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## Indexed Bonds

A Background Paper

Prepared for the

Task Force on Retirement Income Policy

By

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### A. Introduction

1. Objective. The purpose of this paper is to discuss the pros and cons of establishing a system of indexed bonds as a means of assisting employers in the event that governments (federal and/or provincial) should require them to adjust pension payments under their pension plans to compensate for inflation. Cl) The main body of this appendix is divided into three parts. This introduction describes briefly the mechanics of indexed bonds, the way that inflation may affect the cost of indexed pensions and, hence, the reasons why indexed bonds are being considered as a means of offsetting such inflationary impacts. It also notes the role of pension fund money in the financial system in Canada. The second part appraises the possible impact of indexed bonds on the economy generally, on financial markets, and on government operations. It also briefly reviews experience abroad with indexed bonds. The third part deals with the conclusions arrived at from the foregoing discussion. In addition, there are two annexes. One of these provides an estimate of the possible demand for, and supply of, indexed bonds. The other comments on the risk that with indexed bonds, public debt servicing costs might become less predictable.

2. The Mechanics of Indexed Bonds. The indexing of securities involves the periodic adjustment over time of interest and/or principal payments on those securities in line with recorded changes in some predetermined standard - the 'index'. The choice of the index and the precise method of linkage to changes in principal or interest is a function of the ingenuity of borrowers and of their perception of the potential demand in the market for specific indexing arrangements.

The following discussion focuses only on two simple types of indexed bonds: 1) the 'principal compensation' bond and, 2) the 'indexed principal' bond. In the case of the former, compensation is paid at the end of each year for the decline in the real value of the bond's nominal value during that year. At maturity, therefore, only the original

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(1) It should be pointed out that this appendix does not explore the equity issues raised by the indexed bond approach. While indexed bonds are examined here solely as a technique to facilitate indexed pensions, the equity question would undoubtedly merit attention should serious consideration be given to adopting this approach.

nominal value of the bond, adjusted for the inflationary experience of the last year, would need to be repaid, since the lender would already have been compensated for the loss in the real value of his original investment during each of the previous years. The indexed principal bond, on the other hand; provides for repayment of principal in real terms only upon maturity. In that case, full compensation for the loss in real value of the principal amount of the bond is paid when the bond matures.

In both cases, a specific 'real' rate of interest would also be paid annually. Mechanically, the real value interest stream can be calculated by applying the specified real rate of interest on the bond (i.e. 2%) to the indexed value of the bond's principal at the end of each interest period. Table 1 illustrates how the alternative systems would work based on two five-year indexed bonds, one of the principal compensation variety and the other of an indexed principal type, each carrying a 2% 'real value' coupon. This illustration further assumes that, during the five-year life of these bonds, the annual inflation experience was as follows: 3%, 5%, 6%, 4%, 2%. This would have produced the following stream of payments with respect to interest, inflation compensation, and principal.

Table 1

Debt Servicing Schedules for Principal Compensation  
and Indexed Principal Bonds

Year		Principal Compensation			Indexed Principal		
		Compen -	Prin-		Compen-	Prin-	
I	(3%)	2.06	3.00		2.06		
II	(5%)	2.10	5.00		2.16		
III	(6%)	2.12	6.00		2.29		
IV	(4%)	2.08	4.00		2.38		
V	(2%)	2.04	2.00	100.0	2.43	21.61	100.00
Interest earned on all payments							
made during years I to IV				3.84			1.31
Value at maturity of stream of principal and/or interest payments to the lender, assuming reinvestment of all payments received at prevailing interest rates							
				134.24			134.24

As noted above, the real value interest rate concept requires that interest payments be calculated on the basis of the indexed value of the bond's principal at the end of each year. This is quite simple in the case of the principal compensation bond, where the principal

value series for the purpose of calculating interest payments is as follows: \$103, \$105, \$106, \$104 and \$102, and where 2% of \$103, for instance, is \$2.06. In the case of the indexed principal bond, however, where no inflation compensation payments are made until maturity, a compounding element occurs in the principal base used for calculating interest payments. Interest payments are, therefore, based on the following series: \$103, '\$108.15, \$114.64, \$119.22, \$121.61. The \$108.15 principal base for year 11, in this case, is derived by multiplying the \$103 principal value at the end of year 1 by 1.05 (which reflects the second year's rate of inflation).

3. The Impact of Inflation on Pensions. Generally speaking, as shown in the Task Force report, inflation causes fluctuations and uncertainties in the cost of defined benefit pension plans even in the case of those that are not indexed. The extent to which cost fluctuations occur in individual plans varies widely at any given level of inflation and depends on a number of actors. These include the economic assumptions used, the method of valuation of assets and liabilities, the extent to which a plan may already have been underfunded, the provisions for amortization of unfunded liabilities and the type of plan concerned. Moreover, it appears that the more a defined benefit plan is indexed for inflation, the greater the range of cost fluctuations it is likely to experience. By definition, however, there is no impact on money purchase or other defined contribution plans because liabilities in such plans are simply a function of contribution levels and of realized rates of return.

Employers would feel more confident with respect to the cost of their pension plans if the rate of return on their pension fund assets were always to reflect the current inflationary experience. Ideally, therefore, many employers would like access to an investment instrument with a yield which would adjust fully and immediately to changing rates of inflation. Unfortunately, the present financial system offers no such instrument. The market value of long-term bonds fluctuates inversely with interest rates. In periods of rising inflation, therefore, the market value of outstanding long-term bonds may be eroded both in nominal and real terms. Equities produce unstable rates of return and are no longer considered to provide an adequate short- and medium-term hedge against inflation. Residential mortgages offer more scope for yield adjustment since the periodic renewal clause has come into general use, but still may lag well behind changes in inflation rates and consequent changes in rates of interest. Short-term debt securities and money market instruments usually provide greater scope for yield adjustment, however, because their frequent rollovers do enable investors to reinvest the proceeds of maturing securities into others. There is no certainty, of course, about the real yield that will be earned on the proceeds that are reinvested. Indexed bonds, however, could further increase the ability of employers to invest in securities providing a rate of return which kept pace with inflation.

4. Indexed Securities and the Significance of Real Rates of Return. Under existing non-indexed pension plans providing benefits based on career average earnings - the relative importance of which has been declining - there may be a tendency to seek to maximize nominal rates of return because, all other things being equal, higher than anticipated money income on pension fund assets reduces the need for employer pension contributions. Those pension plans providing benefits based on so-called final average earnings, which have been gaining in importance are, of course, already effectively indexed until retirement. Nominal returns are, therefore, of lesser concern (and real returns of greater concern) for such plans. With full indexing, however, real, rather than nominal, rates of return would become the overriding concern for all plans because all liabilities (pre- and post-retirement) would be indexed. (Basically, the real rate would 'finance' the accumulation of assets necessary to produce a given level of real downstream pension benefits, while the 'inflationary premium' part of the nominal rate of return could be deemed to be funding the current dollar value of that level of downstream benefits.)

5. The Significance of Employer-Sponsored Pension Funds in Financial Markets. It may be useful to note briefly the significance of the flow of savings associated with employer-sponsored pension plans, and of the already existing stock of such savings, within the overall Canadian financial framework. If employer-sponsored pensions (particularly those in the private sector) were to be indexed, and indexed bonds made available to facilitate the indexing of those pensions, questions would arise as to what the demand for such bonds might be and what portion of Canadian financial markets and financial assets might become indexed for inflation. An examination of the total volume of assets involved, and of their current deployment as between various types of instruments, constitutes a necessary step towards determining the demand for indexed bonds and their possible effect on financial markets. While for a number of reasons the volume of pension fund assets will likely always be less than the volume of pension liabilities, the asset figure will nevertheless be useful in developing a first approximation of demand.

Table 2 sets out the distribution of assets accumulated in various private forms to 'fund' retirement incomes such as trustee pension plans, the annuities and segregated funds activities of insurance companies, and Registered Retirement Savings Plans (RRSPs). These numbers specifically exclude the Canada and Quebec Pension Plans (C/QPP), Old Age Security (OAS) and Guaranteed Income Supplement (GIS), the public sector superannuation programs, and Government of Canada annuities. They do, however, include all public sector 'trusted' plans.

Table 2

Estimated Assets of Trusteed Pension Plans,  
Other Employer-Sponsored Plans, and RRSPs, 1976

	Total Assets	Bonds	Stocks	Mortgages and Guaranteed Funds (1)	Misc.(2)	Annual Flow
(\$ billions)						
Trusteed pension						
funds	25.2	12.2	5.8	4.3	2.9	3.7
Insurance Cos.						
a) annuities	4.6	1.7	0.3	1.9	0.7	0.4
b) segregated funds	2 ~2	0.6	0.8	0.6	0.2	0.4
RRSPs	7.5	1.3	1.1	4.5	0.6	1.7
Total	39.5	15.8	8.0	11.3	4.4	6.2

(1) Includes investment certificates, term deposits, etc., the proceeds of which are largely used by issuers to finance the acquisition of mortgages.

(2) Includes cash balances, money market instruments, real estate and foreign securities.

By comparison, the asset components of the total Canadian financial market are illustrated in Table 3.

Table 3

Relative Importance of Various Types of Assets in  
Canadian Financial Markets, 1973-1976

	End of Year Level 1976	Annual Flow			
		1973	1974	1975	1976
(\$ billions)					
Treasury Bills &					
Short-Term Paper	17.1	1.2	3.7	1.2	2.5
Mortgages	81.5	7.9	8.3	8.6	12.4
Bonds (1)	111.7	3.9	7.8	12.2	15.9
Stocks	117.7	1.4	1.3	1.8	1.9
Total	328.0	14.4	21.1	23.8	31.7

(1) Net of Canada Savings Bonds.

Source: 1. Financial Flow Accounts as taken from CANSIM, June 1, 1978.  
 2. Statistics Canada, 13-002, *Financial Flow Accounts*.  
 3. Statistics Canada, 13-563, *Financial Flow Accounts*.

The importance of these private retirement financing arrangements relative to the Canadian financial structure taken as a whole can be gauged from comparisons of the 1976 cash flow of these private retirement income funds, at \$6.2 billion, with overall savings flows of \$31.7 billion in 1976 (amounting to 20%), and of the 1976 figure for retirement-related assets of \$39.5 billion with the total asset figure of \$328 billion (representing 12%). It can be further illustrated by the fact that the annual net cash flows of trustee pension funds alone during the decade to December 31, 1974, in all but one year were equivalent to 22-26% of the total net new supply of Canada long-term financial instruments.

It is difficult to be specific about the offsetting liabilities of retirement income funds. By definition, total liabilities with respect to RRSPs and money purchase plans are identical to their assets.

Insured plans also have few or no unfunded liabilities. As for segregated funds of insurance companies, no data are available. With regard to trustee pension fund liabilities, however, a 1975 survey by the Ontario Pension Commission of a substantial sample of plans indicated that 68% of the plans surveyed, covering 84% of the surveyed plan membership, were under-funded by an average 32%. Most of this under-funding reflected 'initial prior service credits', retroactive amendments and updating, experience deficiencies arising from unexpectedly high salary increases in the case of final average pay plans, updated benefits in the case of flat benefit plans, and adjustments to pensions-in-pay generally.

Normally, smaller employers with less favourable pension plans tend to be more fully funded. These results do not appear out of line with the United States experience, insofar as the latter can be determined from information provided in new issue prospectuses filed with the Securities and Exchange Commission and, from material published elsewhere.

Little is known about the disbursement patterns of pension plans involving the insurance companies and about the liquidation rates of RRSPs. With regard to trustee pension funds, however, a reported net cash flow of \$3.7 billion in 1976 reflected total contributions of \$3.4 billion, plus \$1.7 billion of investment income, less \$1.1 billion in pensions paid out or purchased, and less a further \$0.3 billion in other miscellaneous expenses - including cash withdrawals by beneficiaries.

In summary, private retirement arrangements constitute a significant portion of net new savings flows and of the total stock of financial assets in Canada. The future growth in private retirement-related assets could continue to outstrip the overall rate of asset growth as a result of a number of possible factors. These include a reduction in existing unamortized liabilities, an increase in the popularity of RRSPs as the average age of the population rises, and the possible increase in the future in the assets of private retirement funds. Still, there are offsetting factors and it is difficult to be certain.

## B. Analysis

1. Choice of Scenarios. If the federal government were to urge - or require - private employers to index their pension plans, it may well be argued that such a policy stance would have to be augmented by some initiative on the part of the government to reduce the volatility and uncertainty of employer pension costs. The introduction of indexed federal bonds might constitute such an initiative. One question that arises, however, is whether a sufficient quantity of indexed bonds could, as a practical matter, be made available to meet the requirements of pension plans (including those administered by life insurance companies).

To answer this question, it is necessary to consider the framework within which indexed bonds might be introduced. The analysis below assumes that the federal government would take the initiative in issuing indexed bonds. (2) Three scenarios are considered:

Scenario 1: Government of Canada indexed bonds are available in unlimited quantities, but only to eligible purchasers in respect of pension and retirement saving programs. (3)

- (2) A report prepared for the Economic Council by James Pesando argues that, for reasons of cost, private companies are unlikely to take the lead in offering indexed bonds.
- (3) While it may be that the federal government in this case could limit acquisition of its own indexed bonds to 'eligible purchasers' only, (i.e. to retirement income plans) other issuers of indexed bonds might not impose such restrictions.

Scenario 2: The volume of Government of Canada indexed bonds is limited, but there are no restrictions on who may purchase them.

Scenario 3: The volume of Government of Canada indexed bonds is limited and they are available only to eligible purchasers for pension-related purposes.

A fourth scenario, where Government of Canada indexed bonds would be available in unlimited quantities to all willing buyers, was examined, but discarded as being impractical. If the demand for, and the supply of, indexed federal bonds were open-ended, the federal government at some point would likely have to assume the role of a major financial intermediary, since the level of indexed bonds it would be expected to issue would, at times at least, be in excess of its own financing needs. (This is what happened in Brazil in 1974.)

Under Scenarios 2 and 3, where there is a limit on the quantity of federal indexed bonds issued, the question arises as to how the federal government would establish and allocate the available supply. One way of determining the total amount of new indexed bonds to be made available would be to limit it to a fraction of the total of net new cash requirements and rollovers of maturing bond issues, without any commitment to hold this ratio fixed over time. The total supply to be made available and its allocation might be determined simultaneously by offering new indexed bonds to prospective purchasers based on the historical pattern of their acquisition of assets. The latter would have the advantage of facilitating the forecasting by the government of the future demand for indexed bonds, and of helping to prevent sudden fluctuations in demand as economic conditions changed.

An alternative means of determining the distribution of a given volume of new indexed bonds, however arrived at, would be to allocate the total by auction based on bid prices. In any case, it might well be desirable to build into any allocation system a preference for small- and medium-size pension funds, while retaining the price mechanism as the basic determinant of who would get the bonds.

2. The Supply of and Demand for Indexed Bonds. To develop even a rough sense of what the demand might be for indexed bonds under each of these three scenarios necessarily involves considerable guesswork. A major uncertainty concerns the real interest return that should be established on an indexed bond. If the real return is significantly higher than many lenders believe they will likely be able to earn from conventional securities, after discounting the nominal rate of interest offered by the anticipated rate of future inflation, the resulting heavy demand for indexed bonds could have a disruptive effect on financial markets. In the reverse situation, however, the demand for indexed bonds may be minimal, with the result that they will fail to achieve their stated objective. (4)

(4) To the extent that a viable secondary market develops for indexed federal bonds, the chances of this happening would be reduced.

Other questions relate to the number of buyers who would be willing to pay something extra to obtain an indexed bond in a period of more than normal uncertainty about future inflation, and to the number of buyers (e.g. some small pension funds) who would be willing to do so at all times, regardless of inflationary circumstances. For instance, it is not inconceivable that some buyers who would not normally accept less than an anticipated 2% real return annually on ordinary money bonds might, in fact, accept, less than a 2% real return annually if that return were assured. Unfortunately, it is by no means clear how the certainty of real returns would be valued by various classes of buyers.

Thus, the demand for a given volume of indexed bonds at any point in time would be influenced heavily by the real rate of return that is guaranteed, and by the way that real rate compares to the anticipated real rate on money bonds in light of inflationary expectations. On the assumption that the real rate and the price would be appropriate to market circumstances, a very crude approximation of demand and supply can be developed.(5)

In Scenarios 1 and 3, eligible holders of indexed federal bonds are limited to institutions administering pension and retirement saving programs - namely, trustee pension funds, insurance companies with respect to their annuity and segregated fund operations, and all financial intermediaries with respect to RRSPs. The total asset base and the annual cash flow of these sectors of the financial markets was approximately \$39.5 billion and \$6.2 billion respectively in 1976. These numbers set the outer limit for the potential demand for indexed bonds in that year. In practice, however, total demand would have been a good deal smaller for the following reasons: a) pension fund managers would be unlikely to commit themselves unreservedly to such a new instrument; b) a continuing desire to achieve the perceived benefits of investment diversification; c) institutional inertia, as some investment managers would resist any wholesale move into indexed securities for reasons of their own survival (although in most cases they could be overruled by the plans' sponsors); and d) any widespread liquidation of non-indexed assets to purchase indexed bonds could cause an erosion in the market value of the former which would increase the cost of making such a switch to the point of being prohibitive.

(5) An attempt has been made in Annex A to quantify the potential demand for, and supply of, indexed bonds. In the absence of any price structure within which the supply and demand situation might evolve, its findings are, of course, tentative in the extreme.

The analysis in Annex A suggests that potential demand under Scenario 1 might be in the \$5 billion range annually for a period of several years, with great uncertainty as to whether the demand might subsequently drop, remain constant, or rise. The factors that bear on demand are so numerous, and so contradictory, that it is difficult to make any judgment as to what the outcome would be.

Under Scenario 3, although potential demand would be similar to Scenario 1, the limited supply under some allocation procedures could result in a lower real return as compared to Scenario 1 and, hence, serve to cut down the total effective demand. Under Scenario 2, assuming the same supply of indexed bonds as in Scenario 3, the real return required to place those bonds could be even lower than in Scenario 1, since potential demand would be greater at all price levels.

On the supply side, Scenario 1 guarantees that the supply will meet the demand at the real rate of return chosen. Scenarios 2 and 3 are based on a limited supply, and the inference is that there are other government objectives that must be considered, and that these necessarily constrain the potential supply. Some of these other objectives are discussed below. Here it is sufficient to note that the analysis in Annex A suggests that perhaps \$3 billion annually might be made available in indexed bonds by federal and provincial governments in the several years ahead if this approach were adopted. This would be about two-thirds of the estimated potential demand. On a longer term basis, however, the potential supply from governments would likely drop to half the potential demand, or less, as government cash requirements declined.

As noted previously, there would be nothing to prevent the federal government from limiting the sale of its indexed bonds to institutions financing indexed pensions. However, the federal government would not be able to impose the same constraints on other issuers. It would be up to the latter to decide for themselves if the sale of their indexed bonds would be limited in this, or any other, way.

What about sources of supply for indexed bonds other than the federal and provincial governments? Municipalities have a revenue base which is less elastic relative to inflation than the federal or provincial governments. Hence, they would likely feel less able to issue indexed bonds than the provinces. In any event, pension funds are at present a less significant source of financing for municipalities than for the provinces and, accordingly, municipalities may feel less compelled to offer indexed bonds to protect an established financing source.

It is also doubtful that, in the first instance at least, the corporate sector would be a major source of indexed bonds. For one thing, corporations that issue indexed bonds would face substantial uncertainties. For instance, even if initial debt servicing costs were lower for indexed bonds than for money bonds, the differential might not be considered sufficient to offset the apparently open-ended nature of the borrower's debt servicing liability during the life of the issue. Secondly, to the extent that indexed bonds would be a new and

untried instrument, they might well involve the borrower in additional marketing and advertising costs, which would further reduce the advantage in initial borrowing costs that indexed bonds might have over money bonds. Finally, assuming that indexed bonds would be geared to some general index, such as the Consumer Price Index (CPI), future debt servicing costs need not conform with the specific future cost and profit patterns of individual borrowers. Even if the proceeds of an indexed issue were invested in generally 'inflation-proof' assets such as real estate, the fact that the value of these assets might keep pace with inflation over the long haul would not eliminate corporate concern about its ability to meet current debt servicing costs during the short and medium term.

On the other hand, it should be noted that some corporations are already accepting what is clearly equivalent to the servicing costs of 'indexed debt'. Some large corporations, for example, depend on 'short-term commercial paper' as a source of financing. Others use revolving lines of bank credit. Still others in recent years have obtained term financing from banks on a 'prime rate plus' basis. In each of these instances, future debt servicing costs will fluctuate with the interest rate structure and will not be predictable with precision. To the extent that indexed bonds would replace such financing, corporate exposure to risk from unforeseen future debt service cost fluctuations would not be much different than it would be under existing circumstances. Still, a long-term indexed bond issue would commit the corporate borrower to more unpredictable debt servicing costs over longer periods of time.

Furthermore, the degree of acceptance by corporations of indexed bonds as a financing instrument is likely to vary from one corporation to another. To the extent that corporations could readily 'layoff' the risk of future debt service cost fluctuations onto someone else, their attitude towards indexed bonds would likely be less negative. Monopolies, or near monopolies - whose market power enabled them to pass on to their customers cost increases, including debt servicing costs - might have fewer reservations about indexed bonds than companies in more competitive environments. To the extent that firms in regulated industries could incorporate anticipated increases in future debt servicing costs into their expenditure base for the purpose of justifying rate increases, they might also be relatively less concerned about the fluctuating debt service cost aspects of indexed bonds. Finally, financial intermediaries which could match indexed liabilities with indexed assets could, all other things being equal, be expected to be in a favourable position to issue indexed bonds. (6)

- (6) In the final analysis, and in the context of the feasibility of indexing pensions, it may well be that the same considerations of market power and financial strength that would enable a corporation to consider issuing indexed bonds are also pre-requisites for the feasibility of the indexing of the corporate pension plan. That is, corporations that already offer a substantial measure of pension indexing would also be those most likely to issue indexed bonds.

In summary, because federal and provincial governments would appear unlikely to meet the initial demand for indexed bonds, and corporations would probably not be in the field at first, it appears almost inevitable that the supply of indexed federal and provincial bonds would need to be subject - at least at the outset - to some form of restraint, with the result that there would be some, perhaps substantial, unsatisfied demand. (7) These conclusions, it bears repeating, are based on very rough estimates only. Furthermore, governments might find themselves in future unable to issue as many indexed bonds as may be practical simply because of limits on their cash requirements. And while some corporations might have begun by then to issue such bonds, demand may also have risen. Therefore, with the passage of time, the allocation problem may remain difficult. There are, however, too many variables at this stage to speak with any certainty.

**3. The General Economic Impact.** Indexed bonds may have an effect on the efficiency and stability of the economic system because they eliminate the transfers of real wealth between borrowers and lenders that occur with money bonds when the actual inflation rate differs from the anticipated rate. There is no consensus as to the nature or likely importance of these effects. Some advocate the use of indexed bonds as having potentially beneficial 'effects on the functioning of the economy; others see substantial dangers to the economy from the use of indexed financial instruments.

This section provides a brief discussion of the effects that the existence of indexed bonds might have on saving, investment, economic stability, and investor psychology. Unfortunately, key links in the analysis are subject to considerable uncertainty. One uncertainty concerns the role that indexed assets would come to play in financial markets and, in particular, the extent to which they would be issued by borrowers other than the federal government. The financial market might adjust readily to a limited issue of indexed federal bonds (and to offsetting reductions in the issue of other types of securities

(7) Even with unsatisfied demand, there is a risk with Scenarios 1 or 3 that the issue price of indexed bonds would be below the price that would prevail if there were no restrictions on buyers. If the price paid by pension funds were lower than it would be in the absence of restrictions, this would imply a subsidy to them. This could occur if market expectations about inflation exceeded the government's inflationary expectations. In that case, the market would bid up the price of the indexed bond, thus implying that the real interest coupon on the indexed bond was higher than it need have been.

by the federal government) through some switching in financial flows. If this were to occur, the use of indexed assets in the capital markets might remain modest. This is most likely in Scenario 3 and, under these circumstances, any general economic effect would be quite limited. Alternatively, if the federal government were to issue substantial quantities of indexed bonds and not restrict their holding (Scenario 2), or if it were to issue unlimited quantities to pension funds and life insurance companies in respect of their pension and annuity liabilities (Scenario 1), there might well be a general shift to indexed securities which could have a significant economic impact.

a) Effect on Savings. The availability of indexed bonds would offer savers increased certainty as to the real rate of return they would be able to obtain on their savings over specific periods of time. While this might be counted as a benefit in itself, it is by no means clear what effect it would have on the total level of savings. For some people it might make saving more attractive; others might feel they would need to save less, since they would no longer have to protect themselves against the contingency of a major reduction in their real wealth due to unanticipated inflation at some point in the future. It is also unclear whether the availability of indexed bonds would result in savers expecting higher or lower real returns. It would not be unreasonable to expect that, because of the removal of the inflation risk, somewhat lower real rates of return on indexed bonds would be acceptable to many lenders than the real return that they might in practice be able to earn on securities denominated in money terms. However, this could not be taken for granted.

If unanticipated inflation did occur, the existence of indexed assets would mean that wealth would not be redistributed from the personal sector (net asset holders) to net debtors (the corporate sector and governments), which is what occurs when only money bonds are available. Again, however, there is no very strong 'presumption as to the direction of the net effect on savings of such a redistribution of wealth. (8) One might conclude, therefore, that whatever the direction of the effect, indexation is unlikely to cause a major change in net savings in the economy.

(8) Widespread adoption of indexed principal financial instruments, however, would cause a significant change in the appearance of the composition of savings as depicted in the National Accounts. Basically, the 'inflation component' of nominal interest, which is now recorded in different parts of the ledger as part of personal (interest) income, part of government expenditure, part of business expenses, and - to the extent it is reinvested - as part of personal savings, would be eliminated.

But the effect of indexation on the composition of savings appears to be more predictable and perhaps more significant. The availability of indexed bonds could be expected to reduce the relative attractiveness of assets such as consumer durables, *objets d'art*, inventories and real estate which have acquired a growing appeal in recent years as hedges against inflation. As a result, everything else being equal, the availability of indexed bonds would mean that a greater proportion of savings would be available for investment in financial assets; in particular, one would expect a greater willingness to channel savings into long-term debt instruments.

b) Effect on Investment. Indexed bonds could have some favourable and some unfavourable effects on the allocation of investment. On the favourable side, the issuance of indexed bonds by corporations, if it were to come about, would likely reduce two tendencies towards distortion in the allocation of business investment which otherwise exist when either the inflationary outlook is uncertain and/or when a high continuing rate of inflation and high nominal interest rates prevail. Firstly, in the absence of indexed instruments, expectations about inflation forecasts might be expected to have a significant influence on a firm's willingness to invest, particularly in longer-term projects, when a substantial part of the investment must be financed through borrowing. Everything else being equal, the higher the rate of inflation a firm expects, the more likely it is to judge a project to be profitable when financed through issuing debt at a given nominal interest rate. There is little reason to expect different firms' expectations about future rates of inflation to be correlated with the inherent real returns on their investment projects. Thus, in the absence of indexation, diverse expectations about future rates of inflation will introduce an extraneous factor (individual firms' expectations about inflation) into the allocation of investment. The use of indexed bonds as a financing medium by corporations would tend to reduce this extraneous factor. In particular, the possibility of borrowing via indexed bonds might encourage investment on the part of those with low inflationary expectations, i.e. those who look upon current interest rates as incorporating a high real interest cost.

Indexed bonds might also alter the effect of inflation on the allocation of investment in a second way. In the absence of indexed bonds, the combination of a shift to higher levels of inflation and higher levels of nominal interest rates changes the time pattern of real debt service payments on a bond or mortgage. With inflation, real debt service payments in respect of repayment obligations with a fixed money interest rate are relatively high early in the life of the debt, and decline towards the end of the repayment period as the principal sum is amortized. The longer the life of the asset and the higher the rate of inflation, the stronger this effect will be. This basic point may be illustrated further with reference to a conventional mortgage where the debt service payments - interest plus principal amortization - are constant in current dollars over the life of the mortgage. Obviously, with inflation, a constant stream of payments in current dollars will have a value in real terms which declines (and the more rapidly so the higher the rate of inflation). If two payments streams under different

rates of inflation are to have the same present values - as is the case if nominal interest rates adjust fully for inflation - the one that declines faster in real terms (the higher inflation case) must start at higher levels in real (and nominal) terms and end at a lower level in real terms. Also, since a longer, maturity implies a greater decline from start to finish in the value of the real payments stream for any given rate of inflation, the longer the maturity, the larger will be the initial shift up (and the larger the shift down at maturity).

Without indexed bonds, the 'tilting effect' of this time profile of real debt services charges(9) means that a shift to higher levels of inflation will result in more severe initial cash flow problems for long-lived investment projects than for shorter-lived projects.

Some relative discouragement of long-lived projects under the existing system might thus be expected. In other words, firms, confronted with the choice of two projects having the same expected real rate of return over their lifetimes, will choose the shorter-lived project in order to avoid the higher risks associated with the longer-lived project during the initial period of reduced relative cash flow. An indexed loan, however, would have a constant debt service stream in real terms.

It can thus be argued that if the corporate sector were to follow the government's example in selling indexed bonds, the use of the indexed bonds by corporate borrowers would tend to avoid two potentially distorting effects on the allocation of corporate investment which otherwise tend to occur under inflationary conditions. But it is not possible to determine the quantitative significance of these distortions.

On the other hand, the introduction of indexed bonds (by the federal government) could also have some adverse effects on private borrowers and private investment.. If some borrowers were to issue indexed bonds, it might well become more difficult for others to raise funds on an unindexed basis. If that were to be the case, this might have the effect of raising interest rates on unindexed debt and discouraging private investment. However, this need not be the case. If governments only substituted indexed debt for some of the non-indexed debt they would otherwise have issued, there need not necessarily be any effect on the nominal interest rate which those wishing to borrow on an unindexed basis would need to pay. But even in this case, as the great majority of private borrowers would be reluctant to issue debt on an indexed basis, many private borrowers would believe themselves to be at a disadvantage in raising funds in the market relative to governments. The psychological effect alone might discourage these private borrowers from undertaking investment.

(9) While the tilting effect is fully eliminated in the case of indexed principal bonds, since both interest payments and the redemption value are constant in real terms, it is less adequately dealt with in the case of principal compensation bonds. In the case of the latter, the bonds' current value will decline in real terms in an inflationary environment and, hence, the debt servicing schedule still contains a front-end load element.

Mortgage borrowers might be thought to be among those placed at a disadvantage if indexed debt became available from governments. But because of the generally long amortization periods associated with mortgages, mortgage borrowers are particularly vulnerable to the tilting of real payment streams under inflationary conditions already discussed. As a result, the indexation of mortgages could provide benefits to mortgage borrowers by reducing the initial real debt servicing cost burden.

c) Effect on Expectations and Other Economic Effects. Extension of indexing to federal government bonds might be taken as a further indication that the government viewed the problem of inflation as insoluble. The Organization for Economic Cooperation and Development (OECD) put the traditional case against indexed government bonds on expectational grounds most strongly in a 1973 report entitled Indexation of Fixed Interest Securities. It stated that "a concern of governments must be to guard against the risks that recourse to indexation would be interpreted by public opinion as a sign that the authorities were less firm in their determination to bring inflation under control and that a widespread adoption of indexing would fuel inflation expectations". In recent years, however, the high rates of inflation experienced have increased somewhat the importance of the equity objectives achieved through indexing relative to the concerns that exist about its expectational impact. A group of independent experts chaired by Paul McCracken presented a report to the OECD in 1977 in which they commented rather favourably on the indexation of financial assets, even though they continued to express reservations about the desirability of wage indexation and escalators in price contracts.

Indexing financial instruments would also have certain broad economic effects which parallel those resulting from the indexation of taxes, social security payments or wages. It would tend to reduce one source of 'automatic stabilization' in the economy to variations in demand-related inflation. For instance, at present, an increase in inflation causes a decline in real wealth and, thus, presumably a decline in real consumer spending. This reduction in real demand will tend to brake the increase in inflation, if it has its origins in excess demand. To the extent that a growing portion of total wealth would be held in the form of indexed bonds, the real value of which would not be affected by inflation, this stabilizing wealth effect on consumer spending would tend to diminish.

To the extent that business relied on indexed debt instruments for financing, and to the extent that it was able to raise prices as costs rose, any increase in the rate of inflation would raise the debt servicing component of total operating costs and, thus, put further upward pressure on prices. Indexing could then become a potential source of cost-push inflationary pressure. This would be particularly troublesome when the inflation triggering the indexing resulted from a depreciation of the currency necessary to restore equilibrium in the current account of the balance of payments, as has been the situation in Canada in recent years. In that case, indexing would temper the ensuing change in relative prices and impede the process of adjustment. In 1967, following the devaluation of the markka, the Finnish government eliminated much of the indexing in its economy for that very reason.

On the other hand, by reducing the shifts in the distribution of wealth and income between borrowers and lenders which result from unexpected inflation, and by reducing any changes in the composition of demand which these income shifts entail, the indexing of financial instruments might well reduce one possible source of disturbance in the economy. Under the existing system, a demand management policy that is successful in reducing inflation tends to leave some borrowers stranded with previous high nominal interest rate commitments, which may create financial difficulties for those borrowers. The use of indexed bonds could lessen the financial difficulties corporate borrowers might encounter during the transition from high to low rates of inflation and thereby facilitate the implementation and acceptance of anti-inflationary monetary and fiscal policies.

In summary, from the point of view of its effects on economic stability, there is a great deal of uncertainty as to the direction of the effect of indexation. It might impede adjustment if the economy experienced a shock to prices that was not created by excessive demand but by other causes such as a sharp increase in the cost of imported oil. At the same time, however, it might facilitate adjustment to lower rates of inflation achieved through conventional demand management methods. As was the case with savings and investment, the impact of indexing on economic stability would likely be least significant under Scenario 3.

**4. The Implications for Financial Markets.** A key to the implications for the financial markets of the issuance of the Government of Canada indexed bonds relates to the effect they might have in inducing other borrowers to follow suit. The experience of other countries has shown that the introduction of indexed securities by a leading borrower does have some effect on other borrowers' willingness to market indexed securities.

The impact of the issuance of indexed federal bonds on the financial system can be analyzed in terms of their effect on lenders and borrowers and would depend, to a large extent, on the proportion of overall demand for this type of security. If demand were large, exceeding that required for retirement income funding purposes, many debt issuers might eventually feel obliged to resort to this type of financing. This would likely lead to a greater variety of indexed investment instruments being developed so as to enable borrowers to remain competitive and the needs of lenders to be met.

The relative attractiveness of indexed securities depends not only on the market's forecast with respect to inflation and real interest rates, but also on the degree of confidence the market has in this outlook. The choice the market faces is whether there is greater risk in its outlook on real interest rates or its outlook on inflation; another uncertainty relates to the volatility of possible changes in these outlooks. When the market has little confidence in its inflationary outlook, changes in which can be quite volatile, it would prefer an indexed bond to minimize the risk related to this uncertainty. Consequently, the case can be made that, for reasons of risk minimization, there will

always be some demand for indexed bonds. This demand would exist even in the absence of expectations of high and rising inflation rates and would be a function of the degree of uncertainty borrowers attached to their anticipated rate of inflation and to the volatility of that rate vis-à-vis anticipated real interest rates.

On the assumption that there would likely be a substantial demand for indexed bonds, a key determinant of the impact on financial markets of the introduction of indexed bonds is obviously the extent to which they might be issued by borrowers other than the federal government. As noted earlier, however, it is uncertain what the reaction of other borrowers might be. The issuance of indexed bonds by the federal government could result in pension funds seeking to purchase more indexed federal bonds and fewer bonds of other borrowers. While such switching of financial flows could put pressure on other borrowers to compete through indexation of their own securities, this need not be the case, provided the government did not increase the overall demands on the market beyond that which would otherwise exist. In the former case, the increased purchase of indexed federal bonds by pension funds would mean that fewer federal bonds would need to be sold elsewhere. This, in turn, would leave funds available from lenders for those borrowers who had previously depended heavily on financing from pension funds. It is, thus, conceivable that the financial market adjustment to the issuance of indexed federal bonds could be limited to some switching in financial flows, without any overwhelming pressure for more widespread indexation of bonds by other issuers. On the other hand, the federal example with respect to the indexing of its bonds could induce a general shift towards indexation, in which case there would likely be less switching of capital flows. The indexation of securities would tend to spread, however, if borrowers who previously had depended heavily on pension funds as a major source of long-term financing found that it was necessary to issue indexed bonds of their own in order to attract the funds they required from other sources or, indeed, to compete for a share of funds from retirement savings.

Under Scenario I (unlimited quantities of indexed federal bonds for eligible purchasers), the indexing of bonds would be most likely to spread to other issuers either because the latter sought to, protect their traditional financing sources or because they found that an indexed bond feature was essential to the development of alternate sources of long-term financing. Under Scenario 2 (limited quantities of indexed federal bonds to all comers), the risk of the spread of indexation might be somewhat lower in the first instance because there might not be the same pressure on borrowers to protect traditional funding sources. On the other hand - depending on investors' experience with indexed bonds - there might eventually develop greater pressure for more, and more widespread, indexing of all bonds. Under Scenario 3 (limited quantities of indexed federal bonds to be available only to eligible purchasers), the risk of the spread of indexing is likely to be smallest and might well be a function of the extent of the limit on the supply of indexed federal bonds: the fewer issued, the less likely indexing would be to spread.

## 5. The Impact on Government Operations.

a) Effect on the Conduct of Monetary Policy. The introduction of indexed bonds would influence the structure of the bond market - that is, the types and amounts of securities available - and the nature of those who issued and purchased securities. The extent to which the market structure changed would have considerable implications for the conduct of monetary policy because of the importance of open market operations (the buying and selling of federal securities) by the Bank of Canada as a means of implementing monetary policy. The success with which open market operations is conducted depends heavily on the nature of that capital market.

From this perspective stems one argument against the unrestricted Scenario 1. This is the need to retain flexibility in the type of instrument available for trading in the market. The implementation of an effective monetary policy could be hampered if ownership of federal securities were unduly concentrated, particularly if it were concentrated in less actively traded accounts. If indexed federal government bonds were freely available to the pension system and if the private sector did not issue indexed securities on a significant scale, a substantial volume of pension funds might switch into federal government debt. Over time, pension funds could end up holding a large proportion of federal debt outstanding. In that case, the breadth and depth required in the market to absorb large transactions in federal bonds without causing excessive fluctuations in interest rates might be reduced. In this context, Scenarios 2 and 3, with their implied restraints on the supply of indexed bonds, would be easier from the point of view of the implementation of monetary policy.

The Bank of Canada normally purchases some portion of new government debt issues for purposes of managing the money supply. If pension funds were allowed to acquire any amount of indexed federal debt they wished, they might not only force the federal government into the role of a financial intermediary in years when pension funds' demand for such debt was in excess of the amount needed to finance government operations, but they could also interfere with the central bank's management of the money supply.

On the other hand, there are some observers who feel that the effectiveness of monetary policy might be enhanced by the existence of parallel markets for both indexed and non-indexed bonds. In their view, the monetary authorities, by operating in both segments of the market simultaneously, would be able to influence real interest rates as well as nominal interest rates, and would be able to provide clearer

signals to market participants. (10) Under Scenario 3, however, there would likely be a very thin market for indexed bonds, and very little trading; the potential for using indexed bonds as a monetary policy tool, as outlined here, would then be very small.

In summary, it is difficult to be precise about the impact of the introduction of indexed bonds on the effectiveness of open market operations, and hence on monetary policy, as it has traditionally been implemented. It can be assumed, however, that except under Scenario 2, difficulties might arise for implementing monetary policy because of a likely reduction of the depth and diversity of the market for government securities. Parallel markets for indexed and non-indexed bonds, however, would not in themselves inhibit the government from implementing effective policy. They might even be helpful.

b) Effect on Public Debt Charges. Two sorts of questions may be raised about the implications of indexed bonds for the cost of public debt charges to the government:

- a) how might one expect the interest costs of such bonds to compare, on average, with those of conventional bonds? and
- b) what are the risks of significant budgetary problems if the actual costs turn out very differently from expected costs (because inflation turns out differently from expectations at 'the time the bonds were issued')?

With regard to the cost of borrowing through indexed bonds, a theoretical case can be made that the expected cost to the government should be lower for indexed than money bonds. This assumes that bond buyers would be willing to accept a lower real rate of interest than the real rate which they expect on a money bond, in return for the elimination of the 'inflation risk'. Of course, if both investors and governments under-estimated future rates of inflation, as they appear to have done fairly consistently during the last two decades, the cost to

(10) For instance, in a market confined to the trading of money bonds, an increase in interest rates resulting from open market sales might be misinterpreted as reflecting an increase in inflationary expectations. Hence, it could fail to curtail the rate of growth in spending. In contrast, an increase in the real cost of borrowing caused by open market sales of indexed bonds would be less likely to be misinterpreted and more likely to reduce all types of spending, including investment. Furthermore, a sale of indexed bonds would tend to compress the yield differential between money and indexed bonds, would lower one possible indicator of inflationary expectations and could possibly have a psychological impact on inflationary expectations. Alternatively, the money authorities could attempt to reduce this differential, and lower inflationary expectations, by selling indexed bonds and buying money bonds, leaving the overall stance of monetary policy unchanged.

the government of using indexed bonds would be higher than the cost of using money bonds (since the actual cost of the money bond in real terms would turn out to be lower than the real rate interest coupon on the indexed bonds likely would have been). The reverse could also occur; if the government had greater confidence than the public in its ability to reduce the rate of inflation over time, the use of indexed bonds would appear very attractive from an expected cost point of view. Annex B seeks to quantify the magnitude of the possible cost fluctuations and to measure the risks involved.

On balance, however, it could well be wrong to assume that the use of indexed bonds would lead to significant savings to the government on average public debt charges over any extended period of time. For such an assumption to be realized, a high degree of success in forecasting inflation would be required, and the experience of recent years raises questions about such an outcome. Use of indexed bonds would also increase the margin of uncertainty surrounding short-run forecasts of the dollar value of public debt payments, though this margin would still be relatively small in the case of the 'indexed principal' form of indexed bonds

(where the compensation for the loss of real value is delayed until maturity, i.e. until some point well into the future). (11) In general, the use of indexed principal bonds could be expected to increase the stability of public debt payments marginally in terms of Gross National Product (GNP), whereas if the principal compensation form of bond were used, stability in terms of GNP would decrease. Thus, if the government wished to maintain a relatively stable ratio of public debt charges to GNP, use of indexed principal bonds would be preferable to principal compensation bonds.

c) Implications for Tax Policy. Before considering: the implications for tax policy, some clear limits must be placed on this aspect of the issue of indexed bonds.

Firstly, there are direct implications for tax policy only if taxable entities are involved. Since neither registered pension funds nor the government are taxable, any system of bond indexing involving only these institutions is not directly relevant for tax policy. This means that the following discussion is largely limited to Scenario 2, where some of the indexed bonds are held outside pension funds, and to circumstances where taxable corporations issue indexed instruments.

Secondly, even under Scenario 2, there are direct implications for tax policy only if special tax treatment is accorded to the inflation component of interest payments on the indexed bonds. Under Scenario 2, the government issues specific quantities of indexed bonds to the public at large. At present, with unindexed bonds, bond holders are not indifferent to the existence of inflation. Inflation increases nominal

(11) This is the case on a cash basis only.

rates of interest, but with progressive taxation, increases taxes proportionately more. The interaction of inflation and taxation has the effect of reducing the real income that bond holders would have earned from their investment in a non-inflationary environment, since tax is also paid on the inflationary portion of interest.

Under a system of indexed bonds, taxation of the inflationary element of the investment return would be highly visible and would likely generate criticism. But the exemption from taxation of the explicitly inflationary component of interest payments on indexed bonds would also generate demands to exempt the implicitly inflationary component of interest payments on non-indexed bonds. In turn, this would raise wider questions about the way the entire income tax system handles inflation. Until such time as the structure of the tax system can be altered in a fundamental way to handle inflationary situations more fairly, tax policy considerations may be viewed as a substantial argument against Scenario/2.

There is one further fact to consider. If indexed federal bonds were sold under Scenario 2 and a special exemption provided for the inflationary component of the interest income, that exemption would make the bonds of greater value to taxable entities than to non-taxable entities. In that case, pension funds might have trouble acquiring them in competition with other taxable investors. In any case, with taxable entities bidding for them, real returns might decline, making them of less interest to pension funds.

6. Other Countries' Experience with Indexed Bonds. Indexation of financial assets has been tried at one time or another in a number of countries, including Finland, Israel, Sweden, Norway, France, Austria, Ireland, the United Kingdom, Brazil and Argentina. However, in only a few countries did the volume of indexed bonds outstanding at any one time ever reach a high proportion of the total volume of securities outstanding.

In Finland, the indexing of long-term bonds was initiated immediately after World War II to avoid criticism from those who were being paid off in bonds for war-induced damage and losses. The index used was linked to wholesale prices. Initially, indexed bonds were issued only by the government, but over time financial institutions also became major issuers. Gradually indexing also spread to pensions and life insurance policies. During the late 1960s, indexing was abolished for everything but pensions and life insurance policies following an exchange crisis and currency devaluation. The government feared that the rapidly rising import prices would create an inflationary spiral via the various index linkages which would offset the benefits intended by the currency devaluation.

In Israel, the concept of indexed bonds was introduced in 1948 (using an exchange rate index) and was applied to government bonds in 1957. Since 1957, indexation has spread to many other economic and financial activities and transactions.

During the 1950s, when high rates of inflation prevailed in France, indexed instruments were popular and both public and private sector borrowers used them so extensively that up to one-half of the total new bond volume was of an indexed nature. The indexing bases used varied widely and related to prices, productivity, gold, and stock exchange prices, to mention only a few. Early in the Fifth Republic (1958), indexation was outlawed.

In Brazil, indexation was introduced in 1964 amidst conditions of runaway inflation. Ten years later, in 1974, government issuance of indexed bonds had to be temporarily suspended as accelerating inflation induced a wholesale shift towards indexed government bonds which threatened to dislocate the entire financial system. The index used in Brazil can be, and has been, altered from time to time so as to produce 'appropriate' results. Outside the government bond sector, indexing is of significance only in the area of housing finance.

The experience of other countries with respect to the indexing of bonds may not be directly applicable to Canada. Most other countries which have used indexed securities have a greater measure of government control over interest rates and the allocation of credit than does Canada. Their experience may, therefore, be of limited relevance to the relatively unrestricted, sophisticated and competitive North American financial markets.

Nevertheless, foreign experience suggests that:

- indexing can be, and has been, tied to many bases;
- parallel markets for indexed and non-indexed securities can exist side by side;
- the possibility of a proliferation of indexation does exist. In Finland and Israel, indexing spread to bonds issued by almost every type of borrower, to bank deposits and bank loans, to pension and insurance benefits, and to many other types of financial assets as well as to wages and salaries;
- indexing of financial instruments is not a panacea. An indexed system can produce undesirable feedbacks, particularly in countries which have a relatively open economy, where export prices can get out of line through the interaction of internal index-linkages; and
- on balance, the failure of indexed bonds to spread, or to maintain themselves where they were introduced, may well be indicative of their limitations as a policy instrument.

### C. Summary and Conclusions

#### 1. Summary.

- a) Unanticipated inflation has a strong adverse impact on the financing arrangements underlying defined benefit pension plans, even in their present largely non-indexed form, because of its disparate impact on

pension fund assets and liabilities. The introduction of indexed bonds has been suggested in some quarters as a means of helping to ensure that the current return on pension fund assets would more adequately reflect the current inflationary experience.

b) The funding of retirement income constitutes a major source of new private financing in Canada's financial markets. By the end of 1976, total assets accumulated in this manner amounted to \$39.5 billion, i.e. 12% of the total financial assets in Canada, while the \$6.2 billion annual cash flow amounted to 20% of the total flow of savings in that same year.

c) A federal initiative to issue indexed federal bonds might well be required as a *quid pro quo* if private employers were to be persuaded to index their pension plans, or if, in conjunction with the provinces, indexed pension plans were to be legislated.

d) Three separate scenarios were identified involving the volume of indexed bonds issued by the federal government and the restrictions placed on the identity of the holders of such bonds. It appeared that the broad effect of the introduction of indexed bonds would be quite different under each approach, although with a considerable degree of uncertainty as to detailed effects.

e) A great deal of uncertainty surrounds any analysis of the economic impact of the introduction of indexed bonds. The effect on total savings would likely be fairly insignificant. The introduction of indexed bonds could have some impact on the ability of the economy to adapt to changing circumstances (i.e. on its built-in stabilizing capability). It could add to cost-push inflation by making possible a more rapid transmittal of price increases through the economy. It could also increase demand-pull types of inflation because indexed bonds would eliminate the transfers of wealth from lenders to borrowers which currently tend to reduce the purchasing power of savers in an inflationary environment. If corporations were to issue indexed bonds, the potential exists for some favourable effects on the allocation of corporate investment. On the other hand, if corporations did not issue indexed bonds, they might become less competitive in the long-term bond market, in which case the future growth of the economy could be impaired.

f) The effect of the introduction of indexed bonds on Canadian capital markets is also far from certain. In other countries where indexed bonds have been experimented with, they appear to have failed, by and large, to achieve a permanent place in the overall capital market structure.

g) The effect on government operations is only marginally clearer than the effect on the economy. The impact on government debt servicing costs would likely be small. While in theory it should be cheaper to borrow through indexed bonds because of the removal of the inflationary risk premium which is now part of the overall returns required by lenders, in practice the opposite might well be true if future inflation continued

to be under-estimated. The effect on the market for government securities, and hence on the implementation of monetary policy, under Scenarios 1 and 3, would not be favourable, while Scenario 2 raises problems of tax policy.

h) The current demand for indexed bonds by retirement income funds alone could be in the range of \$5 billion annually during an initial five-year period. The main source of indexed bonds would almost inevitably have to be the federal and provincial governments, which might be able to divert, within their current borrowing programs, as much as \$3 billion to indexed bonds, an amount that could be easily absorbed by the market with appropriate pricing. The several years ahead are perhaps an ideal time to introduce indexed bonds because the cash requirements of the federal government appear likely to be abnormally high by historical standards.

i) Finally, it must be noted that although the overall analysis suggests that from a broad economic and financial perspective indexed bonds might have as many advantages as disadvantages, the analysis is very tentative. There appears to be a good deal of scope for things to go wrong, the risk of which needs to be balanced against the various alternatives facing the government relating to retirement income policy.

## 2. Conclusions.

a) Indexed federal bonds by themselves should not be expected to make possible the indexing of the private pension system; the amount of bonds that would likely be required would be too large for the federal government alone or in conjunction with the provinces, to supply. They could, however, perhaps be of some use in any package of measures designed to enhance the feasibility of indexed private pension plans.

b) Of the three possible scenarios identified, Scenario 1, which assumes that unlimited amounts of indexed federal bonds would be issued to all those who wanted them for retirement income funding purposes, would be best suited to the needs of pension funds. However, it might require the federal government to act as a major financial intermediary; it might also interfere with the conduct of monetary policy by narrowing the market for Government of Canada securities. Because of this, and because of its likely unsettling effect on the Canadian capital markets, it would have to be rejected.

c) Scenario 2, which limits the volume of indexed federal bonds to be issued, but places no restrictions on who might hold them, would be less effective in helping pension funds to index. Pension funds would face competition for the acquisition of a smaller volume of indexed bonds than under Scenario 1, particularly if the tax system were changed to provide more equitable treatment for purely inflationary returns. Therefore, Scenario 2 is not likely to be effective.

d) Scenario 3, which limits both the supply of indexed federal bonds and the right to hold indexed federal bonds, would be more useful to pension funds than Scenario 2. Any meaningful restriction on the supply, however, might drive up the price of indexed bonds and reduce their real returns. Such a scenario would thus have some value - but only limited value - in helping to persuade the private sector to accept an indexed pension system.

e) If other bond issuers were involved in the issuance of indexed bonds, there would be some advantages. The issuers would share the burden of risk of greater than expected interest payments. Any increase in the supply and the diversity of indexed bonds available might help to better meet the needs of pension funds. On the other hand, a loss of control by the federal government as to who might hold indexed bonds, would likely cause holdings to spread beyond the pension funds, and thus would bring the difficulties associated with taxation front and centre.

Unfortunately, if only for technical reasons, these tax difficulties are not easily solved. There would still be no assurance that the total supply of indexed bonds would be anywhere close to what pension funds might need, unless the federal government were prepared to accept, regardless of its own financing requirements, a role as the supplier of last resort of indexed securities.

f) Therefore, since under any of the three scenarios identified the advantages of issuing indexed federal bonds appear to be offset by the disadvantages of doing so, it is doubtful that a federal initiative to issue indexed bonds could by itself be expected to solve the indexed pension issue.

## ANNEX A

### THE SUPPLY OF, AND DEMAND FOR, INDEXED BONDS

#### A. The Demand for Indexed Bonds

In Scenario 1 eligible holders of indexed federal bonds are limited to institutions administering pension and retirement saving programs, namely trustee pension funds, insurance companies with respect to their annuities' and segregated funds' operations, and all financial intermediaries with respect to Registered Retirement Savings Plans (RRSPs). The total asset base and current cash flow involved in these activities in 1976 was \$39.5 billion and \$6.2 billion respectively.

To quantify what proportion of these outstanding holdings might be converted into indexed bonds, and how much of this annual cash flow might be invested in indexed bonds, the pension fund sector was divided, somewhat arbitrarily into three separate components, each of which might react differently to the availability of indexed bonds. Firstly, there are the small pension funds (with assets of less than \$1 million). Secondly, there is a group of public sector funded plans comprising federal and provincial Crown corporations, boards and commissioners, civil services of five provinces, and municipalities and municipal agencies (but excluding teachers' federations, educational institutions and health organizations). This group is already exposed to an indexing risk and generally more restricted in its investment powers than the 'average' funded plan. Finally, there is the residual of all other plans.

Small funds generally have had a poor investment performance. During the last decade during, they tended to be heavily committed to mutual funds and pooled funds typically operated by large institutions. Investment managers do not actively seek these accounts because the potential remuneration is not commensurate with the work involved. Therefore, small funds are left with the choice of continuing to invest through trust and insurance companies or to administer their own arrangements (via a trustee). With the availability of indexed bonds, one might expect that most, if not all, existing assets and new cash flows of small funds would be channelled into those instruments.

In recent years there has been a tendency among pension funds to move into quasi-indexed assets, e.g. liquid instruments and mortgages. This appears to reflect in large part the realization that the rates of return on these short- and medium-term assets are more elastic vis-à-vis inflation than the rates on other investment instruments. To the extent that liquid assets were used as quasi-indexed instruments, much of the future demand for indexed bonds among all other pension funds might well, therefore, arise from a reduction in such assets. Since, however,

public sector funds did not follow the general trend towards a historically high ratio of liquid assets, relatively less demand for indexed securities could be expected from the substitution by public sector funds of indexed securities for liquid assets.

Among all other funds, the ratio of liquid to total assets reached a peak in the 10% range by the end of 1974, a much higher ratio than that of previous years. This also suggests the existence of a significant demand for indexed bonds. In addition, the magnitude of their bond holdings is such as to warrant the expectation that some displacement by indexed bonds would take place.

The potential demand among trustee pension funds for indexed bonds, disregarding the effect of the actual real rate at which these bonds might be offered, might therefore conceivably evolve as follows. Note that the numbers that follow, while they have some element of logic in them, are by no means projections. They are simply assumptions. They are intended only to provide an initial 'ballpark' estimate of the demand for indexed bonds.

Trusteed Pension Funds	Asset Basis	Flow Cash Basis
	\$ billions	\$millions
1. Small Funds		
60% of assets (including liquid assets, pooled funds and bonds)	0.3	
100% of cash flow		67/p.a.
2. Public Sector Funds Excluding , Health and Education		
nil of liquid assets or pooled funds		
40% of bond portfolio	1.9	
50% of cash flow		660/p.a.
3. All Other Funds		
50% of liquid assets	0.6	
60% of pooled funds	0.8	
40% of bond portfolio	2.8	
50% of cash flow		940/p.a.
Total		1,857/p.a.

With regard to the annuities aspects of the insurance business, over half the assets involved were already invested in quasi-indexed instruments (mortgages and liquid assets) with almost the entire balance being held in the form of fixed income securities. This would appear to suggest that the annuities business might possibly constitute a substantial source of demand for indexed bonds from liquid asset replacement:

Insurance Cos.-Annuities	Asset Basis \$ billions	Cash Flow Basis \$ millions
Excludes amounts covered under trustee plans and RRSPs		
40% of bond portfolio	0.7	
50% of liquid assets	0.2	
100% of cash flow		<u>400/p.a.</u>
Total	0.9	400/p.a.

In the segregated funds' operations, the insurance companies displayed quite a different strategy; while bonds, mortgages and liquid assets account for a relatively insignificant share, over half the assets of segregated funds were held in the form of equities. The resulting demand for indexed bonds might be as follows:

Insurance Cos.-Segregated Funds (excludes amounts covered under trustee plans and RRSPs)	Asset Basis \$ billions	Cash Flow Basis \$ millions
25% of bond portfolio	0.1	
50% of liquid assets	0.1	
25% of cash flow		105/p.a.
Total	0.2	105/p.a.

Finally, one of the remarkable features of RRSPs is their very high proportion of liquid assets, presumably including a large number of Guaranteed Income Certificates (GICs) of the trust companies which administer many RRSPs. Since it is unlikely that the trust companies would willingly surrender funds already held in this form, and since most of these assets are in the form of fixed-term deposits, the likely proportion of these assets to be converted into indexed bonds in the first instance might not be very great:

RRSPs	Asset Basis \$ billions	Cash Flow Basis \$ millions
25% of bond portfolio	0.3	
35% of liquid assets	1.1	
40% of cash flow		670/p.a.
Total	1.4	670/p.a.

The foregoing data may be summed as follows:

Grand Total	Asset Basis \$ billions	Cash Flow Basis \$ millions
Amount	8.9	3,032

In summary, these numbers seem to suggest a demand for indexed bonds from the conversion of existing assets equal to around \$9 billion and \$3 billion from current cash flow. For reasons outlined earlier, fund managers might find it difficult to quickly convert the desired proportion of their existing asset base into indexed bonds. Assuming, therefore, that such conversions were to be phased in over a five year period, this would result in an annual conversion rate of \$1.8 billion. Thus, on the basis of the above calculations the total initial five-year demand for indexed bonds might be estimated to be in the \$4.8 billion range annually.

Note that these calculations were done in respect of 1976. Updating this tentative analysis in terms of current demand is difficult, as some of the basic data are not available. However, it is known that the assets of trustee pension funds grew by nearly 40% and cash flow by perhaps 50%, between the end of 1976 and the end of 1978. On the other hand, with the improved stock and bond market performance, the temptation to switch to indexed bonds might not have increased at the same rate. As a very rough estimate, therefore, 1978 demand in the range of \$5 billion annually might not be too far wrong.

One further point might be noted. If, in fact, it were to take five years to convert the desired level of the existing stock of non-indexed pension fund assets into indexed assets, the demand for indexed bonds would subsequently decline (in constant dollar terms) subject to further growth of the system. The \$4.8 billion 1976 demand would fall to \$3 billion; or in 1978 terms, the \$5 billion might decline to roughly \$3.2 billion annually. Note further that a conversion within five years might well be practical in the sense that government cash requirements look like they will be very large by historical standards in the several years ahead, so that the capacity to supply abnormally large volumes of bonds (in this case indexed bonds) is perhaps within the realm of possibility.

It cannot be stressed sufficiently, however, how tentative these numbers are. They should be taken only as an extremely subjective estimate of possible demand levels for indexed bonds for retirement income funding purposes, if the supply were available to meet it.

#### B. The Supply of Indexed Bonds

To determine the amount of indexed bonds the federal government might be able to supply, a review has been made of federal financing requirements over the last decade. There are four main sources of borrowing: Treasury Bills (TBs), Canada Savings Bonds (CSBs), marketable bonds and government employee pension plans. Of these, it has been assumed that the latter must be left out of the calculations entirely. Furthermore, as was the case for the demand analysis, price considerations were not taken into account.

It has been assumed that a significant proportion, i.e. 30% of CSBs might be diverted into indexed bonds. This in part reflects the fact that, on a few occasions in the last decade, the government has sold very large quantities of CSBs to assist its tight cash requirement

position (in particular in 1971, 1974 and 1975). A significant portion of those cash requirements might have been met by loans from pension funds. (1) Moreover, there is no overriding need to meet CSB demand at historical levels, though presumably the government would have an interest in keeping that market alive and well, having developed it over the years. In any event, the 30% figure might be lower than is feasible, resulting in a downward bias to the results.

With respect to TBs, only a 10% conversion is assumed, as it is arguable that the requirements of monetary policy would impose a substantial constraint on the monetary authorities with regard to the volume of TBs that could be replaced.

As for marketable bonds, a 30% switch to indexed bonds is assumed. Anything beyond that figure might mean that the government would endanger the continuance of a sufficiently diversified market for its securities. And even 30% might be considered a bit on the high side, introducing an upward bias to the results.

Note that the assumptions for TBs, and more particularly for marketable bonds, might not be readily achievable. For example, during the ten years from 1967 to 1976, almost all net new bonds and bills were taken up by the banking system (or non-residents). While this situation has altered in the last couple of years, it is arguable that, for the period as a whole, central bank requirements for bonds and bills, related both to money supply expansion and the conduct of open market operations, and chartered bank requirements for bonds and bills for liquidity purposes; would have made the 30% and 10% assumptions unrealistic. It is assumed here, however, that if indexed bonds had existed, monetary policy might have been implemented in a somewhat different manner "and the banking system could have adjusted its modus operandi to get along with fewer federal securities. Although traditionally the chartered banks have looked upon federal securities as their preferred instrument for liquidity purposes, it might have been possible for the central bank to help develop an active market for other instruments, such as commercial paper, if as a result of the introduction of indexed federal bonds the supply of marketable federal securities were to prove insufficient to meet the liquidity needs of the banking system.

The estimate of demand for indexed bonds set out above was couched initially in terms of 1976 conditions. Therefore, the supply side is also examined initially in terms of that year. In 1976, net new CSBs sold were equal \$0.8 billion. The net treasury bills issued in 1976 were equal to \$1.6 billion. This implied a potential supply of \$0.4 billion (30% of \$0.8 billion plus 10% of \$1.6 billion). In addition, gross issues of marketable bonds were equal to \$3.95 billion (excluding CSBs and TBs), of which 30% or \$1.2 billion might have been indexed bonds. Thus, in that year, about \$1.6 billion in indexed federal bonds might have been made available. Gross figures are used for other marketable

(1) It may be significant in this context that since 1974, when the federal government re-entered the long bond market after several years absence, pension funds have been adding to their Canada bond holdings in a substantial way.

bonds since there is no reason not to include rollovers of that type of security as a potential source of supply. (2) Net figures have been used for TBs and CSBs, since TBs may be rolled several times annually, and since CSBs, owing to their encashability feature, may also be rolled over. However, assuming most CSBs are not rolled over, using net figures introduces a downward bias to the potential supply.

In 1976, the provinces had gross new issues of \$5.4 billion in Canadian dollar bonds. Eliminating about \$1.9 billion for Canada Pension Plan (CPP) and Quebec Pension Plan (QPP), (3) \$3.5 billion was sold in Canadian dollar bonds. Assuming that 30% might have been sold to pension funds as indexed bonds, about \$1.0 billion of indexed bonds might have been supplied by the provinces in that year.

Thus, looking at the federal and provincial governments together, if our estimate is based on 1976 alone, a \$2.6 billion supply might have been feasible (\$1.6 billion federal and \$1.0 billion provincial).

One question is whether the 1976 results were in some way atypical and, therefore, whether \$2.6 billion would be an appropriate estimate to use. An alternative perspective is provided by looking at 1972-1976 in aggregate. In that period, annual net new CSB sales averaged around \$1.3 billion. New TBs issued averaged \$0.8 billion annually. Using the same proportions as earlier for converting CSBs and TBs to indexed bonds, \$0.5 billion rather than \$0.4 billion might become available from the diversion of CSBs and TBs into indexed bonds.

Gross issues of other federal bonds averaged \$2.5 billion annually over the same five years, which might have permitted \$0.8 billion annually in indexed bonds. From this alternative perspective, i.e. looking at 1972-1976 in aggregate, \$1.3 billion annually, rather than \$1.6 billion, might be the safer estimate.

For the 1972-1976 period, gross sales of provincial bonds denominated in Canadian dollars, excluding CPP and QPP, equalled \$2.3 billion annually. Of that amount, 30% equals \$0.7 billion. Thus, if a five-year perspective is used, \$2 billion annually might be more appropriate (\$1.3 billion federal and \$0.7 billion provincial) than \$2.6 billion.

The estimate of supply available in 1978 could have been much higher than this \$2 billion due to the exceptional federal cash requirements. Indeed, in that year, it could perhaps have been in the \$3-4 billion range. This goes some distance towards meeting the estimated \$5 billion demand in that year. Given the likely cash needs of governments during the next several years, the 1978 supply figure might well be more typical of what is possible during the next few years than the 1972-1976

(2) Gross figures would be appropriate only until the first issues of indexed bonds mature after which net figures would be more appropriate.

(3) Gross saving of social security funds was \$2.2 billion. Of this, \$1.5 billion was CPP money invested in provincial securities. Of \$522 million in QPP funds, it is assumed that the Caisse de Dépot et Placement invested \$0.2 billion in Quebec bonds.

average.

Thus, it is conceivable that federal and provincial governments might jointly be able to meet a substantial proportion, say, two-thirds of the possible demand for indexed bonds over the next several years without damaging in any significant way the depth and breadth of the market for their securities. It bears repeating, however, that a supply of this size appears to require some adjustments in the demand for federal securities on the part of the central bank and the chartered banks.

It is also important to bear in mind that as governments gradually reduce their deficit position (whether it takes three, five or ten years) and hence their cash requirements, the potential supply of indexed bonds will be reduced. It is also the case that the demand for indexed bonds might in one sense begin to ease as the initial backlog of demand for such bonds would perhaps be satisfied after, say, five years. On the other hand, as noted earlier, the overall rate of growth in private retirement fund assets might increase relative to all financial assets. Thus, the possibility cannot be ruled out that after five years or so, the potential supply from governments would decline relative to the potential demand.

## ANNEX B

### THE IMPACT OF INDEXING ON PUBLIC DEBT CHARGES

Indexed bonds give rise to two types 'of risks as regards public debt charges: the risk of the increased unpredictability of the dollar value of public debt payments in the short run, and the risk that, if inflation were to accelerate, such payments might become a serious burden on the budget. These issues will be considered in turn.

The impact of the existence of indexed bonds on the short-run predictability (i.e. the predictability of expenditures in the fiscal year one year ahead) of government cash requirements for public debt servicing purposes(1) depends on the type of indexed bond which has been issued and the type of non-indexed debt instrument which it replaces. For a 'principal compensation bond', the margin of uncertainty for the following year's debt servicing payments is a function of the degree of uncertainty in the next year's inflation forecast and of the nominal value of the principal of, and the 'real' interest payment on, such bonds. For an 'indexed principal' bond, the margin of uncertainty in the next year's debt service charges depends on the uncertainty in the inflation forecast and on the real ,interest payment on all indexed bonds outstanding plus the value of bonds maturing that year.

The point may be illustrated for a case in which there is an amount (B) of indexed bonds outstanding with a face value of \$10 billion, the 'real' interest rate (r) payable on these bonds is 2%, one-tenth of the bonds mature each year, the forecast rate of inflation (i) is 5% with a margin of uncertainty eu) one year ahead of 2%. Cash payments on \$10 billion of principal compensation bonds would equal the real interest on the entire amount, plus a sum to compensate lenders for the reduced real value of their bonds, plus the repayment of the principal on the fraction maturing. They can be calculated as follows:

(1)The analysis is cast in terms of debt charge cash flow. Questions would arise concerning the accounting treatment of the 'inflation compensation' component of such payments, and concerning the accrual of liabilities for future inflation compensation payments on the principal of 'indexed principal' type bonds. The following discussion assumes that accrual of such liabilities would not be recorded as part of current expenditures.

$$\begin{aligned}
&= r(1 + i \pm u)B \\
&\quad + (i \pm u)B \\
&\quad + (1/10) \times B \\
&= .02 (1 + .05 \pm .02) \$10 \text{ bil.} \\
&\quad + (.05 \pm .02) \$10 \text{ bil.} \\
&\quad + (1/10) \times \$10 \text{ bil.} \\
\\
&= \$1.71 \text{ bil.} \pm \$204 \text{ mil.}
\end{aligned}$$

i.e. the margin of uncertainty is \$204 million.

Cash payments on \$10 billion of indexed principal bonds would equal the real interest on the entire (indexed) amount, plus the repayment of the indexed principal on the fraction maturing:

$$\begin{aligned}
&= r(1 + i \pm u) B \\
&\quad + (1 + i \pm u) \times (1/10) \times B \\
\\
&= .02(1 + .05 \pm .02) \$10 \text{ bil.} \\
&\quad + (1 + .05 \pm .02) \times \$1 \text{ bil.} \\
&= \$1260 \text{ bil.} \pm \$24 \text{ bil.}
\end{aligned}$$

i.e. the margin of uncertainty is \$24 million. (2)

As an indication of the comparable margin of uncertainty on non-indexed bonds, assume that there is a 2% point margin of uncertainty on the short-term (Treasury Bill) interest rate forecast, a 1% point margin of uncertainty on the long-term bond interest rate forecast, and that one-tenth of the stock of long-term marketable bonds mature each year.

(2) In comparing this figure with the \$204 million margin of uncertainty on principal compensation bonds, it should be kept in mind that in the case of indexed principal bonds the face value of the bonds outstanding either understates the amount actually owing to bond holders or alternatively exceeds the face value at the time of issue depending on whether face value does or does not include inflation compensation accruals with respect to previous years. The two sets of results very specifically should not be taken as providing an insight into the relative borrowing costs of the two types of indexed bonds.

Then the margin of uncertainty on the cash payment on \$10 billion of TBs would be \$200 million, while the margin of uncertainty on payments on \$10 billion of long-term bonds would be only \$10 million. Since it has been assumed that indexed bonds would mainly displace long-term bonds, it appears that their use might lead to a greater margin of uncertainty in short-term debt payment forecasts, although this margin would still be relatively small in the case of indexed principal bonds. However, to the extent that indexed bonds displaced CSBs, the analysis would fall between the TB and long-term cases.

The larger margin of uncertainty on the dollar value of public debt charges associated with indexed bonds would apply to medium-term as well as short-term forecasts. However, once the time horizon extends beyond the maturity date of bonds outstanding at the time of the forecast, it is not readily apparent whether indexed or non-indexed bonds give rise to the larger margin of uncertainty. The issue would turn on the relative predictability of nominal interest rates, inflation rates and real interest rates. Perhaps more important than predictability of the dollar value of debt charges, particularly in the medium-term, are the implications of indexation for debt charges relative to total expenditures, revenues or (GNP). With indexed principal bonds an acceleration of inflation would not be expected to lead to an increase in the short run in the ratio of debt charges to revenues from the existing tax structure or to GNP. (3) On the other hand, use of the principal compensation bond could give rise to greater short-run instability in the ratio of debt payments to revenues or GNP than at present because of the need to compensate bond holders in full for the loss in real value of their bond in the very year that loss occurs. Especially under a government policy of maintaining a relatively stable ratio of total expenditures to GNP, it would seem advantageous to minimize fluctuations in the ratio of public debt charges to GNP. Use of indexed principal bonds would thus be preferable to principal compensation bonds from this point of view. (4)

- (3) An exception to this generalization, which could be of some significance over periods of one or two years, would occur if the increase in the inflation index used to adjust bond payments resulted from price changes that occurred outside the economy and which were thus not associated with higher current dollar GNP and higher government revenues. Such would be the case, if the Consumer Price Index (CPI) were used as the index, and if some event or action caused a major increase in import prices. Indices which would be less likely to give rise to such a problem could be developed, but are not currently familiar to the public.
- (4) Given the tendency of nominal interest rates to increase with inflation, the same tendency for debt charges to increase relative to GNP, as inflation accelerates, exists for unindexed bonds if one considers a period long enough for the bonds to mature. However, as maturity of the existing stock is spread out, the increase relative to GNP is much more gradual for unindexed bonds than it would be for principal compensation indexed bonds.

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