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Common Ownership of Competing Firms: Evidence from Australia

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Abstract

We provide the first estimates of the extent of common ownership of competing firms in Australia. Combining data on market shares and substantial shareholdings, we calculate the impact of common ownership on effective market concentration. Among firms where we can identify at least one owner, 31 percent share a substantial owner with a rival company. Analysing 443 industries, we identify 49 that exhibit common ownership, including commercial banking, explosives manufacturing, fuel retailing, insurance and iron ore mining. Across the Australian economy, common ownership increases effective market concentration by 21 percent. Our estimates imply that if listed firms seek to maximise the value of their investors' portfolios, then they place the same value on $3.70 of their competitors' profits as on $1 of their own profits. We discuss the limitations of the available data, and the potential implications of common ownership for competition in Australia.

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1. Introduction

Concentrated markets have been linked to a decline in the labour share (Autor et al, 2020), low productivity growth (Blonigen and Pierce, 2016; Nickell, 1996) and low investment (Gutiérrez and Philippon, 2017) as well as high prices (Azar, Schmalz and Tecu, 2018), high markups (De Loecker and Eckhout, 2018) and rising inequality (Gans, Leigh, Schmalz and Triggs, 2018). On one measure, more than half of Australia's markets are concentrated (Leigh and Triggs, 2016). By another metric, market concentration in the Australian economy rose from 2002 to 2017 (Bakhtiari 2021).

In this paper, we provide the first Australian evidence on another potential threat to competition: the possibility that the same investors may own rival firms, and use their influence to mute the degree of competition in the market. This phenomenon, sometimes termed 'horizontal shareholding', arises most frequently in the case of institutional investors that hold significant stakes in competing firms. Since the incentive of shareholders is to maximise the total value of their portfolio, investors who own rival firms may prefer a degree of competition between the firms that is less than the social optimum.

To see the problem of common ownership in its simplest form, take the case of a duopoly. If both firms have separate owners, it is in each firm's interest to maximise its own profits. If the two firms are wholly owned by the same person, then it is in the financial interests of the owner for both companies to behave like a monopoly: aiming to maximise joint profits. In the presence of a common owner, the firms are more likely to cosily divide the market than they are to embark on a risky price war.

As Backus, Conlon and Sinkinson (2021a) note, most studies of common ownership have been based on reduced-form correlations between ownership structures and consumer outcomes.[1] Azar, Schmalz and Tecu (2018) found that common ownership among airlines operating on the same route was correlated with higher ticket prices of between 3 to 12 percent. Azar, Raina and Schmalz (2019) found that common ownership of banks in a county led to higher fees and lower deposit rates. In pharmaceuticals, Gerakos and Xie (2018) found that incumbent firms were 12 percent more likely to pay a generic brand to stay out of the market when there was common ownership between the incumbent and the generic brand. In the stock market, Boller and Scott Morton (2020) found that common ownership increased stock returns.

Beyond prices, Azar and Vives (2018) found a strong correlation between rising common ownership and rising inequality in the US. Elhauge (2018) found that common ownership is driving the historically large gap between low corporate investment and high corporate profits. Gutiérrez and Philippon (2017) found that the investment-profit gap was larger in concentrated industries – particularly those with high rates of common ownership. Elhauge (2016) contends that common ownership can help explain fundamental economic puzzles, including why corporate executives are rewarded for industry performance rather than individual corporate performance alone, why corporations have not used recent high profits to expand output and employment, and why economic inequality has risen in recent decades. Although there are still gaps in the empirical evidence on common ownership, some have called for limits to be placed on common ownership (Posner, Morton and Weyl, 2017; Elhauge, 2016).

While most of the empirical research on common ownership has emerged in the past decade, the issue has a long lineage among policymakers. As Elhuage (2020) notes, the reason the Sherman Act of 1890 was known as an anti*trust* law was that it aimed to ban an arrangement under which shareholders of competing firms pooled their holdings in a trust, which then elected directors who would dampen competition. In blurring the boundaries between firms, common ownership highlights the importance for competition regulators to look beyond formal legal structures to the underlying economic reality.[2]

Our paper does not present direct evidence of nefarious behaviour by common owners of Australian firms. Nonetheless, it is useful to consider the various channels through which common ownership might reduce consumer surplus. Just as monopolies can harm consumers without breaking the law, common ownership does not require foul play for consumers to be left worse off. Indeed, one channel through which common ownership can increase prices is by reducing the incentives for firms to energetically compete. As Azar, Schmalz and Tecu (2018) note, 'If a match between lazy principals and lazy agents becomes pervasive in an industry, then in a Cournot model context, industry output declines and margins increase'. This poses a challenge for policymakers, since it implies that common ownership could be a driver of secular stagnation – reducing economic dynamism by blunting the incentives for managers to win market share from rival firms.

But while common ownership can do harm without any illegality, it also increases the incentives for managers to actively seek to constrain competitive behaviour by forming cartels or entering into other anti-competitive arrangements (Greenspon, 2019). As Ennis

(2014) shows, only around one in five cartels are discovered, so a manager who enters into such an arrangement is odds-on not to be caught. Moreover, the probability of detection is presumably lower in the presence of common ownership. Commonly owned firms could also subtly reduce competition through corporate communications, including the sharing of information between shareholders (Park, Sani, Schroff and White, 2019; OECD, 2017; Greenspon, 2019).

How are managers made aware of the interests of their common owners? Shareholders can influence managers by direct engagement, voting on board membership, and incentives such as executive remuneration. Large shareholders – including institutional investors – engage on a regular basis with management teams. Managers therefore have an incentive to present a strategic plan that aligns with their largest shareholders' wishes. In effect, managers are internalizing the objectives of their shareholders, including shareholders' objectives regarding other firms (Elhauge, 2018; Azar, 2017; Anton, Ederer, Gine and Schmalz, 2018). Elhauge (2020) argues that it is virtually costless for institutional investors to influence a firm's competitive behaviour through voting on corporate governance matters.

Schmalz (2015) provides a case study of the way in which this might occur. In 2015, an activist hedge fund campaigned to have DuPont's management take a more aggressive approach to winning market share from its major competitor, Monsanto. The campaign was opposed by institutional investors, including BlackRock and Vanguard. Upon the news that the activist campaign against DuPont had been defeated, Monsanto's shares rose 3.5 percent. Schmalz infers that these institutional investors voted to maximise the value of their entire portfolio, which included significant stakes in both DuPont and Monsanto.

Documenting the channels through which common owners affect competition, Shekita (2020) uses public domain sources to identify thirty cases of common owner intervention across a broad set of industries including pharmaceuticals, oil and gas, banking and ride-hailing services. Shekita classifies these interventions into three categories: voice, executive compensation, and voting. For example, in 2019 BlackRock recorded 2,050 engagements with 1,458 companies in 42 different markets.

Common ownership has some similarity with the situation in which consumers mistakenly think that brands are competitors, when in reality they have the same corporate owner. Examples of 'faux competitors' include Adidas and Reebok, Taco Bell and Pizza Hut, and Dove and Lux. The variety of beers on offer in many pubs belies the fact that the top two

manufacturers control around nine-tenths of the Australian market. It would be a mistake to analyse competition in such markets at the brand level, thereby ignoring the corporate structure. Similarly, ignoring overlapping ownership may lead regulators to adopt an overly rosy picture of the true competitive environment.

A significant driver of common ownership has been the rise of institutional investors, particularly index funds. Institutional investors allow small-scale savers the opportunity to invest through a diversified portfolio, but they also benefit considerably from economies of scale. One of either BlackRock, Vanguard, or State Street is the largest shareholder in 88 percent of S&P 500 companies. They are the three largest owners of most DOW 30 companies (Greenspon, 2019). Their representation among the top 10 shareholders of U.S. corporations has skyrocketed since the 1990s (Greenspon, 2019).

To date, most of the literature on common ownership has focused on the United States (an exception is Burnside and Kidane 2020, who explore common ownership in Europe, and find it to be less prevalent than in the United States). We provide the first estimates of common ownership of competing firms in Australia and show the extent to which common ownership increases the effective extent of market concentration. Matching data on market shares and financial market shareholdings, we calculate three measures of common ownership: the proportion of firms with common owners, the weight that firms place on their competitors' profits, and the Modified Herfindahl-Hirschman Index (MHHI), a measure of market concentration that accounts for the impact of common ownership. Our analysis covers 443 industries, with combined revenue equivalent to around 70 percent of Australian Gross Domestic Product.

To preview our results, we find that 49 out of 443 industries exhibit common ownership. At a minimum, this means that a single shareholder owns 5 percent of two of the largest four firms. Industries with common owners are among the largest in Australia, collectively representing 36 percent of total revenues across the 443 industries. Among the subset of firms where we can identify at least one owner, 31 percent share a substantial owner with a rival company. We estimate that if listed firms seek to maximise the value of their investors' portfolios, then they place the same value on $3.70 of their competitors' profits as on $1 of their own profits. However, given data limitations, this finding should be treated as merely an approximation.

Weighting by industry revenues, common ownership causes the HHI measure of

concentration to rise by 21 percent. In industries that exhibit some degree of common ownership, the effect is much larger: averaging a 60 percent increase in market concentration. Accounting for common ownership more than doubles the estimate of market concentration for four industries: commercial banking, fund management services, money market dealers and general insurance. Common ownership increases estimated concentration by over 50 percent for eight industries: concrete product manufacturing, copper ore mining, department stores, electricity retailing, explosives manufacturing, fuel retailing, gas supply and motor vehicle dealers.

It is important to be clear about the limitations of our paper, which merely documents the existence of common ownership in Australia. As will become clear, this is a non-trivial empirical undertaking, but it falls well short of providing a complete picture of common ownership. There are, as Backus, Conlon and Sinkinson (2021a) put it, 'myriad empirical gaps in the argument left to fill'. We hope that that our work will help pique the interest of other scholars, who will improve on our estimates of the extent of common ownership, analyse the channels through which common owners affect corporate behaviour, and explore whether firms with horizontal shareholdings tend to behave differently from those without common owners.

The remainder of our paper is structured as follows. In section 2, we outline and discuss several illustrative examples of common ownership. In section 3, we discuss techniques for measuring common ownership. In section 4, we outline the available data for calculating common ownership in Australia. In section 5, we formally analyse the extent of common ownership across the economy. The final section concludes with a discussion of the implications of our findings on common ownership for competition policy in Australia, and some specific suggestions for further research.

2. Examples of Common Ownership

To illustrate the issue of common ownership, Table 1 shows the ownership patterns across five industries: commercial banking, explosives manufacturing, fuel retailing, general insurance and iron ore mining. In banking, BlackRock and Vanguard are among the top three investors for all four major banks. In explosives manufacturing, Vanguard is a common owner in Orica, Incitec Pivot and Downer EDI while BlackRock and Harris Associates LP

are common owners of Orica and Incitec Pivot. Vanguard is a common owner in three major fuel retailers — Coles Group, Caltex and Woolworths Group — with BlackRock a common owner of both Caltex and Woolworths Group. In general insurance, BlackRock and Vanguard are common shareholders across Insurance Australia Group, Suncorp Group and QBE Insurance Group. In iron ore mining, BlackRock is a common owner of both Rio Tinto and BHP Group.

Table 1: Examples of Industries with Common Owners
Table shows all shareholders with an ownership stake of 5 percent or more as at 12 December 2019

Panel A: Commercial banking

Commonwealth Bank	Westpac	NAB	ANZ
BlackRock (5%)	BlackRock (5%)	BlackRock (5%)	BlackRock (6.1%)
Vanguard (5%)	Vanguard (5%)	Vanguard (5%)	Vanguard (5%)

Panel B: Explosives manufacturing

Orica	Incitec Pivot	Downer EDI	MAXAM Explosives
Harris Associates LP (7.4%)	Schroder Investment Management (9.8%)	AustralianSuper (8.2%)	N/A (private overseas company)
BlackRock (6%)	Harris Associates LP (8.5%)	T Rowe Price Associates (5%)	
Vanguard (5%)	Perpetual Limited (5.8%)	FIL Limited (5.1%)	
AustralianSuper (5%)	Vanguard (5%)	Vinva Investment Management (5%)	
	BlackRock (5%)	Vanguard (5%)	

Panel C: Fuel retailing

Coles Group	Caltex	Woolworths Group	7-Eleven Stores
Wesfarmers Limited (15%)	BlackRock (6.1%)	BlackRock (6.4%)	N/A (private company)
Vanguard (5%)	AustralianSuper (5.2%)	Vanguard (5%)	
	Vanguard (5%)		

Panel D: General insurance

Insurance Australia Group	Suncorp Group	QBE Insurance Group	Allianz Australia
Vanguard (5.1%)	BlackRock (6%)	Vanguard (6.1%)	N/A (overseas listed)
BlackRock (5.1%)	FIL Limited (5.5%)	BlackRock (6%)	
	Vanguard (5%)		

Panel E: Iron ore mining

Rio Tinto	BHP Group	Fortescue Metals Group	Hancock Prospecting
Shining Prospect Pte Ltd (10.3%)	BlackRock (6%)	The Metal Group Pty Ltd (35.2%)	N/A (private company)
BlackRock (6.2%)	Elliott Capital Advisors LP (5.5%)	Hunan Valin Group (13.1%)	
Vanguard (5%)		Magnitogorsk Iron and Steel Works (5.4%)	
		The Capital Group Companies, Inc (5.1%)	

3. Techniques for Measuring Common Ownership

One measure of the impact of common ownership is the MHHI, which estimates the impact of common ownership on market concentration. Where s_j is the market share of firm j, the HHI is expressed as:

$$HHI = \sum_j s_j{}^2 \tag{1}$$

By convention, market shares are expressed on a scale from 0 to 100. If one firm has a 100 percent market share, the HHI is simply $100^2=10,000$. If two firms have 50 percent shares, the HHI is $2\times50^2=5,000$. With an infinitely large number of equally sized firms, HHI$\rightarrow$0.

The MHHI is the sum of the HHI and the MHHI delta, a term that captures the extent to which competitors are connected by common ownership and control. The MHHI delta is a function of β_{ij}, the share of firm j that is owned by investor i, and γ_{ij}, the share of firm j that is controlled by investor i. β_{ij} and γ_{ij} can either be expressed on a scale from 0 to 1, or 0 to 100 (the scale becomes irrelevant because the numerator and denominator cancel out). Subscript k indexes firm j's competitors.

To estimate the MHHI delta, we take each pair of competitors, and sum the products of the γ_{ij} and β_{ik} (the control share of firm j and the ownership share of firm k), then divide that sum by the products of γ_{ij} and β_{ij} (the control share of firm j and the ownership share of firm j). This is then multiplied by the product of the market shares of the two competitors.

$$MHHI = \underbrace{\sum_j s_j^2}_{HHI} + \underbrace{\sum_j \sum_{k \neq j} s_j s_k \underbrace{\frac{\sum_i \gamma_{ij}\beta_{ik}}{\sum_i \gamma_{ij}\beta_{ij}}}_{Profit\ weight}}_{MHHI\ delta} \tag{2}$$

The first term to the right of the equals sign is the HHI. The second term is the MHHI delta.

Two examples help illustrate the MHHI. Suppose that two firms, each with 50 percent of the market, are purchased by a common owner, which exercises full control over both. In this case, $\gamma_{ij} = \beta_{ij} = \beta_{ik} = 1$. Thus the MHHI delta is $2\times50^2=5,000$. With an HHI of 5,000, the MHHI is 10,000. This reflects the reality that the common owner is indifferent between profits earned by either firm, and can therefore be expected to run the two firms in the same manner as a single monopoly.

A second example (adapted from Backus, Conlon and Sinkinson 2021a) illustrates the role

that other shareholders play in calculating the MHHI. Suppose that the two firms still have a 50 percent market share, but now imagine that they have the ownership structure set out in Table 2, involving three substantial investors. Investor 1 owns and controls 10 percent of both firms. Investors 2 has 10 percent of Firm 1, but no stake in Firm 2. Investor 3 has 10 percent of Firm 2, but no stake in Firm 1. The remaining 80 percent of each firm is held by small investors, who are presumed not to coordinate with one another.

Table 2: Hypothetical Ownership Structure

	Firm 1 (%)	Firm 2 (%)
Investor 1 (common investor)	10	10
Investor 2 (ordinary investor)	10	0
Investor 3 (ordinary investor)	0	10
Retail investors	80	80

As before, the HHI is 5,000. But now there are both ordinary and common investors to consider. In the case of the common investor (Investor 1), $\gamma_{ij} = \beta_{ij} = \beta_{ik} = 0.1$. In the case of the ordinary investors (Investors 2 and 3), $\gamma_{ij} = \beta_{ij} = 0.1$, while $\beta_{ik} = 0$. This allows us to calculate the MHHI delta as $2 \times 50^2 \times \frac{0.1^2}{0.1^2 + 0.1^2} = 2,500$. Summing the HHI and MHHI delta gives an MHHI of 7,500.

As Backus, Conlon and Sinkinson (2019) point out, a useful way to think about the fractional term in the MHHI delta is in terms of *profit weights*, meaning the weight that one firm puts on its competitors' profits. Profit weights are derived through the framework of Rotemberg (1984) in which firms seek to maximise the total profits of their shareholders. In the absence of common ownership, firms place zero weight on their competitors' profits. If firms are fully owned by the same common owner, they place the same weight on their competitors' profits as they do on their own profits. Numerically, if own-profit weight is normalised to 1, then competitor-profit weight in the case of firms fully owned by the same common owner would also be 1. A profit weight of 0 corresponds to what we would expect in a world of profit-maximising firms, while a profit weight of 1 is what a firm would place on the profits of a newly acquired subsidiary. Backus, Conlon and Sinkinson (2021a) argue that because profit weights start with the firm's objective function, they offer a fully general path forward for the study of common ownership.

Recall the first of our hypothetical examples, in which two firms are under the sole control of a single shareholder. In that case, firms place the same weight on $1 of their competitor's profits as on $1 of their own profits. In our second hypothetical example, in which each firm

has both a common investor (with a 10 percent stake) and an ordinary investor (with a 10 percent stake), the profit weights equal 0.5. Intuitively, this means that each firm places as much value on $2 of profits earned by its competitor as on $1 of its own profits. Empirically, Backus, Conlon and Sinkinson (2021a) show that across S&P 500 companies, the average weight that firms place on their competitors' profits grew from 0.2 in 1980 to 0.7 in 2017.

It is important to note a subtle feature of the profit weight term. Because retail investors are presumed not to coordinate their voting, competitor profit weights can be extremely high if the common owners are the only substantial shareholders. Indeed, in the event that a common investor is the only substantial investor, the competitor profit weight will equal 1, regardless of the size of the investor's holding in each firm. Backus, Conlon and Sinkinson (2019) present some evidence to justify the omission of 'mum and dad' investors, citing a study that found institutional investors cast their votes 91 percent of the time, while retail investors voted just 29 percent of the time.

4. Data Sources and Limitations

Unlike measures of the market share of the top firms, precise estimation of the HHI requires market share data for the full universe of firms. In principle, one could use the Australian Bureau of Statistics' Business Longitudinal Analysis Data Environment (BLADE), but these data do not include shareholdings, and matching shareholdings from external sources creates confidentiality problems that are difficult to resolve within the BLADE environment.

Instead, we source market share data from IBIS World Industry Reports, making adjustments to account for the fact that we do not observe all firms. Two alterations are made in compiling this dataset. First, given we are interested in competition between private firms, industries in which a national or sub-national government controls a third of the market or more are excluded. This excludes eight industries: nature reserves, ambulance services, public general hospitals, correction and detention services, police and firefighting, postal services, health services, education and training, and hydro-electricity generation. Second, industries for which market share data are not available for any firms are also excluded. This results in the exclusion of around 40 industries. In total, we analyse 443 industries, a substantial representation of the Australian economy. The IBIS World Industry Reports we use are the most recent available as at 10 November 2019.

A limitation of IBIS World Industry Reports is that they include market share data for only the largest firms – typically, the largest four firms. This is true for other private datasets such as those from MarketLine or BMI Research, and public datasets such as the World Bank's Global Financial Development Database – so in principle our approach could be used by researchers analysing those datasets. In recent years, IBIS World also reports the total number of firms in the industry, which allows us to make assumptions about the distribution of firm sizes outside the top four.

In general, the distribution of firm sizes has been shown to follow a Zipf distribution (Axtell 2001). We therefore assume that the unobserved firms in each industry follow such a pattern. Our starting point is the largest of the unobserved firms (at the 1st percentile of the unobserved distribution), which we assume to have a market share that is 0.1 percent smaller than the smallest observed firm. Moving along the distribution, for a firm at the yth percentile, we assume that its market share is $1/y$ as large as the firm at the 1st percentile. For example, we assume that a firm at the 2nd percentile is half as large as the firm at the 1st percentile, that a firm at the 50th percentile is 1/50th as large as a firm at the 1st percentile, and that a firm at the 100th percentile is 1/100th as large as the firm at the 1st percentile. We populate the dataset with the (known) number of firms, ensuring that the total market share of the unknown firms matches the share of the market that remains once we get beyond the largest firms.

Our main focus is on the impact of common ownership on the HHI (rather than on the HHI itself), so we do not expect our main findings to be especially sensitive to this approach to calculating the HHI. As Naldi and Flamini (2014a) show, knowing the market shares of the largest firms permits a fairly precise estimate of the HHI. Across a range of datasets, the correlation between the market share of the largest four firms and the HHI exceeds 0.9. Naldi and Flamini (2014b) show that it is possible to estimate upper and lower bounds for the HHI, based on knowing the market share of the largest firms and the total number of firms in the market. As a robustness check, we re-estimate our results using either the lower bound or the upper bound for the HHI (see Appendix). As expected, this makes no qualitative difference to our results.

With this assumption about the market shares of remaining firms, we calculate the HHI for 443 industries and calculate an average for the Australian economy (weighted by industry revenues, also given by IBIS World's reports). We then identified the firms in these industries that are listed on the Australian Stock Exchange. For each listed firm, we match

shareholding data using substantial holding reports from the MorningStar database. This requires considerable data cleaning. Some shareholder names contain misspellings. Minor differences must be made consistent (eg. Ltd versus Limited). One entry in the MorningStar database suggested that the National Australia Bank had a 6 percent shareholding in itself. When we inquired about this, MorningStar acknowledged that it was an error, and we omit it from our analysis. We also explored using substantial shareholder listings in annual reports, but quickly discovered that these tend to be less accurate than notifications from substantial shareholders themselves. This appears to be a function of both the penalty regime and the focus of the regulator (see ASIC 2020b).

While it would have been prohibitively time-consuming to fully check the MorningStar database against substantial shareholder notifications lodged with the Australian Stock Exchange, we did check the shareholdings for the major firms in the five industries listed in Table 1. Across these holdings, we identified four errors, three of which were minor (the remaining error was the National Australia Bank mistake described above).[3] This provided us with some reassurance that the MorningStar database is largely accurate. Note that our MorningStar extract was taken on 12 December 2019, in order to best match the IBIS World Industry Reports data on market share. Corporate shareholdings change over time, so our data will not precisely match the substantial shareholders after this date.

We also drop nominee shareholders given they hold shares on behalf of others; they are custodians rather than beneficial owners. To identify nominee shareholders, we rely on the expertise of Dean Paatsch, co-founder of Ownership Matters, a firm that specialises in a corporate governance research. This involves some fine judgment calls. For example, we drop shareholder disclosures by 'National Nominees', but code disclosures of 'National Nominees (Australian Ethical)' as being held by Australian Ethical, a superannuation fund. We drop all holdings where the shareholder is identified as 'State Street', since we cannot distinguish instances in which State Street operates as a fund manager from those in which it operates as a holding company.[4]

Under Australian law, shareholders are required to publicly report their holdings if they own 5 percent or more of a publicly traded company (a level known as the 'substantial holding threshold'). This is standard across advanced countries, but represents less investor disclosure than in the United States, where investment managers with over $100 million in holdings are required to disclose all their holdings. US disclosure takes place via quarterly '13(f) filings' to the Securities and Exchange Commission. In 2017, the $100 million threshold covered

around 4000 investment managers. In their analysis, Azar, Schmalz and Tecu (2018) also omit shareholders with less than 0.5 percent of a given firm, on the basis that such shareholders have no weight in the firm's objective function (though they show that their results are not sensitive to this assumption).

How is the omission of shareholders with stakes between 0.5 percent and 5 percent likely to affect our analysis? Doubtless there will be some common investors who have shareholdings below the 5 percent threshold, including those who strategically keep their investments below 5 percent to avoid mandatory reporting requirements. But there will also be some shareholders that do not have common ownership which are omitted by our analysis. As we have seen, the MHHI delta is a function of the size of common owners *relative to other substantial shareholders*. Consequently, the biases could go either way: the omission of an investor with a 4.9 percent holding in multiple firms will bias the MHHI delta downwards (since it ignores an additional common owner). But in the presence of some common ownership, the omission of an investor with a 4.9 percent holding in a single firm will bias the MHHI delta upwards (since it ignores a substantial shareholder that would counter the voting behaviour of the common owners). Because the mix of investors differs substantially across countries, it is unlikely that analysis of US data could reveal the likely bias in the Australia data.[5]

Four other limitations of our ownership data are worth noting. First, as with the US studies, we do not have data on the ownership of privately held or overseas-listed companies, so we will miss instances in which investors own rival private or foreign-listed firms. Given there may be significant common ownership among firms that are not listed on the Australian Stock Exchange, this omission likely understates the extent of common ownership in Australia.

Second, because IBIS World only reports the largest firms in an industry, there may be other listed firms not included in our dataset that have common ownership (our analysis does not account for overlapping ownership of firms beyond those listed by IBIS World). If there are a substantial number of smaller firms which have the same owners, then this omission would also understate the true extent of common ownership in Australia.

Third, our approach does not take account of instances in which common owners themselves have common owners (eg. when a firm is partially owned by a bank that itself is partly owned by an index fund). This omission also potentially understates the true extent of common

ownership in Australia. For example, an index fund may directly own shares in competitor A, and also own shares in a bank that holds a substantial stake in competitor B. Our analysis would capture the direct holding in A, but not the indirect holding in B, and would therefore understate the true extent of common ownership.

A fourth limitation relates to market definition. Measuring market concentration requires data on market shares, and that data inevitably comes with pre-defined markets. Ideally, market definition would be determined based on the underlying economics. Specifically, whether two firms compete in the same market hinges on the degree of substitution between the things they produce.[6] The degree of substitutability is, in part, influenced by how specialized the product is, whether firms are within the same geographic market, and whether firms operate at the same functional level (retail, wholesale, distribution or manufacturing). By contrast, using market share data from IBISWorld means we are implicitly adopting IBISWorld's definitions of these markets which, in turn, are based on the Australian and New Zealand Standard Industrial Classification which closely align to the North American Industry Classification System. Such an approach, however, is imperfect since it implicitly adopts their industry categorization.[7] IBISWorld, for example, assumes that all markets are national markets. Because of these data limitations, our results should be regarded as less precise than corresponding estimates from the United States. The exact impact that this would have on our results is ambiguous. A country town with only two hairdressers that are owned by the same person would report high levels of market concentration and common ownership if the market was defined as being restricted to that local town. If the market was considered to be a national market then both market concentration and common ownership would be substantially reduced. Conversely, the IBIS World market definitions would inflate both market concentration and common ownership if it treated two products as being in separate markets (e.g. soft drink and energy drinks) when in reality consumers regarded them as substitutes.

5. Estimating the Impact of Common Ownership on Market Concentration

When we search for common owners across the largest firms in each of the 443 industries identified by IBIS World, we find 49 industries in Australia which have common ownership. Although this is only 11 percent of total industries, they collectively account for 36 percent of total industry revenues across Australia. They include health insurance, supermarkets and

grocery stores, fuel retailing, plumbing goods wholesaling, fertilizer manufacturing and copper ore mining. The common owners are overwhelmingly institutional investors. Ninety-two percent of the time, the common owners are either Vanguard (51 percent of the time) or BlackRock (41 percent of the time).

The 49 industries with common ownership tend to be more concentrated than those without common ownership. The average HHI in industries with common ownership is 1202, which is 238 points higher than in industries without common ownership, where the average HHI is 964 (these averages are not weighted for revenue).

As a starting point, we ask the question: conditional on a firm having at least one substantial owner, what is the probability that the firm has at least one owner in common with one of its rivals? And how does this probability vary with the number of owners we observe? The results from this exercise are set out in Table 3. Across all 402 firms with at least one substantial shareholder, 31 percent have some degree of common ownership with another firm in the same industry. This figure is lowest for firms with only a single substantial owner (5 percent), and highest for firms with two substantial owners (43 percent).

Because we do not observe ownership stakes below 5 percent, the analysis in Table 3 omits instances in which, for example, a common owner has a 4 percent share of one firm and a 6 percent share of another firm in the same industry. Among the 402 firms analysed in Table 3, it is therefore likely that the true extent of common ownership exceeds 31 percent.

Table 3: Prevalence of Common Ownership Across Firms		
Number of substantial shareholders	Proportion of firms that share at least one owner with a rival (%)	Number of firms in this category
1 or more	31	402
1	5	19
2	43	121
3	32	71
4	30	61
5 or more	22	130

We also calculate the profit weight for every pair of firms in the dataset. Recall that the profit weight denotes the weight that a firm puts on its competitor's profits. For example, a profit weight of 0.1 means that a firm places the same weight on $10 of its competitor's profits as on $1 of its own profits. By definition, profit weights are zero where either firm in the pair is a private or overseas-listed company (since we only observe the ownership of listed

Australian firms). We then average each firm's profit weights (with each of its competitors in a given industry) to derive a single profit weight for each firm within a given industry. Since IBIS World lists four firms for most industries, most firms' overall profit weights are an average of three pairwise profit weights (for each of their three competitors).

Averaging across all listed firms in our dataset, we estimate the average profit weight is 0.10. If we weight firms by their revenue, the average profit weight for listed firms is 0.27, which is our preferred estimate. Taking the inverse of the profit weight (1/0.27) implies that if listed firms seek to maximise the value of their investors' portfolios, then they place the same value on $3.70 of their competitors' profits as on $1 of their own profits. Comparing this figure with the estimate of Backus, Conlon and Sinkinson (2021a) for the S&P 500, the estimated average profit weight of 0.27 for listed Australian firms is close to the average profit weight for large US firms in 1980 (0.2), and considerably below the average profit weight of listed US firms in 2017 (0.7) (although the data limitations discussed earlier could skew the Australian results in either direction).

All estimates of profit weights depend crucially on the assumption that firms maximise the total profits of their shareholders. There are multiple reasons why this may not occur, including the possibility that institutional investors have less influence than the model suggests, that institutional investors do not in fact wield their power for anti-competitive ends, or that corporate managers do not acquiesce to such pressure. For an empirical test of whether the profit weight approach predicts pricing decisions in the US breakfast cereal market, see Backus, Conlon, and Sinkinson (2021b). In the case of the Australian estimates, the available data also limits the precision of profit weight estimates. All these factors should lead our profit weight estimates to be regarded as merely suggestive; hopefully to be further refined by future research.

We turn now to estimate the MHHI for each industry, which is a function of both profit weights and market shares. We find that common ownership has a substantial effect on effective market concentration. Weighting by industry revenues, we find that across all industries, the average MHHI (which accounts for common ownership) is 21 percent higher than the average HHI. Among those industries which exhibit some degree of common ownership, the average MHHI is 60 percent higher than the average HHI (again, weighting by industry revenues). Table 4 sets out the HHI and MHHI for the 49 industries that exhibit common ownership, sorted in descending order of the degree to which common ownership increases effective market concentration. The largest increases are for commercial banking,

where the MHHI is 281 percent higher than the HHI, money market dealers, where the MHHI is 255 percent higher than the HHI, and fund management services, where the MHHI is 140 percent higher.
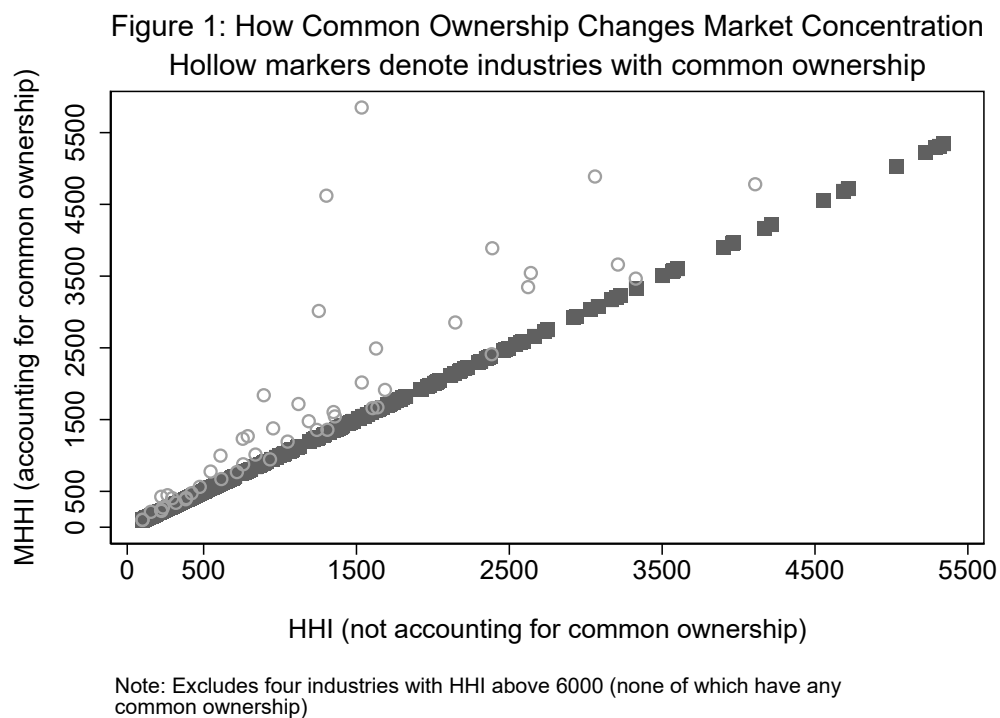
Table 4: Market Concentration and Effective Market Concentration in Industries with Common Ownership			
Industry	HHI	MHHI	% change
Commercial banking	1534	5850	281
Money market dealers	1303	4621	255
Fund management services	1254	3014	140
General insurance	893	1840	106
Motor vehicle dealers	223	425	91
Superannuation funds management services	264	446	69
Fuel retailing	610	998	64
Gas supply	756	1233	63
Explosives manufacturing	2388	3889	63
Electricity retailing	789	1269	61
Department stores	3061	4888	60
Concrete product manufacturing	1121	1717	53
Copper ore mining	1628	2491	53
Fossil Fuel Electricity Generation	955	1378	44
Financial planning and investment advice	546	776	42
Retail Property Operators in Australia	155	215	39
Consumer Goods Retail in Australia	294	405	38
Plaster product manufacturing	2641	3543	34
Iron ore mining	2147	2854	33
Fertilizer manufacturing	1535	2017	31
Liquor retailing	2623	3347	28
Insurance brokerage	1188	1478	24
Basic inorganic chemical manufacturing	839	1013	21
Life insurance	1350	1605	19
Hardware Wholesaling in Australia	475	562	18
Mineral Exploration in Australia	234	276	18
Bauxite mining	4109	4780	16
Oil and gas extraction	758	877	16
Alumina Production in Australia	3211	3661	14
Computer and software retailing	1049	1194	14
Metal Roof and Guttering Manufacturing	1359	1544	14
Health insurance	1687	1914	13
Timber wholesaling	421	474	13
Internet publishing and broadcasting	1241	1357	9
Gold ore mining	616	671	9

Table 4: Market Concentration and Effective Market Concentration in Industries with Common Ownership			
Industry	HHI	MHHI	% change
Glass Wool, Stone and Non-Metallic Mineral Product Manufacturing in Australia	222	240	8
Mortgage brokers	718	769	7
Citrus, banana and other fruit	319	340	7
Superannuation funds	385	406	5
Office Property Operators in Australia	100	104	4
Clay brick manufacturing	3327	3465	4
Hardware and building supplies retailing	1310	1358	4
Iron smelting and steel manufacturing	1605	1661	3
Plumbing goods wholesaling	1637	1671	2
Ceramic Product Manufacturing in Australia	383	390	2
Mining Support Services in Australia	224	228	2
Industrial and Other Property Operators in Australia	100	101	1
Plastic pipe and plastic packaging material Manufacturing	934	946	1
Supermarkets and grocery stores	2385	2411	1

Of particular interest is whether there are industries in which there is a lot of common ownership that currently receive limited attention from regulators. The US Department of Justice (2018) applies a rule of thumb that an HHI over 1,500 implies a relatively concentrated industry while an HHI above 2,500 implies a highly concentrated industry. Furthermore, the Department's merger guidelines make clear that it uses these thresholds for guidance in terms of which mergers may cause competition concerns. Specifically, the guidelines state that 'Transactions that increase the HHI by more than 200 points in highly concentrated markets [those with a HHI > 2,500] are presumed likely to enhance market power'. The same is true in Australia. The Australian Competition and Consumer Commission's merger guidelines state that 'the ACCC will generally be less likely to identify horizontal competition concerns when the post-merger HHI is less than 2000' (ACCC, 2008).

Naturally, policymakers should not purely focus on the MHHI, which has a different conceptual basis than the HHI. Even if our estimates of the MHHI were not affected by the data limitations we outline in section 4, it would still make sense for policymakers to consider both the HHI and the MHHI. Still, it is interesting to see how the MHHI differs from the HHI, with reference to the (admittedly arbitrary) thresholds of 1,500 and 2,500.

Across the Australian economy, using the Department of Justice thresholds, nine industries

are in a different category for the MHHI than the HHI. General insurance, concrete product manufacturing, life insurance, and metal roof and guttering manufacturing are unconcentrated on the HHI, but relatively concentrated on the MHHI. Commercial banking, iron ore mining and explosives manufacturing are relatively concentrated on the HHI, but highly concentrated on the MHHI. Money market dealers and fund management services are unconcentrated on the HHI, but highly concentrated on the MHHI. Under both the Australian and US merger guidelines, all these industries would attract more attention from the regulators under the HHI compared to the MHHI. In Figure 1, we plot for each industry the HHI and MHHI. Industries on the diagonal (with solid markers) have no discernible common ownership. Industries above the diagonal (denoted with hollow markers) have some degree of common ownership. The further an industry is above the diagonal line, the more that common ownership affects market concentration.

Figure 1: How Common Ownership Changes Market Concentration
Hollow markers denote industries with common ownership

Note: Excludes four industries with HHI above 6000 (none of which have any common ownership)

6. Implications of Common Ownership

The rise of common ownership has been linked to uncompetitive outcomes in airlines, banking and pharmaceuticals. At the economy-wide level, common ownership has been linked to rising inequality, declining rates of investment, rising executive remuneration and a fall in the labour share. Understanding the extent to which common ownership of competing firms exists in Australia is particularly important given the economy has relatively

concentrated markets.

In this paper, we provide the first estimates of the extent of common ownership in Australia. Combining data on market shares and shareholding information for firms in 443 Australian industries, we search for instances of common ownership across competing firms, and report three metrics of common ownership. Conditional on observing at least one substantial shareholder, 31 percent of firms share an owner with one of their major rivals. We find that about one-tenth of industries (representing one-third of total output) exhibit common ownership. For the Australian economy as a whole, we estimate that common ownership increases effective market concentration by 21 percent. If listed firms seek to maximise the value of their investors' portfolios, then they place the same value on \$3.70 of a competitor's profits as on \$1 of their own profits. Once again, it is worth noting that data limitations mean that our results should be treated as ballpark estimates, upon which future researchers will hopefully improve as more information becomes available.

As we have noted, the contribution of our paper is essentially to identifying the presence of common ownership in Australia. This leaves open a range of other important research questions. From a corporate governance perspective, it would be valuable to know more about the influence of large minority shareholders over board decisions, the processes that guide institutional investors in their voting and engagement with firms, and the relationship between boards and management on competition matters. From a legal standpoint, it would be useful for researchers to explore how the law shapes the decisions of investors, boards and managers when deciding how aggressively firms should engage in competition with their rivals. From an economic perspective, it would be instructive to know more about whether there is any relationship between firm behaviour and common ownership in Australia, as has been observed in the US banking and airline industries (the industries in Table 1 might provide a useful starting point for such research in the Australian context).

Given that common ownership is largely driven by the rise of institutional investors, any problems may well grow over coming decades. The rise of index investing appears inexorable, as savers recognise that index funds tend to produce higher returns than actively managed funds. But because index investing offers significant returns to scale, it increases the risk that a few behemoth institutional investors dominate the industry – and consequently end up holding large stakes in competing firms.

Because of this risk, policymakers and regulators should actively monitor common

ownership, and produce regular estimates of its impact on the effective degree of market concentration. In adjudicating merger requests and foreign investment proposals, it may be appropriate to consider both the MHHI and the HHI in assessing the degree of concentration in a market. In addition, the direct engagement and voting patterns of large institutional investors merit scrutiny, given the possibility that they aim to maximise the profitability of their total portfolio rather than the profitability of each constituent firm.

Finally, the potential for common ownership to undermine competitive markets suggests that there should be more transparency about who owns listed firms. A register of beneficial ownership would provide important insights into the overlapping ownership of Australian firms. Another option would be to reduce the threshold at which substantial shareholdings are reported from 5 percent to 1 percent (although to date the Australian Securities and Investments Commission has shown little interest in such an approach: see ASIC 2020a).

In recent decades, the United States has provided more transparency on share ownership than most other advanced nations. While OECD financial regulatory authorities generally use a threshold of 5 percent as the point at which substantial shareholdings must be reported (Capobianco 2017, 44), the United States additionally requires full disclosure of investments by investors whose portfolios exceed $100 million. However, the United States is now likely to substantially reduce the available data on common investment. In July 2020, the Securities and Exchange Commission issued a proposed rule increasing the reporting threshold from investors with $100 million or more in assets to investors with $3.5 billion or more in assets. If brought into force, it will lead to considerable imprecision in researchers' estimates of the extent of common ownership in the United States. In considering the appropriate disclosure threshold, researchers should take account not only of the administrative burden on investors, but also the public policy value of being able to accurately estimate common ownership. Only by 'following the money' is it possible to get a true understanding of the competitive landscape.

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Appendix: Estimating Upper and Lower Bounds for the HHI, Given Incomplete Market Share Information

Naldi and Flamini (2014b) show that if we know the market shares of the largest firms, and the total number of firms in the market, then it is possible to estimate lower and upper bounds on the HHI. This allows researchers, for example, to estimate bounds on the HHI given the four-firm concentration ratio and the total number of firms in the market.

For most markets, the IBIS World dataset that we use contains for the shares of each of the largest four firms, but for some industries it lists more of the largest firms. We therefore present the formulas for the HHI bounds in their general form, rather than for the special case in which there are four known firms.

Where s_i is the market share of firm i, N is the total number of firms in the market, and M is the number of firms whose market share is known, we can define the market share of the unknown firms as:

$$R = 1 - \sum_{i=1}^{M} s_i \tag{3}$$

We can also define the ratio of the market share of the unknown firms to the market share of the smallest known firm as:

$$Q = \frac{R}{s_M} \tag{4}$$

The HHI is lower the more equally the market is shared, so the lower bound is defined by the case in which the unknown firms equally share the remainder of the market:

$$Lower\ Bound = \sum_{i=1}^{M} s_i^2 + \frac{R^2}{N - M} \tag{5}$$

The upper bound is slightly more complicated. The HHI is at its maximum when the market is concentrated in the smallest possible number of firms. This leads to two cases.

If $R \leq s_M$, the upper bound is the case in which all the residual market share is assigned to the (M+1)st company.

$$Upper\ Bound\ (R \leq s_M) = \sum_{i=1}^{M} s_i^2 + R^2 \tag{6}$$

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Alternatively, if R>s_M, the upper bound is the case in which the residual market share is allocated among the smallest possible number of the unknown firms. This will be the case in which a handful of unknown firms each have the same market share as the Mth company. There will be Q such firms. In this instance, the upper bound is:

$$Upper\ Bound\ (R > s_M) = \sum_{i=1}^{M} s_i^2 + s_M^2 Q + \left(1 - \sum_{i=1}^{M} s_i - s_M Q\right)^2 \qquad (7)$$

Appendix Table 1 repeats the analysis in Table 4, showing for each industry the lower bound for the HHI, the upper bound for the HHI, and the change in the HHI as a result of common ownership (in Table 4, ΔHHI was the difference between the HHI and the MHHI). Industries appear in the same order in Appendix Table 1 as in Table 4.

Appendix Table 1: Bounds on Market Concentration in Industries with Common Ownership			
Industry	HHI (lower bound)	HHI (upper bound)	ΔHHI
Commercial banking	1496	1833	4316
Money market dealers	1243	1608	3318
Fund management services	1179	1352	1761
General insurance	761	1112	946
Motor vehicle dealers	143	223	203
Superannuation funds management services	133	264	183
Fuel retailing	559	828	388
Gas supply	634	891	477
Explosives manufacturing	2353	2388	1500
Electricity retailing	693	943	480
Department stores	3059	3085	1828
Concrete product manufacturing	1096	1345	597
Copper ore mining	1604	1741	863
Fossil Fuel Electricity Generation	782	1153	423
Financial planning and investment advice	485	739	231
Retail Property Operators in Australia	67	155	60
Consumer Goods Retail in Australia	221	299	111
Plaster product manufacturing	2635	2666	902
Iron ore mining	2128	2281	707
Fertilizer manufacturing	1495	1535	482
Liquor retailing	2616	2687	724
Insurance brokerage	1140	1476	290
Basic inorganic chemical manufacturing	750	1153	174
Life insurance	1315	1538	255
Hardware Wholesaling in Australia	404	475	88

Appendix Table 1: Bounds on Market Concentration in Industries with Common Ownership			
Industry	**HHI (lower bound)**	**HHI (upper bound)**	**ΔHHI**
Mineral Exploration in Australia	45	308	42
Bauxite mining	4108	4110	672
Oil and gas extraction	708	956	119
Alumina Production in Australia	3167	3211	451
Computer and software retailing	1006	1181	144
Metal Roof and Guttering Manufacturing	1237	1361	186
Health insurance	1657	1797	227
Timber wholesaling	282	421	53
Internet publishing and broadcasting	1224	1443	116
Gold ore mining	528	829	55
Glass Wool, Stone and Non-Metallic Mineral Product Manufacturing in Australia	145	222	18
Mortgage brokers	663	882	51
Citrus, banana and other fruit	194	356	22
Superannuation funds	116	385	21
Office Property Operators in Australia	3	100	4
Clay brick manufacturing	3314	3353	138
Hardware and building supplies retailing	1250	1310	48
Iron smelting and steel manufacturing	1560	1605	56
Plumbing goods wholesaling	1574	1663	34
Ceramic Product Manufacturing in Australia	169	387	7
Mining Support Services in Australia	56	224	4
Industrial and Other Property Operators in Australia	3	100	1
Plastic pipe and plastic packaging material Manufacturing	851	1057	12
Supermarkets and grocery stores	2377	2493	26

Notes

[1] Two exceptions are Park and Seo (2019) and Ruiz-Pérez (2019), both of which use structural modelling to analyse the impact of common ownership.

[2] Contemporary commentators have noted how common ownership might mute competitive pressures. In 2017, CNBC journalist Becky Quirk, interviewing Warren Buffett following Berkshire Hathaway's purchase of substantial shares in the top four US airlines, asked him: 'You know, Warren, it does occur to me, though, if you're building up such a significant stake in all the major players, is that anything that's, like, monopolistic behaviour? Is there any concern to think that you would say something to the airlines to make them make sure that they're not competing on prices quite the same? What would keep somebody from worrying about that?' (quoted in Azar, Schmalz and Tecu 2018).

[3] Specifically, we corrected AustralianSuper's holding in Caltex from 6.1 percent to 5.2 percent; T Rowe Price's holding in Downer EDI from 5.8 percent to 5 percent; and Schroder Investment Management's holding in Incitec Pivot from 11.1 percent to 9.8 percent.

[4] Omitting State Street involves removing eight substantial shareholder listings from our dataset (compared with over 80 listings apiece for Vanguard and BlackRock). Although we have been unable to obtain a breakdown of State Street's custodian and fund management businesses in Australia, the firm reports that on a global basis, it had US$36.6 trillion in assets under custody and/or administration, and US$3.1 trillion in assets under management (as of September 2020).

[5] One way to see the impact of the 5 percent disclosure threshold is to take the hypothetical example in Table 2. Recall that example had two firms with a 50 percent market share, a common owner with a 10 percent stake in each firm, two ordinary owners with 10 percent stakes in just one of the firms, and the remaining 80 percent held by retail investors. In that example, the HHI is 5,000, the profit weight is 0.5 $\left(\frac{0.1^2}{0.1^2+0.1^2}=0.5\right)$, the MHHI delta is 2,500 $(2 \times 50^2 \times 0.5 = 2{,}500)$ and the MHHI is 7,500. Now suppose that the remaining 80 percent of each firm is not held by retail investors, but by 20 shareholders who each have a 4 percent stake. If these investors are all common owners, the profit weight rises to 0.81 $\left(\frac{20 \times 0.04^2+0.1^2}{20 \times 0.04^2+2 \times 0.1^2}=\right.$ $\left.0.81\right)$, the MHHI delta rises to 4,038, and the MHHI is 9,038. Conversely, suppose that the remaining 80 percent of each firm is held by 40 shareholders who each have a 4 percent stake in one firm, and no common ownership. Under this scenario, the profit weight falls to 0.19

$\left(\frac{0.1^2}{20 \times 0.04^2 + 2 \times 0.1^2} = 0.19 \right)$, the MHHI delta falls to 962, and the MHHI is 5,962. This suggests that the bounds on the profit weight are very large, with the theoretical maximum (0.81) being more than four times larger than the theoretical minimum (0.19).

[6] As one judicial passage phrased it, 'if the firm were to "give less and charge more" would there be… much of a reaction?': *Re Queensland Co-Op Milling Association Limited and Defiance Holdings Limited (QCMA)* (1976) 8 *Australian Law Reports* 481 at 517.

[7] IBIS World's industry classifications generally follow the 2006 Australian and New Zealand Standard Industrial Classification system (ANZSIC), which is based on supply-side based industry definitions. This approach groups together firms that use similar production processes. Unlike the 1993 ANZSIC, which used a mix of supply-side and demand-side concepts, the 2006 ANZSIC focuses solely on the supply side. This is not generally a problem for the purposes of competition analysis, but occasional exceptions arise. For example, the ANZIC system (and IBIS World) classify 'Fossil Fuel Electricity Generation' as a separate industry from 'Hydro-Electricity Generation', even although the final product in both industries is electricity. It is worth noting that other analyses of market concentration in Australia (eg. Bakhtiari 2021) also define markets according to the ANZSIC framework.