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Comments welcomed

Taxation of Indexed Bonds

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Abstract:

This paper analyses the tax treatment of inflation indexed bonds in Australia. It demonstrates that the method of taxation which has been adopted (which involves including the inflation adjusted increase in principal value in taxable income, even though not realised) is based on an implicit assumption that the Fisher Effect holds. In this case, the tax treatment is non discriminatory vis a vis other fixed interest securities, although distorting vis a vis other inflation hedges. If the Tax Adjusted Fisher Effect holds, the tax treatment of indexed bonds is discriminatory vis a vis other fixed interest securities.

Taxation of Indexed Bonds

The Australian Tax Office applies a method of tax treatment to income from capital indexed (inflation indexed) bonds which is contrary to the usual cash flow treatment of personal income. Specifically, annual assessable income is calculated as the interest income received plus the accrued increase in the value of the principal due to the inflation indexation, even though no annual cash flow occurs as a result. The objective of this paper is to explain the rationale for such a tax treatment and to examine whether it has the potential to create significant asset allocation distortions.

Section one of the paper outlines the characteristics of capital indexed bonds and the nature of the tax treatment applied to them. Section two considers how alternative tax treatments affect the after tax rate of return on indexed bonds relative to other assets. It is shown that the current tax treatment involves no distortion relative to "standard" fixed interest securities if nominal interest rates are determined according to the Fisher Effect. However, if the Tax Adjusted Fisher Effect applies, the current tax treatment discriminates against capital indexed bonds. In both cases, the current tax treatment discriminates against capital indexed bonds relative to other assets which have market values which tend to move in line with the price level but which are not taxed on such an "accruals" basis.

1. Capital Indexed Bonds and Taxation

The Australian Treasury first issued inflation indexed bonds in 1985. Both capital indexed and interest indexed bonds were issued via public tender and a tap system, but such issues ceased in 1988. In 1993 capital indexed bonds were reintroduced, with issues made via a tender panel of dealers.

Capital Indexed Bonds are securities which promise a fixed coupon interest rate (the "real interest rate") applied to a principal amount which is indexed to the Consumer Price Index. To date, the real coupon interest rate has been specified as 4.00% p.a., although the tender process determines the actual real interest rate at issue date through the determination of the issue price.

The mechanics of the capital indexed bond are best seen by way of a simple example which assumes annual interest payments. (In practice, interest is paid quarterly). For a bond issued at date 0 with an initial principal amount of P_0, the principal amount is adjusted each year

in line with the inflation rate of that year. The "real" interest rate specified for the bond, which we denote by r, is applied to that adjusted principal amount. Thus, if the Consumer Price Index at date 0 stood at C_0, and at date t stood at C_t the principal amount at date t would be $P_t = P_0 (C_t/C_0)$. Interest paid at date t would be given by:

$$i_t = r.P_t = r.\ P_0\ (C_t/C_0)$$

and the principal repaid at maturity (date T) would be

$$P_T = P_0\ (C_T/C_0).$$

Table 1 provides an illustration of the cash flows for a particular CPI scenario.

Table 1:

Illustrative Cash Flows and Taxable Income for a Capital Indexed Bond

DATE	0	1	2	3	4	5
CPI	100	105	107	109	113	120
Principal	100	105	107	109	113	120
Interest		4.2	4.28	4.36	4.52	4.8
Cash Flow	-100	4.2	4.28	4.36	4.52	124.8
Taxable Income		9.2	6.28	6.36	8.52	11.8

The important features of the Capital Indexed Bond are that the nominal interest paid increases in line with inflation such that the real value of interest receipts is held constant over time. The adjustment of the principal amount, and repayment of that adjusted amount compensates the holder for the decline in the real value of principal caused by inflation. Consequently, the real interest rate paid on the bond, if purchased on the issue date and held to maturity, is constant at the specified coupon rate, although the timing of nominal cash flows will vary depending upon the pattern of inflation. Note, however, that the market value of the bond can differ from the adjusted principal amount because of changes in market interest rates, leading to different real interest rates for investors with holding periods different to the bond's life.

The taxation treatment of income received from indexed bonds involves a departure from the usual cash flow basis applied to individuals. Under the Division 16E tax provisions, the imputed increase in outstanding principal is considered to be income in the year in which it accrues. The taxable income is thus the sum of interest received and increase in capital value in

each year, despite the fact that the latter does not involve a cash flow to the investor at that time. This can be seen in the example given in Table 1.

2. Rationale for the Taxation Regime

In principle, it would be possible to tax the income on capital indexed bonds in a variety of ways. At one level (Approach A), interest received could be subject to tax and the increase in capital value taxed when realised under the capital gains provisions, whereby the real capital gain is subject to taxation. An alternative approach (Approach B) would be to tax interest received and to tax the increase in capital value when received without providing for indexation of the cost base as per the capital gains legislation. A third approach, (Approach C), which is the one used, would be to tax interest as received as well as increases in the capital value as they accrue. The objective of this section is to outline the different implications of each approach and examine what sort of asset allocation biases might result.

Approach A involves the taxation of real interest only. Because the increase in capital value is exactly proportional to the CPI increase over the life of the bond, the indexed cost base will be equal to the adjusted principal amount, so that no taxable income will arise from this source. Thus the real after tax rate of return would be r(1-t) where t is the investor's tax rate. (This can be derived by noting that the interest after tax on an initial \$1 principal is $(r+r\pi)(1-t) = r(1+\pi)(1-t)$ which in real terms is $r(1+\pi)(1-t)/(1+\pi) = r(1-t)$.

Approach C involves taxing the interest received ($r + r\pi$) plus the compensation for the decline in real principal value (π) as it accrues. This is exactly equivalent to taxing the nominal interest rate on a "standard" fixed interest bond, since $i = r+ r\pi + \pi$ where $r + r\pi$ represents the interest received and π represents the decline in real principal. Consequently the real after tax interest rate is

$$r_{at} = [\, i\,(1- t) - \pi\,]/(1+\pi) = [(r+r\pi+\pi)(1-t)-\pi]/(1+\pi) = r(1-t) - \pi t/(1+\pi)$$

which lies below that under approach A.

Approach B involves taxation of real interest during the life of the bond and taxation of the increase in capital value at the bond's maturity. No simple analytic formula exists for the after tax real interest rate on this bond, but the value is clearly below that involved in approach

A. It is also above that for approach C, since approach B involves deferral of the tax until maturity without any change in dollar amount.

Table 2 demonstrates the effect of the alternative tax treatments using a simple example, and compares the after tax nominal rate of return for each case with that on a standard fixed interest bond. For this example, the real interest rate is assumed to be 4% p.a., the inflation rate is assumed to be 5% p.a. and the nominal interest rate is assumed to be 9.2% as given by the Fisher relationship. The tax rate of the investor is assumed to be 30%.

Table 2

After tax rates of return

		Year 0	1	2	3
Straight Bond	Cash Flows	-100	9.2	9.2	109.2
	Taxable Income		9.2	9.2	9.2
	Tax	0	-2.76	-2.76	-2.76
	After Tax C.F.	-100	6.44	6.44	106.44
	IRR	**6.44%**			
Indexed Bond	Principal	100	105	110.25	115.76
	Cash Flows	-100	4.2	4.41	120.39
Tax on interest only	Taxable income		4.2	4.41	4.63
	Tax		-1.26	-1.32	-1.38
	After Tax C.F.	-100	2.94	3.08	119.00
	IRR	**7.94%**			
interest and nominal cg	Taxable income		4.2	4.41	20.39
	Tax		-1.26	-1.32	-6.11
	After Tax C.F.	-100	2.94	3.08	114.27
	IRR	**6.53%**			
interest and cg accrual	Taxable income		9.2	9.66	10.14
	Tax		-2.76	-2.89	-3.04
	After Tax C.F.	-100	1.44	1.51	117.35
	IRR	**6.44%**			

To determine whether the tax treatment of indexed bonds creates any asset allocation distortions, it is necessary to specify the relationship which exists between the nominal returns on other assets and the real return on indexed bonds. As a starting point, assume that the nominal

interest rate is determined according to the Fisher Effect with perfect foresight as regards inflation. The real interest rate on standard fixed interest bonds will thus be equal to that on indexed bonds. In this case the tax treatment of indexed bonds adopted by the Australian Tax Office does not create any biases vis a vis the tax treatment of interest on standard fixed interest securities. This is demonstrated in Table 2 above. However, it should be noted that the tax treatment of standard fixed interest securities is distorting through its taxation of cash flows which are in essence repayments of real principal.

There is, however, no particular reason to believe that the standard Fisher effect will operate in a world with taxes (even with perfect foresight). Darby (1975?) has demonstrated that if the real after tax interest rate at which demand and supply by investors and borrowers is equated is unaffected by the inflation rate, the nominal interest rate will be given by

$$i = r(1+\pi) + \pi/(1-t)$$

Thus, for example, if $r = 0.04$, $t = 0.03$, so that $r(1-t) = 0.028$, an increase in the inflation rate from $\pi = 0$ to $\pi = 0.05$ will see the nominal interest rate increase from 0.04 to

$$i = 0.04(1.05)+ 0.05/0.7 = 0.042 +0.0714 = 0.1134 = 11.34\%.$$

Underpinning the result is the fact that the net tax paid on a straight bond issued and held by the private sector is a zero sum game. Only if the Tax Adjusted Fisher Effect (TAFE) holds is there no transfer of net tax payments between borrower and investor

If the relationship between the nominal and real interest rate is given by the Tax Adjusted Fisher Effect, the current tax treatment will involve a distortion penalising investors in the capital indexed bond in a positive inflation situation, with the distortion increasing as inflation increases. The explanation is best seen by way of an example. Consider an initial zero inflation situation where the real interest rate on standard fixed interest and indexed bonds is the same. If a positive inflation situation now emerges, the nominal interest rate on straight bonds will increase by more that the rate of inflation, reflecting the distorting tax treatment of nominal interest. Borrowers will be willing to pay higher interest rates because of the deductibility of nominal interest, even though it is, in reality, a return of real principal. The after tax real rate of interest for investors and issuers is unaffected. However, the nominal interest rate on the

inflation indexed bond does not adjust in an equivalent fashion, being increased only by the inflation rate. Consequently the after tax real rate of interest falls.

Table 3 provides a numerical illustration of this result, from which it can be seen that the "neutral" tax treatment would involve tax being applied only to interest receipts (and to real capital gains, which are zero for the indexed bond).

Table 3

After Tax Nominal Returns under TAFE

		Year			
		0	1	2	3
Straight Bond	Cash Flows	-100.00	11.34	11.34	111.34
	Taxable Income		11.34	11.34	11.34
	Tax	0.00	-3.40	-3.40	-3.40
	After Tax C.F.	-100.00	7.94	7.94	107.94
	IRR	**0.0794**			
Indexed Bond	Principal	100.00	105.00	110.25	115.76
	Cash Flows	-100.00	4.20	4.41	120.39
Tax on interest only	Taxable income		4.20	4.41	4.63
	Tax		-1.26	-1.32	-1.39
	After Tax C.F.	-100.00	2.94	3.09	119.00
	IRR	**0.0794**			
interest and nominal cg	Taxable income		4.20	4.41	20.39
	Tax		-1.26	-1.32	-6.12
	After Tax C.F.	-100.00	2.94	3.09	114.28
	IRR	**0.0653**			
interest and cg accrual	Taxable income		9.20	9.66	10.14
	Tax		-2.76	-2.90	-3.04
	After Tax C.F.	-100.00	1.44	1.51	117.35
	IRR	**0.0644**			

3. Commentary

In practice, neither the Fisher Effect nor TAFE hold, but the preceding discussion illustrates the potential distortions which might arise between alternative capital market

securities. However, an alternative distortion needs also to be noted. Other assets are subject to a quite different form of taxation, whereby only real capital gains are included in assessable income, and only as realized. Thus, the current tax treatment of indexed bonds involves a distortion in favour of other assets which are viewed (rightly or wrongly)as being inflation hedges, such as property and equities.