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David E. Allen

Jerry T. Parwada

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By

David E Allen and Jerry T Parwada[*]

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*Correspondence author and address:

Mr. Jerry Parwada
Securities Industry Research Centre of Asia-Pacific
PO Box H58 Australia Square
Sydney NSW 1215
Australia
Email: jerry@sirca.org.au

Address for correspondence: Jerry Parwada, Securities Industry Research Centre of Asia-Pacific, PO Box H58 Australia Square, NSW 1215, Australia.
e-mail: jerry@sirca.org.au

Abstract

This study investigates the alleged disintermediation of banks' traditional deposit-taking in favour of investment management activities. Using data on Australian bank-affiliated funds and a nine-year record of the parent banks' liability balances, this study finds that managed funds do not displace bank liabilities. Prudential capital adequacy requirements dissuade banks from using in-house managed investments as indirect conduits for raising funds in the same manner as deposit-taking.

1.   Introduction

The phenomenal growth of the managed fund sectors has led to claims of a considerable decline in the role of banks in financial intermediation. Consensus appears to be settling around a new theory of intermediation that recognises that banks have simply rearranged their business to offer new forms of intermediation that have emerged out of financial markets' demand for additional services beyond the asset transformation aspect of intermediation. Allen and Santomero (1998 and 2001) have led the recent debate on the need to take risk management and the cutting of participation costs, for example, as important factors to consider in determining what intermediaries do. The new theory of intermediation has encouraged the acceptance of the notion that the business of banking, under a strong challenge from financial market participants such as managed funds, is being redefined to encompass such non-traditional activities.

The motivation for this paper is that in the absence of explicit empirical evidence on the substitutability of bank liabilities and managed fund products, managed fund activities continue to be associated with the decline in relative quantum and economic importance of bank deposits. Gallo et al (1996) contend, with reference to the late 1980s and early 1990s in the US, that declining interest rate levels prompted a shift in household savings from traditional bank deposits to managed funds. This shift is alleged to have pushed banks, fearful of disintermediation, into the managed fund business.[1] Commenting on the question of the indispensability or otherwise of commercial banks, Scott (1998) asserts that savings and time deposits at banks might be under threat as managed funds become an alternative for the current payment system. This view extends a trend, triggered off by the rapid growth of alternatives to traditional intermediaries, that associates investment managers with "banks of the future" (Gorton and Pennacchi, 1993).

A belief persists that if practitioners treat bank products and managed fund offerings as substitutes, compounded by a possible similar perception by depositors, this could lead to funding problems for banking institutions. Managed funds may be profitable business lines for banks, but the enforcement by prudential authorities of the principle of separation between the banking and funds management activities housed under a single corporate entity dictates funds raised this way are not equivalent to other forms of liabilities such as deposits. Keeton (2001), for example contends that the movement of investments from deposits to managed funds is the largest contributor to the failure by US banks, particularly small ones, to meet local credit demands.[2] The seriousness of the issue is illustrated by the issuance of a warning

in November 2001 by Standard and Poor's that the funding pressures being faced by banks due, in part, to the waning of the traditional low-cost deposit base as customers increasingly shift towards higher yielding investment options such as managed funds, "could contribute incrementally to negative ratings sentiment in the Australian banking market".[3]

This paper uses panel data on monthly bank liability balances over nine years and a dataset of managed funds covering nine years to quantitatively document the displacement or otherwise of investment-type bank liabilities by internally-produced managed funds products. The next section of the paper provides background aggregate data on the trends of bank deposit balances relative to other investment products and briefly reviews the relevant literature. Section 3 develops a testable model for the displacement of banking products by managed funds. Section 4 describes the data used in this paper and Section 5 presents the empirical results. Section 6 summarises and concludes the paper.

2. Background

2.1 Has the Importance of Bank Deposits Declined?

The available aggregate data on bank deposits and managed funds show a somewhat diminished role for traditional deposits but do not lend direct support for the idea that this has been a result of the shift of depositors to managed funds. Figure 1 carries two graphs of the market share enjoyed by bank deposits relative to cash management trusts (CMTs), superannuation funds and unit trusts.[4] Figure 1A depicts the market share in terms of economic importance by expressing the funds under management in the four investment classes as a percentage of the gross domestic product. The domineering position held by bank deposits is challenged by the phenomenal growth in investments held in superannuation owing largely to the introduction of a compulsory pension scheme with the promulgation of the Superannuation Guarantee (Administration) Act in 1992 which was projected to increase employer contributions alone to 9% of total income earned by 2002-3.[5] Indeed superannuation assets rise from A$60 billion, or 14% of GDP, in 1988, to A$368 billion, 58% of GDP, in 2001. CMTs and unit trusts have also risen to 4% (from 1%) and 22% (from 5%) of GDP, respectively. In comparison, however, deposits have increased from A$123 billion, 29% of GDP, in 1988, to A$975 billion, 69% of GDP, in 2001.

Figure 1B graphs the results of adding up all the assets held in the four investment classes and calculating market share ratios for each based on this total. The share held by bank deposits has fallen from its peak of 62% in 1990 to 45% in 2001 whilst that of superannuation

assets has risen from 27% to 38% over the same period. CMTs have increased their share by just a percentage point to 3% whilst unit trust assets have recovered from a slight fall in popularity in the mid-nineties in which they attracted 8-9% of market share to 14% in 2001.

Undoubtedly the demand for alternatives to bank deposits is sizeable. Whether the trends that have culminated in this apparent demand are associated with a direct displacement of bank liabilities, in particular by products offered by banks' own funds management divisions, is the empirical question this paper attempts to answer.

2.2 Research Related to Bank Participation in Funds Management

Kane (1995) stands out in challenging the market-centric cliché of the disintermediation of bank deposits by querying why banks, faced with competition for deposits from managed funds, have not simply structured products that offer managed fund-like payoffs instead of establishing costly fully-fledged managed fund subsidiaries. Kane concludes that it is the inapplicability of deposit insurance requirements to bank-affiliated managed funds in the US, not-withstanding the credit enhancement implied in their association with the banks, that has provided banks with an incentive to form managed fund operations instead of index-linked deposit products. Kane points to Australia where, by the mid-1990s, at least one major bank was developing such an index-linked offering against a background of the non-existence of deposit insurance. Subsequently, almost all the major banks have developed index-linked deposit products. However, they have also taken part in the frenetic mergers and acquisition activity that began in the mid-1990s that has given the major banks large exposures to funds management business.

To understand the drivers of the potential for the displacement of bank deposits by managed funds it is necessary to consider supply (depositor) and demand-side (bank) factors. On the supply side, contrary to the view encouraged by apparent investor shifts towards market based investment vehicles, the physical attributes of managed funds do not fully conform to their substitutability for bank products. Pilloff (1999) observes that, in spite of similarities in safety, liquidity, accessibility and convenience, the lack of absolute capital preservation guarantees, liquidity constraints and the continued dominance of bank accounts in household finances preclude a verdict of substitutability.[6]

Supposedly, the existence of factors that differentiate bank-affiliated managed funds from the rest of the market offerings may be relevant to their unique ability to attract bank deposits. After analysing the portfolio composition of institutional investment managers, Del Guercio (1996) finds that amongst US managed fund operators, "bank managers are more

sensitive to prudent-man laws" and suggests that prudent-man laws may force bank-managed funds to tilt their portfolio compositions in ways that may, over time, explain the performance differences between them and non-bank funds. Koppenhaver (1999) examines money market mutual funds and, finding that funds affiliated with banks outperform those sponsored by other financial institutions, advances the argument that the abnormal performance may be due to bank expertise in dealing with money market securities and issuers. However, Frye (2001) explicitly tests for the existence of the performance discrepancy predicted by Del Guercio (2000) and, despite finding evidence of more conservative investment practices by bank-managed funds, cannot observe a significant difference in return profiles.[7]

On the demand side, the possibility to generate fee income may be the motivation for banks to offer managed funds. By marketing investment products, banks convert a portion of spread income from deposits into fee income. This has been documented in the context of the cross-selling potential in mergers of banks and investment management entities (Berger et al, 2000). However, DeYoung and Roland (2001) note that income from managed fund activities and other fee-based services is characterised by higher short-run fluctuations than revenue from traditional lending business.

3. Development of a Testable Model

The nascent literature on the disintermediation of bank deposits in favour of managed funds suggests that managed funds and bank liabilities are substitutes. Taken to its extreme, this prediction implies that an increase in managed fund (*MF*) balances should lead to a decrease in bank liabilities (*BL*). This phenomenon could be described by the following *BL* to *MF* displacement ratio:

$$BLR_{NMF} = BLR_{MF} + \alpha MFR_{MF}, \tag{1}$$

where *BLR* is the ratio of total bank liabilities to total assets defined as the assets held by the bank; *MFR* is the ratio of bank subsidiary managed fund aggregate balances to bank total assets; NMF and MF denote a bank without managed fund operations and one that has funds management operations, respectively; and α is the *MF-BL* substitution coefficient.[8]

One view holds that the existence of bank-affiliated managed funds reduces the banking sector's reliance on traditional liabilities, implies that $\alpha > 0$ and conforms to three arguments

that correspond to α values of exactly 1; $0<\alpha<1$; and $\alpha>1$. A value of 1 implies that a dollar of managed fund balances reduces potential bank liabilities by a dollar. Intuitively it appears more reasonable to assume that since a bank may rely on indirect means of offering managed-fund-like products to its customers, such as index-linked deposits, the more likely value to be observed is $0<\alpha>1$. Imperfect substitution may also arise if, owing to the comparative illiquidity of managed fund products, for example, savings in banking products are not reduced one-to-one for an increase in fund balances. Observing a value of $\alpha>1$ would confirm that, indeed, banks are on a precipitous course towards the total delegation of the deposit-taking function to their managed fund operations. Complementarity between *MF* and *BL* corresponds to a negative α.

Assuming that the *BLR* of a non-funds managing bank is a function of a number of control variables which reflect the characteristics that determine the banks' *BLR*, then the *BL* to *FM* displacement ratio can be rewritten as:

$$C\ (\textit{Control Variables}) = BLR_{MF} + \alpha MFR_{MF} = BLR_{NMF}. \qquad (2)$$

Rearranging the above, it follows that the MF ratio of a bank is:

$$MFR_{MF} = -1/\alpha BLR_{MF} + 1/\alpha(\textit{Control Variables}). \qquad (3)$$

To operationalise the equation, assuming that control variables can be identified, the following linear model can be estimated:

$$MFR = \lambda_0 + \lambda_1(BLR) + \lambda_{i+1}\ (\textit{Control Variables}). \qquad (4)$$

Turning now to potential control variables, this study adopts the following:
* *BL* liquidity measured by the ratio of current deposits to total bank liabilities, henceforth denoted *BLQ*. This variable reflects the portion of a bank's liabilities that can easily migrate to competitors or competing intra-group products.
* *BL* size measured as the natural logarithm of total *BL*, denoted *BLSIZE*, and included because size may reflect the bank's ability to attract depositors who believe in the "too-big-to-fail" phenomenon or associate size with superior reputation. *BLSIZE* may also be

partially indicative of the bank's capacity to increase its liabilities in relation to both prudentially and internally-imposed capital adequacy constraints.

- Variability of *BL* calculated as the coefficient of variation of *BL* over the past year, *BLVA*. A recent high variability history may be associated with a bank's instituting of measures to establish greater stability.

- ASIC retirement savings account (RSA) approval status, assigned the dummy variable *RSAD*. This dummy variable is included since there was a strong expectation that retirement savings accounts would slow down the movement of savings from traditional deposits into managed fund products.[9] As customers can maintain RSAs as part of the compulsory superannuation required by law, the market's expectation that their introduction would slow down the growth of other deposits would appear to contradict Hubbard (1986) who suggests that the liquidity constraints that characterise pension assets in general preclude the forced saving from displacing discretionary saving or encouraging increased borrowings.

Having determined the potential explanatory variables for the level of managed fund balances preferred by a bank, the model utilised to examine the relationship between bank-managed funds and other bank liabilities is:

$$MFR = \lambda_0 + \lambda_1(BLR) + \lambda_2(BLVA) + \lambda_3(BLSIZE) + \lambda_4(BLQ) + \lambda_5(RSAD) + \varepsilon \qquad (5)$$

If *MF* and *BL* are substitutes, irrespective of the degree, α will be greater than 0 and consequently λ_1, the *BLR* coefficient, will be negative. [10]

4.   Data

In order to test the model developed in Section II this section utilises asset and liability data provided by the Australian Prudential Regulation Authority (APRA) on all the banks that operated funds management entities directly under the banking entity's licence, as opposed to a subsidiary in a holding company structure, and that were, therefore, subject to Prudential Standard APS 120.[11] The APRA dataset itemises for each bank the different components of liabilities. This study treats the aggregation of interest bearing current deposits, term and call deposits, certificates of deposit and "other" liabilities (including statement savings, savings

investment, passbook and school savings accounts) as the investment-type liabilities that are likely to be displaced by managed fund products. The liabilities that are excluded are non-interest-bearing deposits, "other borrowings" (not defined), bill acceptances and foreign currency liabilities. On the asset side, the APRA dataset distinguishes domestic from foreign currency denominated assets. This paper uses Australian dollar denominated assets to normalise the managed fund assets and bank investment-type liabilities in estimating the displacement model to avoid introducing the influence of currency fluctuations.

Individual managed fund data were provided by ASSIRT Research, Australia's largest fund ratings agency. The ASSIRT database identifies the institutional affiliation of the fund managers and details the total funds under management on a monthly basis for the period 1992-2000 covered by the bank asset and liability data. In addition to cash management trusts, the equivalent of the money market mutual funds studied by Pilloff (1999), which account for only 3% of the assets under management in Australia, this study also includes cash and fixed interest funds. The number of the funds used in this paper increases from 89 in 1992 to 190 in 2000, in tandem with the phenomenal growth in managed fund assets over the period. The funds represent 69% or A\$29.4 billion of the A\$43.3 billion in assets under management held by bank-affiliated funds at the end of 2000.

5.   Empirical Results

Since the banks that form the basis of this study are easily identifiable this paper estimates the managed-fund – bank-liability displacement model using a sample that excludes banks that do not operate funds-management divisions. Table 1 reports the estimates obtained from OLS regressions of the model. Because of well-known autocorrelation and heteroskedasticity problems associated with models estimated with cross-sectional and time-series data two provisions are made in coming up with the results. Firstly, to ameliorate autocorrelation, models are estimated for each of the years in the 1992-2000 analysis period. Secondly, each estimation is repeated to correct for heteroskedasticity using White's (1980) procedure and the results reported separately for each instance in Panels A and B of Table 1, respectively. Two-tailed t-Statistics are reported in parentheses.

5.1   Analysis of Coefficient Estimates

The main finding of this paper is that the coefficient estimates on *BLR* are positive and highly significant in the majority of the years with the only negative coefficient being statistically insignificant. This result appears to rule out the substitutability of managed funds for bank products and is strongly suggestive of complementarity instead. On the basis of this evidence, it would appear the Australian antitrust authorities are correct in maintaining that bank deposits and managed funds do not occupy the same market definition.[12]

Clearly, the observed complementarity is not exclusively strong. It could be conjectured that some substitution effects occur at the margin as a result of banks' indirect usage of managed fund divisions as capital raising conduits. Prudential guidelines normally require banks to set aside capital against any exposure to funds management operations in a trusteeship or custodial role. However, in practice, banks are known to "reclaim" the lost capacity to raise funds for lending via the funds management operations. For example, observing that financial institutions fund their loans with both equity and wholesale debt, primarily commercial paper, Pennacchi (1998) notes the commercial paper is sold to money market funds that, in turn, invite investors to open transaction accounts with them. Indeed, in Australia it is common for a bank-affiliated fixed interest fund, for example, to invest its assets in financial securities originated by, or accounts operated by, the parent bank. Additionally, as noted earlier in this paper, banks have been structuring index-linked products that would appear to be close substitutes for managed funds; however, directly investigating this issue is impeded by the lack of data on balances in such accounts.

The coefficient on *BLSIZE* is negative in all the years except 1999, an indication bank liability size is negatively related to *MFR*. This is not surprising in light of anecdotal evidence from market commentators that the biggest banks have been generally slow in growing their funds management businesses, whether generic or acquisitive.[13] The negative relationship between *MFR* and *BLSIZE* also shows that although the investment classes are complementary, there are factors other than the growth of funds under management that play a significant role in increasing bank liability balances.

Assuming that an increased inflow of depositors' funds into the most liquid bank liabilities is a proxy for a certain sentiment against long term investments amongst the suite of bank products, the existence of substitution effects between managed funds and bank liabilities could be expected to be accompanied by a positive relationship between *MFR* and the ratio of call deposits to total bank liabilities. Similarly, banks would be observed to react to increased volatility in liabilities with increased managed fund balances to compensate for

the variability of its liability base. The results reflected by the *BLQ* coefficient are mixed, with positive, statistically significant coefficients almost being matched by negative ones. However, the majority of the *BLVA* coefficients are negative, indicating that unstable deposit balances do not necessarily lead banks to secure managed fund subscriptions as substitutes, further diminishing the substitutability argument.

Retirement savings accounts are direct competitors of funds operated by the same banking entity. It is, therefore, not surprising that in Table 1 the *RSAD* dummy indicating the authority granted to operate the accounts is negatively related to *MFR* in the latter three of the four years that banks have been allowed to offer them. This implies that banks that offer retirement savings have been able to reduce their reliance on managed fund operations in their quest to participate in funds management activities. Whether this trend will continue is a subject for future research.

5.2 Econometric Issues and Robustness Checks

The results in Table 1 are predominantly similar for both the heteroskedasticity-adjusted and non-adjusted estimates. The only difference of note is in the form of marginally lower *t*-statistics for the heteroskedasticity-consistent results. The explanatory power of the regressions is high, as depicted by adjusted *R*-squared ranging from 48% to 93% on an increasing profile that reflects the inclusion of *RSAD* as an additional variable in 1997, when the account was first authorised, onwards.

The managed fund data include wholesale (institutional) funds numbering 21 in 2000 compared to 169 retail funds. To check whether the presence of wholesale funds influences the results, the model is re-estimated on data that excludes the wholesale funds. The results are not altered in any significant way in terms of the signs, magnitude and statistical significance of the coefficients and are therefore not reported here. Similarly the results could be affected by the aggregation of liabilities that are likely to be substitutable by managed funds. The test results are robust to various combinations of the individual liability types.

5.3 The Role of Capital Adequacy Requirements

With substitution effects all but ruled out, it is noteworthy that treating managed funds and deposits as complements is costly for banks in relation to capital adequacy requirements. This is because banks are required to set aside capital as they increase their direct exposure to managed fund activities. Furthermore, there is a strong suggestion that banks may use managed fund operations to indirectly raise funds for the asset side of their business.

Therefore, as a further test of the robustness of the results reported here, this study repeats the regressions based on the substitution model tested on data for the individual banks spanning 1992-2000. Instead of the *RSAD* dummy variable, each bank's capital adequacy ratio (CAR), reported in the annual reports, is included. If regulatory intentions that are premised on capital provision for incremental managed fund business taken up have a dominant effect, a negative relationship between *MFR* and *CAR* should be observed.

The coefficient estimates for the individual bank pooled regressions are reported in Table 2. The number of banks is reduced to five as two of the banks were not publicly listed and, as such, did not report *CAR* histories, and *CAR* data on one bank is rendered noisy by its takeover of a large bank during the analysis period. The results decisively rule out substitutability as all the banks' *BLR* coefficients are positive and highly statistically significant. Caution should be exercised though in interpreting the high *t*-Statistics owing to the statistical problems associated with pooled panel data noted earlier on. *BLQ*, the measure of the proportion of liquid deposits held, and *BLSIZE* are confirmed to be negatively related to *MFR*, although the results on *BLVA* are still mixed. Most interestingly, as predicted, *CAR* is negatively related to *MFR* in all but one positive but statistically insignificant case. Substitutability is dominated by complementarity and bank prudential regulations successfully compel banks to set aside capital against managed fund exposure at the exclusion of most of Pennacchi's (1998) indirect capital adequacy recoupment effects. This may explain why of late the largest Australian banks, having acquired stand-alone funds management companies have delegated much of their managed fund business to these subsidiaries. The trend is consistent with DeYoung and Poland (2001) who point out that bank fee-based activities undertaken in non-bank subsidiaries are not subject to the stringent requirements to set aside capital against such exposures that apply when they are operated under the licensed banking entity.

6.   Conclusion

Managed funds that are run by banks may intuitively appear to be substitutes for bank deposits. However, using a managed fund-bank deposit substitution model, this study finds suggestive evidence that, empirically, managed fund assets under management and bank liability balances complement rather than displace each other. The complementarity is not exclusive though - in two out of the nine years constituting the analysis period a negative but statistically insignificant relationship is observed between bank liabilities and managed fund

balances normalised by total bank assets. Some weak substitution effects may be emanating from such factors as the ability of bank-affiliated funds to invest in parent bank deposits, thus indirectly replacing the banks' capacity to raise liabilities that is lost to prudential capital provisioning. To directly verify this issue, running the substitution model on individual banks after including the capital adequacy ratio variable shows that the measure is negatively related to the volume of managed fund business. Prudential regulatory requirements successfully dissuade banks from using in-house investment management operations as an indirect conduit for raising funds in the same manner as deposit-taking.

This paper also documents a predominantly negative relationship between managed funds and the aggregate size of a bank's liabilities, reflecting that despite evidence largely supporting complementarity, there are factors other than the existence of a managed fund undertaking within a banking entity that strongly influence the growth of the bank's liabilities. Observed high variability in bank liabilities is negatively related to funds under management, negating the prediction based on the assumption of substitutability that such variability may induce banks to increase their reliance on managed funds for raising monies to on-lend on the asset side. Not surprisingly, the authorisation of banks to operate retirement savings accounts, that are essentially managed funds in nature and tax treatment, results in a reduced reliance on managed funds.

An interesting topic for future research could be an investigation of whether there is a system-wide displacement of bank deposits by whole funds management industry, not only products directly managed by banking entities.

Notes

1. Other reasons offered by Gallo et al (1996), quoting Kaufman and Mote (1994), for bank participation in managed fund activity are 1) the deregulation of bank managed fund activities past 1986; 2) the need to boost non-interest income to offset the decline in net interest margins, a factor linked to the decline in deposits; 3) to reduce bank unsystematic risk through diversification into new lines of business, citing Brewer, 1989; 4) to lock in scale economies by adapting the existing infrastructure to managed fund activities.

2. Keeton (1997) and Schmidt et al (1999) give the securitisation of mortgage and credit card loans as the other reasons for the transfer of investor savings from deposits.

3. See "Funding Pressures Increase at Australian Banks" Standard and Poor's *FundsDirect*, 29 November 2001.

4. Cash management trusts are a form of managed investment in which the primary investments held are in a wider range of money market securities than bank savings accounts.

5. See FSI 1997.

6. Whilst Pilloff (1999) restricts the analysis to money market mutual funds (MMMFs), this paper adopts a broader scope by considering cash and fixed income funds in addition to cash management trusts (CMTs), the Australian equivalent of MMMFs.

7. The so-called prudent-man rule was established in US courts in *Harvard College v Amory* where it was held that "Trustees shall act in a manner as other trustees [later referred to as 'a prudent man'] would act under like circumstances". See Del Guercio (1996) and Cabot (1998) for historical accounts. In the Australian context, the equivalent of prudent-man laws are the fiduciary responsibilities imposed on fund managers by the Managed Investments Act.

8. The logic applied in this section is based on the non-structural model popularised by Ang and Peterson (1984) in the case of debt-lease substitution in firms. In the context of this study the displacement ratio determines the proportion of deposits the incumbent bank loses as a result of offering managed funds. If bank managed funds substitute for bank deposits dollar-for-dollar, the testable hypothesis is that the displacement ratio is equal to one.

9. See Financial System Inquiry (FSI) (1997), page 119. The Australian Taxation Office definition of an RSA is an account offered by banks, building societies, credit unions, life insurance companies and prescribed financial institutions (RSA providers) used for retirement savings and similar to a superannuation fund.

10. The value of λ_1, however, is a measure of the *MF* to *BL* displacement ratio rather than the *BL* to *MF* displacement ratio, α. Alpha cannot be determined by simply taking the inverse of λ_1 due to the presence of a constant and other independent variables in the regression model. However, should a substitutability relationship arise α can easily be

determined by swapping the *MFR* and *BLR* in the above equation to treat the *BL* as the dependent variable, describing the following partial derivative: $\frac{\partial BLR}{\partial MLR} = BL, MF$ displacement ratio.

11. The investment management subsidiaries, with their parent banks in parentheses, are ABN-AMRO Asset Management (ABN-AMRO Bank), Advance Funds Management (acquired by St George Bank in 1997), ANZ Managed Investments Ltd (Australia and New Zealand Banking Group Limited), Barclays Global Investors (Barclays Bank), Commonwealth Financial Services (Commonwealth Bank of Australia), Macquarie Investment Management Ltd (Macquarie Bank Limited), National Australia Financial Management (National Australia Bank Limited), and Westpac Financial Services (Westpac Banking Corporation).

12. This view has been established in a prominent merger application in 2000 in which Commonwealth Bank, one of the four largest banks in Australia, in its application for the approval of its merger with Colonial, a dominant funds management group, unsuccessfully applied to the Australian Competition and Consumer Authority (ACCC) to have managed funds and trusts included in the market definition encompassing term deposits and transaction accounts (Goddard and Walker, 2001). The ACCC subsequently maintained separate definitions for the two product classes.

13. See, for example, "Bank comes up fast in funds management", *Australian Financial Review*, 18 April 2000.

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Fig. 1A: Market-Share Held by Australian Fund Managers
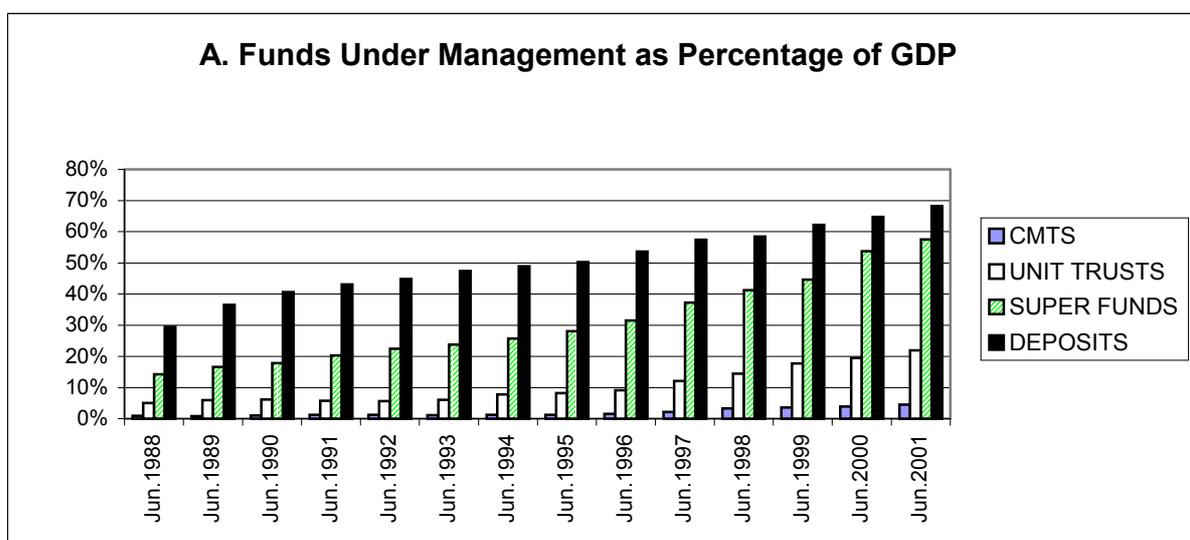
A. Funds Under Management as Percentage of GDP

Sources: Australian Bureau of Statistics and Australian Prudential Regulatory Authority.

Fig. 1B: Market-Share Held by Australian Fund Managers
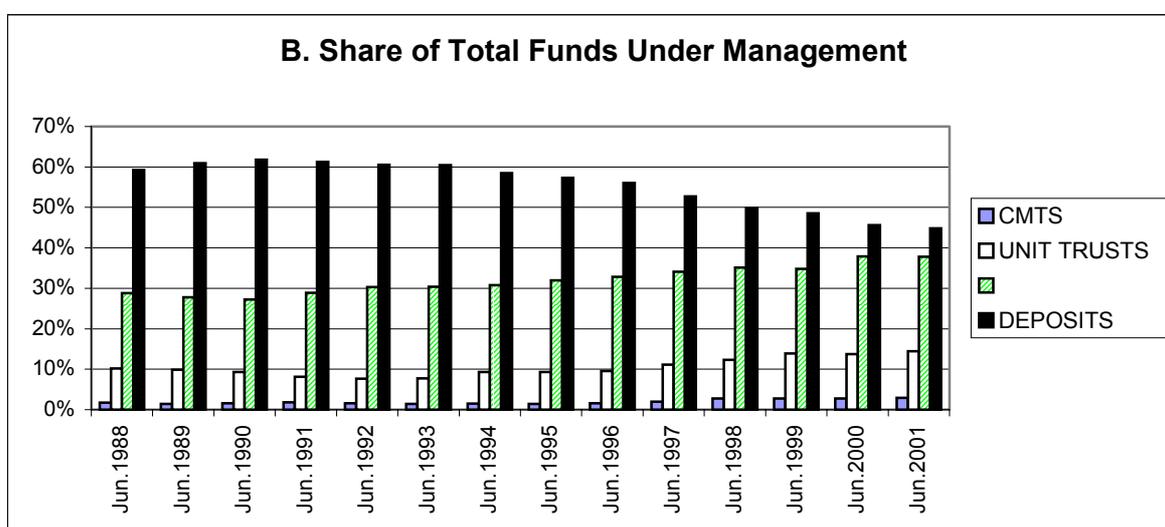
B. Share of Total Funds Under Management

Sources: Australian Bureau of Statistics and Australian Prudential Regulatory Authority

Table 1: <u>Annual OLS Coefficient Estimates of Managed Funds –
Bank Liabilities Substitutability</u>

PANEL A – Heteroskedasticity-inconsistent results

Variable	2000	1999	1998	1997	1996	1995	1994	1993	1992
Constant	2.08	-3.49	4.27	5.86	4.79	6.15	2.95	0.97	1.56
	(7.34)***	(-7.51)***	(10.89)***	(6.54)***	(22.12)***	(5.76)***	(10.56)***	(4.15)***	(3.02)***
BLR	-0.21	0.22	0.18	0.22	-0.08	0.07	0.09	1.29	0.08
	(-1.01)	(1.19)	(7.28)***	(6.25)***	(-0.37)	(16.64)***	(5.44)***	(4.20)***	(4.05)***
BLQ	2.25	12.23	0.52	-1.33	0.51	-1.41	-1.17	-2.06	1.61
	(1.44)	(11.85)***	(2.07)**	(-1.21)	(1.32)	(-1.40)	(-3.92)***	(-2.79)***	(2.62)**
BLSIZE	-0.20	0.13	-0.39	-0.51	-0.44	-0.50	-0.23	-0.10	-0.21
	(-6.34)***	(3.07)***	(-10.99)***	(-6.97)***	(-21.35)***	(-6.00)***	(-11.20)***	(-5.01)***	(-5.38)***
BLVA	-0.49	5.08	-3.26	-2.26	-6.37	-8.87	-2.09	5.89	-1.54
	(-3.21)***	(12.59)***	(-6.83)***	(-0.95)	(-14.78)***	(-4.67)***	(-6.63)***	(6.98)***	(-1.87)*
RSAD	-0.09	-0.37	-0.19	0.24	-	-	-	-	-
	(-1.52)	(-7.34)***	(-2.47)**	(2.80)***	-	-	-	-	-
Adjusted R^2	0.75	0.93	0.75	0.72	0.87	0.78	0.65	0.64	0.48
Number of Banks	7	7	6	6	7	7	7	7	7
Number of Funds	190	182	160	164	149	144	129	110	89

PANEL B – White (1980) heteroskedasticity-consistent results

Variable	2000	1999	1998	1997	1996	1995	1994	1993	1992
Constant	2.08	-3.49	4.27	5.86	4.79	6.15	2.95	0.97	1.56
	(4.09)***	(-4.07)***	(5.32)***	(2.07)***	(21.15)***	(3.69)***	(5.32)***	(4.17)***	(3.33)***
BLR	-0.21	0.22	0.18	0.22	-0.08	0.07	0.09	1.29	0.08
	(-1.17)	(1.54)	(15.03)***	(3.60)***	(-0.45)	(4.62)***	(16.73)***	(4.72)***	(2.05)**
BLQ	2.25	12.23	0.52	-1.33	0.51	-1.41	-1.17	-2.06	1.61
	1.16	9.78***	2.03**	-1.59	1.42	-3.12***	-3.71***	-3.27***	3.31**
BLSIZE	-0.20	0.13	-0.39	-0.51	-0.44	-0.50	-0.23	-0.10	-0.21
	(-4.11)***	(1.84)*	(-5.74)***	(-2.08)**	(-20.34)***	(-3.66)***	(-5.33)***	(-5.38)***	(-5.11)***
BLVA	-0.49	5.08	-3.26	-2.26	-6.37	-8.87	-2.09	5.89	-1.54
	(-1.97)*	(6.81)***	(-3.59)***	(-0.39)	(-15.59)***	(-3.29)***	(-3.60)***	(6.49)***	(-2.72)*
RSAD	-0.09	-0.37	-0.19	0.24	-	-	-	-	-
	(-1.26)	(-5.98)***	(-2.20)**	(1.65)	-	-	-	-	-
Adjusted R^2	0.75	0.93	0.75	0.72	0.87	0.78	0.65	0.64	0.48
Number of Banks	7	7	6	6	7	7	7	7	7
Number of Funds	190	182	160	164	149	144	129	110	89

Notes:
The dependent variable is the ratio of bank-affiliated managed funds' assets under management to total Australian-dollar denominated bank assets. *BLR* is the ratio of aggregated selected investment-type bank liabilities to total Australian dollar denominated bank assets; *BLQ* is a measure of the liquidity of all bank liabilities calculated as the ratio of current deposits to total bank liabilities; *BLSIZE* is the size of the bank's total liability exposure measured as the natural logarithm of total bank liabilities, *BLVA* is variability of bank liabilities calculated as the coefficient of variation of bank liabilities in the analysis year, *RSAD* is a dummy variable denoting whether the bank had approval to operate retirement savings accounts. The expected sign for the *BLR* coefficient is negative if managed fund assets under management and bank investment-type liabilities are substitutes and positive if they are complements. Two-tailed *t*-statistics are in parentheses and ***, **, and * indicate significance at 1, 5 and 10% levels.

Table 2: Pooled OLS Coefficient Estimates of Managed Funds –
Bank Liabilities Substitutability for Individual Banks

Variable	ANZ	CBA	MBL	NAB	WBL
C	0.14 (4.68)***	0.78 (1.70)*	6.68 (2.54)**	0.24 (4.45)***	0.20 (5.81)***
BLR	0.03 (131.74)***	0.09 (55.76)***	0.33 (2.04)**	0.15 (4.04)***	0.06 (235.48)***
BLQ	-0.02 (-3.26)***	0.04 (0.42)	-0.31 (-0.50)	-0.06 (-4.56)***	-0.03 (-2.85)***
BLSIZE	-0.01 (-4.57)***	-0.04 (-1.26)	-0.92 (-2.05)**	-0.02 (-4.08)***	-0.01 (-4.69)***
BLVA	-0.03 (-1.91)*	0.49 (3.38)***	2.10 (4.41)***	0.01 (0.64)	-0.07 (-2.22)**
CAR	0.00 (-2.30)**	-0.03 (-1.78)*	0.10 (1.17)	0.00 (-2.47)**	0.00 (-4.88)***
Adjusted R^2	0.83	0.99	0.28	0.25	0.91

Notes:
The dependent variable is the ratio of bank-affiliated managed funds' assets under management to total Australian-dollar denominated bank assets. *BLR* is the ratio of aggregated selected investment-type bank liabilities to total Australian dollar denominated bank assets; *BLQ* is a measure of the liquidity of all bank liabilities calculated as the ratio of current deposits to total bank liabilities; *BLSIZE* is the size of the bank's total liability exposure measured as the natural logarithm of total bank liabilities, *BLVA* is variability of bank liabilities calculated as the coefficient of variation of bank liabilities in the analysis year, *CAR* is the total capital adequacy ratio for the bank. The expected sign for the *BLR* coefficient is negative if managed fund assets under management and bank investment-type liabilities are substitutes and positive if they are complements. Two-tailed *t*-statistics in parentheses are adjusted for heteroskedasticity (White's correction). ***, **, and * indicate significance at 1, 5 and 10% levels.