

Bargaining, Openness, and the Labor Share

Dorothee Schneider

Humboldt-Universität zu Berlin



What is the Labor Share?

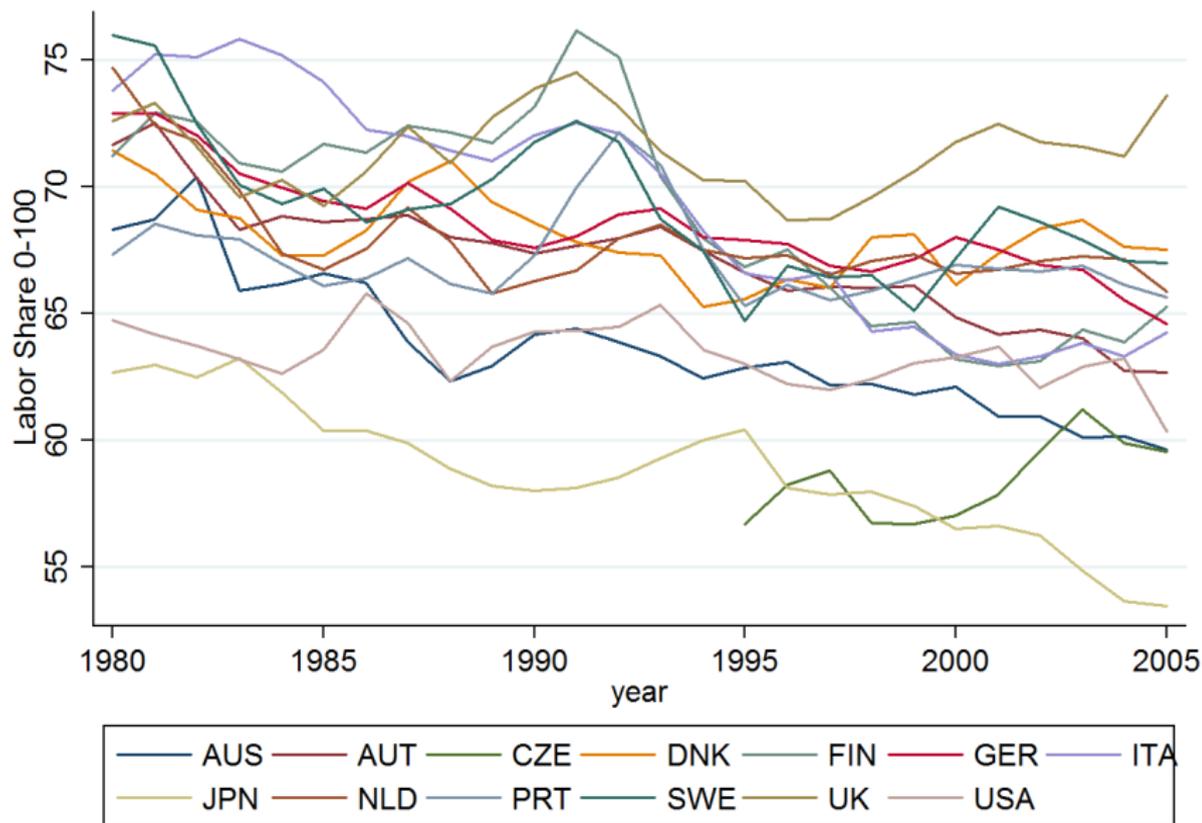
The labor share can be defined as the share of total output which is paid out to workers, wage share. The labor share is:

$$s_L = \frac{WL}{PY}, \quad (1)$$

Y is total output, K the capital input, and L labor, W is the wage and P the price of output.

Issues:

- Distribution of National Income
- Total Compensation in the Wage Bill
- Time Horizon



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What is happening to the labor share?

Changes of the labor share come about through changes in wages, employment and output. These are influenced by:

- Technical Change
- Institutional Change
- Economic Integration

These are all interconnected: i.e. technical change makes offshoring easier; economic openness is found to have a decreasing impact on unemployment;

⇒ What channels can be found in the data? How does this affect the bargaining outcome of wages and employment?

Motivation

Related Literature and Theoretical Considerations

Estimation Procedure

Data and Variables

Estimation Results

- Baseline Results and Interaction

- Mark-up and IV Regression

- High and Low Skilled

- Manufacturing vs Services

Concluding Remarks

Literature - Labor Share

On the Labor Share

- Blanchard, Brookings 1997 and Economic Policy Journal 2006
- Bentolila and Saint-Paul, Contributions to Macroeconomics, 2003
- Arpaia, Pérez, Pichelmann, Economic Paper, 2009
- Checchi and Garcia-Penalosa, Economica, 2010
- Jayadev, Cambridge Journal of Economics, 2007

Bargaining

$$\max_{w,L} (L(w - \bar{w}))^\alpha (F(K, L) - wL - rK - D)^{1-\alpha} \quad (2)$$

- w = wage
- L = employment level / labor
- F = production function
- K = capital
- r = rental rate of capital
- D = outside option of the firms
- \bar{w} = outside options of workers
- α = the bargaining power of the workers

Labor Share

After rearranging the FOC the following condition can be found

$$wL = \alpha (F(K, L) - rK - \delta K^{ICT} - D) + (1 - \alpha) \bar{w}L. \quad (3)$$

Assuming that $F(K, L) = Y$, the labor share is then

$$\frac{wL}{Y} = \alpha \left(1 - r \frac{K}{Y} - \delta \frac{K^{ICT}}{Y} - \frac{D}{Y} \right) + (1 - \alpha) \frac{\bar{w}L}{Y}. \quad (4)$$

Estimation Equation

$$\begin{aligned}\Delta LS_{i,j,t} &= \Delta \ln \left(\frac{K}{Y} \right)_{i,j,t} + \Delta \ln \left(\frac{K^{ICT}}{Y} \right)_{i,j,t} \\ &+ \Delta \text{unioncov}_{i,t} \\ &+ \Delta \text{open}_{i,t} + \Delta \text{rest}_{i,t} \\ &+ \Delta \text{unempl}_{i,t} + \Delta \text{unben}_{i,t} \\ &+ \eta_{i,j} + u_{i,j,t}\end{aligned}$$

of industry j , in country i , at year t .

Set of Countries Analyzed in this Study

Countries	max. time periods
Australia	1982 - 2005
Austria	1980 - 2005
Czech Republic	1995 - 2005
Denmark	1980 - 2005
Finland	1980 - 2005
Germany	1991 - 2005
Italy	1980 - 2005
Japan	1980 - 2005
Netherlands	1980 - 2005
Portugal	1980 - 2005
Sweden	1980 - 2005
United Kingdom	1980 - 2005
United States	1980 - 2005

Set of Industries Analyzed in this Study

27 Industries from the private sector covering

- Agriculture
- Mining and Quarrying
- Manufacturing
- Electricity, Gas and Water Supply
- Construction
- Wholesale and Retail Trade
- Services

Dependent Variable

Labor Share

total labor compensation over value added in industry j and country i

(includes all persons engaged)

values are between 0 and 100

industry-country combinations are dropped if $s_L > 100$ for an entire business cycle.

Data Source: EU KLEMS, March 2008

Technology

Capital-Output Ratio

fixed capital stock (all assets) over value added in industry j and country i

Ratio of ICT-Investments and Value Added

gross fixed capital formation of ICT assets over value added in industry j and country i

Hours Worked by Skill Group

computed from total compensation by skill group over total hours worked by skill group in industry j and country i

Data Source: EU KLEMS, March 2008

⇒ The influence of these variables on the labor share should depend on the elasticity of substitution.

Bargaining Power of the Worker

Union Coverage: share of employees covered by wage bargaining agreements as a proportion of all wage and salary earners in employment with the right to bargain in country i between 0 and 100

Data Sources: ICTWSS Database of the Amsterdam Institute for Advanced Labour Studies (AIAS) (Database on Institutional Characteristics for Trade Unions, Wage Setting, State Intervention and Social Pacts)

⇒ An increase in the workers' bargaining power should increase the labor share.

Outside Option of the Worker

Unemployment Benefits: Gross Replacement Rates in the first year in country i times average hourly wage in country i and industry j

Data Sources: Gross Replacement Rate: FRDB (Fondazione Rodolfo Debenedetti) Database of Structural Reforms, Milan, Italy, 2010

Unemployment Rate: ILO definition, between 0 and 100

Data Sources: ILO: KILM (Key Indicators of the Labour Market)

⇒ An increase in the workers' outside option should increase the labor share.

Outside Option of the Firm

Openness Trade flows [0-100]:

- Trade: (imports+exports)/GDP
- Foreign Direct Investment, stocks (percent of GDP)
- Portfolio Investment (percent of GDP)
- Income Payments to Foreign Nationals (percent of GDP)

Restrictions [0-100]:

- Hidden Import Barriers
- Mean Tariff Rate
- Taxes on International Trade (percent of current revenue)
- Capital Account Restrictions

Data on country level

Data Sources: KOF Index of Globalization

Estimation Results 1; Dep.Variable: Δ Labor Share

	1	2	3	4	5	6
$\Delta \ln \frac{K}{Y}_t$	15.54*** (5.067)	15.47** (5.081)	15.53*** (5.071)	15.54*** (5.040)	15.53*** (5.065)	15.64*** (5.031)
$\Delta \ln \frac{KICT}{Y}_t$	-0.857** (0.288)	-0.876*** (0.279)	-0.714 (0.716)	-1.759 (0.991)	-0.867*** (0.269)	1.831 (1.162)
$\Delta unioncov_t$	0.087** (0.030)	0.080** (0.029)	0.084** (0.030)	0.085** (0.031)	0.084*** (0.026)	0.092*** (0.028)
$\Delta unbent_t$	1.616 (3.420)	1.655 (3.325)	1.614 (3.393)	2.025 (3.314)	1.648 (3.387)	1.412 (3.286)
$\Delta unempl_t$	-0.227*** (0.068)	0.224 (0.255)	-0.318 (0.367)	-0.227*** (0.067)	0.127 (1.035)	-0.241*** (0.067)
$\Delta rest_t$	-0.070 (0.042)	-0.075* (0.038)	-0.070 (0.042)	-0.064 (0.039)	-0.043 (0.101)	-0.193*** (0.057)
$\Delta open_t$	-0.071** (0.031)	-0.017 (0.025)	-0.072** (0.031)	-0.018 (0.067)	-0.071** (0.030)	-0.072** (0.0305)
$\Delta inter op u_t$		-0.007* (0.004)				
$\Delta inter u ict_t$			-0.022 (0.083)			
$\Delta inter op ict_t$				0.015 (0.015)		
$\Delta inter rest u_t$					-0.004 (0.012)	
$\Delta inter rest ict_t$						-0.033* (0.013)
N	6521	6521	6521	6521	6521	6521
r2	0.101	0.102	0.101	0.102	0.101	0.102

Cluster robust standard errors in parentheses (clustering on country level)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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Outside Option of the Firm: Threat to Offshore

Wage moderation of workers due to the threat that firms will offshore production to other countries in the common market.

Wage Mark-up in the Single Market in the Respective Industry:

$$\ln outside_{ijt} = \ln \left(\frac{\tilde{w}_{iEUjt}}{\frac{1}{l_{EU}} \sum_{i \in EU} \tilde{w}_{iEUjt}} \right), \text{ if in EU}$$

or

$$= 0, \text{ if not in EU,}$$

where $\tilde{w}_{ijt} = w_{ijt} \frac{GDP_{it}}{GDP_{US t}}$ and $l = \sum i$.

Data Sources: calculated from EU KLEMS March 2008 data on labor compensation and total hours worked by people engaged



Instrument for Mark-up

Adjusted average wage in the interior market, weighted by geographical distance.:

$$instrument_{ijt} = \frac{1}{I-1} \sum_{i \neq m} w_{ijt} D_{i,m} \quad (5)$$

where $D_{i,m}$ is the geographical distance between country i and m .
Data Sources: calculated from EU KLEMS March 2008 data and CEPII geographical distance measures.

Estimation Results: Outside; Dep.Variable: Δ Labor Share

	OLS	OLS Lag	IV	IV Lag
$\Delta \ln outside_t$	11.87*** (2.974)		-83.46 (80.65)	
$\Delta \ln outside_{t-1}$		-0.700 (2.688)		-51.43 (39.81)
$\Delta \ln \frac{K}{Y}_t$	18.87*** (5.905)	15.39** (5.159)	-7.879 (25.28)	15.22*** (5.069)
$\Delta \ln \frac{K^{ICT}}{Y}_t$	-1.302*** (0.326)	-0.942*** (0.291)	2.274 (3.330)	-0.745** (0.373)
$\Delta unioncov_t$	0.099* (0.049)	0.080** (0.029)	0.002 (0.130)	-0.0257 (0.108)
$\Delta unbent_t$	2.785 (3.648)	1.400 (2.363)	-6.603 (7.298)	-10.74 (9.347)
$\Delta unempl_t$	-0.151 (0.093)	-0.235*** (0.073)	-0.764 (0.688)	-0.529 (0.429)
$\Delta rest_t$	0.042 (0.075)	-0.081* (0.042)	-0.850 (0.977)	-0.237 (0.163)
$\Delta open_t$	-0.050 (0.028)	-0.073** (0.033)	-0.224 (0.208)	0.018 (0.080)
N	6521	6370	6521	6370
r2	0.161	0.101		

Cluster robust standard errors in parentheses (clustering on country level)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Estimation Results: High Skilled

	hs 1	hs 2	hs 3	hs 4	hs 5	hs 6
$\Delta \ln \frac{K}{Y}_t$	15.37** (5.044)	15.37** (5.034)	15.37** (5.048)	15.62*** (4.797)	15.37** (5.043)	19.60*** (4.388)
$\Delta \ln \frac{K^{ICT}}{Y}_t$	-0.834** (0.275)	-0.850*** (0.266)	-0.816** (0.270)	0.006 (0.641)	-0.833** (0.275)	-0.817** (0.277)
$\Delta \text{hours } hs_t$	-0.029 (0.053)	0.093 (0.141)	-0.372 (0.277)	-0.309 (0.228)	-0.046 (0.054)	0.225 (0.157)
Δrest_t	-0.074 (0.042)	-0.076* (0.040)	-0.117* (0.057)	-0.083* (0.043)	-0.075* (0.042)	-0.072 (0.041)
Δopen_t	-0.071** (0.031)	-0.048 (0.029)	-0.070** (0.031)	-0.073** (0.031)	-0.071** (0.031)	-0.073** (0.032)
$\Delta \text{unioncov}_t$	0.085** (0.031)	0.086** (0.033)	0.083** (0.031)	0.087** (0.036)	0.084** (0.031)	0.090** (0.033)
Δunben_t	1.796 (3.435)	1.691 (3.382)	1.923 (3.475)	1.795 (3.328)	1.855 (3.409)	1.791 (3.491)
Δunempl_t	-0.234*** (0.072)	-0.233*** (0.072)	-0.239*** (0.074)	-0.243*** (0.068)	-0.266** (0.102)	-0.233*** (0.069)
$\Delta \text{inter op high}_t$		-0.002 (0.002)				
$\Delta \text{inter rest high}_t$			0.004 (0.003)			
$\Delta \text{inter ict high}_t$				-0.082 (0.062)		
$\Delta \text{inter u high}_t$					0.002 (0.005)	
$\Delta \text{inter k high}_t$						-0.331 (0.221)
N	6471	6471	6471	6471	6471	6471
r^2	0.100	0.101	0.100	0.103	0.100	0.1

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Cluster robust standard errors in parentheses (clustering on country level)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ 

Estimation Results: Low Skilled

	ls 1	ls 2	ls 3	ls 4	ls 5	ls 6
$\Delta \ln \frac{K}{Y}_t$	15.39** (5.039)	15.42*** (5.035)	15.43*** (5.039)	15.62*** (4.907)	15.38** (5.037)	8.729 (6.178)
$\Delta \ln \frac{K^{ICT}}{Y}_t$	-0.850*** (0.276)	-0.855*** (0.270)	-0.894*** (0.265)	-2.021*** (0.576)	-0.848** (0.281)	-0.941*** (0.291)
$\Delta \text{hours } ls_t$	-0.012 (0.030)	-0.083* (0.043)	-0.267 (0.167)	0.153* (0.086)	-0.020 (0.046)	-0.193** (0.088)
Δrest_t	-0.077* (0.043)	-0.077* (0.042)	-0.143*** (0.033)	-0.079* (0.043)	-0.077* (0.043)	-0.070 (0.042)
Δopen_t	-0.071** (0.031)	-0.114** (0.039)	-0.073** (0.032)	-0.071** (0.031)	-0.071** (0.031)	-0.066* (0.030)
$\Delta \text{unioncov}_t$	0.088** (0.031)	0.085** (0.030)	0.092*** (0.030)	0.094*** (0.028)	0.087** (0.031)	0.096** (0.037)
Δunben_t	1.752 (3.376)	1.683 (3.251)	1.725 (3.123)	2.107 (3.029)	1.716 (3.341)	2.027 (3.350)
Δunempl_t	-0.236*** (0.073)	-0.241*** (0.071)	-0.244*** (0.072)	-0.233*** (0.071)	-0.276* (0.144)	-0.253*** (0.063)
$\Delta \text{inter op low}_t$		0.001* (0.0007)				
$\Delta \text{inter rest low}_t$			0.003 (0.002)			
$\Delta \text{inter ict low}_t$				0.037* (0.021)		
$\Delta \text{inter u low}_t$					0.001 (0.004)	
$\Delta \text{inter k low}_t$						0.274** (0.108)
N	6471	6471	6471	6471	6471	6471
r^2	0.100	0.101	0.101	0.103	0.100	0.1

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Cluster robust standard errors in parentheses (clustering on country level)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$ 

Estimation Results: Manufacturing vs. Services

	Manufacturing	Services
$\ln \left(\frac{K}{Y} \right)_t$	14.57** (5.396)	21.44*** (2.795)
$\ln \left(\frac{K^{ICT}}{Y} \right)_t$	-1.124** (0.411)	-0.850*** (0.168)
$\Delta \text{unioncov}_t$	0.145*** (0.046)	-0.003 (0.077)
Δunben_t	3.671 (4.092)	-2.692 (2.085)
Δunempl_t	-0.333*** (0.090)	-0.200** (0.071)
Δrest_t	-0.096 (0.075)	-0.030 (0.035)
Δopen_t	-0.097** (0.044)	-0.056*** (0.015)
N	3298	2262
r2	0.107	0.118

Cluster robust standard errors in parentheses (clustering on country level)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Concluding Remarks

Summary

- The main driving force of the labor share seems to be the capital/output ratio which indicates a capital labor complementarity.
- A decrease in union coverage and increasing openness also affect the labor share negatively. The impact of union coverage seems to be driven from manufacturing industries rather than services.
- An increase in unemployment decreases the labor share.
- There are indications of wage moderation due to a threat of offshoring within the common market.
- There seem to be no strong impacts of changes of high skilled hours to the labor share. Low skilled work seems to be complementary to fixed capital and ICT capital and to a smaller extend to openness.
- The variables have a similar impact on services and