RESERVE BANK OF AUSTRALIA

The COVID-19 shock and productivity-enhancing reallocation in Australia: Real-time Evidence from Single Touch Payroll

Dan Andrews (E61), Elif Bahar (Australian Treasury) and Jonathan Hambur (RBA)

This presentation reflects the views of the authors and does not necessarily reflect the views of the RBA, Treasury, the Australian Government or the OECD. All mistakes are our own

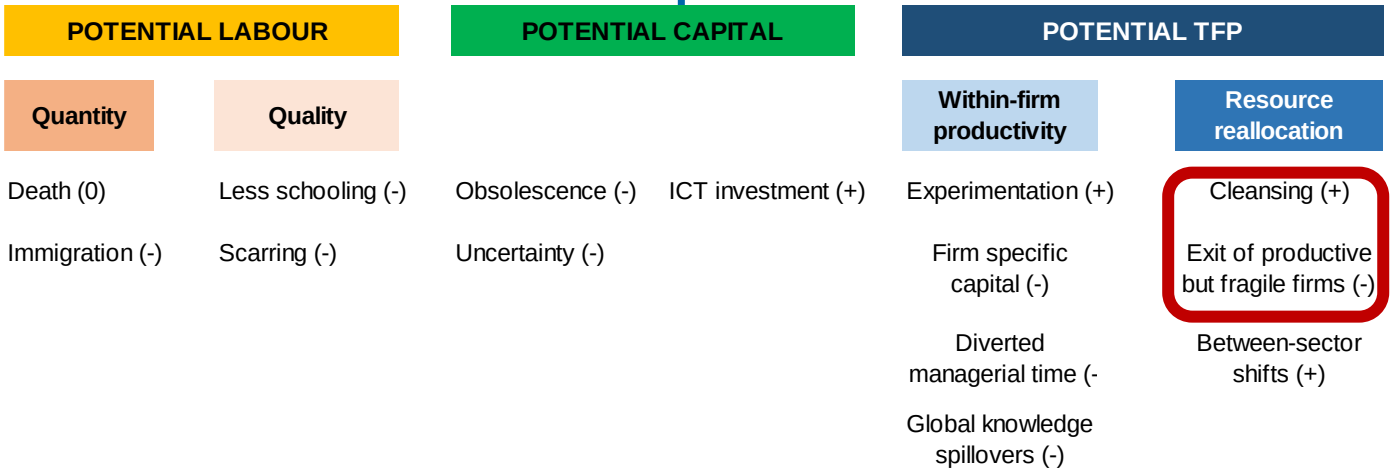
Motivation

- The impact of COVID on potential growth is a key question for economists and policymakers

- Can we use new data to assess some channels fairly quickly?

- Can we understand the roles of policy in amplifying or offsetting these factors?

How will COVID-19 affect potential output?



Many channels operate over long horizons, are not directly observable or face data constraints

Reallocation channel is an exception:

- *Feasibility*: can leverage a rich literature if real time employment data can be merged with (pre-crisis) firm productivity
- *Relevance*: COVID-19 has been characterised as a reallocation shock (Barrero et al 2020) but the debate has so far lacked a link with productivity
- *Policy*: potential output losses from recessions lower in environments where policy more readily accommodates reallocation in the aftermath of a shock.

Reallocation and productivity

- Market economies tend to have a high rate of job creation and destruction – churn and reallocation
  - OECD average >20%

- Strong reallocation-productivity link
  - Resources tend to flow to more productive firms within industries, raising aggregate productivity
  - Facilitated by widespread heterogeneity in productivity even in narrow industries
  - Important as job destruction entails a cost

Recessions, reallocation and productivity

- Conventional view is link strengthened in recessions (cleansing effect - Caballero & Hammour 1994)

- But not a certainty, and this link may be disrupted
  - Credit frictions could lead productive but financial fragile firms to exit
    - Explored in the context of GFC

Recessions, reallocation and productivity

- Hypothesis 1: COVID severely disrupted this usual reallocation process:
  - Exogenous health shock affected productive and less productive alike
  - Job retention schemes slowed reallocation and severed link to productivity

- Hypothesis 2: link remained intact
  - Most productive and well managed best able to adapt and innovate

- Very little hard evidence to date with representative administrative data

Data

Data

- Linked high-frequency employment data to business tax data:
  - Single touch payroll: Constructed firm-level monthly employment metrics and growth rates
    - Headcount – no hours
  - Business income tax data: Construct pre-COVID 2018/19 labour productivity levels
    - Also looked at TFP for a sub-sample of firms

Baseline regression model

$$E_{isr} = \alpha + \beta LP_{isr} + X_{isr} + \rho_{sr} + \varepsilon_{isr}$$

- *E* is either: *i*) cumulative change in ***employment***, or *ii*) ***firm exit*** probability (in firm *i*, industry *s* and region *r*).
- *LP* is pre-crisis firm-level log labour productivity
- *X* includes pre-crisis firm size and firm age dummies
- *ρ* are fixed effects: industry & region or industry*region

Expectations?

- β=0 → reallocation-productivity link distorted by pandemic
- β>0 (employment) or β<0 (exit) → within-industry labour reallocation is productivity-enhancing

Link between productivity and reallocation remained in tact

- More productive firms remained more likely to grow and less likely to exits.
  - 10.5 ppt gap in growth, and 5 percentage point gap in exit probability

- Strength of relationship higher for:
  - Smaller firms
  - Periods/areas subject to more lockdowns (e.g. Victoria)

Table 1—: Baseline results: Firm-level growth and exit responsiveness to productivity

	(1) Growth	(2) Growth	(3) Exit	(4) Exit
Labour productivity	4.415***		-0.020***	
	(0.144)		(0.001)	
Labour productivity Q2		5.965***		-0.030***
		(0.398)		(0.002)
Labour productivity Q3		9.932***		-0.047***
		(0.392)		(0.002)
Labour productivity Q4		12.627***		-0.055***
		(0.465)		(0.002)
Age FE	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes
Industry x State FE	Yes	Yes	Yes	Yes
N	404080	404080	404080	404080
R-squared	0.049	0.049	0.070	0.070
Adjusted R-squared	0.042	0.041	0.063	0.062

Notes: Regressions are all variations of Equation (2). Dependant variable in (1)-(2) is employment growth rate from March 2020 to May 2021. Dependant variable in (3)-(4) is dummy which equals one if firm has exited in May 2021. Standard errors clustered at the state*industry level. Labour productivity Q1 is the bottom quartile and is the base case. Constant not shown. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Source: Authors' calculations based on STP and BIT data.

The role of JobKeeper

- Australia's job retention policy. Implemented to protect job matches, support income and create certainty.
  - By prioritising preservation, could have weakened productivity-reallocation link
  - Or, could protect productive jobs

The role of JobKeeper

- We extend the baseline model:

$$\Delta E_{isr} = \alpha + \beta_1 LP_{isr} + \beta_2 LP_{isr} * JKEsh_{sr} + \delta_1 LP_{isr} * Cycle_{sr} + X_{isr} + \rho_{sr} + \varepsilon_{isr}$$

  - $JKEsh_{sr}$ share of workers on JobKeeper in the industry*state
  - β_2>0 (<0) there was a stronger (weaker) link between growth and productivity in industries that used JobKeeper more intensively
  - $Cycle_{sr}$ LFS employment growth in the industry*state
    - Allows us to capture counter-cyclicality of reallocation and JK use

- Countercyclical relationship – cleansing hypothesis
- Reallocation stronger where JK was used more intensively
  - Seemed to change over time

Table 2—: Firm-level growth responsiveness to productivity: Role of JobKeeper

	(1) Mar-20 to Nov-20	(2) Mar-20 to Aug-20	(3) Mar-20 to May-20	(4) Sep-20 to Nov-20	(5) Sep-20 to Nov-20	(6) Mar-21 to May-21
Labour productivity	2.503***	2.277***	2.886***	0.674***	0.672***	2.298***
	(0.113)	(0.113)	(0.119)	(0.120)	(0.119)	(0.140)
Labour productivity x JK1 share	0.021***	0.028***	0.040***		0.031**	
	(0.006)	(0.006)	(0.006)		(0.010)	
Labour productivity x JK1 - JK2 share				0.031**		
				(0.010)		
Labour productivity x JK2 share					-0.042**	
					(0.013)	
Labour productivity x JK2.2 share						0.035**
						(0.013)
Labour productivity x Cycle1	-0.007	-0.022***	-0.025***	0.008	0.007	0.005
	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)
Labour productivity x Cycle2				-0.004	-0.003	
				(0.005)	(0.004)	
Labour productivity x Cycle 3						-0.003
						(0.006)
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry x State FE	Yes	Yes	Yes	Yes	Yes	Yes
N	387760.000	388673.000	389504.000	439158.000	439158.000	417287.000
R-squared	0.024	0.032	0.070	0.024	0.024	0.045
Adjusted R-squared	0.018	0.025	0.064	0.019	0.019	0.040

Notes: Regressions are all variations of Equations (3) and (4). Standard errors clustered at the state*industry level. JK1 share, JK2 share, and JK 2.2 share denote share of state-industry workforce enrolled into JobKeeper 1, JobKeeper 2, and JobKeeper 2.2, respectively. JK1 - JK2 share denotes share enrolled into JobKeeper 1 minus the share in JobKeeper 2/2.2. Cyclical controls are change in industry-level employment from Feb-20 (Cycle 1), Aug-20 (Cycle 2), and Feb-21 (Cycle 3) to end dates used for dependant variables. Dependant variables are employment growth rates for periods detailed in table. Constant not shown. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' calculations based on STP and BIT data.

- When first phase ended, burst of reallocation where workers flowed of JK
  - We saw something similar at the end of the program
- Suggests JK was becoming more distortive over time

Table 2—: Firm-level growth responsiveness to productivity: Role of JobKeeper

	(1) Mar-20 to Nov-20	(2) Mar-20 to Aug-20	(3) Mar-20 to May-20	(4) Sep-20 to Nov-20	(5) Sep-20 to Nov-20	(6) Mar-21 to May-21
Labour productivity	2.503***	2.277***	2.886***	0.674***	0.672***	2.298***
	(0.113)	(0.113)	(0.119)	(0.120)	(0.119)	(0.140)
Labour productivity x JK1 share	0.021***	0.028***	0.040***		0.031***	
	(0.006)	(0.006)	(0.006)		(0.010)	
Labour productivity x JK1 - JK2 share				0.031***		
				(0.010)		
Labour productivity x JK2 share					-0.042***	
					(0.013)	
Labour productivity x JK2.2 share						0.035**
						(0.013)
Labour productivity x Cycle1	-0.007	-0.022***	-0.025***	0.008	0.007	0.005
	(0.004)	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)
Labour productivity x Cycle2				-0.004	-0.003	
				(0.005)	(0.004)	
Labour productivity x Cycle 3						-0.003
						(0.006)
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry x State FE	Yes	Yes	Yes	Yes	Yes	Yes
N	387760.000	388673.000	389504.000	439158.000	439158.000	417287.000
R-squared	0.024	0.032	0.070	0.024	0.024	0.045
Adjusted R-squared	0.018	0.025	0.064	0.019	0.019	0.040

Notes: Regressions are all variations of Equations (3) and (4). Standard errors clustered at the state*industry level. JK1 share, JK2 share, and JK 2.2 share denote share of state-industry workforce enrolled into JobKeeper 1, JobKeeper 2, and JobKeeper 2.2, respectively. JK1 - JK2 share denotes share enrolled into JobKeeper 1 minus the share in JobKeeper 2/2.2. Cyclical controls are change in industry-level employment from Feb-20 (Cycle 1), Aug-20 (Cycle 2), and Feb-21 (Cycle 3) to end dates used for dependant variables. Dependant variables are employment growth rates for periods detailed in table. Constant not shown. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Source: Authors' calculations based on STP and BIT data.

More productive firms took up JobKeeper

- More productive firms were more likely to take up first phase of JK
  - Especially vulnerable low liquidity firms
- Greater incentive to withstand losses and keep the firm, if good long-term prospects
- Not evident for JobKeeper 2.0
  - Given recovery, firms left were:
    - *In still affected sectors*
    - *Those on downward trajectory*
    - *Those that were less able to adapt*
    - *Likely less productive*

Table 3—: Role of firm-level productivity and financial constraints in JobKeeper take-up

	(1) JK 1	(2) JK 1	(3) JK 1	(4) JK 2	(5) JK 2	(6) JK 2
Labour productivity	0.012***	0.017***		-0.011***	-0.008***	
	(0.002)	(0.002)		(0.002)	(0.002)	
Labour productivity Q2			0.076***			0.015***
			(0.004)			(0.004)
Labour productivity Q3			0.075***			-0.002
			(0.006)			(0.004)
Labour productivity Q4			0.045***			-0.022***
			(0.006)			(0.004)
Fixed share of expenses		0.274***	0.266***		0.241***	0.235***
		(0.027)	(0.027)		(0.027)	(0.027)
Liquidity		0.052***	0.045***		0.017***	0.014***
		(0.003)	(0.003)		(0.002)	(0.002)
Wage share of expenses	No	Yes	Yes	No	Yes	Yes
Age FE	Yes	Yes	Yes	Yes	Yes	Yes
Size FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry x State FE	Yes	Yes	Yes	Yes	Yes	Yes
N	284392	284392	284392	281105	281105	281105
R-squared	0.111	0.115	0.117	0.102	0.105	0.105
Adjusted R-squared	0.101	0.105	0.107	0.092	0.094	0.095

Notes: Regressions are all variations of Equations (5). Dependant variables are dummies which equal one if firm participates in JobKeeper. Standard errors clustered at the state*industry level. Labour productivity Q1 is the bottom quartile and is the base case. Fixed share of expenses denotes ratio of fixed (rent, leasing and interest) to total expenses. Liquidity is a dummy which equals 1 when current/liquid assets are insufficient to cover 6 months of expenses. Wage share of expenses is Yes when the ratio of wages to total expenses is controlled for in regression. Sample slightly different to baseline – includes some firms not in STP (e.g. due to late registrations for the system or becoming a non-employing business). Constant not shown. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: Authors' calculations based on STP and BIT data.

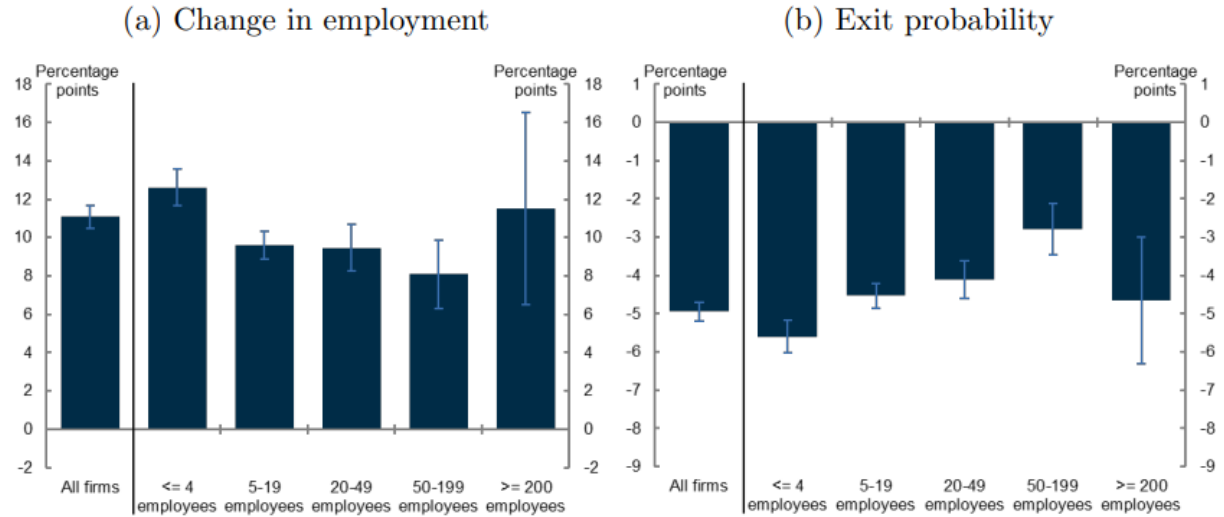
Summary

- Reallocation-productivity link remained intact over the course of the pandemic
  - The scarring effects from an indiscriminate shakeout of productive firms avoided. Sizeable macro implications
- JobKeeper played an important role in facilitating this and protecting highly productive firms
  - But it became more distortive over time
- JRS can be a crucial, are likely to become distortive over time
  - Needs to be considered, alongside their other policy aims and disincentives from changes to policy

Spares

Spares

Figure 3. : Difference in performance between high and low productivity firms, by firm size

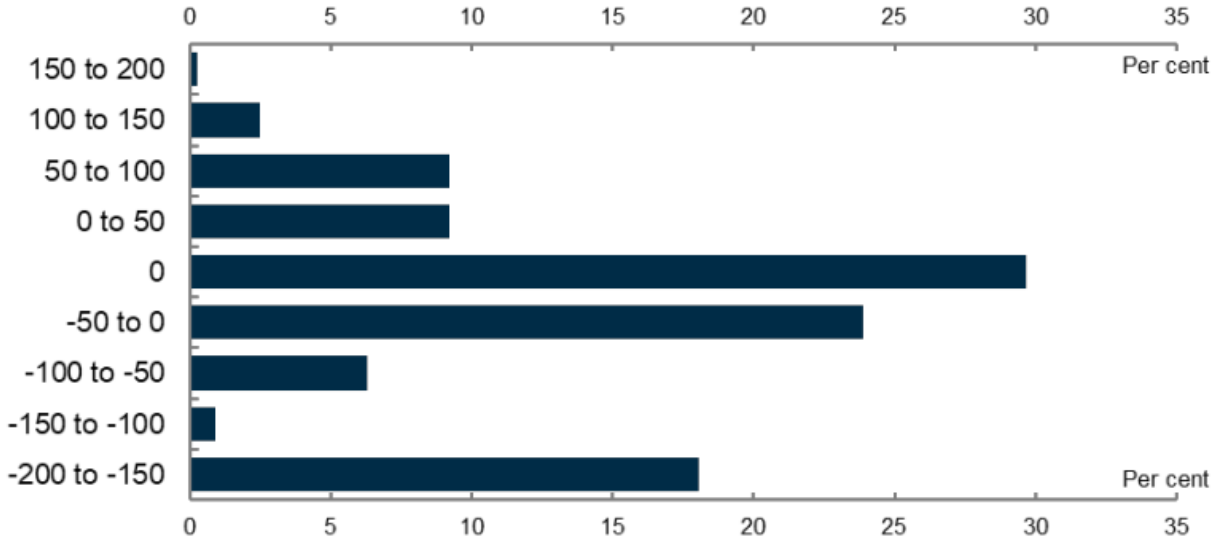


Notes: Plots predicted gap in growth between high and low productivity firms, where high and low productivity firms are +/- one standard deviations above the mean, respectively, of each firm size sub-group. Coefficients taken from baseline regression run on firm size sub-samples, as indicated in chart. Ranges show estimates using upper and lower bounds of 90 per cent confidence intervals on the coefficients. Econometric estimates underlying chart are in Table B3.
Source: Authors' calculations based on STP and BIT data.

Spares

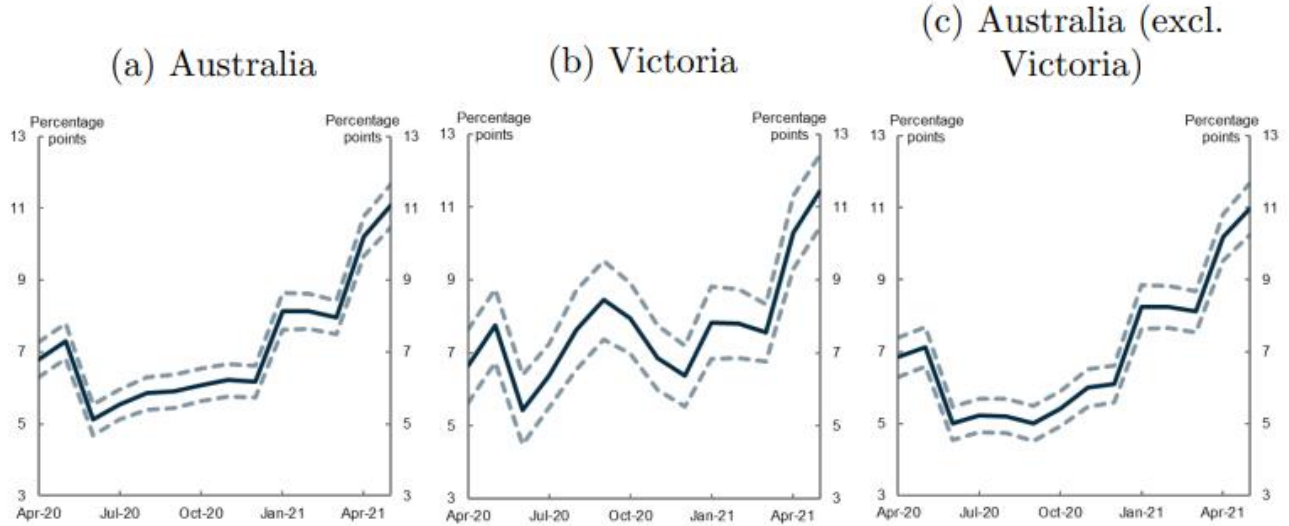
Figure A2. : Widespread heterogeneity in firm performance

(a) Distribution of employment growth in STP



Spares

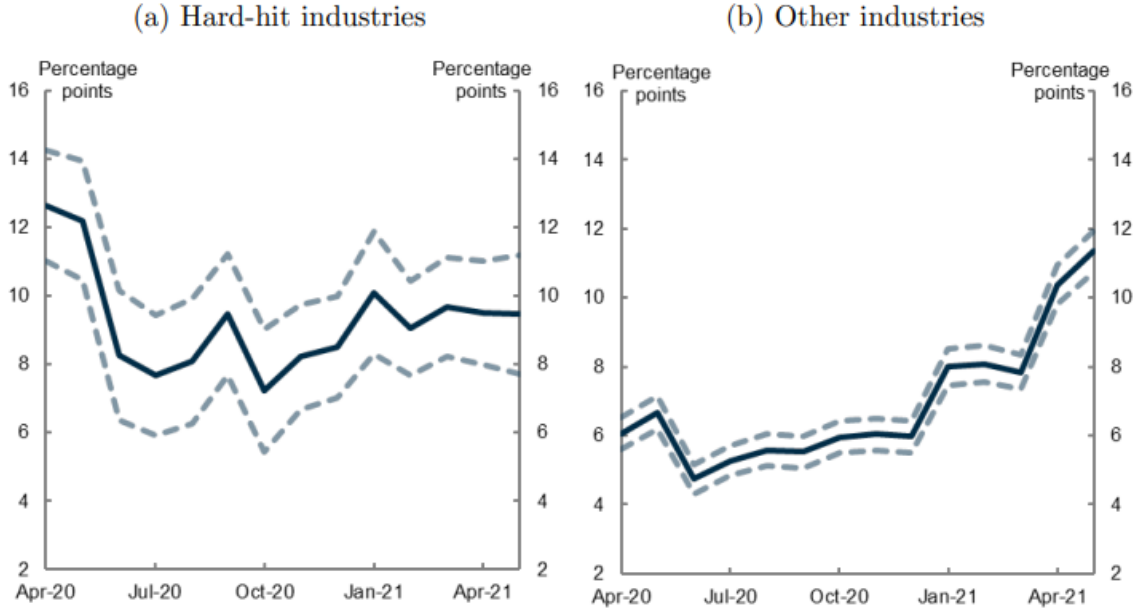
Figure 4. : Difference in performance between high and low productivity firms, by region



Notes: Solid lines show estimated difference in employment growth between high productivity firm (LP one standard deviation above industry mean) and a low productivity firm (LP one standard deviation below industry mean). Dashed lines denote 90 percent confidence intervals. Regressions run on (a) Australia, (b) just Victoria, and (c) Australia excluding Victoria.
Source: Authors' calculations based on STP and BIT data.

Spares

Figure A3. : Difference in performance between high and low productivity firms, by industry

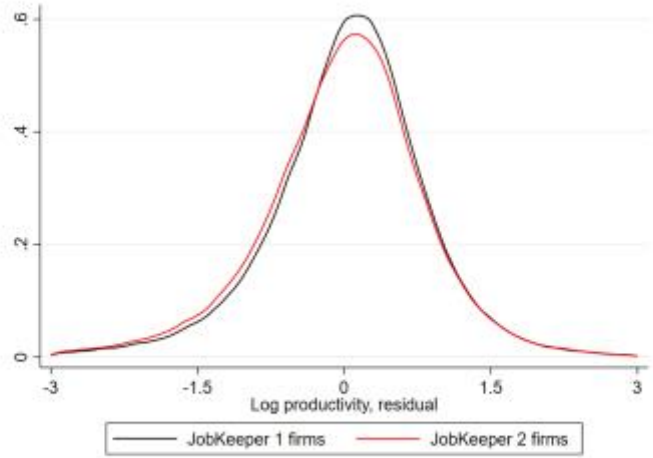


Notes: Solid lines show estimated difference in employment growth between high productivity firm (LP one standard deviation above industry mean) and a low productivity firm (LP one standard deviation below industry mean). Dashed lines denote 90 percent confidence intervals. Based on specification in Table 1 Column (1) run for different periods. Hard-hit industries are Accommodation and Food Services, and Arts and Recreation Services.

Source: Authors' calculations based on STP and BIT data.

Spares

Figure 6. : Distribution of labour productivity for JobKeeper recipient firms



Notes: Plots residuals from regression of labour productivity on balance sheet controls from take-up regressions in Table 3. Residuals plotted separately for firms in JobKeeper 1.0 and 2.0.
Source: Authors' calculations based on BIT data.

Aggregate implications

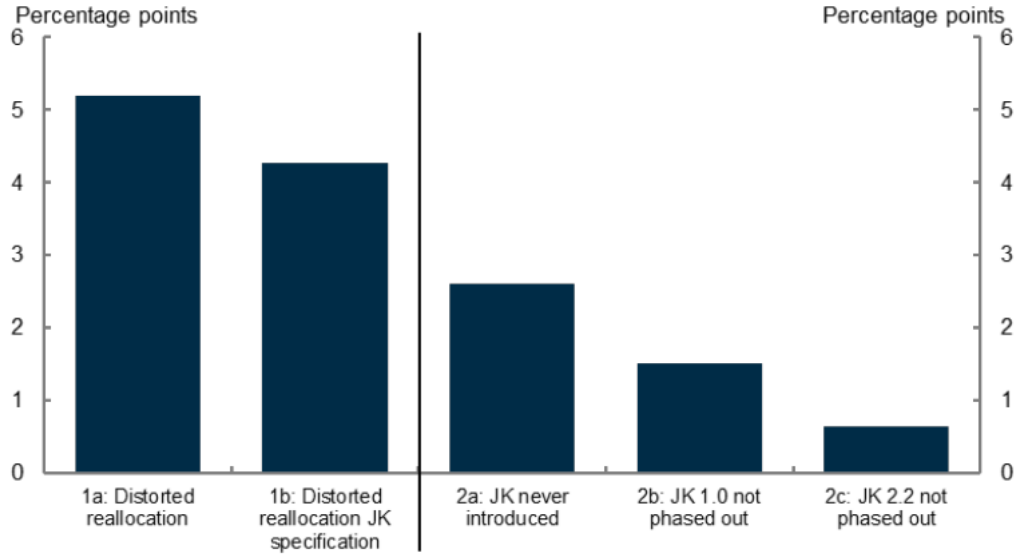
- How important was it that links between employment and productivity were maintained?

- Simulate counterfactual productivity based on prior productivity, and predicted employment:
  - Distorted reallocation: No relationship between productivity and growth
    - Fall in productivity if there was an indiscriminate shake-out due to restrictions
  - No JobKeeper: JobKeeper provided no ‘boost’ to relationship
    - Fall in productivity if no JobKeeper to prevent indiscriminate shakeout
    - Does not capture other benefits to JobKeeper
  - JobKeeper not phased out: JobKeeper coverage did not decline (August to November)
    - Fall in productivity if labour wasn’t freed up with the phasing down of productivity.

- Estimates should be taken as indicative, not precise

Spares

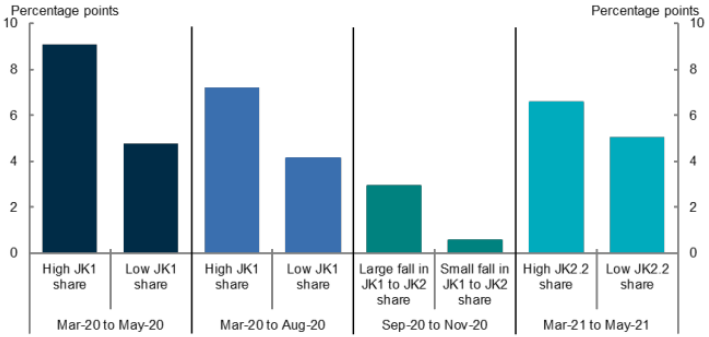
Figure 7. : Gain to aggregate labour productivity relative to counterfactual scenarios



Notes: Charts difference in aggregate productivity using predicted employment outcomes, and counterfactual scenarios discussed above. Bar 1a is based on baseline model results in Table 1 Column (1), but estimated to December 2020. Bar 1b is based on results in Table 2 Column (2), estimated to August. As such, it is more comparable to the results in Bar 2a, which uses the same model but focuses on the JobKeeper term. Bar 2b uses the model in Table 2 Column (4) estimated from August to November 2020. Bar 2c uses the model in Table 2 Column (6) estimated from August to November.
Source: Authors' calculations based on STP and BIT data.

Productivity-enhancing reallocation across markets according to JobKeeper coverage

Figure 5. : Employment growth gap between high and low productivity firms, by JobKeeper uptake



Notes: High/low productivity firms are +/- one standard deviation from the mean of the productivity distribution. High JobKeeper 1 share is 60 per cent and low is 15 per cent. Large fall in JobKeeper share is 38 percentage points. Small fall is 7 percentage points. High JobKeeper 2.2 share is 17 per cent and low share is 1.5 per cent. These represent 10th and 90th percentiles of industry*state distribution.
Source: Authors' calculations based on STP and BIT data.

Gap between high and low productivity firms larger where JK use was more intense – strong link reallocation and productivity

Gap was larger where more labour was freed up - it was now able to flow to more productive firms.