AUSTRALIAN INDEXED BONDS

by

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The Australian financial markets have recently witnessed the first issue of indexed bonds by the Australian Government. Aspects covered herein include the background to that issue, the design of the two types of securities, the mechanics of the tender and tap issues, the pricing formula together with some comments concerning the future markets, the British experience and possible effects on product development.

Background

In recent years, the Hancock Report into National Superannuation discussed indexed securities while the Campbell Report suggested that they should be considered as a possible component within the Government's funding program. However, it was not until the increased tax on lump sum superannuation benefits and the Hawke Government's desire to encourage retirement benefits in income form, that indexed bonds were placed on the agenda. It is worth noting that while the Australian Government's decision is directly linked to encouraging the provision of pensions and annuities for retirees, the British Government, which introduced indexed gilts in 1981, argued that they provide greater flexibility in their monetary policy. Given the Australian Government's objective, it is expected that indexed bonds will only make a modest contribution to the funding of Government debt.

The Design of the Securities

Two forms of indexed securities have been issued. They are the capital-indexed stock, which is issued by tender with a restricted tap issue, and interest-indexed stock which is only issued on a tap basis.

Capital-Indexed Stock

This form of stock is based on the indexation of the capital's value with the interest payments adjusted in line with the changing value of the capital.

As interest payments are quarterly, the indexation of the capital also occurs on a quarterly basis. However, to reduce the effect on one-off movements in the Consumer Price Index (CPI), the indexation is not on a quarter-by-quarter basis. Rather, each quarter the value of the capital is adjusted by half the movement in the CPI for the previous 6 months. Table 1 illustrates the effect of this indexation method.

The table also highlights the lag produced by most methods of indexation. As it is desirable to know the next quarterly interest payment (and hence the value of the capital in 3 months' time) a lagging effect is established. For example, the quarterly indexation from August to November 1985 is determined by half the movement in the index from December 1984 to June 1985.

TABLE 1

**Cash flows for a hypothetical 4%
2 year capital-indexed 20 August 1987 stock**

Movement in Index[1]		% increase in Index for the 6 month period	Date of Interest Payments	Indexed Value of Capital[3]	1% Quarterly Payment based On Indexed Value of Capital
					$
December 84	135.9				
March 85	137.8	3.826			
June 85	141.1	4.427			
			20. 8.85	100.00	—
September 85[2]	143.9	3.969		x 1.91%	
			20.11.85	101.91	.0191
December 85	146.7	3.892		x 2.21%	
			20. 2.86	104.16	1.0416
March 86	149.5	3.954		x 1.98%	
			20. 5.86	106.22	1.0622
June 86	152.5	2.809		x 1.95%	
			20. 8.86	108.29	1.0829
September 86	153.7	2.689		x 1.98%	
			20.11.86	110.43	1.1043
December 86	156.6	2.863		x 1.40%	
			20. 2.87	111.98	1.1198
March 87	158.1			x 1.34%	
			20. 5.87	113.48	1.1348
June 87	159.0			x 1.43%	
			20. 8.87	115.10	1.1510
September 87	163.2			Maturity Value 115.10	

Notes:

1. The index used is the Consumer Price Index-Weighted Average of Eight-Capital cities: All Groups Index.
2. From September 1985, the values of the CPI shown are purely hypothetical.
3. The value of the capital is increased on a quarterly basis by an amount equal to half the change in the index for the six month period preceding the start of that quarter.

One effect of the lag can be seen by comparing the indexation received over the two years in the example in Table 1, namely 15.10 per cent, or 7.28 per cent p.a. compound with the actual inflation experienced from August 20, 1985 to August 20, 1987 which may be estimated to be 13.09 per cent, or 6.35 per cent p.a. compound. In this example it operated to the lender's advantage, but if there was a significant inflationary surge in the June 1987 quarter it would operate in the other direction. Clearly, even a capital-indexed bond does not guarantee exact inflation protection.

Table 1 only illustrates positive movements in the index. Negative movements in the index are possible and these would decrease the value of the capital and also the related interest payment providing the value of the capital remains above 100.00. Should the capital value fall below 100, then a minimum interest payment based on a capital of 100 is paid although the "excess interest" paid above the "correct" amount will be recouped when the capital value rises above 100.00. Given the current economic conditions, it is unlikely that this guarantee will operate.

Interest-Indexed Stock

This form of stock is similar to a floating rate note with a fixed capital value and interest payments linked to movements in the index. Each quarterly interest payment is the sum of

(i)   the fixed rate of interest, which is determined by the tender of the capital-indexed stock;

(ii) the rate of change in the index (assuming it is positive); and

(iii) the product of (i) and (ii).

Table 2 sets out the cash flows for a 5 per cent 2-year interest-indexed stock based on the same inflation assumptions as in Table 1.

As with the capital-indexed stock, the quarterly indexation is based on half the CPI movement for the preceding six months. However, the effect of a negative CPI movement is a little different as the minimum quarterly interest payment is the fixed rate. Hence, if deflation (as measured by the CPI) occurs in one six month period, then some "excess interest" will be paid in the following quarter. This will be recouped when positive movements in the CPI return.

The operations of this guarantee is quite feasible and would have occurred with the introduction of Medicare.

It has been suggested by the Government that these interest-indexed stocks will be attractive to retirees

TABLE 2

Cash flows for a hypothetical 5% 2 year interest-indexed 20 August 1987 stock

Movement in Index[1]		% increase in Index for the 6 month period	Date of Interest Payments	Size of Interest Payment[2]
December 84	135.9			
March 85	137.8	3.826		
June 85	141.1	4.427		
			20. 8.85	—
September 85	143.9	3.969		
			20.11.85	1.25% + 1.91% + 0.02% : $3.18
December 85	146.7	3.892		
			20. 2.86	1.25% + 2.21% + 0.03% : $3.49
March 86	149.5	3.954		
			20. 5.86	1.25% + 1.98% + 0.02% : $3.25
June 86	152.5	2.809		
			20. 8.86	1.25% + 1.95% + 0.02% : $3.22
September 86	153.7	2.689		
			20.11.86	1.25% + 1.98% + 0.02% : $3.25
December 86	156.6	2.863		
			20. 2.87	1.25% + 1.40% + 0.02% : $2.67
March 87	158.1			
			20. 5.87	1.25% + 1.34% + 0.02% : $2.61
June 87	159.0			
			20. 8.87	1.25% + 1.43% + 0.02% : $2.70
September 87	163.2			Maturity Value $100.00

Notes:

1. As for capital-indexed stocks, the index used is the Consumer Price Index-Weighted Average of Eight Capital Cities: All Groups Index.

2. Each quarterly interest payment is the sum of
    a) a quarter of the fixed annual rate;
    b) half the increase in the index for the six month period preceding the start of that quarter; and
    c) the product of a) and b).

and others on a fixed income. However, given the uncertainty of the future income flows and the decrease in the interest payment level, when the rate of inflation falls, it could be argued that few retirees on a low income might invest in these securities.

The Tender and Tap Issues

The first tender for capital-indexed stocks, held in late July 1985 was for a 10 and 20 year stock, with each stock offered for $50 million and a 4 per cent coupon (i.e. one per cent per quarter of the indexed capital value). The bids, expressed as *real* yields payable quarterly, ranged from 4.35 per cent to 5.57 per cent for the 10 year stock and 4.22 per cent to 4.90 per cent for the 20 year stock, with weighted averages of 5.200 per cent and 4.487 per cent respectively.

These weighted averages, less a margin, provided the basis for both tap issues. Hence the two capital indexed stocks were available on tap at real yields of 5.00 per cent and 4.25 per cent respectively. For these stocks, the issue price was calculated according to a formula

announced by the Reserve Bank and all investors will receive the same first interest payment (per $100 face value) on November 20, 1985.

The above weighted averages also provided the fixed rates of 5 per cent (1.25 per cent per quarter) and 4.25 per cent (1.0625 per cent per quarter) for the 10 and 20 year interest-indexed stocks. The issue price and the maturity value of these stocks will always be $100. Hence the size of the first interest payment will vary according to the day of purchase.

The tap was initially open for three weeks although the Treasurer retained the right to close it earlier. In particular, the amount of capital-indexed stocks issued at tap is limited to approximately 10 per cent of the tender amount. There is no limitation on the amount of interest-indexed stock issued although no investor may apply for more than $100,000 on indexed-stocks (both types combined) of any one maturity at any one issue.

Price of Capital-Indexed Stock

As mentioned above, the price of capital-indexed stock at issue is determined by the Reserve Bank formula. Although at first glance this formula may appear formidable, it is in a similar form to the conventional bond formula and may be understood in a similar way. The formula that will normally be used is:

$$\text{Price} = v^{\frac{f}{d}} \left(\frac{1}{1 + \frac{p}{100}} \right)^{\frac{f}{d}} \left\{ c + \frac{gK}{100}t\ a_{\overline{n}|} + K_t v^n \right\}$$

where $v = \frac{1}{1 + i}$ and i is the *real* yield per quarter;

   f/d is the fraction of the current quarter remaining;

   p is half the percentage change of the CPI for the preceding 6 months;

   c is the next interest payment (which is known);

   g is the interest rate per quarter;

   K_t is the capital value at the next interest payment date;

   n is the number of full quarters remaining; and

   $a_{\overline{n}|} = v + v^2 + \cdots + v^n = \frac{1 - v^n}{i}$

As an example, let us consider the price of the 4% capital-indexed stock maturing on 20 August 1995 as at 21 August 1985, which was the last day of the tap, to provide a real yield of 5%.

Hence:

   $i = .0125$ and $v = .9876543$

   $f/d = 91/92$

   $p = 1.91$ as the CPI increased by 3.826% from December 1984 to June 1985

   $c = 1 \times 101.91 = 1.0191$ as per Table 1

   $g = 1\%$ (i.e. ¼ of 4%)

   $K_t = 101.91$ or the next capital value

   $n = 39$

and the price may be determined as:

$$(.9876543)^{\frac{91}{92}} \left(\frac{1}{1 \times \frac{1.91}{100}} \right)^{\frac{91}{92}} \left\{ 1.0191 \times \frac{1 \times 101.91}{100}\ a_{\overline{39}|} \times 101.91 v^{39} \right\}$$

$= 92.19967$ which was the price of the last day of the tap issue.

The differences between the above formula and the conventional bond formula are

(i)   the use of a *real* yield in place of a *nominal* yield;

(ii)   the introduction of an indexation factor at the front of the expression;

(iii)   the use of K_t to represent the changing value of the capital in place of 100; and

(iv)   the quarterly interest payments.

One complication arises when the stock goes ex-interest or at issue when there is more than a full quarter until the final interest payment. In these cases, c becomes zero and a full quarter's indexation factor is added to the expression.

The Index

A short comment is required concerning the conditions relating to index used, namely the Consumer Price Index — Weighted Average of Eight Capital Cities: All Groups Index. It should be noted that:

(a)   if its publication is delayed, then the Reserve Bank will determine a substitute figure for the calculation of interest payments;

(b) if a replacement index is produced, then this index will be used; and

(c) if, in the opinion of the Treasurer, there has been a change in the calculation of the CPI which would be detrimental to stockholders, then investors will have the right to redeem their stock at market prices.

This last clause is of some concern as it is the Government, which is issuing the stock, who determines whether changes to the calculation of the CPI is detrimental to investors. It would be preferable if the arbiter could be seen to be clearly independent from the issuer.

Taxation

The taxation position for interest-indexed bonds is the same as for existing securities. That is, all interest received and any capital gain due to discounted prices is assessable income.

In respect of the capital-indexed stock, assessable income includes income received, capital gain due to discounted prices and, at the moment, the increase in the capital value of the stock due to indexation.

This capital value increase is assessable in the year it occurs, even though it will not be received until maturity. Hence for many taxpayers, a negative cash flow will be generated as the net interest received will not be sufficient to cover the tax on the increased value of the capital. The proposed indexed capital gains tax

may alter this situation and thereby increase the attractiveness of these bonds.

The Market

It is too early to make any definite statements concerning the development of the secondary market in indexed stocks. However, the lower yields for the 20 year stock at the first tender would seem to indicate that life offices and superannuation funds prefer the longer term stock to match their long term liabilities.

For a market of any depth to develop, it is essential that the existing two capital-indexed stocks are re-issued on identical terms until there is a reasonable size of each stock on issue. This is the current intention of the Government with the next issue in late October, 1985, following the release of the September CPI figures.

One aspect of capital indexed stocks that market participants should realise is that real yields are likely to be less volatile than nominal yields on stocks of similar terms. The accompanying graph, which illustrates the yields for two 1996 British stocks, shows the yield for the indexed gilt fluctuated by less than 2 per cent real during the 3½ year period while the conventional stock's yield moved within a 5½ per cent nominal range. On the other hand, it should also be noted that the indexed stock, with a greater portion of its cash flow received at maturity, will produce a greater price change for a 1 per cent change in the yield. Even so, the price of capital-indexed stocks will show greater stability than conventional stocks.
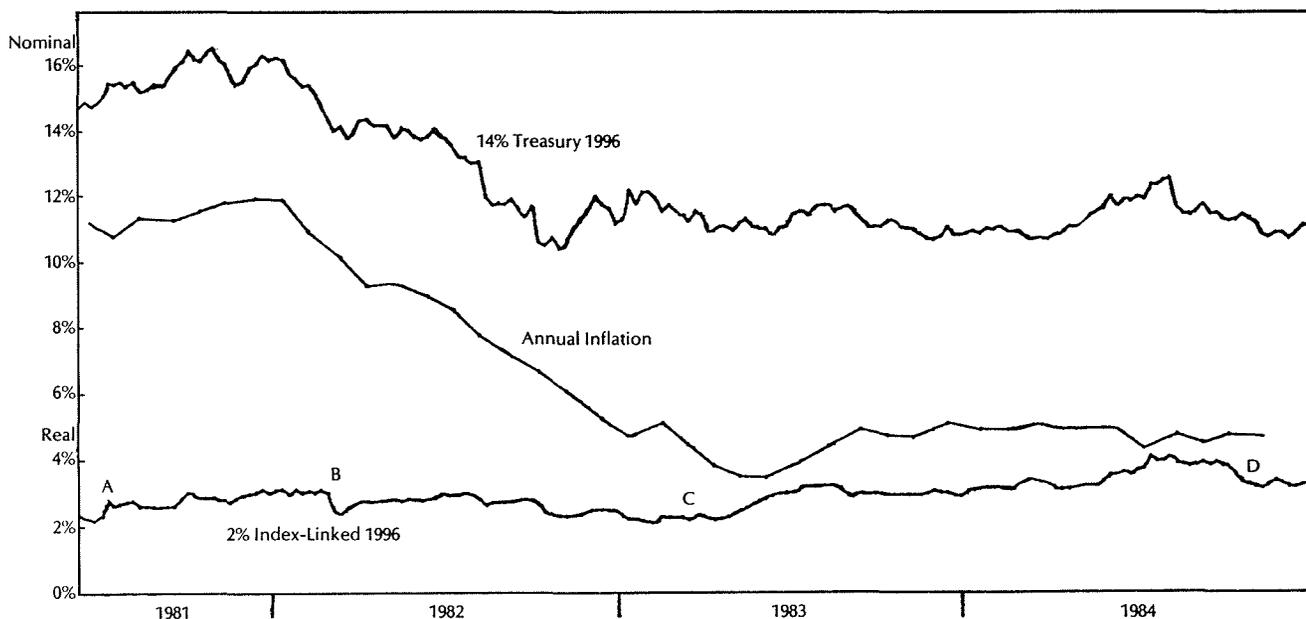
Other aspects of this graph which may be of interest are:

(i)   at the second issue of indexed stocks (point A), real yields rose markedly;

(ii) at point B, yields dropped significantly as these stocks were made available to all investors and not just pension funds;

(iii) in the lead-up to the general election in early 1983 (point C), real yields were lower due to political uncertainty. During this period, the Government issued an indexed convertible stock which enabled it to continue to raise funds even during an election campaign;

(iv) in late 1984, real yields dropped considerably due to the Bank of England's prediction of higher inflation and subsequent greater demand for indexed stocks; and

(v)   the relationship between the yields available on the two types of stocks. It may be suggested that the redemption yield available from conventional stocks may be considered to equal the real yield available on indexed stocks plus the expected future inflation rate plus a risk premium (of say 1 per cent) for accepting the uncertainty of future inflation levels. The size of this risk premium is likely to vary as economic conditions change.

Although the graph reflects British conditions, it may be suggested that it highlights the factors which could cause a fundamental shift in the size of real yields. These include:

(a)   a change in the rules relating to the ownership or taxation of these stocks as at point B;

(b)   political uncertainty as at Point C; and

(c)   economic uncertainty or changes to predicted economic conditions as at point D.

The Future

The Government is to be congratulated for issuing index-linked securities but it must make it clear that it intends to continue issuing these long-term stocks on a regular basis. Without such an assurance, the effect of these securities will be significantly reduced.

The immediate impact on product development within the superannuation and annuity markets is likely to be limited, although with continued issues of indexed securities, it is likely that a number of institutions will offer indexed annuities and similar products. Indeed, with current real yields above 4 per cent, it is feasible that some institutions could offer annuities that not only match inflation but also provide a 1 per cent or 2 per cent per annum real increase. If this development occurs, and an increased number of Australians are attracted to pensions and annuities, then the issue of indexed Government securities will have been a real success.