Dissecting Labour Shares using BLADE: trends & drivers

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EMG Workshop

Motivation

Labour Share Decline

- Moderate in Australia (La Cava, 2018) & close to historic trends (Trott and Vance, 2018)
- Global Experience (Dao et al, 2018)
- Stylised macroeconomic fact to have constant share growth

Broad Welfare and Social Implications

- Distribution of income between labour and capital
- Income inequality
- Stagnating Wage Growth
- Decoupling from labour productivity

Incomplete Assessment

- Limited to aggregate data (e.g. La Cava, 2018; Trott, 2018)
- Use micro data to create macroeconomic results to drive policy

Research Questions

…As well as preview of results

1 What are the trends in labour's share of income in Australia ?

- Measure labour share at the firm level and aggregate to a macroeconomic level

- Address mismeasurement issues that confound labour share measurement (e.g. Gollin, 2012; Elsby et al, 2013; Rognolie, 2015)

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2 What are the drivers of labour share changes?

- Test several hypothesis using reduced form regressions

  - E.g. Declining Competition, Capital- biased technological change, import competition

- Find that increasing concentration is a significant driver of labour share decline

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3 Is this a symptom of increasing or declining competition?

- Propose a new empirical framework to identify Autor et al (2017, 2019) superstar model

- Find evidence for declining competition, rather than increasing competition

Business Longitudinal Analytical Data Environment (BLADE) (2002 - 2017)

Data

- Acknowledgements: Australian Bureau of Statistics (ABS), UNSW, The Treasury

- Highly confidential data with strict data access

- Firm characteristics for more than 2 million activity trading businesses

- Business Activity Statements (BAS) and Pay As You GO (PAYG) administrative data

- Data points: e.g. Turnover, Wages, Capex, Opex

- Creation of data set - See Appendix for further details

Table: Summary statistics from BLADE (Total and Average) (2002-2017)

	No of observations	Total Gross Output ($b)*	Total Labour Cost ($b)	Average FTE
Total Economy	32,080,643	$66,094	$9,597	12.6
Manufacturing	1,364,695	$5,394	$690	17.3
Retail Trade	2,202,355	$5,562	$558	10.6

Source: ABS; Notes: there are measurement concerns with output; hence, it may be overestimated (Hansell and Rafi, 2018)

Part I: Trends

Accounting Framework

Firm Level: - Constructed using Business Activity Statements (BAS) of Australia Firms

Value add produced in a firm *i* at time *t* can be interpreted as being equivalent to labour and capital costs plus profits accruing to producers selling above the average cost of production (Barkai, 2016; Karabounis and Neiman, 2019):

$$P_{it}Y_{it} = w_{jt}L_{it} + R_{jt}P_{jt}^K K_{it} + \Pi_{it}$$

$$1 = \lambda_{it} + \emptyset_{it} + \pi_{it}$$

Where

- $P_t Y_t$ is value added for a firm *i* (constructed as gross output – intermediate inputs using BAS)
- $w_t L_t$ is employee wage compensation provided by BAS - L_{it} is FTE for firm *i,* and w is the average wage rate
- R_t is the rental rate of return for industry j (Constructed), $P_{\{t-1\}}^K$ is the price of capital for industry *j (Constructed)*, K_t is capital stock for firm *I* in BAS *(perpetual inventory method using firm investment)*
- Π_{it} are retained economic profits for firm *I – calculated as the residual of value added after deducting capital costs and labour costs*
- λ_{it} labour share ; $\emptyset_{it}$ capital share ; π_{it} profit share
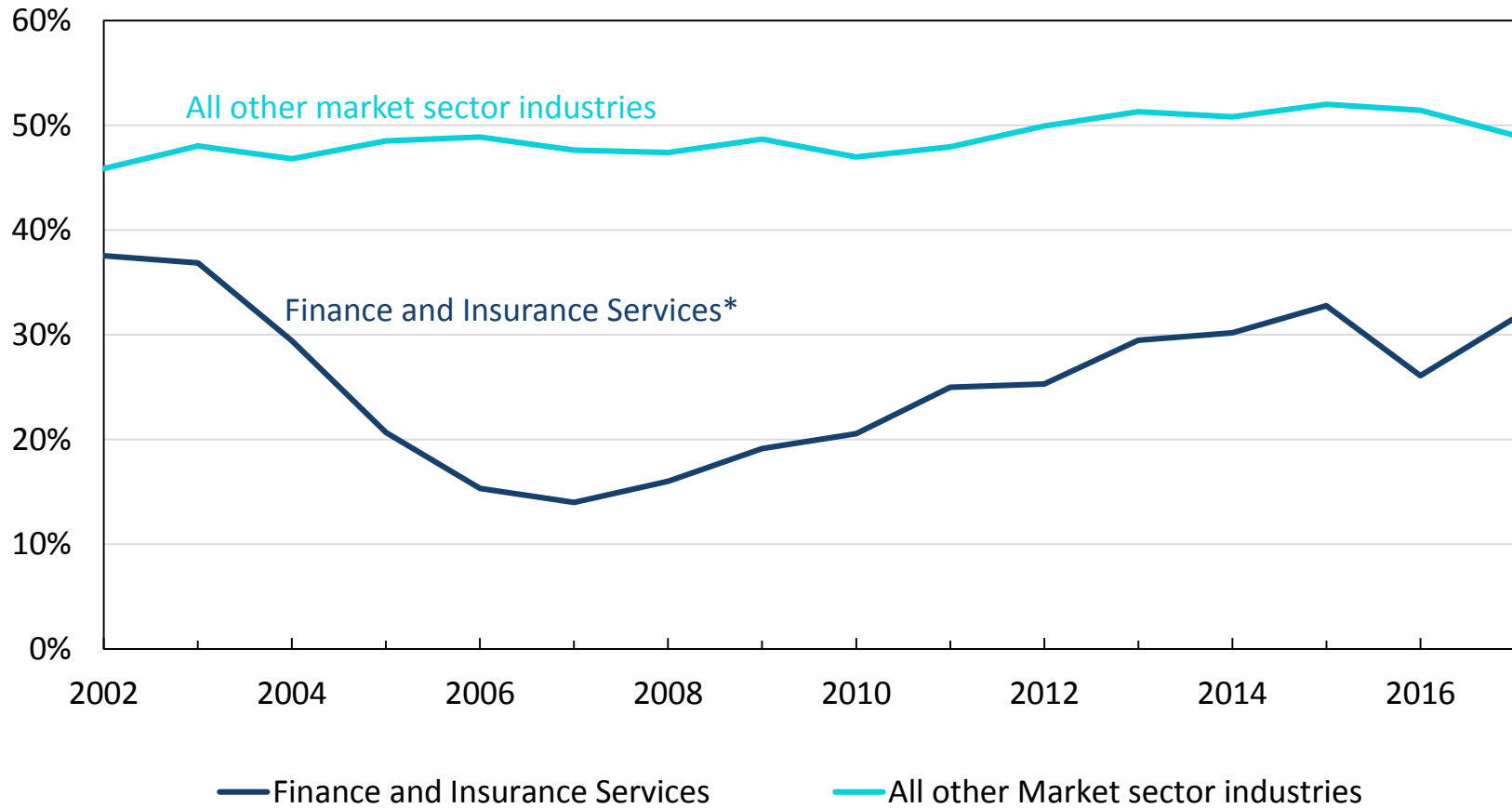
Aggregate Level:

$$\lambda_t = \frac{\sum W_{jt} L_{it}}{\sum P_{it}Y_{it}}$$

Economy wide Labour Shares

Removing FIS, the share of income accruing to labour is stable…

Labour's Share of Income (2002-2017)

All other market sector industries

Finance and Insurance Services*

Legend:
— Finance and Insurance Services
— All other Market sector industries

Source: ABS BLADE; Takes weighted mean of firm level labour shares

For further discussion, please see appendix.

Addressing Measurement Problems

Income for self-employed

(1) No of self employed - Level shift up, but trend is robust to adjusting for the self-employed in the corporate and non-corporate sector

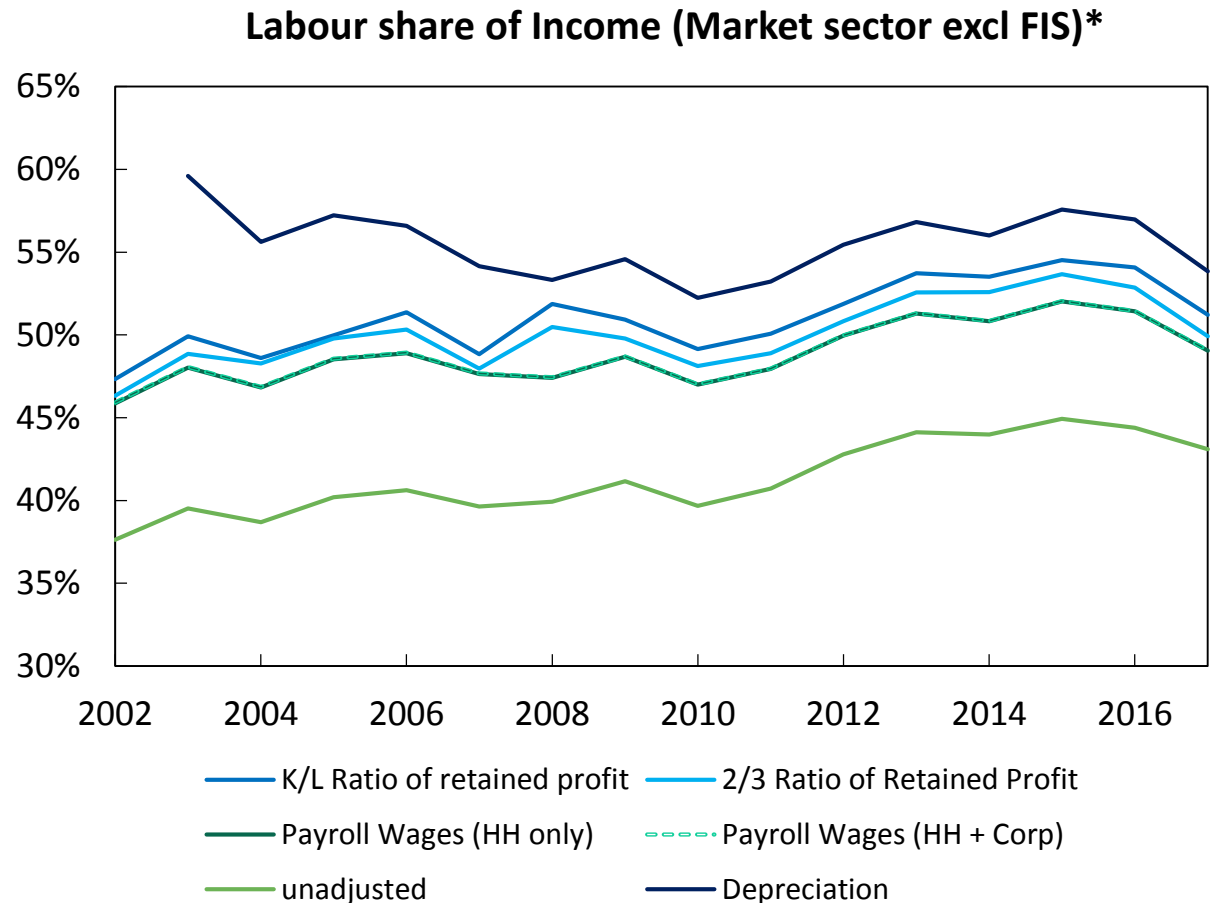**Labour share of Income (Market sector excl FIS)***
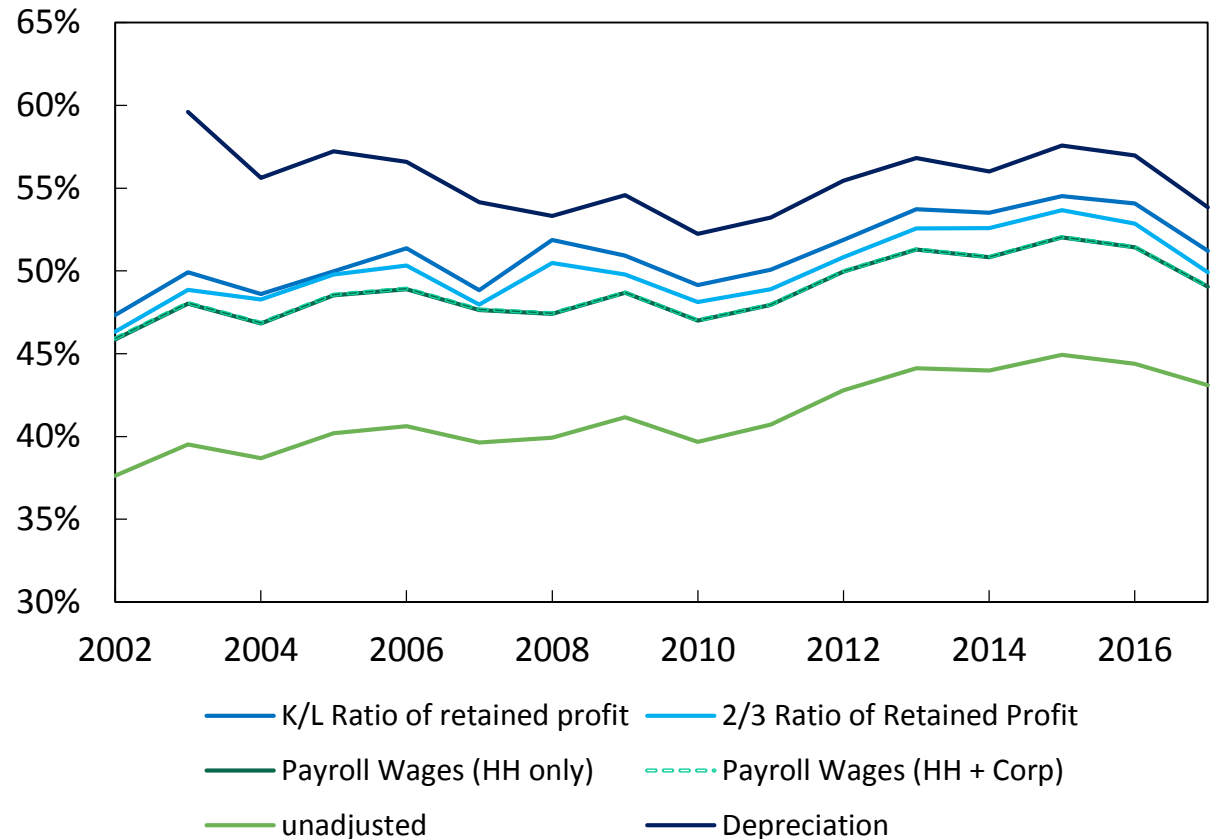
Source: ABS BLADE

*Graph depicts average weighted labour for market sector with finance excluded. First, accounting for the number of self- employed– defined as sole proprietors, partnerships, family partnerships and trusts – earning the same as the average employee. Second, adjusting for income of self-employed (using 2/3 retained profits; and the 4-digit industry ratio of capital to labour); Third, net labour share removing depreciation from value added (2002 net labour share not shown as depreciation accumulates at t+1).

Addressing Measurement Problems

Income for self-employed

(2) Income of self employed – Level shift up, but trend is robust to adjusting for different measures of income for self-employed

Labour share of Income (Market sector excl FIS)*

Source: ABS BLADE

Legend:
- K/L Ratio of retained profit
- 2/3 Ratio of Retained Profit
- Payroll Wages (HH only)
- Payroll Wages (HH + Corp)
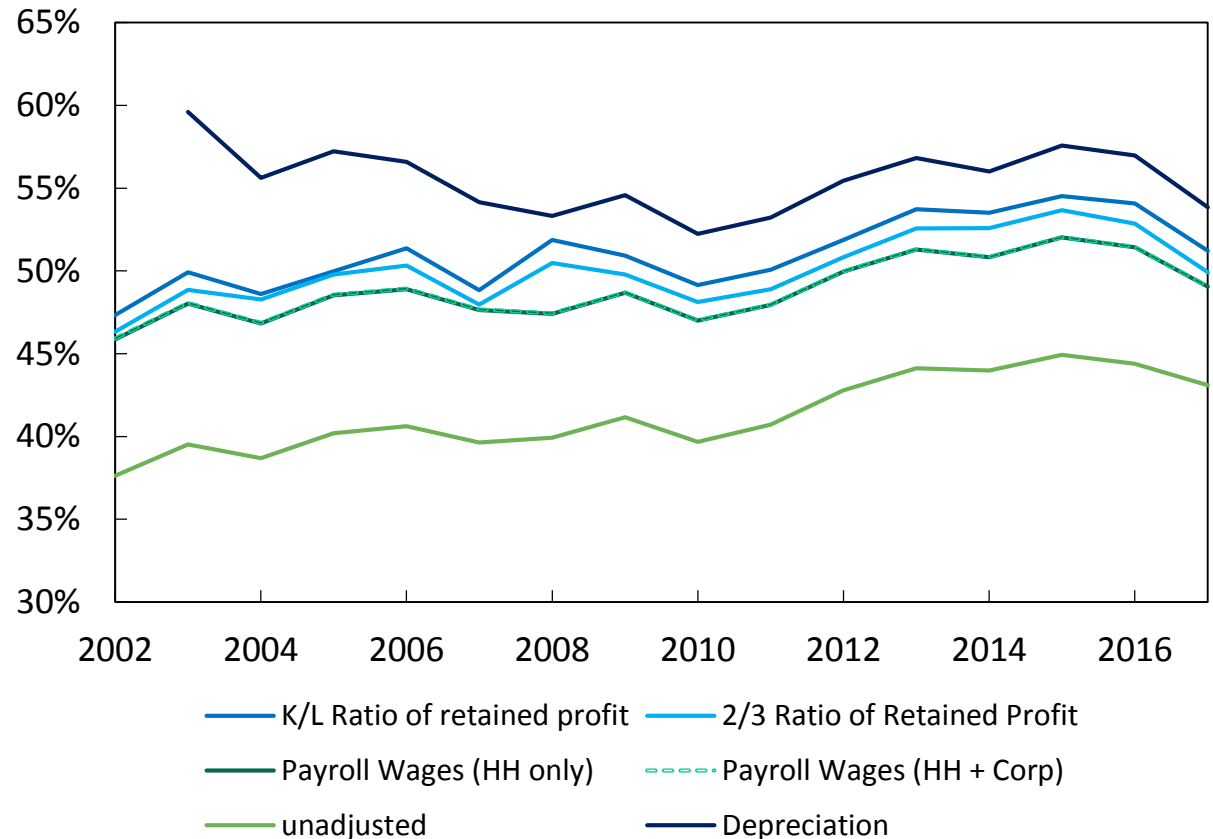- unadjusted
- Depreciation

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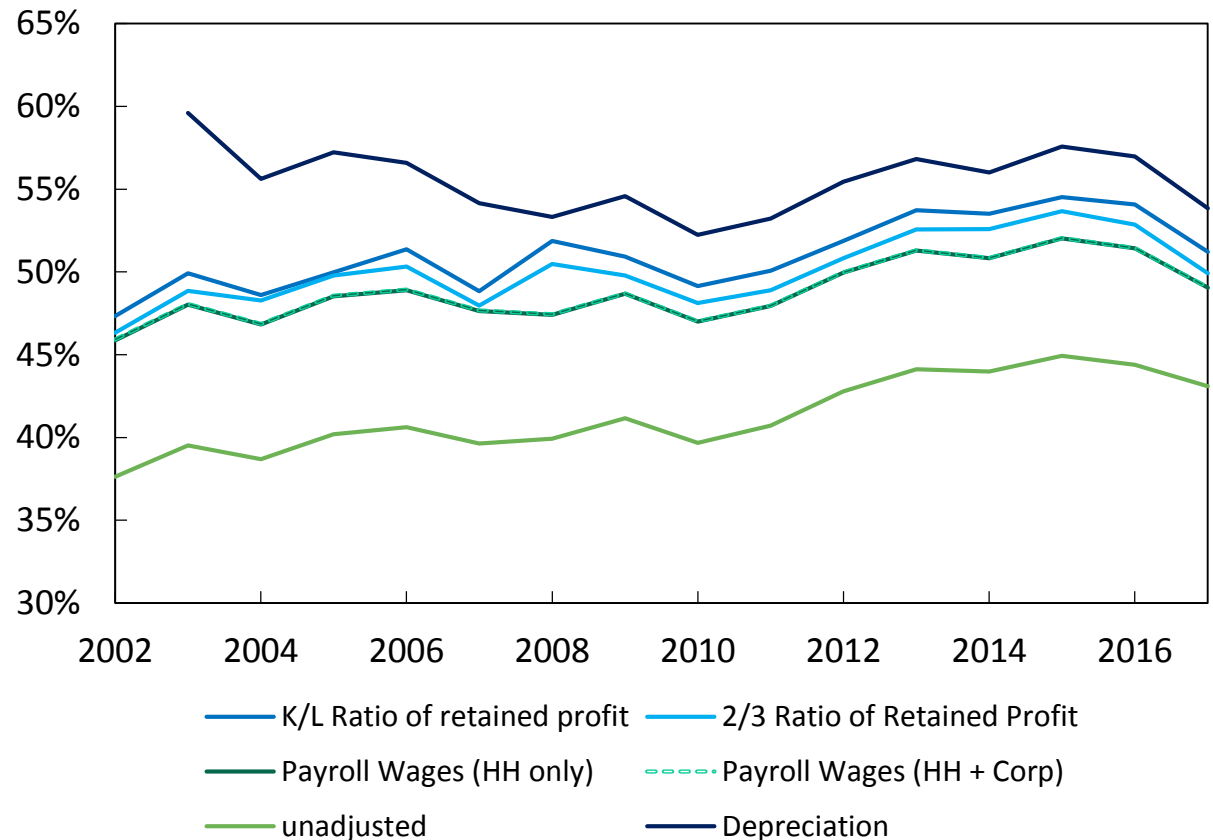
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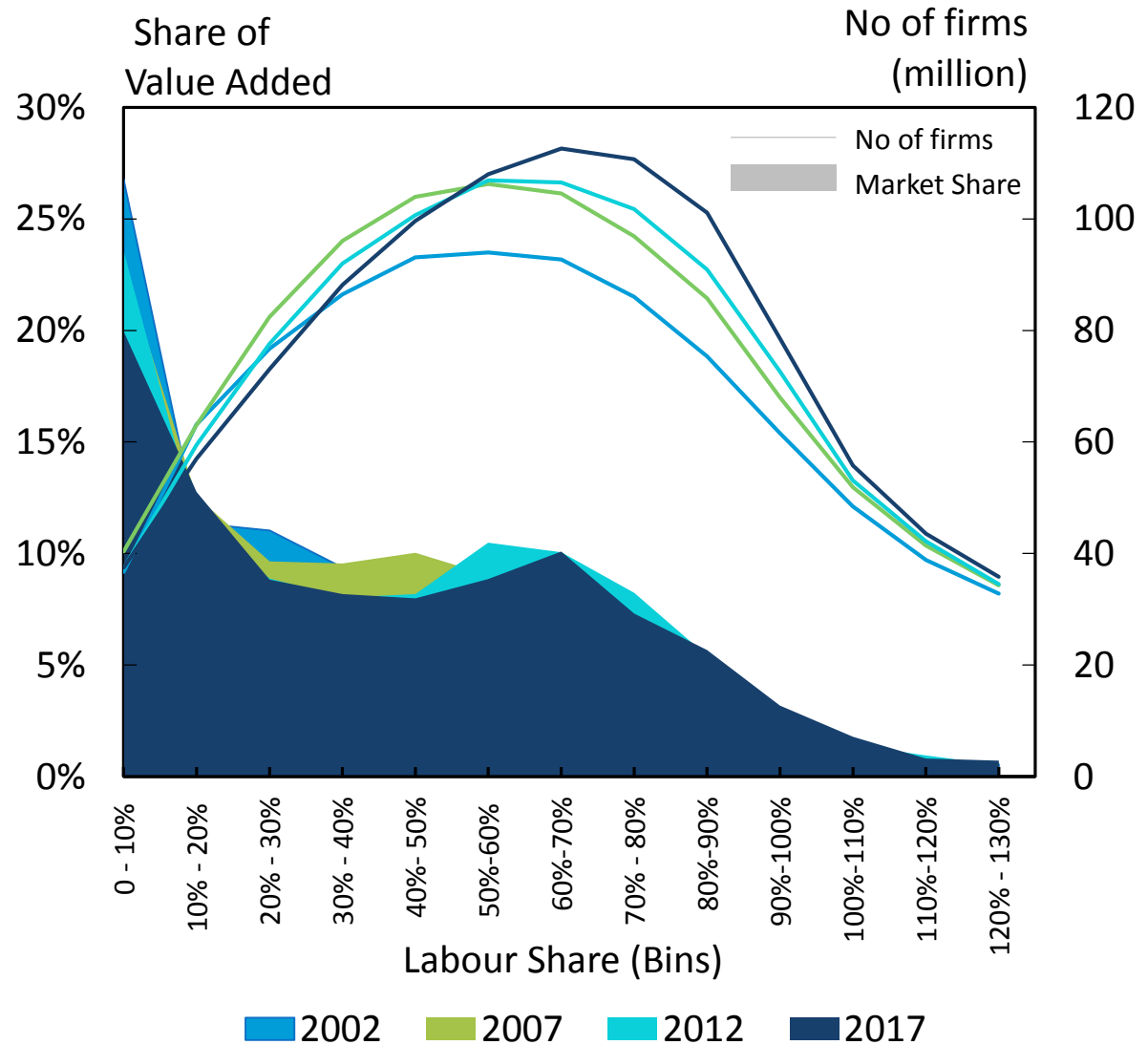**Labour share of Income (Market sector excl FIS)***

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Distribution of Labour Share

Reallocation of market share and grown in number of high labour share firms

1. Significant Heterogeneity

2. Most firms have high labour shares

3. Distribution of value added has shifted towards high labour share firms

4. Number of high labour share firms have increased

Share of Value Added

No of firms (million)

Labour Share (Bins)

Legend: No of firms, Market Share

2002 2007 2012 2017

Distribution of Labour Share

Reallocation of market share and grown in number of high labour share firms

1. Low labour shares firms have higher labour productivity, larger capital stock share and smaller fte – this has increased with time.

2. High labour share firms have low labour productivity, smaller share of capital stock and higher fte share – this has increased with time.

Source: ABS BLADE
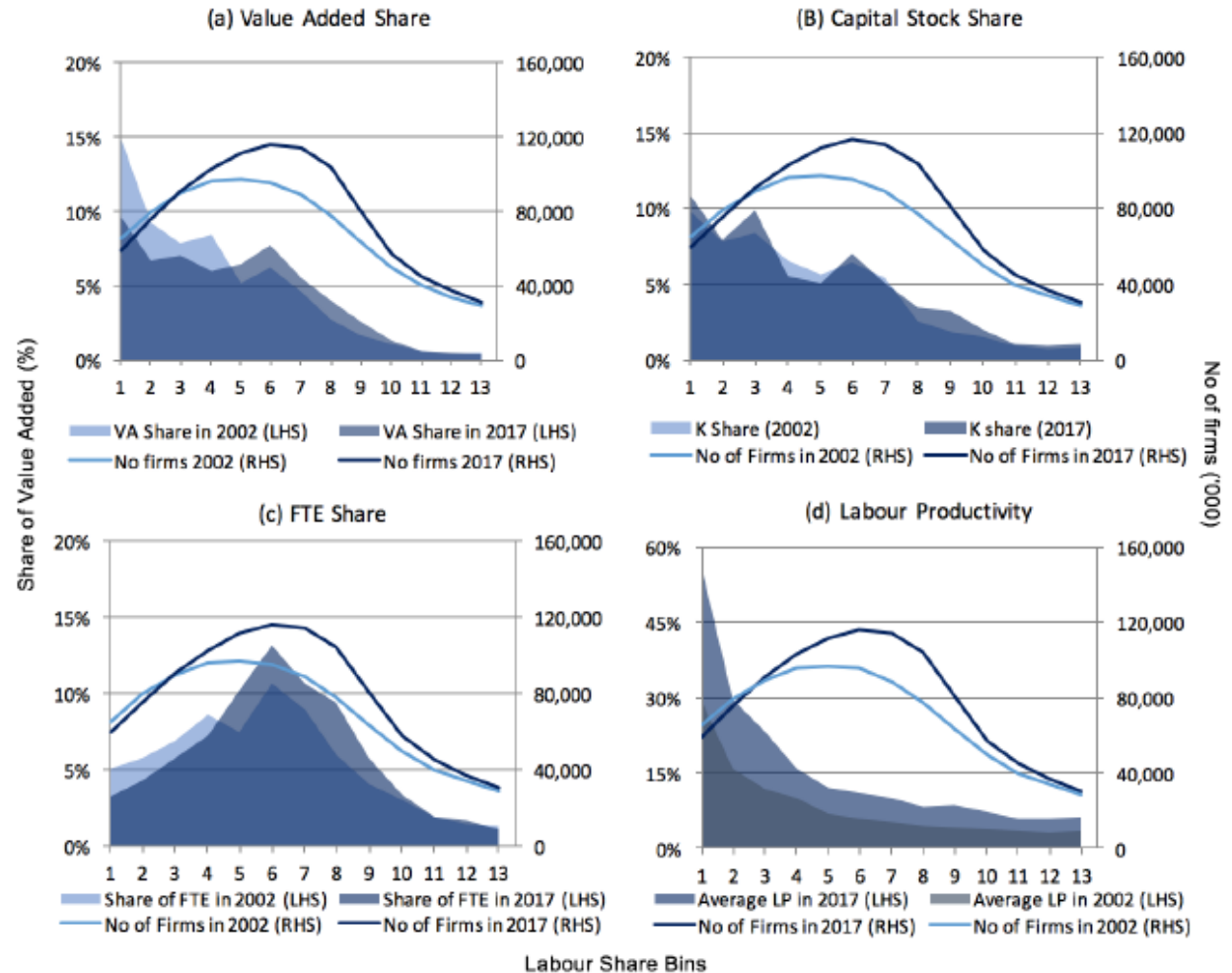
Part 2: Drivers

Drivers of labour share trends[*]

No comprehensive studies have been completed in Australia; most cross country or American based

Theory	Description	Empirical Proxy
Increasing Competition	Increasing competition through dominance of highly productive 'superstar firms' has resulted in decline in labour shares within industries (Autor et al, 2019)	Concentration ratio of Top 4 firms
		Mark ups (gross output function)
Declining Competition	Increase in rent-seeking behaviour by dominant firms, has caused them to raise mark-ups and thereby reduce labour shares (Barkai, 2017; De Loecker et al, 2018)	Concentration ratios
		Mark ups (gross output function)
Capital	Production has shifted away from labour biased to capital-biased methods. Fall in the price of capital has led to capital accumulation and capital share increase (Karabounis and Neiman, 2014; IMF, 2017)	Capital Intensity
		Price of Capital
		Rental Rate of Return
Productivity Dispersion	Increase in productivity dispersion due to growing monopsony power of highly productive firms (Gouin – Bonenfant, 2018)	Labour productivity DIspersion
		TFP dispersion

* Other drivers not tested: housing returns (Rognolie, 2015) already assessed; increase in intangible capitals (Koh et al , 2018) declining unionisation (Piketty, 2014) due to lack of data

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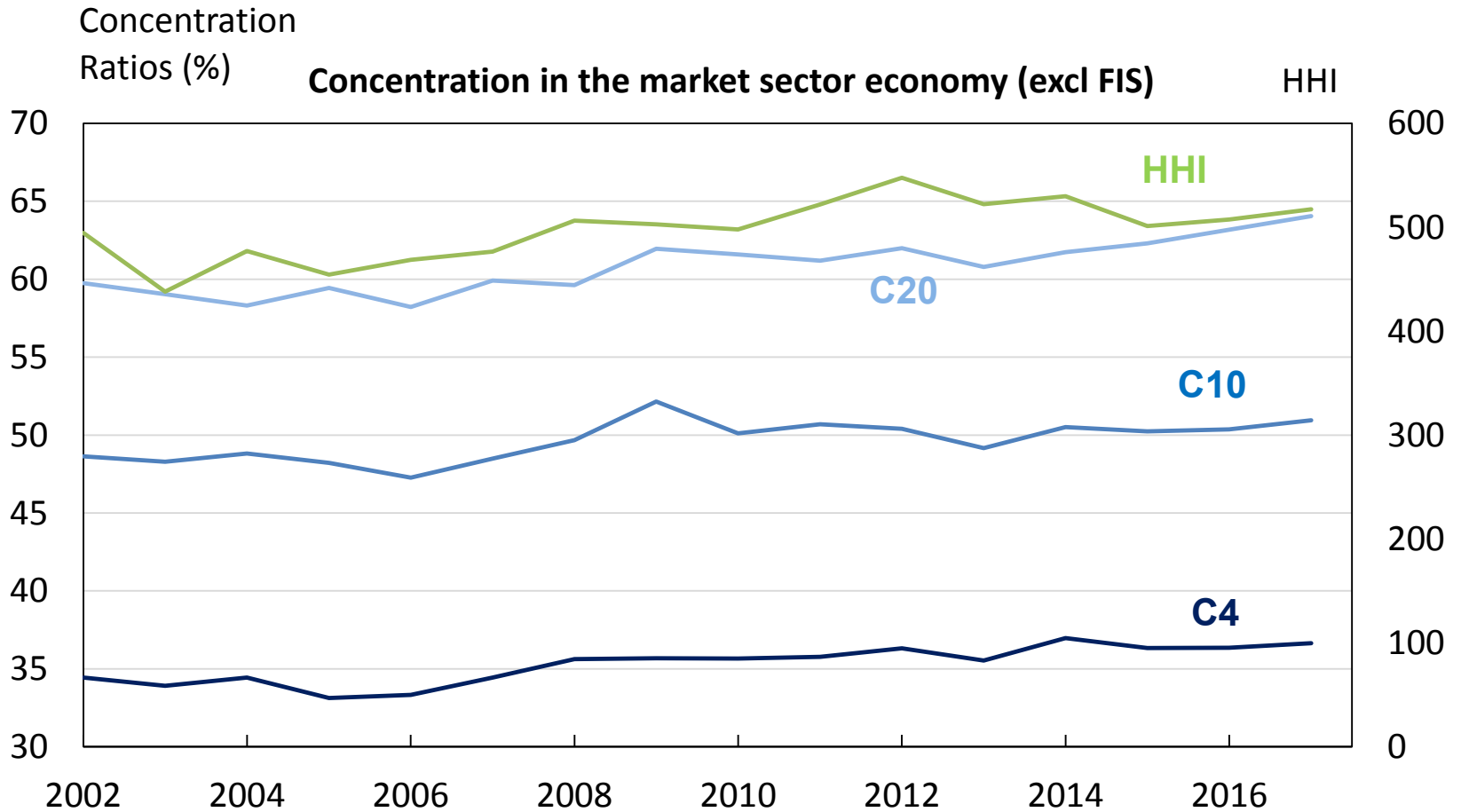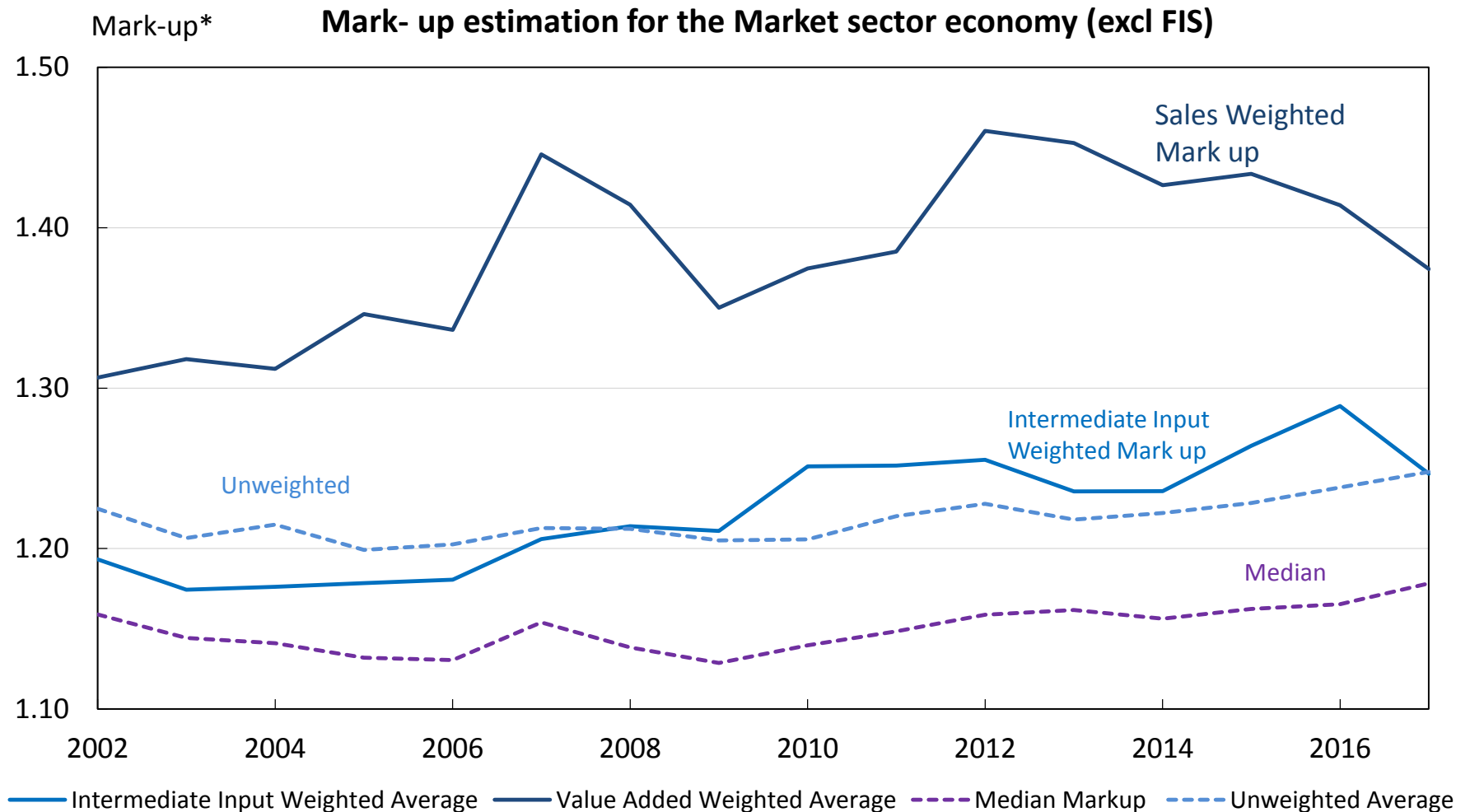No comprehensive studies have been completed in Australia; most cross country or American based

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Concentration Ratios have increased across the board…

Concentration Ratios (%)

Concentration in the market sector economy (excl FIS)

HHI

HHI

C20

C10

C4

And so have mark ups…

Mark- up estimation for the Market sector economy (excl FIS)

Mark-up*

Legend: Intermediate Input Weighted Average — Value Added Weighted Average — Median Markup — Unweighted Average

* Firm – level mark ups estimated using De Loecker and Warzinski (2012) approach and subsequent papers. Here, a gross output production function and intermediate inputs are used instead of a value added function to avoid endogeneity with value-added labour shares. Firm – level mark ups are aggregated according to weighted means, unweighted means and median as shown in the diagram

Reduced Form OLS regressions

4 – digit industry level regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Log(C4)	**Log (μ_{jt})**	**Log (lpIQR)**	**Log (tfpIQR)**	K_{jt}/Y_{jt}	**Relative Price**	**Log(Rental Rate)**
$\log \lambda_{jt}$	-1.75***	-0.041**	-0.13***	-0.12	0.0014***	0.32+	0.90*
	(0.078)	(0.014)	(0.025)	(0.15)	(0.00031)	(0.36)	(0.44)
Constant	4.884***	-0.995***	-1.046***	-1.114***	-1.099***	-1.387***	0.872
	(0.26)	(0.055)	(0.052)	(0.093)	(0.052)	(0.36)	(0.94)
Obs	7193	7190	7188	7182	7193	7193	7193
R^2	0.228	0.040	0.042	0.040	0.073	0.038	0.039
Adj R^2	0.226	0.037	0.040	0.038	0.071	0.036	0.037
Controls	X	X	X	X	X	X	X
Year FE	X	X	X	X	X	X	X
Industry FE	X	X	X	X	X	X	X

Notes: standard errors in parentheses; *** p<0.001 **p<0.01 *p<0.05 +p<0.1
OLS Regression of labour shares on empirical proxies, with time dummies and 4-digit level industry fixed effects. Unit of observation is at the 4-digit industry level
Mark
Source ABS BLADE

Concentration, mark ups and labour productivity dispersion are significant.*

Price of capital is not significant at the economy – level **

*Quantile Regresion results are consistent;

Sub analysis by corporate/non corporate and firm size confirms the relationship exists.

It is stronger for corporate and larger firms.

Robustness tests for concentration and mark ups in Appendix

PART 3: COMPETITION

Identification Problem

Concentration is a poor measure of competition; mark-ups not the best either

- The correlation between concentration and labour shares can be explained by **two monopolistic competition models** (Tirole 1988)

- Concentration can signal increasing or decreasing competition (Syverson 2017, Tirole 1988)

- Important implications from policy perspective – technology improvements or weakening anti-trust regulations?

- Measurement is difficult, however.

- Rely on two key microeconomic mechanisms:

  - Reallocation of value added

  - Within – industry changes

Identification Problem

Two monopolistic models

Declining Competition	Increasing Competition

Increase in concentration

Increase in concentration

Driven by decline in no of businesses→ declining in business dynamism, increased barriers to entry

Driven by increased returns to scale to large firms by technology, network effects or their ability to connect consumers

Firms seek more profits by increasing prices and hence **increase in mark ups.**

Increase in mark ups as overhead costs and production costs spillover the large revenue base of dominant firms /decline in production costs

Leads to an increase in profit share & **decline in labour share** and capital share of all incumbent firms

Leads to a **decline in labour share**, driven by reallocation of market share to productive, but low labour share firms

Rent-seeking model (Barkai, 2017)	*Superstar model (Autor et al, 2017/2019)*
Decline in labour share of all incumbent firms	**Reallocation of market share** to larger firms while labour shares are kept constant of incumbent firms)

"WITHIN"

"REALLOCATION"

Identification Problem

Declining Competition

Declining Competition	Increasing Competition
Increase in concentration	Increase in concentration
⬇	⬇
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⬇	⬇
Leads to an increase in profit share & decline in labour share and capital share of all incumbent firms	Leads to a decline in labour share, driven by reallocation of market share to productive, but low labour share firms

Rent-seeking model (Barkai, 2017)

Decline in labour share of all incumbent firms

Superstar model (Autor et al, 2019)

"WITHIN"

Identification Problem

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"REALLOCATION"

Identification Strategy

Application of dynamic productivity decomposition methods to labour shares

Application of Autor et al's (2017, 2019) identification strategy:

1. Decompose firm level labour share changes into reallocation (w_{it}) and within-industry component (λ_{it})

2. Assess which component is larger

3. Regress each component (C) on a measure of concentration using a 16-year long difference, with a vector of fixed effects τ_j

$$\Delta\lambda_{C,t} = \beta_o + \beta_1\Delta Conc_{jt} + \tau_j + \epsilon_{jt}$$

4. The within coefficient will be significant if it is a rent-seeking mechanism, and the reallocation coefficient will be significant if it is a superstar mechanism.

Relies on the fact that aggregate labour share, λ_t, can be decomposed in labour share, λ_{it}, and market share, w_{it}, of an individual firm:

$$\lambda_t = \frac{\sum_i W_{it} L_{it}}{\sum_i Y_{it}} = \sum_i \lambda_{it} w_{it}$$

Identification Strategy

DF is better for identification than MP

General form: Decompose labour share into surviving (S), exiting (X) and entering (N) components:

$$\Delta \lambda_t = \lambda_t - \lambda_{t-1} = \underbrace{\sum_{i \in S} w_{it}\lambda_{it} - \sum_{i \in S} w_{i,t-1}\lambda_{i,t-1}}_{surviving\, \Delta \lambda_{S,t}} + \underbrace{\sum_{k \in N} w_{kt}\lambda_{kt}}_{entering, \Delta \lambda_{N,t}} + \underbrace{\sum_{l \in X} w_{l,t-1}\lambda_{l,t-1}}_{exiting\, \Delta \lambda_{X,t}}$$

Specific forms:*

Melitz and Polanec (2015) was used by Autor et al (2017, 2019).

$$\Delta \lambda_{s,t} = \underbrace{\frac{1}{N}\sum_{i \in s}(\lambda_{i,t} - \lambda_{i,t-1})}_{\text{unweighted mean}} + \underbrace{\Delta[\sum_{i \in s}\left(w_i - \frac{\sum_s w_i}{S}\right)\left(\lambda_i - \frac{\sum_s \lambda_i}{S}\right)]}_{\text{covariance}}$$

Adapting Diewert and Fox (2010) to labour shares is better for identifying the effects of competition (see appendix)

$$\Delta \lambda_{s,t} = \underbrace{\sum_{i \in s}(w_{i,t} - w_{i,t-1})\left(\frac{\lambda_{i,t} + \lambda_{i,t-1}}{2}\right)}_{between-change\ in\ resource\ allocation} + \underbrace{\sum_{k \in s}\left(\frac{w_{i,t} + w_{i,t-1}}{2}\right)\left(\lambda_{i,t} - \lambda_{i,t-1}\right)}_{within-change\ in\ labour\ shares}$$

*Further decomposition of surviving terms is only shown

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within   between   within

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(see appendix)

between   within

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Methods produce different implications

Dynamic Decomposition of Firm - Level Labour Shares (2002-2017)

Diewert and Fox (2010) Method
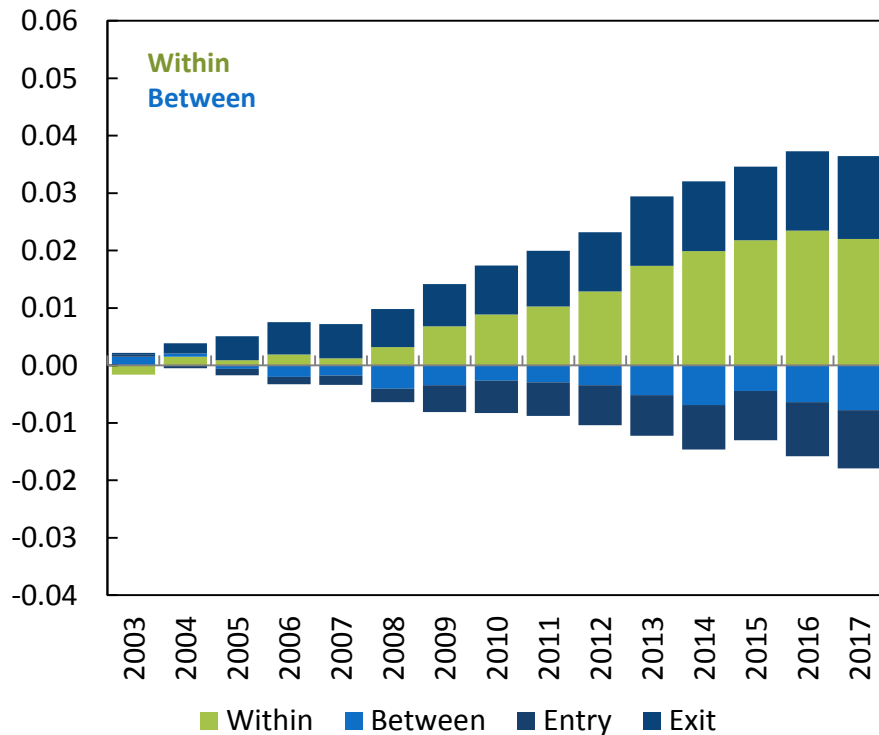
Within term – consistent with the literature e.g. Kehrig and Vincent (2018), Autor et al (2019), Barkai (2017)
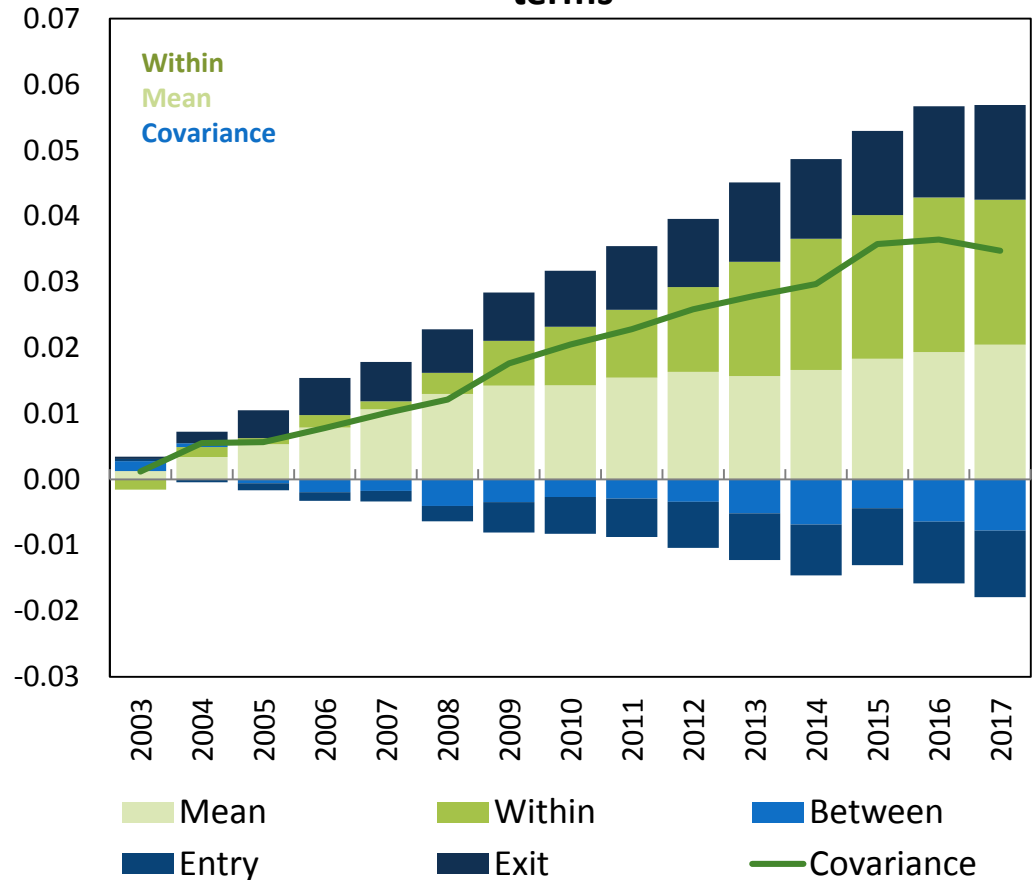
Melitz and Polanec (2015) Method
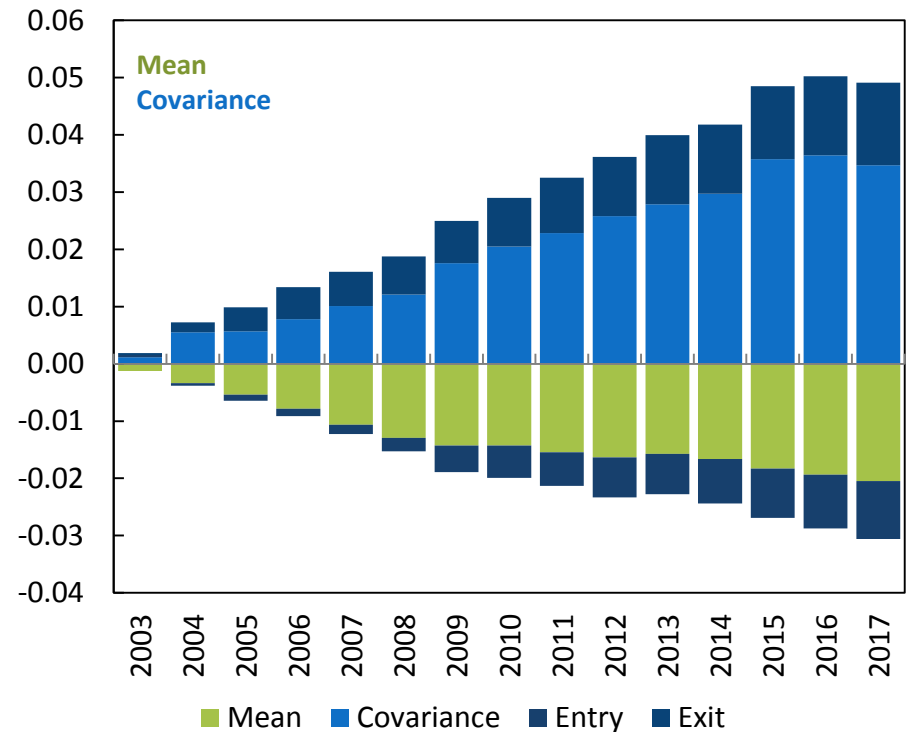
Covariance term – consistent with Autor et al (2017)

Reconciling the two approaches

- Components of surviving firms, as well as the exit and entry terms are equivalent for MP and DF

- Covariance term can be rewritten as the sum of the within, between and unweighted mean component.

$$\Delta\left[\sum_{i \in s}\left(w_i - \frac{\sum_s w_i}{S}\right)\left(\lambda_i - \frac{\sum_s \lambda_i}{S}\right)\right]$$

$$= \sum_{i \in s}(w_{i,t} - w_{i,t-1})\left(\frac{\lambda_{i,t} + \lambda_{i,t-1}}{2}\right)$$

$$+ \sum_{k \in s}\left(\frac{w_{i,t} + w_{i,t-1}}{2}\right)(\lambda_{i,t} - \lambda_{i,t-1})$$

$$- \frac{1}{N}\sum_{i \in s}(\lambda_{i,t} - \lambda_{i,t-1})$$

Decomposing labour share using both MP & DF terms

The within component is the driving force of the covariance component, suggesting within-industry components are key drivers of labour share change

PART 4: RESULTS

Melitz and Polanec (2015) Decomposition

Regressing concentration on MP labour share components*

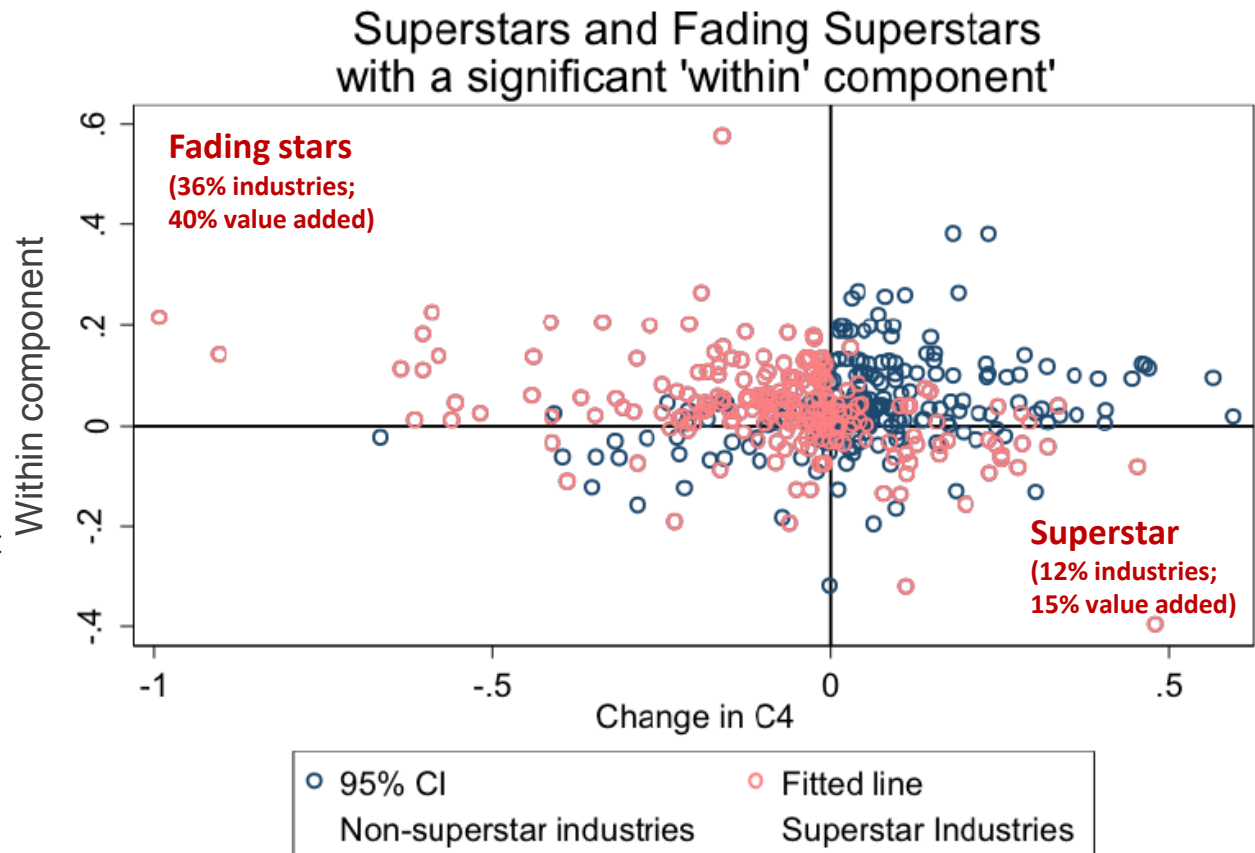|	Mean				Covariance			
Change in C4	-0.0016	-0.00219	-0.00357	-0.00198	-0.0102**	-0.0108*	-0.00801	-0.0135+
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
Constant	0.0000402	-0.000907	0.00896	-0.0124	0.0475***	-0.0031	-0.00718	0.0335+
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	435	435	435	435	435	435	435	435
R-squared	0.001	0.066	0.246	0.489	0.008	0.083	0.247	0.466
Adjusted R-squared	-0.002	0.033	0.094	0.13	0.006	0.051	0.095	0.092
Industry Controls	X	X	X	X	X	X	X	X
OLS	X				X			
Industry 1-digit FE		X				X		
Industry 2 -digit FE			X				X	
Industry 3-digit FE				X				X

Notes: Standard errors are presented in parentheses. This table presents the results of regressing the MP decomposition of labour shares on the change in the concentration ratio of top 4 firms in a 16 -year long difference regression (refer to Model eqn 6.11). Standard errors are clustered at the 4-digit industry level and industry controls (capital intensity, size) are used. Unit of observation is firm level results aggregated to 4-digit industry level.

Concentration is affecting the covariance component of labour share – suggestive of increasing competition

* Robust for different measures of concentration (including mark-ups), subsample analysis (goods v services sector; trade v non-trade intensive) and division analysis

Diewert and Fox (2010) Decomposition

Regressing concentration on DF labour share components*

	(A) Within				(B) Between			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Change in C4	-0.0131***	-0.0131***	-0.0143***	-0.0165***	0.00232	0.00232	0.00475	0.00133
	(0.00315)	(0.00315)	(0.00286)	(0.00285)	(0.00317)	(0.00317)	(0.00461)	(0.00531)
Constant	0.0388***	0.00291	0.0217+	0.0223	0.0113***	-0.00379	-0.0200++	-0.00384
	(0.00618)	(0.0148)	(0.0145)	(0.0361)	(0.00319)	(0.00947)	(0.0107)	(0.0206)
Observations	445	445	445	445	445	445	445	445
R-squared	0.012	0.050	0.283	0.519	0.002	0.053	0.196	0.450
Adjusted R-squared	0.009	0.017	0.141	0.181	-0.001	0.020	0.037	0.064
Industry Controls	X	X	X	X	X	X	X	X
No FE	X				X			
Industry 1-digit FE		X				X		
Industry 2 -digit FE			X				X	
Industry 3-digit FE				X				X

Notes: Standard errors are presented in parentheses. This table presents the results of regressing the DF decomposition of labour shares on the change in the concentration ratio of top 4 firms in a 16 -year long difference regression (refer to Model eqn 6.11). Standard errors are clustered at the 4-digit industry level and industry controls (capital intensity, size) are used. Unit of observation is firm level results aggregated to 4-digit industry level.

Concentration is affecting the within-industry component of labour share – suggestive of declining competition

* Robust for different measures of concentration (including mark-ups), subsample analysis (goods v services sector; trade v non-trade intensive) and division analysis

Interpreting the MP results in line with DF decomposition

1. Few superstar industries, concentrated in Retail Sector – increasing allocative efficiency

2. Many fading superstars – declining allocative efficiency

3. Most industries with a significant 'covariance' term when regressed with concentration have a significant 'within' component when regressed with concentration - suggesting competition aspect

4. Competition doesn't explain the whole story

Superstars and Fading Superstars with a significant 'within' component'

Fading stars
(36% industries; 40% value added)

Superstar
(12% industries; 15% value added)

Within component

Change in C4

- 95% CI   Fitted line
- Non-superstar industries   Superstar Industries

Implications & Future research opportunities

1. Autor et al. (2019) results are sensitive to the decomposition method used. The DF method, prima facie, gives evidence for rent-seeking mechanisms within the economy, while MP gives evidence of superstar mechanisms.

2. Relying entirely on the MP method does not give a clear picture of competition in the economy, as the joint market share and labour share difference terms form the covariance term.

3. Using the DF method gave us some insight into superstar industries, and was a useful tool to tease out the real impact of concentration on labour share in an industry. Ancillary evidence, such as regressing concentration with productivity & mark ups, supports this view.

4. Future research opportunity to use the Autor et al (2017, 2019) data and apply the Diewert and Fox decomposition

Practical implications – Only few superstar industries exist

Suggests an increase in allocative efficiency, even though there is evidence of declining competition

Decomposing MP into DF Components for selected industries

(a) 'Rent seeking' superstar industries   **(b) 'Pure' superstar industries**
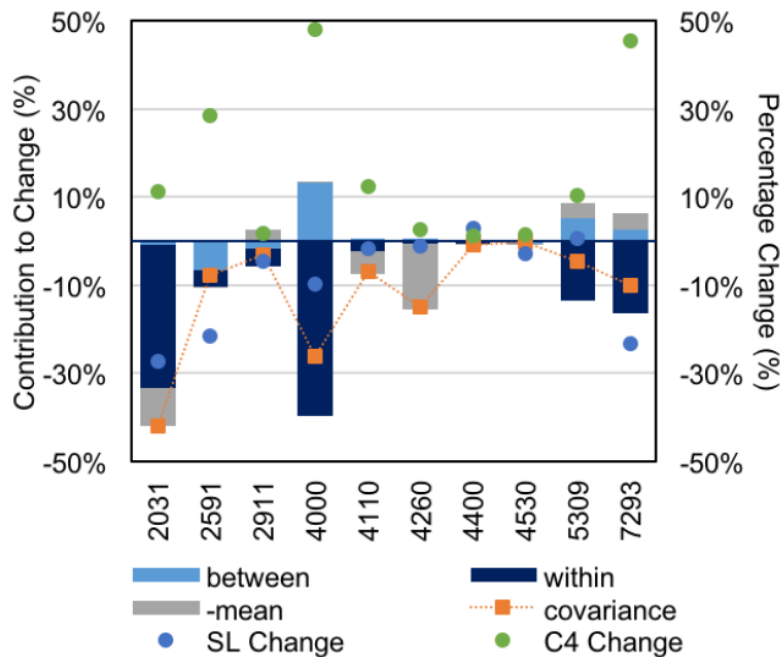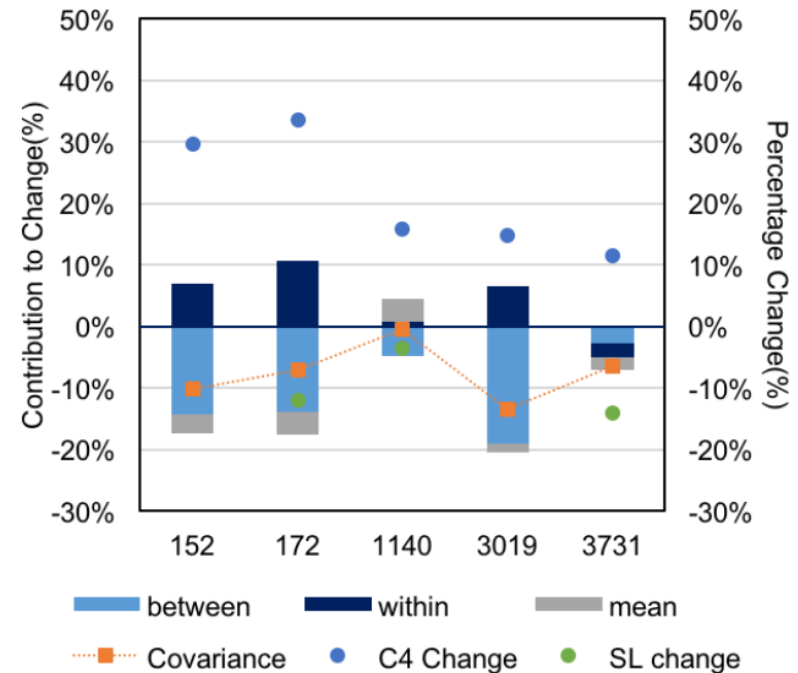
Some possible implications: should anti-trust policies be further examined? What factors are enabling them to have higher growth and productivity than other parts of the economy? Role of technology?

Practical implications – Fading star industries are more prevalent

Suggest a decline in allocative efficiency, even though this is a competitive outcome

Decomposing MP into DF Components for selected industries
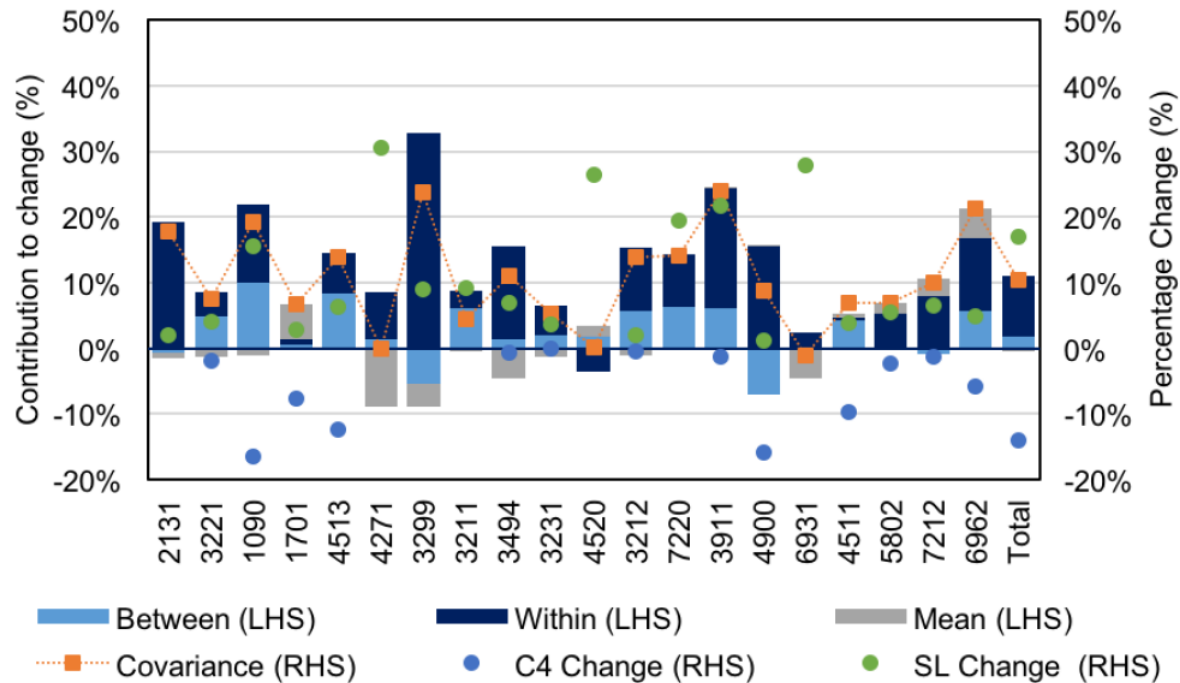
Some possible implications: why is value added shifting towards less productive firms? What's the role of innovation and productivity? How can policy promote efficient allocation of resources, capital investment?

Key takeaways

Three key contributions to the literature

1 Labour Share has been relatively flat between 2002-201

- Aggregate gross labour share trend is driven by large firms

- > 50% of 4-digit industries have experienced a decline

2 Concentration and mark ups are the key drivers of labour share change

- Some evidence for labour productivity dispersion

- No evidence for capital accumulation/fall in price of capital at the aggregate level; but some at the division level e.g. mining

3 There is evidence that declining competition is driving labour share changes

- Used Diewert and Fox (2010) to better quantify the effect of concentration on the reallocation of value added and the within firm labour share change

- This is supported by the aggregate increase in profit shares, concentration & mark ups

- Mixed story at the 4-digit industry level, with other factors compounding labour share

- Only few superstar industries, with many fading star industries.

- Brings into question the robustness of the empirical framework used by Autor et al

THANK YOU
ANY QUESTIONS?

Appendix
Final Dataset

Final Data set

- Removing non-market sector and finance sector due to known measurement issues with value added
- Unfortunate as Finance is the largest driver of labour share in Australia.
- Consequence: Labour share overall flat – falling till 2011, then picking up.

BLADE labour share decline
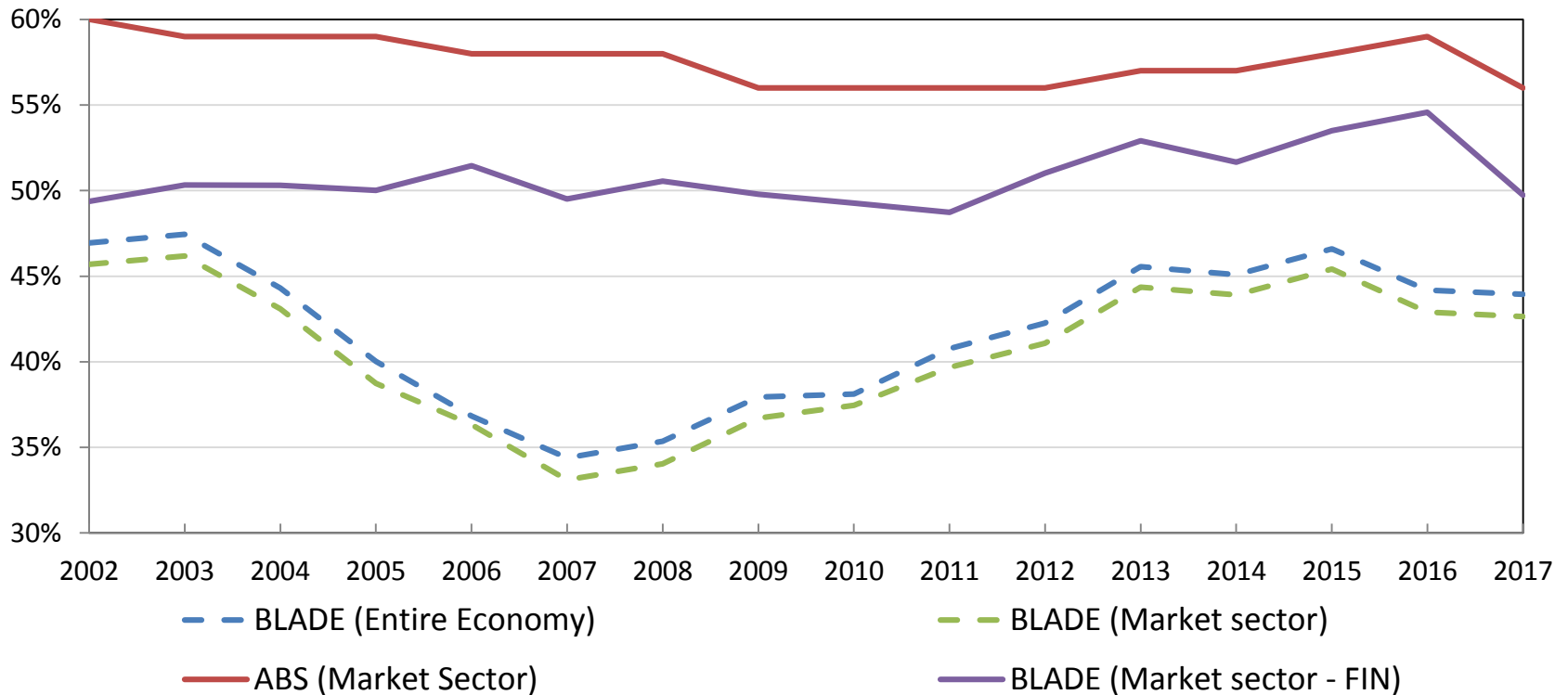
Trends in Labour's share of income*

Majority of firms are experiencing a decline; aggregate trend is driven by large firms

Weighted Average v Median Labour Shares (Market sector excl FIS)

Weighted Average —— Median
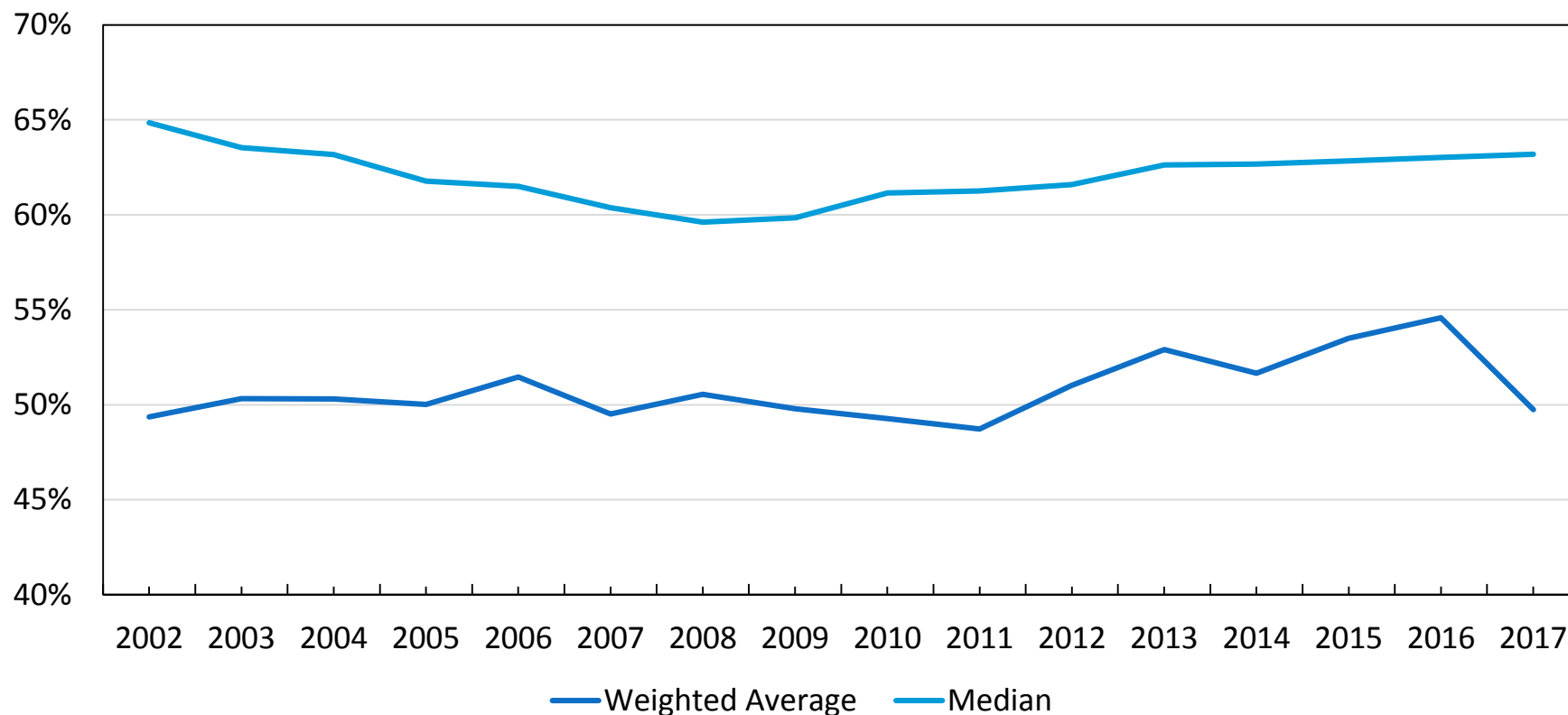
More than 50% of 4 digit industries have experienced a point to point decline

*Graphs depict average weighted labour share and median labour share for market sector with finance and insurances excluded. Industry time series available in the appendix.

Finance and Insurance Services (FIS)

Removing FIS, the share of income going to labour is stable

All other market sector industries

Finance and Insurance Services

— Finance and Insurance Services
— All other Market sector industries

Cf: Blade time series onward

All other industries

Finance and insurance

*   Compensation of employees divided by total factor income.
Source: ABS
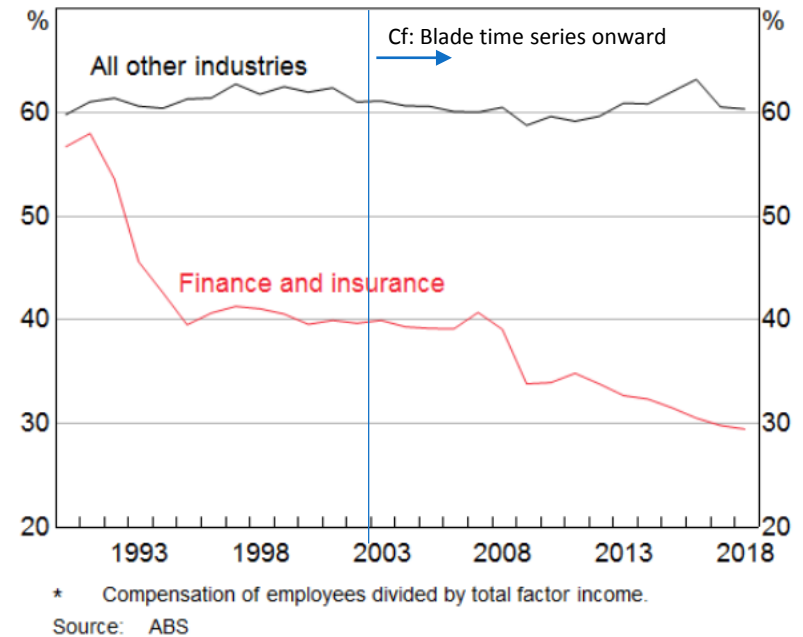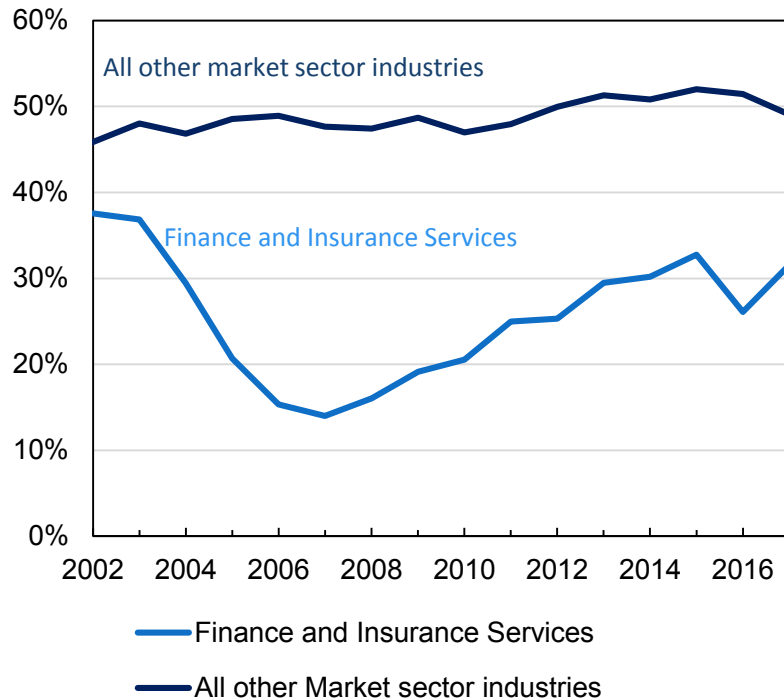
Finance and Insurance Services

FIS cannot be included due to measurement issues with value added

FIS Labour Share of Income (BLADE v ABS)
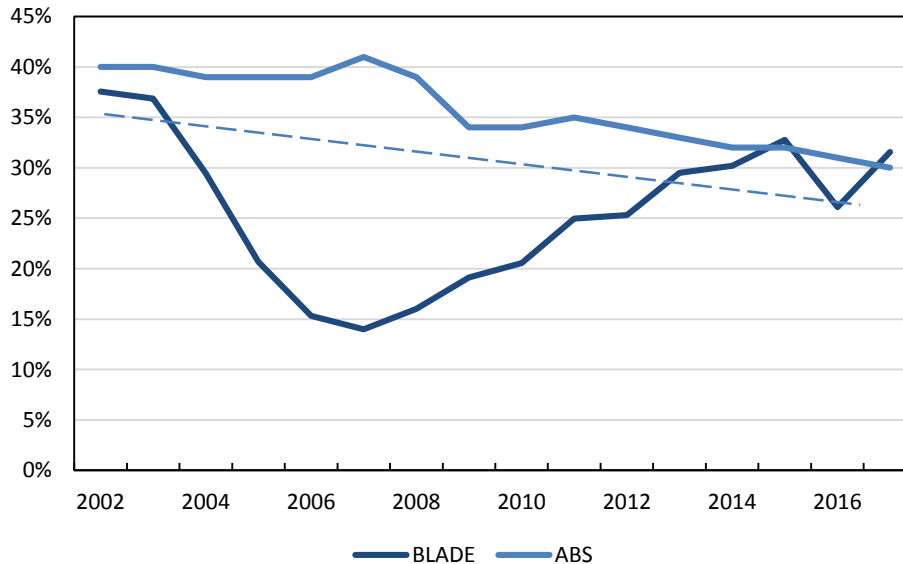
- Measure of value added is an imperfect measure of output in BLADE
- E.g. Large dip around GFC is counterintuitive
- Preferred measure is Financial intermediation services indirectly measured (FISIM).
- ABS National Accounts can indirectly impute it, smoothing the time series.
- Not within scope of this paper to impute FISIM

Appendix

DF v MP

Diewert and Fox (2010)

Preferred to Melitz and Polanec (2015)

- While Autor et al (2017/2019) use Melitz and Polanec (2015) ("MP") decomposition, I argue that the Diewert and Fox (2010) ("DF") method is a better method for identifying the within/between components .

- $\lambda_{s,t}$ - labour share of surviving firms; $\omega_{s,t}$ is market share of surviving firms

MP	$\Delta \lambda_{s,t} = \underbrace{\frac{1}{N}\sum_{k \in s}(\lambda_{k,t}-\lambda_{k,t-1})}_{within-change\ in\ labour\ shares} + \underbrace{\Delta[\sum_{k \in s}(\omega_{k,s}-\bar{\omega})(\lambda_{k,s}-\bar{\lambda})]}_{between-change\ in\ resource\ allocation}$

- Covariant of market share and labour share captures both aspects of increasing firm size and declining labour share, but it doesn't isolate the driving force of whether its market share change, or labour share change. Moreover, OP fallacy – 'within' term is mere artefact arising from mathematical identity

- Other literature has identified that 'within' component is driving LS decline. Autor et al (2019) completes a further decomposition on the 'between' term, identifying that it is a 'within' shift driving the reallocation. Also, Kehrig and Vincent (2018)

DF	$\Delta \lambda_{s,t} = \Delta \underbrace{\sum_{k \in s}\left(\frac{\omega_{k,s,t}+\omega_{k,s,t-1}}{2}\right)(\lambda_{k,t}-\lambda_{k,t-1})}_{within-change\ in\ labour\ shares} + \Delta \underbrace{\sum_{k \in s}(\omega_{k,s,t}-\omega_{k,s,t-1})\left(\frac{\lambda_{k,t}+\lambda_{k,t-1}}{2}\right)}_{between-change\ in\ resource\ allocation}$

- True indicator of within and between effect (Zheng, forthcoming; Baldwin and Gu, 2002). Aspects of the covariance term are split by the DF model - isolates reallocation effect and within effect, keeping the other aspect constant.

- Identified in the literature as the preferred method (e.g. Balk, 2015, Riley et al (2015); Riley and Bondibene (2017))

Division Analysis

Evidence of declining competition - (Increase in Concentration & fall in labour share within component)
- Retail Trade
- Administration and support services
- Rental Hiring and Real Estate Services
- Professional, Scientific and Technical Services
- Electricity and Gas
- Mining

Evidence of increasing competition - (Decline in Concentration & increase in the within component of labour share)
- Accommodation and Food services
- Agriculture

Coefficient for regressing the change in C4 on the DF Component
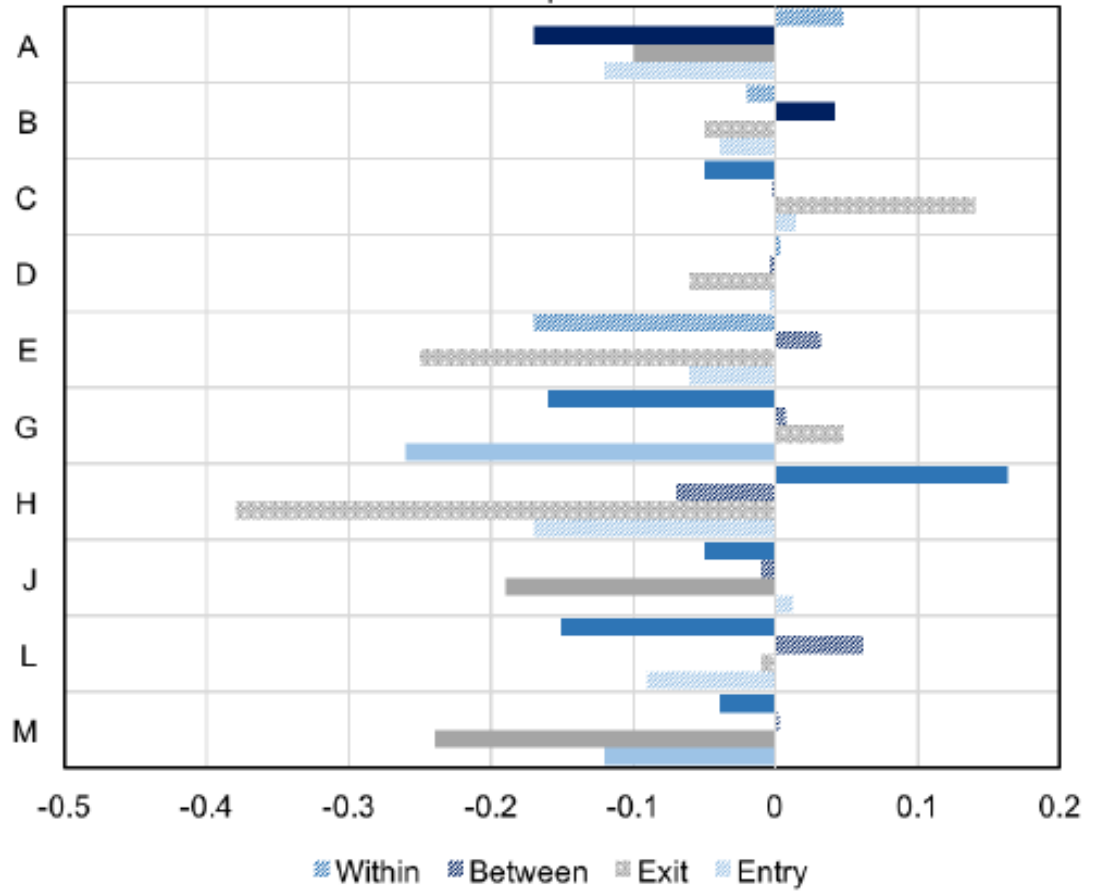
Profit Shares have increased

Further evidence for declining competition

- There is discussion over whether an increase in profit shares represents mismeasurement issues for capital stock or price of capital (see e.g. Karabounis and Neiman (2019). However, different measures of capital shares have not been finalised yet.
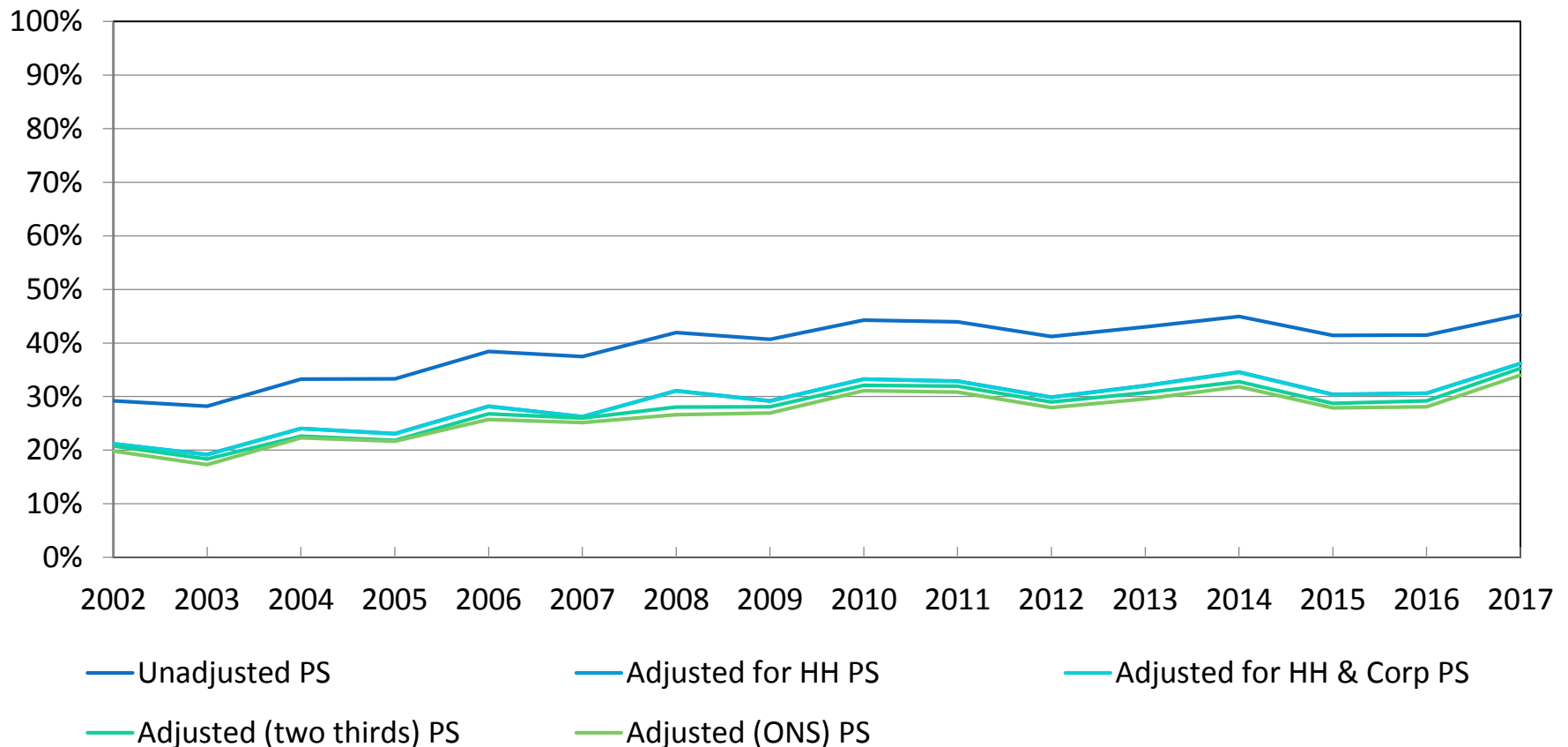
Melitz and Polanec (2015) Dynamic Decomposition

(following Autor et al, 2017/2019)

Covariance is the largest contributor to labour share change between 2002-2017.
For robustness, this has also been confirmed over 5 year periods

Evidence of superstar firms.
Robust for other measures of concentration (e.g. HHI, C10, C20)

Melitz and Polanec (2015)
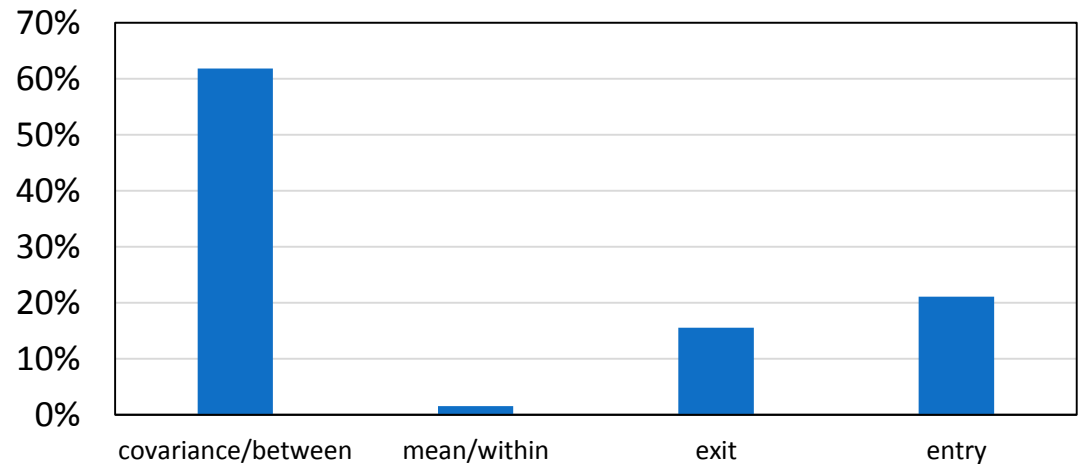
	Covariance	Mean	Exit	Entry
Log (Conc	-0.000102[+]	-0.0000160	0.000219[+]	-0.0000594
Top 4)	(0.006)	(0.570)	(0.027)	(0.353)
Obs	435	435	437	437
R^2	0.008	0.001	0.036	0.006

Notes: OLS regression of the change in concentration on components of labour share between 2012-2017, with standard errors clustered at the 4-digit industry level. P-values in parentheses.

Regressing Components of Labour share and Concentration

Chart categories (top to bottom): Other services, Arts and Recs, Healthcare, Education, Public Admin, Administration and Support Services, Professonla, Scientific Services, Rental Hiring and Real estata, Financial and Insurance Services, IMT, Transport and Postal, Acommodation and Food Services, Retail Trade, Wholesale Trade, Construction, Electricity + Gas, Manufacturing, Mining, Agriculture

X-axis: -0.012, -0.01, -0.008, -0.006, -0.004, -0.002, 0, 0.002, 0.004

Legend: Covariance, Mean, Exit, Entry

Superstar hypothesis

- Retail Trade
- Other Services
- Administration and Support services
- Construction
- Electricity and Gas
- Agriculture

Rent – seeking hypothesis

- Professional, Scientific and Technical Services
- Rental Hiring and Real Estate
- IMT
- Accommodation and Food Services

Notes: OLS regression of the change in concentration on components of labour share between 2012-2017, with standard errors clustered at the 4-digit industry level. Significant coefficients are in block colours, while insignificant components are in stripes.

Implications

- The superstar model has been very influential. However, the results suggest that the results are sensitive to the decomposition method used. This brings into question the robustness of the superstar model

- Second, Diewert and Fox is a much more better method for decomposing labour shares. It suggests that rent-seeking model prevails in Australia, rather than super-star firms. If this were the case in USA, this would require replicating Autor's paper but also conducting the DF method on their data. This is outside the scope of this thesis.

Appendix
Other Slides

Construction of Preliminary Data Set

1. Exclude not-profit institutions serving households, financial corporations, and general government according to the Standard Institutional Sector Classification of Australia (SISCA)

2. Exclude inactive firms

3. Impute Wages and FTE for self-employed

   - Majority of literature looks at corporate sector only to avoid measurement problems with self-employed (Karabarbounis and Neinman, 2013; Rognlie, 2015)

   - But non-corporate/household sector accounts for 61% observations in BLADE

   - Concerns for underestimation or overestimation of wages (Elsby et al 2013)

   - For all firms within the household sector, assume there is 1 person who is a FTE, receiving average wage at the 4 digit ANZSIC level (better estimator of wage than at the division level)

-

Construction of Preliminary Data Set

- Create variables of interest – labour shares and value add

- Keep negative value add (alt: drop negative value add, replace with zero)

- Delete outliers following OECD methodology (Schwellanus et al, 2018; Andrews, Criscuolo and Gal, 2016)

  - Growth level approach

  - Variables of interest: value added, intermediate inputs, gross output, employment, labour productivity, labour share

  - Outlier **detection** to remove noise: Identify observations which had growth levels above or below 3 standard deviations away from the mean

  - Outlier **deletion** to remove shift level changes: Delete all observations associated with that firm that displayed the erratic behavior above

	Original Data Set	Sector deletion (Government & Not for profit)	Inactive firms deletion	Outlier Deletion
Unique Firm IDs	52,733,185	32,816,790	32,716,053	32,080,643
Remaining Data (%)	100%	62.23%	62.04%	60.84%

Summary Statistics

Total and Averaged from 2001/02 – 2016/17

	No of observations	Total Gross Output ($b)	Total Labour Cost ($b)	Average FTE
Total Economy	32,080,643	$66,094	$9,597	12.6
Select Industries				
Manufacturing	1,364,695	$5,394	$690	17.3
Retail Trade	2,202,355	$5,562	$558	10.6
Wholesale Trade	1,205,382	$5,943	$424	12.1
Professional, Scientific and Technical Services	3,879,694	$3,093	$777	6.9

Final Data set

- Removing non-market sector and finance sector due to known measurement issues with value added
- Unfortunate as Finance is the largest driver of labour share in Australia.
- Consequence: Labour share overall flat – falling till 2011, then picking up.

BLADE labour share decline
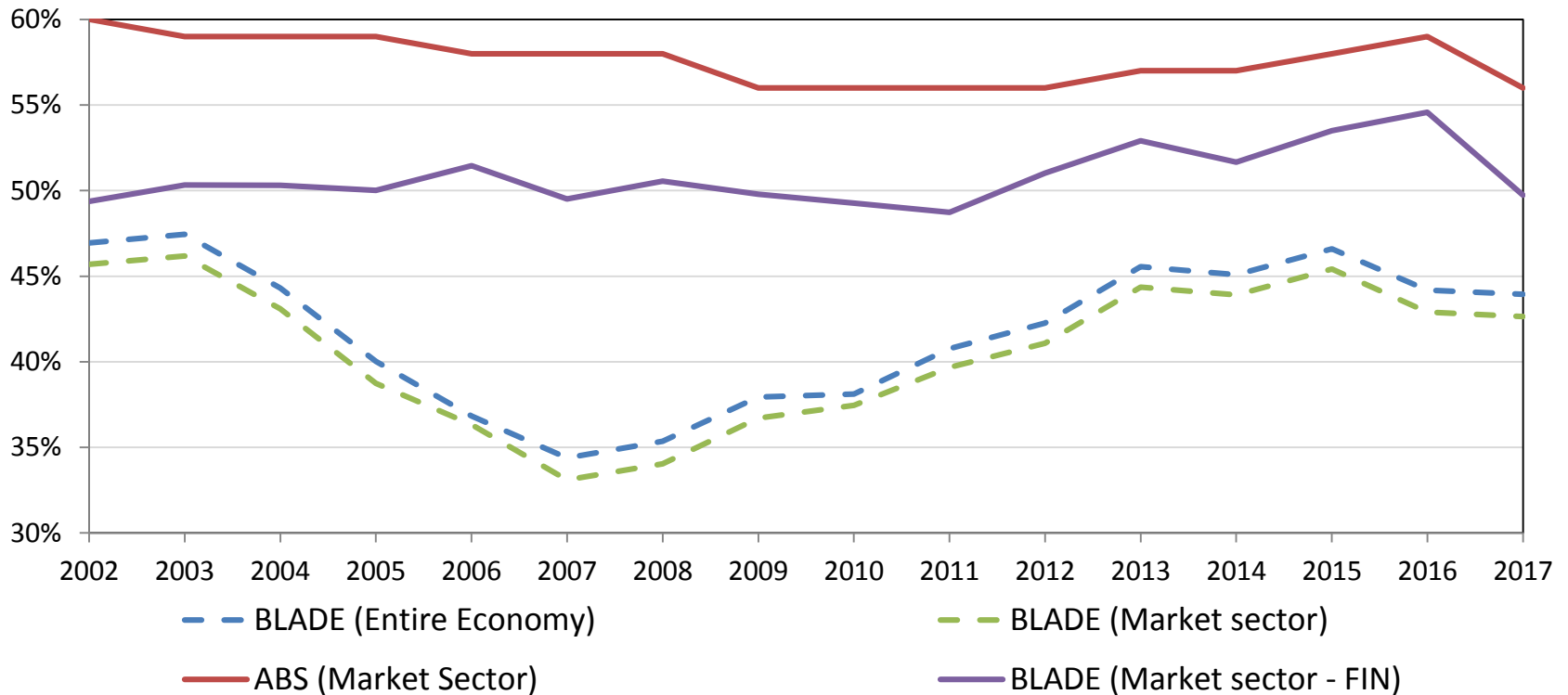
Division Labour Shares

…however, heterogenity at firm level

Change in labour share between 2002 – 2017 (weighted mean of firm labour shares)

Legend: ■ BLADE (Change o/t) ◆ ABS (Change o/t)

X-axis categories: Health Care, TPW, Educ & Training, FIS, Retail Trade, Agriculture, Professional Services, EGWWS, Other Services, Construction, Mining, Accom & Food, Admin Services, Wholesale Trade, RHRES, Manufacturing, Public Admin & Safety, IMT, Arts & Rec
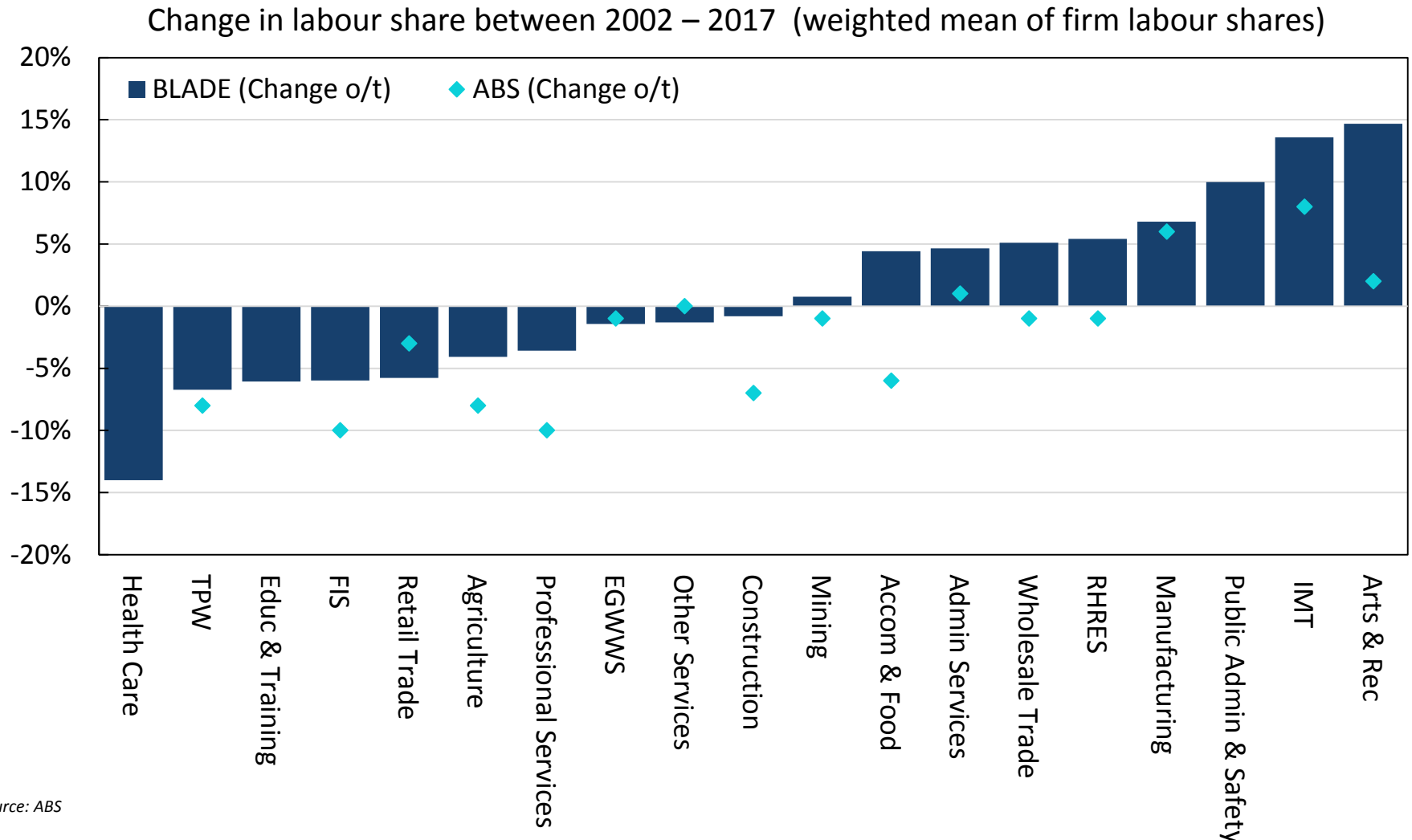
Source: ABS

TPW stands for Transport, Postal and Warehousing; FIS, Financial and Insurance Services; EGGWWS, Electricity, Gas Water and Waste Services; RHRES, Rental, Hiring and Real Estate Services; IMT; Information Media and Technology

ABS 5260.0.55.002 – provides only market sector labour shares. Health Care, Education and Training, and Public Administration and Safety labour shares are missing

* See appendix for division labour share time series

ABS v BLADE

Agriculture
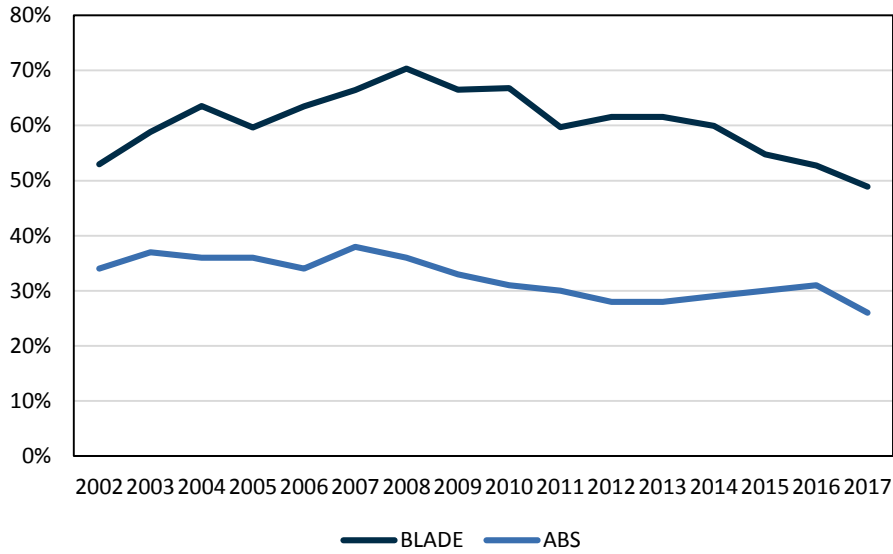
Mining
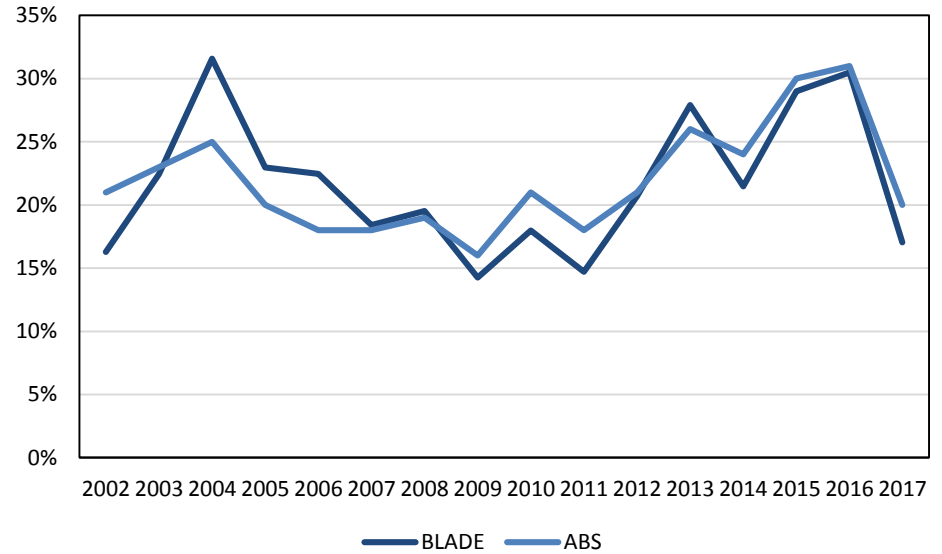
Manufacturing
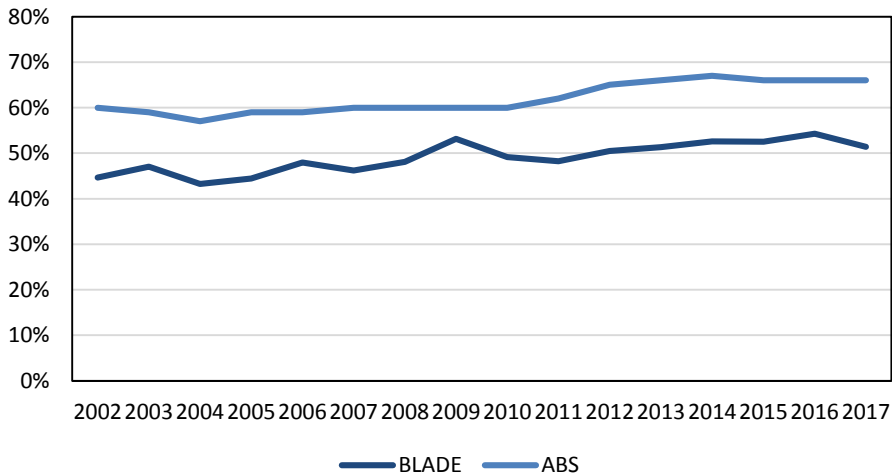
EGWWS
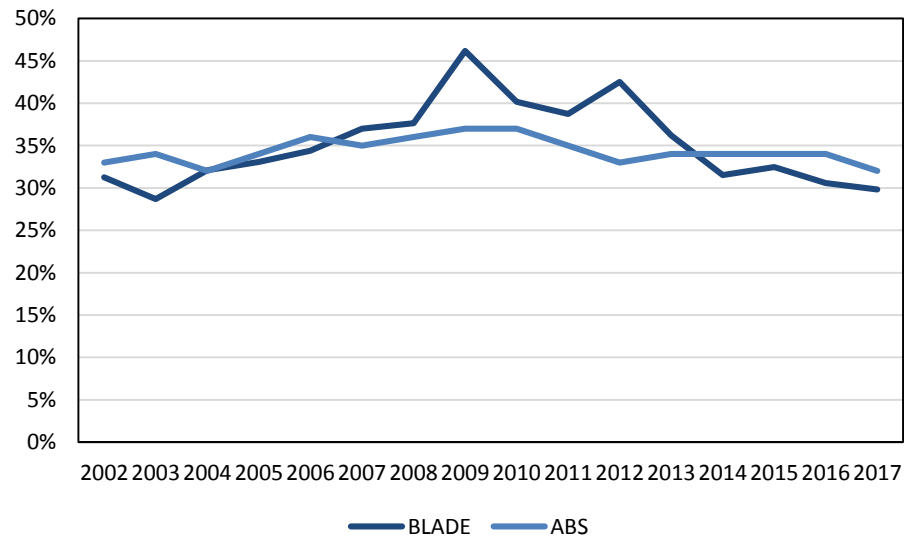
ABS v BLADE

Construction — BLADE, ABS (2002–2017)

Wholesale Trade — BLADE, ABS (2002–2017)
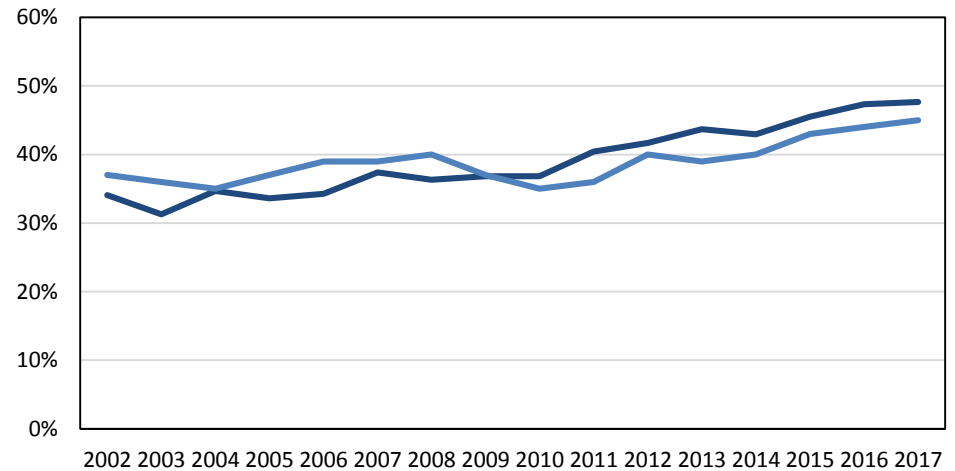
Retail Trade — BLADE, ABS (2002–2017)
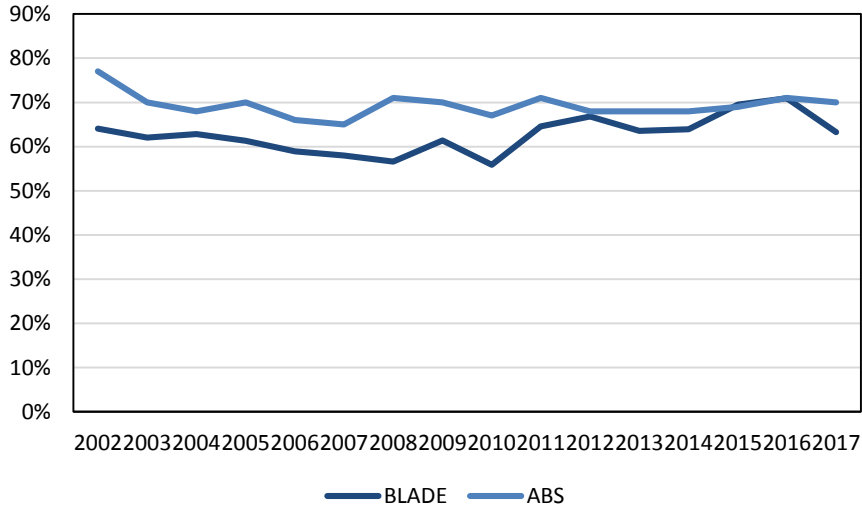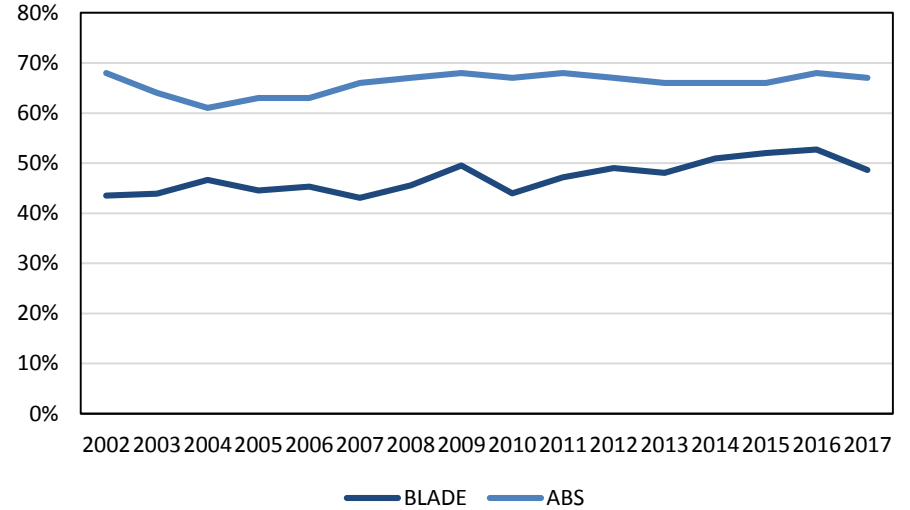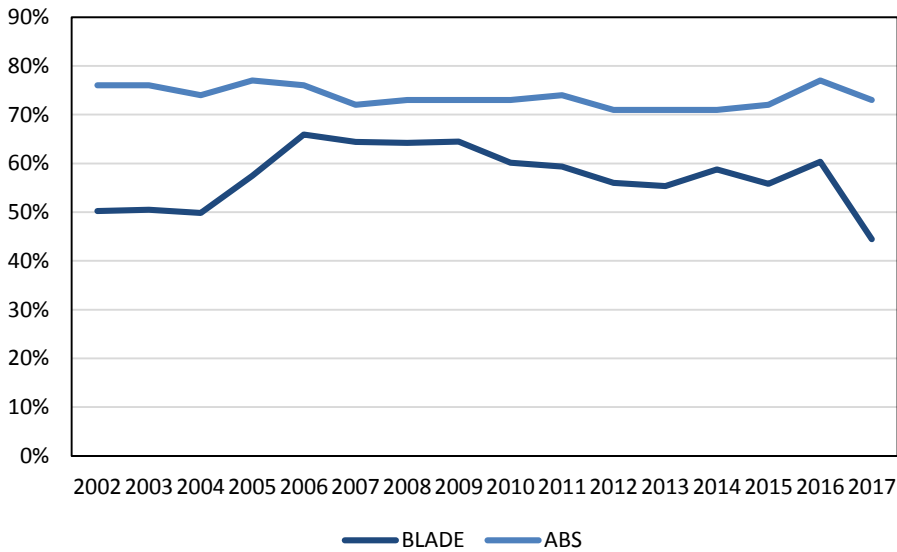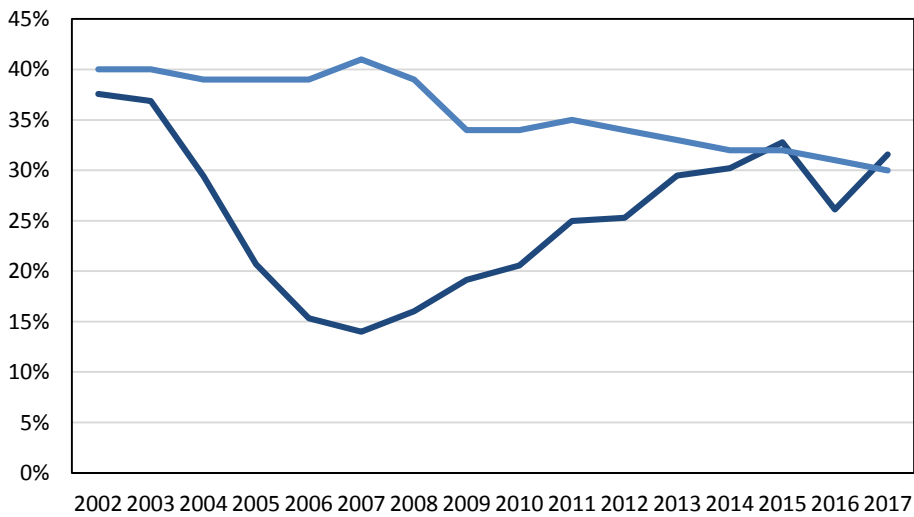
Accom & Food Services — BLADE, ABS (2002–2017)
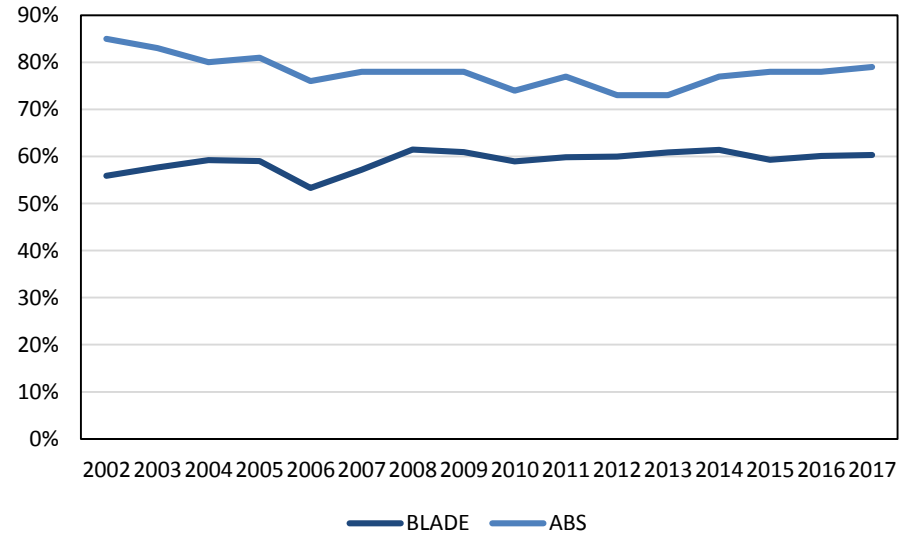
ABS v BLADE

TPW
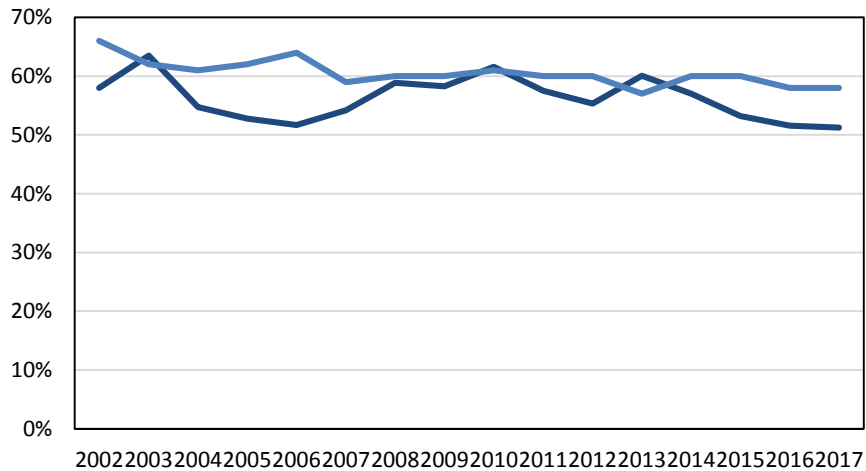
IMT

FIS

RHRES
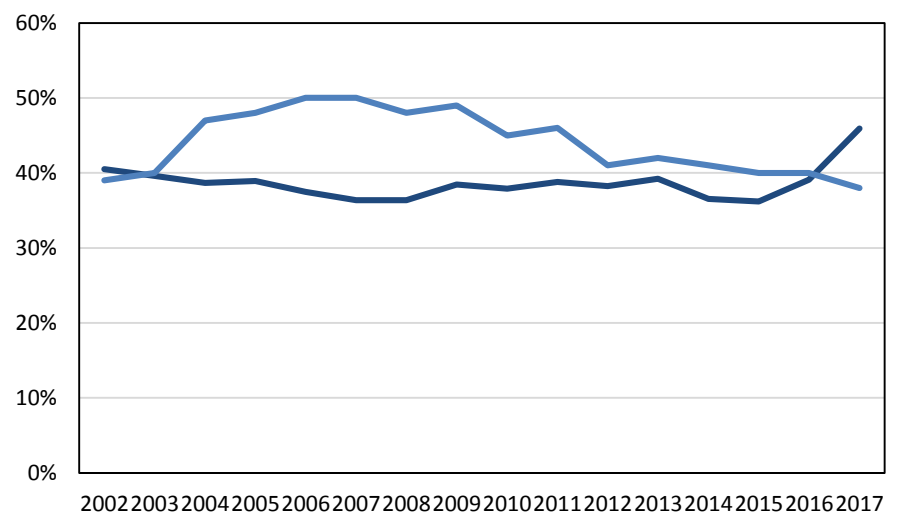
Professional Services
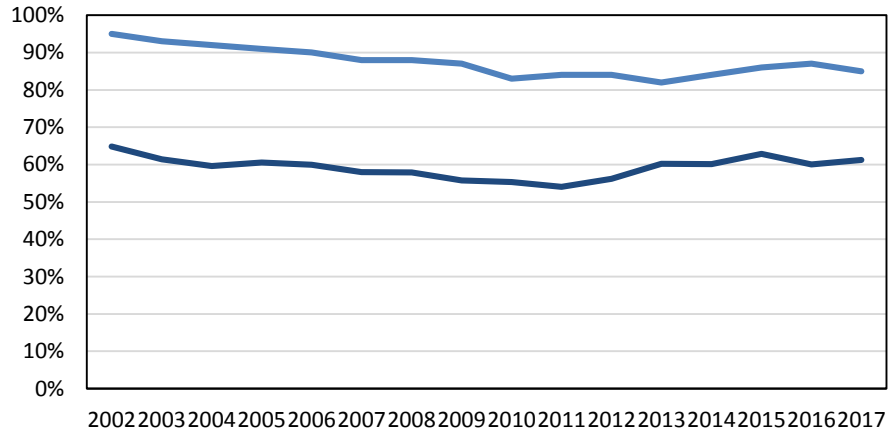
Admin Services
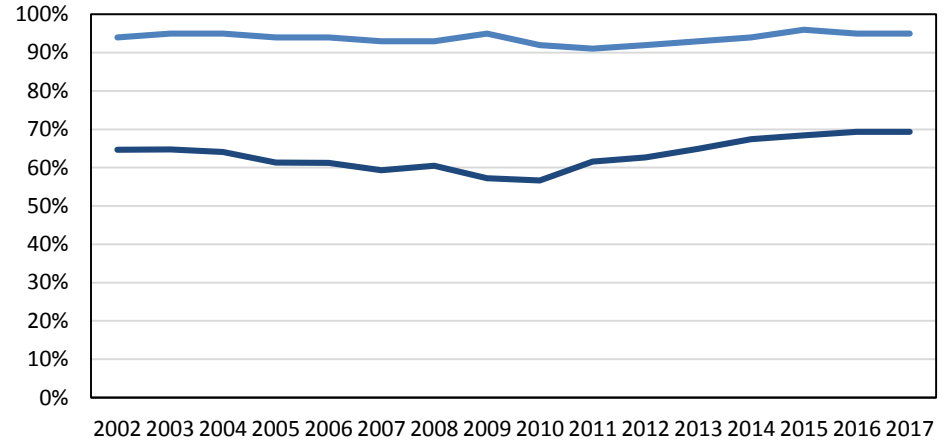
Arts & Recs
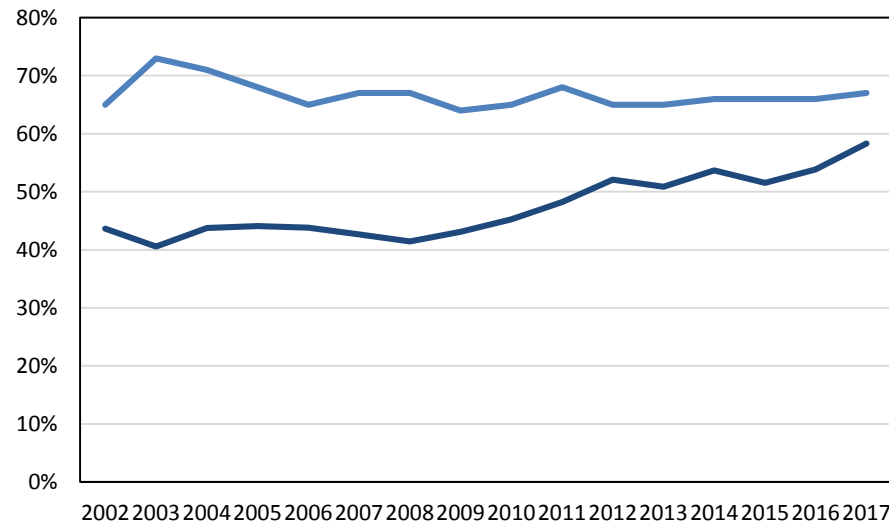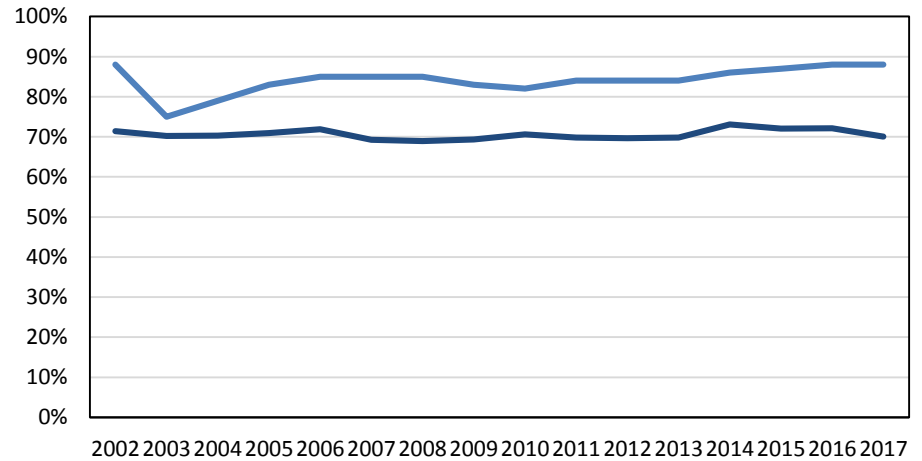
Other Services

Addressing Measurement Problems

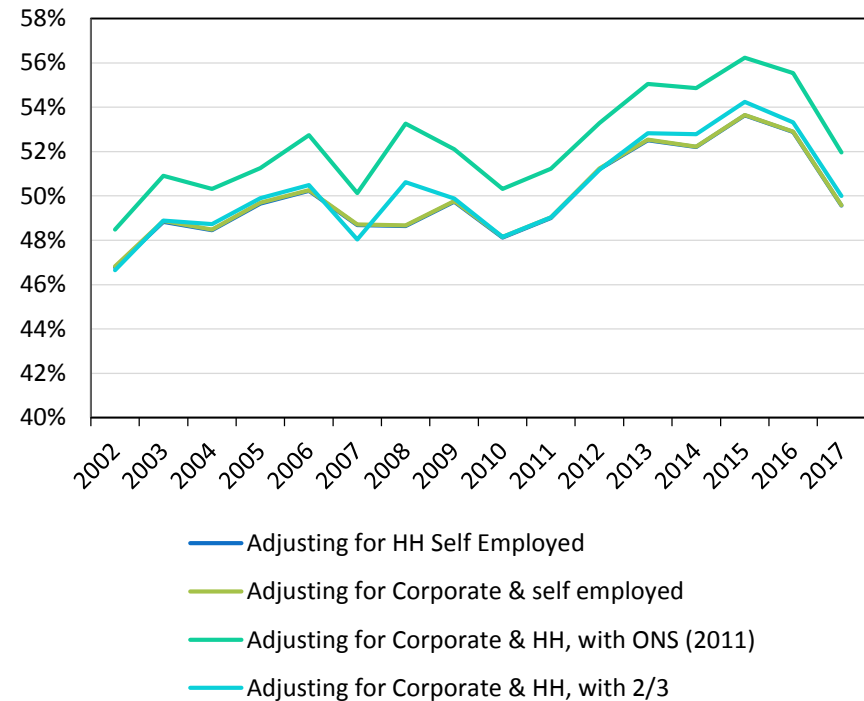Several papers have identified that labour share decline is subject to measurement

	Category	Issue	Solution	Outcome
Numerator = wages	**Self-employed are excluded from payroll estimations of wages**	• Exist in the household sector (Gollin, 2002 Elsby et al, 2013) • Exist in the corporate sector (Guiterrez & Phillipon, 2018)	• Identify self-employed through use of sector classification and legal organisation (sole trader, partnership, trust) • Add 1 FTE and wage for 1 FTE	• Raises level of labour share • Trend robust
	Imputation of self-employed income is incorrect	• Same as income for those in payroll Gollin, 2002 Elsby et al, 2013) • Portion of retained profits (how much?)	• Estimate average wage at 4 digit industry level (OECD) • 2/3 of capital/labour retained profits • Ratio of capital/labour (ONS)	• Raises level of labour share • Trend robust
Denominator = Value Added	**Housing returns (Rognolie, 2015)**	• Value added can be overestimated if it includes returns to housing • Overestimation of labour share decline	• Remove the rental and real estate sector • VA at firm level doesn't account for returns to housing i.e. rent	• No effect • (contrary to EU and US)
	Adjusting for depreciation (Guiterrez & Phillipon, 2019)	• Value added can be overestimated if it includes depreciation • Depreciation goes to neither capital or labour • Net labour share is better welfare measure	• Remove depreciation from VA	• Raises level of labour share • Strong decline in Labour share • Accentuates dip in GFC • Consistent with literature

Addressing Measurement Problems

Denominator – Value added

Trend does not change even after the real-estate sector has been removed

- Increase in housing returns leads to an overestimation of Value Added (Guiterrez and Phillipon, 2019)

- Remove Real Estate and Rental Hiring Services (Guiterrez and Phillipon, 2019)

- Not an issue when calculating using BLADE as rents are not accounting for in 'turnover' in BAS

Legend:
- Adjusting for HH Self Employed
- Adjusting for Corporate & self employed
- Adjusting for Corporate & HH, with ONS (2011)
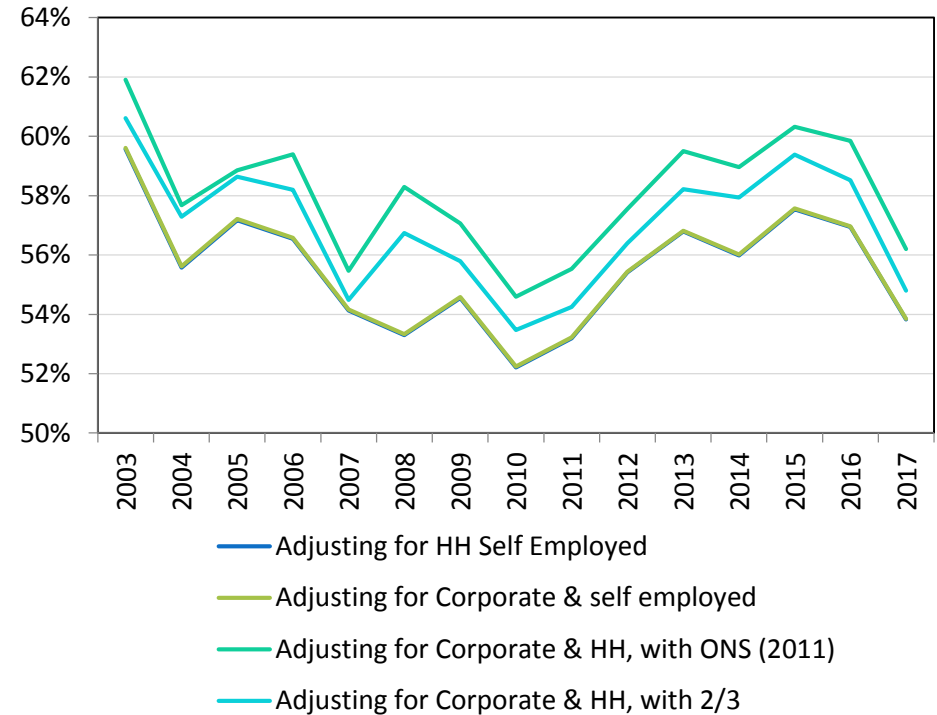- Adjusting for Corporate & HH, with 2/3

*Graphs depict average weighted labour for market sector with finance excluded, using four measures of estimating labour share for self-employed (Unadjusted, Adjusted for self-employed in Household sector using average wage; HH and corporate sector using average wage; HH & Corp using 2/3 retained profits; and HH & corp sector using ONS method

Addressing Measurement Problems

Denominator – Value added

Net labour share is declining

- Depreciation eaten up in production process
- Not a form of income
- Net labour share better measure for income welfare purposes
- Relevant, as stock of depreciation is rising and depreciable products (e.g. computers and software) rising

Legend:
- Adjusting for HH Self Employed
- Adjusting for Corporate & self employed
- Adjusting for Corporate & HH, with ONS (2011)
- Adjusting for Corporate & HH, with 2/3

*Graphs depict average weighted labour for market sector with finance excluded, using four measures of estimating labour share for self-employed (Unadjusted, Adjusted for self-employed in Household sector using average wage; HH and corporate sector using average wage; HH & Corp using 2/3 retained profits; and HH & corp sector using ONS method

Different measures of self-employed
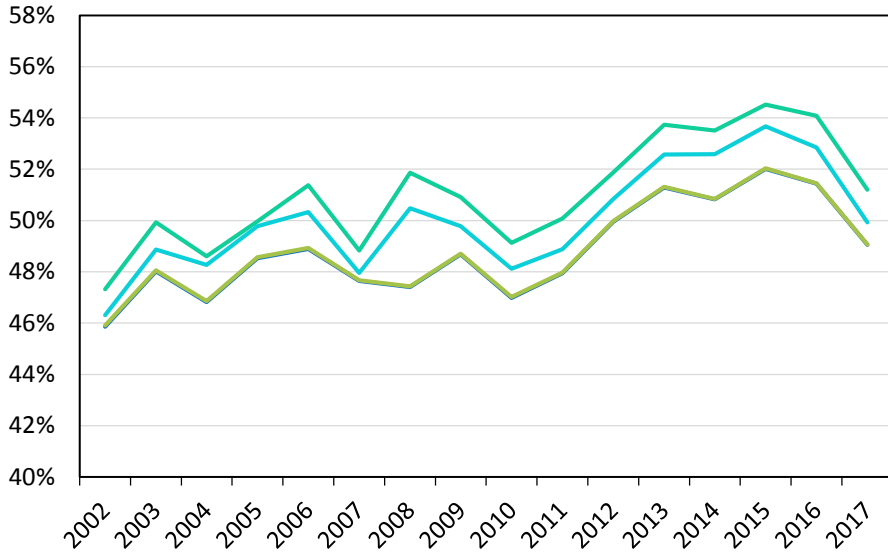
Adjusting for housing

Net labour share (removing depreciation)

Legend:
— Adjusting for HH Self Employed
— Adjusting for Corporate & self employed
— Adjusting for Corporate & HH, with ONS (2011)
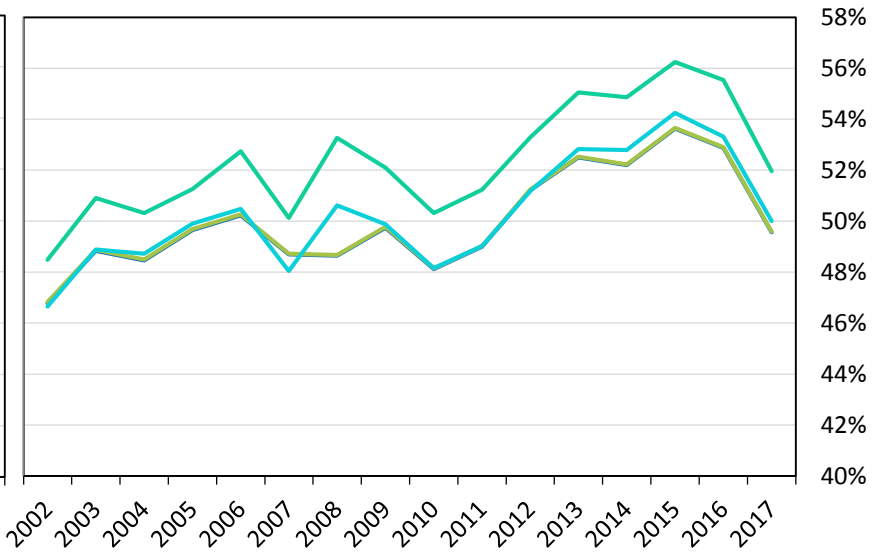— Adjusting for Corporate & HH, with 2/3

*All graphs depict average weighted labour for market sector with finance excluded, using four measures of estimating labour share for self-employed (Unadjusted, Adjusted for self-employed in Household sector using average wage; HH and corporate sector using average wage; HH & Corp using 2/3 retained profits; and HH & corp sector using ONS method

Concentration and labour share

Robustness tests

Second specification: Annual Fixed effects

$$\log \lambda_{jt} = \alpha \log C_{jt} + \tau_t \, u_{jt}$$

*See Appendix for Industry level regression

Concentration (value added)	Non adjusted LS	HH Adjusted LS	HH + Corporate Adjusted LS
	log(LS)	log(LS)	log(LS)
log(HHI)	-0.183***	-0.199***	-0.198***
	(0.0229)	(0.0221)	(0.0221)
log(c4)	-0.326***	-0.357***	-0.357***
	(0.0417)	(0.0401)	(0.0402)
log(c10)	-0.440***	-0.482***	-0.483***
	(0.0590)	(0.0564)	(0.0566)
log(c20)	-0.556***	-0.608***	-0.609***
	(0.0773)	(0.0736)	(0.0738)
N	7085	7085	7085
Year Dummies	Y	Y	Y
Fixed Effects	Y	Y	Y

Notes: standard errors in parentheses; Regression of labour shares on concentration, with time dummies and 4-digit level industry fixed effects*** p<0.001 **p<0.01 *p<0.05. Net labour shares not finalised yet.

Robustness tests: Other measures of labour shares (wage compensation/gross output). Additional measures of concentration using gross output, value added, turnover, full time employment and head count. The results are robust to trimming outliers and to focusing on the sub-set of divisions examined in Autor et al (i.e. excluding agriculture, mining, education, healthcare, arts and public administration).

Mark-ups and Labour Shares

Robustness tests

	Labour Share (log)				
	1	2	3	4	5
Markup (log)	-0.471***	-0.494***	-0.532***	-0.520***	-0.381***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year FE		X	X	X	X
Division FE			X		
Industry FE				X	
Firm FE					X
R2	0.1798	0.1888	0.2350	0.2147	0.1881
N	17396314	17396314	17396314	17396314	17396314

Notes: p-values in parentheses; Regression of mark-ups (log) on labour shares (log), at a firm level *** p<0.001 **p<0.01 *p<0.05

Concentration and labour share

Robustness tests – industry level
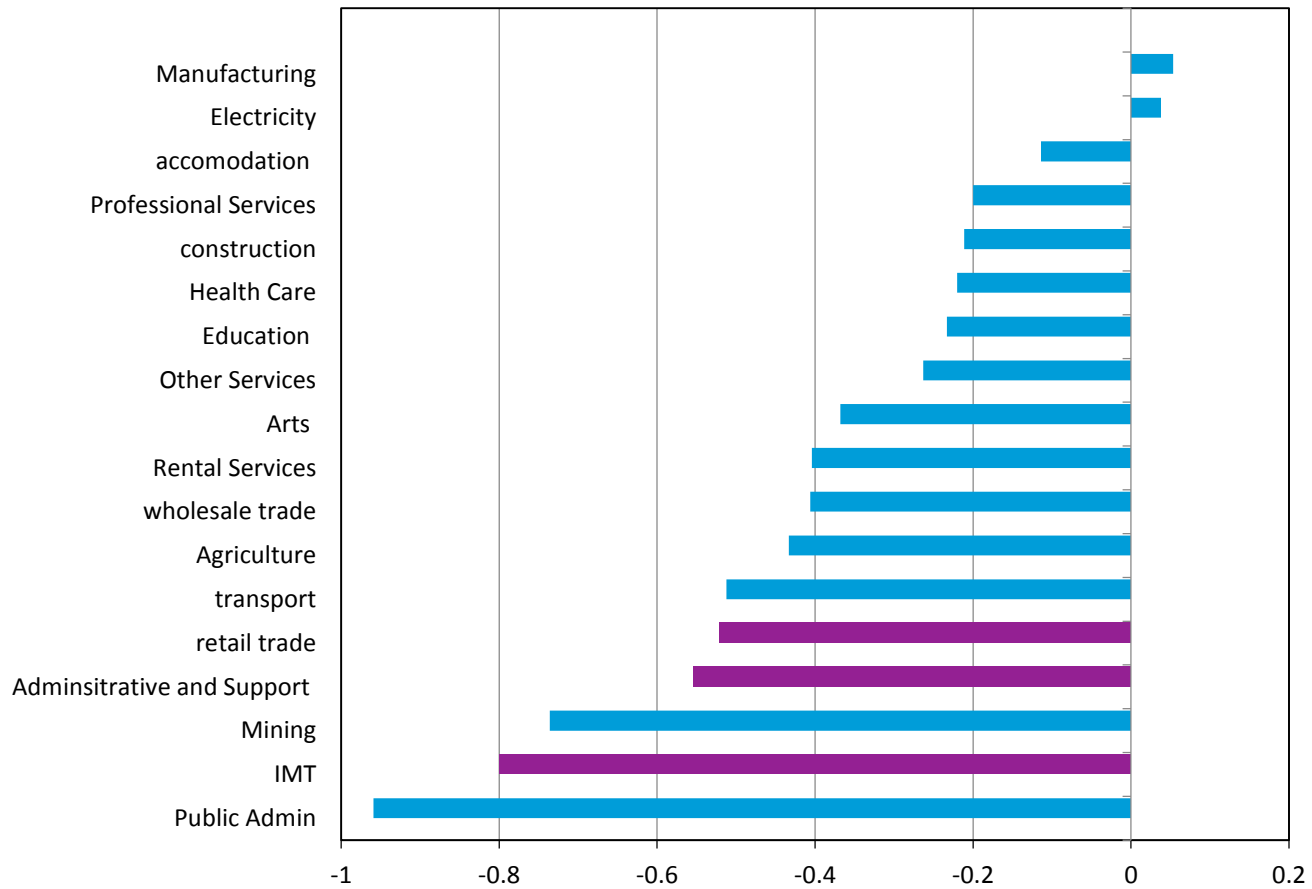
Profit share and concentration are strongly correlated

Further evidence of declining competition

Concentration	Profit Share (log)			
	Top 4 firms (log)	Top 10 firms (log)	Top 20 firms (log)	HHI (log)
Value Added	0.788***	0.968***	1.080***	0.358***
	(0.0574)	(0.000)	(0.065)	(0.0269)
Gross Output	0.529***	0.723***	0.890***	0.268***
	(0.054)	(0.0733)	(0.0925)	(0.0282)
Year FE	X	X	X	X
Industry FE	X	X	X	X
R2	0.1798	0.1888	0.2350	0.2147
N	5693	5693	5693	5693

Notes: standard errors in parentheses; Regression of profit shares on concentration, with time dummies and 4-digit level industry fixed effects*** $p<0.001$ **$p<0.01$ *$p<0.05$.