



Market Concentration and Income Inequality

Atthahira Sastia Kartika

International and Development Economics, Crawford School of Public Policy,
The Australian National University, Canberra, Australia

Email: kartika.sastia@gmail.com

Abstract: *The degree of market concentration across industries has been found to have increased recently. Analysing the data on Australia's firms. This study finds that market concentration is different across sectors. Some sectors are more concentrated than others. Following market concentration, income inequality is found to be increasing in Australia. Using data for Australia from 1980-2021, this study finds a positive relationship between market concentration, measured in markups, and income inequality. In addition, this study also provides the result for the relationship between income inequality, trade openness, and automation. Lastly, this study highlights the policy implication that is important to overcome the adverse impact of market concentration and income inequality.*

Keywords: *Market Concentration; Income Inequality; Trade Openness; Automation*

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INTRODUCTION

Market concentration is a complex and multifaceted issue that has profound implications for economies and society. Driven by globalisation and technological progress, market concentration is rising quickly worldwide. For instance, De Loecker and Eeckhout (2018) find that since 1980, there has been a steady increase in markup, worldwide, ranging from 1.1 to 1.6 in 2016. They also find that on average, global markups are flat starting in 2000. Benkard et al. (2021) find that in the U.S market, the concentration level is relatively small in the local market, but the aggregate sectors show a reverse finding, in which they find an increase in concentration over time. According to De Loecker et al. (2020), there was an increase in markups in the U.S, from 21% in 1980 to almost 61% in 2014, showing a 40-points increase. A higher markups indicates that firm have high market power or the ability to set or influence price in the market (Leigh 2023). As market is controlled by a small number of firms, those firms become more powerful. This phenomenon can be driven by number of factors, namely technological advancement or globalisation. When a few firms dominate the market, they might be referred to as superstar firms.

The rise of superstar firms can have a number of far-reaching effects. For instance, Deb et al. (2022) find that less competitive market lead to higher skill premium and a lower wage level, which widens the gap between superstar firms and other firms and increases inequality. In another study by Gans et al. (2019), an increase in market power leads to a transfer of wealth between consumers to shareholders, which benefit bigger firms due to the wide gap between big firms and small firms. In addition, superstar firms might be more powerful in controlling the market than smaller firms, making it difficult for smaller firms to enter. Leigh and Triggs (2016) argue the lack of competition can come from the misuse of power by bigger firms, so they hinder growth of competition. Autor et al. (2020) also suggest that superstar firms are better able to lobby for policies that creates the barrier to entry for small firms. As a result, it is harder for entrepreneurs to enter the and innovate.

Following the increase in market concentration, income inequality is also found to increase globally. This urges further discussion about this trend and the implication on the global economy. Based on the definition given by the International Monetary Fund (IMF), income inequality is the degree of income distribution within a country. However, income inequality stands beyond financial disparities or income distribution. Income inequality also influences social cohesion and overall well-being. An increase in income inequality has been linked with numerous consequences, from economic to social dimensions.

On social dimensions, income inequality can lead to wasteful consumption. If we see income inequality from a social interdependence framework, we can see how an income gap can lead to destructive behaviour. When an income gap exists in the middle of society, the lower income group have the tendency to compare themselves with the higher income group. As a result, the feeling of dissatisfaction arises and leads to an over-consumption behaviour. Christen and Morgan (2005) state that when there's a gap in the society, the members of less fortunate groups consume more to keep up with higher income groups. Zheng et al. (2018) also state that in order to keep up with the gap between high income groups and low income groups, the members of the low income group will try to consume more luxury goods just to feel superior. Banuri and Nguyen (2023) also note that in order to keep up with the lifestyle, the members of low income groups might borrow more money, worsening inequality even more.

On an economic dimension, high income inequality can hinder growth of a country. Much research has been dedicated to see the impact of inequality on economic growth. Most of the research finds that income inequality is not a desirable condition for economic growth. According to Birdsall (2001), when inequality is high, it can lead to inadequate social contract and can give negative impact for effective economic policies. In line with Birdsall, Polacko (2021) also stated that income inequality reduces growth, innovation, and investment. Topuz (2022) finds that high inequality has an adverse impact on economic growth. However, Topuz also mentioned that the income level of a country should be taken into account when drawing the conclusion about the impact of inequality.

Income inequality was found increasing over time. In a research by Heathcote et al. (2010), the U.S shows an increase in earning inequality. Moreover, according to Perry (2019) New Zealand shows significant increase in income inequality in the 1980s. In line with Perry, Rashbrooke (2020) also states that 59% of New Zealand wealth is held by 10% of the richest New Zealanders. As inequality can affect economic growth quite extensively (Blotevogel et al. 2022), we also need to understand that income inequality can also be affected through many channels. In addition, Leigh and Triggs (2016) also conclude while market concentration may be only one of many factors that can lead to income inequality, but it is a significant factor that is contributing to the steady rise in inequality.

Income inequality in Australia has been a topic of concern. According to Wilkins (2014), shows a substantial increase between 2001 and 2010. Although historically, the GINI coefficient (a common measurement for inequality) in Australia is relatively stable, among OECD countries, Australia is the 14th highest inequality in 2020 (Treasury.gov.au 2023). Many factors are perceived to have contributed to the inequality in Australia, like access to employment or wage disparities between workers. Another pertinent point in the rising of inequality in Australia is market concentration. The possibilities of bigger firms to hire more employees and provide better wages might create an income gap between workers. The market concentration in Australia is also an important aspect to be accounted for. Bakhtiari (2021) finds that on average, market concentration in Australia is increase and this trend is most pronounced in industries that are already have high concentration. Triggs and Leigh (2014) also state that compared to the U.S, Industry in Australia is more concentrated. Given that market concentration and income inequality are complex phenomena, it is worth examining whether they are related to each other. This paper will therefore explore the relationship between market concentration and income inequality. First, I will explain the underlying theory behind this research, that is market concentration.

Market concentration is defined by the OECD as the extent to which some particular industry or market is dominated by a small group of large firms (OECD 2021). Benkard et al. (2021) state that industry concentration is a pivotal aspect in antitrust enforcement and most used by economists as a proxy for assessing the level of competition in some markets. High market concentration typically shows that major players hold great market power and are responsible for the market share. While it might lead to efficiency and innovation at some point, high levels of concentration raises concerns about anticompetitive practices, limitation in consumers' choices, and increase in pricing power.

This high level of concentration might have far-reaching economic implications, from hindering innovation to limiting consumer choice. On one hand, market concentration might be beneficial as it might foster economies of scale and stability within an industry. Lopez et al. (2014) find that in the U.S an increase in market concentration would increase overall welfare in 69% industries due to efficiency gains and also increase welfare in industries with low initial concentration, showing a greater exposure to the international market. Bessen (2020) also suggests that connecting market concentration directly to competition might not be appropriate, since rising concentration might reflect efficiency and greater innovation. Autor et al. (2020) establish facts about superstar firms and fall in labour shares, which shows that industries that are more concentrated are those with high productivity and innovation. However, on the other hand, it can create a barrier to entry and limit the options for consumers.

Fernández-Villaverde et al. (2021) state that market concentration might lead to a monopoly behaviour. As a result, market concentration might lead to monopsony power in the labour market, a boost in firms' profit, and an increase in productivity and market shares (Fernandez-Villaverde et al. 2021). Furthermore, Guadalupe (2007)

states that while the relationship between product market competition and the level of wages is well-established, the impact on return to skill and wage inequality is less understood. When the competitiveness is high in product market, firm might gain profit and attract skilled workers, resulting in high return to skill (Guadalupe 2007). Autor et al. (2020) also suggest that industries with a high market concentration also experienced a large decline in labour share.

Market concentration is closely related with market power. In highly concentrated markets, the market power held by superstar firms is also high. According to DeLoecker and Eeckhout (2018), measuring market power is essential for policy-making. Regulating market concentration is important to ensure the fairness in the market, as well as the efficiency and also responsiveness to consumer demand. To measure market power, DeLoecker and Eeckhout (2018) use markups, that is the ratio of the price to the marginal cost of production. They also mention that for some market structures, the Herfindahl-Hirschman Index (HHI) can also be an indicator for market power. As one of the most widely used tools to measure market concentration, it is more data intensive and requires information on the firm-level distribution (OECD 2021). The HHI considers both the varying sizes of market participants and their quantity (Buthelezi et al. 2019)

When market concentration is high, major firms can influence pricing, production, and overall industry behaviour. DeLoecker and Eeckhout (2018) state that high markup might affect distribution. They later explain that firms with high markups have a less demand on input, since the price is high, the demand on output is also decreased causing less production. As a result, demand for labour decreases. In the end, market concentration (markups) can impact both consumers and competition in the market. (Colciago and Mechelli 2020) also state that higher markups means decrease in labour share income and rise in profit and ratio of market capitalisation to GDP. Buthelezi et al. (2019) investigate market concentration in South Africa. From their research, they find a high persistence level of market concentration. Although the causes remain unclear, they estimate that the reasons for high market concentration in South Africa is due to previous privileges, the behaviour for existing firms that cause crowding out potential competitors, barriers to entry, merger and acquisition, and economy of scale (Buthelezi et al. 2019).

Since the 1980s, in the OECD countries, 10% of the richest have had seven times higher disposable income (Keeley 2015). Nolan et al. (2019) also note that two-thirds of the countries experience an increase of 0.01 Gini. In general, income inequality is an unequal distribution of income among households and most of the time, perceived as undesirable conditions. This unequal distribution of income raises complex problems, economically and socially. Hoeller and Pisu (2013) discussed Kuznets' hypothesis suggesting an inverted-U relationship between income inequality and per capita income. This hypothesis posits that inequality rises in the early stages of development, stabilises, and eventually declines in the later stages of development. Income inequality is a global phenomenon. Numerous studies indicate that it is prevalent not only in wealthy nations but also in emerging and developing countries (Keeley 2015).

According to Keeley (2015), since inequality could cause slow growth in the economy and badly impact social welfare, understanding inequality is important. However, understanding income inequality requires in depth research, especially on the cause of inequality. The common driver for income inequality is probably globalisation (Keeley 2015; Nolan et al. 2019; Polacko 2021). Polacko (2021) states that globalisation causes many goods and services that previously produced within countries began to be produced outside the country. He also explains that globalisation causes demand for skilled labour. As a response to an increase in demand for skilled labour, income inequality increases, creating a widening gap between skilled and unskilled labour.

Researchers seem to reach a consensus on the impact of globalisation on income inequality (Heimberger 2020). For example, Xu et al. (2021) find that in Africa, trade openness has a positive relationship with inequality. Calderón and Chong (2001) also find that trade openness affects both basic goods and industry goods differently. They also state that since developing countries export mainly basic goods, income inequality increases, however, since developed countries export industry goods, income inequality decreases. In addition, Gonese et al. (2022) also find trade openness might take into effect in the long-run.

However, Heimberger (2020) also states that despite being theoretically conclusive, but empirically many researches are still inconclusive in the exact effect of globalisation. One of the profound theoretical approaches is the Hecksher-Ohlin model and the Stolper-Samuelson theorem. According to the theorem, globalisation will increase demand for unskilled labour in developing countries (Dorn et al. 2022; Heimberger 2020; Nolan et al. 2019). Meschi and Vivarelli (2009) state that openness will be more beneficial for countries with abundant factors because trade will benefit the sector intensive in the abundant factor. However, Nolan et. al (2019) suggest that globalisation might affect income inequality differently, such as a shift in production and specialisation across countries.

Globalisation opens the opportunity for countries to exchange goods and services. In other words, globalisation is hand in hand with trade openness. Trade openness is beneficial for labour-abundant countries. In the Stolper-Samuelson theorem, countries with labour-abundant factors are more advantageous (Heimberger 2020). Many researchers try to explain how trade openness affects inequality, especially in developing countries (e.g Goldberg and Pavcnik 2007; Heimberger 2020; Dorn et al. 2022; Meschi and Vivarelli 2009). Trade openness increases demand for unskilled labour by raising their price and lowering the price for skilled labour.

Since the developing countries are labour-abundant, more specifically the unskilled-labour, developing countries show a change in distribution (Goldberg and Pavcnik 2007). As a result, the demand for unskilled labour increases,

creating a smaller gap between unskilled-labour and skilled labour. Therefore, globalisation in developing countries could decrease inequality. For developed countries, Stolper-Samulson predicts the opposite. Greater trade openness leads to heightened income inequality as it increases the actual income for skilled labour while diminishing the income for unskilled labour (Heimberger 2020; Dorn et al. 2022; Goldberg and Pavcnik 2007; Meschi and Vivarelli 2009).

With globalisation, technological change also plays a vital role in the market. Automation is something that comes along with globalisation and affects the income of workers. High-skilled workers in the high-technology market often have higher wages compared to low-skilled workers. As the role of low-skilled workers is being replaced with machinery, low-skilled workers might face declining income. Hemous and Olsen (2022) find that an increase in automation results in a rise in the wage premium, decline in labour share, and decline in low-skill wage. New technology also benefits high-skilled workers. Autor et al. (2008) state that computerisation impacts the demand of skill throughout income distribution, that is increase the demand for higher skill tasks, and reduce the demand for clerical tasks.

Moll et al. (2022) state that automation technology not only increases income for the high-skilled workers, but also to the owners of the firms. As a result, income inequality increases. They also provide the channel of the relationship between automation and income inequality, by increasing the returns to wealth and stagnant wages. According to Moll et al. (2022), first automation increases income inequality directly, as household wealth increases. Second, the benefit from production goes to the firm owner, resulting in unchanged wages.

Market concentration in Australia has been a subject of growing concern. Several industries dominate the market with their power and shares. According to Bakhtiari (2021), Australia is perceived to have little competition, but Australia is really concentrated, by having major players dominate certain sectors. Many industries are characterised by a small number of key players, like in telecommunications industries or in groceries. This may reduce competition and leave consumers with fewer options. Bakhtiari (2021) finds that although Australian industries are highly concentrated, a few industries also show a fall in market concentration. Most of the industries that have an increase in concentration, productivity are also growing (Bakhtiari 2021).

Hambur (2021) finds that the concentration level in Australia has increased by 2 percentage points since the mid-2000s and in general, Australian industries are more concentrated than the US. Leigh and Triggs (2016) calculate the market concentration in Australia. From their calculation, it is found that almost half of the industries in Australia are concentrated. They also found that Australia is more concentrated than the US. On average, in the US, the four major firms hold 33% of the US market while Australia's four major firms accounted for 36% of the market, suggesting that major firms in Australia are more dominant in the market (Leigh and Triggs 2016).

With an increase in market concentration, the gap between big firms and small firms is widening because big firms might pay their workers better than small firms. Australia, like many developed countries, also has to face the problem with income inequality. When measured in top income shares, Australia has a high inequality (Leigh and Triggs 2016). According to Fenna and Tapper (2015), there is an increase in top income in Australia, mostly occurring in the 1980s. Kaplan et al. (2018) find that income inequality and consumption inequality has been increasing since the early 1990s, with income inequality having increased more. Nolan et al. (2019) also find that Gini in Australia show an increase of about 0.052 from 1980 to 2013.

As both market concentration and inequality show a similar trend, the relationship between both has emerged as a promising area of research. Given that market concentration can provide the degree of competition, high concentration could result in less competitive market and high market power. This can raise the problem of income inequality. Therefore, it is important to understand the relationship between both market concentration and income inequality.

METHODOLOGY

In the descriptive analysis, this paper adopts the methodology outlined by Leigh and Triggs (2016) in measuring market concentration in Australia. Leigh and Triggs (2016) calculate four-firm concentration and two-firm concentration for industries in Australia. In their paper, Leigh and Triggs use data from the comprehensive IBISWorld Industry Report. This paper also uses data from IBISWorld Industry Report. This extensive set of data helps construct a comprehensive analysis of market share data for approximately 509 industries operating within the Australian market. The majority of this data is derived from the most recent year of 2023 and reflects the distribution of industry revenues among firms. However, due to limitations in data availability, this study was compelled to rely on the 2022 dataset to calculate the market share of 16 industries in Australia. This strategic approach is taken in the hope of a thorough examination of market concentration while accommodating constraints of data availability. The complete list of industries in Australia is listed in Appendix 1.

For the main regression, due to the availability for aggregate data on market concentration, this paper uses markups as a proxy for market concentration. The underlying rationale for this choice lies in the intrinsic relationship between market concentration and competition. Market concentration is often viewed as a reliable indicator of the competitive landscape within industries. When firms possess significant market power, they also wield the potential to monopolise the market. Hence, influencing market price according to their preferences. Consequently, firms may markup the market price in alignment with their strategic objectives. Thus, this paper uses markups as a proxy for assessing the intensity of competition. To facilitate this analysis, this paper draws upon aggregate markup data from De Loecker and Eeckhout (2018), encompassing a dataset from over 70.000

firms across 134 countries. This dataset covers the period from 1980 to 2016.

In term of income inequality, this paper uses The Standardised World Income Inequality Database (SWIID) by Solt (2020), that provides Gini indices for both disposable and market income inequality across 198 countries, from 1960 to the present (Solt 2020). Additionally, SWIID also offers insight into absolute and relative redistribution measures (Solt 2020). This paper also takes the income shares of different income groups, such as top 10%, top 5%, top 1%, top 0.1%, and bottom 90%, to provide an overview on income inequality in Australia from World Income Inequality Database (WIID) from 1980 to 2021.

Given the potential impact of trade openness on income inequality, this paper incorporates trade openness as one of its key variables. In this paper, trade openness is measured as the proportion of imports and exports relative to a country's GDP. To acquire accurate and up-to-date information on trade openness, this paper relies on data from the World Development Indicator from the World Bank, from 1980 to the present year. In addition to trade openness, this research also integrates the variable of Automation into the main regression model. Automation, in this context, refers to the stock of robots in the industries in Australia. The data on Automation is gathered from the International Federation of Robotics, covering the period from 1993 to 2021. By incorporating both trade openness and automation into the analysis, this paper aims to provide a comprehensive assessment of their roles in influencing income inequality in Australia.

The empirical approach in this paper will employ a Vector Error Correction Model (VECM) framework. This framework deals with non-stationary time series data that exhibit long term relationships, known as cointegration. VECM allows for the modelling and analysis of the dynamics of cointegrated variables and captures both short-term and long-term equilibrium relationships among variables. Moreover, VECM also handles endogeneity issues in cointegrated time series data by allowing us to model both the short-term and long-term relationship among variables.

In order to investigate the relationship between market concentration and income inequality, this paper use the model as follows:

$$\begin{aligned}\Delta INEQ_t &= \mu + \beta_0 \Delta INEQ_{t-1} - \beta_1 \Delta MARK_{t-1} - \beta_2 \Delta OPENNESS_{t-1} - \beta_3 \Delta AUTOMATION_{t-1} + \gamma_1 (INEQ_{t-1} - \theta_1 MARK_{t-1} \\ &\quad - \theta_2 OPENNESS_{t-1} - \theta_3 AUTOMATION_{t-1}) + \varepsilon_t \\ \Delta MARK_t &= \mu + \beta_4 \Delta INEQ_{t-1} - \beta_5 \Delta MARK_{t-1} - \beta_6 \Delta OPENNESS_{t-1} - \beta_7 \Delta AUTOMATION_{t-1} + \gamma_2 (MARK_{t-1} - \theta_4 INEQ_{t-1} \\ &\quad - \theta_5 OPENNESS_{t-1} - \theta_6 AUTOMATION_{t-1}) + \eta_t \\ \Delta OPENNESS_t &= \mu + \beta_8 \Delta INEQ_{t-1} - \beta_9 \Delta MARK_{t-1} - \beta_{10} \Delta OPENNESS_{t-1} \\ &\quad - \beta_{11} \Delta AUTOMATION_{t-1} + \gamma_4 (OPENNESS_{t-1} - \theta_7 INEQ_{t-1} - \theta_8 MARK_{t-1} - \theta_9 AUTOMATION_{t-1}) + \mu_t \\ \Delta AUTOMATION_t &= \mu + \beta_{12} \Delta INEQ_{t-1} - \beta_{13} \Delta MARK_{t-1} - \beta_{14} \Delta OPENNESS_{t-1} \\ &\quad - \beta_{15} \Delta AUTOMATION_{t-1} + \gamma_4 (AUTOMATION_{t-1} - \theta_{10} INEQ_{t-1} - \theta_{11} MARK_{t-1} - \theta_{12} OPENNESS_{t-1}) + \tau_t\end{aligned}$$

Where $\Delta INEQ_t$ refers to the changes in inequality at period t . $\Delta MARK_t$ refers to estimated changes in markups at period. $\Delta OPENNESS_t$ refers to the changes in trade openness in period t , and $\Delta AUTOMATION_t$ refers to the changes in stock of robots in period t .

The testable hypotheses drawn from the literature can be summarised as follows:

Main hypothesis: Markup has a positive impact on income inequality in Australia, that an increase in markup leads to an increase in income inequality.

Hypothesis 2: Trade openness has a positive impact on income inequality, that an increase in trade openness leads to an increase in income inequality in Australia.

Hypothesis 3: Automation has a positive impact on income inequality, that an increase in automation leads to an increase in income inequality.

RESULTS

This paper compiles market share data for 509 industries in 2023 and represents the shares of industry revenues. All data on the four-firm concentration for 509 industries are listed in Appendix 1. To take a few examples, ice cream manufacturing, wired telecommunications network operation, credit card processing, bauxite mining, lithium and other non-metallic mineral mining, tobacco and other store-based retailing, fast fashion, casino, credit card issuance, and domestic airlines, the four major player in the industry control more than nine-tenths revenue of the market.

In iron ore mining, petroleum product wholesaling, craft beer production, supermarket and grocery stores, newspaper publishing, beer manufacturing, the four largest firms control more than four-fifths of the market revenue. International airlines, battery material mining, fertiliser manufacturing, software suppliers, and meat processing, the four major players in the industry, accounted for more than half of the market. Landscaping services, over the counter medication manufacturing, and furniture and floor covering wholesaling are the industries where the top four firms accounted for less than one-tenths of the market shares. Image 1 depicts market concentration for 20 largest industries in Australia based on industry revenue.

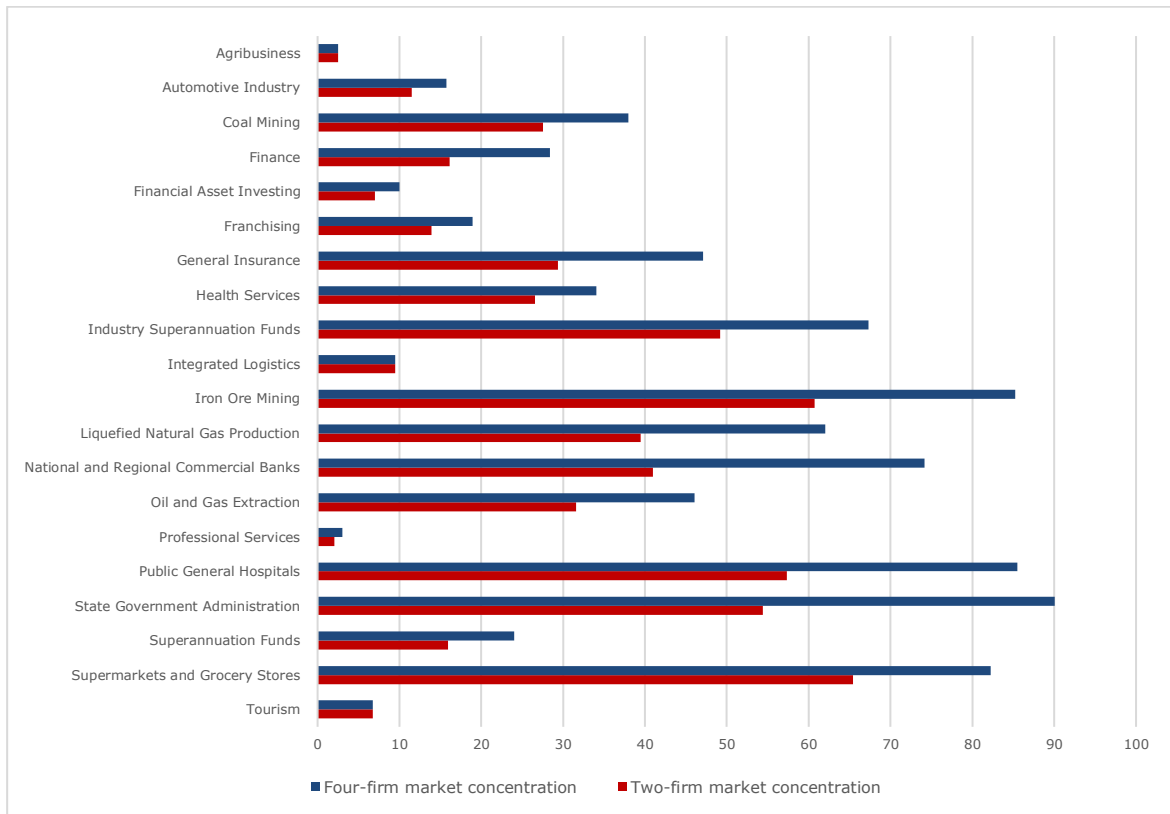


Figure 1. Market Concentration for 20 Largest Industries in Australia

Based on the market share data and on the calculation on market concentration, more than a half of the industries listed in the IBISWorld have a high concentration level. Although there is no set rule, according to Leigh and Triggs (2016), a market with a four-firm concentration ratio exceeding one-thirds of the market, can be considered a concentrated market. To see how this market concentration differs between sectors, this paper also aggregates all 509 industries into 20 sectors. From the result, we can see that mortgages are the most concentrated industry in Australia, followed by the mining industry with 63.5% four-firm concentration ratio and information media and telecommunications with 60.5% four-firm concentration ratio. The least concentrated sectors are personal services and professional, scientific, and technical services, with 16% and 15.15% four-firm concentration ratio, respectively. Image 2 depicts market concentration in Australia by sector.

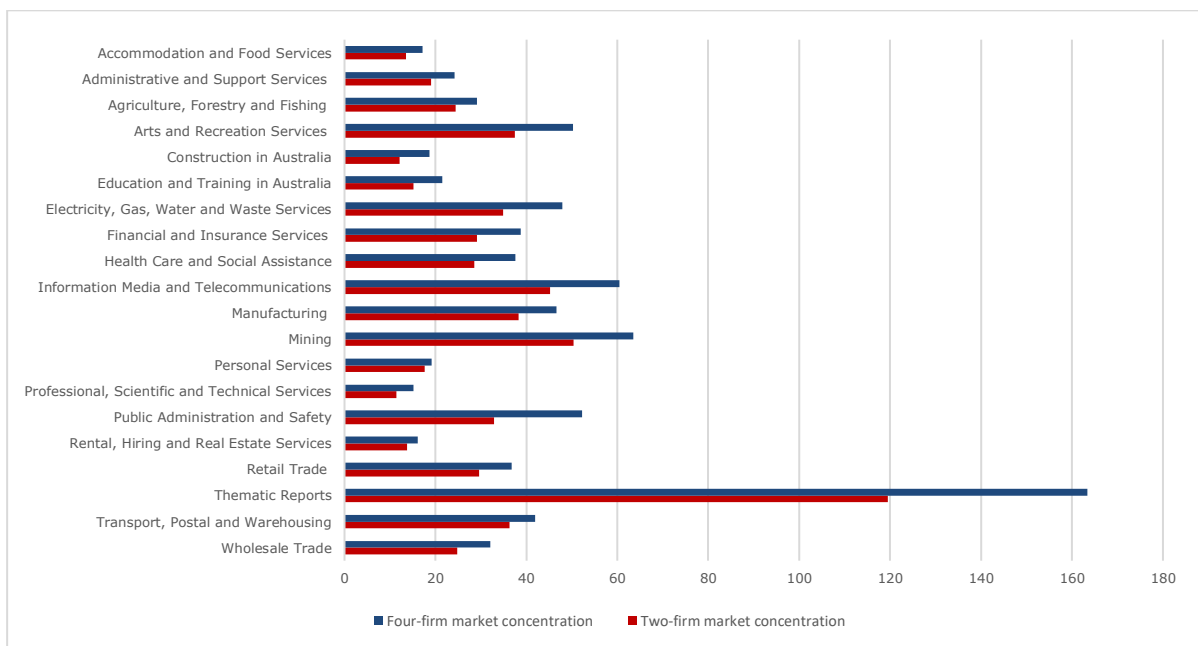


Figure 2. Market concentration in Australia by sector

Australia's income inequality has become an increasingly pressing concern in recent years. Despite the country's reputation for having a relatively equitable society, income disparities have been on the rise. From the work of

Leigh (2013), it is found that inequality has risen since the 1970s. Image 3 plots the top and bottom income shares in Australia over time.

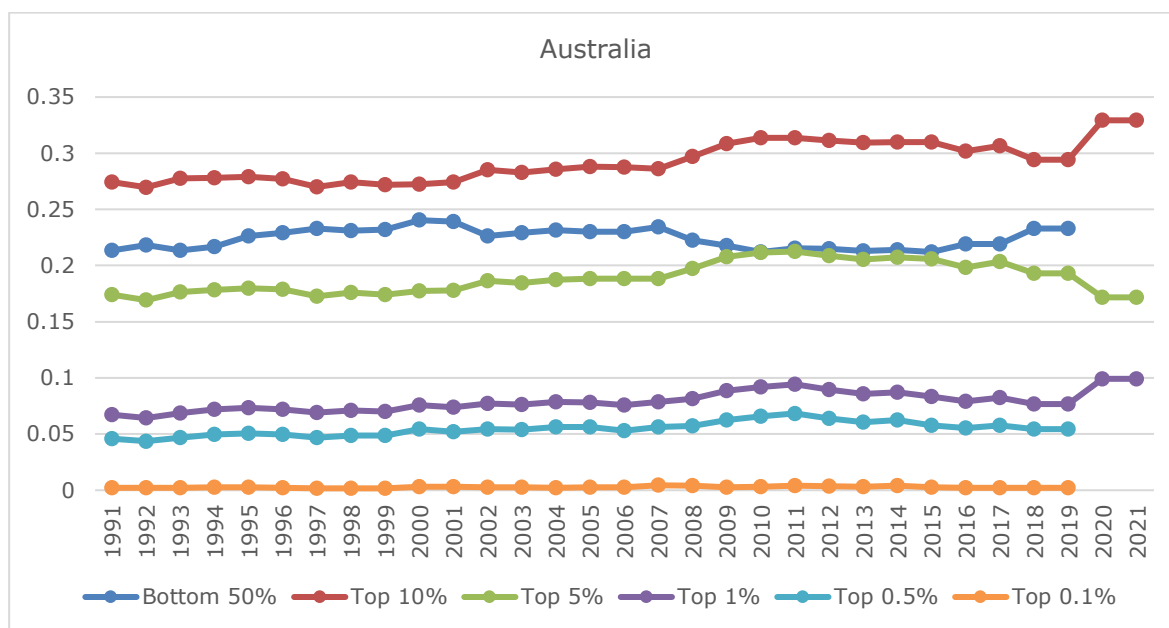


Figure 3. Top and Bottom Income Shares in Australia

Over the period, Australia has seen an increase in income inequality. In image 4, we can see that from the Gini coefficient alone, the graphic representations of increasing income inequality in Australia are increasing. The graph reveals a rising Gini coefficient, indicating an increase in income inequality in Australia between 1980-2019. Although the graph shows a rather stable Gini coefficient towards the end of the period, income inequality in Australia has put Australia as 14th highest inequality among OECD countries.

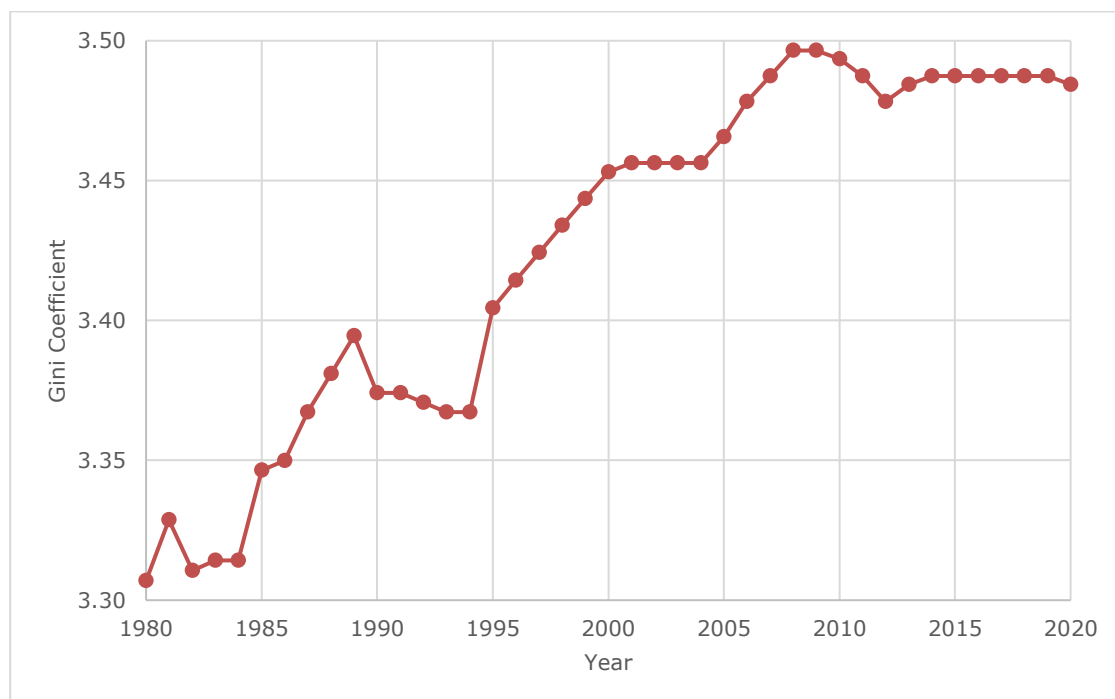


Figure 4. Australia's Gini Coefficient

Aside from the market concentration and income inequality, this paper also describes the markups, trade openness, and automation in Australia. Image 5 depict the condition for markups in Australia from 1980 to 2016. In the figure, we can see that there is an increase in markups over the period.

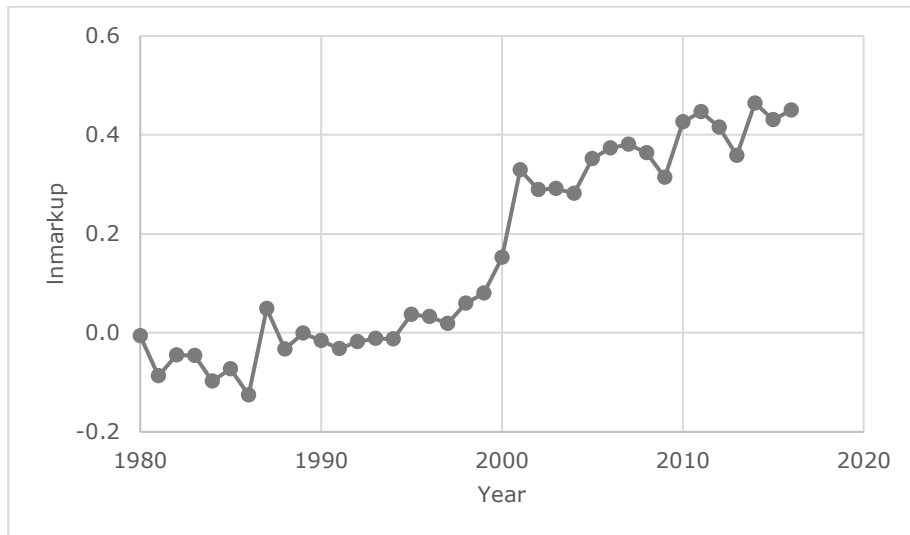


Figure 5. Markup in Australia

In addition, Image 6 also depicts the condition for trade openness in Australia from 1980 to 2022. Trade openness in Australia is showing an incline trend. In 2019, there is a slight dip in trade openness. One possible reason is the COVID-19 pandemic that cause the closure of border.

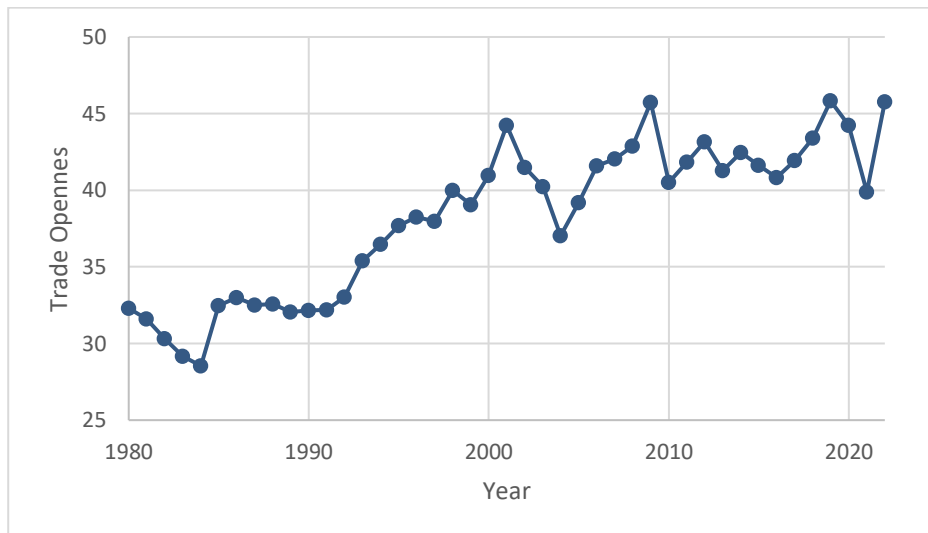


Figure 6. Trade Openness in Australia

Lastly, in Image 7, there is also an incline in Automation in Australia from 1993 to 2021

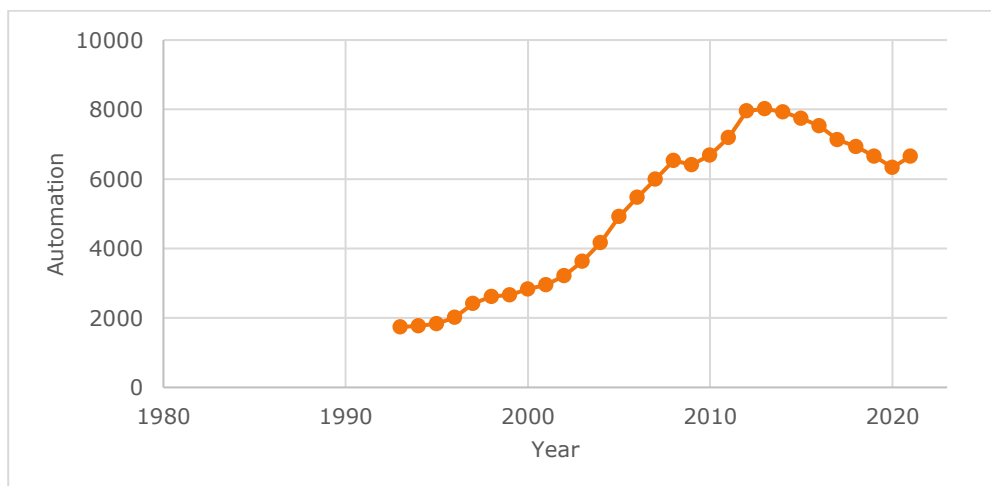


Figure 7. Automation in Australia

In table 1, I present the result from the Vector Error Correction Model (VECM) on the association between markups and income inequality in Australia. The results suggest that there is a long-term relationship between markup and income inequality in Australia. It provides crucial insight into the intricate and enduring interplay between both variables. This relationship signifies that changes in markups and income inequality are not random or driven by short-term fluctuations. Instead, they are interconnected and mutually influenced over an extended period. In the case of Australia, this implies that as markup (market concentration) increases, it also increases income inequality. Looking at table 1, it indicates that 1% increase in markups raises the Gini coefficient by 2.5%, holding other variable constants. This result support the first hypothesis, suggesting that markup has a positive impact on income inequality in Australia.

Table 1. Vector Error Correction Model (VECM)

VARIABLES	(1) D_Ingini	(2) D_Inmarkup	(3) D_Intrade	(4) D_Inauto
L_ce1	-0.0199** (0.00803)	0.0225 (0.156)	0.230** (0.0981)	-0.208** (0.0957)
LD.Ingini	-0.0312 (0.166)	1.403 (3.231)	6.423*** (2.033)	-2.325 (1.983)
L2D.Ingini	0.0151 (0.107)	0.534 (2.071)	0.801 (1.303)	1.687 (1.271)
LD.Inmarkup	-0.0471** (0.0227)	-0.116 (0.440)	0.578** (0.277)	-0.208 (0.270)
L2D.Inmarkup	-0.0445** (0.0214)	-0.0879 (0.416)	0.517** (0.262)	-0.0273 (0.255)
LD.Intrade	0.0706* (0.0360)	-0.370 (0.700)	-1.270*** (0.440)	0.199 (0.429)
L2D.Intrade	0.0567** (0.0248)	-0.218 (0.481)	-0.684** (0.303)	0.0662 (0.295)
LD.Inauto	-0.00191 (0.0247)	-0.331 (0.479)	0.666** (0.301)	0.0524 (0.294)
L2D.Inauto	0.0336 (0.0219)	0.248 (0.425)	0.0308 (0.268)	0.0927 (0.261)
Constant	-0.00436** (0.00193)	0.0306 (0.0374)	-0.0135 (0.0236)	-0.0112 (0.0230)
Observations	21	21	21	21

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Johansen normalization restriction imposed

beta	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
_ce1						
Ingini	1	.	.	.	.	.
Inmarkup	-2.500588	.3742374	-6.68	0.000	-3.23408	-1.767096
Intrade	4.178454	.6432206	6.50	0.000	2.917765	5.439143
Inauto	.7139159	.1084396	6.58	0.000	.5013783	.9264536
_cons	-24.61326	.	.	.	.	.

Aside from the result of the relationship between markups and income inequality, the VECM results provide information about the association between trade openness and income inequality in Australia. The results suggest that there is a long-term relationship between trade openness and income inequality. It shows that trade policies have a direct and discernible effect on income inequality. The VECM findings provide a quantitative representation of this relationship, revealing the extent to which changes in trade openness are associated with variations in income inequality. In Australia, this result implies that as trade openness increases, income inequality decreases. Looking at table 1, it indicates that 1% increase in trade openness leads to a decrease in income inequality by 4.2%. This quantifiable relationship underscores the potential for well-managed trade policies to positively impact income distribution and promote a more equitable society. This result rejects the second hypothesis, suggesting that trade openness has a negative impact on income inequality.

Lastly, the model shows that there is also a long-term relationship between income inequality and automation in Australia. The recognition of a long-term relationship between income inequality and automation in Australia is a significant and thought-provoking finding that sheds light on the intersection of economic and technological forces. The model's assertion of a long-term relationship signifies that changes in the level of automation significantly affect the distribution of income over an extended period. This relationship is not merely a temporary consequence of technological advancements but has lasting and far-reaching consequences. Based on the result, a 1% increase in automation led to a 0.7% decrease in income inequality. Therefore, this result also rejects the third hypothesis, suggesting that automation and income inequality is negatively affecting each other.

DISCUSSION

The result from the Vector Error Correction Model (VECM) shows that markups are positively related to income

inequality in Australia. When there is an increase in markups, income inequality also increases. When the market is concentrated, dominant firms have power to control the price in the market. As a result, they might set higher prices for goods and services, affecting lower-income households. Firms, on the other hand, gain substantially more benefit from higher prices. According to Gans et al. (2019), as market power increases, there is a transfer of wealth from the consumers to the shareholders. In other words, shareholders in a firm receive profits from high prices. This wealth transfer creates a widening gap between small firms and superstar firms (Gans et al. 2019), resulting in widening gap of income. From the results, we can see that even small changes in market power can have substantial consequences for income disparities. This highlights the need for a competitive market in shaping healthy distribution.

Han and Pyun (2021) also find the positive relationship between markups and income inequality. They suggest that competition can drive income inequality down, by reducing markups, especially through globalisation. It is important to note that, even though Australia has imposed a tax and transfer system to mitigate the inequality problem, increasing competition is still important and beneficial (Ennis et al. 2019). In their research, Ennis et al. (2019) investigate the impact of competition on inequality in 8 OECD countries. They find that market power increases the wealth of the richest 10% and reduces the income for the poorest 20%.

This has crucial implications for policymakers, showing the importance of regulation that promotes competition and prevents excessive market concentration to reduce income inequality. Bakhtiari (2020) reminds us that increase in concentration should be addressed carefully. Big firms might want to gain advantages, so instead of going through innovation, which might be more expensive and time consuming, firms prefer a cheaper and more effective solution, that is lobbying (Bakhtiari 2020). Australia has the Australian Competition and Consumer Commission (ACCC) that acts to protect consumers as well as ensuring fair competition. Therefore, businesses should act accordingly to also ensure fair competition. Firms should be more aware of the potential consequences of their power and pricing strategies. Although competition is beneficial, market concentration (market power) is also needed to provide and foster innovation. Therefore, ethical and fair pricing practices can contribute to a more balanced and inclusive economic landscape.

In addition, from markups and income inequality, the main regression shows negative relationship between trade openness and income inequality in Australia. According to Stolper-Samuelson theorem, in developed countries, an increase in trade openness leads to an increase in income inequality, while for developing countries, the opposite is true (Roser and Cuaresma 2016). Reuveny and Li (2003) explain that an increase in trade openness causes the demand for unskilled labour to increase, resulting in a shortening gap between unskilled labour and skilled labour. Topuz and Dagdemir (2020) also state that as demand for unskilled labour increases, the wage for skilled labour will decrease and the wage for unskilled labour will increase. Therefore, with an increase in trade openness, the expected result should be a decrease in income inequality in developing countries, and an increase in income inequality in developed countries.

However, from the main regression we can see that Australia, as a developed country, shows an opposite result. With an increase in trade openness, income inequality decreases. Although the theorem predicts otherwise, trade openness does not necessarily cause income inequality because the government, or policymakers, can promote international trade while compensating or mitigating the negative impact from trade openness (Reuveny and Li 2003). In addition, although an increase in trade openness might alter the need for skilled and unskilled labour, trade openness can create another demand in different sectors, for instance in service areas. Furthermore, Reuveny and Li (2003) also find that there is a decrease in income inequality due trade openness in developed countries because of government intervention. For example, Australia's progressive tax and transfer system has reduced the extent of income inequality by re-distribute income from top group to bottom group (Productivity Commission 2018). Therefore, Australia has a better policy to reduce income inequality, so when the effect of trade openness is negative, Australia can mitigate the impact.

The fact that an increase in trade openness can result in a reduction in income inequality indicates that policymakers must consider the potential consequences of trade agreements and globalisation. These findings call for a balanced approach to trade policies that takes into account the impact on income distribution, ensuring equal distribution of the benefit from globalisation.

Aside from trade openness, automation also found to have a negative relationship with income inequality in Australia. When automation is high, income inequality decreases. This result might not come as expected, because most of the time, automation causes inequality. According to Nolan et al. (2019), in general, technology tends to cause greater inequality among workers, for example between unskilled and skilled labour, however, the final outcome also depends on how agents or other variables respond to the modified technology and incentives. In addition, Nolan et.al (2019) also states that higher inequality is not an unconditional outcome for technological progress, but shaped through institutions. The results in the regression, showing that there might be a secondary effect of automation. For example, the installation of an ATM might cause job loss for some people. However, in the long-run, more ATMs can also mean more jobs (ex: opening new branches or maintenance jobs). Nolan et al. (2019) also mention that automation might have no effect on employment, but negatively affect unskilled workers, however, the negative effect is compensated by an increase of employment in the service area. Therefore, an increase in automation does not necessarily cause an increase in income inequality.

CONCLUSION

Market concentration and income inequality are two economic concepts that are closely related to each other.

The discussion around market concentration and income inequality has become an interesting topic of research. With an increase in market concentration and income inequality, the relationship between both variables is important to understand. Income inequality often refer to as unequal distribution of income among individuals or households. It is known that income inequality often perceived as undesirable situation and most of the time, many researchers have tried to investigate the driver of income inequality and the strategies to address inequality. However, researching on the best strategies to address inequality is not enough to address the inequality issues. Solving income inequality requires comprehensive approaches, from the government to individuals.

Market concentration, as reflected in markups, provides the information about the competition in the market. In addition, highly concentrated market shows unequal market power, due to the existence of superstar firms, that dominate the market. These superstar firms have the power to control the pricing in the market, resulting in profit gain for them. As a consequence, highly concentrated market could lead to an increase in income inequality, due to the widening gap between superstar firms and smaller firms. This highlights the importance of regulation for fair competition to address the potential issues of income inequality.

This study describes the market concentration in Australian market. Using the data for more than 500 industries in Australia, this study calculates the four-firm concentration and two-firm concentration for industries in Australia in 2023. Based on the calculation, this study finds that some sectors are more concentrated than the others. Aside from the market concentration, this study also finds that in general, income inequality, markups, trade openness, and automation in Australia between 1980-2021 are showing an increasing trend.

In this research, I examine the relationship between market concentration, as measured in markups, and income inequality. In addition, this research also examines the relationship between income inequality, trade openness, and automation. The study shows that markups have positive relationship with income inequality in Australia. When markups are high, income inequality is found to be high. Highly concentrated market cause dominant firms to control the price in the market, setting higher prices that affects lower-income households. On the other side, firms gain significant benefit that increase their wealth. As a result, it creates widening gap between big firms and small firms.

In terms of the relationship between trade openness and income inequality, surprisingly, the study shows that trade openness has a negative impact on income inequality in Australia. On the contrary to the Stolper-Samuelson theorem, the results implies that well-managed policies can positively impact income distribution in developed country, in this study Australia. In other words, government intervention also plays a significant role in mitigate the adverse impact of trade on inequality.

With an increase of automation in Australia, income inequality can potentially arise. While automation create demand for skilled-labour, it can displace unskilled-labour. This situation creates the possibilities for an increase in income inequality. However, this research finds that in Australia, an increase in automation lead to a decrease in income inequality. The rationale explanation might come from the secondary effect of automation itself, that creates a new opportunity in service area. This finding highlights the importance of skill improvement for employee to ensure the equal distribution of the benefit from automation.


The research findings provide more information about the relationship between market concentration and income inequality, as well as trade openness and automation, especially in Australia. The unique dynamic between these variables suggests the need for well-established regulatory framework, especially in market competition. It is essential for policymakers to promote healthy competition while addressing income inequality in society. As Australia already has related commission, it is important to make sure that business owners obey the business conduct to ensure the competition is healthy in the market. Therefore, law enforcement is also necessary. As Wilkinson and Pikett (2009) note that the social problem is more common in unequal societies. Therefore, addressing the issues in inequality is important.

This research uses markups to study the relationship between market concentration and income inequality. While markups are a widely used proxy for competition, future research could use other indices, such as the Herfindahl-Hirschman Index (HHI). Additionally, to make the research more robust, future research could include other countries other than Australia. Finally, given the important role of the government, future research should examine how institutions may influence the relationship between market concentration and income inequality.

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