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Essentials of Corporate Bonds for Pensions Actuaries

Prepared by the Corporate Bonds Working Party,
Pensions Board, The Actuarial Profession.

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Introduction

This report was prepared under the auspices of the Investment Committee of the Pensions Board of the Actuarial Profession. The authors are Ken Forman, Guy Freeman, Gary Marshall and Ian McKinlay. While the authors believe that factual information provided in the report is accurate, they accept no responsibility for it. Any opinions are those of the authors and are not necessarily shared by their employers.

The paper is aimed at actuaries working in the pensions field and who wish to increase their knowledge of the UK corporate bond market. Corporate bonds have become increasingly important to investors in recent years because of their higher income yield. With FRS 17 requiring liabilities to be valued using the yield on a corporate bond index, pension actuaries should have an additional interest in them.

The paper is divided into three sections covering the marketplace, pricing considerations and considerations for pension fund investors. There is also an appendix and a bibliography. We hope you find it informative and stimulating.

KEY ISSUES FOR ACTUARIES

- 1. Sterling bonds are issued by a wide variety of issuers, not just the UK government (Section 1.1 and Appendix 1).**
- 2. Corporate bonds offer a higher expected return than gilts in return for assuming various risks (Section 2.1).**
- 3. The risk profile is asymmetric, with upside limited by the gilt market and any credit rating improvement while the downside is potentially a total loss (Sections 3.1 and 3.8).**
- 4. Swaps (involving synthetic corporate bond exposure) can provide much longer asset durations than the physical market (Section 3.2).**
- 5. Investment grade corporate bonds are closely correlated with gilts and may therefore be treated as the same asset class whereas non-investment grade bonds are poorly correlated with gilts (Section 3.1).**

1. The Marketplace

1.1 Definition

A corporate bond is a debt security issued by a corporation. However the term 'corporate bonds' is more loosely used in the UK to describe debt securities issued by an entity other than the British Government.

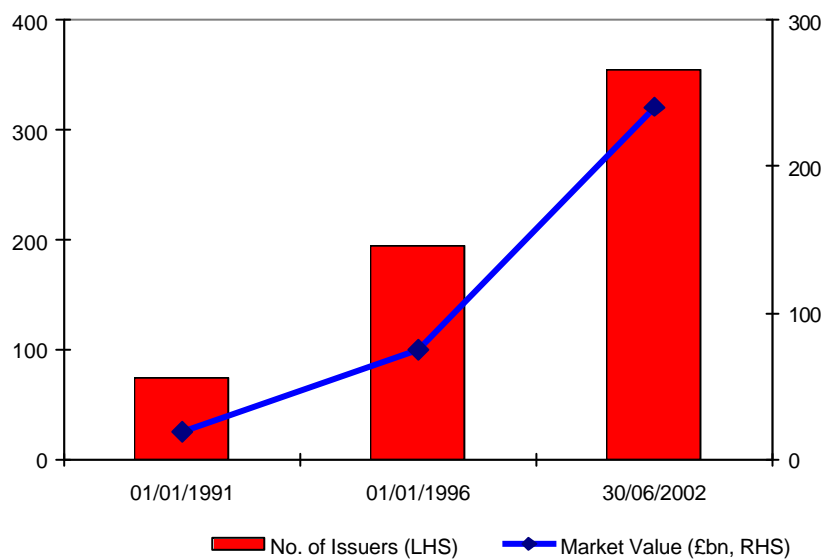
1.2 Issuing Terms

The bonds are predominantly fixed coupon and fixed maturity but there are many variations, most of which are listed in Appendix 1.

1.3 Market Development

During the high inflation era there was almost no issuance of corporate debt in the UK. The main reasons for this were the reluctance of corporations to commit to paying 'double figure' coupon rates. As the cost of issuing debt reduced, the size of the market has increased considerably over the last ten years, both in terms of number of issuers and overall market size, as shown in chart 1 below.

Chart 1: Sterling Corporate Bond Market



Source: Barclays Capital

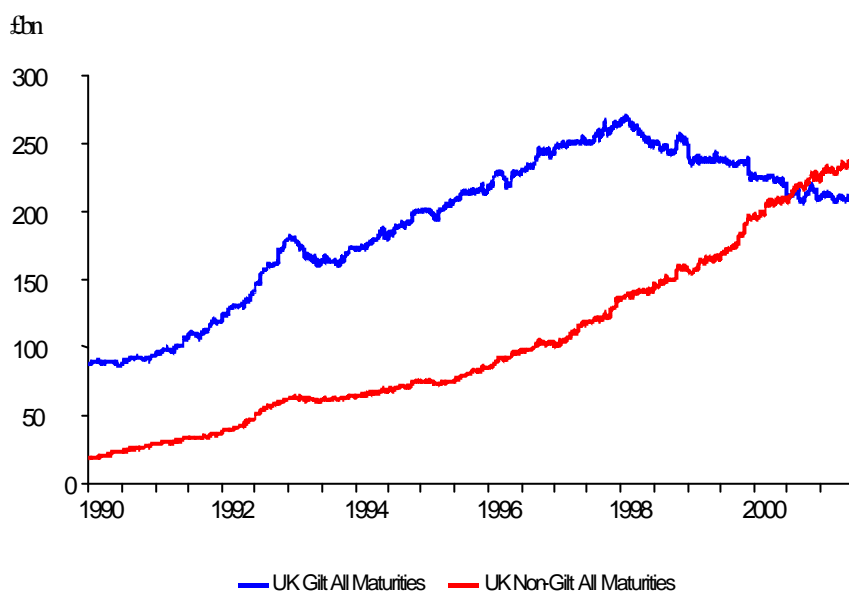
The corporate bond market is not exchange traded. Prices are not 'instantaneous' like the equity or gilt markets. This affects liquidity. Although, like gilts, there is no stamp duty on purchase, dealing spreads are wider than gilts – spreads on lower quality bonds are typically 0.2% to 0.3%, compared to 0.1% for gilts.

The market is divided into 'investment grade' and 'non-investment grade', the latter sometimes referred to as 'high yield' or 'speculative grade'. In most cases, the credit rating for the bond will determine which sector it falls into. Investment grade covers ratings that fall within the range AAA to BBB- (see section 1.5). Generally speaking the lower the credit rating, the higher the yield on the bond, to allow for the increasing risk of default.

At some £225bn, the investment grade corporate bond market now exceeds the gilt market in size, and secondary market liquidity is improving. However some bond issues are tightly held (normally by insurance companies, who purchase and then hold to maturity), and some are very rarely traded. This is a particular feature of the non-investment grade sector which is only about one tenth the size of the investment grade market. The irony is that some of these illiquid issues are constituent parts of the corporate bond indices. Investors seeking to track an index must be aware of this anomaly as it implies paying a (potentially unjustifiable) premium to hold such issues, which may then be difficult to sell on.

This market has grown much faster than the gilt market over the last five years and last year overtook the size of the gilt market for the first time, as we show in chart 2.

Chart 2: Market Capitalisation of UK Bonds



Source: Barclays Capital

1.4 Benchmark Indices

There are five main sterling corporate indices currently in use:
Barclays Capital Sterling Non-Gilt Index,
Merrill Lynch Sterling Corporate Index Series,
UBS Warburg Corporate Index Series,
iBOXX Sterling Non-Gilt Index,
JPMorgan euro Sterling Index.

Corporate bond indices are generally provided by investment banks. They are involved in the issue & trading of bonds - and provide indices on them as a sideline. Global equity indices, on the other hand, are dominated by two main providers, namely FTSE and MSCI that are both specialist and independent. FTSE is currently developing a bond index series for launch later this year in conjunction with an existing Reuters index series. This will complement its equity product. Corporate bond indices have not, historically, been global so that an index may be dominant in one market but non-existent in another. Barclays Capital, for example, has extensive indices in the UK non-gilts market but does not provide cover of either the euro or the US dollar markets. The expansion of the market and the introduction of the euro have given impetus to the development of indices and a number of providers have developed indices across the three main markets (US\$, £ and Euro). Lehman Brothers and Merrill Lynch have indices for the rated and high yield side and JP Morgan for the high yield side alone. Another impetus to the provision of indices is the fact that institutions have increased exposure to bonds at the expense of equities and are looking to ensure a closer link between their assets and the underlying liability profile.

There are differences in the construction of the different indices reflecting differences amongst the providers' policy regarding the treatment of new issues, rating changes, defaults and whether large bond issues should be constrained. Bond indices will aim to exclude defaulting bonds and cover only those paying their coupon - so it is a big issue as to when a bond is dropped. The investment banks will formulate their rules to reflect what their clients require and this can revolve around practical issues such as how to trade out of defaults and how to keep tracking errors within agreed limits. Historically the main index used in the UK has been the Barclays Sterling Non-Gilts Index. It provides flexibility in its de-construction and therefore is particularly useful for constructing customised indices to track specialist mandates for particular liability profiles.

The features of the Barclays Sterling Non-Gilt Index are set out in the charts in Appendix 2. There are some interesting duration features of this index. The overall index has a duration similar to the All-Stocks gilt index and the same is true for the Over 10 years categories. The Over 15 years corporate bond index, however, tends to have a duration fairly close to the Over 10 years corporate bond index and shorter than the Over 15 years gilts index.

1.5 Bond Ratings

The most commonly used ratings agencies are Moody's Investors Service, Standard & Poor's (S&P) and Fitch IBCA. They provide services which are broadly inter-changeable and a table of their rating equivalences is shown in Appendix 3. However, as the ratings are to some extent qualitative, it is inevitable that the two will differ in their rating of any particular bond at any time. Differences may result from a number of factors ranging from opinions of the individual analysts involved, to analytical information available, to macro-level economic assessments, to simple timing differences between rating reviews.

A potential conflict of interest exists in the fact that the bond issuer pays to have its own bond rated. However, the agencies are generally perceived to be independent and any evidence of conflict in this area would be dealt with swiftly and exactly by the market. There is a convincing history of rating downgrades at times which have clearly not been welcome to the

agency's clients although market participants may sometimes claim that the agencies are slow to react.

An **issuer credit rating** is an opinion that is not specific to any particular financial obligation but rather provides an overall assessment of the credit worthiness of the issuer.

An **issue-specific credit rating**, on the other hand, is an opinion of the creditworthiness of an issuer with respect to a specific financial obligation in issue. It will take account of where that obligation ranks in relation to the company's other obligations, and any specific securities pledged to it.

In this paper, we are concerned with issue-specific ratings.

The ratings process adopted by S&P can be summarised as follows:

1. Issuer requests a rating prior to sale or registration of a debt issue;
2. S&P analysts conduct basic research including meeting issuer to review in detail the key operating and financial plans, management policies, and other credit factors that have an impact on the rating;
3. Analysts present findings to S&P rating committee of five to seven expert voting members;
4. Rating decided by rating committee;
5. Issuer notified and has the opportunity to appeal prior to the rating publication;
6. Rating published.

Issues are monitored by S&P for at least one year from date of publication. The issuer can elect to pay S&P to continue surveillance thereafter.

It is worth noting the relevance of credit ratings in accounting. FRS17 requires the yield on AA rated corporate bonds to be used as the benchmark reference point for assessing liabilities. It is also worth noting that it is the market and not the credit rating that will determine the yield on individual issues. But the credit rating will influence the market yield. A change in rating for an outstanding issue is a discrete event whereas the yield will generally discount such a change over a period.

2. Pricing Considerations

2.1 Risk and Reward

Investors in corporate bonds are accepting more risks than by investing in gilts. The main risks relate to the issuer failing to make payments on the due dates and to the ability of the investor to realise a fair value price in the event of selling before the maturity date. To compensate for these risks, corporate bonds offer a premium, known as the spread, over the yield available on gilts. The spread can be split into a credit premium and a liquidity premium attributable to the individual risk.

The spread will vary over time partly because the risks will vary. But the spread can change even if the underlying risk levels themselves do not change. This is because investors' risk appetite will vary.

The critical issue for investors is whether the spread represents a suitable reward on top of the risk free rate for the risks taken.

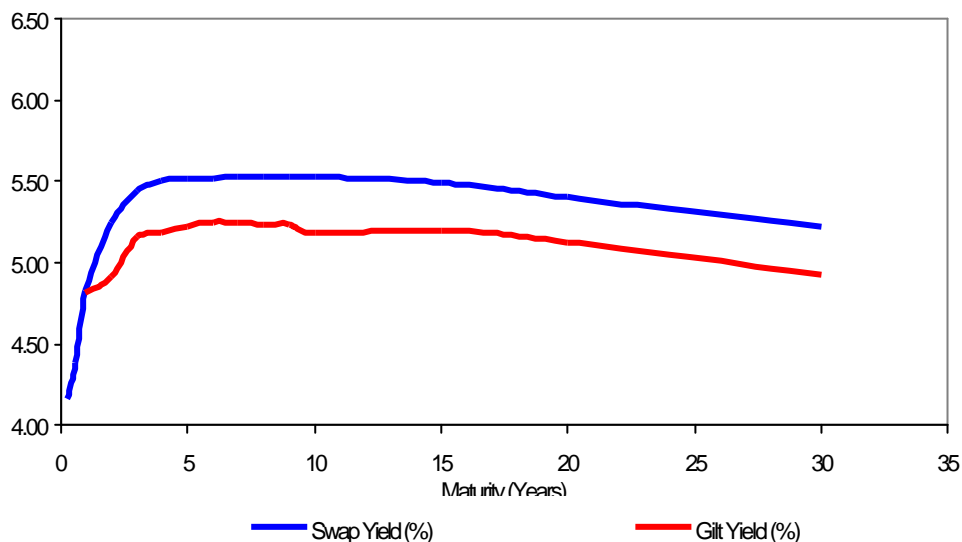
2.2 Reference Yields

In order to assess credit spreads, bond investors have traditionally focussed on the spread over the nearest equivalent gilt yield. For many investors, this is still what they mean by a credit spread. However market participants now increasingly focus on the spread over swap yields and a credit spread for these investors means the spread over a swap yield. These two alternate definitions can clearly lead to confusion. Swap yields and the swap market are explained in the box on the next page.

The swap yield curve is often called “Libor”. This is because fixed cash flows at the swap yield can be converted into floating cash flows at the Libor short-term rate. Spreads on bonds are therefore often described as being Libor plus x basis points which means that the yield is x basis points above the relevant point on the swap yield curve.

Referencing everything to the swap yield curve means that gilts and some AAA issuers typically trade at sub-Libor yields or Libor minus a spread whereas AA and lower-rated bonds trade above Libor. At the time of writing, the swap yield is approximately 0.3% higher than a gilt with the same maturity. We show this in chart 3 below.

Chart 3: Yield Curves



Source: JP Morgan

In addition, the credit default swap market also provides a reference point for credit spreads. The credit spread payments on these swaps are referenced to the credit spreads above Libor. The point is that investors need to be aware of the reference yield as well as the spread.

The Swaps Market

The swaps market offers the facility to construct or de-construct financial instruments of very wide ranging complexities. It can therefore be used as a means of achieving the same effective exposure as by dealing physically in the corporate bond market. In their simplest form, swap contracts involve the swapping of one form of risk for another. For example, an investor who wishes to secure a series of fixed income payments could buy an investment with floating rate payments and at the same time enter into an agreement with a counterparty to swap the floating payments for fixed payments. There could be cost efficiencies involved in such a series of transactions compared with the more direct alternative.

A swap yield is the fixed coupon that the market will exchange for a stream of floating interest rate payments over a given term. For example, the 20-year sterling swap yield might be 5%. This means that for a given notional amount, the two parties to the swap contract would exchange fixed cash flows of 5% on the notional for floating rate cash flows (i.e. typically 3-month or 6-month Libor returns applied to the notional amount). One party to the swap would pay the fixed rate and receive the floating rate with the other side doing the opposite. The two cash flows are netted off each other with the residual amount being paid from one party to the other at appropriate dates. The ability to receive fixed cash flows for a set period makes swap yields closely related to bond yields. Like gilts, swaps are also highly liquid and have become the benchmark for assessing credit spreads.

In a credit default swap (CDS), one party swaps a regular credit spread payment with another party in return for the contingent loss on default of a bond issued by a third party.

In contrast to futures and options which are subject to considerable government regulation, the swap market has virtually no government regulation. However swaps are, as a consequence, extremely flexible in amount, maturity and other terms. The International Swaps and Derivatives Association, Inc (ISDA) is an industry organisation that provides standard documentation for swap agreements and keeps records of swap activity. Unlike futures and exchange traded options where the exchanges effectively guarantee the contracts, the swaps market has no such guarantor and participants must be certain of the creditworthiness of their counterparties. If the swaps are collateralised then the counterparty risk is reduced to the impact of a movement in interest rates between a default and the time that the contract can be replaced with another counterparty.

As a consequence of the lack of regulation and guarantees, participation in the swaps market is effectively limited to firms and institutions that either engage in frequent swap transactions or have access to major swap dealers that assess the creditworthiness. Swap dealers have mostly replaced swap brokers, where the swap dealer acts as a principal to each side of the swap. The dealer accepts the risk of default by either party and becomes the counterparty for both parties.

The sterling swaps market is huge with notional outstanding of around £6,000bn which compares with a combined market capitalisation of less than £600bn for the gilt and corporate bond markets.

The spread between gilts and swaps is called the swap spread. The difference in yields is due to liquidity and credit differences. As the credit risks are small the yield difference is largely due to the scarcity of gilts and investor preferences for holding gilts. Increasingly changes in the swap spread are deemed to be due to factors affecting the particular gilt stocks rather than factors affecting the swap yields.

Credit markets are increasingly global. Many companies around the world now raise debt in currency other than their 'home' currency. This is true for some UK-based companies and can also be seen by the variety of issuers of sterling bonds. Table 1 below shows features of various BT bond issues.

Table 1: Features of BT bonds

Currency of issue	£	\$	€
Coupon (%)	7.125	7.625	6.125
Maturity	Dec 2006	Dec 2005	Feb 2006
Term	3y10m	2y10m	3y
Current Spread (21/02/03)			
- over gov't	112	145	95
- over swaps	90	83	85

Source: JP Morgan

Spreads can no longer simply be compared by focussing on the home currency bond market. There are two reasons for this.

Firstly, the swap market facilitates an arbitrage across the issues for a particular issuer in different currencies. A euro BT bond can be converted into a sterling BT bond using a cross-currency swap. The effective yield on such a synthetic product will be equal to the sterling swap yield plus the spread over swaps from the euro market. Any significant differences in the spreads over swaps across the different markets for the same credit risk can therefore be arbitrated away.

Secondly, the rapidly developing credit default swaps (CDS) market provides an alternative route to transferring credit risk, and spreads in this market are comparable to the spreads over swaps. For example, a BT credit default swap would have cost 76 bps a year to transfer the credit default risk to a counterparty.

The CDS market also indicates a term structure for credit risk with longer terms requiring greater spreads. Whilst there are slight differences in credit risk between credit default swaps and corporate bonds, the CDS spreads in this example are close to the bond spreads over swaps after adjusting for term.

	3-Year	5-Year	7-Year
Credit Default Swap (bps)	76	92	102

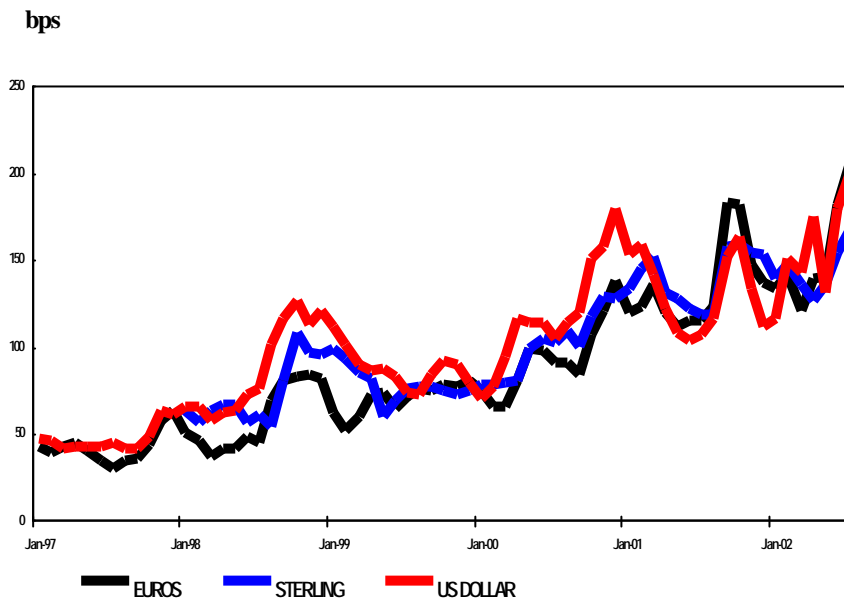
Source: JP Morgan, spreads at 21 February 2003

Similarly after adjusting bond spreads to allow for the term structure the spreads over swaps are all very close. Investors however sometimes demand a slightly higher spread for issuers from foreign markets than for domestic issuers. This is one of the reasons why BT's spread over swaps is slightly higher in US dollar terms than in sterling and euro.

Whilst there are clearly differences in the credit quality of constituent issues in different markets the credit spreads over swaps across the different markets are very close for the same rating, as

illustrated in chart 4. This is largely as a result of the arbitrage possibilities and the CDS market discussed above.

Chart 4: BBB Credit Spreads over Swaps by Currency



Source: Standard & Poor's

2.5 Default Compensation

The expected allowance that investors should make for future defaults for a particular bond will reflect a wide range of factors relating to its issuer. The most obvious is credit quality for which the credit rating from agencies like Moody's and S&P provides a proxy. Other factors being equal, the better a bond's credit quality, the lower the credit spread. Not only is this demanded by theory, but is fairly evident in practice. Broadly speaking, BBB bonds do, on average, trade on higher yields than AAAs. The conventional scales applied by ratings agencies are not particularly precise, but there are few other readily available data sources which aim to proxy credit quality alone.

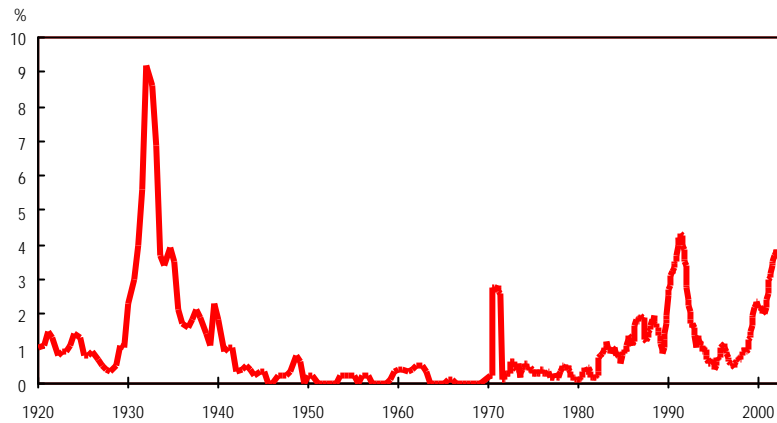
A starting point for estimating the allowance is an analysis of historical default rates i.e. the proportion of companies that default each year. The best sources of data are the analyses of companies that are rated by agencies. Most commonly, the rating agencies publish time series starting from the early 1980s, though additional records do trace defaults back as far as the 1920s. Chart 5 shows the Moody's series which dates back to 1920.

As may be expected, the data from the different agencies tend to exhibit a reasonably similar pattern through time, peaking at the end of recessions and falling significantly when the economy is expanding.

Over the long term, this cyclicity is obscured by a broader pattern. Defaults were very high in the 1930s (peaking at 9% in 1932) but have never come close to that peak since then. From 1940 to 1970, they never rose above 1%. In the 1990s, levels have been higher than that

(reaching 4% in 1990 and coming close to that level today), but are still less than half the level of the peak in 1932. This long-term pattern contrasts with credit spreads, which have been much more evenly cyclical in nature, and were much higher in the 1970s and 1980s than the 1990s.

Chart 5: Default Rates History



Source: Moody's

A major reason for the difference between default rates and credit spreads is that the former is a backward looking series based on actual experience whereas credit spreads are forward looking and based on expectations. It is a common feature of markets (and expectations) that they are more volatile than the underlying economic fundamentals.

Another reason for differences between credit spread and default rate time series stems from changes in Moody's and S&P's databases over time, and on the average quality of recent new issuance. When their samples contain more companies with speculative grade ratings, there will naturally be a higher proportion of defaults, and vice versa. As such, rating agency data on default rates tend not to be very pure indicators of credit conditions through time, and therefore of variations in downside risks on any particular piece of credit paper. This helps to explain why default rates were consistently so low between 1940 and 1980, except for the railroad defaults in 1970, despite numerous recessions and periods of stress in credit markets. Conversely, the default rate in 1991 was made much higher because of the glut of junk bond issuance that took place in the late 1980s.

To control for this, analysts often look at ratings transition matrices, like the one shown in Appendix 4, rather than default rates. These matrices show the past history of rating changes over one-year horizons and can therefore provide a guide to the probability of changes in ratings in the future. It is fairly easy to measure and to control the average credit rating of a portfolio. But what is more important is how the risks of downgrade and ultimate default vary through the cycle, and so whether or not market spreads provide sufficient compensation. Because ratings transition matrices (which include transitions to default) cover a much broader universe than do defaults, they are less distorted by changes in the average credit quality of the rating agencies' universe.

However, this does not yet tell us much about the expected losses due to defaults i.e. at what level do credit spreads compensate for defaults? To calculate this cost, the first thing to

consider is the likelihood of losing money over the life of the bond due to a default. This depends upon not only on future ratings transition probabilities and default rates but also on how much of a loss is suffered on default. In most cases, investors normally receive a proportion of the contractual payments, perhaps with a delay. This proportion is known as the recovery rate.

Again, the ratings agencies provide the best source of information on recovery rates. Moody's measures recovery rates for defaulted bonds by reference to the price of the bonds in the secondary markets one month after the date of default. A table of recovery rates is also included in Appendix 4. The alternative methodology of using realised payouts from workouts and bankruptcies is very difficult to apply as it would involve tracking all payments to creditors and discounting them back to the default date. In addition, using post-event secondary market prices is also consistent with the payout structure on credit default swaps where the loss below par is generally paid to the buyer of protection soon after the default date and the loss is based on the trading price of the defaulted bonds.

In summary, the estimated allowance for default therefore depends upon a view of future transition and default probabilities and recovery rates. These in turn may be developed based on historic statistics. The amount the investor requires to be paid to compensate for this depends further on their required return for taking risk and on their ability to diversify this risk.

2.6 Spread Attractiveness

The investor's desired spread can be compared to credit spreads in the market to determine relative value in particular bonds. Investors will also demand a spread for the potential illiquidity of a bond. However, the appropriate amount is very hard to measure or estimate and varies across market conditions i.e. it depends on whether markets are normal or stressed. Some indication can however be gleaned from turnover statistics and typical bid/offer spreads.

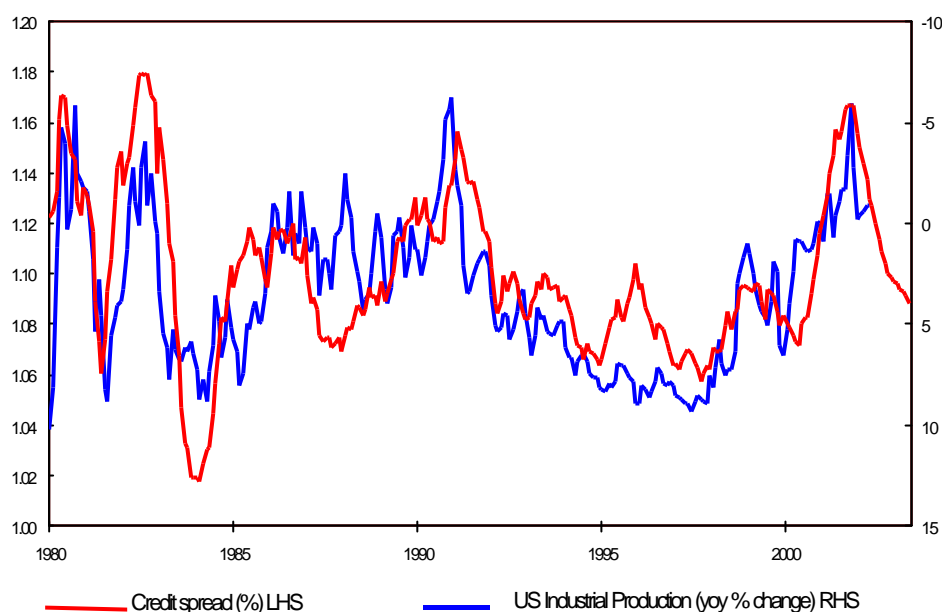
As a result, the estimated allowance for credit risk is usually compared to the market spread to form views of value.

2.7 The Credit Spread Cycle

While individual credits are obviously driven by variations in their issuers' perceived creditworthiness, sector or market spread movements and ratings themselves clearly show the influence of the broader business cycle. This is most clearly seen in the non-financial corporate sector (i.e. bonds issued by industrial companies).

Across the business cycle, credit spreads narrow when the economy is doing well, and widen when the economy is doing poorly. This makes good intuitive sense, for two reasons. First, when the economy is doing well, the chances of a default will tend to diminish. Rating agencies try to look beyond the immediate cycle, but the probability of a default varies substantially through time. Second, when the economy is doing well, the sheer improvement in sentiment means that investors are prepared to settle for lower spreads on credit with a given rating. Conversely, when the economy is in trouble, spreads widen as sentiment becomes more bearish, and investors shift into safer assets in an attempt to avoid defaults, even if it means giving up spread. This relationship works with almost any cyclical economic variable, but one of the better ones is industrial production as we illustrate in chart 7.

Chart 7: US Credit Spread and Industrial Production Cycles



Source: Moody's, US Federal Reserve

The second influence is interest coverage, which is defined to be the ratio of pre-tax, pre-interest corporate profits to the amount of interest companies need to pay on their debt. Once again when interest payments are better covered by the level of profits, creditworthiness improves, and credit spreads narrow. While this is clearly a bond specific factor there is also a general influence from the business cycle.

Between 1960 and 1980, US corporate debt/GDP rose only from 50% to 55%. Since 1980, it shot from 55% to almost 90% but 1980 was also the peak in long- and short-term interest rates. Since then, the sustained fall in interest rates – and in future interest rate expectations – has allowed companies to take on steadily more debt. Therefore, despite the current record debt levels today, interest payments are only just above their long-term average interest coverage. This seems to be the case irrespective of which market we look at. Indeed, the conclusion is difficult to avoid even when focusing on individual credit sectors. The relatively high correlations between sectors across borders – and even between sectors which have recently had unrelated credit fundamentals, such as utilities and telecoms – suggest that all investors have exposure to this broader credit spread cycle.

3.0 Considerations for Pension Fund Investors

3.1 Are Corporate Bonds a Separate Asset Class?

Unfortunately there is no accepted definition of 'asset class'. A few practical examples might help. Some might say that 'equities' are an asset class. After all, each equity provides the same form of economic benefits, namely a share in the assets and earnings of a company. But are UK and US equities in the same asset class? Or do two portfolios measured against the FTSE All-

Share Index, but one managed passively and the other managed to a 'high performance' mandate, belong to the same asset class?

For the record, the correlation between the UK and US equity market has been about 85%. Arguably, they are in the same asset class, but generally are treated as being separate classes. Typical correlation between a passive and a high performance equity mandate might be about 95% (or higher). Most people would agree they are the same asset class. There are clearly shades of grey, perhaps the crossover point might be about 90%.

Table 2 shows correlations between UK corporate bonds and gilts over the five years ending June 2002. For this purpose we compare All-Stocks benchmarks, but similar conclusions can be drawn for separate maturity band benchmarks.

Table 2: Correlation between Gilts and Corporate Bonds

Bond Rating Category	Average Monthly Correlation With Gilts
AAA	93%
AA	90%
A	83%
BBB	79%
Total Inv Grade	90%

Not surprisingly the higher the quality of bond the closer the behaviour to gilts. The difference is most marked in BBB showing the lowest correlation. Interestingly, the investment grade universe shows a 90% correlation to gilts.

From this simple quantitative analysis it is difficult to conclude that investment grade corporate bonds are very different from gilts. It would perhaps be better to regard them as collectively constituting one asset class – 'fixed income bonds'.

Against this might however be set a qualitative analysis. Where gilts and corporates differ are:

risk of default and asymmetric distribution of returns (i.e. corporate bonds have a similar upside to gilts but with default, a very different downside potential),

correlations of returns can be volatile – for example for AA, although averaging out at 90%, the annualised correlation to gilts varied over the period from 72% to 99%,

exposure to systemic risk in corporate bonds – e.g. a whole sector could be affected by one economic event, and

the way they are managed requires very different skills – principally the management of credit risk which is an essential part of managing corporate bonds.

Regrettably this paper only scratches the surface of the debate. It is perhaps for others to take the debate forward, but it may prove impossible to form a conclusion as to whether investment grade corporate bonds are a separate asset class.

The case is however very different for non-investment grade (or 'high yield'). In the UK this market is very small and comparisons drawn could be spurious. A useful comparison may however be made with the US corporate bond market. Sweeting (2002) compares the correlation between Treasury bonds, investment grade, and high yield corporate debt. As regards Treasuries and investment grade, the experience was not dissimilar to the UK experience. For high yield, the correlation with Treasuries was only about 30%, and with investment grade, about 50%. On this evidence, high yield would indeed appear to be a different asset class.

3.2 Liability Considerations

Any investment should be justified in relation to funding the liabilities. Immediately there's a problem with respect to pension liabilities linked to final salary, because there is no commonly accepted match.

However there now exists a significant body of academic work debunking the myth that equities are a good match for (real) pension liabilities. Regulatory distortions aside (MFR, or accounting), most actuaries would agree that the 'least risk' investment strategy is to invest in gilts, and then probably a mixture of fixed income and index-linked, depending on a scheme's liability profile. This is especially the case where it is possible to match the cash flows required for a portfolio of pensioners, with the cash flow from a portfolio of gilts.

Given the similarities between gilts and corporate bonds, and the attractive risk adjusted returns available from corporate bonds there seems a prima facie case for investment in 'fixed income bonds' rather than just purely gilts.

Reasons for investing in fixed income bonds rather than gilts are as follows.

Maturity and Volatility of Contributions

A maturing scheme creates an appetite for a more defensive investment strategy. A scheme where payroll is small (or declining) in relation to fund size will exhibit significant volatility of contributions in relation to payroll largely driven by the quantum of investment risk taken on. This is because experience surpluses and deficits must be spread into the (small) payroll. Volatility can be controlled by investing in bond type assets and corporate bonds offer a higher expected return than gilts.

Pending or Planned Insurance

Many schemes have considered some form of insurance (e.g. for pensioner liabilities), or at its most extreme, a buy-out of liabilities on winding up. Insurance companies use a mixture of corporate bonds and gilts for pricing and trustees seeking to match annuity prices in advance of insurance will be using a portfolio of corporate bonds and gilts. This might be especially relevant in a wind up situation.

Move to Market Related Actuarial Valuation Bases

Many actuaries have moved away from the discounted dividend way of assessing funding level,

using instead, market related funding bases. Many of these use the yields on corporate bonds as a benchmark (“plus a bit” for the higher expected return on equities). Inevitably securities with bond characteristics can provide a better match for liabilities measured in this way.

Corporate Pensions Accounting

For good or ill, under FRS17 the UK has moved towards an environment of more transparent pension cost disclosure where pension items are “marked to market”. Under this standard, pension liabilities and assets are taken directly onto the corporate balance sheet. Assets are taken at market value and liabilities are marked to market using the yields available on AA rated corporate bonds.

Investing in a portfolio of such bonds would protect the fund against fluctuations in FRS17 funding level, and so fluctuations in the net pension liability on the sponsoring company’s balance sheet. In fact, this can only be true if the liabilities are short (and predictable) enough for matching. Liabilities of long (un-matchable) duration, and those linked to salary inflation cause complications for direct matching, although the swaps market can be used to synthetically manufacture longer duration assets than are available in the physical market. Yields for discounting long term liabilities (up to 70 years) can also be derived from the swaps market.

US (FAS87etc.) and international (IAS19) accounting standards require pension liabilities to be calculated with reference to corporate bonds although (presently) incorporate more sympathetic smoothing mechanisms resulting in lower balance sheet volatility than FRS17 creates.

Strictly speaking, pension fund investors, being responsible for funds held under trust, and legally separate from the sponsoring employer, are a step removed from the need to manage corporate accounting measures. But they do not operate in a vacuum, and ought to be aware of corporate accounting issues.

3.3 Inflation-linked Liabilities

The considerations which apply if an investor wishes to cover inflation-linked liabilities with fixed income corporate bonds, have direct parallels to using fixed income gilts to cover these liabilities.

The reality is that each client will have a view on the trade-off between risk and reward. As with most decisions on the risk management of a pension scheme (e.g. to manage volatility in funding security, and/or contributions) this can be modelled, either through deterministic or stochastic projections.

3.4 Inflation-linked Corporate Bonds (Including LPI)

In theory there should be great demand for such securities. The reality is that issuance has been light and the issues which exist are tightly held and extremely illiquid. This probably makes investment in this asset class impractical although synthetic index-linked corporate bonds could be created using interest rate swaps.

3.5 Active or Passive?

Tracking a corporate bond index is less straightforward than tracking an equity index (such as the FTSE All-Share). This means higher tracking errors than might be experienced in (for example) a gilt fund.

The weights in the index reflect an even greater concentration than those in the equity market. Sector weights too are more concentrated, particularly in financials and utilities, so tracking the index can mean large sector exposures.

New equity issues (e.g. new listings or rights issues) tend individually to be small, having little influence on the index. New debt issues tend to be much larger, and companies with existing debt issues often issue new debt of a similar size to the existing issue(s). This can have a dramatic effect on index weightings, resulting in heavy trading costs to rebalance. It is worth remembering that the issuers or sectors with the largest debt are often the least creditworthy and the credit risk tends to increase when their market weighting is rising.

A further feature of the corporate bond market, as we mentioned in section 3.1 is the potential asymmetry in returns distribution – that is, no high flyers but possibility of total loss. In this sense they are quite different to equities (potential high flyers) and gilts (no default risk). So there is a premium on the quality of credit research, and knowing where the portfolio may contain systemic (i.e. non-diversifiable) risk.

Finally, active managers are free to anticipate rating upgrades and downgrades. By definition the index must follow a downgrade down, and cannot anticipate a new entrant arising from an upgrade. These are low risk opportunities to add value which are denied to the passive manager.

For corporate bonds, the balance of the argument appears to favour an active, as opposed to a passive, management approach.

3.6 Active Portfolios Construction

Most bond managers separate their activities into fund management, credit analysis and trading. It's not unusual to see these functions blurred with fund managers and credit analysts being one and the same, especially as credit analysts are in short supply. Another variation is where the fund manager executes trading. The corporate bond market is not exchange traded and it could be argued this gives fund managers a closer 'feel' for their market. Typically fund managers/portfolio constructors will be aided by risk reporting – especially when designed to control tracking error of fund performance against the performance benchmark.

In constructing portfolios, the fund manager will pay particular attention to the benchmark, but obviously in an actively managed portfolio will need to take active positions.

The types of bet that might be taken in an active portfolio are:

Duration – betting that interest rates in general (i.e. all the way along the yield curve) will rise or fall and so benefit from different price performance compared to the benchmark by having a different duration,

Yield curve – constructing a portfolio that overall is duration neutral but that can profit from interest rate moves at different parts of the yield curve,

Rating band – betting that bonds with one particular credit rating will do better than the benchmark,

Sector level – betting that the credit quality of a given sector will improve relative to the benchmark,

Stock level – betting that a single bond will rise more than another, and

Off-benchmark – including assets which are not in the benchmark, in the expectation of profit relative to the benchmark, for example buying foreign bonds but hedging out the currency risk to profit from a higher yield available in the foreign market.

It should be immediately clear that active management of corporate bond portfolios is fundamentally different from that required to manage gilts – the potential sources of out-performance being myriad, and requiring a different skill set.

As regards the amount and nature of active positions, this will usually depend on the out-performance target (against the benchmark), and the manager's philosophy and process. For example, 'top down' managers tend to arrange their bets in accordance with macro economic factors. 'Bottom up' managers tend to focus bets on identifying relative attractions of individual stocks or issues.

3.7 Attributes of a Good Corporate Bond Manager?

There is no right or wrong fund management model, but the following may be sources of competitive advantage:

Quality/depth of credit research - this is not the same as how many credit analysts are employed, given shortage of supply of quality credit analysts. An argument can also be made in favour of communication between equity and credit analysts providing insight (beware, however, managers who use this to justify lack of resource).

Diligence in sourcing prices (or deals) from brokers - corporate bonds are not exchange traded; those managers offering liquidity to brokers may be able to achieve liquidity in return. This may result in exploitable opportunities denied to others.

Risk awareness - not just about tracking error, but risks attaching to broader issues, such as duration risk, sector risk, and developments in the global markets.

Risk diversification - taking risk awareness and leveraging it effectively. Knowing where to allocate risk most efficiently – possibly through a risk budgeting approach.

Managing defaults – in the event of a default, a good manager will be involved in the default process to secure the best outcome.

Portfolio construction skill - partly about anticipating downgrades/upgrades in advance of the rating agencies, but also skill in spotting when the market has mis-priced a bond (i.e. the market has overreacted to the threat of a downgrade, which would suggest the bond is undervalued). Being aware of all previous bond issues (including the term, coupon and covenants) for making switching decisions. Understanding/identifying technical features/sentiment in the market.

3.8 Monitoring the Manager

The nature of markets and competitive environment imply a process of continual change. Investors ought to meet their manager(s) regularly, assessing whether there has been change in any of the above factors, and most particularly, the catalyst and impact of any change. Change can be positive or negative.

Investors need to understand sources of under- or out-performance, whether risks being taken are commensurate with the out-performance target. They also need to give the manager sufficient room for manoeuvre. Even for a skilled and successful manager, active management can mean periods of under-performance.

Employing more managers can mitigate manager risk. It is, for example, possible to combine managers with complementary styles (for example, a 'top down' with a 'bottom up'). The extent of diversification needs to be practical given the size of the scheme, expense and convenience. Smaller pension fund investors could delegate such monitoring to a third party, which would then enable efficient access to a well-diversified portfolio.

3.9 Alternative Investment Opportunities

The high yield market in Europe is in its infancy, whereas in the US it is a mature market. Investors looking for broader bond opportunities might wish to consider overseas bond markets, not only as a source of high yield type bonds but also for tactical performance gains with or without the currency exposure.

Ten years ago the UK corporate bond market was in its infancy, but now, at a size of some £225 billion for investment grade, it has probably reached maturity. There is only so much capacity for issue of investment grade bonds. Of course this is different from potential demand! A recent estimate for the liability pool of UK non- insured pension funds is £800 billion. And then there are insurance companies on top.

Compared to the UK corporate bond market (some £250 billion, including high yield), the global corporate bond market has a market capitalisation of some £6 trillion. The reality is that enormous opportunities exist abroad. If the rationale for investment in UK corporate bonds has been to seek investments which amount to "gilts with a bit more risk", it would be quite legitimate for investors to look at these markets.

Investors need however to understand that the choice of duration available in certain overseas markets is different (generally shorter) than in the UK. Additionally, price changes are not driven by movements in sterling interest rates, so there is a mismatch to the driver of liability values which will need to be justified on risk/reward grounds.

The main risk of investing in overseas bond markets is almost certainly currency. But this can often be hedged out at very low cost, effectively locking in any yield pick up. Typically however, pension funds do this on a 3-month rolling basis which leaves them exposed to rollover risk. One alternative would be cross-currency swaps which can be used to effectively convert a foreign currency bond into a domestic currency bond. Another alternative is to gain a credit exposure via the CDS markets using a globally diversified portfolio of CDS risk as an overlay to a AAA sterling asset that best matches the liability.

3.10 The Euro

If the UK adopts the euro, then by definition the yields on Euro-zone and UK bonds must converge, and any currency risk for a UK investor buying a Euro denominated bond disappears. Presently the yield for European bonds is higher than that for a comparable UK bond. For issuers this will lead to more expensive financing, but for investors, a greater return (and by inference, cheaper pensions) should then be available.

However it isn't as simple as this. Despite having one monetary policy across the Euro-zone, individual countries may still experience different inflation rates. However euro-denominated bond yields will settle at a level related average Euro-zone inflation.

Meantime, index-linked gilts may remain linked to domestic inflation (despite being euro-denominated). This could mean a series of (small) index-linked markets operating alongside an enlarged fixed income market. Because of this, it is possible (if UK inflation expectation exceeds that of the Euro-zone) that index-linked gilts could become attractive relative to corporate bonds. Investors will also have to take a view on whether Euro bonds will return a satisfactory premium over inflation. This may lead them to look for different ways of hedging against domestic inflation.

Investors should make themselves aware of the nature of the inflation link implied by their liabilities, and invest accordingly. They should also take care to understand the consequences of any mismatching.

This discussion will of course remain theoretical as it remains to be seen how the inflation peg for index-linked gilts is set (and how Eurozone and UK inflation might diverge), and of course the UK electorate must decide whether to adopt the euro. At the time of writing this is looking unlikely in the next few years.

3.11 Corporate Re-engineering

Some companies are beginning to consider the assets and liabilities of their pension fund along with their operational assets and liabilities when considering capital structure. Boots is a good example of this.

For those unfamiliar with the case, Boots pension fund is now invested solely in a portfolio of fixed income (actually AAA rated) and index-linked bonds. In addition, the trustees have some RPI swaps which exchange some of the fixed rates flows for inflation-sensitive payments like index-linked bonds. The liability profile is however typical of a UK pension scheme, with duration in excess of 30 years. To add to the mystique, the change in investment strategy was conducted over a period just prior to an equity market collapse (thereby locking in very

considerable value). Moving the assets at that time was an accident of timing, plain and simple. But calling markets was never Boots intention anyway.

Instead, the thinking behind the move was that the corporate structure of any company can be thought of as including the pension scheme and indeed investors have started to price securities on this basis. That is, pensions are a liability ultimately falling upon shareholders, so form part of the company's debt obligation. A pension fund loaded with equities is therefore a source of corporate risk over which the company has limited control.

Pension liabilities can be thought of as bond-like in nature. Boots argued that by switching equities into bonds in the pension fund, they were matching scheme assets and liabilities more closely and therefore reducing the risk for shareholders and creditors as well as for pension scheme members. Having reduced the off- balance sheet risk they could therefore increase the on-balance sheet risk without affecting the overall risk.

A further advantage is tax efficiency. If more of the gearing of a total entity is taken on the balance sheet, there will be less tax to pay as the debt interest charges can be offset against income before tax is levied.

To the extent that bonds are expected to underperform equities in the long term, the expected contribution rates to provide the pension benefits will rise if all the assets are held in bonds, but in Boots' case, they reduced the overall annual management costs of the pension fund by about 0.25% of assets, providing at least some offset.

It remains to be seen how many other pension funds go down this route, but both pension scheme and corporate decision making/governance need to be perfectly aligned. This perhaps makes it an unlikely strategy for most pension schemes, but nonetheless one which cannot be ignored.

Appendices

Appendix 1: Common Variations in Issuing Terms

Maturity features:

Callable - The issuer of the bond has the right to redeem the debt before maturity, on specified dates and at specified prices. Lower interest rates increase the likelihood of a call option being exercised. Often a callable bond will be structured so that it is highly likely that the issuer will call it at the call date. This could be achieved by specifying a rise in the coupon as the bond moves towards maturity. This would increase the cost of the debt to the issuer, but if new debt can be issued at a lower yield then the old bond will be called, with the proceeds coming from the funds raised from issuing new debt.

Puttable - The holder of the bond has the right to redeem the debt before maturity, on specified dates at specified prices. Higher interest rates increase the likelihood of a put option being exercised.

Sinking Fund – The issuer is required to retire a specified portion of the issue each year.

Coupons:

Index-linked – both coupon and capital payments are linked to the RPI. These suit investors whose liabilities are defined in real terms, e.g. pension funds.

Floating rate - the coupon payment is referenced to an index, normally short term interest rates.

Inverse floater – coupon payment is determined by subtracting the referenced variable index rate from a fixed rate. Therefore the coupon payments floats inversely to the reference rate.

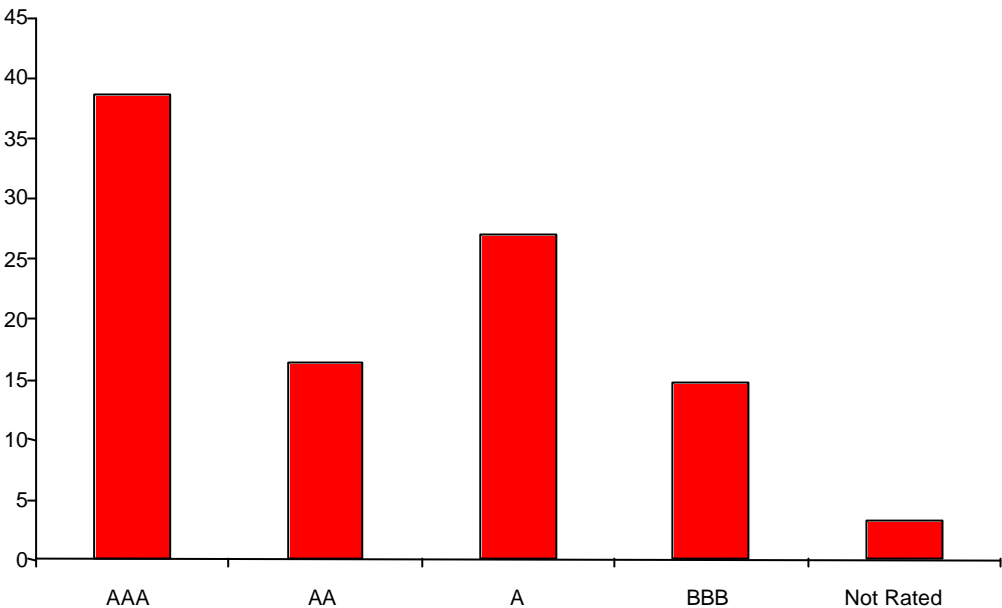
Step-up coupon – the coupon increases on a quality downgrade.

Step-up notes - interest rate increases periodically with time.

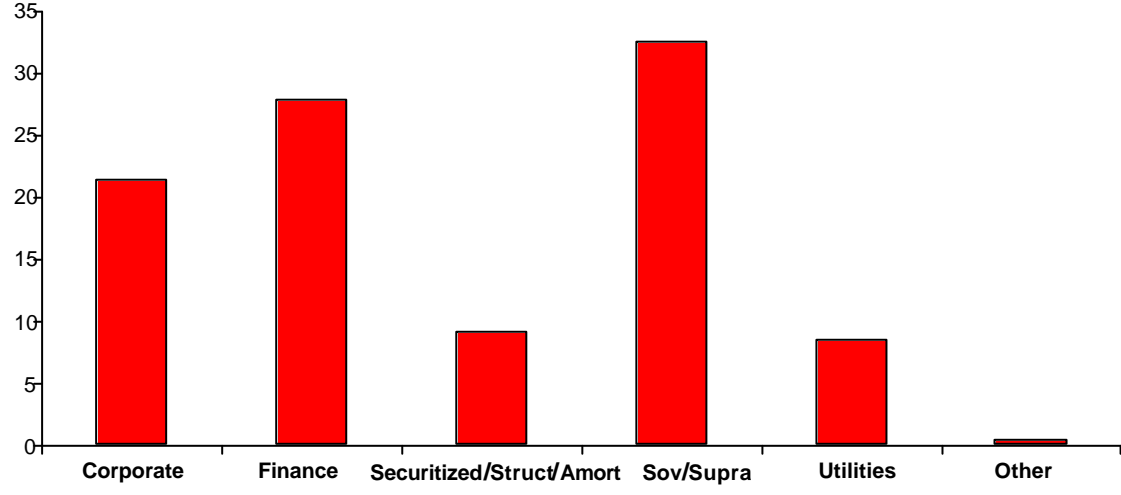
Zero coupon – has no interest payments and pays only the principal on maturity.

Appendix 2: Features of Barclays Capital Sterling Non-Gilt Index

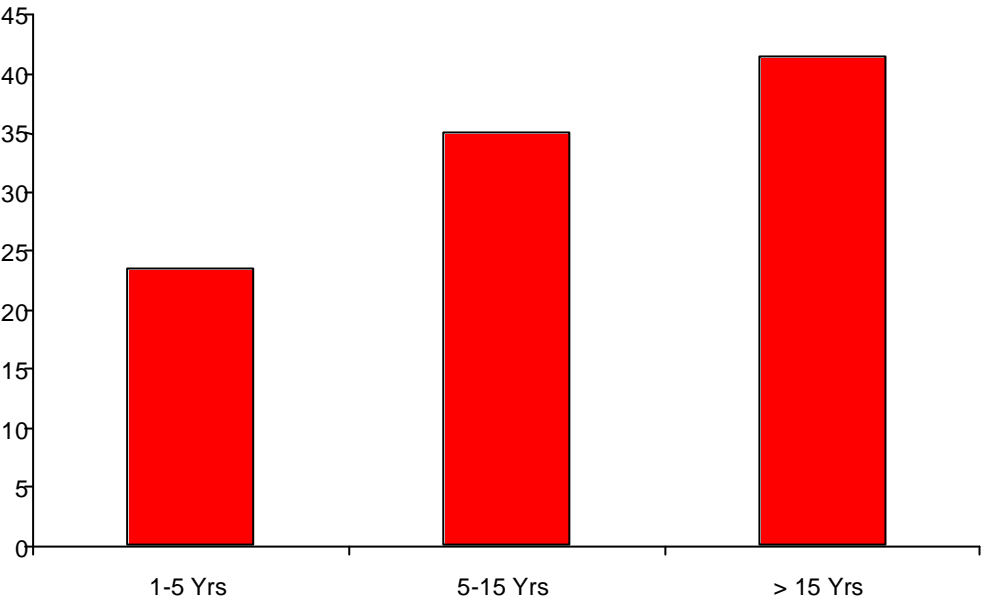
Quality Distribution :



Sector distribution :



Maturity distribution :



Appendix 3: Rating Scale Equivalencies

Ratings are split into two categories, short term and long term, normally covering maturities of up to 1 year and over 1 year. The market also distinguishes between investment grade and speculative (or non-investment) grade issues.

Standard & Poor's		Fitch IBCA		Moody's	
Short term	Long term	Short term	Long term	Short term	Long term
Investment grade					
A-1+	AAA	F1	AAA	P-1	Aaa
	AA+		AA+		Aa1
	AA		AA		Aa2
A-1	AA-	F1	AA-	P-1	Aa3
	A+		A+		A1
A-2	A	F2	A	P-2	A2
	A-		A-		A3
A-3	BBB+	F3	BBB+	P-3	Baa1
	BBB		BBB		Baa2
	BBB-		BBB-		Baa3
Non-investment grade					
B	BB+	B	BB+	Not Prime	Ba1
	BB-		BB-		Ba2
	B+		B+		Ba3
	B		B		B1
	B-		B-		B2
C	CCC	C	CCC	Not Prime	B3
	CC		CC		Caa
	C		C		Ca
D	D	D	D		C

Appendix 4: Ratings Transition Matrices And Recovery Rates

Average One-Year Rating Migration Rates (%), 1985 – 2001

Europe

Rating at Start	Rating at End								
	Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	Rating Withdrawn
Aaa	86.34	8.21	0.19	0.00	0.00	0.00	0.00	0.00	5.26
Aa	0.76	86.71	9.13	0.10	0.00	0.00	0.00	0.00	3.30
A	0.00	5.05	84.80	3.63	0.10	0.02	0.00	0.02	6.39
Baa	0.74	0.25	4.82	78.83	2.86	1.16	0.04	0.00	11.31
Ba	0.00	0.00	0.64	10.52	71.40	9.29	0.68	0.25	7.22
B	0.00	0.00	0.33	1.03	9.40	65.52	8.28	3.29	12.17
Caa-C	0.00	0.00	0.00	0.00	0.00	22.41	48.58	14.53	14.47

United States

Rating at Start	Rating at End								
	Aaa	Aa	A	Baa	Ba	B	Caa-C	Default	Rating Withdrawn
Aaa	87.69	6.13	0.42	0.00	0.08	0.00	0.00	0.00	5.68
Aa	0.72	85.21	8.75	0.45	0.12	0.02	0.00	0.00	4.74
A	0.08	2.32	87.15	5.34	0.64	0.24	0.03	0.02	4.18
Baa	0.07	0.30	5.55	83.01	4.54	0.99	0.08	0.18	5.28
Ba	0.03	0.04	0.65	5.18	73.90	8.57	0.47	1.45	9.71
B	0.01	0.06	0.23	0.64	5.06	73.94	3.84	7.18	9.04
Caa-C	0.00	0.00	0.00	1.18	1.66	5.18	59.51	21.75	10.72

Source: Moody's

Average Defaulted Debt Recovery Rate Estimates 1985-2001 (Percent of Nominal)

Seniority	Europe		United States	
	Average	Number	Average	Number
Bank Loan – Sr. Secured	71.80	4	66.80	201
Sr. Secured	55.00	1	56.90	150
Sr. Unsecured	20.80	28	50.10	565
Sr. Sub.	24.00	4	32.90	359
Sub.	13.00	1	31.30	342
All Bonds	22.00	34	42.80	1,416

Source: Moody's

Bibliography

Valuing Credit Fundamentals: Rock Bottom Spreads, Nov 17, 1999, and *Introducing the JPMorgan Rock-Bottom Spread Calculator*, Jul 12, 2001
The Role of High Yield Corporate Debt in Pension Schemes, Paul Sweeting, 2002
Structured Solutions Liability Driven Investing, Standard Life, 2002
The Sterling Corporate Bond Market and its Future Development, Mehta et al, 2001
FRS17: Investment Strategies for Pension Schemes, Schroders, 2002
Corporate Bonds Made Simple - What a Trustee Needs to Know, NAPF, 2002
Credit Derivatives: A Primer, J P Morgan, 2002
Modelling Corporate Bonds – Considerations for Stochastic Modelling, Exley & Smith, 2002
The Merrill Lynch Guide To The Gilt-Edged And Sterling Bond Markets,
Patrick Phillips - 1996
Futures, Options and Swaps, 3rd edition, Robert Kolb - 30 June 1999
Credit Spreads, Default rates and the Business Cycle, JP Morgan Securities, August 2002

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