Employment Protection Deregulation and Labor Shares in Advanced Economies

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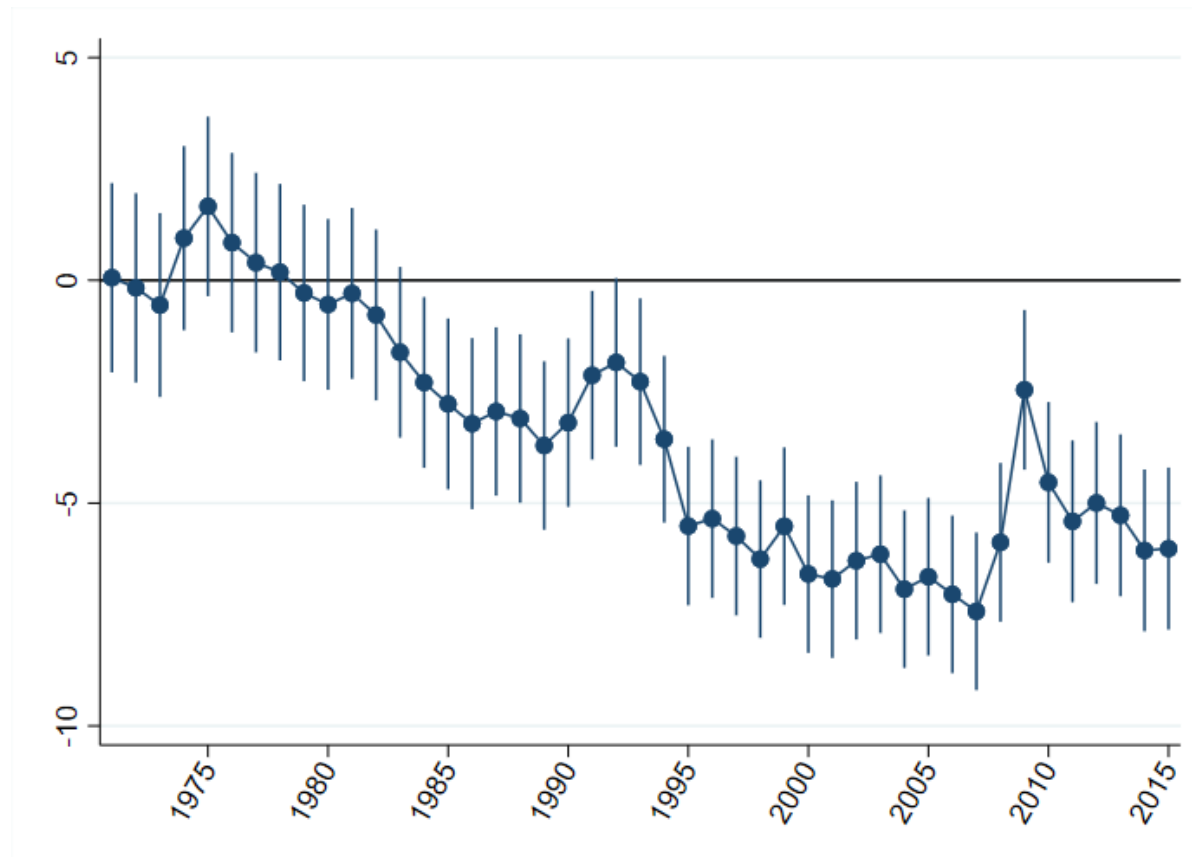
Joint with Gabriele Ciminelli and Davide Furceri

*The views expressed here are those of the authors and not those of the IMF

Motivation: the labor share has been declining

Notes: The Figure shows the coefficients of the year fixed effect from the following regression: $LS_{jit} = \alpha + \rho_t + \gamma_{ji} + \varepsilon_{jit}$, where the subscripts j, i and t denote, respectively, country, industry and year. LS is the labor share, α is a constant term, ρ are year fixed effects, γ are country-industry fixed effects and ε is the error term. The (blue) red line show estimates from a regression in which industries are (un-)weighted by their relative share. Vertical lines show 1.645 standard errors. Estimates can be interpreted as the average labor share changes in percentage points relative to 1970, the base year.

=> Flies in the face of stylized fact that labor share is constant (Kaldor, 1957, 1961)

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Labor share drivers: literature

1. **Technology** => capital goods prices and K-L substitution (Karabarbounis and Neiman, 2014; Alvarez-Cuadrado *et al.*, 2015; Acemoglu and Restrepo, 2016; Dao *et al.*, 2017)

2. **Globalization** => offshoring of production and reduction of working bargaining power (Elsby, Hobijn and Sahin, 2013; Boehm *et al.*, 2017; Dao *et al.*, 2017; Furceri *et al.* 2017; OECD, 2012)

3. **Superprofits** => increasing market concentration among high-profit, low-labor-share, "superstar" firms (Autor *et al.,* 2017; Barkai, 2017)

4. **Measurement issues** in factor shares => rise of intangible capital & self-employment (Elsby, Hobijn and Sahin, 2013; Rognlie, 2015; Koh *et al.,* 2016; Bridgman, 2017)

5. **(De)regulation of labor markets**, affecting distribution of rents within the firm => **our focus, zooming in on EPL**

    $\Rightarrow$ Early contributions mostly theoretical (Blanchard and Giavazzi, 2003; Bentolila and Saint-Paul, 2003)

    $\Rightarrow$ Little empirical work: basic macro panel analysis or does not consider EPL (Checchi and Garcia-Penalosa, 2008; Deakin *et al.*, 2014; Elsby *et al.*, 2013). Exception: OECD (2012), which finds no effect

Our contribution: role of labor market institutions

1. Show that labor share decline has been typically larger following major episodes of EPL deregulation

2. Analyze the impact of deregulation at the country-industry-time level using a rich dataset of major EPL reforms

3. Sharp diff-in-diff identification strategy borrowed from theory...

4. ...which, together with rich set of FEs, limits potential endogeneity biases arising from omitted variables and reverse causality

Preview of results

- Major episodes of EPL deregulation have had large, negative and persistent effects on the labor share

- Effect stronger in industries where:

- workforce needs to be regularly adjusted (EPL is more binding)

- K and L are less substitutable (wage decline not fully offset by employment gain)

- Back-of-the envelope calculation: EPL deregulation might have contributed about 15% to overall labor share decline in the typical advanced economy

Basic theory (see paper and [link])

- Lower worker bargaining power lowers LS…

- Always under efficient bargaining (lower wage, employment unchanged pinned down by efficient bargainig condition)

- If, and only if, K and L are complements (EOS < 1) under right-to-manage model

- Actual bargaining may combine elements of both models, e.g. Cahuc *et al.* (2014) see them as *"limit cases of the same model"* (page 441)

- Insofar as EPL deregulation lowers worker bargaining power, it is more likely to lower LS in industries/countries where K and L are less substituable

$\Rightarrow$ Use this insight in empirical analysis

Dataset: sample

i. Country sample: **26 advanced economies**

ii. Industry sample**: 25** 2-digit level (private sector) **industries**

iii. Time sample: **1970-2015**

Dataset: overview

- <u>Dependent variable</u>: headline **labor share** change

  $\Rightarrow$ KLEMS (incl. EU KLEMS 2017)

- <u>Main explanatory variable</u>: **"major" changes in EPL for regular workers**

  $\Rightarrow$ identified in Duval, Furceri, Hu, Jalles and Nguyen (2018)

  $\Rightarrow$ -1/0/1 variable for tightening reform, status quo and liberalizing reform episodes

- <u>To identify impact of EPL reforms at the country-industry level we estimate</u>:

  $\Rightarrow$ **Layoff rates**, from the 2014 (U.S.) Displaced Worker Survey (IPUMS-CPS) (link)

  $\Rightarrow$ **Elasticities of substitution** (EOS), from firms F.O.C. and using KLEMS data (link)

- <u>Other variables used in robustness checks</u>:

  $\Rightarrow$ trade union density, trade openness, investment and output prices, GDP growth rates (various sources)

Dataset: EPL reforms - examples

| Country	Year	Area	Content	Normative language	Mention in other reports	Large change OECD EPL	Value
UK	2000	severance pay	**Quadrupling maximum compensation for unfair dismissals** from October 1999 (pg. 116, 2000)			Yes, 2000	-1
Italy	1970	procedural inconvenience	The Act of 1970 referred to as the "workers' statute". Mechanism for **reinstatement after a dismissal has been declared unlawful**…laid down by Article 18 [see https://www.eurofound.europa.eu/efemiredictionary/workers-statute]			No data but would qualify	-1
France	1987	procedural inconvenience	Checks on the genuineness of redundancies in firms with fewer than 10 employees to be discontinued (and from 1st January 1987, official authorisation for layoffs no longer necessary). (pg. 76, 1987)	…one area - employment - where a deliberately active economic policy is being pursued, with 1985 marking **a major shift** in the choice of instruments... the most important measure, at least from a psychological point of view, was the **discontinuation of the requirement for official authorisation** to lay off workers (with full effect from January 1987)... (pg. 37, 1987)	pg. 33 or 44, 1989; pg. 59, 1990	yes for 1987	1
Portugal	1976	procedural inconvenience	…to combat the rise in unemployment caused by the domestic and international recession and by the return of expatriates from the former colonies, the authorities enacted legislation virtually **prohibiting all dismissals** (pg. 9, 1976)		pg. 12, 1979 pg. 67, 1989	No data but would qualify	-1
Spain	mid-1994/1995	procedural inconvenience, collective dismissals	The draft law simplifies layoff procedures. Dismissal of a small number of workers (treated as if they were individual dismissals) would **no longer require prior consultation** with workers' representatives and administrative authorization. (pg. 81, 1994) …the Government has presented a draft law modifying existing labour legislation significantly…Layoffs of permanent employees will be made much easier, notably by **abolishing in many cases the requirement of administrative authorization**. (pg. 88-89, 1994)	... far-reaching labor market reforms aimed at lifting barriers to job creation. A decree was passed at the end of 1993 and a draft has been presented to Parliament and is expected to become law by the middle of 1994. (pg. 80, 1994) This draft law breaks with the corporatist philosophy of past legislation and is expected to increase labour market flexibility considerably. (pg. 88-89, 1994)		Yes, 1995	1

Stylized facts: distribution of EPL reforms over time
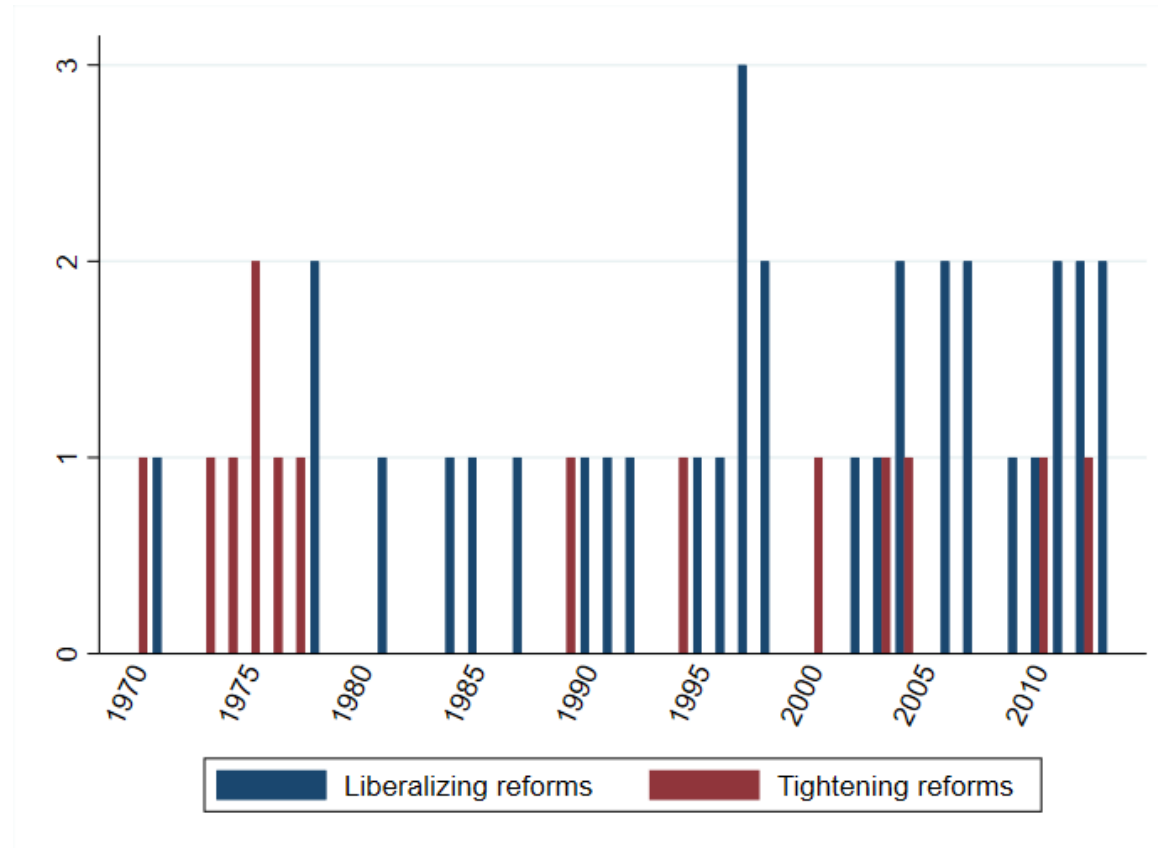
Notes: vertical bars show the number of reforms per year across all the countries in the sample

=> Most of liberalizing reforms concentrated in the 1990s and 2000s, when trend decline in labor share accelerated
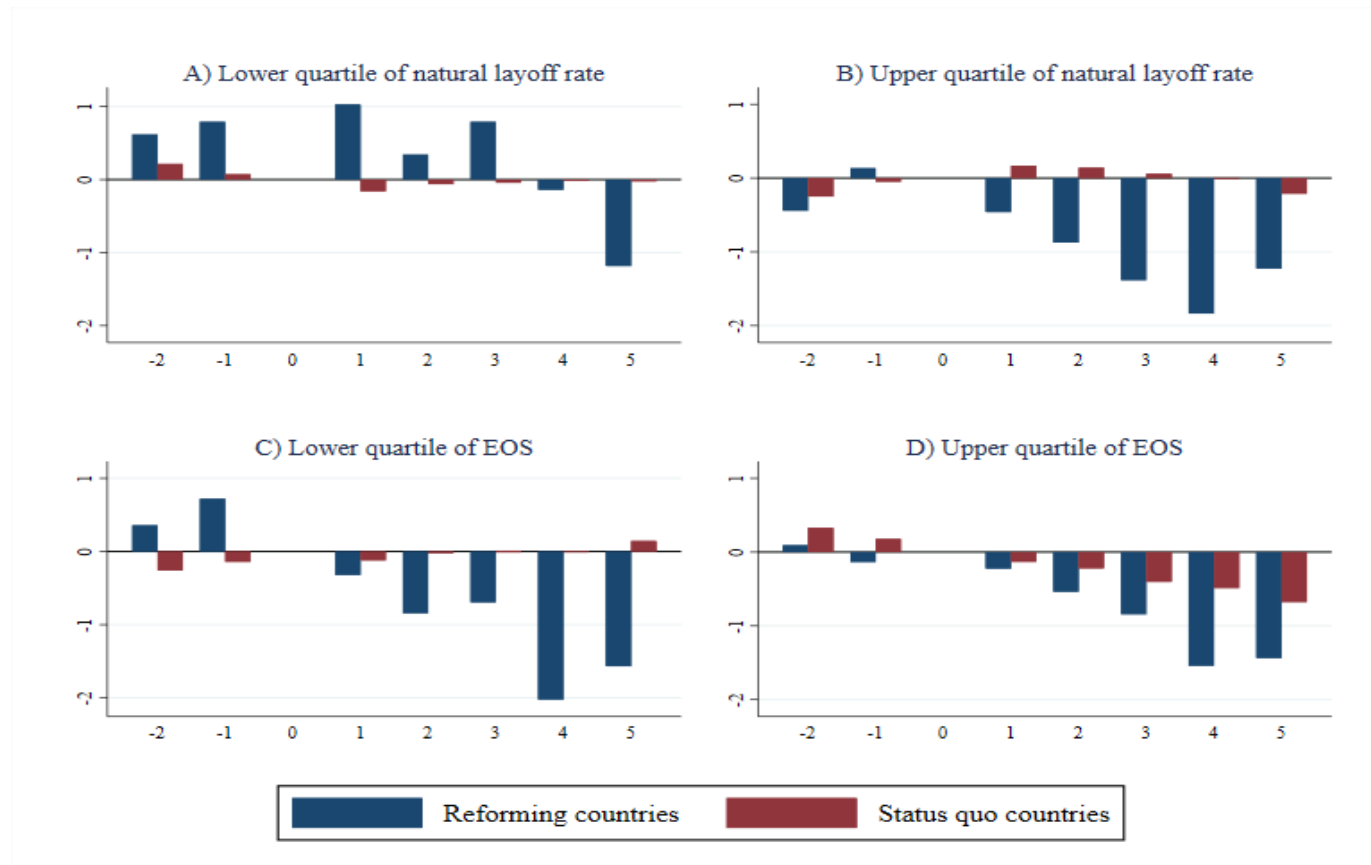
Stylized facts: labor share change around EPL reforms (1)
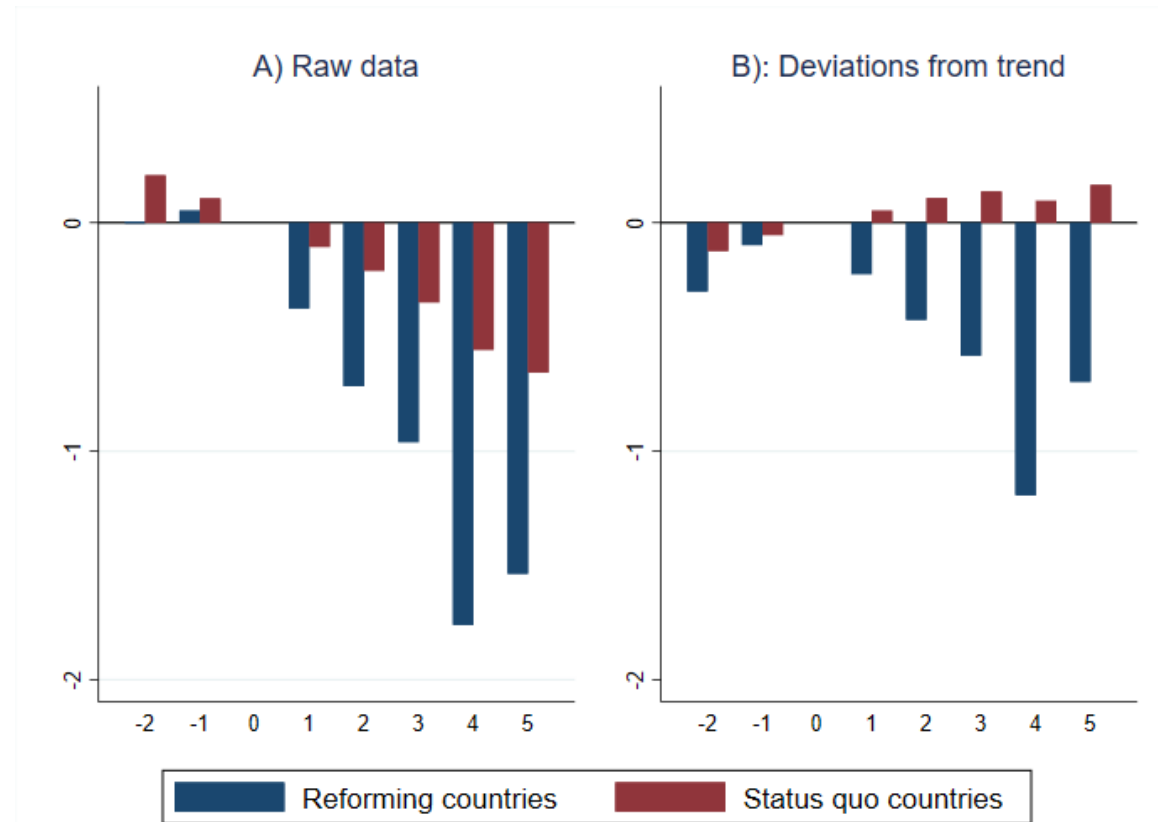
Notes: The Figure compares the mean cumulative change in country labor shares relative to reform years in (i) reforming countries (blue bars), and (ii) status quo countries (maroon bars). Panel A reports changes in the raw data, Panel B reported changes in de-meaned and de-trended data. The y-axis measures the size of the mean cumulative change (in percentage points). The x-axis represents the number of years before (negative numbers) and after (positive numbers) the base year (denoted by 0).

=> Trend-decline in labor share typically larger following liberalizing EPL reforms

Stylized facts: labor share changes around EPL reforms (2)

Notes: The Figure compares the mean cumulative change in country-industry labor shares relative to years of EPL reforms in (i) reforming countries (blue bars), and (ii) status quo countries (maroon bars), and for industries in the lower (Panel A) and upper (Panel B) quartiles of the layoff rate as well as those in the lower (Panel C) and upper (Panel D) quartiles of elasticity of substitution. The y-axis measures the size of the labor share change (in percentage points). The x-axis represents the number of years before (negative numbers) and after (positive numbers) the base year (denoted by 0).

=> Decline in labor share typically larger in industries with lower EOS and higher layoff rate, as expected from theory

Econometric framework: country-industry-level analysis

- 'Diff-in-diff' strategy a la Rajan-Zingales (1998):

$$y_{i,j,t+k} - y_{i,j,t-1} = \alpha_{j,t} + \gamma_{i,j} + \mu_{i,t} + \beta_k \vartheta_i R_{j,t} + \theta X_{i,j,t} + \varepsilon_{i,j,t}$$

- $\alpha_{j,t}, \gamma_{i,j}, \mu_{i,t}$ => country-year, industry-year & industry-country fixed effects

- ϑ_i => either (i) U.S. layoff rate, (ii) parameter ε (EOS), or (iii) interaction between the two

- $X_{i,j,t}$ => vector of control variables including 2 lags of yearly labor share changes and, interacted with ϑ_i :

  - 2 lags of EPL reforms + reforms over [t+1;t+k]—could be confounding factors (see Teulings and Zubanov, 2014)
  - Reforms to temporary contracts (also from database of Duval et al, 2018)
  - Past, current and expected future GDP growth rates, other labor share drivers (robustness checks)

Advantages:

- **Reverse causality:** reforms arguably not undertaken in response to expected industry-specific labor share changes

- **Omitted variable bias:** rich set of fixed effects, country-year and industry-year are key

- **Disentangle channels and test theory:** larger declines where EPL more binding and/or EOS is lower?

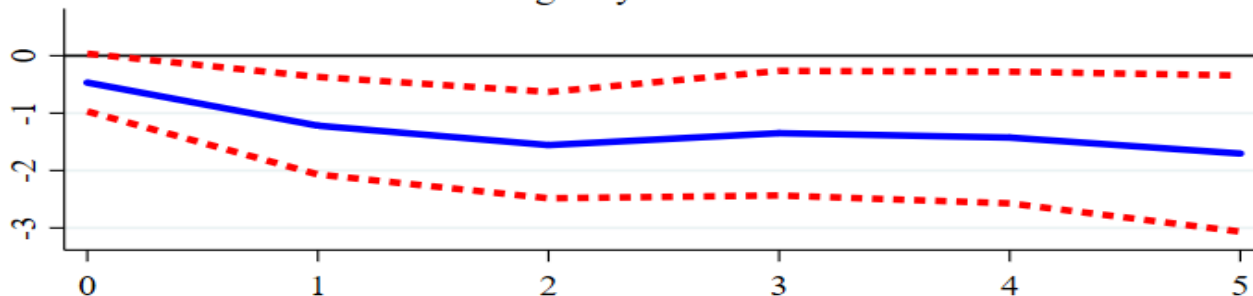# Country-industry-level analysis: baseline results

Panel A. Identification through layoff rates
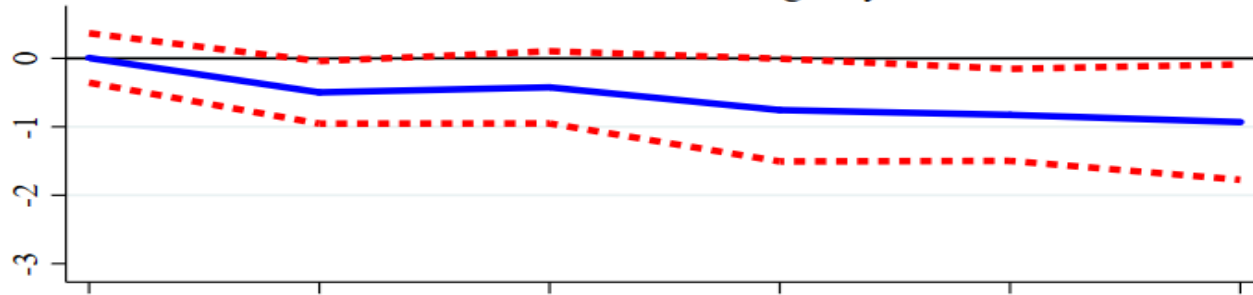
Panel B. Identification through elasticities of substitution
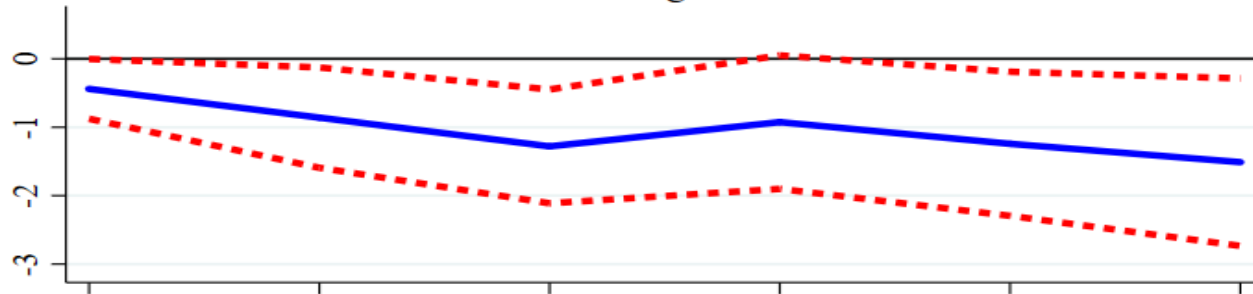
Panel C. Identification through layoff rates and elasticities of substitution

⇒ Effect stronger in industries:

- with higher propensity to regularly adjust the workforce

Or/and:

- with lower EOS between K and L

Notes: Coefficients rescaled to report differential effect for industries at 25th & 75th percentile of layoff rate, EOS distribution, & their interaction. Solid lines denote the estimated average differential labor share effect of EPL reforms between industries in the 75th percentile and 25th percentile of the layoff rates distribution (Panel A), in the 25th percentile and 75th percentile of the distribution of the elasticities of substitution (Panel B) and in the 25th percentile and 75th percentile of the distribution of the interaction between the two (Panel C). Dotted lines indicate 90 percent confidence interval based on standard errors clustered at country-industry level. The Y-axis reports the magnitude of the estimated effects (in pct pts).

Country-industry-level analysis: robustness checks

- Lag structure (1, 3 & 4 lags) - link

- Without inclusion of forward reform dummies - link

- Country and industry sample stability (excluding one country/industry at a time) - link

- Using only latest (2017) EU KLEMS vintage => sample reduced to 18 countries - link

- Public sector industries (plus agriculture and construction) used as controls - link

- Different measures for the layoff rates - link

- Different assumptions and data for the EOS - link

- Control variables (other labor share drivers) – link

=> **Main finding is robust to all of these**

Extension (1): channels

- For results to be consistent with our (bargaining power) interpretation, EPL deregulation should lower W/P

- Implications for K/Y and L more ambiguous: should rise and fall, respectively, **if** bargaining is only on wages

=> Estimate effect of EPL deregulation on W/P, L, and K/Y

	Impact	1y	2y	3y	4y	5y
Identification through layoff rates						
Labor share	0.01	**-0.50**	-0.42	-0.76	**-0.83**	**-0.93**
Real wage	0.22	**-0.96**	**-1.22**	**-1.38**	**-1.47**	**-1.30**
Employment	0.11	**0.41**	0.42	**0.83**	0.66	0.19
Capital-to-output ratio	1.45	2.84	0.49	-2.30	-4.66	-3.87

Notes: estimates based on Equation (4) and using layoff rates for the identification. The rows "Labor share" "Real wage" "Employment" "Capital-to-output ratio" report estimates obtained using, respectively, the labor share, the log hourly wage deflated by the price index, the log of engaged individuals and the ratio of the nominal capital stock to value added as dependent variables. Bold numbers indicate significance at the 90 percent confidence interval, based on clustered standard errors.

$\Rightarrow$ **Main channel is decline in real wage, in line with theory**

Extension (2): EOS below/above 1

- If bargaining takes place only over wage, EPL reforms should lower (increase) labor share in industries with EOS below (above) 1

=> Estimate (differential) effects on subsamples of industries with EOS below/above 1

	Impact	1y	2y	3y	4y	5y
Identification through layoff rates						
Full sample	0.01	**-0.56**	-0.48	-0.85	**-0.93**	**-1.05**
Elasticity above 1	**0.96**	**1.30**	**1.51**	**1.83**	1.39	0.86
Elasticity below 1	0.01	**-0.61**	-0.47	**-0.92**	**-0.92**	**-0.98**

Notes: estimates based on Equation (10) and using layoff rates for the identification. The rows "Full sample", "Elasticity above 1", "Elasticity below 1" report estimates obtained using, respectively, the full sample, the restricted sample of industries with elasticity of substitution above 1 and the restricted sample of industries with elasticity of substitution below 1. Bold numbers indicate significance at the 90 percent confidence interval, based on clustered standard errors.

⇒ In line with theory: negative (and significant) effect when EOS < 1; positive (but less significant) effect when EOS > 1

Conclusion

- Trend decline in labor share in AEs, particularly during the 1990s

- Literature focused on technical change, globalization, market concentration and measurement issues as leading explanations

- We show that EPL deregulation since early 1990s also contributed
    => back-of-the-envelope calculation: about 15 percent in typical AE

- Mainly through lower bargaining power and wages

- Stronger where EPL is more binding and/or K and L are less substituable

- Calls for greater focus on labor market institutions and worker bargaining power in LS debate

Thank you!

Supplementary Slides

Basic theory: competitive labor markets

- CES production function with K and L, labor- (capital-)augmenting technical progress, labor paid its marginal product

- Cost minimization then implies that labor share (LS) relates to k = K/Y as follows:

$$LS = 1 - \alpha k^{\varepsilon} \qquad\qquad (1)$$

$\Rightarrow$ any change in factor prices or quantities affects LS only through its impact on k

$\Rightarrow$ decrease in k lowers labor share if K and L are complements ($\varepsilon = (\sigma - 1)/\sigma < 0$) and increases it if they are substitute ($\varepsilon > 0$)

- Next, consider potential disturbances to (1) stemming from LM regulation:
  $\Rightarrow$ Under two (extreme) wage bargaining models (as in e.g. Blanchard and Fischer, 1989)
  $\Rightarrow$ Assuming EPL deregulation weakens worker bargaining power (as in e.g. Blanchard and Giavazzi, 2003)

Basic theory: bargaining over wages

- Workers and employers (Nash) bargain over the wage => **Right-to-Manage model**

- Firms set employment such that MPL=W => (1) still holds:

$$LS = 1 - \alpha k^{\varepsilon} \qquad\qquad (1)$$

- EPL Deregulation => lowers worker bargaining power θ => bargained wage goes down => firms respond by substituting labor for capital => LS declines if substitution is "weak"

- Specifically, LS declines if K and L are complements ($\varepsilon < 0$), but increases if they are substitutes ($\varepsilon > 0$):

$$\frac{\partial LS}{\partial \theta} = -\alpha\varepsilon k^{\varepsilon-1}\frac{\partial k}{\partial \theta} => \begin{cases} > 0 \ \ if \ \varepsilon < 0 \\ < 0 \ \ if \ \varepsilon > 0 \end{cases}$$

Basic theory: bargaining over wages & employment

- Workers and employers bargain over both wage & employment

- **Efficient bargaining** => set employment such that MPL equals opportunity cost of working

- Wage is weighted average of average and marginal products of labor, with weight on the former reflects bargaining power of workers. One can then show that:
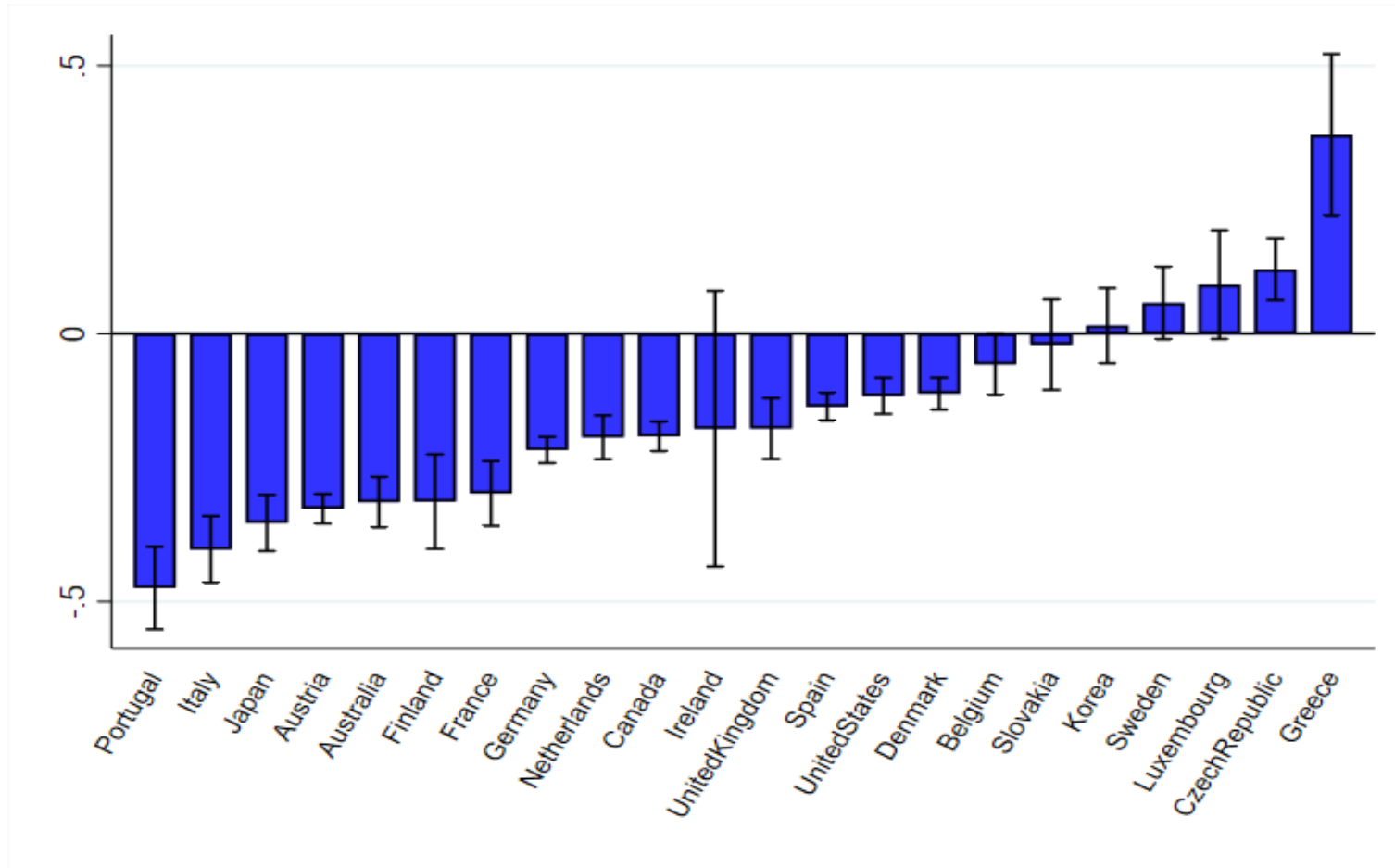
$$LS = 1 - (1 - \theta)\alpha k^{\varepsilon}$$
(2)

- Lower EPL => lower worker bargaining power θ => lower wage, but employment pinned down by efficient bargaining condition => LS *unambiguously* decreases:

$$\frac{\partial LS}{\partial \theta} = -\varepsilon\alpha(1 - \theta)k^{\varepsilon-1}\frac{\partial k}{\partial \theta} + \alpha k^{\varepsilon} = \alpha k^{\varepsilon} > 0$$
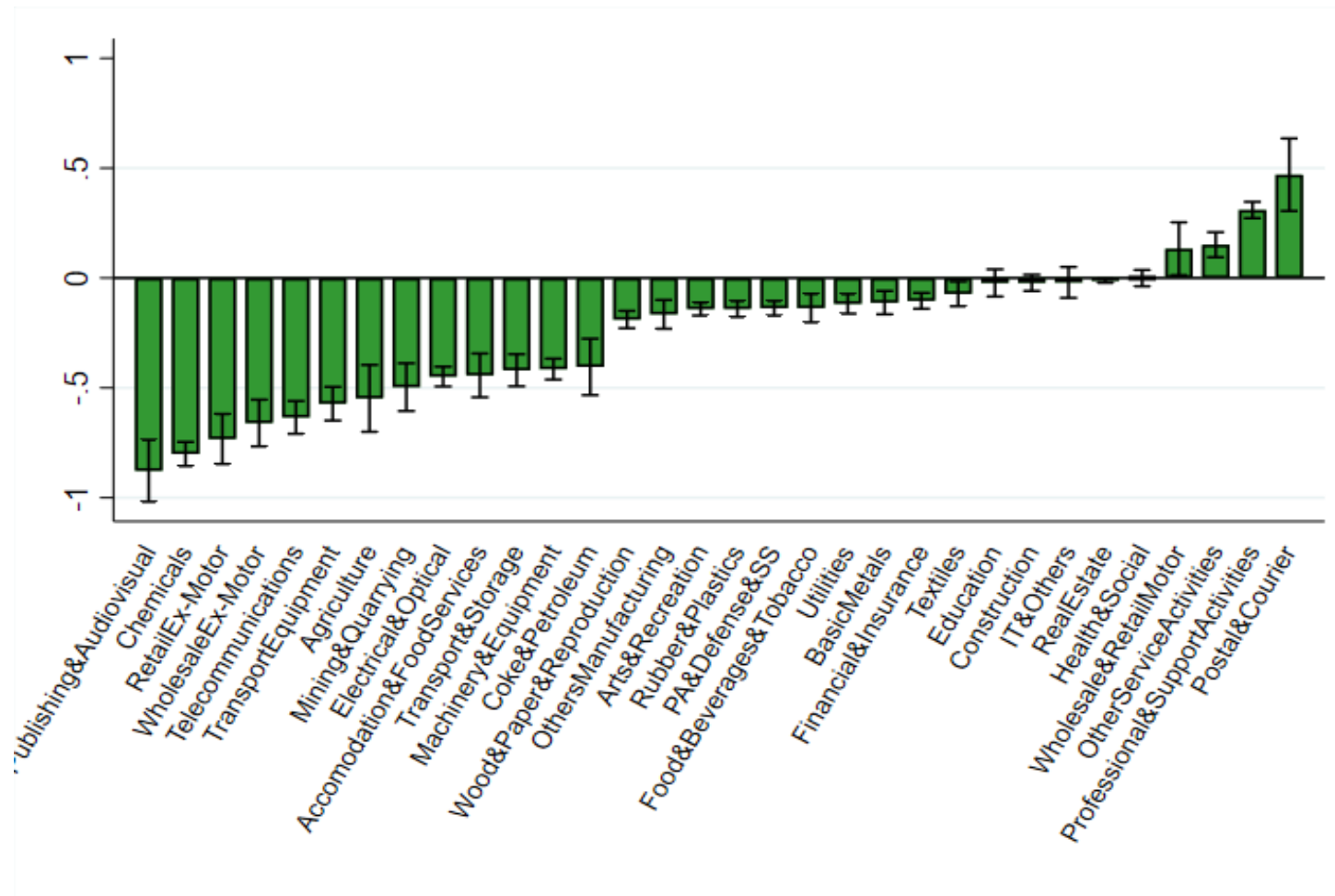
Fairly broad-based decline across countries...

Notes: The Figure shows estimated linear trends in industry labor shares (y-axis) for each country. Trends are estimated from the following regressions: $LS_t^j = \alpha^j + \tau_t^j + \varepsilon_t^j$, where the subscript t and the superscript j denote respectively year and country. LS is the labor share, α is a constant term, τ is the linear trend, and ε is the error term. Capped spikes denote 90% confidence intervals. Estimates should be interpreted as the average yearly change in country labor shares over the period considered. The period considered is country-specific and depends on the availability of labor income data in the EU KLEMS database. On average, for each country about 33 years of data are available.

...and across industries

Notes: The Figure shows estimated linear trends in aggregate labor shares (y-axis) for each industry. Trends are estimated from the following regressions: $LS_t^i = \alpha^i + \tau_t^i + \varepsilon_t^i$, where the subscript t and the superscript i denote, respectively, year and industry. LS is the labor share, α is a constant term, τ is the linear trend, and ε is the error term. Capped spikes denote 90% confidence intervals. Estimates should be interpreted as the average yearly change in industry labor shares over the period considered. The period considered is country- and industry- specific and depends on the availability of labor income data in the EU KLEMS database. On average, for each industry about 33 years of data are available.

Econometric framework: country-level analysis

- Estimate short- and medium-term effect of EPL reforms using local projection method (Jorda, AER 2005):

$$y_{t+k,j} - y_{t-1,j} = \alpha_j + \gamma_t + \beta_k R_{j,t} + \theta X_{j,t} + \varepsilon_{j,t}$$

- α_j, γ_t => country and year fixed effects,

- $R_{j,t}$ => EPL reform variable

- $X_{j,t}$ => vector of control variables including:

  - 2 lags of yearly labor share changes & 2 lags of EPL reforms

  - All EPL reforms over *t+1*-to-*t+k,* which could be confounding factors (see Teulings and Zubanov, 2014)

  - Reforms to temporary contracts (also from Duval et al, 2018)

  - Past, current and expected future GDP growth rates, other labor share drivers (robustness checks)

- Estimation through OLS, IRF obtained using estimated β_ks (for *k=0,...,5*) and clustered standard errors

Country-level analysis: baseline results
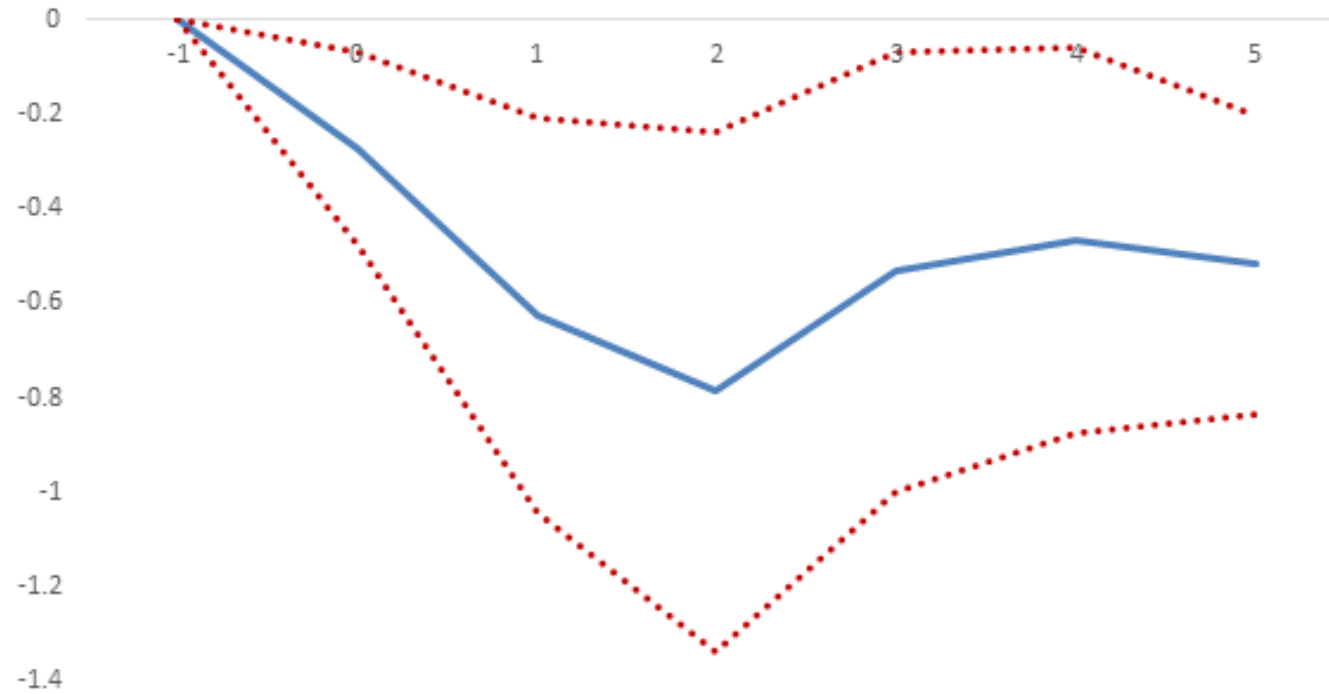
Notes: estimates based on equation (3). Solid line denotes response of labor share to EPL reforms. Dotted lines indicate 90 percent confidence interval based on clustered standard errors. The y-axis indicates the magnitude of the effect. The x-axis indicates the effect horizon, with 0 being the reform year

⇒ EPL reforms have negative and significant impact on labor share
⇒ Effect is persistent => levels off at about 0.6 ppt after 7 years

Country-level analysis: robustness checks

	Impact	1y	2y	3y	4y	5y
Baseline	**-0.27**	**-0.63**	**-0.78**	**-0.53**	**-0.47**	**-0.55**
Other labor share drivers	**-0.26**	**-0.58**	**-0.85**	**-0.69**	**-0.62**	**-0.69**
(Exp.) GDP	**-0.28**	**-0.61**	**-0.73**	**-0.47**	**-0.47**	**-0.49**

Notes: estimates based on Equation (3). Coefficients are in percentage points. Bold numbers indicate significance at the 90 percent confidence interval, based on clustered standard errors. The row "Other labor share drivers" reports estimates from a regression including the change in union density, the relative investment price, the trade openness and a variable capturing reforms to temporary contracts as controls. The row "(Exp. GDP)" reports estimates based on a regression including current, past and expected future GDP growth as controls.

$\Rightarrow$ Estimates robust to controlling for other common drivers of labor share (change in trade union density, relative investment price and trade openness)

$\Rightarrow$ Also robust to controlling for past and expected GDP growth rates

Country-level analysis: back-of-the-envelope calculations

1. Take long-term impact of a single major EPL deregulation episode on labor share (-0.6 ppt)

2. Calculate net number of EPL deregulation reforms in each country

3. Derive country-specific measures of labor share change caused by EPL deregulation

4. Divide EPL-induced labor share change by overall labor share change

➢ **Labor market deregulation might have contributed to about 14 percent of the observed overall labor share decline in the typical advanced economy**

• Calculation robust to excluding (post-)GFC period & focusing only on 1990-2015.

• Other factors might have also depressed workers' bargaining power (labor mkt. concentration, decline in unionism, non competing clauses, no poaching agreements) => overall effect of declining bargaining power might be larger

Derivation of industry layoff rates

- Following approach of Bassanini *et al.* (2009), define layoff rate as percentage of laid-off workers over wage and salary employment
    - Laid-off worker if lost job due to (a) plant or company closed or moved, (b) work was insufficient, (c) position or shift was abolished

- Use 2014 U.S. Displaced Workers Survey (IPUMS-CPS) to retrieve employment and displacement information for about 90,000 individuals over 2011-2013 period
    - Use U.S. data since EPL is almost non-existent there => closest empirical example to frictionless labor market

- Match NAICS 2012 to ISIC Rev. 4 industry classification to estimate industry-specific layoff rates for 2011, 2012 & 2013
    - Use 2011-2013 average for baseline estimation. Other years for robustness checks

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Estimation of elasticities of substitution (1)

- Estimate structural parameter directly from the solution to the firm's profit maximization (similar to Berndt (1976), Antràs (2004), and others)

- Assume aggregate production function, $Y = H(K, L, X_i, A)$, with K & L for flow of capital and labor services, X_i for other inputs, and A for technical efficiency => assume (i) technical efficiency is Hicks-neutral, (ii) K &L are weakly separable => $Y = AJ(X_i, F(K, L))$, with $F(K, L)$ the aggregate input => characterize *F* as a CES:

$$Y = F(K, L) = (\alpha(K)^\varepsilon + (1 - \alpha)(L)^\varepsilon)^{1/\varepsilon}$$

- Firm sets capital to maximize profit: $P^K = PF_K(K, L)$. Use that $F_K(K, L) = \alpha K^{\varepsilon-1} F(K, L)^{1-\varepsilon}$, take logs, use that (1-ε=1/σ) to estimate EOS from:

$$ln\left(\frac{P_{j,t}^K}{P_{j,t}}\right) = ln(\alpha_j) + \frac{1}{\sigma} ln\left(\frac{F_{j,t}(K_{j,t}, L_{j,t})}{K_{j,t}}\right) + \epsilon_{j,t}$$

Estimation of elasticities of substitution (2)

- Data for baseline elasticities (all from 2017 EU KLEMS):

    - Flow of capital services, for $K_{j,t}$

    - Value added and its price, for $F_{j,t}$ and $P_{j,t}$

    - Compute $P_{i,j,t}^k = q_{i,j,t-1}^k i_{j,t-1} + \delta_i^k q_{i,j,t}^k - (q_{i,j,t}^k - q_{i,j,t-1}^k)$, using (i) the data on nominal divided real capital stock for $q_{i,j,t}^k$, (ii) EU KLEMS geometric depreciation rates for δ_i^k , (iii) an internal rate of return of capital computed as residual of capital compensation, depreciation and capital gains ($i_{i,j,t} = \frac{P_{i,t}^K K_{i,j,t} + \sum_k (q_{i,j,t}^k - q_{i,j,t-1}^k) A_{i,j,t}^k - \sum_k \delta_i^k q_{i,j,t}^k A_{i,j,t}^k}{\sum_k q_{i,j,t-1}^k A_{i,j,t}^k}$), where $P_{i,t}^K K_{i,j,t}$ is total capital compensation (valued added minus labor income), $A_{i,j,t}^k$ is capital stock

- Estimation is done in first difference (to deal with non-stationarity), through OLS, and for each industry once at a time (pooling over countries)

- Derive alternative EOS estimates (i) relaxing Hicks-neutral assumption, (ii) using different data for capital services, and (iii) the rental rate of capital for robustness checks

Dataset – descriptive statistics

Mean values of relevant industry characteristics

	Share in value added	Labor share	Elasticity of substitution	Natural layoff rate	Industry code
Food, Beverages & Tobacco	2.66	57.25	0.69	3.03	10t12
Textiles	1.25	77.51	0.38	3.73	13t15
Wood, Paper & Reproduction	1.86	69.14	0.49	3.81	16t18
Coke & Refined Petroleum	0.44	41.42	0.88	1.07	19
Chemicals	2.19	47.82	0.90	2.58	20t21
Rubber & Plastics	1.75	65.16	0.53	2.41	22t23
Basic Metals	2.84	68.34	0.45	3.24	24t25
Electrical & Optical	2.33	62.48	0.58	5.62	26t27
Machinery & Equipment	1.67	71.09	0.49	2.86	28
Transport Equipment	1.85	68.92	0.47	2.77	29t30
Others Manufacturing	1.34	77.38	0.44	7.31	31t33
Wholesale & Retail, Motor vehicles	1.43	69.20	0.47	2.32	45
Wholesale ex. Motor Vehicles	5.69	62.13	0.52	2.69	46
Retail ex. Motor Vehicles	5.00	76.44	0.39	2.57	47
Transport & Storage	4.75	67.43	1.36	2.94	49t52
Postal & Courier	0.89	82.18	0.73	1.44	53
Publishing & Audiovisual	1.36	65.86	0.54	3.21	58t60
Telecommunications	1.73	39.35	1.48	1.98	61
IT & Others	1.30	78.76	0.37	3.10	62t63
Agriculture	3.35	79.65	0.90	3.61	A
Mining & Quarrying	1.53	41.27	0.79	/	B
Utilities	2.84	34.35	0.95	1.59	DtE
Construction	6.71	78.85	0.30	6.37	F
Accommodation & Food Services	2.69	76.86	0.47	3.08	I
Financial & Insurance	5.95	57.42	0.88	2.34	K
Real Estate	8.95	6.83	1.20	1.90	L
Professional & Support Activities	7.20	72.87	0.56	3.68	MtN
PA, Defense & SS	7.21	76.15	0.86	/	O
Education	4.90	90.20	0.58	1.35	P
Health & Social	6.01	84.21	0.63	1.78	Q
Arts & Recreation	1.12	72.34	1.11	3.40	R
Other Service Activities	1.55	84.49	1.31	2.73	S
Average	3.20	65.73	0.71	3.02	/

Notes: share in value added and labor share are averages across countries and years, computed from the EU KLEMS database. The elasticity of substitution are estimated according to Equation (7). The natural layoff rate is calculated as the average ratio of displaced workers for (i) company/plant closing, (ii) insufficient work, (iii) position or shift abolished over the wage and salary employment across the years 2011-2013, computed using individual level data contained in the 2014 Displaced Workers Survey of the IPUMS-CPS.

Stylized facts: labor share changes decomposition

- Compute between- & within-industry changes: $\Delta LS^j = \sum_i \overline{\omega}_i^j \Delta LS_i^j + \sum_i \overline{LS}_i^j \Delta \omega_i^j$ (A1)
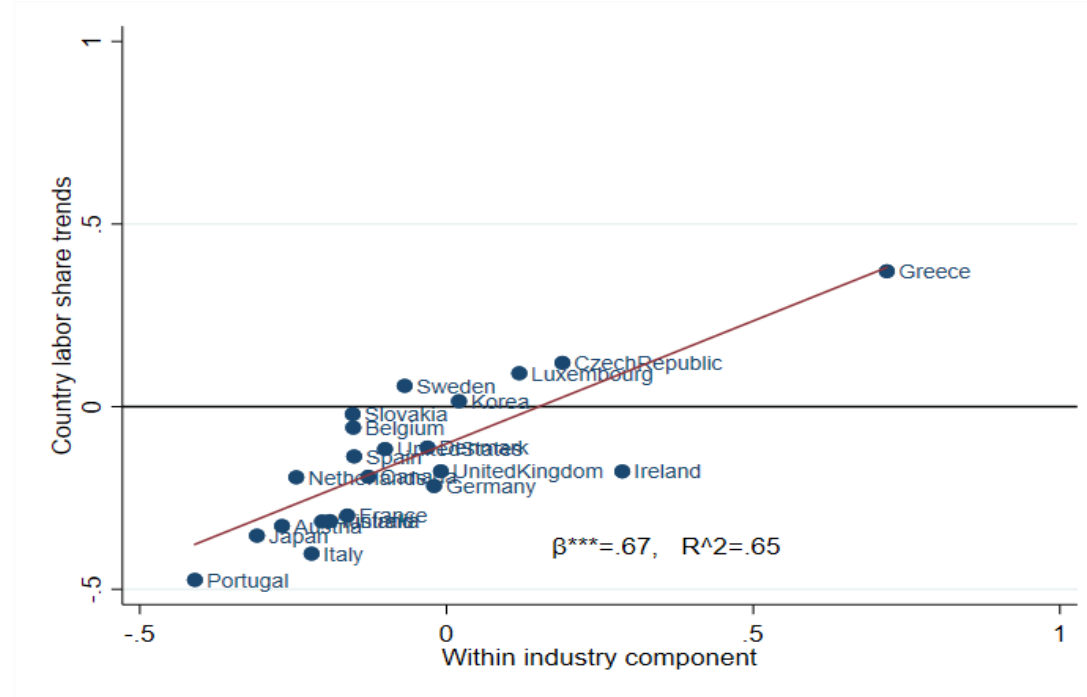
Notes: The figure plots country aggregate labor share trends (y-axis) over the within industry component in labor share trends (x-axis). Country trends are estimated from the following regression: $LS_t^j = \alpha^j + \rho_t^j + \varepsilon_t^j$, where the subscript t and the superscript j denote, respectively, year and country. LS is the labor share, α is a constant term, ρ are year fixed effects, and ε is the error term. Within industry components are estimated according to the following expression: $y^j = \sum_i \overline{\omega}_i^j \Delta LS_i^j$, where the superscript j and subscript i denote respectively country j and industry i, ΔLS denotes the estimated linear trend in the labor share, $\overline{\omega}$ refer to the mean of the share of added value.

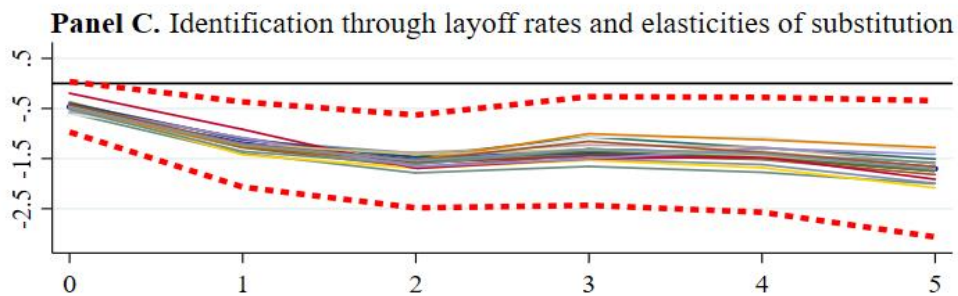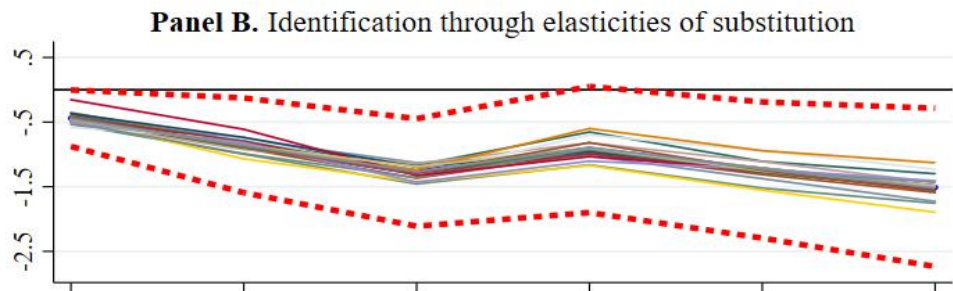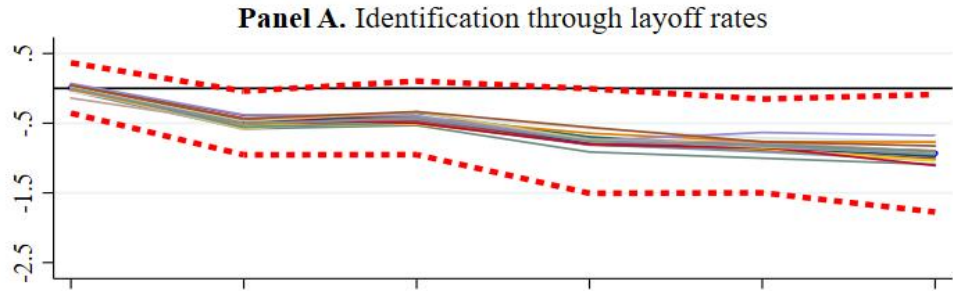=> About 65% of labor share changes explained by within-industry changes

Robustness check (1): empirical specification

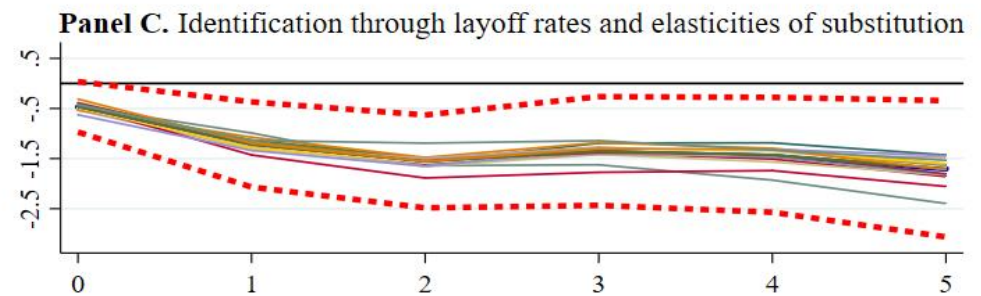|	Impact	1y	2y	3y	4y	5y
Panel A) Identification through layoff rates						
Baseline	0.01	**-0.50**	-0.42	-0.76	**-0.83**	-0.93
1 lag	0.01	**-0.48**	**-0.50**	-0.56	**-0.71**	**-0.76**
3 lags	0.01	-0.35	-0.48	**-0.84**	**-0.87**	**-0.98**
4 lags	0.02	-0.41	-0.54	**-0.99**	**-1.10**	**-1.25**
No forward dummies	0.01	**-0.48**	-0.37	-0.58	-0.70	**-0.74**
Panel B) Identification through elasticities of substitution						
Baseline	-0.44	**-0.86**	**-1.28**	-0.93	**-1.24**	**-1.51**
1 lag	-0.39	**-0.75**	**-1.00**	-0.53	**-1.20**	**-1.08**
3 lags	**-0.48**	**-0.74**	**-1.39**	**-1.07**	**-1.35**	**-1.63**
4 lags	**-0.54**	**-0.90**	**-1.52**	**-1.33**	**-1.72**	**-2.08**
No forward dummies	-0.44	**-0.79**	**-0.86**	-0.60	-1.28	**-1.12**
Panel C) Identification through layoff rates and elasticities of substitution						
Baseline	-0.47	**-1.22**	**-1.56**	**-1.35**	**-1.42**	**-1.70**
1 lag	-0.45	**-1.13**	**-1.40**	-0.93	**-1.44**	**-1.36**
3 lags	-0.50	**-0.97**	**-1.68**	**-1.51**	**-1.54**	**-1.83**
4 lags	-0.53	**-1.16**	**-1.83**	**-1.87**	**-2.06**	**-2.48**
No forward dummies	-0.47	**-1.13**	**-1.12**	-0.95	-1.44	**-1.30**

Notes: estimates based on Equation (4). The row "Baseline" reports estimates obtained from the baseline specification, including two lags of the EPL reform dummy and of the first difference of the industry-country labor share at time *t*. The rows "1 lag", "3 lags" and "4 lags" report estimates obtained including, respectively, 1, 3 and 4 lags of the aforementioned variables. The row "No forward dummies" report estimates from a specification that does not include the corrections ala Teulings and Zubanov (2014). Coefficients are in percentage points. Bold numbers indicate significance at the 90 percent confidence interval, based on clustered standard errors. For a definition of Panels A, B, C, see notes to the figure showing the baseline country-industry results.

Robustness check (2): sample stability

Panel A. Identification through layoff rates

Panel B. Identification through elasticities of substitution

Panel C. Identification through layoff rates and elasticities of substitution

Panel A. Identification through layoff rates

Panel B. Identification through elasticities of substitution

Panel C. Identification through layoff rates and elasticities of substitution

Notes: estimates based on Equation (4). Each solid line represents estimates obtained excluding one country at a time. Red dotted lines indicate the 90 percent confidence interval based on standard errors clustered at country-industry level obtained from the baseline specification, including all countries. The Y-axis reports the magnitude of the estimated coefficients (in percentage points). For a definition of Panels A, B, C, see notes to the figure showing the baseline country-industry results.

Notes: estimates based on Equation (4). Each solid line represents estimates obtained excluding one industry at a time. Red dotted lines indicate the 90 percent confidence interval based on standard errors clustered at country-industry level obtained from the baseline specification, including all countries. The Y-axis reports the magnitude of the estimated coefficients (in percentage points). For a definition of Panels A, B, C, see notes to the figure showing the baseline country-industry results.

Robustness check (3): sample composition

	Impact	1y	2y	3y	4y	5y
Panel A) Identification through layoff rates						
Baseline	0.01	**-0.50**	-0.42	-0.76	**-0.83**	**-0.93**
All manufacturing	-0.06	**-0.33**	-0.22	-0.31	-0.30	**-0.49**
Control group	**-0.25**	**-0.56**	**-0.54**	**-1.04**	**-0.97**	**-0.62**
KLEMS 2017 database	0.06	-0.43	-0.46	**-0.90**	**-0.85**	**-0.91**
Panel B) Identification through elasticities of substitution						
Baseline	-0.44	**-0.86**	**-1.28**	-0.93	**-1.24**	**-1.51**
All manufacturing	-0.46	**-0.89**	**-1.25**	-0.86	**-1.15**	**-1.50**
Control group	**-0.73**	**-1.15**	**-1.53**	**-1.64**	**-1.74**	**-1.52**
KLEMS 2017 database	-0.35	-0.65	**-1.19**	**-1.06**	**-1.24**	**-1.46**
Panel C) Identification through layoff rates and elasticities of substitution						
Baseline	-0.47	**-1.22**	**-1.56**	**-1.35**	**-1.42**	**-1.70**
All manufacturing	-0.39	**-0.96**	**-1.05**	**-0.80**	-0.77	**-1.21**
Control group	**-0.77**	**-1.50**	**-1.75**	**-2.02**	**-1.95**	**-1.66**
KLEMS 2017 database	-0.40	**-1.01**	**-1.54**	**-1.56**	**-1.45**	**-1.70**

Notes: estimates based on Equation (4). The row "Baseline" reports estimates obtained from the baseline specification, which includes 22 countries and excludes the (i) Coke, Refined Petroleum and Nuclear Fuel, (ii) Other Manufacturing, (iii) Public Administration, Defense and Social Security, (iv) Education, (v) Health and Social Work, (vi) Agriculture, and (vii) Construction industries. The row "All manufacturing" report estimates obtained also including industries (i) and (ii). The row "Control group" report estimates obtained using industries (iii)-to-(vii) as control group. The row "KLEMS 2017 database" report estimates obtained using only the 18 countries covered by EU KLEMS 2017 database. Coefficients are in percentage points. Bold numbers indicate significance at the 90 percent confidence interval, based on clustered standard errors. For a definition of Panels A, B, C, see notes to the figure showing the baseline country-industry results.

Robustness check (4): layoff rates

	Impact	1y	2y	3y	4y	5y
Panel A) Identification through layoff rates						
Baseline	0.01	**-0.50**	-0.42	-0.76	**-0.83**	**-0.93**
Qualitative measure	0.01	-0.34	-0.61	**-1.48**	-1.05	-1.46
2013 layoff rate	0.11	**-0.74**	-0.46	-0.68	-0.69	-0.77
Panel B) Identification through elasticities of substitution						
Baseline	-0.47	**-1.22**	**-1.56**	**-1.35**	**-1.42**	**-1.70**
Qualitative measure	0.02	-0.07	-0.10	**-0.20**	**-0.22**	**-0.26**
2013 layoff rate	-0.40	**-1.17**	**-1.37**	**-1.09**	**-1.13**	**-1.27**

Notes: estimates based on Equation (4). The row "Baseline" reports estimates obtained from the baseline specification, relying on the average layoff rate calculated using the 2014 Displaced Workers Survey (covering the 2011-2013 period). The row "Bassanini *et al.* (2009)" report estimates obtained relying on the layoff rates calculated by Bassanini *et al.* (2009) (based on the 2004 Displaced Workers Survey (2001-2004)). The row "Qualitative measure" relies on a qualitative, 0/1, measure dividing industries in two groups depending on whether their layoff rate was above the median for all the three years covered by the 2014 Displaced Workers Survey. The row "2013 layoff rate" report estimates obtained using the layoff rate calculated for the year 2013. Coefficients are in percentage points. Bold numbers indicate significance at the 90 percent confidence interval, based on clustered standard errors. For a definition of Panels A, B, C, see notes to the figure showing the baseline country-industry results.

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Robustness check (5): elasticities of substitution

	Impact	1y	2y	3y	4y	5y
Panel A) Identification through layoff rates						
Baseline	-0.44	**-0.86**	**-1.28**	-0.93	**-1.24**	**-1.51**
Stock	-0.53	-0.52	**-1.49**	-0.78	-0.93	-1.45
Rental rate	-0.30	**-0.83**	-0.82	-0.70	-0.99	-1.28
Technical change	-0.38	**-0.72**	**-0.86**	-0.65	**-1.10**	**-1.19**
Panel B) Identification through elasticities of substitution						
Baseline	-0.47	**-1.22**	**-1.56**	**-1.35**	**-1.42**	**-1.70**
Stock	-0.50	-1.05	**-1.92**	**-1.43**	-1.41	**-1.86**
Rental rate	-0.38	**-1.19**	**-1.11**	-1.08	-1.17	**-1.53**
Technical change	-0.41	**-1.09**	**-1.17**	**-1.10**	**-1.26**	**-1.40**

Notes: estimates based on Equation (4). The row "Baseline" reports estimates obtained from the baseline specification, relying on elasticities of substitution (EOS) estimated using data on capital services and capital rental rates calculated as in Jorgenson (1963), and (iii) assuming Hicks-neutral technical change. The row "Stock" report estimates obtained using capital stock rather than services data. The row "Rental rate" report estimates obtained using data on nominal capital stock divided by capital services to proxy for the rental rate. The row "Technical change" report estimates obtained relaxing the assumption of Hicks-neutral technical change. Bold numbers indicate significance at the 90 percent confidence interval, based on clustered standard errors. For a definition of Panels A, B, C, see notes to the figure showing the baseline country-industry results.

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Robustness check (6): omitted variables

	Impact	1y	2y	3y	4y	5y
Panel A) Identification through layoff rates						
Baseline	0.01	**-0.50**	-0.42	-0.76		**-0.83**
Relative investment price	0.03	-0.42	-0.48	**-0.79**		**-0.84**
Trade openness	0.01	-0.45	-0.50	**-0.83**		**-0.88**
Trade union density	0.02	-0.43	-0.48	**-0.81**		**-0.78**
Panel B) Identification through elasticities of substitution						
Baseline	-0.44	**-0.86**	**-1.28**	-0.93		**-1.24**
Relative investment price	-0.15	-0.60	**-1.34**	**-1.04**		**-1.24**
Trade openness	-0.18	-0.63	**-1.36**	**-1.08**		**-1.31**
Trade union density	-0.16	-0.60	**-1.39**	**-1.11**		**-1.19**
Panel C) Identification through layoff rates and elasticities of substitution						
Baseline	-0.47	**-1.22**	-1.56	-1.35		-1.42
Relative investment price	-0.19	**-0.90**	-1.70	-1.51		-1.48
Trade openness	-0.23	**-0.94**	-1.72	-1.56		-1.56
Trade union density	-0.20	**-0.91**	-1.73	-1.59		-1.41

Notes: estimates based on Equation (4). The row "Baseline" reports estimates obtained from the baseline specification, only including reform to temporary contracts as control variable. The rows "Relative investment price", "Trade openness" "Trade union density" report estimates obtained including, respectively, the price of investment goods, the sum of import and exports as a share of GDP and the change in trade union density as additional control variables. Bold numbers indicate significance at the 90 percent confidence interval, based on clustered standard errors. For a definition of Panels A, B, C, see notes to the figure showing the baseline country-industry results.