

Some perspectives on inflation-indexed bonds

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Inflation-linked government bonds have become increasingly common in a range of countries. This article looks at indexed bonds, particularly against the backdrop of the 1995 reintroduction of the instrument in New Zealand.

Executive summary

Most conventional (“nominal”) bonds on issue – even those issued for relatively long terms – promise the holder a fixed dollar flow of payments over the life of the bond. In contrast, most other receipts and outgoings facing individuals and firms tend to adjust reasonably quickly if the price level changes. As a result, unexpected changes in the general level of prices – which alter the real purchasing power of money – are a major risk both to holders and to issuers of conventional bonds. Indexed bonds, by contrast, substantially reduce this risk. They link the lender’s receipts, and the borrower’s payments, to movements in the general price level. This is a particularly valuable feature if the future price level is very uncertain – perhaps early in an anti-inflation drive – and may allow a borrower, especially the government, to make savings on borrowing costs.

For central banks in particular the existence of indexed debt, alongside conventional nominal debt, offers an added bonus: comparing yields on the two instruments can provide some direct – if approximate – evidence on the inflation fears of wholesale financial market participants.

However, around the world, indexed bonds represent only a small proportion of all debt on issue, and the private market in indexed instruments is still very much in its infancy (and does not exist at all in New Zealand). Indexed debt has its limitations. At present, for example, issues tend to be much less actively traded – and hence less liquid – than other bonds. And as income tax generally (including in New Zealand) is levied on the total returns on all bonds – indexed as well as conventional – it is not possible to purchase an instrument providing full after-tax protection against changes in the price level.

I Introduction

Inflation-indexed bonds have become an increasingly common feature of government bond markets around the world in recent years. This article takes a look at indexed bonds, with a particular emphasis on New Zealand’s experience with them. It highlights some of the key issues relevant to these kind of instruments, in particular:

- what are indexed bonds and how do they compare with conventional bonds?
- what are the advantages of indexed bonds for borrowers, investors, and monetary policy makers?
- what are the limitations of indexed bonds?
- why are indexed instruments not more common?

It also discusses the development of the New Zealand government indexed bond market since its relaunch in 1995.

II Background

Inflation is a major risk for anyone contracting to receive or pay a fixed dollar amount of money at some date in the future. This is particularly so for those entering into long-term contracts, such as borrowing or investing in ten or twenty year government bonds. Lenders must – implicitly at least – assess how much they expect that inflation will erode the purchasing power of the money they are lending, and hence how much they will build into the interest rate charged to borrowers to protect the real value of their money. Borrowers face the same question in deciding how much they can afford to pay.

Policy initiatives such as the Reserve Bank of New Zealand Act 1989 help narrow down the range of likely future inflation rates, and provide considerable certainty about the price level over the year ahead – the sort of horizon that encompasses the terms of most contracts that are fixed in dollar terms. But on a twenty year bond, an investor or borrower is having to consider the outlook for the level of prices up to twenty years ahead. Even the current annual inflation target range, specified in the Policy Targets Agreement, in principle allows the price level to

be unchanged or to rise by anything up to 80 percent over twenty years.¹ And that is before allowing for the possibility of changes of regime – the provisions of the Act or the Policy Targets Agreement – which are exceptionally difficult to forecast years ahead.

Inflation-indexed bonds, however, adjust dollar payments to keep pace with changes in the price level – considerably reducing this forecasting burden. The concept of indexing financial instruments has been around for many years but, in practice, for a combination of reasons, only recently have indexed instruments become more popular in the western world.² Governments have led the way.

The United Kingdom is perhaps the most often noted example. The British government began issuing indexed bonds in 1981 when it was attempting to reduce inflation substantially. As is often the case, the disinflation drive met widespread scepticism – holders of conventional bonds were, in effect, charging the government for an expected inflation rate much higher than the government intended to deliver. Issuing indexed bonds was intended both to help demonstrate the seriousness of the government's monetary policy endeavours, and to reduce funding costs by promising to compensate investors for high inflation only if inflation did not in fact fall as the government had planned. Of course, many governments have set out on disinflation drives only to ease off the pressure as the short-term costs became apparent. But as it happens, the British strategy proved to be a considerable success, and the government ended up making substantial savings in its borrowing costs. The United Kingdom now has the most well-established indexed bond market among OECD countries, with indexed debt comprising 15-20 percent of the government debt on issue.

Both Australia and Canada have added inflation-adjusted instruments to their range of government debt issues over the last decade, and earlier this year the United States government also began issuing wholesale indexed debt.

In New Zealand, a variety of inflation-adjusted government securities were available between 1977 and 1985. Three types were issued - one a wholesale instrument,

1 If the inflation rate were to be 3 percent per annum for twenty years, the price level would have risen by 80.6 percent by the end of the period. This is a deliberately extreme illustration, but even the difference between average annual inflation rates of one and two percent, is the difference over twenty years between the price level rising by 22 percent or by 49 percent.

2 For a good background on the earlier history of economic thought concerning indexation see Jud (1978). For a survey of earlier examples of indexation, not only with reference to financial instruments, see Page and Trollope (1974).

and the others retail savings products. At their peak in 1984 these issues accounted for around two billion dollars of government funding, or around 15 percent of the domestic debt on issue at the time. The retail Inflation Adjusted Savings Bonds (IASBs) were tax-preferred, and as a result were popular in periods of high inflation. Wholesale inflation adjusted bonds were sold at tender – in 1983 and 1984 – at a time when the government's own inflation goals – backed by somewhat unorthodox prices and incomes controls – were markedly different from what investors feared the inflation rate would turn out to be. The issuance of indexed debt was discontinued shortly after the change of government in 1984.

Perhaps paradoxically, exactly the same credibility gap confronted the new government in its own use of more orthodox methods to cut inflation. In view of the expected high cost of selling long-term nominal bonds, in 1986 the sale of New Zealand dollar government debt of longer than around five years was discontinued, until inflation had been tamed in the early 1990s. Shortening the term of the government's nominal debt is one appropriate response to heightened price level uncertainty, but this exposes the government to heightened risks associated with the rollover of maturing debt. Only in November 1995 did the government return to the index-linked market, introducing the long-term Inflation Indexed Bonds (IIBs). IIBs are wholesale instruments sold at tender, on which both interest payments and the principal amount of the bond are adjusted every six months for changes in the Consumers' Price Index (CPI).

Table 1 - Indexed bond markets around the world

Date of introduction	Country
1945	Finland
1952	Sweden
1955	Israel
1955	Iceland
1964	Brazil
1966	Chile
1967	Colombia
1972	Argentina
1981	United Kingdom
1985	Australia
1989	Mexico
1991	Canada
1994	Sweden
1995	New Zealand
1997	United States

Source: Campbell and Shiller (1996)

Table 2 - Indexed and conventional bonds under different inflation scenarios

Year	Conventional bond 8 percent coupon					Indexed bond 4.5 percent coupon				
	Nominal cash flow	Real (inflation adjusted) cash flow under different inflation scenarios CPI inflation (percent)				Real (inflation adjusted) cash flow	Nominal cash flow under different inflation scenarios CPI inflation (percent)			
		0%	2%	4%	8%		0%	2%	4%	8%
1	80	80	78.43	76.92	74.07	45	45	45.90	46.80	48.60
2	80	80	76.89	73.96	68.59	45	45	46.82	48.67	52.49
3	80	80	75.39	71.12	63.51	45	45	47.75	50.62	56.69
4	80	80	73.91	68.38	58.80	45	45	48.71	52.64	61.22
5	80	80	72.46	65.75	54.45	45	45	49.68	54.75	66.12
6	80	80	71.04	63.23	50.41	45	45	50.68	56.94	71.41
7	80	80	69.64	60.79	46.68	45	45	51.69	59.22	77.12
8	80	80	68.28	58.46	43.22	45	45	52.72	61.59	83.29
9	80	80	66.94	56.21	40.02	45	45	53.78	64.05	89.96
10	80	80	65.63	54.05	37.06	45	45	54.85	66.61	97.15
Principal	1000	1000	820.35	675.56	463.19	1000	1000	1218.99	1480.24	2158.92

III How do inflation-indexed bonds compare with conventional ones?

Conventional fixed interest (nominal) bonds fix the future payments by the borrower in dollar terms at the time the loan is taken out. By contrast, on inflation-indexed (real) bonds the payments are fixed in real terms. In other words, both the total dollar interest and principal payments on indexed bonds are adjusted to keep pace with the changing price level (see Table 2 for a numerical illustration).

Investors in both types of bonds make allowance for inflation over the life of the bond. In the abstract, if investors had perfect foresight – so that the rate of inflation, and the price level, over the years ahead are known from the start – then both sorts of bonds would earn the same rate of return. In practice, of course, no one has perfect foresight and future price levels are inherently uncertain.

Uncertainty about the future price level is the source of the most important distinction between the two types of bonds. Conventional bonds expose both issuers and investors to *unexpected* changes in the price level. As a first approximation, indexed bonds do not. To make this clear, consider the returns to a conventional bond. If future inflation outcomes are uncertain, then it is possible that the price level will turn out to be different than expected. If actual inflation over the life of the bond is higher than expected, the real return to investors will diminish and the real borrowing cost to the issuer will fall. If actual inflation is less than expected over the life of the bond, the real return to investors will be unexpectedly high, and the real borrowing cost to issuers will rise.

Indexed bonds eliminate much of this real return risk. That gain should have an economic value. The greater the uncertainty about the future price level, the more valuable an indexed bond becomes relative to nominal bonds. Put simply, the higher the chance that inflation will in fact turn out significantly different than first expected, the more willing an investor is likely to be to accept a slightly lower yield on the indexed bond, in return for the ‘insurance’ against rises in the general price level that indexed bonds provide. But by the same token, the greater the uncertainty about the future price level, the more willing a borrower will be to pay a slightly higher, but more certain, real interest rate, to avoid the uncertainty about the price level.

IV Potential benefits of inflation-indexed bonds

Whether or not governments should issue indexed debt has been much debated. As a practical matter, if a country’s inflation rate is very high – perhaps in excess of several hundred percent – it is quite likely that indexed instruments will be the only form in which the government will be able to find people willing to lend to it voluntarily in local currency terms. A number of other considerations are rather more relevant to low inflation countries such as New Zealand, including whether funding by way of indexed debt can:

- reduce overall real debt servicing costs;
- provide a better match with the government’s other net cash flows;

- help reinforce the credibility of stated policy commitments to price stability.

There may also be a question whether the government's peculiar position – as the party which ultimately determines the inflation rate – imposes some obligation to provide instruments offering protection against inflation. The first two of these considerations (debt service and cash flow hedging) also face private borrowers in exploring the possibilities of indexed debt.

The discussion in the previous section treated indexed instruments largely in isolation from the overall economic position of potential borrowers or investors. It is one thing to note that indexed bonds reduce the risks posed by an uncertain price level, but perhaps that risk is already hedged? If, for example, all our spending and all our income were also fixed far into the future in dollar terms, long-term conventional debt instruments would be ideal. Of course, outside the financial markets long-term contracts with fixed dollar prices are not widespread. And although formal indexation is also not common – outside areas such as welfare benefits – most nominal cash flows do tend to adjust over time as the price level changes.

To illustrate, few workers have their wages formally indexed to the price level, but most wage rates are reviewed annually. Over time, average wages tend to keep in step with prices – after allowance for other “real” influences, such as productivity growth etc. Similarly, although supermarkets don't formally index the prices of their groceries, prices are reviewed frequently and if the general price level has changed substantially, an individual firm's grocery prices are also likely to have moved up. And what about the government? A large proportion of its cash-flows adjust almost automatically with inflation. Tax rates are levied proportionately, so that if inflation raises the dollar value of private income and spending, tax revenue rises at least one for one.³ Benefit payments are formally indexed. And as a large employer of staff and purchaser of goods, most of the government's other expenditure tends to rise – over time and other policies unchanged – pretty much in accord with movements in the general level of prices.

In other words, once time horizons extend beyond, say, 12-18 months, most of economic life is actually conducted in “real” terms. What people are interested in primarily is the real volume of goods and services their efforts will enable them to purchase, not the number of dollars they

are receiving or having to pay. Most individuals and firms are already approximately hedged against changes in the longer-term inflation rate. But the hedges break down in respect of longer-term financial instruments. Almost all of these instruments involve fixed dollar payments which don't adjust if the price level changes.

Thus, other things being equal, most savers and most borrowers should in principle be considerably more interested in longer-term financial products which carry a certain real return than in those carrying a certain nominal return. If borrowers do have to borrow through long-term nominal instruments they should be reluctant to pay quite as much as otherwise – since such borrowing worsens their naturally hedged position, exposing them over the long-term to considerable real economic risk if the price level changes unexpectedly. And if lenders have to lend through long-term nominal instruments, they will want a little more return than otherwise, to compensate for the risk of the price level changing unexpectedly. Both parties would seem able to gain from contracting in instruments indexed to the price level – reducing the variability in (and uncertainty about) the real costs of, or returns on, their financing transactions. Because borrowers should be willing to pay a little more and investors should be willing to receive a little less, for the greater certainty indexed instruments offer, it is not clear, *a priori*, whether the resulting real interest rate would be higher, lower, or no different than that on nominal bonds⁴.

In fact, indexed debt instruments represent a very small share of all long-term financial contracts, and the way has been led by government borrowers rather than by private sector savers or borrowers. Why?

There are no fully satisfactory answers to this question, and certainly no single “magic bullet” explanation. However, a number of factors might together go some way towards an explanation.⁵

- Only in the last 50 years or so has inflation become a serious issue for long-term contracts in most countries. Throughout the nineteenth century, for example, a rise in prices for a few years at one point in the business cycle was usually offset by a fall in prices at some other point in the cycle, leaving the price level over time fairly stable. And although inflation rates have been consistently positive since World War Two, un-

3 This is not to say that the tax system is entirely neutral with respect to inflation. On the contrary, the interaction of inflation with a nominal based tax regime causes a number of distortions. See, for example, Feldstein (1997) for a recent contribution to this literature.

4 However, it is widely assumed that the inflation uncertainty premium is positive – that is, the real return on indexed bonds is below the real return on comparable nominal bonds.

5 There have been many reasons put forward in the literature for the apparent lack of indexed bonds, both from the government and private sector. See, for example, Kelly (1982), Weiner (1983), and Fischer (1983).

certainty about the price level did not become a big issue, particularly in the main English-speaking countries, until the late 1960s. But that was 30 years ago, and the market has developed only slowly since, despite increasingly competitive financial markets. It has been argued that in the United States the law prohibited indexation for many years,⁶ but these provisions did not directly affect the rest of the world.

- When the inflation rate is relatively stable, the costs of uncertainty about inflation and the price level may be low, relative to all the other economic risks facing any individual (job loss, real wage changes, changes in welfare or educational entitlements, etc) or firms (new competitors, regulatory change, real exchange rate moves, etc).
- It is a well-known problem – seen famously with the QWERTY keyboard – that established and pervasive practices can be very difficult to change even when they no longer appear optimal, unless there are overwhelming benefits to change. Financial instruments have been nominally-based for hundreds (or thousands) of years, and hence also all the teaching material, and public understanding of financial instruments.
- Although conceptually straightforward, some practical aspects of indexed instruments are quite complex. The New Zealand experience with IASBs suggests that if the additional return is large enough people will adjust and learn, but in a deregulated and relatively low inflation economy there are not often those large benefits.
- Because all the earnings on indexed instruments are taxed (the inflation adjustment is treated as income rather than a capital payment), indexed instruments cannot offer investors full protection, in after-tax terms, against unexpected changes in the price level. Over time, other popular assets, notably equities and residential property (but also short-term instruments such as bank bills and term deposits on which the rate is reset frequently), are also likely to provide a hedge against inflation. Because of the differing tax treatment of nominal capital gains, equities and residential property may in fact provide a superior hedge on average through time – although there is a trade-off in that the returns on those assets are probably rather more variable and uncertain in the short term. The specific features of the New Zealand tax system suggest that the disadvantages faced by indexed debt relative to other instruments may be greater here than in most comparable countries.⁷

Table 3 - Impact of inflation on after-tax real returns

	Indexed bond 4.5 percent coupon	
Annual inflation rate (a)	2.00	4.00
Before-tax real yield (b)	4.50	4.50
Before-tax nominal yield (c)=(a)+(b)	6.50	8.50
Tax@ 33 percent (d)=0.33x(c)	2.15	2.81
After-tax nominal yield (e)=(c)-(d)	4.36	5.70
After-tax real yield (f)=(e)-(a)	2.36	1.70

Taxation component includes inflation indexation on principal which is subject to tax in New Zealand

- The power of conventional understandings might also be relevant. For example, where many depositors seem to opt for the highest posted rate on offer, there are likely to be problems marketing an instrument offering “five percent plus the CPI inflation rate” against ones offering a straight “seven percent”. On the other side, indexed mortgages would also be difficult to introduce, especially when the inflation rate was relatively low. Such mortgages would feature gradually rising dollar payments (compared with flat nominal payments on a conventional table mortgage) and a rising nominal value of the debt outstanding in the early years of the mortgage – something borrowers would take some getting used to.⁸
- Those using index-linked instruments are exposed to the risk of changes in the composition of the index. This has recently attracted some attention in Australia,

7 Even in pre-tax terms, most inflation-indexed bonds provide a less than fully effective hedge, particularly in the face of extreme changes in prices, because, to enhance the secondary market tradeability of the instruments, the indexation is typically applied with a lag (indexation is based on changes in the price level two quarters previously). As a result, the next coupon payment on the bond is known in advance, so a change in inflation following the fixing of the coupon will change its real value, and thus change the real yield realised on the bond.

8 An anecdote illustrates the point. In a previous article on the impact of inflation, the Bank noted the potential for indexed mortgages to ease the intense cashflow problem borrowers faced in the early years of a conventional mortgage during periods of high inflation. This prompted one small lender to introduce such a product, but just at the time inflation was falling quite sharply. There was apparently considerable consumer resistance to the idea of rising nominal payments and the product was not a success.

6 See McCulloch (1980).

in the context of the possibility of removing interest rates from the official CPI at a time which many believe to be the trough of the current interest rate cycle.

So where does the government fit into all this?

The government is in a unique position as far as inflation risk is concerned. As a large borrower, with most of its revenues directly linked with inflation, and most expenditure relatively well linked to inflation over time, indexed debt might reasonably be expected to find a place if the government needs to raise domestic debt.⁹

However, the government, through the Reserve Bank, is also ultimately responsible for the inflation rate. As such, in times when the private sector is particularly uncertain about the inflation outlook, the government **may** have better information about how the inflation rate will come out, especially over perhaps a 1-3 year horizon. In these circumstances it may well be sensible – both from a cost perspective, and to help signal the government’s policy intentions – for the government to put less weight than usual on conventional nominal debt. Colloquially, this would be an example of putting the government’s money where its mouth is.

In principle at least, a government heavily dependent on conventional nominal debt could be thought of as facing an incentive to generate deliberately a surprise increase in the price level to reduce the real value of its debt liabilities. The possibility of deliberately reducing the value of outstanding liabilities to one’s own advantage, is not open to private borrowers. Quite how relevant this point is in practice in well-established and stable societies is, at least, open to question. No Western country, for example, ended up with high inflation in the 1970s as part of a deliberate strategy to reduce its debt burden and, if anything, most countries are more indebted now, with low and stable inflation, than they were then.

More generally, there is a wider public policy benefit if the government is able to signal effectively and convincingly its commitment to its price stability goals, and to build confidence that inflation surprises will not be used for other macro-economic stabilisation or debt reduction purposes. A track record of low inflation, and in New Zealand structural reforms such as the Reserve Bank of New Zealand Act 1989 represent the most important steps in that direction. However, indexed debt may also have a role to play in signalling the government’s ongoing com-

mitment. Borrowing in foreign currency denominated terms can also perform a similar role – albeit less directly – but may have other signalling disadvantages: governments of most other developed countries make little use of foreign currency borrowing, and heavy use of foreign currency borrowing is often linked to difficulties governments in troubled economies have in raising debt in any other form.

Monetary policy

A further aspect of some relevance to the government (in the wider sense, including the Reserve Bank) is the possibility of obtaining useful information from indexed bonds.

Information on inflation expectations and real interest rates is valuable to policy makers – and often quite difficult to distil reliably. First, it is real monetary conditions that affect demand and hence inflation. Second, inflation expectations can be self-fulfilling so that if expectations about future inflation change then this can in time alter actual inflation.

A simple example can bring these two concepts together. If the nominal interest rate on the 10 year government bond increases from 7 to 8 percent, policy makers need to take a view on whether this is due to an increase in inflation expectations, an increase in the real interest rate, an increase in any premium investors or borrowers need to compensate for uncertainty about inflation, or some combination of all three. The implications for monetary policy of each possibility are quite different: if inflation expectations have risen, a more restrictive policy may be needed to offset the possible inflationary impact, whereas if the real rate has increased then monetary policy may have become too restrictive.

A major obstacle in making this assessment accurately is that inflation expectations and real interest rates are not directly observable. Common methods used to measure inflation expectations include survey data, professional forecasts, and estimates based on recent inflation outcomes. These methods often have drawbacks. To take the use of survey measures: survey respondents may not have the incentives to forecast inflation accurately, surveys take time to compile and are only available on a periodic basis, and many surveys concern themselves with a limited cross-section of people – often economists and commentators whose expectations may not be representative or have a significant impact on economic outcomes.

There are no wholly reliable solutions to these problems. However, as noted earlier, borrowers and lenders using conventional bonds must – implicitly at least – make allowances for expected changes in the price level. If the

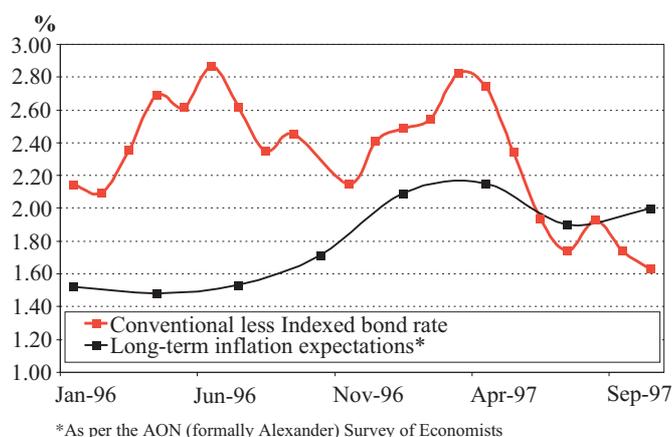
9 An open empirical question is the extent to which inflation surprises themselves are correlated with economic shocks which alter the government’s real tax revenues and/or real spending.

implicit inflation expectations factored into market prices could be derived, this would be available “on-line”. Monetary policy makers are primarily concerned about the accuracy of these measures in one sense only – not whether inflation turns out to be what people expect, but in getting a broadly accurate fix on what it is that people actually expect.

When both indexed and nominal bonds are on issue and traded, an approximation of the market’s implicit estimate of inflation expectations can be derived. The Fisher equation lies at the heart of most derivations of inflation expectations from financial market prices. In its simplest form, the Fisher equation states that the nominal bond rate can be broken down into two components – the real rate and the average inflation rate expected over the life of the bond.

If the indexed bond yield is used as a proxy for the real interest rate then a simple estimate of the implicit inflation expectation can be obtained¹⁰ (figure 1). However, there are some difficulties with this approach, including:

Figure 1
Nominal and indexed bond rate differential and inflation expectations



- *Inflation uncertainty premium.* As explained previously, there may be an inflation uncertainty premium embodied in nominal bond yields. It is often assumed that any inflation risk premium is constant, allowing changes in the differential between indexed and nominal bonds to be used to assess changes in inflation expectations. However, it is quite likely that the inflation uncertainty premium changes over time¹¹ – and perhaps particularly at times of stress when other in-

dicators are also most difficult to read. If the inflation uncertainty premium changes over time, implicit inflation expectations derived from the difference between indexed and nominal bonds will be inaccurate. More advanced techniques have been developed to distinguish between the implicit expectation and the uncertainty premium,¹² but these require more than one indexed bond on issue and so cannot currently be applied in New Zealand.

- *Liquidity premium.* Indexed bonds are usually quite illiquid relative to nominal bonds. If indexed bonds are less liquid, investors may require a higher yield to compensate. Thus, when comparing indexed and nominal bonds to derive inflation expectations, it is important to account for any premium due to differences in the liquidity of each instrument – something which is, of course, particularly difficult to get at.
- *Arbitrage conditions.* The indexed and nominal bond markets may not be fully inter-linked, especially when the indexed market is relatively new and illiquid. If some kind of market segmentation is relevant, then the real yields in each market may at times differ by more than one would expect simply on the basis of any inflation uncertainty risk.
- *Lack of directly comparable maturities.* Formally, the derivation of inflation expectations requires the use of two bonds differing only as to whether or not they are indexed. In New Zealand at present, however, the only indexed bond matures in 2016 and the longest conventional government bond matures in 2009. But other indicators suggest that at any point in time, inflation expectations from about three years ahead are very smooth; no doubt as the result of a lack of other information to shape expectations further ahead. So there are unlikely to be any odd patterns of expectations affecting the comparison between the 2009 and 2016 maturities.

Finally, there is no particular reason to believe that at any point in time the inflation expectations of bond market participants adequately reflect those of the individuals and firms undertaking spending and investment transactions and putting pressure on real resources. At present, in-

10 For more complicated measures of inflation expectations using indexed bonds see, for example, Deacon and Derry (1994).

11 In fact, this seemed to be the case in mid-1996 – the difference between indexed and nominal bonds widened markedly at a time when there was little evidence of an increase in inflation expectations. This trend appeared to reflect a higher risk premium being factored into market prices, possibly in response to what appeared to be mounting uncertainty over the political outlook.

12 See, for example, Levin and Wright (1996).

dexed products are not readily accessible to, or used widely by, households and corporates.

If one sought formally to derive economy-wide inflation expectations solely from the indexed and conventional bond market comparison, estimates would rightly be subject to considerable criticism.¹³ However, imprecision and the use of a range of approaches is a feature of almost all economic analysis. Opinion surveys and formal economic statistics are only approximations to the sort of economic concepts forecasters and policy-makers are continually trying to get a fix on; one piece of information supplements others and together they help build a tentative picture of what is going on in the economy.

Thus, in New Zealand and other countries the indexed bond market has been useful in supplementing other methods (for example, survey data) for getting a fix on the inflation concerns of the public and markets - and especially in assessing *changes* in those concerns. The usefulness of indexed bonds as a source of monetary policy information should gradually improve, especially as global markets are likely to deepen now that the United States - which has the deepest and most liquid market for government bonds - is committed to issuing a range of indexed bonds (a 30 year indexed bond is to be introduced in 1998).

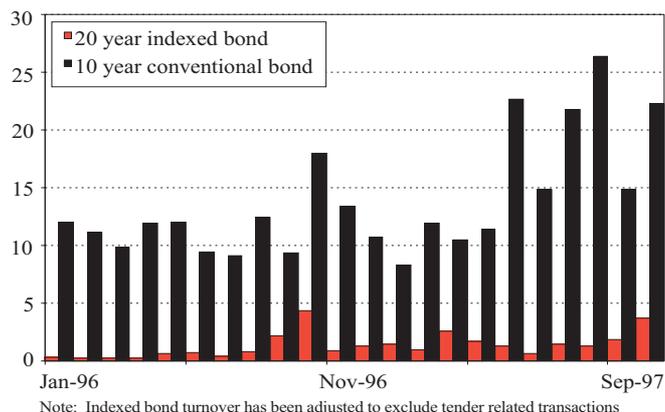
V How has the New Zealand market developed?

After two years and twelve tenders there is now almost \$700 million of indexed debt on issue, which is around three percent of the domestic government debt on issue. Are there any unusual features of the New Zealand indexed bond market when seen in the light of the experience of other similar countries, or relative to expectations when the instrument was introduced? At this relatively early stage, a few observations can already be made.

- The degree of secondary market activity has picked up gradually, and major bond market participants are generally able to source stock to meet moderate demand between tenders. However, secondary market turnover is relatively low compared with activity in conventional government bonds (figure 2). This is similar to the experience of other Western countries with indexed debt on issue. The price-makers in the New Zealand bond market have no commitment to

¹³ The indexation lag, referred to previously, also complicates the formal derivation of inflation expectations. However, these difficulties can be overcome. See, for example, Deacon and Derry (1994).

Figure 2
Monthly bond turnover
(as a percent of amount on issue)



quote two-way prices in IIBs between themselves (by contrast, two-way prices with narrow spreads are made in \$5 million parcels of liquid conventional bonds).

- The market for indexed debt remains heavily concentrated in the bi-monthly tenders, the only place in which demand for large parcels can effectively be satisfied. By contrast, weekly secondary market turnover in conventional government bonds swamps the size of tenders. A typical \$50 million IIB tender is the equivalent of two weeks' secondary market activity, whereas a \$200 million tender of a conventional bond would be the equivalent of only around one day's turnover.
- Very few of the bonds are held by individual investors directly. Moreover, no unit trust or similar products backed by earnings on IIBs have developed. This probably reflects a number of factors including:
 - the relative novelty of the instrument;
 - the relative illiquidity of the bonds;
 - that bonds do not provide a complete hedge in after-tax terms (and may be bettered by other assets);
 - the cash-flow implications of the way the bonds are taxed. Income tax is payable on the inflation adjustment when it accrues, but the inflation adjustment to the principal is only paid out at maturity, in 2016;
 - the low headline interest rates available on the bonds.
- The majority of the bonds are held by foreign holders, and there is now no significant difference between the shares of indexed and conventional bonds held by non-residents. This is of particular interest because, in its role as a hedge against inflation, the IIB is of more limited value to foreign investors, who are mainly ex-

Table 4 - A selection of inflation indexed government bond markets

	Total indexed bonds outstanding (billions in US dollar terms)	Total indexed debt outstanding as a percentage of total domestic marketable debt	Current long-term (20 year) indexed bond rate
Australia	3.1	4.9	4.1
Canada	5.7	1.9	4.0
New Zealand	0.4	2.8	4.9
Sweden	16.7	12.0	3.9
United Kingdom	90.5	18.2	3.2
United States	7.4	0.2	3.5

Source: Various national sources

posed to exchange rate risk rather than New Zealand inflation risk (the two risks are correlated but quite distinct). Some had expected that the most likely holders of IIBs would be domestic funds with known long-term future pension liabilities. However, in general, inflation-indexed bonds are not held, for example, to back specific future pension liabilities, but as part of general investment portfolios, revalued and reassessed regularly, and IIBs do not appear to be an exception to this. In other words, IIBs are primarily used not as a specific inflation hedge, but as a distinctive category of bonds with potential diversification benefits for investment funds, domestic and foreign.

- Similarly to abroad, the gap between indexed and nominal bond yields seems to fluctuate more than appears easily able to be explained by fluctuations in longer-term inflation expectations or the inflation uncertainty premium. In that sense, inflation bonds have come to be seen by investors as a good “defensive” asset – tending to sell-off considerably less in “bear” markets than do nominal bonds. These days, most rises in nominal bond yields appear to reflect changes in expectations about the stance of monetary policy required to maintain a given inflation target, rather than changes in medium-term inflation expectation themselves.
- No private sector indexed issues or derivatives have yet occurred in New Zealand. Some have argued that the lack of privately issued indexed bonds – and the modest take-up of IIBs by domestic institutions – is related to the potentially high “set-up” costs of establishing a market in this kind of instrument, including establishing familiarity, and having the fund management industry recognise and establish separate inflation-indexed asset classes. However, now that the government has committed itself to funding a portion

of its borrowing requirement by indexed debt, these potential “set-up” costs have probably diminished somewhat. Private issuance has become more common recently, especially in the better-developed Australian market, but also in the United States. In Australia, wholesale derivative instruments – interest rate swaps – based on indexed debt are also now available. In part, this additional wholesale market activity is facilitated by having a range of maturities on issue. Multiple maturities allow banks a much greater degree of flexibility to, for example, hedge the risks they assume in providing indexed financing facilities.

VI Conclusion

Indexed bonds have become an increasingly common feature of Western government debt markets in recent years. New Zealand rejoined the group of issuers two years ago in a modest way. No one factor provides an overwhelming case for issuing indexed debt, but together a number of factors suggest that there are likely to be advantages, especially for the government itself to be an issuer. Since IIBs were introduced here, some market activity has developed and there has been a gradually increasing interest in the bonds, especially from abroad. However, it is still early days and as the market develops it will be of particular interest to see how private issuers respond to the opportunities indexed finance appears to provide.

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