The Cost of Financial Intermediation in Australia

Indeewari U. Colombage[1], Dirk G. Baur, and Yihui Lan

University of Western Australia Business School

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Abstract

This paper finds a negative trend in the unit cost of financial intermediation in Australia. The result is remarkable given the seemingly low competition in the Australian banking system and the relatively constant costs identified for the US (Philippon, 2016). We show that the negative trend is related to falling interest rates which are positively correlated with the cost of financial intermediation in Australia but not the US. We additionally study the potential to lower the costs for customers and compare five types of financial institutions: a shareholder-owned deposit-taking institution, a customer-owned deposit-taking institution, a non-deposit-taking institution, a deposit-taking FinTech, and a non-deposit-taking FinTech firm. Our calculations reveal that the costs of financial intermediation could decrease by up to 50% through improved operational efficiency and profits passed on to customers instead of shareholders.

JEL Classification: G21, G23, G32

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[1] Corresponding author

1. INTRODUCTION

Financial intermediation is an essential service for a country's economic development and the well-being of individuals. Therefore, whether financial intermediation is provided at a reasonable cost and whether cost benefits of recent technological advancements have been passed on to the customers are important questions. Philippon (2016) calculates the unit cost of financial intermediation by "dividing the income of the finance industry by the quantity of intermediated assets" and concludes that it has not declined in the US despite technological advancements[2]. We adopt this approach and calculate the unit cost of financial intermediation for the entire financial sector of Australia. The resulting cost curve indicates a negative trend which is a clear deviation from the constant cost curve observed by Philippon (2016) for the US.

Australia has a diverse financial sector and has embraced technological advancements and FinTechs with the expectation of increasing competition. Deloitte (2014) states that factors needed for a competitive system (the number of competitors, availability of substitutes, and low barriers to entry) are at a satisfactory level for the Australian banking sector. Despite such statements, the Australian financial sector is dominated by four major banks. The H-statistic[3] calculated by the World Bank on bank competition reports a value of 0.32 in 2015, which indicates low competition compared with other advanced countries[4] (Trading Economics, 2022).

The lack of bank competition adversely affects consumer welfare in Australia because only competition will motivate a shareholder-owned and thus profit-oriented bank (Authorised Deposit-Taking Institution (ADI)) to consider the interests of customers and thus enhance consumer welfare. In the absence of competition, such banks can pass costs and risks to customers and thus increase profits and shareholder wealth. Since most loans written by Australian banks are at a variable rate, banks are passing most of the interest rate risk to customers. In addition, despite detailed credit checks of potential borrowers, Australian banks require borrowers to obtain a Lenders Mortgage Insurance (LMI) for mortgage loans that do not meet an 80% loan-to-value ratio. Hence, banks are also passing a significant fraction of credit risk to the customers. The

[2] If we consider the financial intermediation cost of an individual bank, it can be calculated by identifying the net interest income (Interest income - interest expenses) divided by total (intermediated) assets. Example: Bank A has short-term deposits worth $1 million (liabilities) and long-term government bonds worth $1 million (assets). If Bank A pays 2% interest and receives 3% interest, the net interest income will be $10,000. Therefore, the unit cost of financial intermediation will be $10,000/ $1m = 1/100. A similar calculation is used for the whole financial sector to get an idea about the financial intermediation cost of a country.

[3] H-statistic captures the elasticity of interest revenue (interest income from loans) to input prices (interest expense to deposits, operational costs and fixed cost) which gauges the efficiency of the banking sector. A higher value indicates higher competition.

[4] The H statistics of several other advanced countries for the year 2015 are France (0.67), Finland (0.77), Singapore (0.78), Canada (0.81), Italy (0.87) and Germany (0.88).

availability of a variety of financial service providers and the apparent lack of competition makes the Australian financial sector an ideal case to study the dynamics of the cost of financial intermediation, profits, and consumer welfare.

This study is structured as follows. The first part calculates the cost of financial intermediation in the Australian financial sector using a concept introduced by Philippon (2016), i.e. dividing the income of the financial industry by the quantity of intermediated assets. The income of the finance industry was obtained as the value added by finance and insurance to overall GDP and the quantity of intermediated assets was calculated by obtaining data on broad money, credit to private sector, market capitalization and public debt. The second part identifies the relationship between the cost of financial intermediation and interest rates for the entire financial sector and the banking sector. In the third part, we analyse financial statements of different types of financial institutions (a large shareholder-owned Authorised Deposit-Taking Institution (ADI), a customer-owned ADI, a non-ADI lender, a Fintech lender, and a neobank) to infer the potential to enhance consumer welfare through either lower borrowing rates or higher deposit rates.

We observe that the unit costs of financial intermediation have decreased over time in Australia for the financial sector and the banking sector, respectively, whereas these costs remain constant for the US. We also find a positive relationship between intermediation costs and interest rates for Australia. In contrast, our findings indicate that the costs of financial intermediation of banks in the US are less sensitive to policy rates, consistent with the high exposure to long-term fixed-interest mortgage loans. Since the majority of loans in Australia are on variable interest rates, it is plausible that the cost of financial intermediation is more sensitive to the policy rate in Australia than in the US. We added macroeconomic variables and changes in monetary policy (increase or decrease in policy rates) to the analysis and the results remain qualitatively the same. From the analysis of five separate financial statements, we find that the customer-owned bank without a profit motive and the FinTech did not perform as well as the large shareholder-owned bank. We conclude that scale advantages play a key role in the profits of financial institutions.

The remainder of the paper is organized as follows. Section 2 provides an overview of the Australian banking sector. Section 3 summarizes the literature. Section 4 describes the data and methodology. The fifth section presents the main results followed by the conclusion in the sixth section.

2. AUSTRALIAN BANKING SECTOR

2.1. Composition of the Banking Sector

The Australian financial sector that is involved in the banking business can be broadly divided into two categories based on regulations: deposit-taking institutions that are regulated by the Australian Prudential Regulations Authority (APRA) and non-deposit-taking institutions which are regulated by the Australian Securities and Investments Commission (ASIC). As of December 2021, authorized deposit-taking institutions (ADIs) had a market share of 92.1% and non-ADIs had a market share of 7.9%.

Deposit-taking Institutions - Authorized deposit-taking entities in Australia could be in the form of banks, credit unions, and building societies. As at March 2022, there are 144 ADIs operating in Australia, out of which 97 are banks. Banks in Australia are further categorized into domestic banks, foreign subsidiary banks, and foreign branches by the APRA.

ADIs can also be categorized as shareholder-owned ADIs and customer-owned ADIs. Customer-owned ADIs do not have shareholders and can therefore be considered less profit-oriented than shareholder-owned ADIs. As per the Customer Owned Banking Association (an Association of which customer-owned ADIs are members in Australia) all profits reported by a customer-owned ADI are used to benefit customers which could be in the form of better pricing and quality of service. As per APRA, there are 60 customer-owned ADIs as of March 2022 operating in Australia. Customer-owned ADIs could take the form of banks, credit unions, and building societies. ADIs declined from 157 as at December 2015 to 144 as at March 2022 as indicated in Table 1. The drop in customer-owned ADIs is due to mergers and acquisitions and the demutualization of customer-owned ADIs.

[Table 1 about here]

Jain et al. (2015) analysed credit unions in Australia converting to mutual banks. They attribute such conversion to technological advancements and difficulty in meeting the complex demands of consumers such as financial planning and wealth management. As a result, the number of credit unions decreased from 76 in 2015 to 36 in 2021. Credit unions, which were the mutual-based entities in Australia, came under a common regulation after Australia adopted the twin-peak approach (Jain et al. 2015).

Non-ADIs – Entities that are involved in money market operations and lending using wholesale funds without obtaining deposits are categorized as non-ADI financial institutions, in Australia. As shown in Table 2, there are 107 non-ADI financial institutions in Australia as at

December 2021, even though they account for a mere 7% of the overall lending business in Australia.

FinTechs – FinTechs in Australia take various forms and could be ADIs or non-ADIs. Payment platforms such as digital wallets, lending institutions such as Buy Now Pay Later services, SME lending, consumer lending, and neobanks which are authorized to mobilize deposits all are forms of FinTechs in Australia. The COVID-19 pandemic has improved the performance of FinTechs in Australia with consumers seeking digital banking solutions (KPMG, 2022).

[Table 2 about here]

Further, enacting the Consumer Data Rights Act in 2019 to facilitate the Open Banking system has enabled the FinTechs to demarcate their existence in the financial sector of Australia (Goldbarsht et al.2021).

2.2. Regulation of the Australian Financial Sector

The Australian financial sector is mainly regulated under the Twin Peaks regulatory architecture. Australia pioneered this regulatory architecture in 1998, after the Willy's Report which was on financial system inquiry and regulation for the developing banking sector. Under this system, there are two regulatory bodies separately responsible for prudential regulation and market conduct. In Australia, the APRA oversees the prudential regulations, thereby, ensuring the resilience and soundness of financial institutions and the Australian Securities and Investments Commission (ASIC) oversees the market conduct and customer protection aspects (Salim, et al., 2016). Later, in 2018, the Royal Commission Report on misconduct in the financial sector was out, which details the unfair and unethical behavior of financial institutions and emphasizes the shortcomings of the regulators (Gilligan, 2018). However, this report also recommends continuing the Twin Peaks regulatory structure with improved communication between the regulators.

Accordingly, all ADIs are licensed by the APRA and regulated according to the Twin Peak Structure. Therefore, customer-owned ADIs that are focused mainly on consumer welfare and are smaller in scale compared to shareholder-owned entities must also meet the stringent prudential regulations enforced by APRA. Meanwhile, all institutions that conduct consumer lending come under the National Credit Code and thereby, are regulated by the ASIC. Lending to institutions/SMEs and "buy-now-pay-later" forms of lending are not considered under this code and, therefore, an Australian Credit License is not required for such operations (K&L Gates, 2015).

Regulation of FinTechs is complex due to the diversity of FinTechs in Australia. No specific regulation applies to FinTechs affiliated with regulated financial institutions. FinTechs conducting lending for consumer purposes are regulated by the ASIC. Neobanks that conduct operations similar to ADIs sans the physical existence are regulated by the APRA in accordance with the strict rules that apply to ADIs. However, neobanks at their inception are given two years to fulfill licensing requirements and issued a restricted license during these two years to conduct their business operations.

2.3. Bank Concentration in Australia

The Australian banking sector is dominated by four major banks, despite the presence of other ADIs, several neobanks, and other non-bank institutions (NBIs) operating within the country. The four major banks comprise 67 percent of the total assets of the Australian financial sector as of December 2021. Nguyen et al. (2018) and Holden (2022) document that the major four banks in Australia are extremely powerful in setting trends on product innovation and pricing for other financial institutions. The Australian Government's Productivity Commission (AGPC) compiled a report in 2018 on "Competition of the Australian Financial System", which acknowledged the high concentration of market power among the major banks in Australia.

A considerable decline in competition was witnessed after the Global Financial Crisis (GFC). Healey and Nicholls (2015) emphasize that the more liberalized policies on increasing competition before the GFC were considered triggers for the crisis, and overall regulations were strengthened around the world, making meeting regulatory costs a burden to most financial institutions. Consequently, competition in the Australian banking sector declined considerably.

3. LITERATURE REVIEW

3.1. Unit cost of Financial Intermediation

There are a few prominent studies conducted on the unit cost of financial intermediation. Philippon (2015) observed constant costs for the US. Philippon (2016) argues that the finance sector has gone through most technological innovations, but has not passed on any savings to consumers as financial institutions continue to set relatively high interest spreads between deposits and loans. Bazot (2018) has done a similar study for Europe and has identified that after financial deregulation no European country except France has experienced a decline in financial intermediation costs. France had a state-based financial sector with a comparatively higher unit cost of financial intermediation before the 1990s (i.e. before financial deregulation) but lower

costs after financial deregulation. Bazot (2023) extends this study to 15 countries and finds a decreasing trend for eight countries (Belgium, France, Italy, New Zealand, Denmark, Finland, Japan, and Sweden). Mixed evidence is found for the remaining seven countries (Canada, Spain, UK, US, Germany, Korea, and Norway).

Extant literature also attempts to identify reasons for the shape of the unit cost of financial intermediation curve. Bazot (2018) finds that nominal interest rates are positively correlated with the unit cost of financial intermediation by conducting a panel regression analysis. Other control variables such as GDP per capita growth, inflation and financial globalization do not provide significant results. Bazot (2023) concludes that the effect of deregulation is low when market power is high. Philippon (2016) argues that tighter regulations have acted as barriers to entry and thus favour established and larger financial institutions, as meeting regulatory costs discourages new entrants and limits the operations of established or incumbent smaller firms. Therefore, dominant banks had the bargaining power to pass risks and costs to consumers and assume higher profitability due to low competition.

The emergence of FinTechs is another element influencing the unit cost of financial intermediation. FinTech has been rapidly growing in the world with increased popularity along with technological advancements and the tech-savvy generation entering the workforce and starting to use financial products. Philippon (2016) argues that FinTechs can minimize costs, provide better consumer satisfaction, and enable better competition in the financial sector, disrupting traditional banks' operations. Carney (2017) supports this view by finding that the FinTech revolution will benefit individuals, industries, and traditional banking institutions alike through cost advantages, risk management, and expediting processes. Therefore, the cost of financial intermediation should decrease.

The COVID-19 pandemic also contributed to the increasing popularity of FinTechs as consumers sought digital solutions as opposed to physically visiting places. Digital wallets, online banking, and mobile banking became more common where FinTechs thrive. Therefore, an improvement in reducing financial intermediation costs can be expected during the period after the COVID-19 pandemic hit the world. Nevertheless, as of now, such anticipated disruption and rapid improvements in financial services have not been witnessed. Makarov and Schoar (2022) argue that the incumbent financial institutions act as central nodes in the financial sector with large economies of scale that enable them to comply with prudential regulations, money laundering regulations, and tax laws and remain profitable compared to FinTech startups.

Customer-owned financial institutions are also a part of financial intermediation. These entities were better appreciated in the aftermath of the 2008 financial crisis in the world. Birchall (2013) states that customer-owned banks are more stable and have been resilient throughout crises for over 100 years while providing better consumer services and promoting financial inclusion compared to shareholder-owned banks. Birchall (2013) further points out that customer-owned banks were entirely unaffected during the global financial crisis and did not require any government bailouts, unlike profit-oriented banks. Further, it is believed that customer-owned banks allow for lower costs and better service (Birchall, 2013). Banks are also more concerned with ESG-related objectives, allocating more funds and improving reporting on ESG (Galletta et al., 2022; Galletta and Mazzù, 2023) On the contrary, Milton Friedman (1970) argues that firms are supposed to concentrate on shareholder wealth maximization, which is beneficial for the firm, consumers, employees, and the economy, as conducting other corporate social responsibility projects is not within the competence level of the firm. Whether this theory also applies to banking institutions is an open question.

3.2. Financial Intermediation Cost of the Banking Sector

There is a large volume of literature on the determinants of intermediation cost of the banking sector, as it is the most prominent sector of the financial sector. In most of these studies, net interest margin (NIM) is used a dependent variable in identifying the determinants for bank profitability and intermediation cost[5] (Jarmuzek and Lybek, 2018; Calice and Zhou, 2018).

The determinants of NIM fall into three categories. The first category includes macroeconomic factors such as GDP (Jarmuzek and Lybek, 2018; Cruz-Garcia et al., 2019; Kohlscheen et al., 2018), inflation rate (Jarmuzek and Lybek, 2018; Calice and Zhou, 2018; Kohlscheen et al., 2018; Saunders and Schumacher, 2000), Short-term and long-term interest rates (Calice and Zhou, 2018; Busch and Memmel, 2017; Cruz-Garcia et al., 2019; Kohlscheen et al., 2018), governance indicators (Jarmuzek and Lybek, 2018) credit and infrastructure (Calice and Zhou, 2018). The second category is related to banking sector structural factors, e.g., competition (Jarmuzek and Lybek, 2018; Calice and Zhou, 2018; Cruz-Garcia et al., 2019). The third category comprises bank-specific factors such as the size of the institution (Kohlscheen et al., 2018), efficiency (Jarmuzek and Lybek, 2018; Cruz-Garcia et al., 2019; Kohlscheen et al., 2018), credit risk

[5] Adeabah and Andoh (2020) have taken interest income as a percentage of interest-bearing assets and interest expense as a percentage of interest-bearing liabilities as the measure of the price of loans and deposits, respectively. Busch and Memmel (2017) have used a similar dependent variable in their analysis which they call the interest income margin (interest income as a percentage of total assets) and interest expense margin (interest expense as a percentage of total assets).

(Jarmuzek and Lybek, 2018; Calice and Zhou, 2018; Cruz-Garcia et al., 2019) risk aversion (Calice and Zhou, 2018; Jarmuzek and Lybek, 2018; Cruz-Garcia et al., 2019), capital, and liquidity levels (Kohlscheen et al., 2018).

The findings of previous studies on the determinants of NIM vary due to the sample countries used and different categories of variables used. Jarmuzek and Lybek (2018) using a panel regression for a sample of 100 countries identified that operational cost, capital adequacy ratio (proxy for risk) credit risk, and law and regulatory quality variables are significant in determining NIM, whereas competition, inflation, and real GDP growth were found to be insignificant. However, Calice and Zhou (2018) using a sample of 160 countries and Kohlscheen, et al. (2018) using a sample of emerging market economies find that inflation is a significant factor in the analysis. Similarly, competition is identified to be a significant variable in Smirlock (1985), Bourke (1989), Calice and Zhou (2018) and Cruz-García et al. (2019). Credit risk is generally found to be insignificant (Calice and Zhou, 2018; Cruz-García et al., 2019).

3.3. Bank NIM and Interest Rates

A number of studies investigate the relationship between interest rates and NIM and contribute to explaining the behavior of NIM. Cruz-Garcia et al. (2019) find that short-term interest rates have a positive association with NIM, which is complemented by Calice and Zhou (2018). When interest rates increase, the banks have to account for risks associated with increasing interest rates resulting in banks assuming a higher interest rate spread (via increasing lending costs at a higher rate than increasing deposit rates). On the contrary, Kohlscheen et al. (2018) have concluded that short-term interest rates have a negative relationship with NIM. They argue that, increasing funding cost will reduce the spread of the banks.

Regarding testing theories specifically on interest rates and bank profitability, several studies stand out. Wang et al. (2022) have done a comprehensive study on identifying the effect of market power and monetary policy transmission in the US banking sector through a dynamic model. They state that interest rate pass-through can be explained through three frictions - regulatory (regulatory capital requirements), imperfect competition (market power concentration), and financial friction (friction created through funding sources of the bank). They have identified market power as an explanatory factor for the different responses of banks to policy rates.

Busch and Memmel (2017) have conducted a study on how German banks respond to interest rate changes. They find a positive relationship between interest rates and the net interest margin of banks in the long run and a negative relationship in the short run. They explain this situation

with the stickiness of deposits which is higher than the loans in the long run. The severity of this effect is more visible in a low-interest rate scenario as the lower-bound exerts more pressure on deposits of a bank (Busch and Memmel, 2017).

Claessens et al. (2018) have done a similar study to find the impact of interest rates on bank profitability. They have considered the NIM and ROA as their dependent variables and interest rate as an independent variable amongst a number of bank-specific and country-specific control variables. They have added a control for high-interest rates and low-interest-rate time periods in different countries. They concluded that in low-interest rate periods, the bank NIM and interest rate relationship is much stronger than it is in high-interest rate periods. The reason behind this finding is that in a lower interest rate situation, banks tend to lower loan rates more compared to deposit rates, in line with the justification offered by Busch and Memmel (2017) on the zero-bound behaviour.

3.4. Banking Sector Studies in Australia

Recent studies on the Australian banking sector are limited even though Australia has some unique characteristics in its banking sector which makes it an important case study in formulating banking policy. Gangopadhyay et al. (2022) examine how banks' profits outweigh the information technology costs in Australia. They explain that if information technology is used to gather soft information, banks can profit through relationship banking and transaction banking. Hoang et al. (2020) have studied the impact on shareholder value of banks and conclude that further increase in bank concentration may create scale disadvantages for the big banks in Australia.

To the best of knowledge of the authors, a unit cost calculation for Australia has not been conducted so far, with a more thorough analysis on the relationship between intermediation costs and interest rates specifically for Australia. The interest rates considered in the previous studies have been market rates and three-month overnight interbank rates. In this study, the overnight interbank rate is employed, which is closer to the policy rates and thereby provides a better understanding of how policy rates and financial intermediation costs are related. In addition, there appear to be no studies that closely examine the financial statements of different types of financial institutions to make inferences on the possibility of improving consumer cost benefits. Our study aims to address these gaps in the literature.

4. METHODOLOGY

This section is comprised of three parts. First, we present the equation for calculating the unit cost of financial intermediation for Australia using the methodology proposed by Philippon (2015), Philippon (2016), and adopted by Bazot (2018) for the financial sector of Australia. Then we describe the regression model for investigating the relationship between the cost of financial intermediation and interest rates. We conduct the regression analysis for the financial sector and the banking sector, respectively. We focus on the intermediation costs of the banking sector as this sector represents 81% of total assets of the financial sector (excluding superannuation funds) as at the end of December 2021 (RBA) in Australia. In the third sub-section, we study the cost of financial intermediation at a more granular level by comparing the financial statements of representative financial institutions, one from each of the five types, as shown in Table 3 The five types of financial institutions are characterized by different regulatory requirements, operational efficiencies, technological innovations, and ownership structures. Along with this analysis, we identify the potential to decrease the cost of financial intermediation thereby increasing cost benefits to consumers.

[Table 3 about here]

4.1 Unit Cost of Financial Intermediation

We use two estimates of the unit cost of financial intermediation. The first estimate is based on the entire financial sector and the second estimate is based on the banking sector.

We follow Philippon (2015), Philippon (2016), and Bazot (2018) to calculate the unit cost of financial intermediation for the Australian financial sector. The unit cost of financial intermediation is calculated as the "Income of the Finance Industry" divided by the "Quantity of Intermediated Assets".

$$Unit\ Cost\ of\ Financial\ Intermediation = \frac{Financial\ Income}{Financial\ Intermediated\ Assets}$$

Philippon (2015, 2016) and Bazot (2018) have considered the value added by the finance and insurance industries to the economy to calculate the income of the finance industry. Data on the Australian finance and insurance sector is available on the Australian Bureau of Statistics website from September 1974 up to June 2022.

Philippon (2015) has taken credit, equity, and liquid assets of the household and non-financial businesses sector to calculate the quantity of intermediated assets. Bazot (2018) uses a similar approach and considers credit to the private sector, money supply, public debt, and market

capitalization to account for the output of financial services. Both these approaches consider the liquidity creation function and financial services provided by financial intermediaries. In addition, several quality adjustments are carried out by both Philippon (2015) and Bazot (2018) in adjusting these data to represent financial intermediation more appropriately.

With regards to Australia, M3 and credit to the private sector were extracted from monetary aggregate data provided by the RBA, market capitalization data was obtained from the Australian Stock Exchange and public debt data (market value of debt issued in AUD) was taken from the Australian Office of Financial Management. A 10% discount factor was added for public debt as a risk adjustment following Bazot (2018). Since market capitalization data is only available from 2010, we limit our analysis to the data from 2010 onwards.

4.2 Regression on cost of financial intermediation and interest costs

We conduct regression analysis for the financial sector as a whole for Australia and then for the banking sector of Australia and US. The unit cost of intermediation calculated in Section 4.1, is used as the dependent variable for the financial sector and the net interest margin obtained from APRA for Australia and Federal Deposit Insurance Corporation (FDIC) for the US are used for the banking sector.

The net interest margin[6] is the intermediation cost of banks as it directly accounts for the lending and deposit mobilizing operations of a bank. The main independent variable was the interest rates, which are proxied by overnight-interbank rates. This data for Australia and US are obtained from the FRED Economic Data website. Linear regressions of NIMs (dependent variable) on interest rates, lags of NIMs and lags of interest rates are estimated. Thereafter, residual stationarity was checked using the Dickey-Fuller test, and autocorrelation was checked using the Breusch–Godfrey test. The Newey-West standard errors are used to address autocorrelation in the tested models. In additional analyses, changes in interest rates (Monetary Policy changes) and macroeconomic variables are also added to the model as control variables. The frequencies of these observations are given at Table 4.

[6] NIM in Australia was gathered from the APRA and is calculated as an average of all ADIs' NIM. NIM of an individual ADI is calculated by dividing Net Interest Income (Interest Income – Interest Expense) by the average total assets. NIM in the US was gathered from the Federal Deposit Insurance Corporation which is also an average of all the banks. The NIM of an individual bank in the US is calculated by dividing the Net Interest Income by the average interest bearing assets. While the denominators are different for Australia (total assets) and the US (interest bearing assets), they are comparable because interest baring assets make up a large portion of total assets (91% for 2022 Q4). Therefore, the trends in NIM between Australia and the US can be compared but the levels may differ.

[Table 4 about here]

4.3 Comparing financial statements of different types of financial institutions

Financial statements of a shareholder-owned ADI, customer-owned ADI, non-ADI, and FinTechs for 2019 and 2021 were used for this analysis. A lending FinTech and a neobank were selected to represent the FinTechs as it enables the observation of entities with prudential regulation and entities without prudential regulation. The two years were selected to represent the latest position and the position prior to the COVID-19 pandemic. The financial consumers' behaviour changed during the pandemic and regulators implemented several policy responses to the pandemic, which also may have impacted the financial intermediaries.

As the financial institutions considered in this study are of different sizes, it is not possible to compare the absolute figures reported in the financial statements of respective institutions. For comparison purposes, items in the Income Statement were taken as a percentage of interest income. Interest income represents the income from the main business operations of a financial institution and is the starting point for calculating the profit of a financial institution. Therefore, taking other items in relation to interest income would allow the comparison of income statement items for financial institutions of different sizes.

Similarly, items in the Statement of Financial Position are taken as a percentage of total assets. Total assets directly represent the size of the financial institution, therefore, taking items in the Statement of Financial Position as a percentage of total assets would enable an accurate comparison between different sizes of financial institutions.

Theoretical background on financial statement components and profits

All financial institutions record a profit or loss depending on the revenue the financial institution generates from providing financial services, costs incurred on funding, operational costs, and risk management provisions. These factors vary according to its ownership structure, regulatory requirements, and operational efficiencies. The profit a financial institution reports directly reflects the cost of financial intermediation and consumer welfare. Therefore, factors contributing to the profit need to be understood to suggest improvements for cost benefits to consumers from financial services.

Profit of an ADI

ADIs' main income source is interest from loans and advances. In addition, income can be attained from investments, fee-based income, etc. The main expense an ADI incurs is the cost of deposits. Expenses on other funding sources, operational expenses, and provisions are the other deductions to be made when deriving the profit of an ADI.

$$Profit = (IR * Loans - \boldsymbol{IR'} * \boldsymbol{Deposits}) + Other\ Interest\ Income + Non\ Interest\ Income - Other\ Interest\ expenses - Operational\ expenses - \boldsymbol{Provisions}$$

where IR denotes interest rate for loans and advances and IR' denotes interest rate for deposits. Both shareholder-owned and customer-owned ADIs must keep part of their profits to meet capital adequacy requirements imposed by the APRA. In addition, shareholder ADIs will use profits to pay dividends to their shareholders.

Furthermore, regulatory requirements such as maintaining liquid assets and provisioning for non-performing loans may affect the potential of generating revenue for ADIs.

Profit of a Non-ADI engaged in lending

Apart from interest expenses on deposits, all other operational components of non-ADIs are similar to ADIs. Non-ADIs are obtaining funds through borrowing wholesale funds from other ADIs or through issuing debt instruments. Further, making provisions to mitigate credit risks and other prudential requirements are not mandated upon non-ADIs.

$$Profit = IR * Loans + Other\ Interest\ Income + Non\ Interest\ Income - Other\ Interest\ expenses - Operational\ expense$$

There are no regulatory requirements for maintaining capital adequacy for non-ADIs. Therefore, non-ADIs can use the profit for dividends or retain it for business as they wish.

Profit of FinTechs

The profit of FinTechs varies according to the operations they conduct and whether they are an ADI or a non-ADI. It is expected that due to technological innovations overall operational expenses should be substantially lower for FinTechs compared with traditional financial institutions. Low staff costs and no or minimum physical locations should also lower costs and thus make operations more efficient.

Therefore, shareholder-ADIs, customer-owned ADIs, non-ADIs, and FinTechs would have different costs of financial intermediation. Customer-owned ADIs should provide greater cost

benefits to consumers compared with profit-oriented financial institutions, as the former can distribute any profits to customers and not to shareholders. However, all ADIs have prudential requirements to comply with and allocate part of the profit as reserves which would increase the cost of financial intermediation. Since non-ADIs and non-regulated FinTechs can operate outside the regulatory regime of financial institutions they may be able to offer financial intermediation at an even lower cost.

5. RESULTS

We first present the calculation of the unit cost of financial intermediation in Australia. Secondly, we examine the intermediation cost and its relationship with policy rates. Third, we compare five types of financial institutions in Australia and analyze the potential to improve consumer benefits by reducing intermediation costs.

5.1 Unit Cost of Financial Intermediation of the Financial Sector of Australia

Similar to Philippon (2015) and Philippon (2016), the income share of finance and intermediated assets as a percentage of GDP is calculated using the nominal GDP data extracted from the RBA database under "Gross Domestic Product and Income – H1". It appears that the income share of finance and insurance is on a declining trend, whereas financial output (financially intermediated assets) is on an increasing trend. The declining income share for increasing financial output implies decreasing costs for customers. The two lines intersected in mid-2016, at which the relative share of financial output has gone above the relative share of financial income.

Panel A in Figure 1 shows that the unit cost of financial intermediation is trending downwards in the Australian financial sector from a maximum of 2.36% reported in June 2010 to a minimum of 1.41% reported in March 2022. This is in stark contrast to the US (Philippon 2015, 2016) where the cost is relatively constant at around 2%, as shown in Panel B of Figure 1. The declining financial income share in Australia could be due to technological advancements and lower operational costs leading to lower costs for consumers. Nevertheless, whether such a decline is adequate, given the magnitude of improvement in operational efficiencies remains a question. Further, there are many types of financial service providers in Australia that are regulated in a twin-peak regulatory architecture, which is also a different feature compared to the US financial sector.

[Figure 1 about here]

5.2 Relationship between cost of financial intermediation and Interest Rates

Financial Sector - The unit cost of financial intermediation and interest rates are positively correlated implying that the declining cost of financial intermediation may have been affected by the declining interest rate environment in Australia as indicated in Table 5. Further, persistence is also observed as the lagged unit cost variable is also significant.

Subsequent tests were done to check for residual stationarity and autocorrelation. Through the Dickey-fuller test for unit root, it was noted that the residual is stationary, and through the Breusch–Godfrey Test, it was noted that there is no residual autocorrelation.

[Table 5 about here]

Banking Sector - Intermediation cost which is the NIM of banks is downward trending in Australia and constant in the US. A major contrast between the Australian financial sector and the US financial sector is that the majority of mortgage loans in the Australian financial sector are on variable interest rates compared with the long-term fixed-rate loans dominant in the US. Therefore, we hypothesized that interest rates have an impact on NIMs in Australia but a weaker impact on NIMs in the US. As observed in Figure 2, NIM and policy rates have a positive relationship for Australian banks (ADIs) and a seemingly weaker relationship for US banks.

The regression analysis for the NIM and the interest rates presented in Tables 6 and 7 confirms this hypothesis. Interest rates and NIMs have a positive relationship in Australia. Further, the NIM exhibits persistence indicated by the lagged NIM coefficient of 0.71. With respect to the US, there is no statistically significant impact from rates on the NIM and a higher degree of persistence indicated by a lagged NIM coefficient of 0.93 as indicated in Table 6 & 7. This result is in line with Campbell's (2023) assertion that monetary policy transmission is ineffective in the US as the majority of the loans are on a fixed rate basis compared with countries with a variable interest rate.

[Figure 2 about here]

In contrast, the Reserve Bank of Australia (RBA, 2023) indicates that monetary policy transmission through changing policy interest rates is carried out effectively via financial institutions in Australia. The positive relationship means that the NIM falls when interest rates fall and that the NIM increases when interest rates increase. This could be due to a squeeze when

interest rates approach zero as the higher lending rates of banks decline faster than the deposit rates. When interest rates rise, lending and deposit rates can move more freely and the NIM can widen. Our finding is consistent with Bazot's (2018) result of a positive correlation between policy rates and the cost of financial intermediation in France, Germany, and the UK.

[Table 6 & 7 about here]

Subsequent tests revealed that the residual is stationary for both Australia and US, but show autocorrelation for Australia and no autocorrelation for US. Therefore, we used Newey-West standard errors to correct the coefficients for model 3 regression we did on Australia. Furthermore, when we compare the R^2 of the regression results, it is clear that the independent variables explain a substantial fraction (69%) of the NIM in Australia. Since policy rates are insignificant for the US, the R^2 is higher (90%) implying that the NIM is mostly explained by its own lag.

In additional analyses, we add indicator variables for expansionary monetary policy and no-change monetary policy to the baseline model, and the results remain qualitatively the same as indicated in Appendix 2 and 3. No significance was observed when monetary policy was changed, or on their interactions with interest rates for Australia. The no change in monetary policy and its interaction with interest rates for the US is significant. This implies an intercept shift. However, the low number of observations on "no change" as indicated in Table 4 makes this model unreliable.

We also add macroeconomic variables to the baseline model as controls. With regard to deciding on the macroeconomic variables, correlation matrix, and Variance Inflation Factor analysis are used. Accordingly, it is noted that rate and house prices seem to have a strong correlation with NIM in Australia. However, rates and house prices are also strongly correlated with each other. The VIF analysis also provides similar results even though the mean VIF indicates that there is no multicollinearity amongst the variables used in the model (using all macroeconomic variables). Therefore, either interest rates or house prices can be used in the regression. Accordingly, when we checked for all the other macroeconomic variables, only the unemployment rate became significant and the lagged interest rate remains positive and significant. Regarding the US, inflation is the only macroeconomic variable that gives a significant result, and the lagged interest rate remains insignificant. Further, it is observed that the magnitude of the coefficient of the lagged interest rate becomes smaller when inflation is added to the model.

We also conducted a VAR analysis to better understand the dynamics between interest rates and NIM. However, the first differences of the interest rate and NIM variables for the US were not stationary and the results for Australia, were also not consistent for different lags.

5.3 Comparing financial statements of different types of financial institutions

The following describes some interesting facts by comparing the financial statements of different types of financial institutions in Australia. The comparison data is in Tables 8 and 9.

a) All financial institutions are profitable except the FinTechs (Neobanks and Lending Fintech). The shareholder-owned ADI is the most profitable, followed by the customer-owned ADI and the non-ADI. The customer-owned ADI is making higher profits compared to non-ADI and FinTechs despite those entities being profit-oriented. The EPS of the shareholder-owned ADI is 196.30 in 2021 and above 168.60 in 2019.

   When compared over time, using absolute figures, the variation in the impact of the COVID-19 pandemic on financial institutions can be observed. Profit before tax of the shareholder-ADI dropped abruptly in 2020 and recovered beyond the pre-pandemic level in 2021, whereas the customer-owned ADI did not record such a sharp decline and continued to increase profits over time. The non-bank ADI has not shown any impact from the pandemic on its profits and instead recorded a gradually increasing profit over the last four years. Neobank aggravated the loss position during the pandemic and the FinTech lender did not show any such impact from COVID-19 on its losses.

b) Loans & advances is the main income source for all entities, with non-ADI being the entity reporting the highest income from loans & advances.

c) Interest expenses are highest for the Non-ADI in 2021, which could be due to not having access to deposits like the other three ADIs. As they are not part of the Financial Claims Scheme, obtaining low-cost funding is difficult. Neobank reports the lowest interest expenses, which indicates low rates given to their deposits and access to other low-cost funding sources. The depositors of FinTechs may value the convenience of technology over higher interest rates.

   Overall, the customer-owned ADI reports the highest expense for deposits, which implies that they are providing better rates for their depositors, as expected. The shareholder-ADI incurs a lower interest expense on deposits. However, their total interest expenses (expenses on deposits and borrowings) are relatively high, as they incur a higher cost on borrowings from controlled entities which are entities in the group of this shareholder ADI (subsidiaries

and other related parties). For example, if an interest rate approximation is calculated by dividing the interest expense for deposits/borrowing by the average deposits/borrowings, the rate for deposits is 0.82% compared to 7.76% for controlled entities. However, the shareholder ADI may not be too concerned about these expenses as the profit will be consolidated in the year-end accounts for the group of the shareholder ADI.

Net interest income (Interest income – Interest expense) which is the profit generated from the core business of financial institutions is highest at the FinTech Lender, followed by the customer-owned ADI, neobank, and the shareholder ADI. Further, net interest income has gradually increased despite the effects of the pandemic in all financial institutions except for non-ADI. Therefore, at this point, the customer-owned ADI which should operate with a customer-centric objective seems to be reporting higher profits from main business operations compared to the shareholder ADI, Non-ADI, and FinTech lender which are profit-oriented.

These observations raise the question as to why FinTechs are reporting such high net interest income and ending up in a loss position and why customer-owned ADIs are reporting high net interest income instead of passing it to the customers. Operational expenses, risk management, and meeting regulatory requirements may explain these outcomes.

Total operational cost is highest in FinTechs followed by the customer-owned ADI even though it was expected that the FinTechs would display lower operational expenses due to technological innovations and not having a physical presence. Surprisingly, out of the operational expenses, the personnel expenses of Neobank are also high, which implies that it has not reaped the benefits of automation. However, the operational cost and personnel expenses are slightly lower in the FinTech lender. The scale advantage of the shareholder ADI mentioned by Markov and Schoar (2022) is clearly observed through the high operational efficiency of shareholder ADIs and significant inefficiencies in FinTechs.

Figure 3 on NIM and Interest Rates, shows that in all financial institutions except shareholder-ADI, net interest income and operational expenses vary, whereas the net interest income of the shareholder-ADI is stable. This indicates that operational efficiencies and costs are not passed to the customer by the shareholder-ADI or that they have other income sources than the core operations, which compensates for the operational expenses they incur.

Provision/impairment for credit risk management is also highest in the FinTechs, reflecting poor credit assessments prior to the COVID-19 pandemic and the latest financial statements. FinTechs are renowned for providing instant credit by only digitally verifying

creditworthiness via online applications compared to other types of institutions. Credit risk seems to be the lowest in the customer-owned ADI.

All institutions that were compared except for the customer-owned ADI have equity capital. The non-ADI and FinTech lender do not have to fulfil any regulatory capital requirements as they are not regulated by the APRA. Neobank reports the highest equity capital despite a loss during 2019 and 2021.

[Table 8 & 9 about here]

[Figure 3 about here]

Reasons for high net interest income in customer-owned ADI and the FinTech

FinTechs have not been able to pass on cost advantages to their customers due to high operational inefficiencies and credit risk. As such, automation has not delivered the expected cost savings for customers.

The capital requirement of the customer-owned ADI is solely comprised of reserves as they do not have any equity shareholders unlike in other types of financial institutions. The reserves are built from retained profits. As the regulatory requirement on capital is the same for all ADIs, customer-owned ADIs must produce higher profits to build reserves to withstand risks faced by the bank, especially credit risk. With high operational costs (probably due to low economies of scale) these ADIs must report comparatively high profits from their main business operations to comply with capital adequacy regulations. The capital requirement of an ADI is determined as a percentage of risk-weighted assets of such ADI, according to the APRA regulations. Risk-weighted assets are mainly comprised of loans and advances given by ADIs, which fluctuate throughout the financial year. However, capital ratios imposed by the APRA must be maintained at all times by an ADI.

Suggestions to lower the cost of financial intermediation and improve cost benefit to consumers

Net interest income is the difference between the interest income a financial institution receives from loans and the interest expense a financial institution pays on loans (deposits). It is the excess cost borne by customers of such financial institutions and thus a measure of the potential improvement in cost benefit to consumers.

5.3.1 Capital built from profits and cost benefit to consumer

According to the Capital adequacy regulations imposed by the APRA, the total capital ratio to be complied by an ADI is calculated as follows and should be a minimum of 8%:

$$\textit{Total Capital ratio} = \frac{\textit{Total Capital}}{\textit{Total risk-weighted assets}}$$

In addition, to this capital ratio, 2.5% for capital conservation buffer and a countercyclical capital buffer ranging from 0%-2.5% are expected to be held by ADIs at all times. Systemically important ADIs are expected to maintain a 3.5% capital conservation buffer. The countercyclical capital buffer varies with the credit market conditions and can be increased or decreased by regulators from time to time; during 2021 it was 0% in Australia. Considering all such capital requirements, a capital ratio of 10.5% (8.0% Total Capital Ratio + 2.5% Capital Conservation Buffer) is taken as the minimum regulatory requirement for a customer-owned ADI in this analysis.

The customer-owned ADI which was considered for this study is reporting a capital ratio of 14.8% which is above the minimum requirement. Hence, the net interest income can be lowered as shown in Table 10 if the customer-owned ADI is maintaining only the minimum requirement of capital. At present, they have an excess capital of AUD 127.1 million. Therefore, the profit can be allocated to provide better customer benefits by lowering interest rates on loans and increasing interest paid on deposits. The profit component in the excess capital ratio is AUD 33.2 million. Therefore, the customer-owned ADI has the possibility of reducing its profits up to zero while passing the cost benefits to customers as indicated in Table 11. In the most extreme situation, where the entity does not make a profit at all, the net interest income can be decreased by AUD 33.2 million to AUD 123.1 million (AUD 156.3 million – AUD 33.2 million) or by 21%. This reduction implies a lower cost to service loans and increased returns on deposits increasing cost benefit to the consumer. More precisely, if we assume that the current borrowing rate is 5.24% and the welfare gain is only distributed to the borrower, the rate can go down to 4.14% with the recommended improvements. Similarly, if deposit rates are assumed to be 4.00% and the welfare gain is only given to the depositor, the rate can increase to 4.84%.

[Table 10 about here]

The shareholder-ADI is also maintaining higher capital adequacy levels compared to the minimum requirement. As identified previously, the shareholder ADI which is one of the major four banks in Australia (Domestic-Systemically Important Bank) should have a capital ratio of

11.5%. Nevertheless, they are maintaining a capital ratio of 18.9% at present. Therefore, like the customer-owned ADI, this ADI could also pass on the additional capital amount to its consumers via reducing net interest income. As shown in Table 12, Scenario 1, the cost-benefit to consumers can be increased by 20%.

[Table 11 about here]

5.3.2 Profit Distribution and Cost Benefit to Consumer

As a shareholder-ADI is profit-oriented, several scenarios were assumed to evaluate how lower dividend payout ratios will affect the cost-benefit to consumers, while maintaining only the minimum required amount of capital. At present, the dividend payout ratio of the shareholder-ADI is 58%. Scenario 2 shows that cost benefit to consumers can be increased by 24% when the dividend payout ratio is lowered to 50%, scenario 3 shows an increase to 29% and scenario 4 shows an increase to 37% for payout ratios at 40% and 25%, respectively. For the best possible gain, the borrowing rate can be decreased to 3.78% from the assumed rate of 6.00% (deposit rates held constant). Further, the deposit rates can be increased to 4.11% from an assumed rate of 3.00%.

[Table 12 about here]

5.3.3 Operational Cost and Cost benefit to consumers

High operating cost also contributes to financial institutions' net interest incomes. The FinTechs evaluated were the financial institutions with the highest operational costs. Operational expenses as a percentage of interest income for the shareholder-ADI is 42.7% and that of customer-owned ADI is 51.7%. FinTechs should have lower operational costs compared with other financial institutions due to technological innovations and automation. Accordingly, scenarios 1 and 2 of Tables 13 and 14 were created assuming that operational costs can be reduced to 50% and 40% against interest income. However, such improved cost efficiencies would have to be used to offset the losses reported by these FinTechs, before reducing such benefits from the net interest income. After such adjustments, cost benefits to consumers can be increased by 19.6% and 34.6% for the Neobank for scenarios 1 and 2, respectively. Similarly, cost benefits to consumers can be increased by 5.5% and 18% for the FinTech lender for scenarios 1 and 2, respectively. Therefore, operational efficiencies must improve to compensate for the losses currently made by FinTechs before passing benefits to its consumers.

5.3.4 Credit Risk and Cost benefit to consumers

Impairment for non-performing loans is another major cost that can be reduced to provide better consumer value. Impairment is also high for FinTechs. While speedy credit evaluation and loan provision are the competitive edge of FinTechs, they may also attract more risky customers that compensate for the more efficient intermediation. However, FinTechs could require low loan-to-value ratios (e.g. an AUD 100,000 loan for an AUD 200,000 house as collateral) and attempt to reduce non-performing loans, thereby decreasing loan loss provisioning requirements. Scenario 4 in Tables 13 and 14 assumes that the FinTechs will reduce operational costs to 35% of the interest income and reduce the credit risk by 50%. Yet, these cost benefits need to be used to offset the existing loss-making position of FinTechs. Even so, the cost-benefit to consumers can be increased by 50.9% for the Neobank and 56.8% for the FinTech lender under scenario 4 indicating the necessity of operational efficiency and proper credit risk mitigation to provide cost benefit to consumers through financial services. With such gains towards the consumer, the neobank can reduce the borrowing rates to 3.12% from the assumed rate of 6.00%, while keeping deposit rates constant. Similarly, a neobank can increase its deposit rates to 4.44% from the assumed rate of 3.00% with the suggested improvements. In case of the FinTech, the borrowing rates could be reduced to 3.45% from 8.00%.

[Table 13 and 14 about here]

6. CONCLUSION

This study analyzed whether financial intermediation costs in Australia are declining over time due to technological advancements providing cost advantages for customers. Philippon (2016) carried out a similar study for the US and concluded that since financial intermediation costs for the US are constant, the expected improvements from technological advancements have not reached customers. In contrast, we find that the costs of financial intermediation in Australia have decreased over time. We observe a similar pattern for the cost of financial intermediation of the banking sector of Australia and the US. Regression analysis indicates that falling interest rates explain declining financial intermediation costs in the financial sector and the banking sector. No such effect is identified for the US. This result is intuitive as Australia has a high concentration of variable interest rate loans whereas the US has a high concentration of fixed interest rate loans. Given the rising policy rate environment since 2022, it is vital to understand the potential to reduce the financial intermediation costs of banks.

Accordingly, we study the financial statements of different types of financial institutions to identify the potential to improve cost benefits to consumers. We find that large, publicly listed and shareholder-owned banks generate relatively high profits and payout ratios indicating the ability and thus potential to pass on the benefits to consumers. In contrast, other types of entities are more constrained in providing such benefits to the consumer due to scale disadvantages. FinTechs have not been able to report profits due to higher credit risk and operational inefficiencies. Since regulations are the same for all banks (more formally Authorised Deposit-taking Institutions), customer-owned banks must also follow strict capital requirements similar to their generally much larger shareholder-owned competitors. This puts customer-owned banks at a disadvantage.

Technological innovations should improve consumer welfare. FinTechs are expected to disrupt traditional banking by enhancing the usage of technology in providing financial services. Automation and online-only presences should reduce the overheads and personal expenses of FinTechs compared to traditional banking institutions. Further, technology can be used to provide innovative financial services using the Internet of Things (IOT) where data from various applications can be accumulated and analysed. The speed of processing customer requirements should also increase with the use of technology which should enable better customer service. Such technologies can be adopted by all financial institutions and are not confined to FinTechs. However, the observed FinTechs report losses and high operational costs compared with other institutions. Moreover, FinTechs have high default rates aggravating the potential losses. High credit risk could be emanating from attracting less credit-worthy customers compared to the traditional banking sector and more automated credit evaluation and credit risk management. Therefore, the disruption anticipated by FinTechs has not occurred yet.

We produce several scenarios for each type of institution to reduce net interest income which would directly improve consumer welfare either through lower borrowing rates or higher deposit rates. For instance, a shareholder-owned bank could either decrease its borrowing costs to 3.78% from 6.00% while holding the deposit rate constant or could increase the deposit rate to 4.11% from 3.00% while holding borrowing rates constant. A similar example can be constructed for customer-owned banks but not for FinTech institutions that do not report any profits. For FinTechs improving operational efficiency and reducing credit risk can increase consumer welfare.

The findings of this study contribute to the literature on the determinants of financial intermediation costs of banks and financial consumer welfare and highlight that financial intermediation costs change with changing policy rates, a finding that may deserve more attention

by policy makers. Of course, stronger competition can also be assumed to lower the costs of financial intermediation.

Strong capital buffers and low risk exposure, e.g. by passing interest rate risk and credit risk to customers, made the Australian banking sector highly stable and resilient with some of the most profitable banks in the world. However, the excessive profits imply a direct cost to Australian consumers and an indirect cost through lower-than-optimal competition.

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TABLES AND FIGURES

Table 1: Market Share of Financial Institutions in Australia as at December 2021

Institution	No. of Institutions	Total Assets	Market Share
All ADIs	**143**	**5,631**	**92.1%**
All Shareholder-owned ADIs	83	5,476	89.5%
Major Bank	4	4,062	66.4%
Customer-owned ADIs	60	155	2.5%
Non-ADI Financial Institutions	**107**	**485.4**	**7.9%**
Money Market Operations	5	29.3	0.5%
Finance Companies	102	295.5	4.8%
Securitizers	-	160.6	2.6%
Sector Totals	**250**	**6,117**	**100.0%**

Source: APRA and RBA

This table provides a comparison between the number of institutions and market share of various types of financial institutions operating in Australia. Market share is calculated by obtaining the total assets of a particular type of institution as a percentage of the total assets of the financial sector. ADIs have reported a considerably high market share of 92.1%, while non-ADIs have reported a meagre 7.9%.

Table 2: Classification of ADIs in Australia

	Dec 2015	Dec 2020	Dec 2021	Mar 2022
All banks	**74**	**99**	**96**	**97**
Major banks	4	4	4	4
Other domestic banks	22	39	36	36
Foreign subsidiary banks	7	7	7	7
Foreign branch banks	41	49	49	50
Credit unions and building societies	**76**	**40**	**36**	**36**
Other ADIs	7	8	8	8
Restricted ADIs	-	1	3	3
All ADIs	**157**	**148**	**143**	**144**
of which: customer-owned ADIs	90	64	60	60

Source: APRA

Various types of ADIs and the evolution of their number are evident in this table. The total number of ADIs has dropped since December 2015, resulting from the considerable drop in credit unions and building societies. Nevertheless, the number of banks has increased over time, which could be a result of certain credit unions converting to fully-fledged banks.

Table 3: Features of Financial Institutions in Australia

Entity	Regulation		Deposit Taking	Profit-oriented	Only Digital presence
	Prudential (APRA)	Market Conduct (ASIC)			
Shareholder-ADI	√	√	√	√	X
Customer-owned-ADI	√	√	√	X	X
Non-ADI	X	√	X	√	X
Neobank	√	√	√	√	√
FinTech Lender	X	√	X	√	√

This table summarises the features of various types of financial institutions operating in Australia

Table 4: Frequency of the changes in Monetary Policy Variables

Variable	No. of observations
NoChMP_AUS	34
ContMP_AUS	17
ExpMP_AUS	22
NoChMP_US	3
ContMP_US	42
ExpMP_US	28

Table 5: Results of the Regression between Unit Cost of financial intermediation and Interest Rates – Australia

	Model 1	Model 2	Model 3
IR_AUS	0.169***		
	(0.010)		
L.IR_AUS		0.170***	0.026*
		(0.008)	(0.014)
L. UC			0.845***
			(0.081)
Intercept	1.522***	1.511***	0.218*
	(0.026)	(0.019)	(0.124)
Number of observations	50	49	49
Adjusted R-squared	0.84	0.91	0.97

*** p<.001, * p<.1, ** p<.5

This table provides the results of the regression analysis between unit cost of financial intermediation and overnight interbank rates in Australia. It is observed that rates of the previous quarter and the unit cost of the previous quarter contribute to determining the NIM of this quarter, The R2 of 97% implies that the main factor influencing NIM is captured in the model.

Table 6: Results of the Regression between NIM and Rates for Australia

	Model 1	Model 2	Model 3
IR_AUS	0.034***		
	(0.005)		
L.IR_AUS		0.034***	0.010**
		(0.005)	(0.006)
L.NIM_AUS			0.707***
			(0.069)
Intercept	1.553***	1.552***	0.453***
	(0.020)	(0.019)	(0.109)
Number of observations	73	72	72
Adjusted R-squared	0.36	0.36	0.68

*** p<.001, * p<.1, ** p<.5

This table provides the results of the regression analysis between NIM and overnight interbank rates in Australia. It is observed that rates of the previous quarter and the NIM of the previous quarter contribute in determining the NIM of this quarter, The R2 of 69% implies that the main factor influencing NIM is captured in the model.

Table 7: Results of the Regression between NIM and Rates for the US

	Model 1	Model 2	Model 3
IR_US	0.035*		
	(0.020)		
L.IR_US		0.042**	0.009
		(0.021)	(0.007)
L.NIM_US			0.931***
			(0.038)
Intercept	3.227***	3.215***	0.209*
	(0.044)	(0.044)	(0.122)
Number of observations	74	73	73
Adjusted R-squared	0.03	0.04	0.90

*** p<.001, * p<.1, ** p<.5

This table provides the results of the regression analysis between NIM and overnight interbank rates in the US. In model 2, even though the results were significant, the residual was not stationary. In model 3, it is observed that rates of the previous quarter do not have a significant impact on NIM. As per model 3, the NIM is mainly determined by the NIM of the previous quarter, The R^2 of 90.1% implies that the main factors influencing NIM are captured in the model.

Table 8: Normalized financial statement items for five selected financial institutions – 2021

Item	Shareholder ADI	Customer-owned ADI	Non-ADI	Neobank	Fintech Lender
Income Statement					
Interest Income	100.00	100.00	100.00	100.00	100.00
Loans and advances	86.92	88.69	99.65	95.49	-
Debt instruments and other	13.08	11.31	0.35	4.51	-
Interest Expense	38.41	29.24	46.89	33.15	20.01
Deposits	7.81	24.98	-	22.07	-
Borrowings	30.60	4.26	-	11.08	-
Net Interest Income	61.59	70.76	53.11	66.85	79.99
Other Income	21.58	9.81	11.73	4.19	8.71
Personnel expense	24.62	24.62	14.24	40.27	16.43
Technology expense	4.44	6.76	2.88	0.00	-
Other Operational Expenses	13.69	20.31	10.33	26.34	56.94
Loan impairment	1.18	-0.35	0.04	7.91	54.29
Loan losses	-	-	3.56	-	-
PBT	41.60	29.50	26.99	-3.48	-18.94
Basic EPS	196.30	-	36.38	-	-
Balance Sheet					
Assets	100.00	100.00	100.00	100.00	100.00
Loans and Advances	61.95	74.79	91.61	48.52	88.53
Other	38.05	25.21	0.01	51.48	11.47
Liabilities					
Deposits	62.65	78.00	-	49.17	-
Other	30.98	15.00	96.31	35.84	88.37
Total equity	6.37	7.00	3.69	14.99	11.63
Contributed equity	4.97	-	4.22	15.97	12.75
Reserves	0.01	7.00	0.07	0.04	0.60
Retained Profits	1.39	-	-0.61	-1.03	-1.72

This table presents the comparison of the financial statement items for the year 2021 of the five types of financial institutions in Australia. The income statement items are given as a percentage of interest income and balance sheet items are given as a percentage of total assets to facilitate comparison between varying sizes of financial institutions.

Table 9: Normalized financial statement items for five selected financial institutions – 2019

Item	Shareholder ADI	Customer-owned ADI	Non-ADI	Neobank	Fintech Lender
Income Statement					
Interest Income	100.00	100.00	100.00	100.00	100.00
Loans and advances	73.20	89.07	98.67	81.99	-
Debt instruments and other	26.80	10.93	1.33	18.01	-
Interest Expense	63.14	51.50	48.21	86.30	31.01
Deposits	28.84	45.76	7.07	4.28	-
Borrowings	34.31	5.75	41.14	82.02	-
Net Interest Income	36.86	48.50	51.79	13.70	68.99
Other Income	10.95	6.75	23.38	7.95	15.77
Personnel expense	12.51	16.92	26.49	249.27	13.95
Technology expense	2.61	4.04	2.99	58.67	-
Other Operational Expenses	13.15	19.34	22.49	129.72	58.35
Loan impairment	2.95	0.48	-	30.60	43.01
Loan losses	-	-	18.36	-	-
PBT	16.58	14.53	5.58	- 446.60	0.45
Basic EPS - Group	168.60	-	-	-	1.00
Balance Sheet					
Assets	100.00	100.00	100.00	100.00	100.00
Loans and Advances	58.28	82.76	88.51	60.18	90.46
Other	41.72	17.24	11.49	39.82	9.54
Liabilities					
Deposits	53.27	83.46	16.61	26.59	-
Other	40.76	8.23	79.71	23.13	95.73
Total equity	5.97	8.31	3.68	50.28	4.27
Contributed equity	4.36	-	2.73	63.37	3.23
Reserves	0.01	8.31	- 0.08	0.01	0.14
Retained Profits	1.59	-	1.02	- 13.10	0.91

This table presents the comparison of the financial statement items for the year 2019 of the five types of financial institutions in Australia. The income statement items are given as a percentage of interest income and balance sheet items are given as a percentage of total assets to facilitate comparison between varying sizes of financial institutions.

Table 10: Identification of Capital requirement of the Customer-owned bank

Items	AUD million	%
Capital availability		
Total Capital	547.91	-
Risk Weighted Assets	3,691.40	-
Total Capital Ratio (Total Capital/Risk Weighted Assets)	-	14.8%
Regulatory capital requirement		
Minimum Total Capital Ratio required by APRA	-	10.5%
Total capital requirement to comply with regulations	387.60	-
Total Capital at beginning of year	514.70	-
Required capital for the year (as total capital at the beginning of the year exceeds the capital requirement, there is no requirement to accumulate capital this year)	- 127.10	-
Profits transferred to fulfill capital requirement		
Profit for the year	40.69	-
Other adjustments/reserves from profit (Other reserves such as revaluation reserves)	7.48	-
Profit component in capital	33.21	-
Capital needed from this year's profit (As there is no need to accumulate capital this year)	0.00	-

This table shows that the customer-owned ADI does not require to report a profit to fulfill the capital requirements imposed by the APRA.

Table 11: Increase in Cost benefit to customers of a Customer-owned ADI ***AUD million***

Item	Scenario 1	Scenario 1	Scenario 2	Scenario 3
Profit component in capital	33.21	33.21	33.21	33.21
Profits retained for capital (%)	75%	50%	25%	0.0%
Amount of profit retained	24.91	16.61	8.30	-
Saving from lowering profit retention	8.30	16.61	24.91	33.21
Adjusting the Net Interest Income				
Net interest income	156.28	156.28	156.28	156.28
Adjusted Net interest income	147.98	139.68	131.37	123.07
Increase in cost benefit to customers (%)	5%	11%	16%	21%
If deposit rates were constant, decreased borrowing rates (assumed current rate 5.24%)	4.98%	4.66%	4.40%	4.14%
If borrowing rates were constant, increased deposit rates (assumed current rate 4.00%)	4.20%	4.44%	4.64%	4.84%

This table shows the step-by-step calculation of the possibility of increasing cost benefit to consumer by not exceeding the minimum regulatory capital ratios imposed by the APRA. If additional capital is built through allocating profits of a customer-owned ADI, such ADI foregoes the potential decline in net interest income it can report. Net interest income is a result of interest imposed on ADI's consumers (depositors and borrowers). Therefore, the cost benefit to consumers can be increased by the same amount as the decline in net interest income.

Table 12: Increase in Cost benefit to consumers of a Shareholder ADI ***AUD million***

Item	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Profit after tax	5,063	5,063	5,063	5,063
Dividend payout ratio	58%	50%	40%	25%
Dividends paid	2,939	2,532	2,025	1,266
Other adjustments/reserves from profit	143	143	143	143
Profit component in capital	1,981	1,981	1,981	1,981
Saving from profit distribution	-	408	914	1,673
Adjusting the Net Interest Income				
Net interest income	10,007	10,007	10,007	10,007
Adjusted Net interest income (Net interest income – (profit component in capital + saving from profit distribution)	8,026	7,619	7,112	6,353
Increase in cost benefit to consumers (%) equals reduced net interest income (rounded)	20%	24%	29%	37%
If deposit rates were constant, decreased borrowing rates (assumed current rate 6.00%)	4.80%	4.56%	4.26%	3.78%
If borrowing rates were constant, increased deposit rates (assumed current rate 3.00%)	3.60%	3.72%	3.87%	4.11%

This table shows the step-by-step calculation of the possibility of increasing cost benefit to consumers by not exceeding the minimum regulatory capital ratios imposed by the APRA and reducing the dividend payout ratio of a shareholder-ADI in four scenarios. Both, dropping the allocation of profits to capital and reducing profit distribution to shareholders will reduce the requirement of reporting profits during the current financial year. Such a reduction in the requirement on profits will ease the pressure on reporting a higher net interest income, thereby increasing cost benefit to consumers of a value equal to the potential drop in net interest income. Scenario 1 assumes that the ADI only maintains the capital adequacy requirement imposed by the APRA, thereby, not allocating profits to build capital. In this scenario, the actual dividend payout ratio for the financial year of the institution is used. Scenarios 2, 3, and 4 assume that additional capital is not built up while lowering dividend payout ratios.

Table 13: Increase in Cost benefits to consumers of a Neobank

AUD million

Item	Scenario 1	Scenario 2	Scenario3	Scenario 4
Profit before tax	-4.40	-4.40	-4.40	-4.40
Interest Income	126.40	126.40	126.40	126.40
Operational Expenses	63.2	50.56	50.56	50.56
Operational expenses as a percentage of Interest Income (currently at 66.6%)	50.00%	40.00%	40.00%	35.00%
Loan impairment	10.00	10.00	5.00	5.00
Cost advantage after loss elimination	16.60	29.24	34.24	40.56
Adjusting the Net Interest Income				
Net interest income	84.50	84.50	84.5	84.5
Adjusted Net interest income (Net interest income – cost advantage after loss elimination)	67.90	55.26	50.26	43.94
Increase in cost benefit to consumers (%) equals reduced net interest income	19.64%	34.60%	40.52%	48.00%
If deposit rates were constant, decreased borrowing rates (assumed current rate 6.00%)	4.82%	3.92%	3.57%	3.12%
If borrowing rates were constant, increased deposit rates (assumed current rate 3.00%)	3.59%	4.04%	4.22%	4.44%

This table shows the step-by-step calculation of the possibility of increasing cost benefits to consumers by improving the operational efficiency and credit quality of a neobank. As this neobank is loss-making at present, lowering operational costs will be used to break even the neobank and then to seek the possibility of lowering net interest income leading to improving cost benefit to consumers. Scenario 1 and 2 assumes a decline in operational costs similar to a customer-owned ADI and shareholder-ADI, 50%, and 40% respectively. Scenario 3 assumes a decline in operational costs to 40% and a decline in credit risk by 50%. Scenario 4 assumes a decline in operational costs to 35% and a decline in credit risk by 50%.

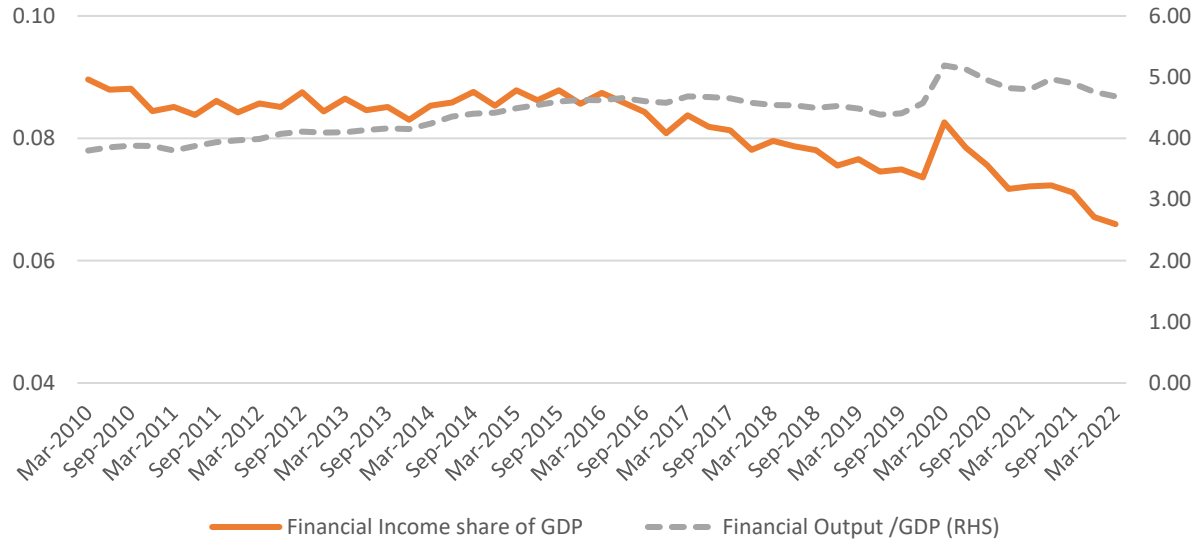
Table 14: Increase in cost benefits to consumers of a FinTech Lender ***AUD million***

Item	Scenario 1	Scenario 2	Scenario3	Scenario 4
Profit before tax	-10.03	-10.03	-10.03	-10.03
Interest Income	52.96	52.96	52.96	52.96
Operational Expenses	26.48	21.18	21.18	18.54
Operational expenses as a percentage of Interest Income (currently at 73.4%)	50.00%	40.00%	40.00%	35.00%
Loan impairment	28.75	28.75	14.38	14.38
Cost advantage after loss elimination	2.34	7.64	22.01	24.66
Adjusting the Net Interest Income				
Net interest income	42.37	42.37	42.37	42.37
Adjusted Net interest income (Net interest income – cost advantage after loss elimination)	40.02	34.73	20.35	18.70
Increase in Cost benefit to consumers (%) equals reduced net interest income	5.53%	18.03%	51.96%	56.87%
If deposit rates were constant, decreased borrowing rates (assumed current rate 8.00%)	7.56%	6.56%	3.84%	3.45%

This table shows the step-by-step calculation of the possibility of increasing cost benefit to consumers by improving the operational efficiency and credit quality of a FinTech Lender. As this FinTech is loss-making at present, lowering operational costs will be used to break even the neobank and then to seek the possibility of lowering net interest income leading to improving cost benefit to consumers. Scenario 1 and 2 assumes a decline in operational costs similar to a customer-owned ADI and shareholder-ADI, 50%, and 40% respectively. Scenario 3 assumes a decline in operational costs to 40% and a decline in credit risk by 50%. Scenario 4 assumes a decline in operational costs to 35% and a decline in credit risk by 50%.

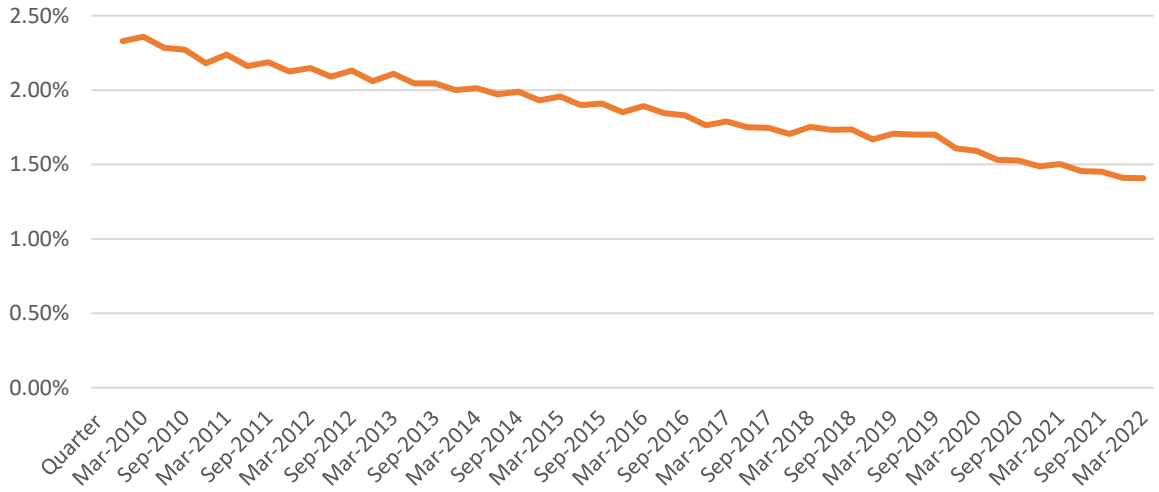
Figure 1: Cost of Financial Intermediation of Australia

Panel A: Income share of Finance and Financial Intermediation as a share of GDP



This figure shows the trend of financial income and financially intermediated assets as a percentage of GDP. From mid-2016 the trend of the relative share of financial output/financial intermediation has gone above the relative share of financial income.

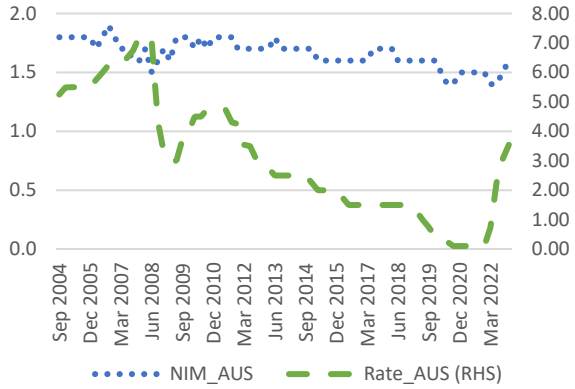
Panel B: Unit cost of Financial Intermediation



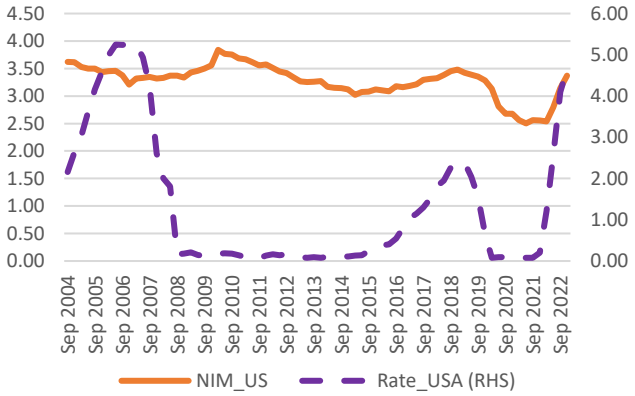
The unit cost of financial intermediation calculated by dividing financial income by financial intermediation/financial output similar to Philippon (2015) for Australia is indicated in this figure, which is on a downward trend.

Figure 2: NIM and Rates

Panel A- Australia



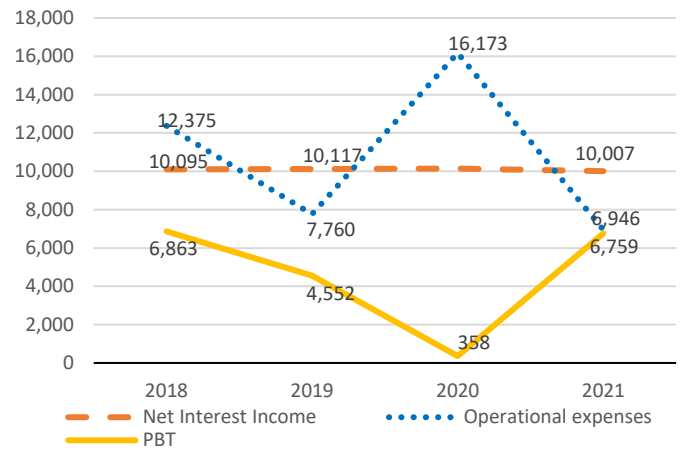
Panel B - US



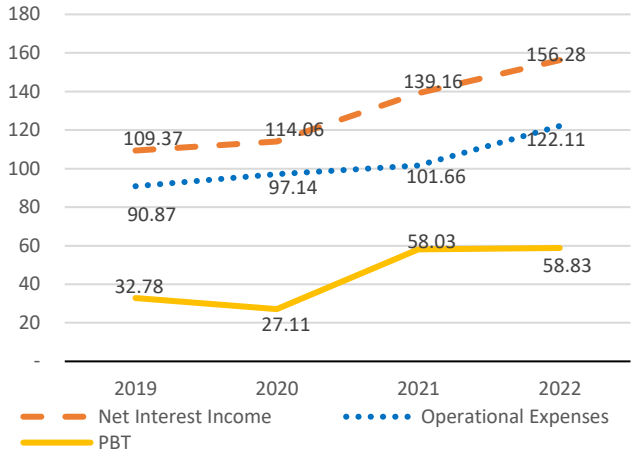
These two figures show the changes in NIM and overnight interbank call money rates in Australia and the US. A positive relationship is observed in Australia, whereas no particular relationship is observed in the US.

Figure 3: Financial position and performance of different types of financial institutions during the latest 4 years – Australia

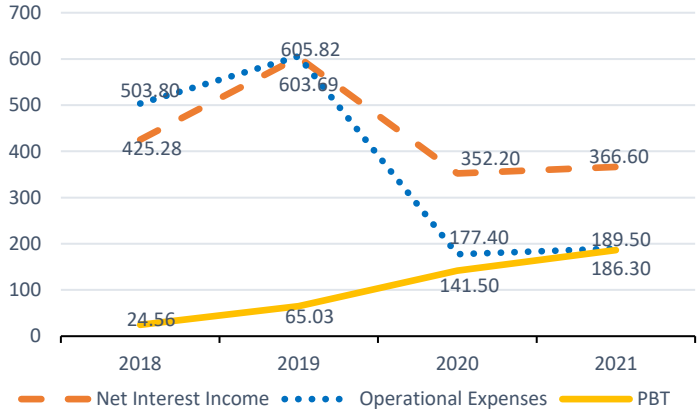
Panel A: Shareholder ADI Profit - Latest 4 years



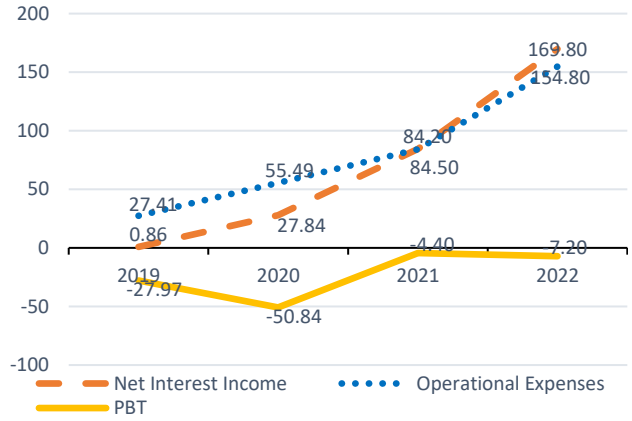
Panel B: Customer-owned ADI Profit - Latest 4 years



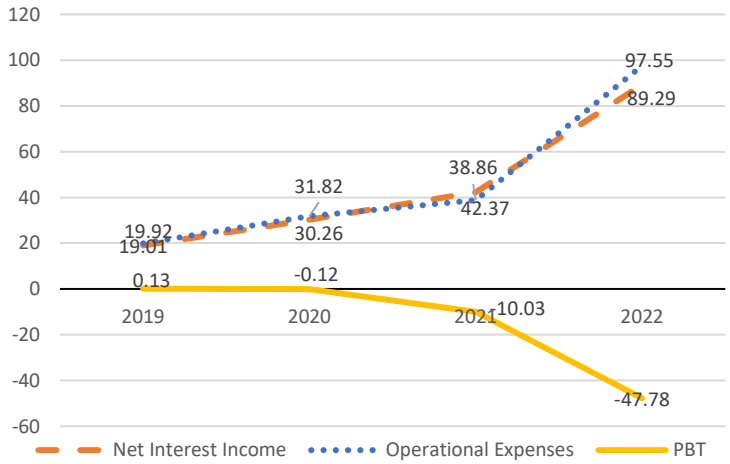
Panel C: Non-ADI Profit - Latest 4 years



Panel D: Neobank Profit - Latest 4 years



Panel E: Fintech Lender Profit - Latest 4 years



APPENDIX

Appendix 1: Variable used in the Analysis

Variable Name	Abbreviation	Definition
Unit cost of financial intermediation - Australia	UC	Calculated unit cost for the financial sector of Australia
Net Interest Margin – Australia	NIM_AUS	Net interest margin of banks (ADIs) obtained from APRA for Australia
Net Interest Margin - US	NIM_US	Net interest margin of banks obtained from FDIC
Interest Rates - Australia	IR_AUS	Overnight interbank rates for Australia obtained from FRED
Interest Rates - US	IR_US	Overnight interbank rates for US obtained from FRED
Contractionary Monetary Policy – Australia	ContMP_AUS	Periods with contractionary monetary policy in Australia, 1 for increase in interest rates
No change in Monetary Policy – Australia	NoChMP_AUS	Periods with no change in monetary policy in Australia, 1 for no change in interest rates
Contractionary Monetary Policy – US	ContMP_US	Periods with contractionary monetary policy in US, 1 for increase in interest rates
No change in Monetary Policy – US	NoChMP_US	Periods with no change in monetary policy in US, 1 for no change in interest rates
Interest Rates and Contractionary Monetary Policy - Australia	IR_ContMP_AUS	Interaction between interest rate and contractionary monetary policy periods – Australia
Interest Rates and no change in Monetary Policy – Australia	IR_NoChMP_AUS	Interaction between interest rate and no change in monetary policy periods – Australia
Interest Rates and Contractionary Monetary Policy – US	IR_ContMP_US	Interaction between interest rate and contractionary monetary policy periods – US
Interest Rates and Contractionary Monetary Policy – US	IR_NoChMP_US	Interaction between interest rate and no change in monetary policy periods – US
Real GDP growth – Australia	GDP_Gr_AUS	GDP (expenditure approach) quarterly growth obtained from OECD database – Australia
Real GDP growth - US	GDP_Gr_US	GDP (expenditure approach) quarterly growth obtained from OECD database – US
Unemployment Rate – Australia	UnE_AUS	Unemployment rate (Total, % of labour force) obtained from OECD database – Australia
Unemployment Rate – US	UnE_US	Unemployment rate (Total, % of labour force) obtained from OECD database – US
House prices index – Australia	HousePrice_AUS	Real house prices 2015 = 100, obtained from OECD database – Australia
House prices index US	HousePrice_US	Real house prices 2015 = 100, obtained from OECD database – US
Inflation – Australia	Infl_AUS	Inflation data obtained from OECD database – Australia
Inflation – US	Infl_US	Inflation data obtained from OECD database - US

Appendix 2: Results of the Regression between NIM, Interest Rate and other variables – Australia

	Model 1	Model 2	Model 3	Model 4	Model 5
L.IR_AUS	0.010**	0.013*	0.010*	0.012*	0.004
	-0.006	-0.007	-0.006	-0.007	-0.012
L.NIM_AUS	0.707***	0.696***	0.710***	0.686***	0.661***
	-0.069	-0.091	-0.07	-0.076	-0.084
ContMP_AUS				0.004	-0.057
				-0.028	-0.072
NoChMP_AUS				0.025	-0.007
				-0.017	-0.031
IR_ContMP_AUS					0.015
					-0.018
IR_NoChMP_AUS					0.011
					-0.013
GDP_Gr_AUS		0.007			
		-0.006			
UnE_AUS		0.031*			
		-0.018			
Infl_AUS		0.012			
		-0.008			
Intercept	1.552***	0.268*	0.449***	0.469***	0.533***
	-0.019	-0.142	-0.109	-0.117	-0.136
Number of observations	72	73	73	73	73
Adjusted R^2	0.36	0.7	0.69	0.69	0.69

*** p<.001, * p<.1, ** p<.5

Appendix 3: **Results of the Regression between NIM, Interest Rate and other variables – US**

	Model 1	Model 2	Model 3	Model 4	Model 5
L.IR_US	0.009	-0.001	0.009	0.008	0.001
	-0.007	-0.01	-0.008	-0.008	-0.007
L.NIM_US	0.931***	0.967***	0.931***	0.915***	0.915***
	-0.038	-0.057	-0.056	-0.062	-0.064
GDP_Gr_US		0.008			
		-0.009			
UnE_US		-0.008			
		-0.01			
HousePrice_US		-0.001			
		-0.002			
Infla_US		0.020*			
		-0.011			
ContMP_US				0.027	0.004
				-0.02	-0.032
NoChMP_US				-0.072	0.803**
				-0.058	-0.327
IR_ContMP_US					0.013
					-0.018
IR_NoChMP_US					-10.631***
					-3.395
Intercept	0.209*	0.217	0.209	0.25	0.261
	-0.122	-0.313	-0.184	-0.206	-0.221
Number of observations	73	73	73	73	73
Adjusted R^2	0.90	0.91	0.90	0.90	0.90

*** p<.001, * p<.1, ** p<.5