Friday, 6th September 1996

The Secretary
Financial Systems Inquiry
Treasury Building
Parkes Place
Parkes ACT 2600

Dear Sir

Miller's Law of Banking

Attached is a paper with this title that we believe is relevant to your Inquiry. The paper, by Christopher Miller and Brenton Fiedler, has been submitted for publication.

Christopher Miller is the managing director of PKF Securities Limited, a licensed dealer in securities and a specialist vehicle of Pannell Kerr Forster in Adelaide providing corporate advisory services. Brenton Fiedler is Lecturer in the School of Accounting at the University of South Australia.

The paper arose out of work by Christopher Miller that led to the identification of widespread misunderstanding at executive levels in financial intermediaries of the relationship between interest spread and return on capital of a bank. A search of the literature by Brenton Fiedler has not found other material analysing this relationship.

Thus, *Miller's Law of Banking* establishes that a perfect bank is inherently less profitable if it borrows funds at, say, 6% and lends at 10% than if it borrows at, say, 16% and lends at 20%. Consequently, the terms of trade have moved against all banks in the low interest rate climate.

However, this is not obviously reflected in reported profits; Chanticleer wrote in *The Australian Financial Review* on Friday, 30th August 1996,

> "Near enough to every second dollar of profit generated by industrial companies in 1995 was attributable to banks, a statistic out of all proportion to capital employed."

This achievement in spite of the adverse movement in their terms of trade appears to reflect a degree of market control that calls for thorough analysis.

Yours faithfully

PJ Whelan
Pannell Kerr Forster

MILLER'S LAW OF BANKING

by

Christopher H Miller and Brenton A Fiedler

September 1996

Abstract

*The financial objective of a bank is to earn a return on its shareholders' funds - its capital. This paper develops an algebraic model to depict the financial performance of a 'perfect' bank (a bank that incurs no operating expenses and suffers no bad debts). This model identifies '**Miller's Law of Banking**' that '**the rate of return on capital by a perfect bank is a function of any chosen indicator interest rate**'.*

*The corollary to **Miller's Law of Banking** is crucial**: 'a perfect bank must increase its interest spread (or increase its fee income) if it is to maintain a constant rate of return on its capital in a falling interest rate climate**'.*

Accordingly, this paper concludes that the terms of trade of a perfect bank are enhanced in a high interest rate climate and diminished in a low interest rate climate. This is an effect additional to and separate from the reduction in the volume of banking business to be done in a low interest rate climate.

Comment

The phenomenon that profitability in the banking industry suffers in a low interest rate climate has been recognised in the press as demonstrated by the following extract from an article in *The Australian Financial Review* on 17th June 1993:

> "The Australian banking industry was facing a crunch in terms of revenues, profits and margins ... National Australia Bank managing director, Mr Don Argus, said last night.
>
> Mr Argus said there was an immediate squeeze on bank revenues, margins and profits as a result of continued low inflation ... "

The banking industry's concerns about the adverse effects on financial performance in a low interest rate climate were considered in the 22nd August 1992 edition of *The Economist*:

> "Bankers hate disinflation. It has exposed past failings, embarrassed their balance sheets and forced them to retrench ...
>
> The biggest impact will be on banks' *raison d'etre* - lending for interest. Simply, there will be less of it. Think of banks as firms that manufacture money. Low inflation means lower output ... "

Volume of Funds

In *The Economist* article referred to above, it was purported that the volume of funds handled by banks, including deposits accepted and amounts lent, grow only slowly in a low inflation climate. This is in sharp contrast with the heady days of the '80's.

Thus, statistics published by the Reserve Bank of Australia reflect growth in the total assets of banks (other than the Reserve Bank, and meaning, essentially, amounts lent by them) in the four years 1986 through 1989 at year-upon-year rates of 25%, 20%, 24% and 24% respectively. Consequently, by the end of that period, the total assets had more than doubled.[1]

This rate of growth was related to but significantly exceeded the rate of inflation. It meant that those banks better than doubled their nominal volumes of business without the expenses of commensurate increases in transaction volumes. Reported banking profits increased greatly, albeit bad debts on loans then written subsequently reached dismal levels.

We acknowledge therefore that changes in the volume of funds have a fundamental impact on bank performance in different interest rate climates. However, the model developed in this paper establishes that the performance of a perfect bank is, in essence, *independent* of the volume of funds. In the following discussion of the model that identifies *Miller's Law of Banking* we identify elements that affect bank performance but are independent of the volume of funds, providing insights not commonly recognised by bankers.

What is Banking?

Analysis can founder on poor choice of basic definition. The starting point of the analysis that identifies *Miller's Law of Banking* needs to be the definition of "banking". Review of dictionary definitions indicates, firstly, that "banking" is not easy to define and, secondly, that the nature of banking activities continually changes.

Collins Dictionary of the English Language (1979) gives this definition:

> "**bank-ing** ... the business engaged in by a bank."

This definition is splendidly circular. In addition, although "business" is a very important concept, it is, in practice, not easy to define. Furthermore, many banks conduct a wide range of activities, as this further definition in the same dictionary indicates:

> "**bank** ... an institution offering certain financial services, such as the safe keeping of money, conversion of domestic into foreign currencies, lending of money at interest, and acceptance of bills of exchange."

This definition is not circular but neither is it precise; the expressions "certain" and "such as" are unlikely to provide a firm foundation for analysis. However, it does illustrate the difficulty of definition.

The Shorter Oxford English Dictionary (1973) appears more constructive:

> "**Bank** ... In modern use: an establishment for the custody of money received from, or on behalf of, its customers. Its essential duty is to pay their drafts on it; its profits arise from the use of the money left by them."

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[1] From Reserve Bank of Australia *Bulletin* (April 1996), Statistical Directory D.5 Total Assets of Financial Institutions

Although the phrase "from, or on behalf of," suggests that a lawyer has been at work, the identification of the origins of a bank's profits is clear: the "use of the money left by them" means the on-lending of money to third parties for interest.

However, banking practices are continuously developing. Thus, taking custody of money from customers and paying their drafts are expensive activities, requiring extensive computer systems (the heart of modern banking), membership of the inter-bank settlement system, and branch establishments. Thus, in current practice, banks are obtaining more of their funding requirements from wholesale money markets and are levying fees to recoup costs (and depress transaction volumes) incurred in the "essential duty" of "pay(ing) their drafts on it". In addition, banks are diversifying into a wide range of other activities from the provision of personal investment advice to trading in foreign currencies.

Simplifying Assumptions

If it is to provide clear insights, a financial model of a bank needs to make simplifying assumptions that identify the core activity and eliminate non-core activities. Accordingly, this paper will assume a perfect bank that conducts a single activity: the lending (primarily) of other people's money - money borrowed from depositors and money markets - and (secondarily) the bank's own money - its shareholders' funds or capital and it is assumed that borrowings and capital are greater than zero. It is further assumed that this perfect bank will lend this money at a "margin" or for an "interest spread" (being the difference between the interest rate at which the bank borrows and the interest rate at which it lends). Whenever the perfect bank borrows it will be at one fixed interest rate and whenever it lends it will be at another (higher) fixed interest rate.

This paper also makes these further simplifying assumptions:

. the perfect bank does not make repayments to its depositors or the money markets and it lends on an 'interest only' basis for one interest rest,
. it does not incur any operating expenses other than interest,
. it never incurs a bad debt and
. it earns no fee income.

Capital Adequacy

As with any business, the rate of return on capital is inversely proportional to the amount of capital. However, in order that banks maintain sufficient capital to weather commercial misadventures (in particular, bad debts) and thus retain the ability to repay deposits as and when they fall due, they are required to comply with risk weighted capital adequacy rules. These rules originated from the Bank for International Settlement in Basle and are now administered by the Reserve Bank of Australia in the course of its role in banking supervision[2].

Accordingly, a perfect bank is likely to restrict its capital to a minimum consistent with regulatory requirements and its own assessment of commercial prudence.

[2] Other financial intermediaries, such as building societies and credit unions, are subject to parallel requirements under laws such as the Financial Institutions Code 1992

Financial Model

The algebraic model that identifies *Miller's Law of Banking* follows.

Let:

B = the amount of **funds borrowed** ($) by the perfect bank from depositors and money markets,

C = the amount of the bank's own shareholders' funds or **capital** ($),

R_b = the **base rate** (%), the rate at which the bank borrows money,

R_c = the **rate of return** (%), the rate of return that the bank earns on its own shareholders' funds or capital

and

R_s = the margin or **interest spread** (%) that the bank earns.

Now,

Interest Income means the total interest received by the bank from borrowers[3],

Interest Expense means the total interest paid by the bank to depositors and money markets

and

Return on Capital is the difference between Interest Income and Interest Expense.

There are three elements to the return on capital:

. an amount equal to the interest expense that the perfect bank would pay to depositors and money markets if it had to borrow an amount equal to its capital,
. interest spread on capital and
. interest spread on the funds borrowed from depositors and money markets.

Relationships between factors are illustrated in the attached diagram.

[3] To whom the perfect bank has lent its own capital together with the amount it has borrowed from depositors and money markets

Working from first principles, it can be seen that:

Interest Income = (Borrowings + Capital) x (Base Rate + Interest Spread)

$= (B + C) \times (R_b + R_s)$

and

Interest Expense = Borrowings x Base Rate

$= B.R_b$

Now,

Profit = Interest Income - Interest Expense

$= (B + C) \times (R_b + R_s) - B.R_b$

$= B.R_b + B.R_s + C.R_b + C.R_s - B.R_b$

$= B.R_s + C.R_s + C.R_b$

and

Gearing - G - is defined to be the ratio of capital to borrowings, ie,

$G = C/B$

or

$C = B.G$

Then, by substitution,

$\text{Profit} = B.R_s + B.G.R_s + B.G.R_b$

Now, the rate of return on the shareholders' funds or capital of the perfect bank, is given by

R_c = Profit/Capital

$$= \frac{B.R_s + B.G.R_s + B.G.R_b}{C}$$

$$= \frac{B.R_s(1 + G) + B.R_b.G}{C}$$

$$= \frac{B}{C}.[R_s(1 + G) + R_b.G]$$

Substituting 1/G for B/C

$$= \frac{R_s(1 + G) + R_b.G}{G}$$

$$= \frac{R_s}{G} + \frac{R_s.G}{G} + \frac{R_b.G}{G}$$

$$= \frac{R_s}{G} + R_s + R_b$$

or

$$= R_s(1/G + 1) + R_b$$

Thus, **the rate of return on capital is a function of the base rate**.

Miller's Law of Banking

This analysis can be recast around any chosen indicator interest rate, which allows *Miller's Law of Banking* to be stated: **the rate of return on capital by a perfect bank is a function of any chosen indicator interest rate**.

Miller's Law Of Banking establishes that, if other variables are held constant, the rate of return on capital by a perfect bank falls in a low interest rate climate. In other words, the terms of trade fall with interest rates. Thus, for example, a perfect bank is inherently less profitable if it borrows funds at, say, 6% and lends at 10% than if it borrows at, say, 16% and lends at 20% as is illustrated below; in both cases, we assume constant gearing of, say, 8%.

From above, we have

$$R_c = \frac{R_s}{G} + R_s + R_b$$

In the high interest rate case

$$R_c = \frac{.04}{.08} + .04 + .16$$

$$= 70\%$$

In the low interest rate case

$$R_c = \frac{.04}{.08} + .04 + .06$$

$$= 60\%$$

In this example, our perfect bank would need to increase its interest spread to almost 5 percentage points to generate the same rate of return on its capital in the low interest rate case. (*Miller's Law of Banking* enables the precise percentage required to be calculated.) The general case is covered in the corollary to *Miller's Law of Banking* below.

Corollary

Suppose, then, that:

(i) the objective of the perfect bank is to maintain a constant rate of return on capital - R_c - in spite of reduced interest rates - R_b - and

(ii) regulation prevents it from increasing its gearing.

Above, it is established that:

$R_c = R_s(1/G + 1) + R_b$

This allows the corollary to *Miller's Law of Banking* to be stated: **a perfect bank must increase its interest spread (or increase its fee income) if it is to maintain a constant rate of return on its capital in a falling interest rate climate**.

Conclusion

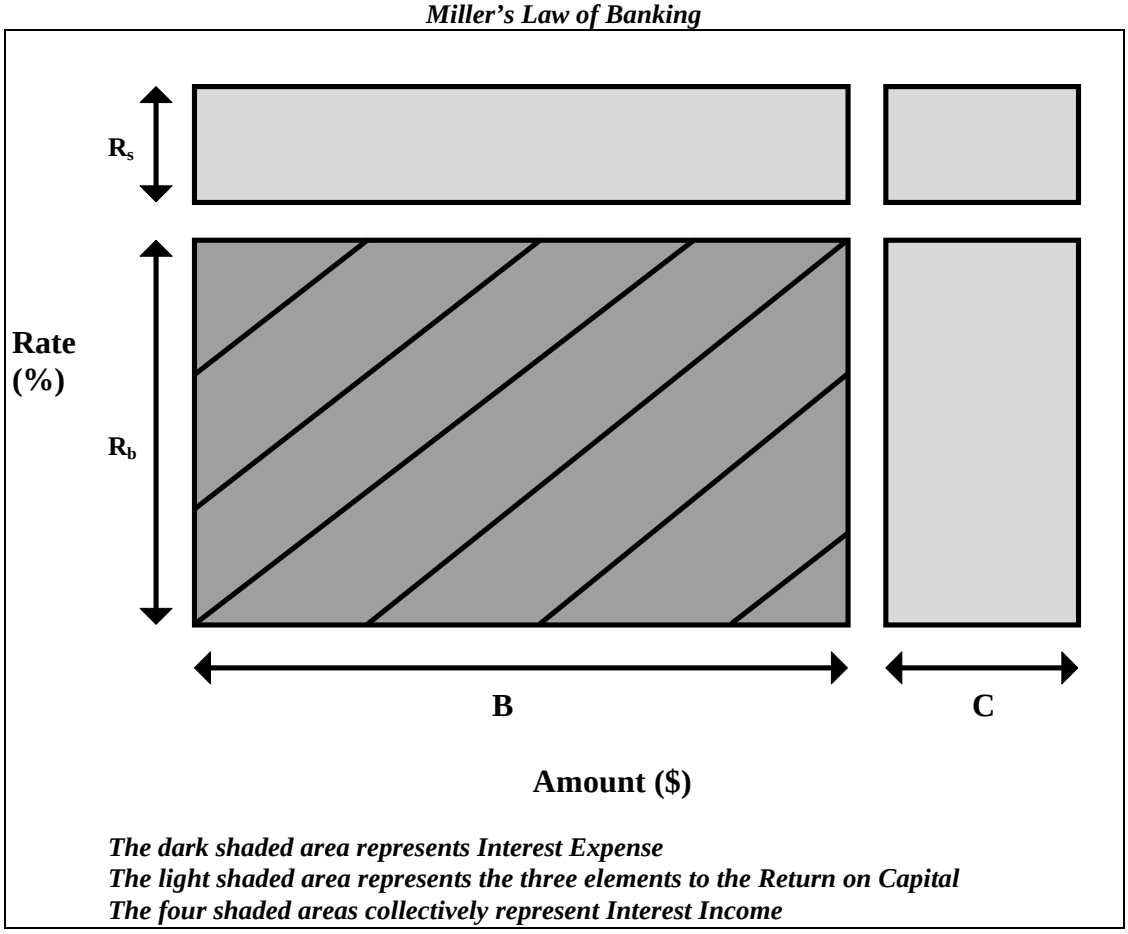
Miller's Law of Banking provides insights into the financial performance of a perfect bank, concluding that its terms of trade are more favourable in a high interest rate climate than in a low interest rate climate. This is an effect additional to and separate from the reduction in the volume of banking business to be done in a low interest rate climate.

The corollary is that there must be an increase in interest spread or margin if a perfect bank is to maintain a constant rate of return on its capital in a low interest rate climate or, alternatively, an increase in fee income.

The significance of the resultant issues facing the major trading banks is indicated in this report by Paul Syvret reporting in *The Australian Financial Review* on 1st August 1996:

> "The ANZ Bank has thrown the contentious issue of higher fees and charges for smaller, less profitable customers back into the spotlight with a vow that it will lead the Australian banking industry in shaking up its fee structure in the next two years.
>
> ANZ's chief executive, Mr Don Mercer, yesterday scaled up his rhetoric on fees, saying they are now a 'survival issue' for the Australian banking industry."

Miller's Law of Banking



The dark shaded area represents Interest Expense
The light shaded area represents the three elements to the Return on Capital
The four shaded areas collectively represent Interest Income

hmiller