



# DECOUPLING OF WAGES FROM PRODUCTIVITY

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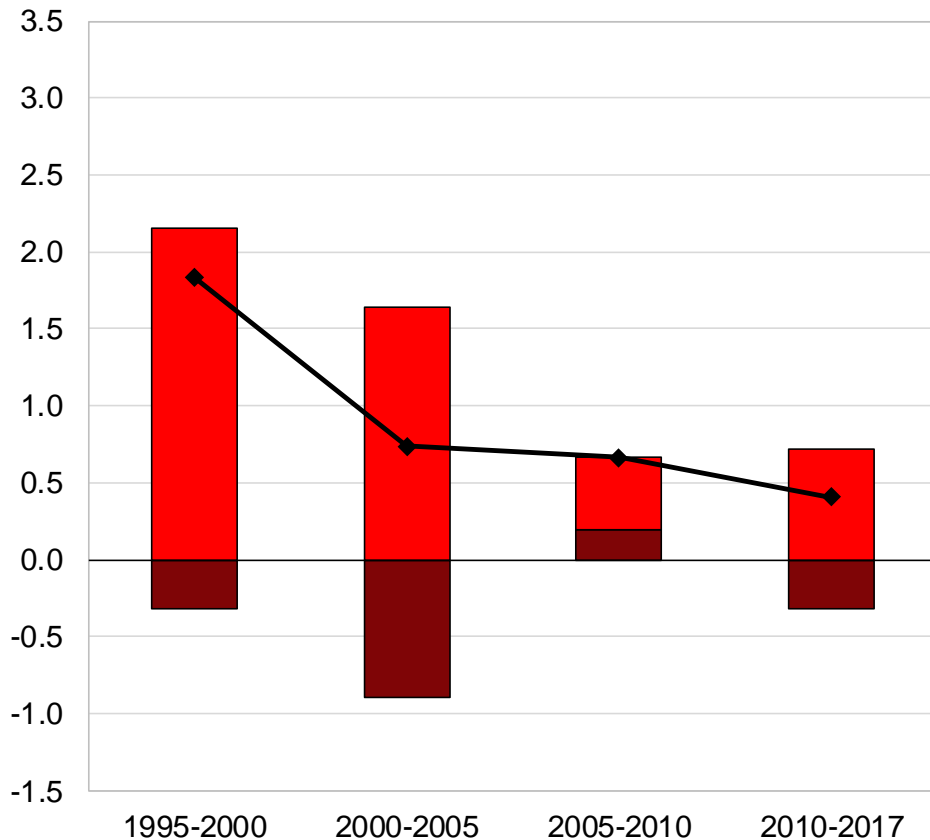
Sydney, 5 April 2019



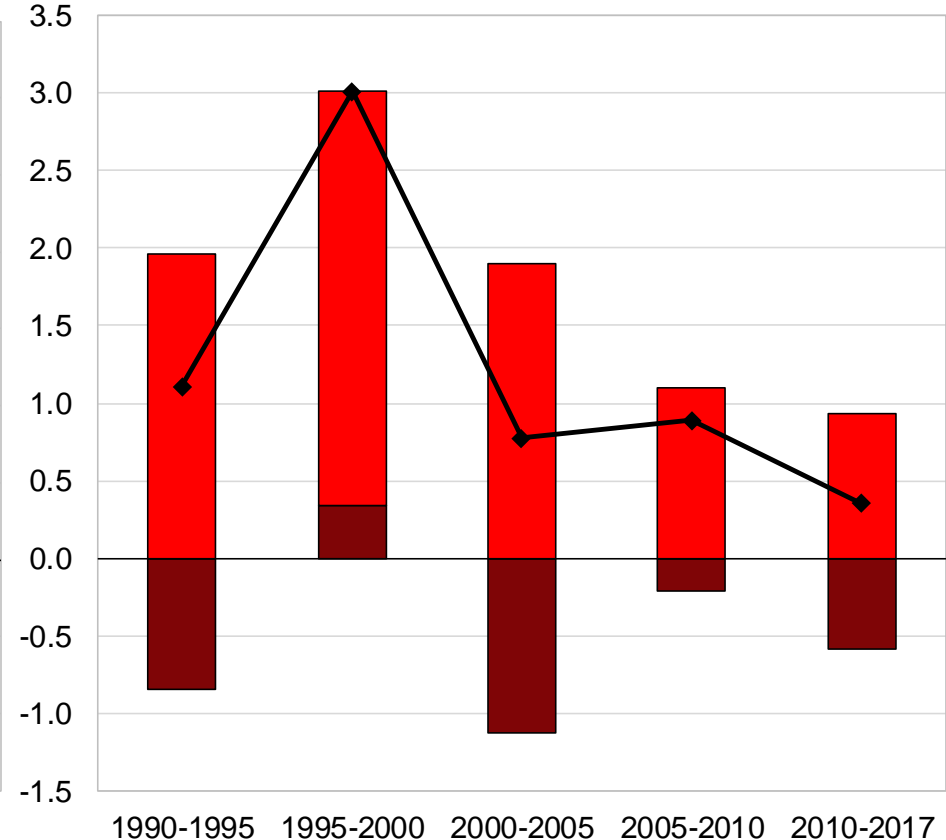
# Productivity and wage slowdown

- ◆ Real compensation growth (producer prices)
- Contribution of labour productivity growth
- Contribution of labour share

OECD



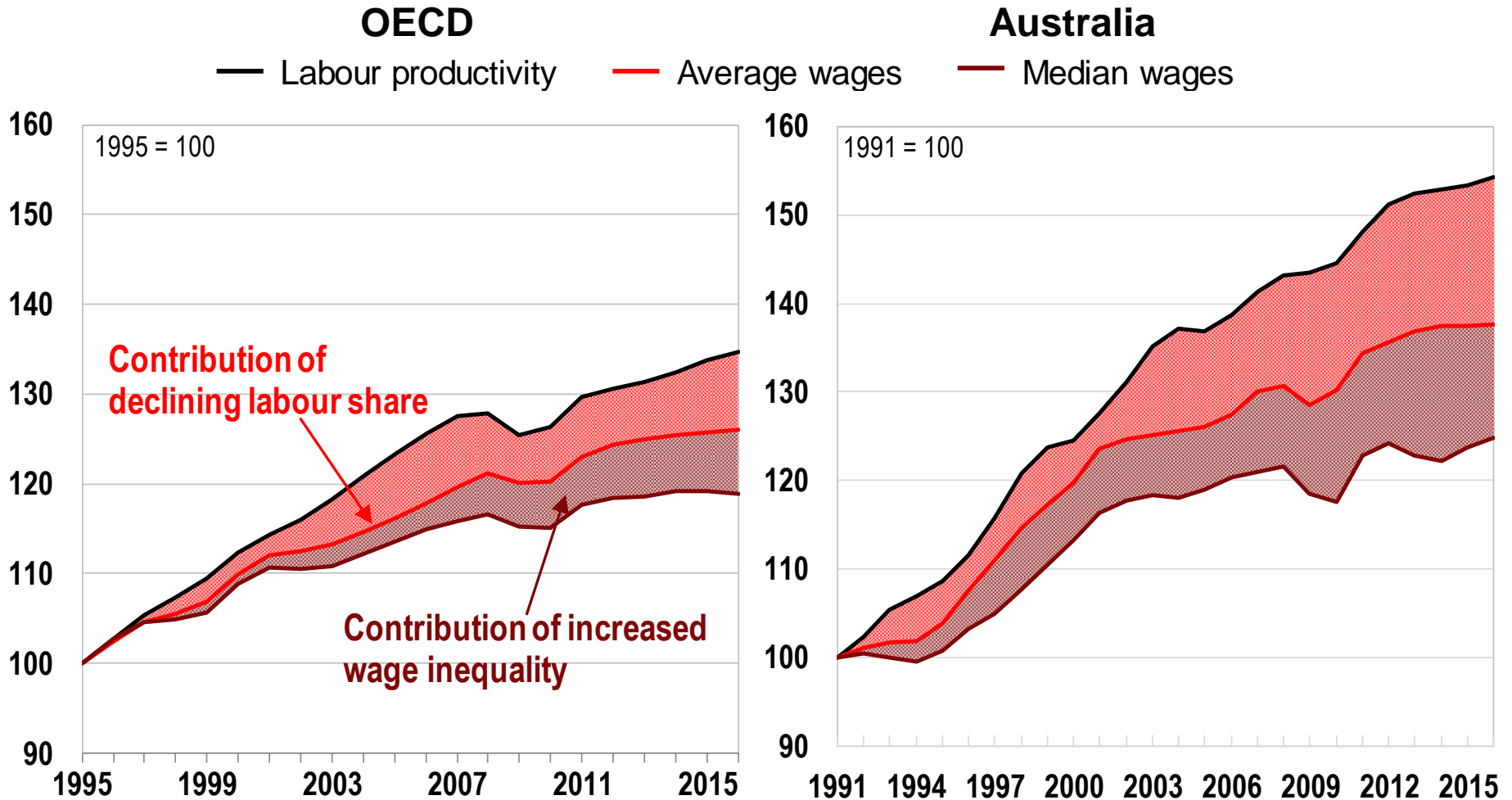
Australia



Note: Total economy excluding primary, housing and non-market industries. OECD is the GDP weighted average of 31 countries.  
Source: OECD National Accounts Database.



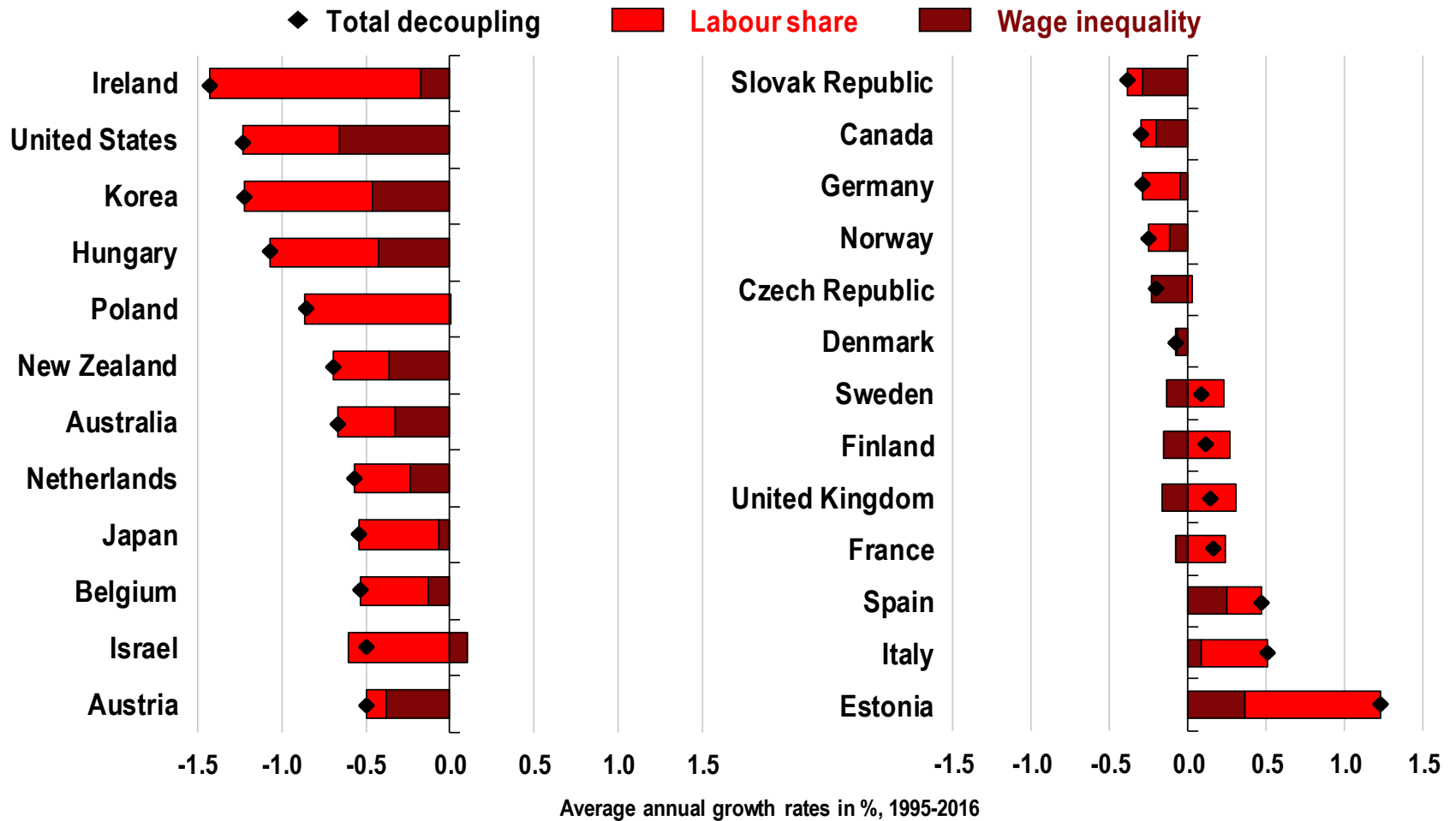
# Productivity gains no longer translate into broadly shared wage gains



Note: OECD is the employment weighted average of 25 countries.  
All series are deflated by the value added price index excluding the primary, housing and non-market industries.  
Source: OECD National Accounts Database, OECD Earnings Database.



# Large heterogeneity in decoupling across countries



*Note:* Total economy excluding primary, housing and non-market industries. 1995-2015 for Korea and Japan; 1996-2016 for Austria, Belgium, Germany, Hungary, Italy and United Kingdom; 1996-2015 for France; 1996-2014 for Ireland and Netherlands; 1996-2012 for Spain; 1997-2016 for Czech Republic; 1998-2015 for New Zealand and Norway; 1995-2013 for Sweden; 1998-2014 for Canada; 2001-2016 for Poland; 2002-2015 for Israel; 2003-2016 for Slovak Republic; 2003-2014 for Estonia.

*Source:* OECD National Accounts Database, OECD Earnings Database



# Objective: Understand the structural and policy drivers of decoupling

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**Go beyond macro-level correlations** by using industry- and micro-level data

**Approach:** Industry-level regressions allowing cleaner identification of structural and policy drivers, complemented with firm-level analyses to focus on selected mechanisms

**Focus:** Labour share developments w/ some evidence on between-firm wage inequality

**Question:** Do changes in labour shares reflect the market response to secular trends, such as technological change and globalisation, or do they reflect changes in public policies?



# Drivers of labour shares

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**Technological change:** Capital-augmenting technological change or technology-driven declines in equipment prices raise capital intensity, which reduces labour shares if the elasticity of substitution is above unity (Karabarbounis and Neiman, 2014; IMF, 2017).

**Globalisation:** Offshoring of the most labour-intensive stages of production or increased import competition may lead to worker displacement and an increase in capital intensity (Elsby et al., 2013; IMF, 2017).

**Changes in market structure:** Rising market shares of highly-productive “superstar firms” with low labour shares (Autor et al., 2017; De Loecker, Eeckhout & Unger, 2018).

**Product and labour market policies:** Impact markups, relative factor prices and relative bargaining position (IMF, 2017; Barkai, 2017; Machin, 2016)



# Roadmap

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## **Data and descriptive statistics**

- Digression: “Winner-takes-most” dynamics?

## **Structural drivers: Baseline model and results**

- Digression: Firm-level labour shares vs reallocation?

## **Policies: Diff-in-diff model and results**

## **Conclusion**



# Data

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**Sample:** OECD countries over 1995-2016 excluding primary, housing and non-market industries

**Industry-level labour shares:** Labour compensation / value added, where labour compensation is the sum of compensation of salaried workers and the imputed compensation of self-employed workers (OECD STAN, EU-KLEMS).

**Relative investment prices:** Investment price / value added price (OECD SNA, OECD STAN, EU-KLEMS).

**Global value chain participation:** (Backward + forward linkages) / value added (OECD TiVA).

**Industry characteristics and policy indicators:** Variety of institutional and academic data sources.

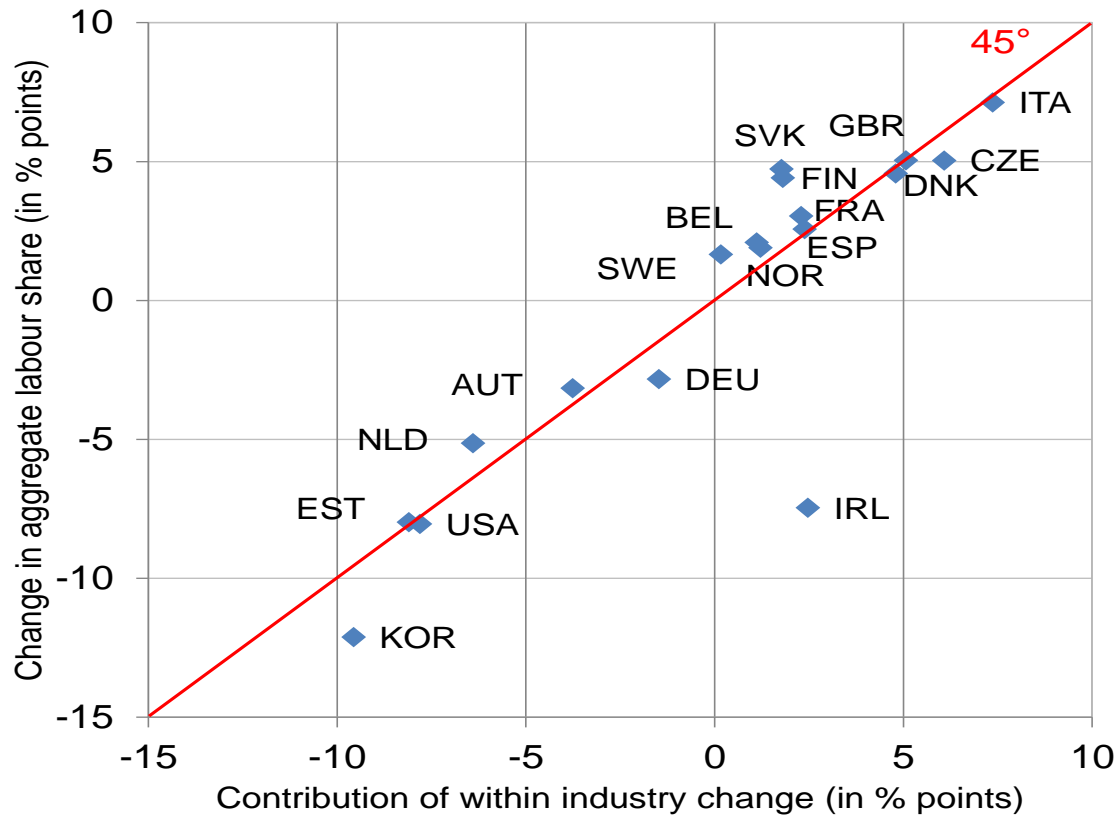
**Firm-level data:** ORBIS (Bureau van Dijk)





# Descriptive statistics

Declines in labour shares overwhelmingly reflect within-industry developments rather than cross-industry reallocation of value added



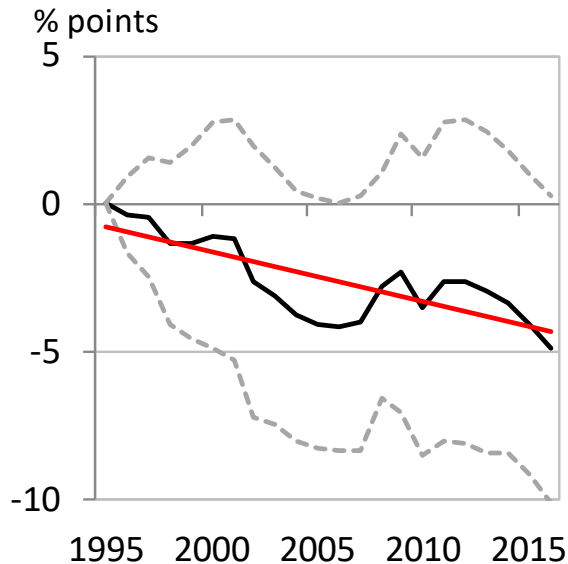
Note: Based on a shift-share decomposition of aggregate changes in labour shares.  
Source: OECD National Accounts Database.



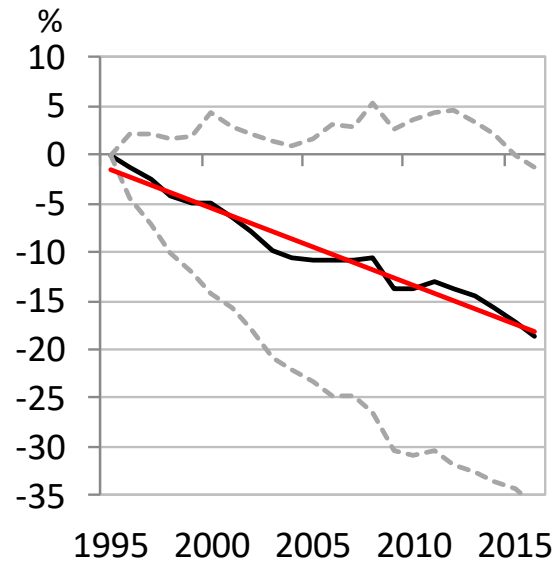
# Descriptive statistics

Declines in labour shares coincided with falls in relative investment prices and the expansion of GVCs

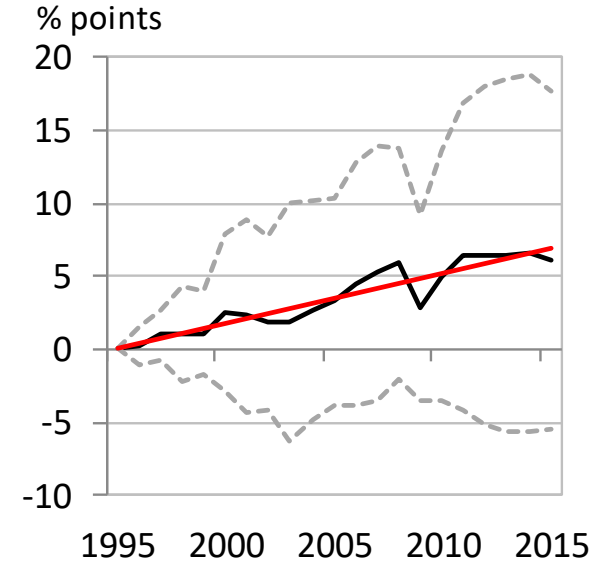
**A. Labour share**



**B. Relative investment price**



**C. GVC participation**



Note: Total economy excluding primary, coke and petroleum products, housing and non-market industries. GDP weighted average of 20 OECD countries included in the industry-level regressions. The black lines indicate cumulated changes; the red lines indicate the corresponding trends; and the dotted lines indicate +/- 1 standard deviation around the weighted average. 1995-2016 for labour share and relative investment price and 1995-2015 for GVC participation.

Source: OECD National Accounts Database and OECD TiVA Database.

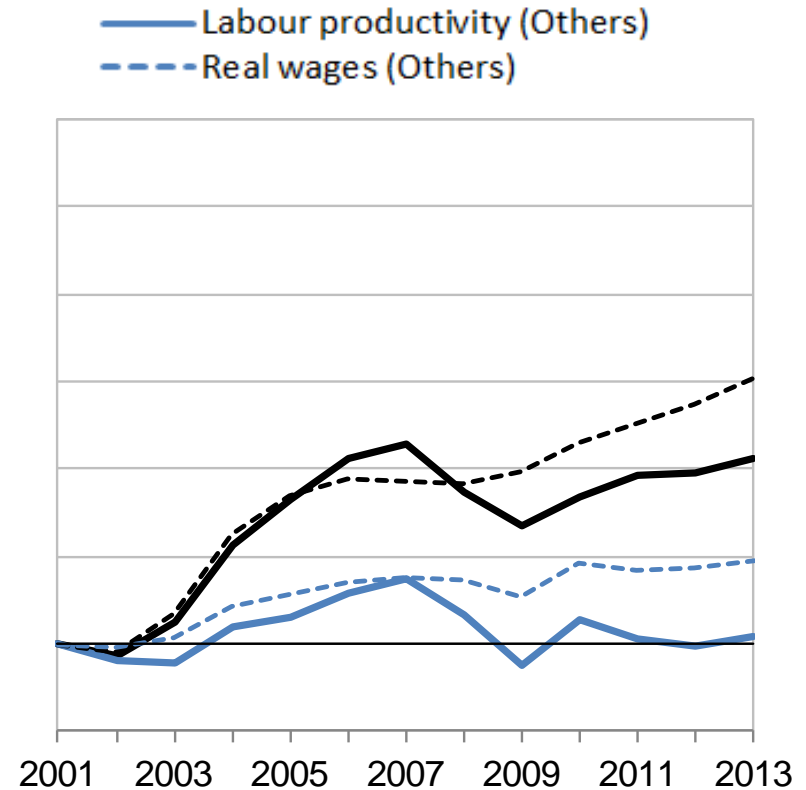
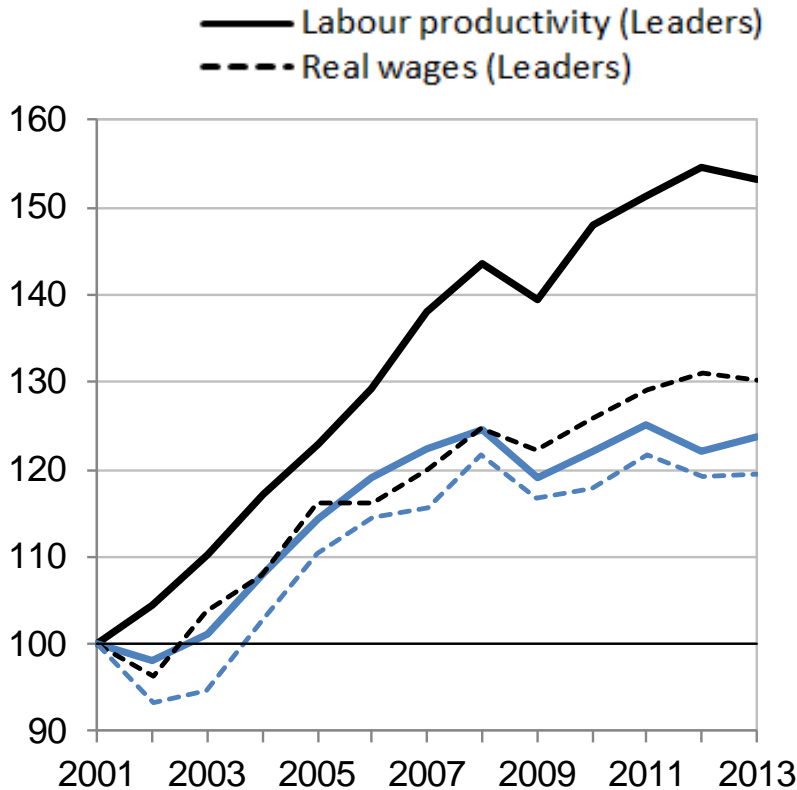


# Firm-level digression: “Winner takes most?”

## Labour productivity and real wages (2001 = 100)

Panel A: Countries with declines in labour shares

Panel B: Countries with increases in labour shares



Note: Labour productivity and real wages are computed as the unweighted mean across firms of real value added per worker and real labour compensation per worker. Leaders are defined as the top 5% of firms in terms of labour productivity within each country group in each industry and year. The countries with a decline in the labour share excluding the primary, housing, financial and non-market industries over the period 2001-2013 are: Belgium, Denmark, Germany, Ireland, Japan, Korea, Sweden, United Kingdom and United States. The countries with an increase are: Austria, Czech Republic, Estonia, Finland, France, Italy, Netherlands and Spain.  
Source: OECD Economic Outlook November 2018.



# Firm-level digression: “Winner takes most?”

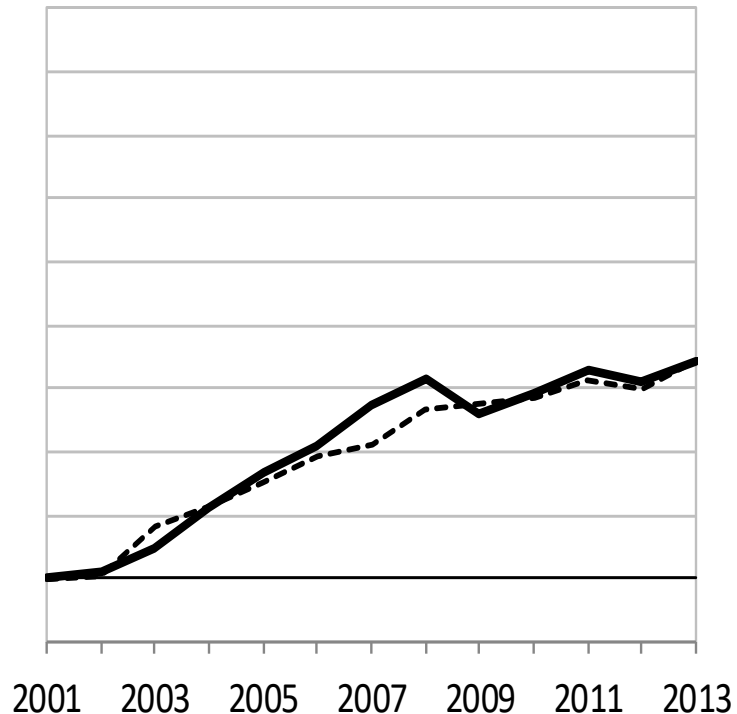
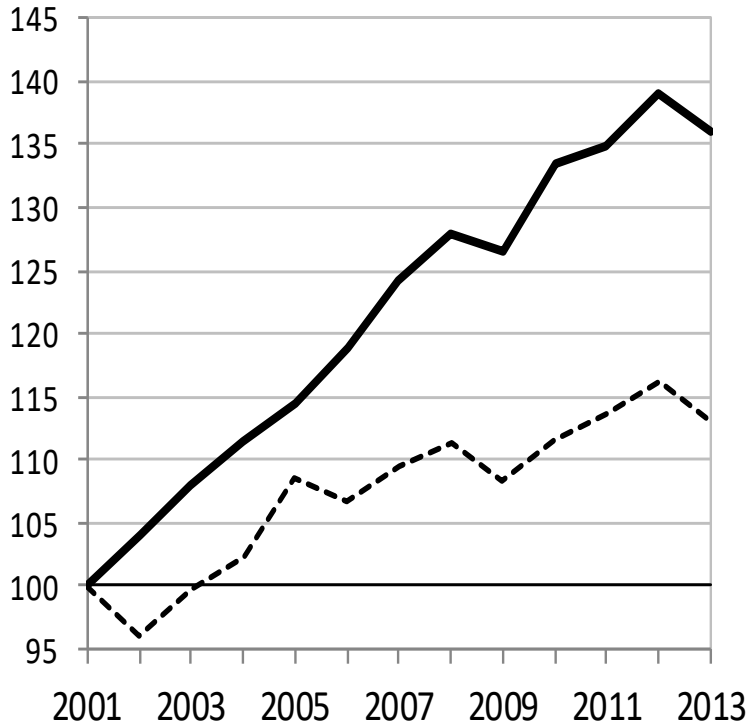
Contributions to labour productivity and real wage growth at the frontier, countries with declines in labour shares

Panel A: Net entry

Panel B: Incumbent leaders

— Labour productivity

- - - Real wages



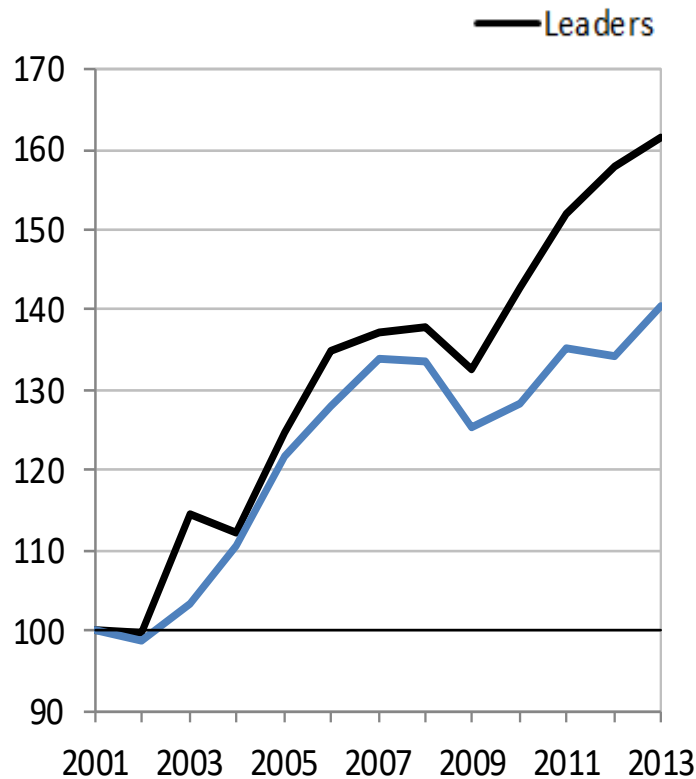
Note: Labour productivity and real wages are computed as the unweighted mean across firms of real value added per worker and real labour compensation per worker. Leaders are defined as the top 5% of firms in terms of labour productivity within each country group in each industry and year. The countries with a decline in the labour share excluding the primary, housing, financial and non-market industries over the period 2001-2013 are: Belgium, Denmark, Germany, Ireland, Japan, Korea, Sweden, United Kingdom and United States. The countries with an increase are: Austria, Czech Republic, Estonia, Finland, France, Italy, Netherlands and Spain.  
Source: Schwellnus et al. (2018).



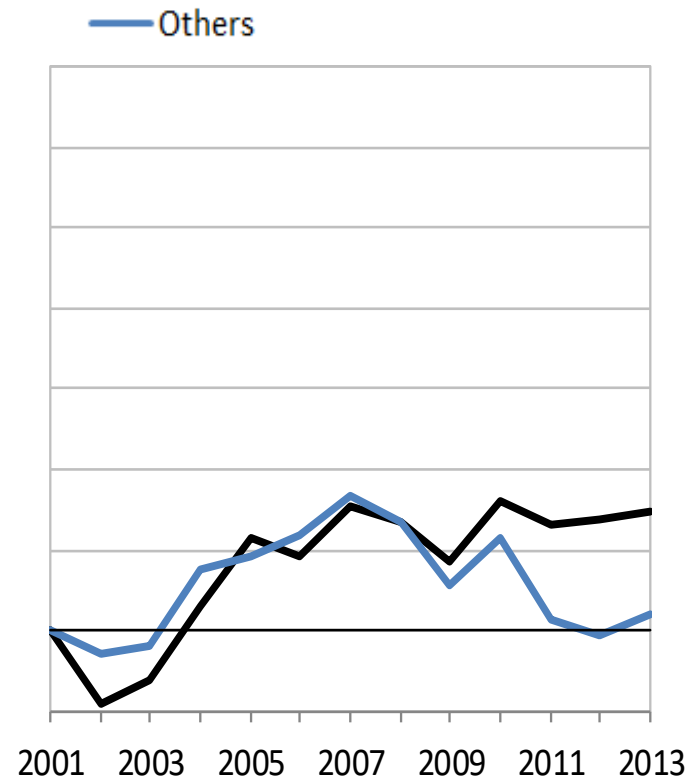
# Firm-level digression: “Winner takes most?”

Real value added (2001=100)

Panel A: Countries with declines in labour shares



Panel B: Countries with increases in labour shares



*Note:* Labour productivity and real wages are computed as the unweighted mean across firms of real value added per worker and real labour compensation per worker. Leaders are defined as the top 5% of firms in terms of labour productivity within each country group in each industry and year. The countries with a decline in the labour share excluding the primary, housing, financial and non-market industries over the period 2001-2013 are: Belgium, Denmark, Germany, Ireland, Japan, Korea, Sweden, United Kingdom and United States. The countries with an increase are: Austria, Czech Republic, Estonia, Finland, France, Italy, Netherlands and Spain.  
*Source:* Schwellnus et al. (2018).



# Notes to Firm-level digression: “Winner takes most?”

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In countries with declines in labour shares value added in leading firms strongly diverged from remaining firms, implying **increasing market shares of firms at the technological frontier**. Given that labour shares in leading firms are well below those in other firms, in these countries reallocation of value added put further downward pressure on labour shares.

This is consistent with "winner-take-most" dynamics but it does not necessarily indicate an increase in anti-competitive forces, such as higher entry barriers. The emergence of new technologies may allow innovating firms to **temporarily pull ahead**.

The risk is that **over time incumbent technological leaders attempt to reduce the threat of market entry** through anti-competitive practices, e.g. through predatory pricing or mergers and acquisitions of competing firms.



# Structural drivers

$$\Delta LS_{ijt} = \beta_1 \Delta P_{ijt}^{Inv} + \beta_2 \Delta T_{ijt} + \beta_3 (RTI_{ijt}^0 \times \Delta P_{ijt}^{Inv}) + \beta_4 (RTI_{ijt}^0 \times \Delta T_{ijt}) + \beta_4 X_{ijt} + \alpha_i + \alpha_{jt} + \varepsilon_{ijt}$$

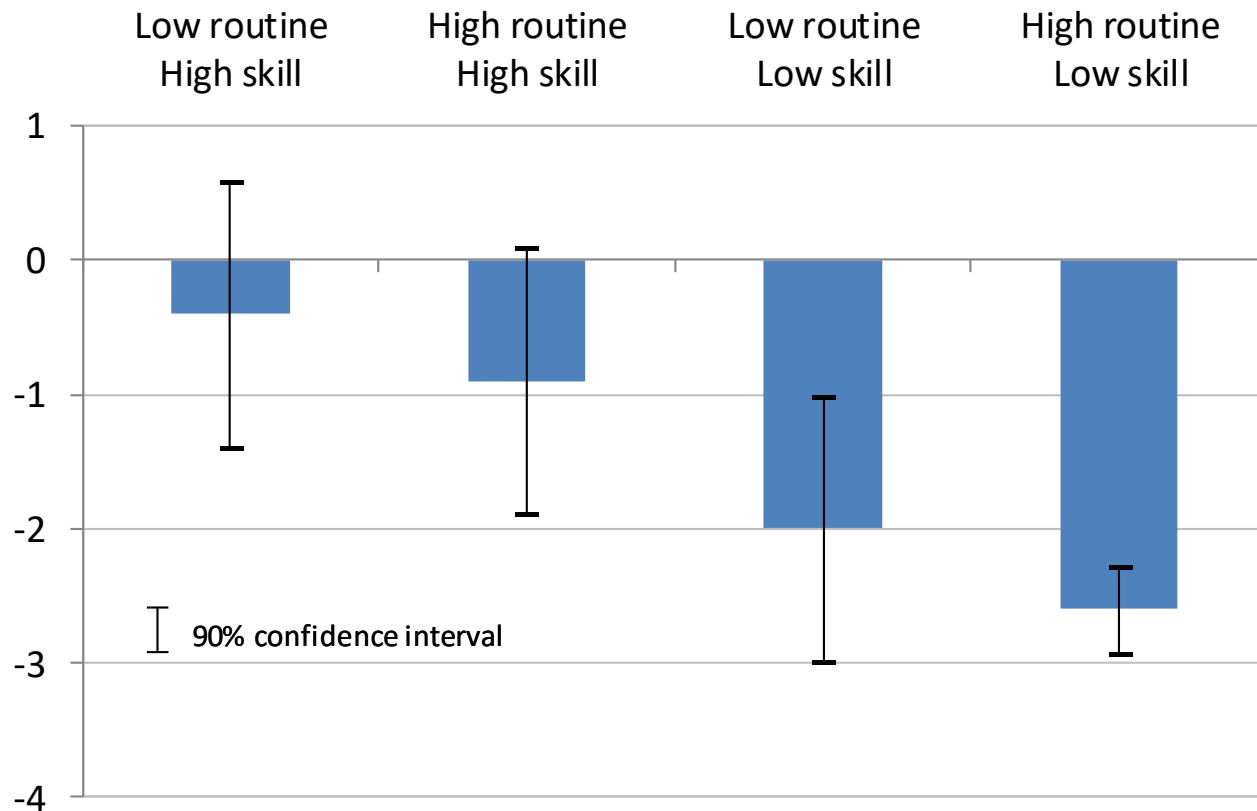
	(1)	(2)	(3)	(4)
Dependent variable	Change in business labour share excluding primary, coke and housing industries			
Change in relative investment price	0.19*** (0.03)	0.18*** (0.03)	0.11*** (0.04)	0.18*** (0.03)
Change in GVC participation	-0.10** (0.04)	-0.11** (0.04)	-0.11** (0.04)	-0.09* (0.04)
High routine intensity x Change in relative investment price			0.11** (0.05)	
High routine intensity x Change in GVC participation				-0.04 (0.05)
Change in output gap	-0.47*** (0.11)			
High routine intensity	YES	YES	YES	YES
Industry x period fixed effects	YES	YES	YES	YES
Country x period fixed effects	NO	YES	YES	YES
Country fixed effects	YES	NO	NO	NO
Observations	959	968	968	968
Number of countries	20	20	20	20
Number of industries	19	19	19	19
Adjusted R <sup>2</sup>	0.26	0.28	0.30	0.28

Note: Changes denote 5-year differences. Weighted OLS, with the share of sector-level value added in total value as weights. Standard errors clustered at the country level. \*, \*\*, \*\*\* denote statistical significance at the 10%, 5% and 1% levels.



# Structural drivers: Skills

Change in the labour share in response to a 10% decrease in the relative investment price, % points



Note: Based on the industry-level results for numeracy skills reported in Schweltnus et al. (2018).

Source: Schweltnus et al. (2018)





# Firm-level digression: Within firms or reallocation?

$$\Delta LS_{cjit} = \beta_1 \Delta P_{ijt}^{Inv} + \beta_2 \Delta T_{ijt} + \beta_3 (C_{cji0} \times \Delta P_{cjt}^{Inv}) + \gamma' X_{cji0} + \alpha_{cj} + \alpha_t + \varepsilon_{cji}$$

	(1)	(2)	(3)	(4)	(5)
Dependent Variable		Change in firm-level labour share			
Change in relative investment price	0.14*** (0.05)	0.13** (0.06)	0.18*** (0.05)	0.17*** (0.06)	
Change in GVC participation	-0.02 (0.05)	-0.01 (0.05)	-0.02 (0.05)	-0.01 (0.05)	
Leader x Change in relative investment price		0.19*** (0.07)		0.19*** (0.07)	0.18** (0.07)
Leverage x Change in relative investment price			-0.06** (0.02)	-0.05** (0.03)	-0.06** (0.02)
Initial leverage and/or initial leader	NO	YES	YES	YES	YES
Firm-level controls	YES	YES	YES	YES	YES
Country x industry fixed effects	YES	YES	YES	YES	NO
Year fixed effects	YES	YES	YES	YES	NO
Country x industry x year fixed effects	NO	NO	NO	NO	YES
Observations	416,888	416,888	416,888	416,888	416,888
Adjusted R <sup>2</sup>	0.21	0.22	0.21	0.22	0.22

Note: The included countries are Belgium, Germany, Spain, Finland, France, Italy, Korea, Sweden and United Kingdom. A leader is defined as belonging to the top 5% firms within an industry with the highest labour productivity across the countries covered by the analysis. Firm-level financial leverage is proxied by the ratio of current liabilities and long term debt to total assets. Standard errors are clustered at the country-industry level. \*, \*\*, \*\*\* denote statistical significance at the 10%, 5% and 1% levels.



## Product and labour market policies

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**Capital-labour substitution:** Public policies that affect labour costs or the cost of capital, such as corporate taxes, tax wedge or minimum wages (IMF, 2017; Bassanini & Manfredi, 2012).

**Size of product market rents:** In an imperfectly-competitive economy, value added does not only include the marginal products of the factors of production but also product market rents (Barkai, 2017; Furman & Orszag, 2015).

**Sharing of product market rents:** In an imperfectly competitive labour market, workers and capital owners bargain over the distribution of rents formally or informally (IMF, 2017; Machin, 2016).



# Product and labour market policies

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Augment the baseline specification by a “**difference-in-differences**” setup

Assumes that the response of labour shares to a given policy reform depends on some **observable industry characteristic**

**Example:** Changes in the minimum wage can plausibly be assumed to have larger effects on average wages in industries with high shares of low-wage workers.

In the **short term**, the increase in wages tends to raise the labour share if the employment response is modest

In the **medium term**, the increase in wages triggers capital-labour substitution



# Product and labour market policies

Estimated equation:  $\Delta LS_{ijt} = \beta_1 (Exp_j^k \times \Delta Pol_{it}^k) + \beta_2 \Delta P_{ijt}^{Inv} + \beta_3 \Delta T_{ijt} + \beta_4 X_{ijt} + \alpha_{it} + \alpha_{jt} + \varepsilon_{ijt}$

Controlling for:	(1) Change in PMR x EXPO: Firm turnover	(2) Change in EPL x EXPO: Worker reallocation	(3) Change in ALMP x EXPO: Low-skilled workers	(4) Change in minimum wage x EXPO: Low-wage workers
EXPO x Change in PMR	<b>-0.31**</b> (0.13)	-0.25* (0.12)	1.01* (0.52)	-0.08** (0.03)
EXPO x Change in EPL	-0.20* (0.11)	<b>-0.24*</b> (0.13)	1.09* (0.61)	-0.08** (0.04)
EXPO x Change in ALMP	-0.25* (0.12)	-0.22 (0.13)	<b>1.10*</b> (0.61)	-0.08** (0.03)
EXPO x Change in CB coverage	-0.31** (0.13)	-0.24 (0.14)	0.71 (0.51)	-0.09*** (0.03)
EXPO x Change in CB decentralisation	-0.30** (0.13)	-0.26 (0.15)	1.12 (0.65)	-0.08* (0.04)
EXPO x Change in minimum wage	-0.21 (0.15)	-0.18 (0.11)	1.03* (0.51)	<b>-0.08**</b> (0.03)
EXPO x Change in tax wedge	-0.31** (0.12)	-0.23* (0.12)	0.80 (0.49)	-0.08** (0.03)
EXPO x Change in corporate tax	-0.32** (0.12)	-0.28* (0.15)	1.10* (0.53)	-0.06 (0.04)

Note: PMR stands for product market regulation; EPL for employment protection legislation; ALMP for active labour market policies; CB for collective bargaining; and EXPO for exposure variable. The table reports the estimated coefficients on the interaction term in the column heading, with each row reporting the estimate when controlling for the interaction term in the row heading. Coefficients in bold font show the baseline estimates in Table 2 above. Public policies and institutions denote 5-year differences. Standard errors are clustered at the country level. Weighted OLS, with the share of industry-level value added in total value as weights. \*, \*\*, \*\*\* denote statistical significance at the 10%, 5% and 1% levels.



# Summary

	Ratio of average wages to labour productivity	Ratio of median to average wages or ratio of bottom to top firm-level wages
	Labour share <sup>1</sup>	Inverse measure of wage inequality <sup>2</sup>
Technological change	↓	↓
Trade integration	↓	↓
High skills	↗	↗
Competition-friendly product market reform	↗	↓
Loosening of employment protection	↗	↓
Minimum wage reduction	↗	↓
Collective bargaining decentralisation	⊘	↓
ALMP spending increase	↗	?

Note: ⊘ indicates statistical insignificance and ? indicates that drivers have not been subject to robust empirical analysis in the context of the studies reviewed in this chapter.

1. Based on Schwellnus et al. (2018) and Pak and Schwellnus (2018).

2. Based on De Serres and Schwellnus (2018) and Berlingieri, Blanchenay and Criscuolo (2017).



# Summary

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Some decoupling on average but **significant cross-country heterogeneity**

Technology-driven declines in relative investment prices and increased global value chain participation **partly explain the decoupling of wage growth from productivity growth**

Public policies and institutions that affect the scope for capital-labour substitution as well as the size and the distribution of producer rents contribute to **differences in decoupling across countries**

Labour share declines have been particularly pronounced at the technological frontier and wage dispersion between firms has increased, which may reflect technology- and globalisation-induced **“winner-takes-most” dynamics**



# References

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## Country-level evidence:

[De Serres, A. and C. Schwellnus](#) (2018), “A general equilibrium (LM and PM reforms) perspective to inequality”, in Astarita, C. and G. D’Adamo (eds.), *Inequality and Structural Reforms: Methodological Concerns and Lessons from Policy*. Workshop Proceedings, European Economy Discussion Papers No. 71, European Commission, Brussels.

[Schwellnus, C., A. Kappeler and P. Pionnier](#) (2017), “The Decoupling of Median Wages from Productivity in OECD Countries”, *International Productivity Monitor*, Vol. 32.

[OECD](#) (2018), “Decoupling of wages from productivity: What implications for public policies”, *OECD Economic Outlook*, Volume 2018, Issue 2, OECD Publishing, Paris.

## Industry- and firm-level evidence:

[Berlingieri, G., P. Blanchenay and C. Criscuolo](#) (2017), “The great divergence(s)”, *OECD Science, Technology and Industry Policy Papers*, No. 39, OECD Publishing, Paris.

Pak, M. and C. Schwellnus (2018), “Labour share developments over the past two decades: The role of public policies”, *OECD Economics Department Working Papers*, OECD Publishing, forthcoming.

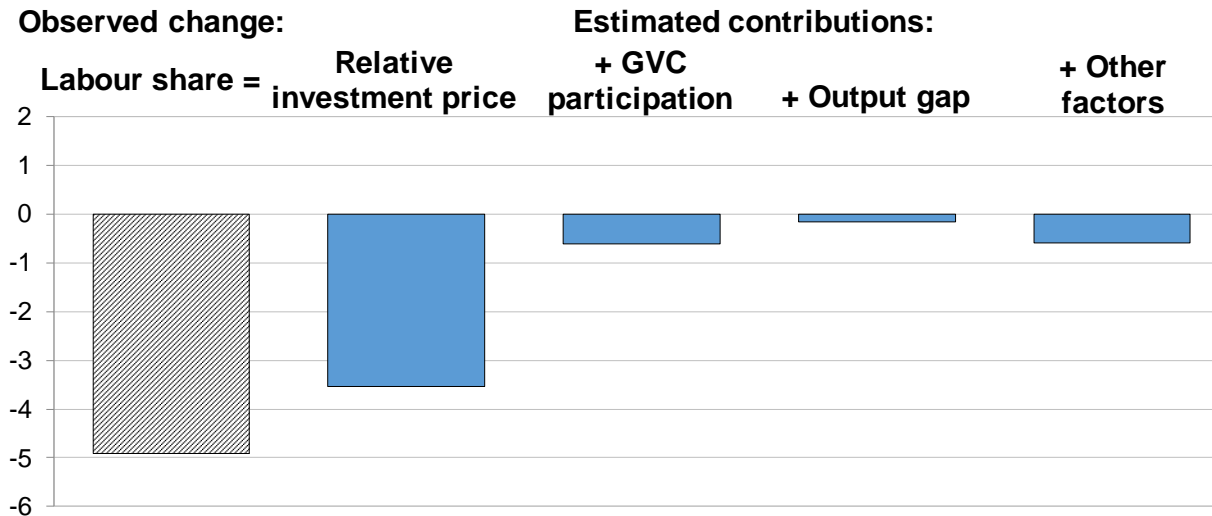
[Schwellnus, C., et al.](#) (2018), “Labour share developments over the past two decades: The role of technological progress, globalisation and “winner-takes-most” dynamics”, *OECD Economics Department Working Papers*, No. 1503, OECD Publishing, Paris.

[Pak, M. and C. Schwellnus](#) (2019), “Labour share developments over the past two decades: The role of public policies”, *OECD Economics Department Working Papers*, No. 1541 OECD Publishing, Paris.



# Structural drivers: Summary

Technological change and, to a lesser extent, GVC expansion explain the overwhelming part of the aggregate labour share decline in the OECD



The decline in labour shares in response to technological change is particularly pronounced in high-routine industries

Industry-level effects are only partly explained by within-firm developments

Capital-labour substitution appears to be particularly pronounced in high-productivity firms





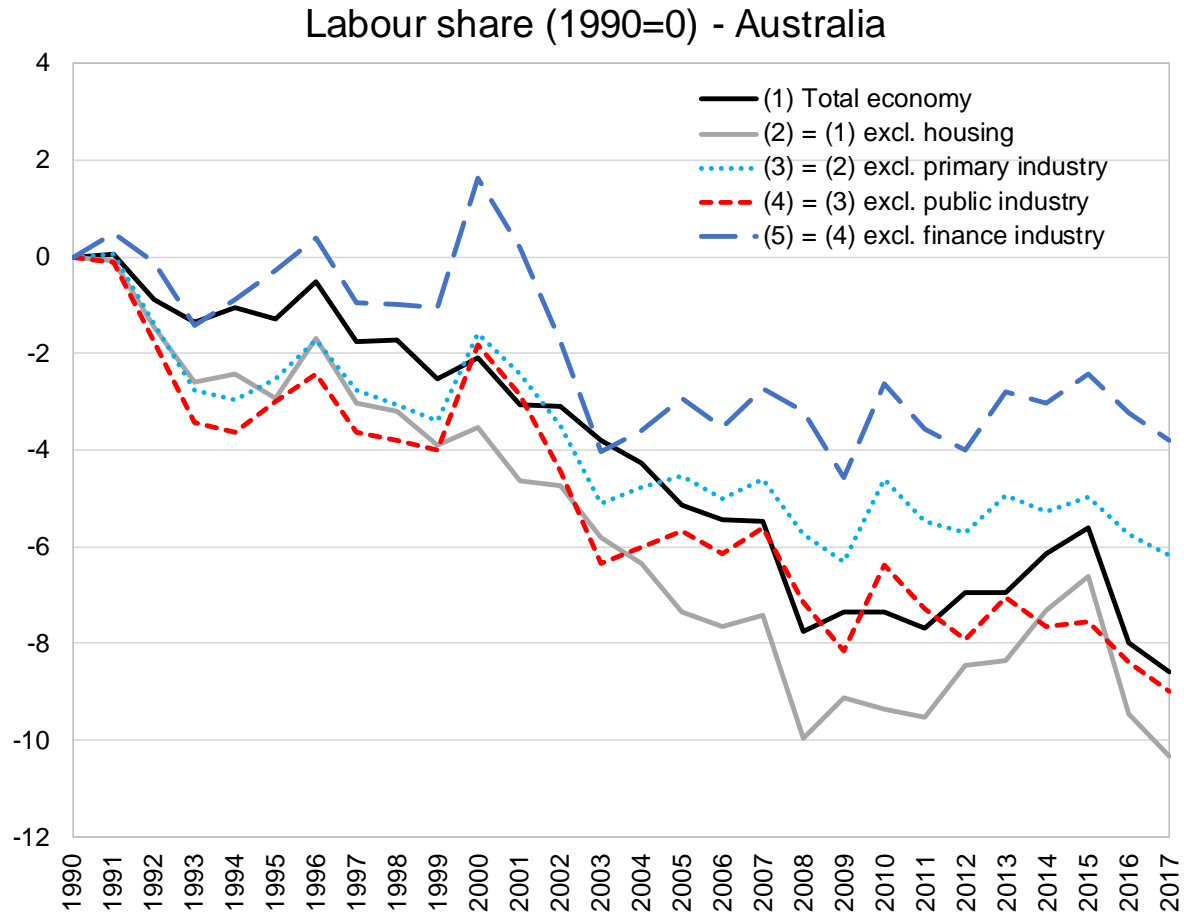
# Reserve slide: Skills

	(1)	(2)	(3)	(4)
Dependent variable	Change in business labour share excluding primary, coke and housing industries			
Change in relative investment price	0.16** (0.06)	0.21*** (0.04)	0.17*** (0.05)	0.22*** (0.05)
Change in GVC participation	-0.12*** (0.04)	-0.12*** (0.04)	-0.12*** (0.04)	-0.12*** (0.04)
High routine intensity x Change in relative investment price	0.08** (0.04)	0.05 (0.04)	0.07 (0.04)	0.05 (0.04)
High share of high skilled (literacy) x Change in relative investment price	-0.09 (0.07)			-0.02 (0.09)
High share of high skilled (numeracy) x Change in relative investment price		-0.17** (0.06)		-0.14 (0.08)
High share of high skilled (pb solving) x Change in relative investment price			-0.13* (0.06)	-0.03 (0.07)
High routine intensity	YES	YES	YES	YES
High skills	YES	YES	YES	YES
Country x period fixed effects	YES	YES	YES	YES
Industry x period fixed effects	YES	YES	YES	YES
Observations	916	916	916	916
Number of countries	20	20	20	20
Number of industries	18	18	18	18
Adjusted R <sup>2</sup>	0.30	0.31	0.30	0.31

Note: Changes denote 5-year differences. Weighted OLS, with the share of sector-level value added in total value as weights. Robust standard errors are clustered at the country level. \*, \*\*, \*\*\* denote statistical significance at the 10%, 5% and 1% levels.



# Reserve slide: Labour share Australia





# Change in wage inequality

Changes in the ratio of median to average wages, 1995-2016  
1995=100

