where  $\lambda$  is the multiplier on the constraint):

# This paper

- Bargaining allows workers to earn more or less than competitive wage—they can share in surplus:

$$\frac{w_L v_L}{G(R)} = S_L = \frac{1}{2} + \frac{1}{2} \left[ \frac{(w_{0L} + \Omega_{0L}) v_L}{G(R)} - \frac{f_L v_L}{G(R)} - \frac{(w_{0K} + \Omega_{0K}) v_L v_K}{G(R)} + \frac{f_K v_K}{G(R)} \right] \quad (11)$$

- Labor's share rises if alternative returns to labor rise, alternative returns to capital fall, fixed costs to capital of relocating rise or fixed costs to labor of relocating fall

# Basic Specifications (for country $c$ , sector $j$ , year $t$ ):

$$\begin{aligned}\text{LABOR}_{cjt} = & B_1 \text{TECH}_{cjt} + B_2 \text{CONC4}_{cjt} + B_3 \text{INTANG}_{cjt} \\ & + B_4 \text{TRADE}_{cjt} + f_c + s_j + D_t\end{aligned}\quad (13a)$$

With fixed country and sector effects, this specification in first or long differences by country-sector-year can also be estimated as follows:

$$\begin{aligned}\Delta \text{LABOR}_{cjt} = & B_1 \Delta \text{TECH}_{cjt} + B_2 \Delta \text{CONC4}_{cjt} + B_3 \Delta \text{INTANG}_{cjt} \\ & + B_4 \Delta \text{TRADE}_{cjt} + D_t\end{aligned}\quad (13b)$$

# Two approaches to identification:

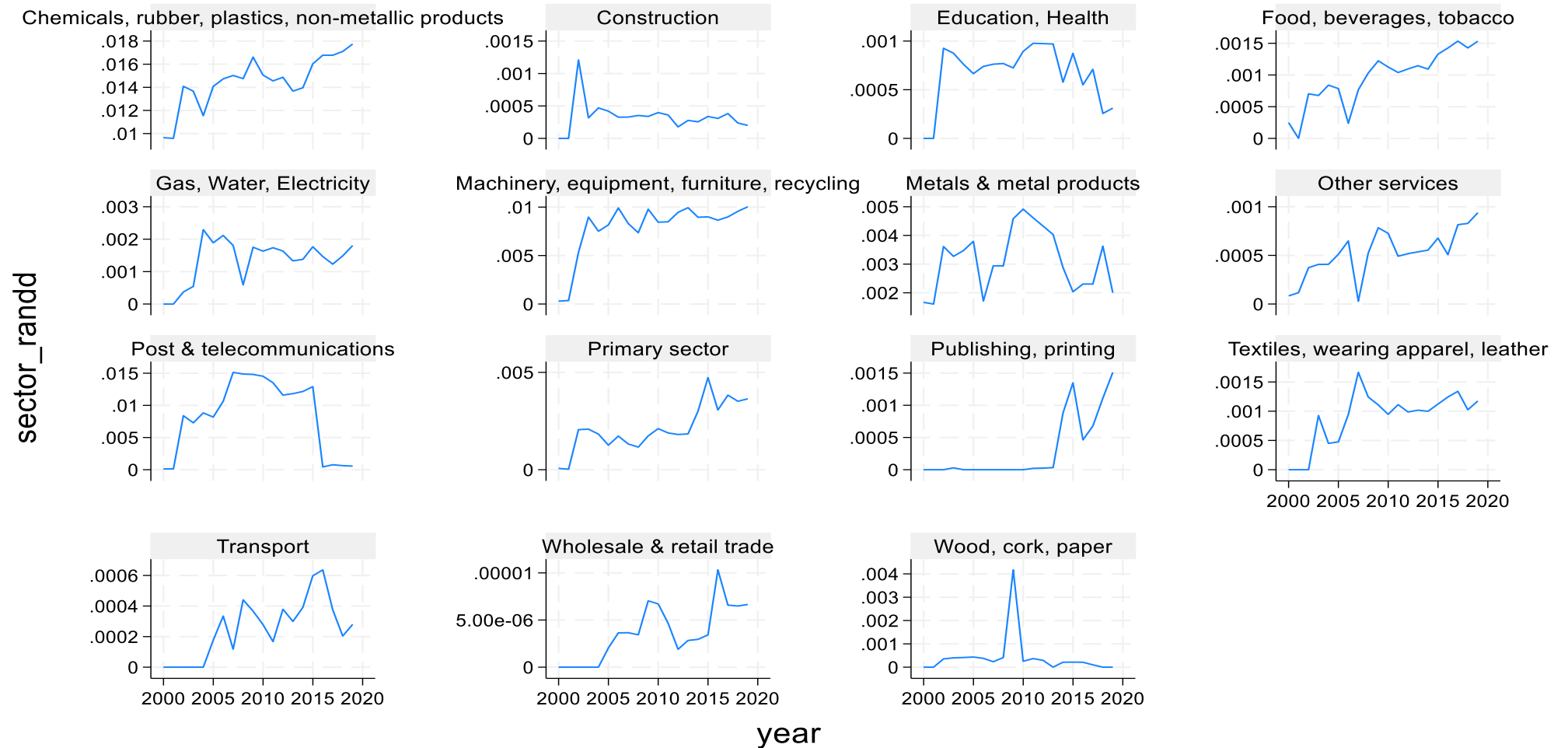
## (1) Firm level: own firm values excluded

$$SectorRandD_{ijt} = \frac{\sum_{k \neq i}^n (researchdevelopmentexpenses_{kjt})}{\sum_{k \neq i}^n (total\ revenue_{kjt})}$$

$$SectorTradeshare_{ijt} = \frac{\sum_{k \neq i}^n (exportrevenue_{kjt})}{\sum_{k \neq i}^n (total\ revenue_{kjt})}$$

## (2) Sector level: 2SLS with other country values

# R and D Shares over Time Rising



Graphs by BvD major sector



# Sector Definitions: Orbis

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Appendix Table A2

BvD Major Sector	Number of Observations	Percentage of Total	Cumulative (%)
Banks	223,119	0.52	0.52
Chemicals, rubber, plastics, non-metal minerals	614,783	1.43	1.95
Construction	5,532,180	12.86	14.81
Education, Health	1,668,772	3.88	18.69
Food, beverages, tobacco	718,167	1.67	20.36
Gas, Water, Electricity	196,507	0.46	20.82
Hotels & Restaurants	2,479,291	5.77	26.58
Insurance Companies	6,146	0.01	26.60
Machinery, equipment, furniture, recycling	2,000,371	4.65	31.25
Metals & Metal Products	895,906	2.08	33.33
Other Services	14,739,171	34.27	67.61
Post & Telecommunications	99,983	0.23	67.84
Primary Sector	2,065,674	4.80	72.64
Public Administration & Defense	7,693	0.02	72.66
Publishing, Printing	744,928	1.73	74.39
Textiles, Wearing Apparel, Leather	357,561	0.83	75.22
Transport	1,383,542	3.22	78.44
Wholesale & Retail Trade	8,993,135	20.91	99.35
Wood, Cork, Paper	278,132	0.65	100.00
<b>Total</b>	<b>43,005,061</b>	<b>100.00</b>	

# Country Coverage favors Europe

IS Code (from BVD)	Number of Observations	Percentage of Total
DE	1,751,549	4.07
FR	26,648,120	61.97
HU	4,765,725	11.08
KR	4,465,769	10.38
SE	5,375,334	12.50
TOTAL	43,000,061	100.00

Table 1. Sector Level Results

Dependent Variable: Labor Share		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CR4 (Four firm Concentration ratio)		-0.177 (0.023)**				-0.158 (0.024)**		-0.173 (0.023)**	
Sector level share of Tangible assets in Total assets			-0.196 (0.036)**			-0.201 (0.035)**	-0.213 (0.035)**		
Sector level share of Intangible assets in Total assets			-0.305 (0.062)**			-0.218 (0.064)**	-0.247 (0.063)**		
Share of research and development expenditures in total sales at sector level				-1.249 (0.454)**				-1.096 (0.445)*	-1.011 (0.451)*
Share of exports in sales at the sector level					-0.174 (0.036)**	-0.187 (0.036)**	-0.202 (0.036)**	-0.173 (0.036)**	-0.185 (0.036)**
CR20							-0.151 (0.027)**		-0.160 (0.026)**
Missing Trade						0.070 (0.011)**	0.078 (0.011)**	0.073 (0.011)**	0.079 (0.011)**
R <sup>2</sup>			0.55	0.54	0.55	0.58	0.57	0.57	0.56
N			1,846	1,846	1,846	1,846	1,846	1,846	1,846

*Notes:* All columns report levels specifications which include sector fixed effects, year fixed effects, and country fixed effects. All variables are aggregated to the sector level. Labor share is defined at the sector level as total payments to employees divided by value-added. Research and development share is the share of reported expenditures divided by total revenues at the sector level. Trade shares are the share of exports in revenues at the sector level. A \* indicates significance at 5 percent and a \*\* indicates significance at 10 percent.

Table 3. Firm Level Determinants of the Labor Share

Dependent Variable: Change in Labor Share				
	(1)	(2)	(3)	(4)
Change in CR4	-0.033 (0.001)**		-0.025 (0.000)**	
Change in share of Intangible assets At the Sector Level	-0.001 (0.002)	0.007 (0.002)**		
Change in share Of tangible assets At the Sector Level	0.026 (0.002)**	-0.017 (0.002)**		
Change in CR20		-0.009 (0.001)**		-0.020 (0.000)**
Change in Export Share At the Sector Level	-0.283 (0.001)**	-0.275 (0.001)**	-0.308 (0.001)**	-0.299 (0.001)**
Change in R and D Share			-0.596 (0.034)**	-0.543 (0.034)**
R <sup>2</sup>	0.01	0.01	0.01	0.01
N	10,429,078	10,429,078	10,594,222	10,594,222

*Notes:* All are first difference results. Time effects included in all specifications whose coefficients are not reported here. Labor share is defined at the establishment level as total remuneration divided by value-added. Research and development share is the share of expenditures divided by total revenues at the sector level. Trade shares are the share of exports in revenues at the sector level. Intangible and tangible assets are changes at the sector level in the share of tangible or intangible assets in total assets. RDSHARE, Trade share, tangible and intangible asset shares also exclude firm  $i$ . For establishment level regressions only, top 20 firms in terms of market share excluded.

Table 4. Firm-Level Results by Country

Dependent Variable: Change in the Labor Share at the Establishment Level						
	Sweden	France and Germany	Hungary and South Korea	Sweden	France and Germany	Hungary and South Korea
Change in CR4	0.007 (0.007)	-0.003 (0.001)**	-0.013 (0.003)**	0.016 (0.007)*	-0.000 (0.000)	-0.012 (0.003)**
Change in share of Intangible assets at the Sector Level	-0.013 (0.007)*	0.006 (0.002)**	0.008 (0.006)			
Change in share of Tangible assets at the Sector Level	0.063 (0.010)**	0.008 (0.002)**	0.013 (0.008)			
Change in Export Share at the Sector Level	-0.282 (0.008)**	-0.011 (0.002)**	0.013 (0.005)**	-0.252 (0.007)**	-0.010 (0.002)**	0.012 (0.005)**
Change in R and D share				-0.138 (0.061)*	0.396 (0.053)**	-0.215 (0.134)
Missing Trade	0.000 (0.001)	-0.006 (0.000)**	0.011 (0.007)	-0.000 (0.001)	-0.006 (0.000)**	0.008 (0.006)
$R^2$	0.17	0.00	0.00	0.17	0.00	0.00
$N$	1,277,591	7,133,021	2,018,466	1,422,482	7,144,743	2,026,997

*Notes:* All are first difference results. Time effects included in all specifications whose coefficients are not reported here. Labor share is defined at the establishment level as total remuneration divided by value-added. Research and development share is the share of expenditures divided by total revenues at the sector level. Trade shares are the share of exports in revenues at the sector level. Intangible and tangible assets are changes at the sector level in the share of tangible or intangible assets in total assets. RDSHARE, Trade share, tangible and intangible asset shares also exclude firm i. For establishment level regressions only, top 20 firms in terms of market share excluded.

Table 5. Labor Demand at the Firm and Sector Level

Dependent Variable:	Firm Level Results: Dependent Variable is First difference of the log of Employment				Sector Level Results			
	Change in the log of Employment at the Establishment Level				Change in the log of Employment at the Sector Level			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in CR4	-0.030 (0.002)**		-0.006 (0.001)**		-0.521 (0.156)**		-0.777 (0.162)**	
Change in share of tangible assets	0.005 (0.006)	0.007 (0.006)					0.028 (0.234)	-0.088 (0.233)
Change in share of intangible assets	0.075 (0.006)**	0.070 (0.006)**					-0.108 (0.234)	-0.152 (0.233)
Change in CR20		-0.033 (0.003)**		-0.008 (0.002)**		-0.868 (0.177)**		-1.207 (0.182)**
Change in Export share	0.035 (0.004)**	0.036 (0.004)**	0.029 (0.004)**	0.029 (0.004)**	1.476 (0.223)**	1.468 (0.222)**	1.683 (0.224)**	1.665 (0.223)**
Change in R and D share			-0.150 (0.083)	-0.141 (0.083)	-13.632 (2.663)**	-12.681 (2.668)**		
Missing Trade	-0.004 (0.000)**	-0.004 (0.000)**	-0.006 (0.000)**	-0.006 (0.000)**	(0.075)	(0.076)	-0.070 (0.075)	-0.010 (0.076)
$R^2$	0.00	0.00	0.00	0.00	0.78	0.79	0.78	0.79
$N$	10,652,349	10,652,349	11,659,816	11,659,816	2,176	2,176	2,176	2,176

Notes: First four columns at the establishment level and last four columns at the sector level. All specifications in differences and include time dummies whose coefficients are not reported here. Employment is the total number of employees at either the sector or establishment level. Research and development share is the share of expenditures divided by total revenues at the sector level. Trade shares are the share of exports in revenues at the sector level. Tangible and intangible asset shares in total assets, R and D shares, export shares, CR4 and CR20 all exclude firm  $i$  for the establishment level results in the first four columns.



**Table 8. Log Wages at the Firm and Sector Level**

Dependent Variable:	Firm Level Results: Dependent Variable is First difference of the log of Wages Defined as Total compensation divided by Employment				Sector Level Results			
	Change in the log of Wages at the Establishment Level				Five Year Long Change in the log of Wages at the Sector Level			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Change in CR4	-0.087 (0.003)**		-0.109 (0.002)**		1.132 (0.163)**		1.228 (0.162)**	
Change in share of tangible assets	0.063 (0.008)**	0.077 (0.008)**			0.588 (0.253)*	0.542 (0.252)*		
Change in share of intangible assets	-0.044 (0.007)**	-0.187 (0.007)**			1.266 (0.423)**	1.072 (0.423)*		
Change in CR20		-0.009 (0.003)**		-0.090 (0.002)**		1.656 (0.199)**		1.753 (0.196)**
Change in Export share	-1.615 (0.005)**	-1.609 (0.005)**	-1.639 (0.005)**	-1.621 (0.005)**	-2.206 (0.230)**	-2.244 (0.229)**	-2.222 (0.231)**	-2.257 (0.229)**
Change in R and D share			-2.760 (0.116)**	-2.549 (0.116)**			5.194 (2.791)	3.628 (2.768)
Missing Trade	-0.025 (0.000)**	-0.025 (0.000)**	-0.029 (0.000)**	-0.030 (0.000)**	0.067 (0.044)	0.096 (0.044)*	0.058 (0.044)	0.091 (0.044)*
$R^2$	0.05	0.05	0.05	0.05	0.20	0.20	0.20	0.21
$N$	9,953,708	9,953,708	10,844,298	10,844,298	1,698	1,698	1,698	1,698

*Notes:* First four columns at the establishment level and last four columns at the sector level. All specifications in differences and include time dummies whose coefficients are not reported here. Employment is the total number of employees at either the sector or establishment level. Research and development share is the share of expenditures divided by total revenues at the sector level. Trade shares are the share of exports in revenues at the sector level. Tangible and intangible asset shares in total assets, R and D shares, export shares, CR4 and CR20 all exclude firm  $i$  for the establishment level results in the first four columns.

Table 10. Sector Level Results with 2SLS: Annual Data and Five Year Differences

Dependent Variable:	Annual Data			Five Year Long Differences		
	Labor Share	Log Employment	Log Wage	Change in Labor Share	Change in Log Employment	Change in Log Wage
CR4	-0.150 (2.93)**	0.802 (2.40)*	-1.141 (3.67)**			
Sector Level Trade	-0.177 (1.85)	2.020 (4.07)**	-1.402 (3.32)**			
Sector Level R & D	-2.594 (2.80)**	-15.490 (2.80)**	-2.471 (0.50)			
Change in CR4				0.398 (0.285)	-3.101 (2.63)	3.573 (2.53)
Sector Level Trade				-0.285 (0.495)	15.738 (4.52)**	-13.302 (3.82)**
Sector Level R & D				2.039 (6.221)	-57.393 (26.17)**	27.931 (23.864)
First Stage F CR4	111.28	113.87	112.76	2.06	2.28	2.22
First Stage F R & D	19.35	18.30	18.43	2.44	2.11	2.11
First Stage F Trade Share	38.41	39.23	39.32	2.82	2.80	2.82
$R^2$	0.60	0.78	0.21	0.02	0.02	0.02
$N$	1,581	1,865	1,863	1,277	1,578	1,580

Notes: All estimates show two stage least squares estimation, where CR4, trade shares, and research and development shares are treated as endogenous. The instruments include the CR4, trade share, and research and development sectoral values for excluded countries. For France, the instruments are the sector level values for all other countries in the sample. The same for the other four countries in the sample. The first three columns include year, sector, and country effects. The last three columns are in long differences, as are the instruments. Only year effects are included in the last 3 columns. F-statistics for the first stage of each endogenous variable are also reported.

# Concluding Comments

- Use of Orbis data allows delving into millions of firm records across 1998 through 2019.
- Globalization, technical change, and market power are all associated with lower labor shares. Magnitudes are largest for globalization and technical change. At the enterprise level, a 1 percent increase in export shares is associated with a .3 percent reduction in labor shares. For R and D, the decline is .6 percent.

However, both theory and data indicate differences across countries:

- Market power is associated with lower labor shares for countries with low worker bargaining power and the opposite for a country like Sweden. Market power is associated with lower employment for all countries.
- Globalization is associated with lower labor shares in countries with higher wages (Sweden), where firms can find alternative locations with lower labor costs. The opposite is true in countries in our sample with lower GDP per capita (Hungary).
- Labor demand is positively associated with trade; negatively with CR4 and R & D
- Wages are strongly negatively associated with export shares