Dissecting Labour Shares using BLADE: Trends & Drivers

Nalini Agarwal UNSW
EMG Workshop
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?
   - Find evidence for declining competition, rather than increasing competition

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)

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

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):

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

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

Where

- $P_{it}Y_{it}$ 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), $P_{jt}^{K}$ 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)
- $\Pi_{it}$ are retained economic profits for firm $i$ – calculated as the residual of value added after deducting capital costs and labour costs
- $\lambda_{it}$ labour share; $\phi_{it}$ capital share; $\pi_{it}$ 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)

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

*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

![Graph: Labour share of Income (Market sector excl FIS)*](image)

- **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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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
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

<table>
<thead>
<tr>
<th>Theory</th>
<th>Description</th>
<th>Empirical Proxy</th>
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<tbody>
<tr>
<td>Increasing Competition</td>
<td>Increasing competition through dominance of highly productive ‘superstar firms’ has resulted in decline in labour shares within industries (Autor et al, 2019)</td>
<td>Concentration ratio of Top 4 firms</td>
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<tr>
<td></td>
<td></td>
<td>Mark ups (gross output function)</td>
</tr>
<tr>
<td>Declining Competition</td>
<td>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)</td>
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<td>Price of Capital</td>
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<td></td>
<td></td>
<td>Rental Rate of Return</td>
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<tr>
<td>Productivity Dispersion</td>
<td>Increase in productivity dispersion due to growing monopsony power of highly productive firms (Gouin – Bonenfant, 2018)</td>
<td>Labour productivity Dispersion</td>
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<td>TFP dispersion</td>
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</table>

* 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
Drivers of labour share trends*

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Concentration Ratios have increased across the board...
And so have mark ups...

* 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

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<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
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<tr>
<td></td>
<td>Log(C4)</td>
<td>Log (μjt)</td>
<td>Log (lpIQR)</td>
<td>Log (tfpIQR)</td>
<td>Kjt/Yjt</td>
<td>Relative Price</td>
<td>Log(Rental Rate)</td>
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<tr>
<td>logλjt</td>
<td>-1.75***</td>
<td>-0.041**</td>
<td>-0.13***</td>
<td>-0.12</td>
<td>0.0014***</td>
<td>0.32+</td>
<td>0.90*</td>
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<tr>
<td></td>
<td>(0.078)</td>
<td>(0.014)</td>
<td>(0.025)</td>
<td>(0.15)</td>
<td>(0.00031)</td>
<td>(0.36)</td>
<td>(0.44)</td>
</tr>
<tr>
<td>Constant</td>
<td>4.884***</td>
<td>-0.995***</td>
<td>-1.046***</td>
<td>-1.114***</td>
<td>-1.099***</td>
<td>-1.387***</td>
<td>0.872</td>
</tr>
<tr>
<td></td>
<td>(0.26)</td>
<td>(0.055)</td>
<td>(0.052)</td>
<td>(0.093)</td>
<td>(0.052)</td>
<td>(0.36)</td>
<td>(0.94)</td>
</tr>
<tr>
<td>Obs</td>
<td>7193</td>
<td>7190</td>
<td>7188</td>
<td>7182</td>
<td>7193</td>
<td>7193</td>
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<tr>
<td>R²</td>
<td>0.228</td>
<td>0.040</td>
<td>0.042</td>
<td>0.040</td>
<td>0.073</td>
<td>0.038</td>
<td>0.039</td>
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<tr>
<td>Adj R²</td>
<td>0.226</td>
<td>0.037</td>
<td>0.040</td>
<td>0.038</td>
<td>0.071</td>
<td>0.036</td>
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<td>X</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>Year FE</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Industry FE</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
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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**

- Increase in concentration
  - Driven by decline in no of businesses → declining in business dynamism, increased barriers to entry
  - Firms seek more profits by increasing prices and hence increase in mark ups.
  - Leads to an increase in profit share & decline in labour share and capital share of all incumbent firms

**Increasing Competition**

- Increase in concentration
  - Driven by increased returns to scale to large firms by technology, network effects or their ability to connect consumers
  - Increase in mark ups as overhead costs and production costs spillover the large revenue base of dominant firms / decline in production costs
  - 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, 2017/2019)*

- Reallocation of market share to larger firms while labour shares are kept constant of incumbent firms

“WITHIN”

“REALLOCATION”
Identification Problem
Declining Competition

Increase in concentration
Driven by decline in no of businesses \(\rightarrow\) declining in business dynamism, increased barriers to entry

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

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

Rent-seeking model (Barkai, 2017)
Decline in labour share of all incumbent firms

“WITHIN”

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Superstar model (Autor et al, 2019)
Identification Problem
Increasing Competition

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**Decline in labour share of all incumbent firms**

*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 ($\lambda_{it}$)
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 $\tau_j$

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

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, $\lambda_t$, can be decomposed in labour share, $\lambda_{it}$, 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:

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

Specific forms:*  


$$\Delta \lambda_{S,t} = \frac{1}{N} \sum_{i \in S} (\lambda_{i,t} - \lambda_{i,t-1}) + \Delta \left[ \sum_{i \in S} \left( w_i - \frac{\sum_i w_i}{S} \right) \left( \lambda_i - \frac{\sum_i \lambda_i}{S} \right) \right]$$

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

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

*Further decomposition of surviving terms is only shown
Identification Strategy

DF is better for identification than MP

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

\[
\Delta \lambda_t = \lambda_t - \lambda_{t-1} = \sum_{i \in S} w_{it} \lambda_{it} - \sum_{i \in S} w_{i,t-1} \lambda_{i,t-1} + \sum_{k \in N} w_{kt} \lambda_{kt} + \sum_{l \in X} w_{l,t-1} \lambda_{l,t-1}
\]

Specific forms:


\[
\Delta \lambda_{S,t} = \frac{1}{N} \sum_{i \in S} \text{unweighted mean} + \Delta[\sum_{i \in S} \text{covariance}]
\]

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

\[
\Delta \lambda_{S,t} = \sum_{i \in S} \left( \frac{\lambda_{i,t} + \lambda_{i,t-1}}{2} \right) + \sum_{k \in S} \left( \frac{w_{i,t} + w_{i,t-1}}{2} \right) \text{within}
\]

*Further decomposition of surviving terms is only shown
Methods produce different implications


**Dievert and Fox (2010) Method**

**Melitz and Polanec (2015) Method**

**Within term** – consistent with the literature e.g. Kehrig and Vincent (2018), Autor et al (2019), Barkai (2017)

**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.

\[
\Delta \left[ \sum_{i \in S} \left( w_i - \frac{\sum_s w_i}{S} \right) \left( \lambda_i - \frac{\sum_s \lambda_i}{S} \right) \right] \\
= \sum_{i \in S} \left( w_{i,t} - w_{i,t-1} \right) \left( \frac{\lambda_{i,t} + \lambda_{i,t-1}}{2} \right) \\
+ \sum_{k \in S} \left( \frac{w_{i,t} + w_{i,t-1}}{2} \right) \left( \lambda_{i,t} - \lambda_{i,t-1} \right) \\
- \frac{1}{N} \sum_{i \in S} \left( \lambda_{i,t} - \lambda_{i,t-1} \right)
\]

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*

<table>
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<td>Industry 3-digit FE</td>
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</table>

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**

<table>
<thead>
<tr>
<th></th>
<th>(A) Within</th>
<th></th>
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<th>(B) Between</th>
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<td>Industry 2 -digit FE</td>
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<tr>
<td>Industry 3-digit FE</td>
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<td></td>
<td></td>
<td></td>
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</tbody>
</table>

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.
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
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

- BLADE (Entire Economy)
- BLADE (Market sector)
- BLADE (Market sector - FIN)
- ABS (Market Sector)
Trends in Labour’s share of income*

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

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.
FIS cannot be included due to measurement issues with value added

- 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)


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

\[
\Delta \lambda_{s,t} = \frac{1}{N} \sum_{k \in s} (\lambda_{k,t} - \lambda_{k,t-1}) + \Delta \left[ \sum_{k \in s} (\omega_{k,s} - \bar{\omega})(\lambda_{k,s} - \bar{\lambda}) \right]
\]

- 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)

\[
\Delta \lambda_{s,t} = \Delta \sum_{k \in s} \left( \frac{\omega_{k,s,t} + \omega_{k,s,t-1}}{2} \right) (\lambda_{k,t} - \lambda_{k,t-1}) + \Delta \sum_{k \in s} (\omega_{k,s,t} - \omega_{k,s,t-1}) \left( \frac{\lambda_{k,t} + \lambda_{k,t-1}}{2} \right)
\]

- 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))
**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
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.
(Alowing 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).

<table>
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<tr>
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<th>Covariance</th>
<th>Mean</th>
<th>Exit</th>
<th>Entry</th>
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<td>0.000219*</td>
<td>-0.0000594</td>
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<td>(0.006)</td>
<td>(0.570)</td>
<td>(0.027)</td>
<td>(0.353)</td>
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<td>Obs</td>
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<td>437</td>
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<tr>
<td>R²</td>
<td>0.008</td>
<td>0.001</td>
<td>0.036</td>
<td>0.006</td>
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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

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

<table>
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<th>Original Data Set</th>
<th>Sector deletion (Government &amp; Not for profit)</th>
<th>Inactive firms deletion</th>
<th>Outlier Deletion</th>
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<td>62.23%</td>
<td>62.04%</td>
<td>60.84%</td>
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## Summary Statistics

### Total and Averaged from 2001/02 – 2016/17

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<th>Total Gross Output ($b)</th>
<th>Total Labour Cost ($b)</th>
<th>Average FTE</th>
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<td>$3,093</td>
<td>$777</td>
<td>6.9</td>
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</table>
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.
Division Labour Shares

...however, heterogeneity at firm level

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

- 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; EGWWS, 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
### Addressing Measurement Problems

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

<table>
<thead>
<tr>
<th>Category</th>
<th>Issue</th>
<th>Solution</th>
<th>Outcome</th>
</tr>
</thead>
</table>
| **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 |
| **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 (Guiterreze & 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 |

Numerator = wages  
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

*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

*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*
*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

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

<table>
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<tr>
<th>Concentration (value added)</th>
<th>Non adjusted LS</th>
<th>HH Adjusted LS</th>
<th>HH + Corporate Adjusted LS</th>
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<td>-0.198***</td>
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<td>( \log(c4) )</td>
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<td>-0.357***</td>
<td>-0.357***</td>
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<td>(0.0417)</td>
<td>(0.0401)</td>
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<td>( \log(c10) )</td>
<td>-0.440***</td>
<td>-0.482***</td>
<td>-0.483***</td>
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<td>(0.0590)</td>
<td>(0.0564)</td>
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<td>( \log(c20) )</td>
<td>-0.556***</td>
<td>-0.608***</td>
<td>-0.609***</td>
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<td>(0.0773)</td>
<td>(0.0736)</td>
<td>(0.0738)</td>
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<tr>
<td>Fixed Effects</td>
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<td>Y</td>
<td>Y</td>
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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

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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

[Bar chart showing concentration and labour share across various industries, including:
- Manufacturing
- Electricity
- Accommodation
- Professional Services
- Construction
- Health Care
- Education
- Other Services
- Arts
- Rental Services
- Wholesale Trade
- Agriculture
- Transport
- Retail Trade
- Administrative and Support
- Mining
- IMT
- Public Admin]
Profit share and concentration are strongly correlated
Further evidence of declining competition

<table>
<thead>
<tr>
<th>Concentration</th>
<th>Top 4 firms (log)</th>
<th>Top 10 firms (log)</th>
<th>Top 20 firms (log)</th>
<th>HHI (log)</th>
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<tbody>
<tr>
<td>Value Added</td>
<td>0.788***</td>
<td>0.968***</td>
<td>1.080***</td>
<td>0.358***</td>
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<td>(0.0574)</td>
<td>(0.000)</td>
<td>(0.065)</td>
<td>(0.0269)</td>
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<td>Gross Output</td>
<td>0.529***</td>
<td>0.723***</td>
<td>0.890***</td>
<td>0.268***</td>
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<td>(0.054)</td>
<td>(0.0733)</td>
<td>(0.0925)</td>
<td>(0.0282)</td>
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<tr>
<td>Year FE</td>
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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.