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Fundamental Credit Special

100 Years of Corporate Bond Returns Revisited

The Upcoming Decade of Credit Returns?

This document provides 109 years of real and nominal returns for US Corporate Bonds, Treasuries, Equities and Property with an additional time series for Oil over the last 50 years. We first published this document in November 2005 during a period of healthy markets and around the peak of the US housing bubble. The main conclusion from the note was that we had just been through a historically unparalleled 25-year period of returns in all asset classes that had sent most risk assets to inflated levels relative to their historical averages. Mean reversion suggested tough times ahead for the long-term investor. Three years later, and in the midst of a once in a lifetime credit crisis, much has subsequently changed in valuations relative to very long-run averages. We therefore update our mean reversion analysis to reflect this.

A quick summary of the results shows that the extreme stress in the cash credit markets, with spreads at around all time (100 year) wides, has left the asset class with the most to gain from mean reversion. Double digit annual returns are a realistic possibility over the medium-term even as defaults pick up. Inflation may actually be a bigger longer-term risk to nominal returns than defaults from this starting point. Indeed Treasuries could be set for a decade of negative real returns from this starting point, assuming no repeat of Japan's almost permanent negligible inflation. US Equities now offer the potential for slightly better than average long-term returns for the first time in over a decade of chronic historical overvaluation. However we also show that we are nowhere near the potential lows if we repeat the low valuations seen through history. Overshooting is a real medium-term concern, especially as the demographic support deteriorates from here. Overall there are plenty of caveats to the results and they should be seen as a long-term valuation tool, and totally irrelevant to short-term price movements. Even if mean reversion exists, the actual point is rarely observed in history and certainly not simultaneously seen across different asset classes.

We also look at demographics in more detail and examine the thesis that frequent bubbles and long periods of strong asset price returns could be associated with the Twentieth Century baby boomers, first in Japan 20 years ago and more recently the Western World. Will the Western World now be resigned to the same asset price fate as post 1990s-Japan now that the demographic support for assets has or is peaking? Or will generally favourable EM demographics save the day in a globalised world?

If demographics are as big an influence on long-term returns as we think they are then risk assets may, in the next decade, trade at valuations below their long-term averages. Even as US equities now start to trade at long-run average valuations for the first time in 13 years, we may have to view future returns in a different light as we did during the baby boomer driven bull market of 1980-2000 for equities and 1980-2005 for fixed income and property assets. A sobering prospect but at least the credit crisis has allowed risk assets to more appropriately price in the more challenging times that are likely to still be ahead, especially as the Western World ages.

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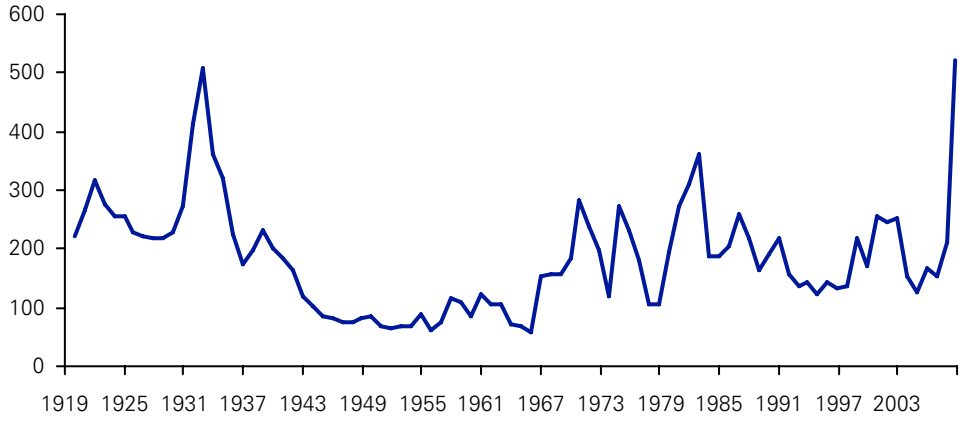
Executive Summary

We first published this document in November 2005 during a period of healthy markets and around the peak of the US housing bubble. The main conclusion from the note was that we had just been through an unparalleled period of returns in all asset classes. Indeed the 25 year period around 1980-2005 saw stunning returns for Corporate Bonds, Government Bonds, Property and Equities alike. However the starting point helped facilitate such super-sized returns. In 1980 the yield on the 10-year US Treasury was 12.43%, the P/E ratio on the S&P 500 was below 10 and BBB spreads were +274bps. Looking at longer term averages for these asset classes, those starting points provided plenty of potential for future performance. However as 2005 was drawing to a close all these asset classes were at valuations notably above their long-term averages. The mean reversion exercise in the piece suggested a much more sober period ahead for absolute total returns in risk assets with negative real returns likely in the second half of the decade in US Bonds, Equities and Property if they mean reverted back to their long-term averages.

So given all the volatility of the last 12-18 months we thought we'd see how the medium to long-term outlook for asset price returns has changed over the period on a mean reversion basis. Our main focus is to assess how much value there is in credit on an absolute basis and also relative to other asset classes.

Given that over the last 3 years credit has gone from near historic tights to historic wides, then it's no surprise that credit comes out of the mean reversion exercise as generally the cheapest asset class. In fact if mean reversion was your only analytic tool then we are set for the "Decade of Credit" with the asset class out-performing traditional alternatives. If we mean revert spreads back to their long-term average, and assume average defaults and recoveries then HY out-performs Treasuries and Equities by 22.9% p.a and 9.8% p.a respectively over the next 3 years and then by 16.6% p.a. and 6.7% p.a. over the next 5 years. Even over the 10 year period HY out-performs Equities by 4.5% p.a. If defaults and recoveries are much lower in this cycle there is still a substantial risk premium attached to credit relative to all asset classes.

Figure 1: LT US BBB Spreads



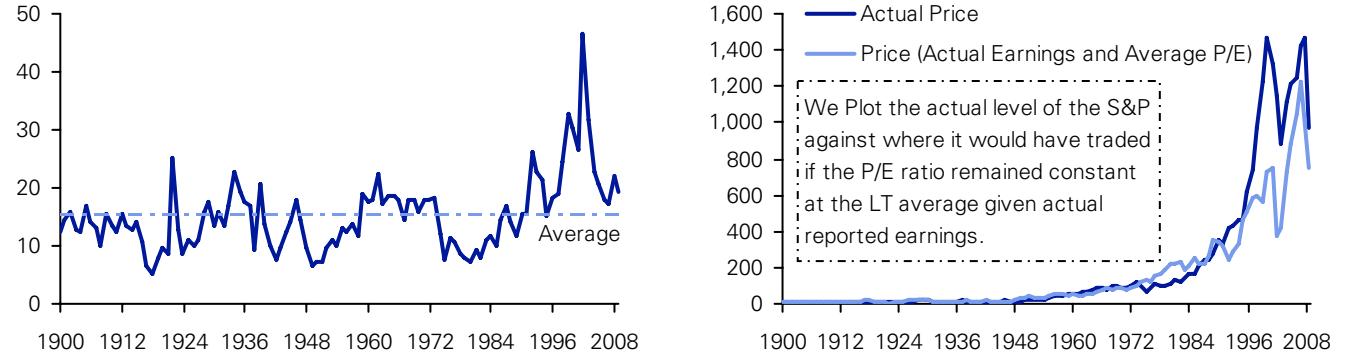
Source: Deutsche Bank, Bloomberg, Moody's, NBER, Irrational Exuberance (second edition) (Robert Shiller)

Indeed long-dated US IG bonds come out of this analysis with potential mean reversion returns greater than that of US equities. This is a very favourable comparison for credit on a risk reward basis as the long-run data (Figure 5, page 8) shows that Equities have historically out-performed IG credit by around 4% p.a.

With the slump in US equities over the last two months, they now come out of the mean reversion exercise with slightly above average returns for the first time in over a decade. This past decade or so has seen US equities as far away from their mean as they ever have been through history.

Figure 2 shows the long-run P/E ratio of the S&P 500 and also where the S&P 500 would have been through history if it had always traded at 15.2 times (the long-term historic average P/E) current trailing earnings.

Figure 2: S&P 500 P/E Ratio (left) and the S&P 500 vs. the Index Based on the LT Average P/E Ratio



Source: Deutsche Bank, Irrational Exuberance (second edition) (Robert Shiller), S&P

Currently the S&P 500's P/E ratio is still slightly above its long-term average but the good news from a valuation perspective is that earnings are now below their long-run trend. Although the P/E ratio of the S&P is similar to where it was pre-crisis (August last year), profits have declined from their highest share of GDP on record to a point where they are slightly lower than their long-run average trend.

However if long-term historical prices are your guide then US equities are not ridiculously cheap at these levels but are instead returning into fair value territory for the first time in over a decade. The worry must remain that in a period where we are in the midst of a once in a lifetime credit crisis, equities could be trading at valuations that rival some of the cheapest seen in history. As we will see on page 21 we are nowhere near these rock bottom valuations. If we matched the valuation lows through history then a realistic overshoot target for the S&P 500 could be 500-600.

Having said this, it does look like we are nearing the end of a 'lost' decade of returns for US Equities relative to most other asset classes. Negative returns from this starting point are likely to be cyclical and overshooting in nature and less from structural overvaluation, assuming that we do not spiral into a Japan-like deflation cycle. This is clearly not an insubstantial risk but at least we start from more reasonable valuations, especially against Treasuries. A full report on the mean reversion exercise appears on page 26, however the results are copied below and are based on assets fully mean reverting in either 3, 5 or 10 years.

Figure 3: Potential Annualised Returns Based on Mean Reversion

		Nominal Returns			Real Returns		
		3yr	5yr	10yr	3yr	5yr	10yr
US Long-Dated	Corporate Bond	15.1%	11.7%	9.3%	11.0%	7.7%	5.3%
(Moody's Data)	BBB Bond	18.9%	14.3%	11.0%	14.7%	10.2%	7.0%
	Treasury	1.4%	2.7%	3.7%	-2.2%	-1.0%	-0.1%
	Equity	13.0%	11.6%	10.6%	9.0%	7.6%	6.6%
High Yield	US High Yield	22.8%	18.3%	15.1%	18.4%	14.1%	10.9%
	Treasury[1]	-0.1%	1.7%	3.1%	-3.6%	-1.9%	-0.6%
iBoxx Euro	Corporate Bond	8.9%	8.0%	7.4%	5.8%	5.0%	4.4%
	BBB Bond	11.0%	9.4%	8.2%	7.8%	6.3%	5.2%
	Bund[1]	1.1%	2.4%	3.4%	-1.8%	-0.5%	0.5%
iBoxx Sterling	Corporate Bond	11.5%	9.8%	8.5%	7.3%	5.5%	4.2%
	BBB Bond	13.5%	11.1%	9.2%	9.3%	6.8%	4.9%
	Gilt[1]	1.8%	3.2%	4.2%	-2.0%	-0.8%	0.1%
iBoxx Dollar	Corporate Bond	12.5%	10.5%	9.0%	8.6%	6.6%	5.0%
	BBB Bond	15.0%	12.1%	9.9%	11.0%	8.0%	5.8%
	Treasury[1]	0.1%	2.0%	3.5%	-3.4%	-1.6%	-0.3%
Other Assets	*Property (price only)*	*-7.5%*	*-3.1%*	*0.3%*	*-10.7%*	*-6.6%*	*-3.4%*
	Oil (price only)	*-14.3%*	*-7.4%*	*-2.0%*	*-17.3%*	*-10.8%*	*-5.5%*

1 – Comparable maturity Government bond
Source: Deutsche Bank

On a mean reversion basis, nominal annualised returns on US Equities would be 13.0%, 11.6% and 10.6% on a 3, 5 and 10-year basis. On a real basis these numbers are 9.0%, 7.6% and 6.6%. For comparison sake the 109-year annualised returns on US Equities have been 9.29% (nominal) and 6.01% (real).

The long-term potential real return for Treasuries has to now be seriously questioned. The flight to quality seen in the asset class has left valuations vulnerable on a mean reversion basis. So although it could be the "decade of credit returns", it could also be the decade of negative real returns in US Treasuries. With mean reversion, Treasuries could see -0.1% p.a. real returns over the next decade. For those that are surprised by this result, a glance at page 10 should be sobering as Treasuries saw four successive decades of negative real returns between 1940 and the end of the 1970s. This long sweeping move started out from a period of Depression, moved to one of negative real yields and then turned into an inflationary spiral. In valuations terms, we are currently in a period similar to the second of these three periods. With real yields so low, there is limited scope for performance.

What are the main limitations of this analysis?

Firstly, the one comment that needs to be made is that markets only ever trade at their true mean reversion point for a split second through history. Markets spend 99.99% of their time trading away from such a point and even if one asset class gets close, another can be a long distance from it. So this analysis should be seen as an (hopefully) interesting valuation guide to asset classes based on their past behaviour.

We should also mention that one man's mean reversion could be another man's structural shift. While we are always suspicious of structural shifts or new paradigms, we accept that the way asset classes interact with each other does change over time and this in turn eventually impacts the averages. So what looks like a return to the mean today may not be with a few more years of data.

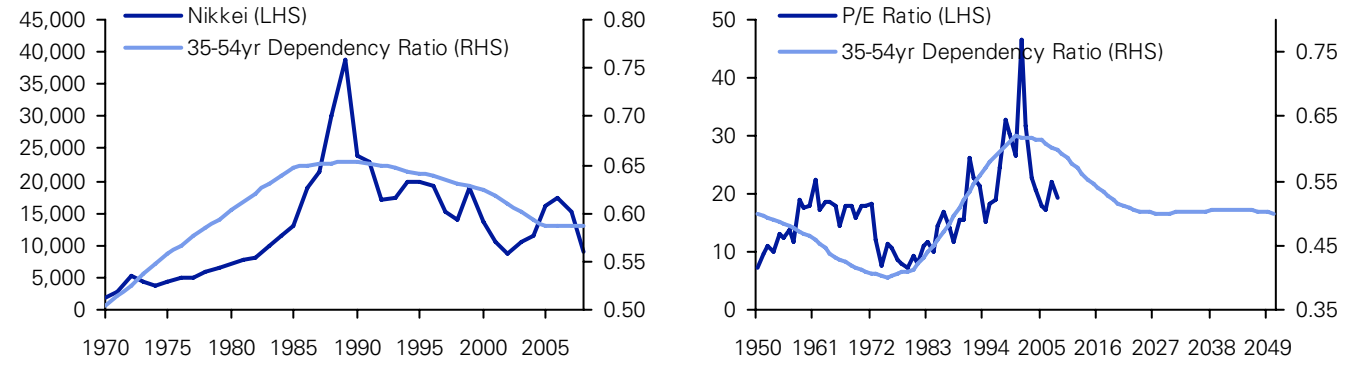
We have also mainly concentrated on US assets in the study. While the results could be a template for other Western markets, there will be noticeable differences. European equities

for example, appear cheaper than US equities. So readers should be aware of this US data bias when interpreting our conclusions.

What are the main risks to mean reversion?

If you accept the validity of the framework used in this study then what are the main risks to the results over the next 3-10 years. Undoubtedly the cloud hovering over the horizon for mean reversion is what happened in Japan 15-20 years ago. Whether it's a coincidence or a harbinger of things to come, the demographic shift that Japan underwent in the late 1980s/early 1990s has started to hit the US. It could be that returns seen in all asset classes (in the West) in the 25 years up to 2005 will eventually be seen as a demographic anomaly. On this basis the next 25 years look very challenging and we may all need to re-assess our beliefs about what an appropriate return level is for various asset classes. This has huge ramifications for the whole investment industry. We explore this in more detail on page 14. Japan is indeed a scary template (see Figure 4 below) but at least risk assets have adjusted ahead of this demographic time bomb to some degree.

Figure 4: Japanese 35-54yr Dependency Ratio vs. the Nikkei (left) and US 35-54yr Dependency Ratio vs S&P 500 P/E Ratio (right)



Source: Deutsche Bank, Irrational Exuberance (second edition) (Robert Shiller), S&P, UN Population Division

So although Treasuries look expensive at the moment, especially when you consider how low real yields are, if this credit crunch eventually turns deflationary for a long period (as in Japan) then yields will likely rally strongly even from these levels. Equities would likely slump, and HY defaults would surpass their modern history highs. IG could hold in better on a relative basis as financials and other large employers would likely need to be bailed-out. Whether the authorities continue to deem this debt to be too important to fail will be crucial to performance but we would say that IG prices in levels of default that are arguably much, much worse than those likely to be seen even in a Depression.

Conclusion

Given the uncertainty of the economic outlook and future returns on all asset classes we think that cash credit represents the best long-term risk/reward investment from this starting point. It is the asset class in this study trading furthest away from its mean and spreads are at levels never before seen in either IG or HY. Given the uncertainty over the future inflation outlook then we would prefer to hedge out the interest rate risk but there is still enough yield to be protected from a significant amount of future inflation. In comparison US Equities have returned to fair value territory but it would be difficult to argue that they are anywhere near as stressed as credit valuations.

So are we close to starting the "Decade of Credit Returns"? Much depends on the credit worthiness of Financials and any subsequent supportive interventions from the authorities. However with or without financials, the asset class is as attractively priced, relative to other asset classes as at most points during the last 109 years. This crisis is far from over with the

technical problems in the credit market likely to continue. However it is hard to argue against there being significant long-term relative value against other asset classes. Indeed in this report we look at vanilla credit with long histories to observe. The reality is that in the overall credit universe there is arguably even more stress (and thus opportunities) in ABS and Structured credit markets. The whole credit universe is throwing up some once in a generation opportunities for those that have the balance sheet to exploit them through the still turbulent times ahead.

Before we launch into the main document, we should stress that the methodology used in this piece is important to be aware of when interpreting the results. Indeed there are numerous assumptions used that means that the methodology section is as long as the actual main body of the piece itself. Please take some time to review this if you want to understand how we reached the results seen throughout the document. We would also urge readers to be aware of the footnotes in the tables and graphs as there may be important information detailed that may slightly change the reader's interpretation of the data.

The history of corporate bond returns in the context of alternative asset classes

Long-term total returns

Figure 5 reminds us why we invest and why hoarding cash under the mattress has rarely been the right thing to do over the medium-term.

Figure 5: Historic US Total Returns by Asset Class to 2008 YTD (Annualised)

		Corp Bonds	AAA Bonds	BBB Bonds	Treasury	HY Bonds	HY Maturity Matched Tsy	Equities	Cash	*Property (price only)*	*Oil (price only)*
Real Total Returns	2008[1]	-21.15%	-14.20%	-27.63%	1.38%	-25.78%	4.25%	-34.65%	-0.45%	*-17.06%*[5]	*-32.53%*
	5yr	-2.45%	-0.88%	-4.06%	3.27%	-3.49%	1.17%	-4.11%	-0.33%	*-2.72%*	*12.96%*
	10yr	1.64%	2.41%	0.95%	3.05%	-0.44%	2.23%	-3.54%	0.44%	*1.92%*	*16.66%*
	15yr	3.10%	3.69%	2.68%	4.37%	2.09%	3.11%	4.02%	1.11%	*1.70%*	*8.32%*
	25yr	6.38%	6.59%	6.26%	6.83%	3.57%[4]	3.97%[4]	6.59%	1.75%	*1.32%*	*0.19%*
	50yr	2.43%	2.31%	2.69%	2.10%			4.85%	1.26%	*0.50%*	*2.77%*
	89yr[2]	2.89%	2.75%	3.26%	2.27%			6.76%	1.03%	*0.95%*	
	109yr[3]	2.19%			1.47%			6.01%	0.66%	*0.43%*	
Nominal Total Returns	2008[1]	-18.66%	-11.48%	-25.34%	4.58%	-23.43%	7.55%	-32.58%	2.70%	*-14.44%*[5]	*-30.40%*
	5yr	0.79%	2.41%	-0.88%	6.69%	-0.29%	4.53%	-0.93%	2.97%	*0.50%*	*16.71%*
	10yr	4.57%	5.36%	3.86%	6.01%	2.43%	5.17%	-0.76%	3.34%	*4.86%*	*20.02%*
	15yr	5.89%	6.50%	5.45%	7.20%	4.85%	5.90%	6.84%	3.84%	*4.45%*	*11.25%*
	25yr	9.70%	9.92%	9.58%	10.17%	6.75%[4]	7.17%[4]	9.93%	4.94%	*4.49%*	*3.32%*
	50yr	6.66%	6.52%	6.92%	6.30%			9.17%	5.43%	*4.64%*	*7.01%*
	89y[2]r	5.76%	5.62%	6.14%	5.12%			9.73%	3.84%	*3.76%*	
	109y[3]	5.35%			4.61%			9.29%	3.77%	*3.54%*	

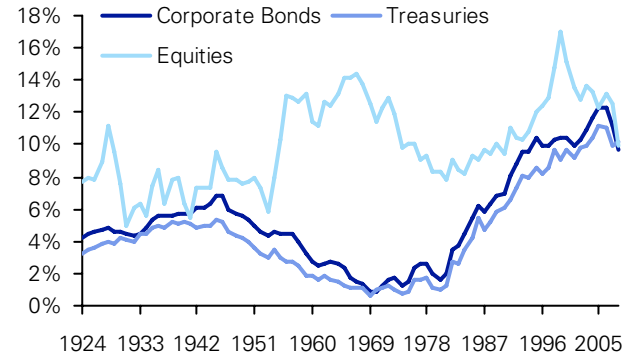
1 – 2008 returns YTD to 31/10/08; 2 – Full history length for AAA and BBB bonds; 3 – Full history for corporate bond, Treasury, equity and cash data; 4 – Full History for HY back 21 years; 5 – 2008 property returns estimated (30/06/08-31/10/08)
Source: Deutsche Bank

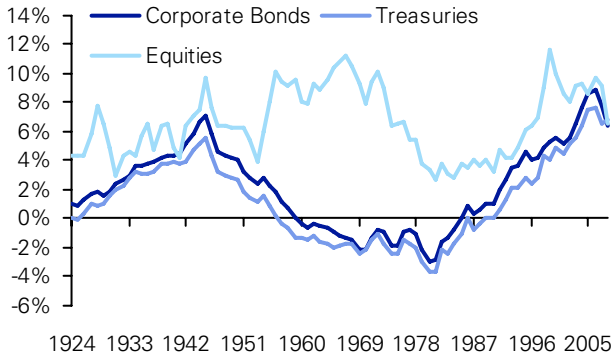
Clearly over the entire 109-year sample period Equities out-perform Corporate Bonds, which out-perform Government Bonds, which out-perform Cash. Over the full 109 year period Equities outperform Governments by 4.54% p.a, Corporates by 3.82% p.a, and Cash by 5.35% p.a.

Perhaps the first point to make though is that with the exception of Treasuries just how poor asset returns have been in 2008 to date from both a real and a nominal perspective. Equities and now Oil have seen the worst of the declines but it has also been a tough time for Corporate Bonds. All this in a period where default rates remain only slightly elevated above multi-year lows. We are pricing in many of tomorrow's likely defaults today.

Taking a slightly longer-term sweeping view of returns we can see from Figure 6 that the 25 years which ended in 1999 proved to be the best such period for Equity returns in our 109 year study and we should perhaps see the subsequent declines as a reaction to this period. For Treasuries the best 25 year period ended in 2006.

Figure 6: Rolling 25 Year Total Returns (Annualised), Nominal (left) and Real (right)





Source: Deutsche Bank

The stunning result of the last two month's sell-off in equities and credit is that we now have a situation where the best asset class over the last 25 years is now long-dated Treasuries. Its 25-year return now eclipses equities, credit, property and oil. So given the choice of a buy and hold investment in Treasuries, equities, property and credit back in 1983, you would have now been best served in long-dated US Treasuries. This really is an amazing statistic in what is widely seen to have been a golden age for investing in risk assets.

Even though it now hasn't paid to take extra risk over the last 25 years, all of the asset classes, with the exception of Oil, have actually seen returns over the last 25 years above their own long-term averages. So it has still been a good period to be fully invested.

Oil is actually the one asset class that has seen lower 25 year returns than its longer-term average. Indeed it's now lower in real-terms than it was 25 years ago in 1983. This is surprising given the run-up in prices over the last 5 years. However its poor performance during the 1980s and then stagnation in the 1990s impacts the data. As we will also see in Figure 7, it was the only asset class to show any real appreciation in the prior period in the 1970s. So the 25 year returns are still impacted by this. Nevertheless Oil is the best performing asset class of the last 5, 10 and 15 year period, so the starting point here is key to historic performance comparisons.

Property is a little out of place in Figure 5 as we have no income series. However we wanted to include it in the table for comparison sake and to show the folly of investors using their main residence (which will not produce an income) as an alternative to traditional asset classes when providing for the future. The very long-term returns over 109 years show it as an asset class that beats inflation by 0.43% p.a., but is no match for asset classes that provide dividends and coupons. Although Oil also has no coupon its price should arguably be more real adjusted to nominal economic growth than property.

Returns by decade

If we look at Figure 7 we see this 109-year period split by decade.

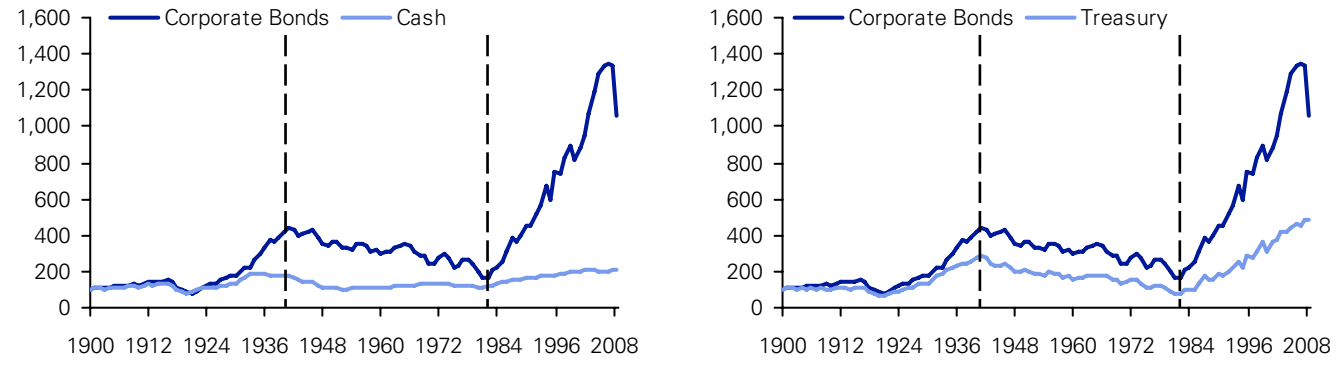
Figure 7: US Total Returns by Decade and Asset Class (Annualised)

		Total Returns							Excess Bond Returns	
		Corp Bonds	BBB Bonds	Treasuries	Equities	Cash	*Property (price only)*	*Oil (price only)*	Corp Bonds	BBB Bonds
Real Total Returns	1900-1909	2.00%		-0.21%	7.65%	1.26%	*-0.40%*		2.21%	
	1910-1919	-3.68%		-3.81%	-1.91%	-3.14%	*-3.22%*		0.13%	
	1920-1929	7.80%	8.38%	7.06%	16.09%	5.18%	*1.61%*		0.75%	1.32%
	1930-1939	8.90%	8.79%	7.69%	2.18%	2.92%	*0.85%*		1.23%	1.09%
	1940-1949	-1.39%	0.05%	-2.83%	3.35%	-4.71%	*2.58%*		1.45%	2.88%
	1950-1959	-1.98%	-1.56%	-2.63%	16.31%	-0.16%	*0.77%*		0.65%	1.07%
	1960-1969	-1.89%	-1.59%	-1.96%	5.04%	1.45%	*-0.65%*	*-1.53%*	0.07%	0.37%
	1970-1979	-1.89%	-1.42%	-3.43%	-1.51%	-1.20%	*0.56%*	*24.44%*	1.54%	2.01%
	1980-1989	8.26%	8.92%	7.22%	11.57%	3.73%	*1.64%*	*-11.17%*	1.04%	1.70%
	1990-1999	6.17%	6.84%	5.28%	14.59%	1.99%	*-0.28%*	*-0.80%*	0.89%	1.56%
	2000-2008	2.60%	1.50%	4.74%	-5.10%	0.27%	*1.39%*	*7.25%*	-2.15%	-3.24%
Nominal Total Returns	1900-1909	4.43%		2.17%	10.21%	3.66%	*1.97%*		2.26%	
	1910-1919	2.66%		2.52%	4.55%	3.23%	*3.15%*		0.14%	
	1920-1929	6.79%	7.36%	6.05%	15.01%	4.19%	*0.65%*		0.74%	1.30%
	1930-1939	6.68%	6.57%	5.49%	0.09%	0.83%	*-1.21%*		1.21%	1.07%
	1940-1949	3.94%	5.46%	2.42%	8.94%	0.44%	*8.12%*		1.53%	3.04%
	1950-1959	0.16%	0.59%	-0.50%	18.84%	2.02%	*2.97%*		0.66%	1.09%
	1960-1969	0.57%	0.89%	0.51%	7.68%	4.00%	*1.85%*	*0.94%*	0.07%	0.38%
	1970-1979	5.36%	5.87%	3.71%	5.77%	6.10%	*7.99%*	*33.63%*	1.65%	2.16%
	1980-1989	13.73%	14.43%	12.64%	17.20%	8.97%	*6.78%*	*-6.68%*	1.10%	1.79%
	1990-1999	9.33%	10.02%	8.42%	18.00%	5.02%	*2.69%*	*2.15%*	0.92%	1.61%
	2000-2008	5.27%	4.15%	7.47%	-2.62%	2.89%	*4.03%*	*10.05%*	-2.20%	-3.33%

Note: 2008 data to 31/10/08
Source: Deutsche Bank

The most striking element of the table for us is just how poor the period between 1940-1979 was for fixed income products in real terms. The data is even more striking graphically (Figure 8) where we show how different the 1940-79 period has been to that after 1980 in fixed income real returns.

Figure 8: Corporate Bond Real Return Series vs. Cash (left) and Treasuries (right)

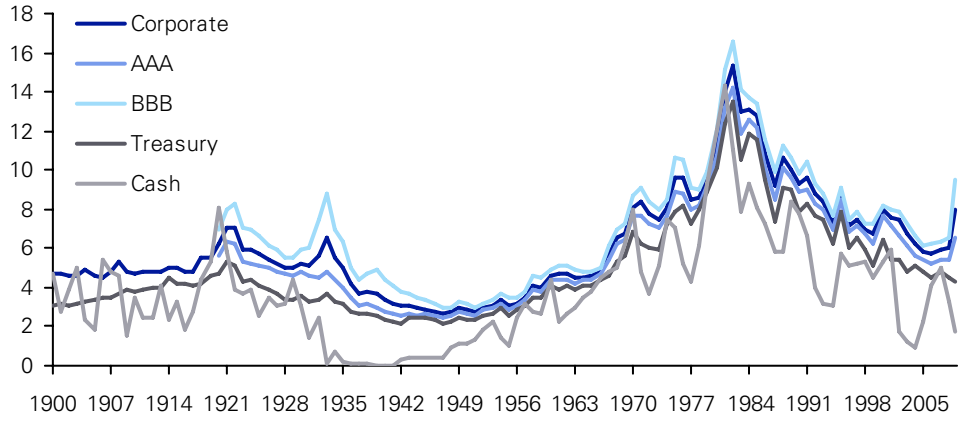


Source: Deutsche Bank

Much of this is due to the starting point of yields and the subsequent inflation environment. Figure 9 shows that yields started the 1980s at the highest level on record which clearly caused the prior multi-decade under-performance and facilitated the phenomenal

performance since. Currently Treasury yields are not as low as the 1930s or 1940s but they are at similar levels to those seen in the mid 1950s and only a sustained period of deflation could sustain the returns seen over the last 5-25 year levels. Any inflation near or above long-term averages will lead to low or negative real returns form this starting point.

Figure 9: Yield Histories



Source: Bloomberg, GFD, Moody's, NBER, Irrational Exuberance (second edition) (Robert Shiller)

It may be a surprise to see real Corporate total returns so high in the 1930s, given the 1929 crash and associated depression. However deflation ensured that fixed income generally performed well. It is also a reminder of the obvious point that future return will be best when spreads start at a wider than average point. Spreads reached their cyclical wides in the first couple of years of the 1930s.

Also striking is the fact that before the 1980s only two decades saw real adjusted Equity returns exceeding 10% on an annualised basis. The 1920s saw Equities grow by 16.09% on an annualised real basis and the 1950s saw 16.31% return on the same real adjusted basis. However as Figure 7 shows both of these strong decades were followed by two decades of below trend Equity performance. The 1980s and 1990s were therefore the only successive decades of annualised double digit real Equity returns over the 109 year study. This current decade is set to be one of below trend real Equity performance with real returns currently negative since the start of 2000. Mean reversion in full effect.

Price only returns

Finally in this section looking at the raw data we decided to strip out income and dividends and simply look at price returns from the different assets. This section also allows us to better assess the relative performance of US Residential Property with other assets as we have not made any assessment for an income return (rental yield) on Property.

Figure 10: Historic US Price Returns to 2008 YTD by Asset Class (Annualised)

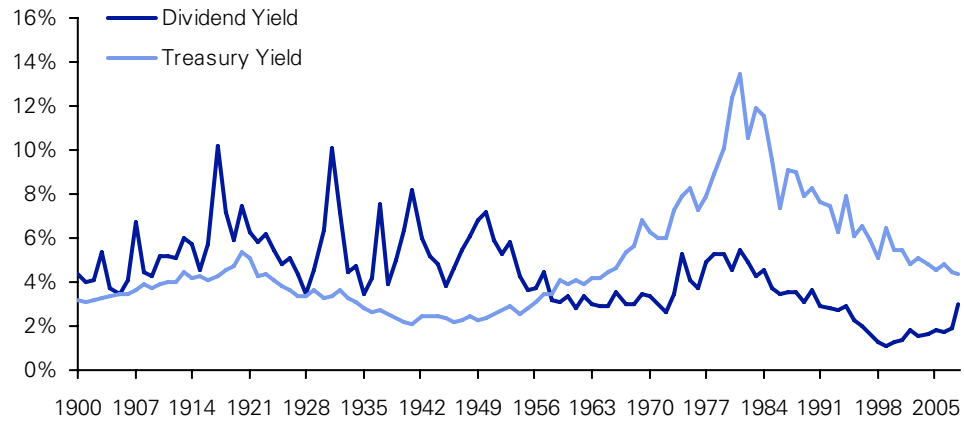
		Corp Bonds	AAA Bonds	BBB Bonds	Treasuries	Equities	Property	Oil
Real Total Returns	2008[1]	-24.58%	-17.26%	-31.34%	-1.14%	-36.05%	-17.06%[4]	-32.53%
	5yr	-7.63%	-5.64%	-9.60%	-0.96%	-5.84%	-2.72%	12.96%
	10yr	-4.49%	-3.24%	-5.56%	-1.73%	-5.09%	1.92%	16.66%
	15yr	-3.42%	-2.42%	-4.22%	-0.93%	2.23%	1.70%	8.32%
	25yr	-1.44%	-0.78%	-2.02%	0.23%	4.08%	1.32%	0.19%
	50yr	-5.15%	-4.84%	-5.40%	-4.36%	1.70%	0.50%	2.77%
	89yr[2]	-3.23%	-2.91%	-3.46%	-2.72%	2.55%	0.95%	
	109yr[3]	-3.66%			-3.26%	1.63%	0.43%	
Nominal Total Returns	2008[1]	-22.19%	-14.64%	-29.17%	1.98%	-34.03%	-14.44%[4]	-30.40%
	5yr	-4.56%	-2.51%	-6.61%	2.33%	-2.72%	0.50%	16.71%
	10yr	-1.74%	-0.46%	-2.84%	1.10%	-2.35%	4.86%	20.02%
	15yr	-0.81%	0.22%	-1.63%	1.75%	4.99%	4.45%	11.25%
	25yr	1.64%	2.32%	1.04%	3.37%	7.34%	4.49%	3.32%
	50yr	-1.24%	-0.92%	-1.50%	-0.42%	5.90%	4.64%	7.01%
	89yr[2]	-0.54%	-0.20%	-0.77%	-0.01%	5.41%	3.76%	
	109yr[3]	-0.68%			-0.26%	4.77%	3.54%	

1 – 2008 returns YTD to 31/08/08; 2 – Full history length for AAA and BBB bonds; 3 – Full history for corporate bond, Treasury, equity and cash data; 4 – 2008 property returns estimated (30/06/08-31/10/08)
Source: Deutsche Bank

Over the full 109-year period the annualised price only return on fixed income assets is notably negative. The effects of inflation clearly erode the principle value of Bonds over time. As one would expect, Equities protect better against the impact of inflation in price terms.

The 109 year 1.63% real price return from Equities compares with the 6.01% when dividends are included. Given that the average dividend yield on US Equities over the last 109-years is around 4.3% we can see how much dividends (and their reinvestment) contribute to the long-run strong performance of Equities.

Figure 11: Long-Term US Treasury and Equity Dividend Yields



Source: Deutsche Bank, Bloomberg, Moody's NBER, Irrational Exuberance (second edition) (Robert Shiller), S&P

The rather low level of current dividends relative to history perhaps raises some concern about future total return prospects. However US companies tend to retain more cash to invest in their business than they did in earlier decades. The investor needs to make his mind up as to whether that is the optimum use of his money or not longer-term.

After Oil, US Property has been the next best performing asset over the last 10 years in price terms, out-performing Equities by around 7% p.a. over the period. That said, this out-performance would be even more notable had it not been for the bursting of the housing bubble and we would certainly not rule out, and indeed expect, further declines in Property.

Mean reversion suggests the asset class has further to go, especially when you consider that over the full 109 year history, capital gains in Property have only been marginally above inflation at +0.43% p.a.

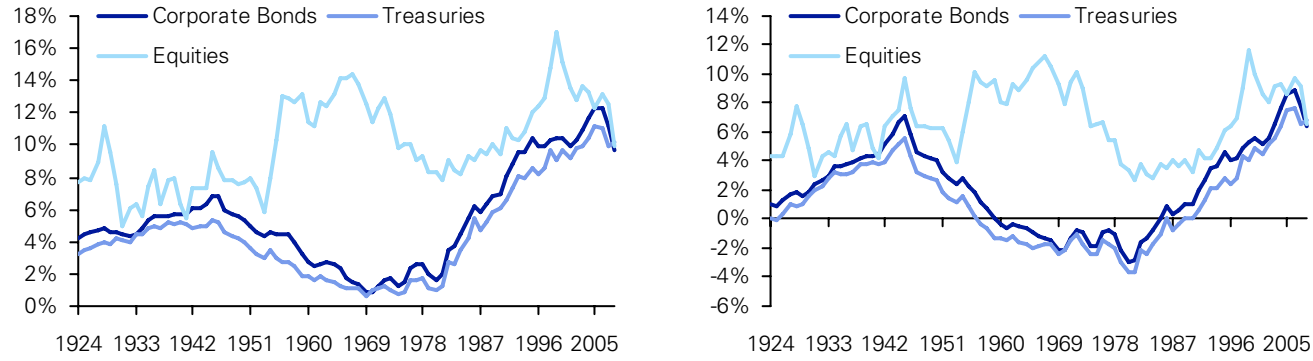
In recent years investors have used their own property as an alternative to equity/bond based pension/investment schemes. The long-term data suggests that this is highly unlikely to be the best way of providing for the future. The mindset of the 'mass' investor perhaps needs to change from that seen in recent years.

We now examine the 1980-2005 Western World super-cycle of asset price returns in more detail and hypothesize as to whether demographics have played a huge part.

1980 – 2005: Beware the outlier period

Over the 109 period of our study there really is no parallel period to the stunning 25 years of returns seen in Fixed Income, Property and Equities around the 1980 and 2005 period.

Figure 12: Rolling 25 Year Total Returns (Annualised), Nominal (left) and Real (right)



Source: Deutsche Bank

It was also an era where we saw numerous crises with bubbles inflating and then popping spectacularly and yet returns over the period remained extremely strong and were higher than any comparable period through our recorded history. So did we go through a period that we will look back on as an overall outlier when its time for this team to look at the performance of our pension pots when we progressively arrive at our official retirement ages in the years between 2039-2046 (and hopefully a lot earlier for this writer)?

Unfortunately we think it will be seen as an anomalous period for returns, and probably driven by a huge demographic transition that occurred during the period. This demographic shift is now in the process of (slowly) reversing in the Western World and our concern is that the mass increase of the so-called baby boomers that have propped up asset prices in Western markets, will subsequently depress asset prices as this powerful group simultaneously sell their earlier investments to fund their retirement over the next quarter of the century. There will of course be huge cyclical variations but it could be that the period from around 2006 to say 2030 sees the backlash from the most feverish investor accumulation of assets in our 109 year study.

A warning from Japan

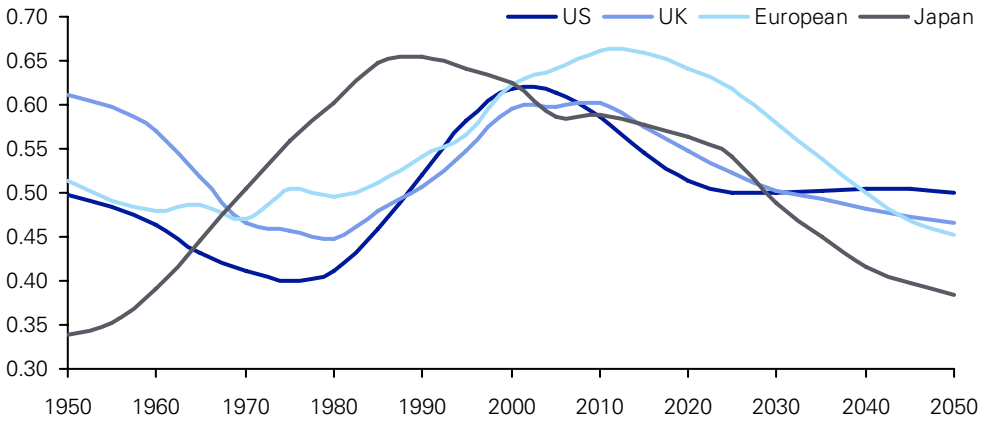
Japan provides a stark warning to the West as to what can happen as a sizeable hump in the population goes through a huge lifetime journey. It is accepted wisdom in academic work that there is a "life cycle hypothesis" that suggests that the population's financial behaviour changes depending on age. In terms of adult life, those in their twenties and thirties tend to be net borrowers as they are relatively low earners at the same time as they look to buy housing, expensive durables and fund their burgeoning families. At some point around middle-age this group then tends to move from being net borrowers to net investors as they accumulate financial assets to hopefully fund their retirement. At retirement (after age 65?) this group then start to shed the financial assets they've been accumulating to fund their non-working days.

If you accept this life cycle hypothesis then Japan becomes a fascinating test case for what the West is about to go through. The real root of this debate can be traced to the Great

Depression and World War II. These events led to a dramatic reduction in the Global birth rate as families first couldn't afford and secondly were not together enough to start a family. As the 1940s progressed the subsequent baby boom first started in Japan and then spread through the Western world and continued (US first and then through Europe) until the advent of mass birth control techniques seen from the mid-1960s.

If we then fast forward through the Twentieth Century this demographic hump appears somewhat important when looking at asset price returns. Figure 13 looks at this group as a percentage of the economically inactive. We have chosen the group aged between 35-54 as our key investor cohort throughout this chapter as their size seems to correlate best to asset price returns (more on this later). We have looked at this subset as a percent relative to those under 24 and those over 65 as this broadly economically 'inactive' group needs to be supported by the working population. In a period where those economically inactive are high, this creates a burden on those economically active and would perhaps reduce their own pool of money to invest. So this 'Dependency Ratio' should be a measure of the power of the net accumulators of assets in the economy to influence asset prices.

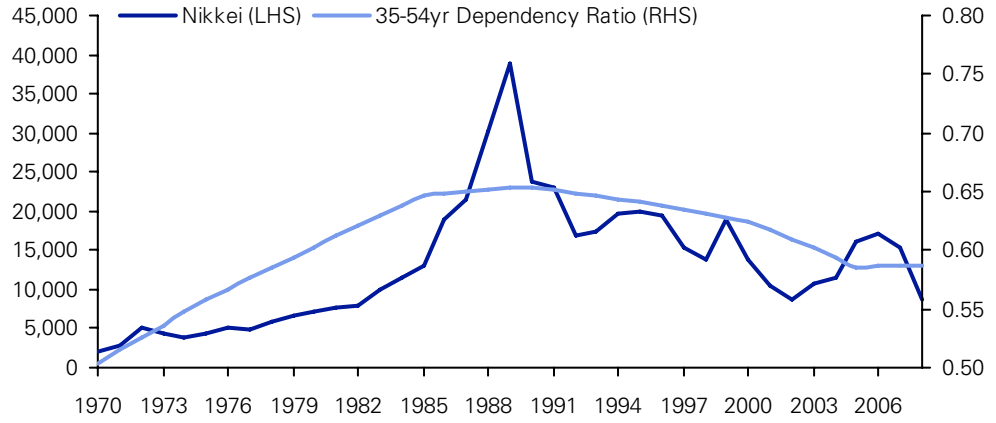
Figure 13: Global 35-54yr Dependency Ratios



Source: Deutsche Bank, UN Population Division

As the graph shows this 'asset accumulating' part of the population reached their peak importance around 1990 in Japan and around 2000 in the US. In the UK and Europe the peak will be reached in 2010. It is statistically difficult to prove whether the bursting of the Nikkei bubble at the end of 1989 and the bursting of the dot.com bubble in 2000 had anything to do with demographics but it does seem that markets can be prone to bubbles if the pool of potential investors grows. Figure 14 plots the Japanese 35-54 year dependency cohort against the Nikkei.

Figure 14: Japanese 35-54yr Dependency Ratio vs. the Nikkei



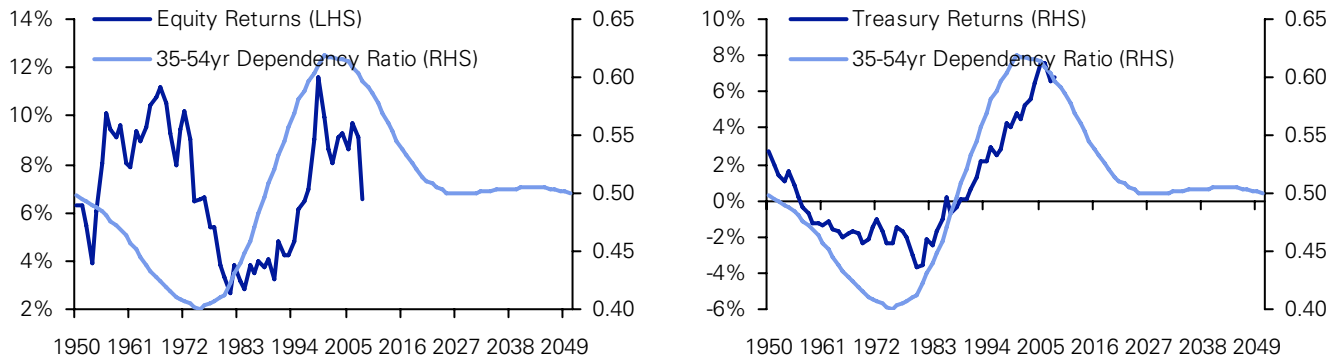
Source: Deutsche Bank, UN Population Division

The Nikkei peak was hit at the same time as this group was at their most significant relative to the dependants in the economy. That the Nikkei has spent 19 years failing to show any meaningful recovery could have much to do with the continuing aging of the population and a diminishing pool of natural investors.

Given the detailed work we have compiled on US returns in this study we can then show that the demographic transition has possibly impacted returns in the Western world too.

In Figure 15 we show the same demographic cohort transitioning its way through the US over the last 60 years. We then plot rolling 25-year real returns of Equities and Treasuries on top of this. We use 25-year rolling returns to try to remove cyclicality and assess the overall climate/trend of returns.

Figure 15: US 35-54yr Dependency Ratio vs. 25 Year Rolling Real Returns; Equity (left) and Treasury (right)



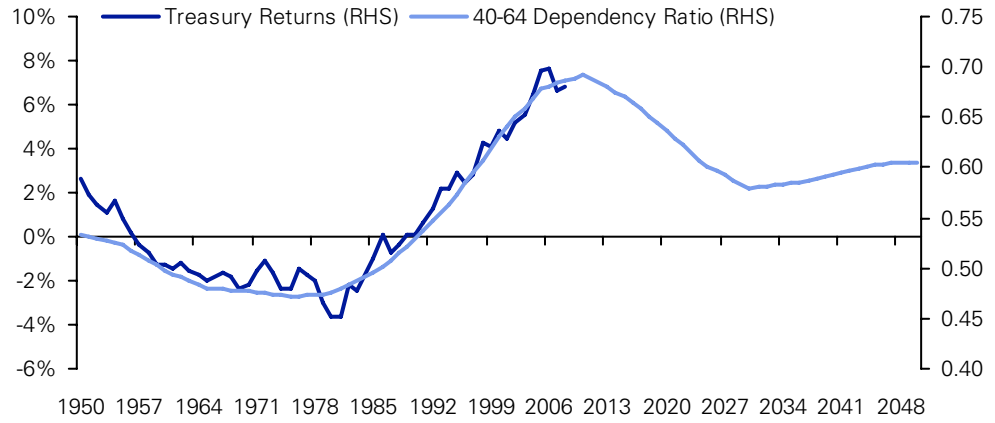
Source: Deutsche Bank, UN Population Division

It is fascinating to see just how correlated the returns are to our 35-54 year dependency cohort. Returns plummeted through the 1970s as the number of 35-54 year olds was at a low against the dependants in the population. It is easy to argue that there were just not enough investors around. Returns started to pick up through the 1980s and continued to thrive well into the 1990s and indeed in this decade for the Bond market and indeed Property.

It is unclear whether it is random that Bond returns are even more correlated to demography than Equities. Demography seems to perfectly catch the turning points of the sweeping nature of Bond returns since World War II. An ever declining investor base seemed to lead to decades of negative real returns in Treasuries. It wasn't until this group started to slowly stabilise and grow in size in the mid to late 1970s that Treasuries started to actually see sustainable real returns.

Intuitively we may expect Treasuries to be more popular with a slightly older group of investors as they start to seek safer investments as retirement nears and also an income from their pool of capital accumulated earlier in their investing days. So it's worth showing that when we use the 40-64 year old group as our numerator rather than the 35-54 year group, it does appear that we get an even better fit.

Figure 16: US 40-64yr Dependency Ratio vs. 25 Year Rolling Real Treasury Returns



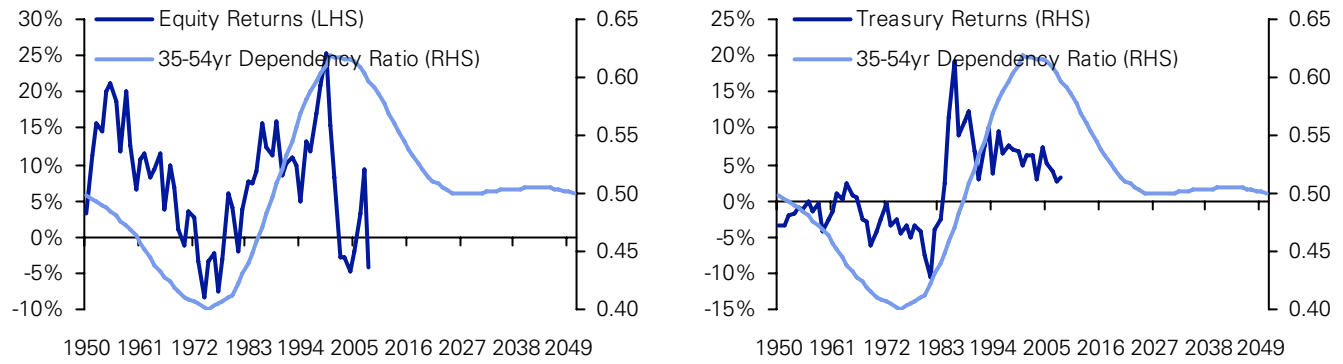
Source: Deutsche Bank, UN Population Division

Bond returns should perhaps peak later than Equities if demographic forces are a significant driver. You could argue that this is exactly what has happened in the US over the last decade. 2000 saw the peak in both the 35-54 year cohort and the wider Equity markets. By definition the 40-64 year cohort peaks 5-10 years later and as we know Bond returns have continued to be strong throughout this decade with the 25-year rolling return reaching its 109 year peak in 2006.

We have to be slightly careful as our returns data will lag current returns as they are effectively a long-term sweeping average. So the general direction of returns will change quicker than the moving average of returns in the graph suggest. However we are more interested in bigger picture themes so we accept that getting the right return figure is tough when there will be such huge short-term variations.

For completeness we show the same data as Figure 15 but we use 5-year rolling returns rather than the 25 year equivalent. The 5-year rolling returns clearly fit less well to the demographic picture but you can certainly observe the increase in returns through the 1980s and 1990s (especially in Equity markets), and the subsequent levelling off.

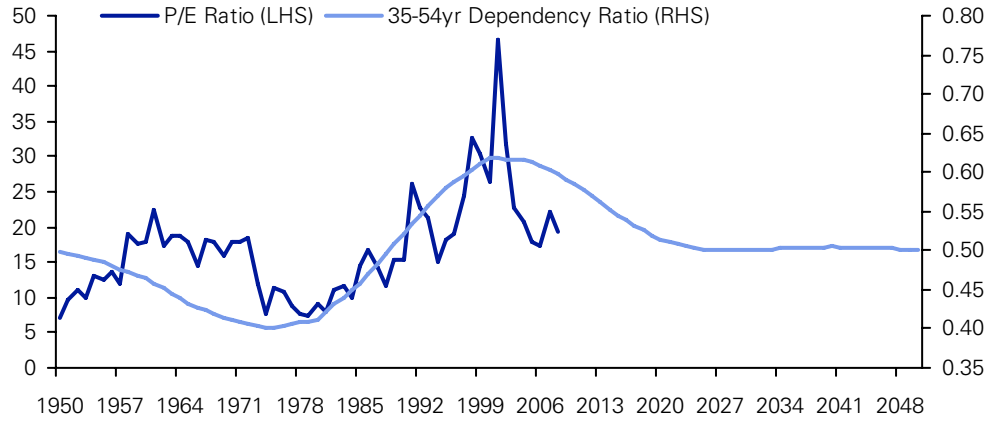
Figure 17: US 35-54yr Dependency Ratio vs. 5 Year Rolling Real Returns; Equity (left) and Treasury (right)



Source: Deutsche Bank, UN Population Division

Overall we should stress that the baby boomers are still to this day, a significant investing force in the US and throughout the Western World and this could explain why we appear to have been particularly bubble prone over the last decade or so. The Equity bubble in 2000 did not seem to destroy the appetite to invest with Credit and Property seemingly the subsequent beneficiaries and home to the rolling bubble that the baby boomers may have been specially predisposed to create. Also interesting is the fact that even with a huge Equity market overvaluation in 2000, the Equity market still hasn't subsequently collapsed and overshot towards historically cheap valuations. Indeed although we've had a lost decade for returns in Western Equity markets, the P/E ratio has generally stayed above its long-term average in the US. We haven't seen the P/E ratio of the S&P 500 dip below its long-term average since 1994. So although the market was perhaps chronically overvalued in 2000, the fact that the baby boomers are still a sizable section of society has cushioned the blow on the downside. By the middle of the next decade the 35-54 year dependency ratio will be back at levels seen in the early 1990s and perhaps P/E ratios will be lower at that point to reflect the smaller cohort of investors.

Figure 18: S&P 500 P/E Ratio vs. US 35-54yr Dependency Ratio



Source: Deutsche Bank, UN Population Division

So overall returns across all assets may be lower in years to come in the West but bubbles may be less frequent. There have perhaps been too few investments for the pool of capital available to invest in over the last 10-20 years. As the baby boomers start to naturally pare back their investments, perhaps we will see less bubbles. However Japan provides us with a very worrying template as to what can happen when an economy ages.

We certainly don't want to be making sweeping generalisations based on one country's experiences but it is clear that as the Western population ages and as life expectancy continues to increase, there are huge risks in assuming that returns seen in the 25 years from around 1980 are likely to be the norm. The vast majority of the population perhaps plans for their future based on recent returns assumptions that could not only be unrealistic but could actually be very dangerous for the economy. Nowhere is that perhaps more frightening than the recent trend to buy Property with a view to fund retirement plans in say 15-30 years time. If a large proportion of the population has this plan then will there be a captive group of buyers for these assets when the retirees need to unlock their capital? The supernormal performance of Property over the last 5-10 years in the US and over the last 25 years in the UK could eventually be seen as an extraordinary outlier in years to come. We are not sure that the mass population is prepared for this.

What can save us from demographic disaster in the West?

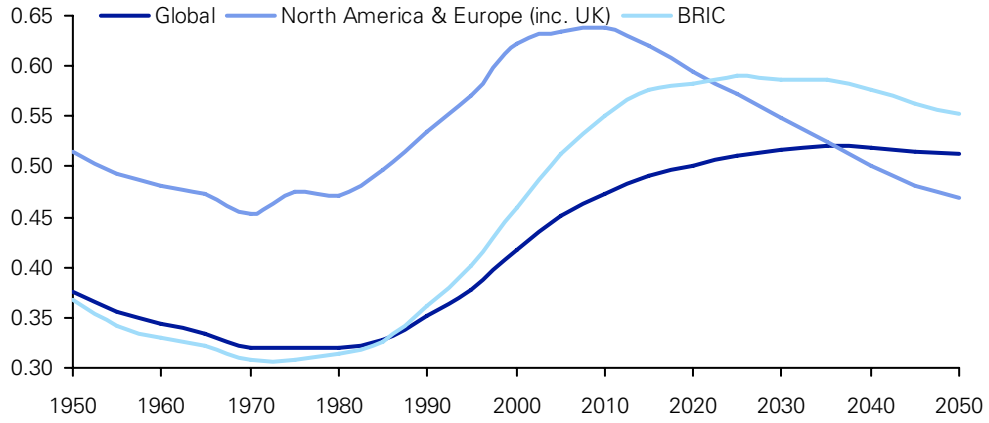
When you look out as far into the future as we have tried to do in this document, then the more you are hostage to events changing the course of future history. The thesis laid out in this chapter is simply one of trying to explain the remarkable period of returns seen in the 25

years up to the middle of this decade. Our concern is that such returns are not sustainable and with risks that there could be some very lean times ahead if the future demographic evolution of the West is anything to go by. However we are aware that we have only really examined relatively few observations in this data and there may have been other more important factors at work over the past century. So what are the things that we need to be aware of when at least accepting that there may be an alternative outcome?

The power of the Emerging World

Over recent years there has been much talk of an increasingly globalised financial system where opportunities and investors are global and not regional. If this is the case we should all breathe a huge sigh of relief as the World still appears to have favourable demographics from a potential investment point of view. Figure 19 shows the Worlds 35-54 year old cohort as a percentage of the dependants. We also show the fast growing BRIC countries on the same graph.

Figure 19: 35-54yr Dependency Ratios for Different Global Regions



Source: Deutsche Bank, UN Population Division

So the hope is that globalisation will survive this recent crisis and smooth the demographic time bomb in the West and that an excess of investible capital in the Emerging World offsets the lack of it in the West. Clearly this is already happening as Sovereign Wealth Funds are deploying capital in areas that desperately need it. However a reliance on this is extremely brave and it could be said that the previously healthy Western demographic environment that we've been through didn't help Japan during its troubles. It is difficult to work out whether that was because Japan has historically been a little more of an insular economic entity than the West in terms of trade and immigration. Would highly open economies help the West?

Is it also the case that in modern times, and without fixed currency regimes backed by precious metals, currencies take more of the strains of adjustment than actual asset prices? It is possible that a substantial currency move lower in the West vs the Emerging world will lessen the demographic shock and thus the correction in Western asset markets? There is little doubt in our mind that US Equities would now be a lot lower had it not been for the huge multi-year decline in the Dollar.

Do Bonds and Equities move in the same direction?

Japan remains a head scratching case study for us all. As the population aged, Bonds and Equity returns moved in completely the opposite direction. However the correlations seen in Figure 15 for the US suggests that Bonds and Equity returns should both suffer as the US population ages. The best explanation we can offer is that once an economy slips towards deflation the whole demographic argument becomes less valid. This is similar to why the so-called 'Fed-model' that values Equities relative to Bond yields can be a very dangerous relative value tool as yields fall for recessionary, or worst still, deflationary reasons.

Alternatively it may be the case that an aging population encourages deflation as society becomes less aspirational and the demand for assets wanes. We are reluctant to jump to this conclusion based on one country's unique experiences. We also may need to consider a Fed that may resort to the printing presses as this crisis progresses. There is also an argument that suggests that inflation is actually higher when the working population is smaller as the shortage of labour pushes up the price of it which subsequently feeds inflation. The future Western demographics suggest labour shortages could push up inflation. However will the favourable BRIC demographics offset these potential wage pressures in the Western World with a globalised market place?

War and Disease

Without wishing to sound fatalistic, War and Disease can shape demography for decades. Indeed the whole baby boom movement had its roots in the events of World War II. So we have to be aware that although future demographics are fairly predictable, there can be big shocks through history because of these external shocks.

Political

The simplest way of dealing with the West's demographic problems would be to raise the retirement age as current levels were set in a day where life expectancy was significantly lower. There are moves to do this but politically it is certainly not a vote winner, especially as the benefits of such a move are perhaps decades in the future, long after the shelf life of most politicians. However such a move cannot be ruled out and this would leave people working (and investing) for longer and also leave less dependants in the economy than current forecasts suggest. We could also see political moves to change immigration and birth policies. Both can change the future demography of a country and help (or hinder) the situation.

So all is not lost but Western countries probably need to do a combination of things to save themselves from the demographic time-bomb. They need to open their economies to foreign capital and immigration. They also need to ensure diplomacy is used where possible to defuse potential tensions with those areas of the world that have the capital the West may need access to in order to ease their future burdens.

They need to raise the retirement age and they need to ensure that birth rates stay high enough to ease the future burdens. Those who fail at this may be sentencing themselves to a lost generation of economic activity.

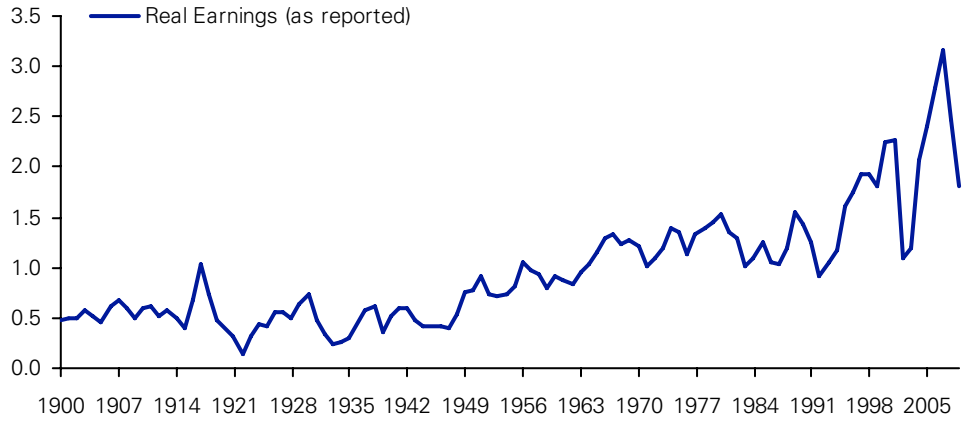
Japan should be a lesson to all in the West.

The worst case scenario for US equities

In the mean reversion section of this note we show that the future potential returns for US equities could actually now be above their long-term average levels if equity valuations do in fact mean revert. In this section we try to look for history to guide us as to what the worst case scenario for the S&P 500 might be using actual observed valuations through history. Given that we are about to enter perhaps the worst economic climate since perhaps the Great Depression it is worth stressing equity valuations back to previous lows.

The two key components for our assessment are historic P/E ratios and real adjusted earnings. For real earnings we look at how far earnings have deviated from trend through history and highlight the largest declines. Figure 20 looks at this real earnings series since 1900.

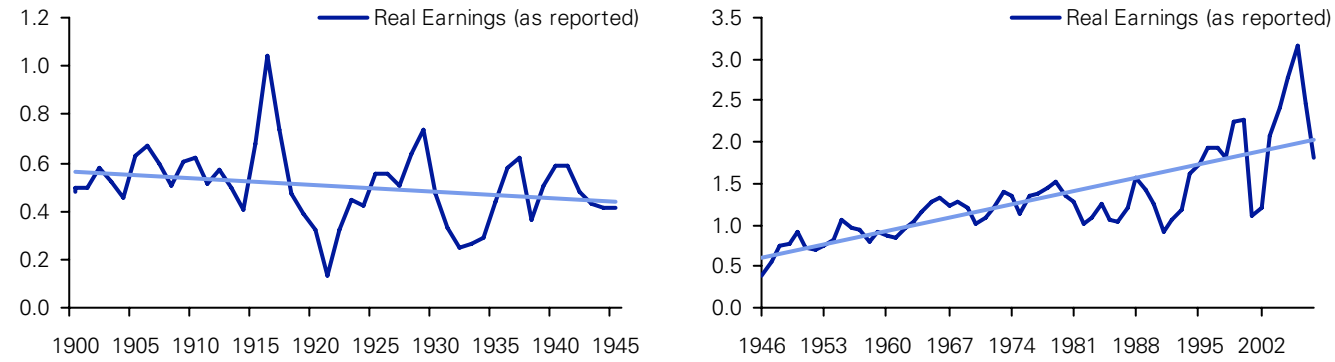
Figure 20: S&P 500 As Reported Real Earnings



Source: Deutsche Bank, Irrational Exuberance (second edition) (Robert Shiller), S&P, US Department of Labour Bureau of Labour Statistics

Looking at the chart we can see that the trend was essentially flat up until the mid to late 1940's from which point we see a much more pronounced upward trend. We have therefore broken this analysis down into two distinct periods (1900-1945 and 1946-2008) with the second one commencing after WWII. Figure 21 shows both periods with appropriate linear trend lines.

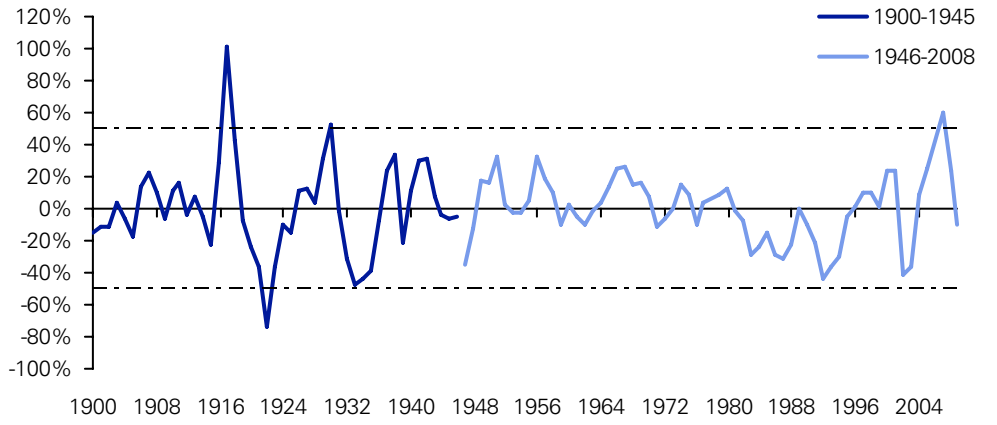
Figure 21: S&P 500 As Reported Real Earnings and Linear Trend Lines: 1900-1945 (left) and 1946-2008 (right)



Source: Deutsche Bank, Irrational Exuberance (second edition) (Robert Shiller), S&P, US Department of Labour Bureau of Labour Statistics

We then use this data to assess how far real earnings have actually deviated from these trends in the past. In Figure 22 we can see that with the exception of two years (1916 and 1921) actual earnings have not generally deviated by more than plus or minus 50% from the respective trends. So given that current real adjusted earnings are now only around 10% below trend (based on this analysis), there is still significant potential for further downside risk to real earnings if we see a severe and deep recession.

Figure 22: S&P 500 As Reported Real Earnings Deviations from Trend



Source: Deutsche Bank, Irrational Exuberance (second edition) (Robert Shiller), S&P, US Department of Labour Bureau of Labour Statistics

How do we value potential worst case trough earnings?

If we stress current real earnings further below trend and assume for the time being that the current P/E ratio (19.3x) of the S&P 500 remains unchanged then clearly it would give us a much lower fair value for the S&P 500 than current. Figure 23 shows the implied levels for the S&P 500 based on real earnings that are -10%, -15%, -20%, -25%, -30%, -40% and -50% below trend with the P/E ratio remaining unchanged at current levels.

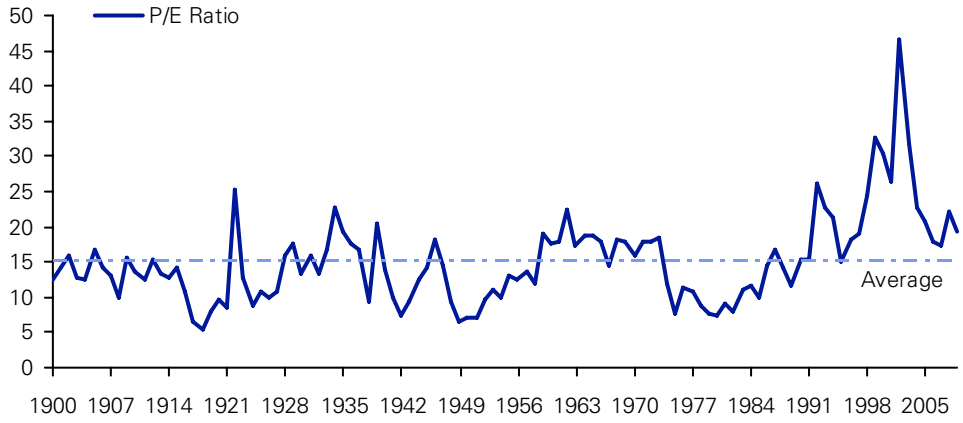
Figure 23: Potential S&P 500 Levels Assuming Current PE ratio and Stressed Earnings

Real Earnings Relative to Trend	-10%	-15%	-20%	-25%	-30%	-40%	-50%
Implied Nominal Earnings (in 2008 terms)	50	47	45	42	39	33	28
Implied S&P 500	969	915	861	807	753	646	538

Source: Deutsche Bank

So far we have only assumed that earnings will be lower under this worst case scenario. History tells us that P/E ratios also decline in many bear markets irrespective of the fact that you are valuing trough earnings. One of the big issues with this current period is that as Figure 24 shows, the P/E ratio of the S&P 500 is still above the long-term average.

Figure 24: S&P 500 P/E Ratio



Source: Deutsche Bank, Irrational Exuberance (second edition) (Robert Shiller), S&P

Given that we are in one of the greatest financial crises in history then there is reason to suggest that P/E ratios could still overshoot on the downside. In Figure 25 we look at where the S&P 500 might trade based on different P/E ratios (5,7,9,11,13), including the long-term average, combined with the potential (negative) deviations of earnings away from trend seen above.

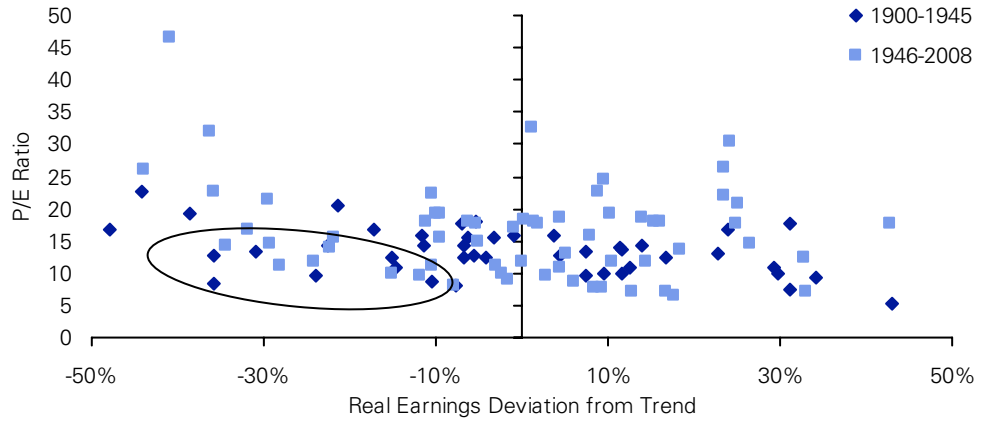
Figure 25: Potential S&P 500 Levels Given Different P/E ratios and Real Earnings Deviations from Trend

Real Earnings Relative to Trend	Implied Nominal Earnings (in 2008 terms)	P/E Ratio 5	7	9	11	13	15.15 (LT Avg)
-10%	50	251	351	452	552	653	761
-20%	45	223	312	402	491	580	676
-30%	39	195	273	351	430	508	592
-40%	33	167	234	301	368	435	507
-50%	28	139	195	251	307	363	423

Source: Deutsche Bank

At the furthest extreme (real earnings -50% vs trend and a P/E ratio of 5) the ridiculous worst case for the S&P 500 is a level around 139. Clearly this is laughably extreme as we are not going to find ourselves in a situation where real earnings are as far below trend as we have ever seen at the same time as the P/E ratio is at its historic lows. In Figure 26 we look at all past combinations of real earnings relative to trend and the prevailing P/E ratio to try and assess some realistic scenarios.

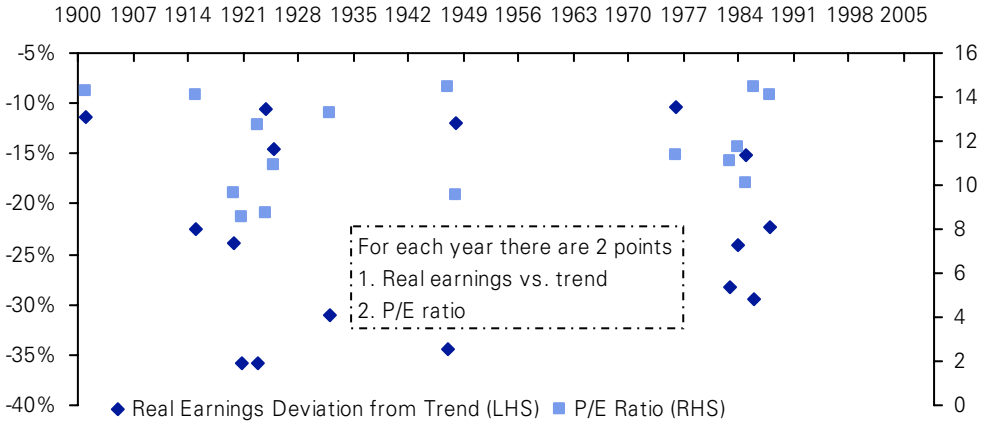
Figure 26: All Yearly S&P 500 PE ratios against where Earnings were relative to Trend



Source: Deutsche Bank, Irrational Exuberance (second edition) (Robert Shiller), S&P, US Department of Labour Bureau of Labour Statistics

The circled area shows the realistic combinations of worst case P/E ratios and real earnings deviations from trend. In Figure 27 we plot the combinations where real earnings have been -10% or below versus trend and the P/E ratio has been below the long-term average through time. There were two main periods where we have seen clusters of years that satisfied these criteria. The first was between 1919 and 1924 and the second was between 1982 and 1987. But perhaps more interestingly we should also note the experiences of the 1930s and 1970s which are bear markets that some of the more bearish analysts are pointing towards for a benchmark for today's troubled times. The worst combinations we saw during these two decades were 31% below trend real earnings with a P/E ratio of 13.3 in 1931 and 10% below trend real earnings with a P/E ratio of 11.3 in 1975. Both of these combinations would imply the S&P 500 should be between 500 and 600, clearly someway below the current level.

Figure 27: All Combinations of Sub -10% Earnings Deviation from Trend and Below Average P/E Ratios



Source: Deutsche Bank, Irrational Exuberance (second edition) (Robert Shiller), S&P, US Department of Labour Bureau of Labour Statistics

In Figure 28 we calculate what the level of the S&P 500 could be based on all of the worst case combinations seen in Figure 27. The outcomes range between about 300 and 700, with an average of around 500.

Figure 28: Worst Case Historical S&P 500 Valuations. Combing P/E and Earnings Lows

Year	Real Earnings Relative to Trend	Implied Nominal Earnings (in 2008 terms)	P/E Ratio at the time	Implied S&P 500 (in 2008 terms)
1900	-11%	49	14.3	707
1914	-22%	43	14.1	612
1919	-24%	42	9.6	407
1920	-36%	36	8.5	304
1922	-36%	36	12.7	456
1923	-10%	50	8.7	436
1924	-15%	48	10.9	521
1931	-31%	39	13.3	513
1946	-34%	37	14.4	528
1947	-12%	49	9.5	467
1975	-10%	50	11.3	567
1982	-28%	40	11.1	446
1983	-24%	42	11.8	497
1984	-15%	47	10.1	476
1985	-29%	39	14.5	570
1987	-22%	43	14.1	612

Source: Deutsche Bank

Whilst we accept that these levels may seem slightly sensationalist given that we have already seen the S&P 500 fall 34% this year to just below 970 we think that given that we are potentially about to enter the worst economic downturn since the Great Depression it is worth having some kind of realistic assessment of a potential worst case scenario for equities. Given all the analysis above, a sensible overshoot target for the S&P 500 would perhaps be somewhere between 500 and 600. So the mean reversion analysis may still hold over the longer-term but history suggests that the market could still become historically 'cheap' before we see the eventual mean reversion returns.

Results from mean reversion

The last time we published the results of our mean reversion exercise in November 2005 Treasuries were set to continue their out-performance of Equities - that began at the start of the decade - until the end of the decade. It wasn't until we got past 2010 that mean reversion suggested the return of Equities out-performing Treasuries. Credit was also set for a poor period of relative returns. Overall all asset classes were expected to exhibit low future real returns given stretched valuations.

If we look at our current results in Figure 29 then we see almost the complete opposite conclusion. If mean reversion is completed over the next 5 years, US credit will out-perform Treasuries by 9.0% p.a. (overall corps), 11.6% p.a. (BBBs) and 16.6% p.a. (HY). Equities will also see an excess return of 8.9% p.a.

The 109 and 50 year historic annual out-performance of equities vs Treasuries is 4.54% and 2.76% respectively. For corporates, the respectively excess return numbers are 0.72% and 0.34%. So mean reversion suggests that credit offers the best risk reward profile relative to historic observations from this starting point.

Figure 29: Potential Annualised Returns Based on Mean Reversion in 3, 5 or 10 Years

		Nominal Returns			Real Returns		
		3yr	5yr	10yr	3yr	5yr	10yr
US Long-Dated	Corporate Bond	15.1%	11.7%	9.3%	11.0%	7.7%	5.3%
(Moody's Data)	BBB Bond	18.9%	14.3%	11.0%	14.7%	10.2%	7.0%
	Treasury	1.4%	2.7%	3.7%	-2.2%	-1.0%	-0.1%
	Equity	13.0%	11.6%	10.6%	9.0%	7.6%	6.6%
High Yield	US High Yield	22.8%	18.3%	15.1%	18.4%	14.1%	10.9%
	Treasury[1]	-0.1%	1.7%	3.1%	-3.6%	-1.9%	-0.6%
iBoxx Euro	Corporate Bond	8.9%	8.0%	7.4%	5.8%	5.0%	4.4%
	BBB Bond	11.0%	9.4%	8.2%	7.8%	6.3%	5.2%
	Bund[1]	1.1%	2.4%	3.4%	-1.8%	-0.5%	0.5%
iBoxx Sterling	Corporate Bond	11.5%	9.8%	8.5%	7.3%	5.5%	4.2%
	BBB Bond	13.5%	11.1%	9.2%	9.3%	6.8%	4.9%
	Gilt[1]	1.8%	3.2%	4.2%	-2.0%	-0.8%	0.1%
iBoxx Dollar	Corporate Bond	12.5%	10.5%	9.0%	8.6%	6.6%	5.0%
	BBB Bond	15.0%	12.1%	9.9%	11.0%	8.0%	5.8%
	Treasury[1]	0.1%	2.0%	3.5%	-3.4%	-1.6%	-0.3%
Other Assets	*Property (price only)*	*-7.5%*	*-3.1%*	*0.3%*	*-10.7%*	*-6.6%*	*-3.4%*
	Oil (price only)	*-14.3%*	*-7.4%*	*-2.0%*	*-17.3%*	*-10.8%*	*-5.5%*

1 – Comparable maturity Government bond
Source: Deutsche Bank

Figure 30: Potential Annualised Excess Returns Based on Mean Reversion

		3yr	5yr	10yr
US Long-Dated	Corporate Bond vs. Treasury	13.7%	9.0%	5.6%
	BBB Bond vs. Treasury	17.4%	11.6%	7.3%
	US High Yield vs. Treasury	22.9%	16.6%	12.0%
	Equity vs. Treasury	11.6%	8.9%	7.0%
	Equity vs. Corporate Bond	-2.1%	-0.1%	1.4%
	Equity vs. BBB Bond	-5.9%	-2.7%	-0.4%
	Equity vs. US High Yield	-9.8%	-6.7%	-4.5%
iBoxx Euro	Corporate Bond vs. Bund	7.8%	5.6%	4.0%
	BBB Bond vs. Bund	9.9%	7.0%	4.8%
iBoxx Sterling	Corporate Bond vs. Gilt	9.7%	6.6%	4.3%
	BBB Bond vs. Gilt	11.7%	7.9%	5.0%
iBoxx Dollar	Corporate Bond vs. Treasury	12.4%	8.5%	5.5%
	BBB Bond vs. Treasury	14.9%	10.0%	6.4%

Source: Deutsche Bank

So from this starting point, Treasuries look set for a decade of negative real returns. If the decade of negative Treasury returns appears to be a somewhat sensationalist argument then examine Figure 8 where we showed that US Treasuries saw 4 successive decades (1940-1979) of negative real returns. In our analysis we have simply mean reverted inflation and real yields to their averages. The risk is that if we see any above average inflation then real returns will likely be far worse. Treasuries need a long period of deflation to justify their current pricing.

iBoxx returns

We also try to assess mean reverted returns for the iBoxx IG Corporate Bond indices. The absolute nominal returns are generally slightly lower than our long-dated US Corporate Bond series. However we should note that this is because these indices are much shorter in duration. We have included the mean reverted returns of Government Bonds with a matching maturity to the various iBoxx indices.

The good news for all the Credit asset classes is that we see large positive real and nominal returns over all horizons. The historically wide spreads offset the potential negative impact of low real yields in the underlying government market.

High Yield the star performer on a mean reversion basis

The main beneficiary from mean reversion in our analysis is undoubtedly the HY market. If we mean revert spreads back to their long-term average, and assume average defaults then HY out-performs Treasuries and Equities by 22.9% p.a and 9.8% p.a over the next 3 years and then by 16.6% p.a. and 6.7% p.a. over the next 5 years. Even over the 10 year period HY out-performs Equities by 4.5% p.a.

Even if we adjust the HY analysis to allow for the worst recorded 3, 5 and 10 year default period in modern times (since 1970) and also over the Depression period of the 1930s (albeit a very different HY market to today), then we still see HY out-perform Equities over nearly every period. Clearly if the HY market did see such high defaults it seems unlikely that Equities would perform as well as the mean reversion exercise suggests so overall it does seem that if you believe in the merits of this exercise, HY represents good risk-reward potential relative to Equities over the long-term. It may also be argued that recovery rates are likely to be lower than the long-term average in the coming cycle, but even if we assume a zero recovery rate in our Depression scenario (which is perhaps a little excessive), mean reverting HY spreads over the next decade would still give slightly better expected returns than for Treasuries.

Figure 31: Potential Returns Based on Different Default Scenarios

		Nominal Returns			Real Returns		
	Default Scenario	**3yr**	**5yr**	**10yr**	**3yr**	**5yr**	**10yr**
US HY Corporate	Average	22.8%	18.3%	15.1%	18.4%	14.1%	10.9%
	Worst	19.7%	16.3%	14.4%	15.5%	12.1%	10.2%
	"Depression"	17.6%	13.2%	10.1%	13.5%	9.2%	6.1%
	"Depression" Zero Recovery	11.8%	7.4%	4.3%	7.9%	3.6%	0.5%

Source: Deutsche Bank

Oil and Property

Oil and Property are different from the other assets in this analysis as we have no yield/coupon to account for. Clearly Oil is a 'real' asset and the price return should be broadly comparable (for analysis sake) to the total return of other assets. With Property we have made no assumption of yield which is clearly wrong as it can be rented out. However we wanted to show the folly of its use as an alternative to traditional assets on a capital appreciation basis alone.

With regard to Oil we are slightly nervous showing the results of our mean reversion analysis as we feel we have more experience of dealing with Equity and Fixed Income assets. However for comparison purposes we have included the results and they make fascinating reading with the next decade showing returns that will only have been worse in the dreadful 1980s (see Figure 7). In reality if there was one asset class in this study that we would be uncomfortable using mean reversion as a guide to future returns, then it is Oil. The complexity of relying on mean reversion for a scarce resource that has recently seen huge demand from the developing world is obvious. The ability to eventually find alternative energy sources will probably determine the price of the asset and the importance of even caring where its price is. However we report the results for those that are interested.

For Property, we are still well above long-term average prices and therefore it's no surprise to see mean reversion show such negative results. We should also remember that the US has corrected far more than other Global property markets. Any mean reversion in countries like the UK is likely to be far greater.

Limitations of mean reversion

Markets rarely trade at their long-term average

The most obvious limitation is that markets only ever trade at their true mean reversion point for a split second through history. Sweeping asset price cycles are prevalent through history and markets spend 99.99% of their time trading away from their average and even if one asset class gets close, another can be a long distance from it. So this analysis should be seen as an (hopefully) interesting valuation guide to asset classes based on their past behaviour.

We should also mention that one man's mean reversion could be another man's structural shift. While we are always suspicious of structural shifts or new paradigms, we accept that the way asset classes interact with each other does change over time and this in turn eventually impacts the averages. So what looks like a return to the mean today may not be with a few more years of higher/lower data.

"New Paradigm?"

Although 109 years worth of data is a long study period it is not necessarily representative of what should happen going forward. Notwithstanding the recent EM sell-off, it is possible that the global economy is still to fully benefit from the rapid emergence of China, and the other BRICs, as economic superpowers. The problems of the West could be eased by growth and capital from the rapidly developing world, thus allowing higher than average returns. However this could all unravel if this credit crisis leads to a collapse in globalisaton.

Alternatively we could see a Japan like structural break in the data that renders the data of the last 109 years much less relevant. Although we think this is unlikely, we should as a minimum be aware of the demographic problems ahead.

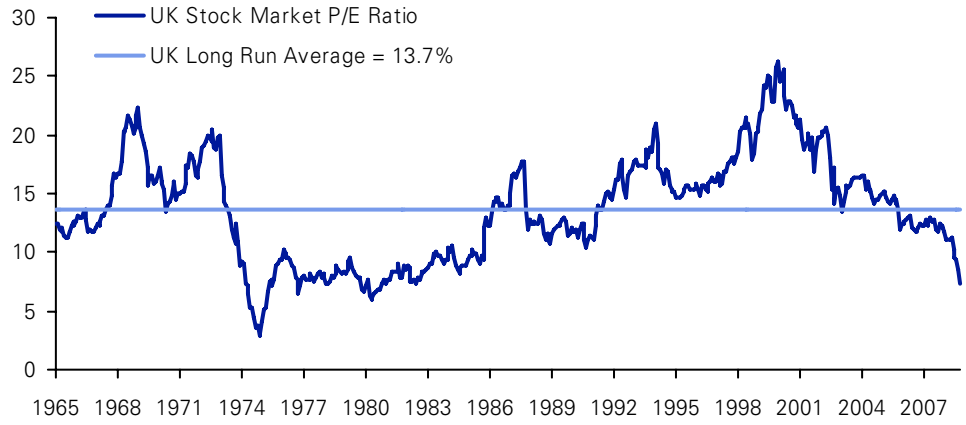
Demographics

As we mentioned in the section titled "1980 – 2005: Beware the outlier period", Japan provides the West with a worrying template for the future. The West's demographics could mean a long period of lower than average returns sending assets to below long-term average valuations in the same way that favourable demographics may have lifted these averages between say 1980 and 2005. Alternatively if the world stays as globalised as it has been in recent years, will the more favourable developing world demographics smooth the transition?

The US is not the entire World

We have based much of this study on long-term US data and have used the data to help us make forecasts for European assets. We have perhaps more confidence in the validity of such an exercise in the increasingly generic Fixed Income world which is why we have made no attempt to forecast European and UK Equity market returns. In reality it is our current view that European and UK Equities trade at lower valuation multiples than US Equities. As such even if US Equities are now in fair value territory, it could be argued that European and UK Equities are already overshooting to some degree.

Figure 32: P/E Ratio of UK Market since 1965



Source: Datastream

We also need to bear in mind the example seen in Japan over the last decade and a half. Yields have fallen to extremely low levels, providing strong Bond returns. However Equities slumped over the same period providing very weak returns. Overall both have moved further away from mean reversion levels.

Mean reversion unlikely to be smooth if it does occur

We have made numerous assumptions going forward. While we are reasonably comfortable that if mean reversion eventually occurs in all the assets/relationships we have detailed, the timings of such moves are less predictable. Indeed it is clear from the charts that the mean reversion point is very infrequently held. We are also confident that if they do mean revert they are unlikely to do so in a straight line and even more unlikely to do so simultaneously. The best example of this is the fact that US equities have arguably spent 13 years above long-run fair value. At the start of 2008 they were still 30-40% above long-run fair value but much of this has now corrected. However the mean reversion took over a decade and could possibly still overshoot on the downside.

Economic data likely to be variable

The economic data assumptions embedded in these forecasts are set at trend. We could be set for an extended period of below trend growth over the next few years as we adjust to the bursting of the biggest credit bubble in history. The inflation figures are also likely to be open to debate. Indeed inflation really does seem to be at a fork in the road. Given the huge conflicting forces of asset price deflation on one hand and huge likely stimulus from the authorities on the other, it seems that stable trend like inflation is the least likely outcome. So this has the potential to hugely influence both nominal and real returns.

How our long-term views differ from simple mean reversion?

Overall, our long-term approach to investing in traditional Developed market assets is based around a starting point of mean reversion. However the results and benefits from simply using mean reversion can take years to manifest, and history suggests long periods of above and below trend valuations.

For us, credit spreads are already well above long-term spread valuations, and in IG we are rivalling anything we've ever seen including the 1930s. So for any long-term investment we would be very happy buying IG credit spreads at this point. Whilst we think IG is a better risk/reward trade than High Yield, we would also now be comfortable buying High Yield in any portfolio with a medium to long-term horizon.

However for longer-dated Government bonds, the only way a long-term investor will see a positive real return from this starting point is if we see sustained deflation. This is clearly possible with the once in a generation de-leveraging but with real yields so low, and with supply across the globe about to see perhaps the largest increase in history, there is not much cushion for any future inflation in current prices. We are also of the opinion that the medium-term policy response to deal with this huge Global crisis is a coordinated one that eventually promotes inflation. So although the short-term outlook may be dominated by deflation fears, the medium to long-term may see more inflationary concerns as the authorities may eventually resort to printing money.

In equities, after 13 years of significantly above average valuations, we finally return to valuations in a range broadly consistent with long-term averages. However given the scale of this crisis we would not be surprised to see an eventual overshoot. Indeed if you only had the historical data at your disposal then a low of 500-600 in the S&P 500 would not be difficult to justify. Credit is at extreme stress valuation levels, equities are not.

Over the longer-term the dark cloud that hovers over all of us in the West is the fact that we are now past the most supportive period for risk assets using demographics. As the West ages, we desperately need Globalisation to cushion the blow. The 1980-2005 period of stunning returns in the West may prove to be the outlier. Given the negative demographics we would expect most Western risk assets to be trading 'cheap' to their long-run averages by the middle/end of the next decade. Our tutors at university would castigate us for the following statement but we really do need a decade of above average inflation to save us from the worst case scenarios. This may cap real returns but it would help underpin nominal values in many of the physical assets (e.g. Property) that have helped create the crisis we are in currently.

Methodology

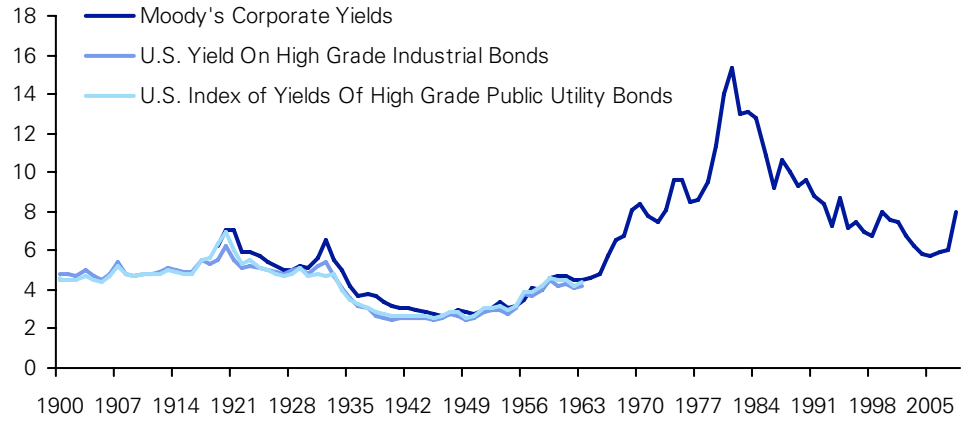
The data series

There is no available index calculating total returns on Credit that extends back much beyond the last couple of decades. The same applies for Government Bonds. So to calculate 109 years worth of returns we needed to find appropriate yield series and compile our own total return calculations.

Corporate Bond series

Moody's was the main source for this data, but their long-term yield data only goes back to 1919, therefore we used data from the National Bureau of Economic Research (NBER) to populate the rest of the history back to the beginning of the century. There are a number of different Corporate Bond and Railroad Bond series available. In the end we decided to go with the series that most closely followed the Moody's series after 1919. In Figure 33 we chart the series used.

Figure 33: Creating the Corporate Bond Yield Series



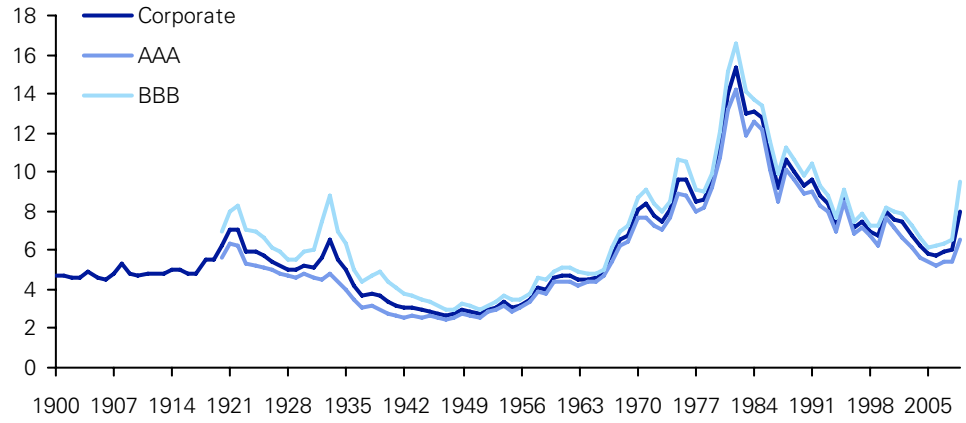
Source: Moody's, NBER

Both the high grade industrial and public utility bond yields closely track Moody's Corporate Bond series and as the Moody's series is made up of both industrials and utilities we decided that the best solution was to use an average of the two.

The next issue to deal with was that Moody's yearly data is actually an average of the yield throughout the year. Between 1919 and 1959 we used this yearly average series but from 1960 we aligned the data to year end points as Moody's first published monthly data from this date. In 1997 we moved over to using their first daily published series.

Moody's also provide us with both the AAA and BBB bond series. The index was constructed using the same methodology as above, but we commenced our study of these assets from 1919. All three series are plotted in Figure 34.

Figure 34: Corporate, AAA and BBB Bond Yield Series

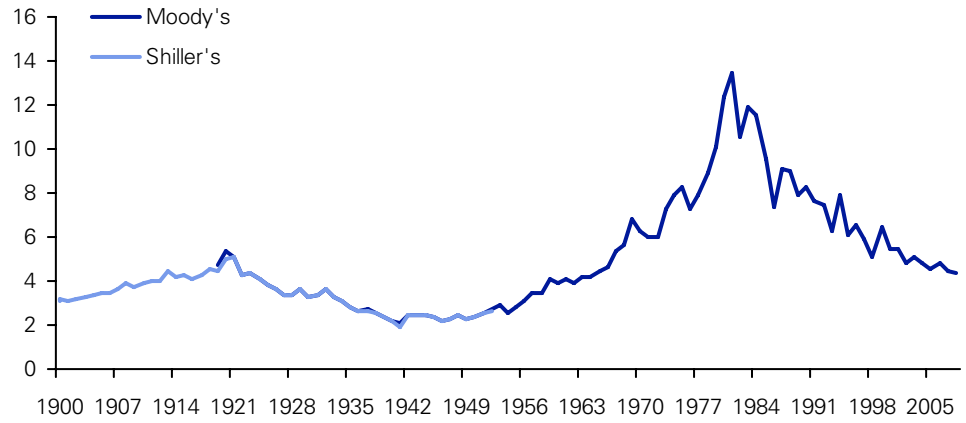


Source: Deutsche Bank, Moody's, NBER

US Treasury series

Once again for the Treasury data we were able to use Moody's series. Again this only provided us with yields back to 1919. Prior to this we use the long-term Government Bond yield from Robert Shiller's "Irrational Exuberance" (second edition). Figure 35 shows that the fit with Moody's data is very strong.

Figure 35: Creating the Long-Term Treasury Yield Series



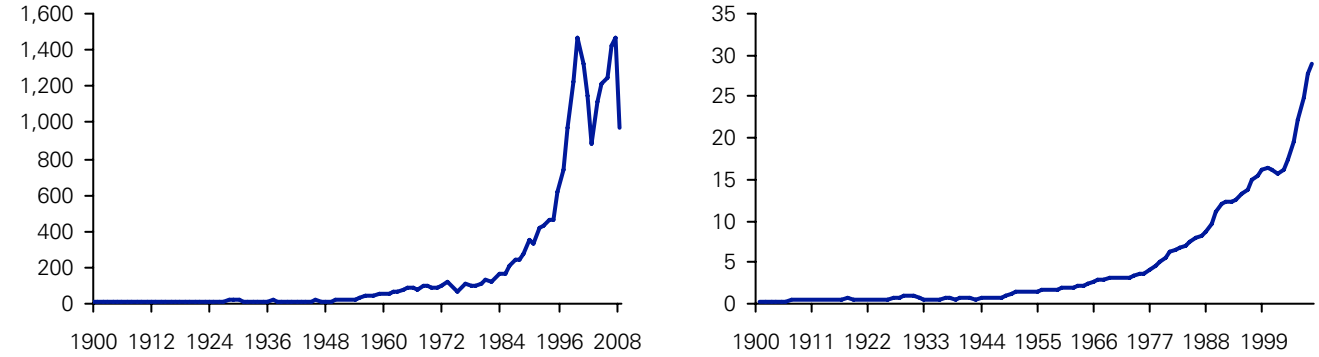
Source: Bloomberg, Moody's, Irrational Exuberance (second edition) (Robert Shiller)

Then using a similar methodology to that used for Corporate Bonds we constructed a series using yearly data from 1919-1959, monthly data from 1960-1996 and then daily data from 1997 onwards but this time we used Bloomberg's 30yr generic Treasury yield. Figure 35 depicts the final yield series used for US Treasuries.

Equity series

We used the S&P 500 index for the Equity series back to 1926 then from 1900-1925 we used the Equity data from Robert Shiller's "Irrational Exuberance" (second edition). Figure 36 charts the yearly price history as well as the yearly dividends used to calculate total returns.

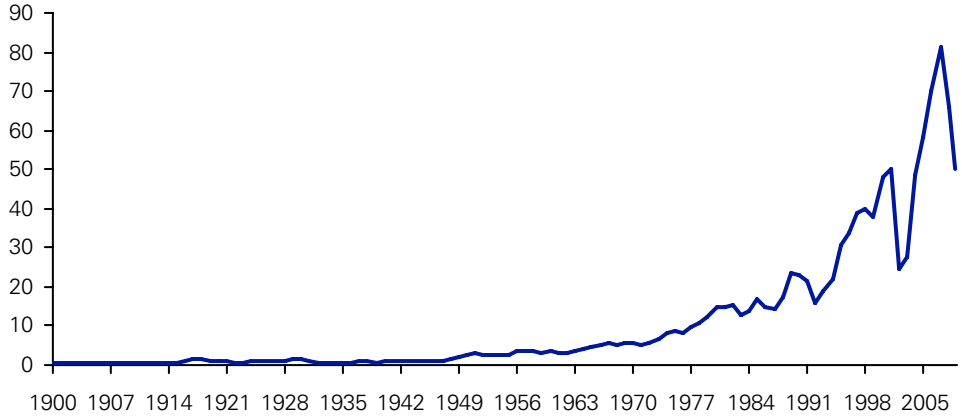
Figure 36: Equity Price Series (left) and Dividend Series (right)



Source: Irrational Exuberance (second edition) (Robert Shiller), S&P

Figure 37 charts the earnings series for the Equity data.

Figure 37: Equity Earnings Series

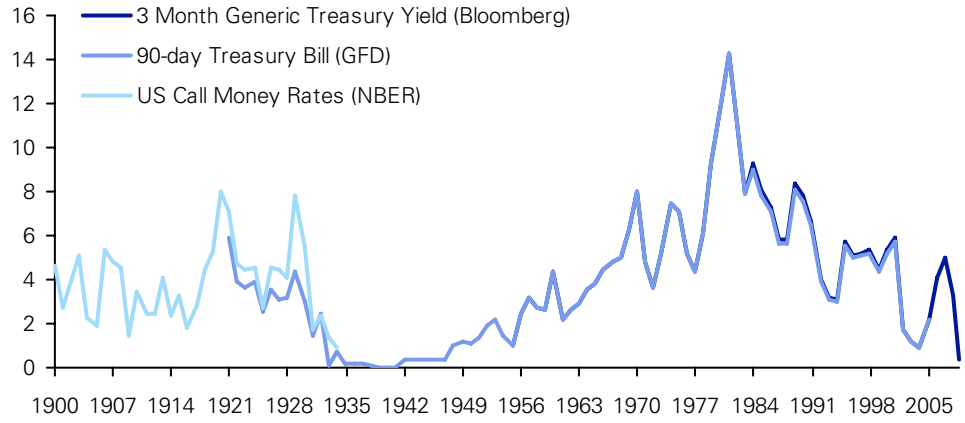


Source: Irrational Exuberance (second edition) (Robert Shiller), S&P

Cash series

We decided that the best data to use for a Cash series would be one linked to short-dated Treasury-Bills. We use Bloomberg data for the generic US 3-month Government yield back to 1954. Prior to this we have used 90-day US Treasury Bill data back to 1920 from Global Financial Data with data from NBER populating the remainder of the series based on a series with the best fit to the overlapping data points. Figure 38 charts the series we used from the NBER to splice into the T-Bill data. This was their "US call money rates" series.

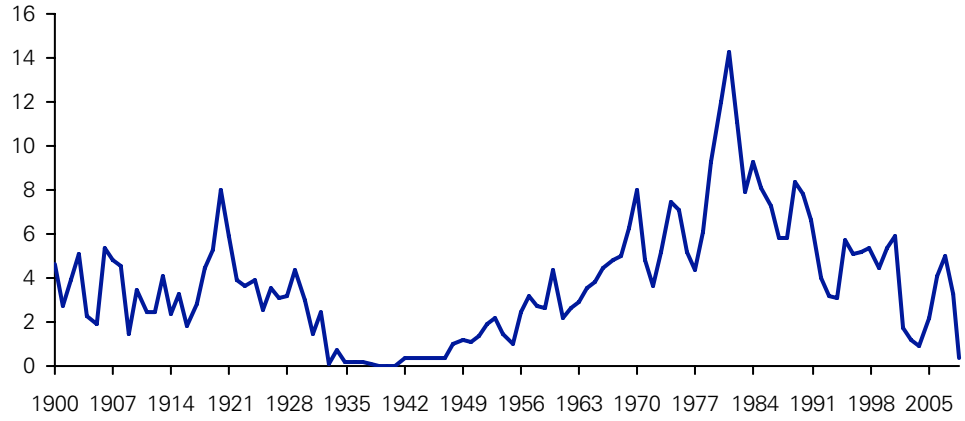
Figure 38: Creating the Short-Term Rate/Cash Series



Source: Bloomberg, GFD, NBER

In Figure 39 we chart the final yield series used for Cash data.

Figure 39: Cash Series

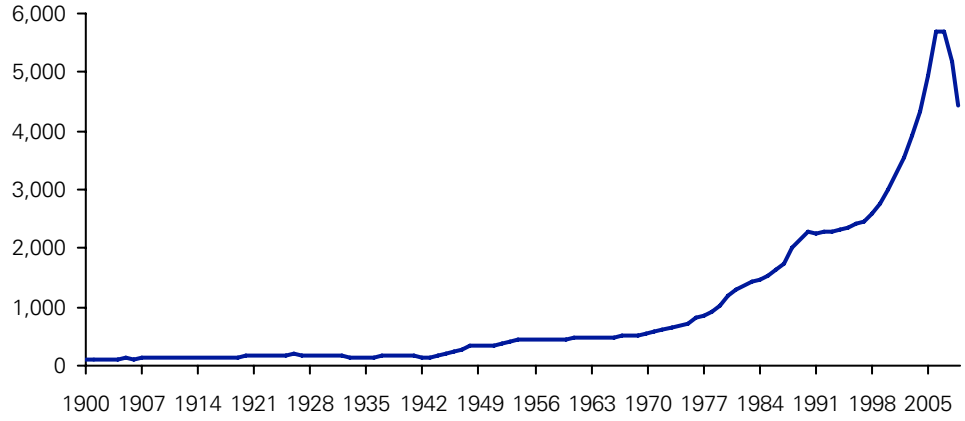


Source: Bloomberg, GFD, NBER

Property series

For the Property series we used the data from Irrational Exuberance (second edition) by Robert Shiller. The data since 1987 is more specifically from the S&P/Case-Shiller US Home Price Index. Figure 40 shows the full series.

Figure 40: Property Series

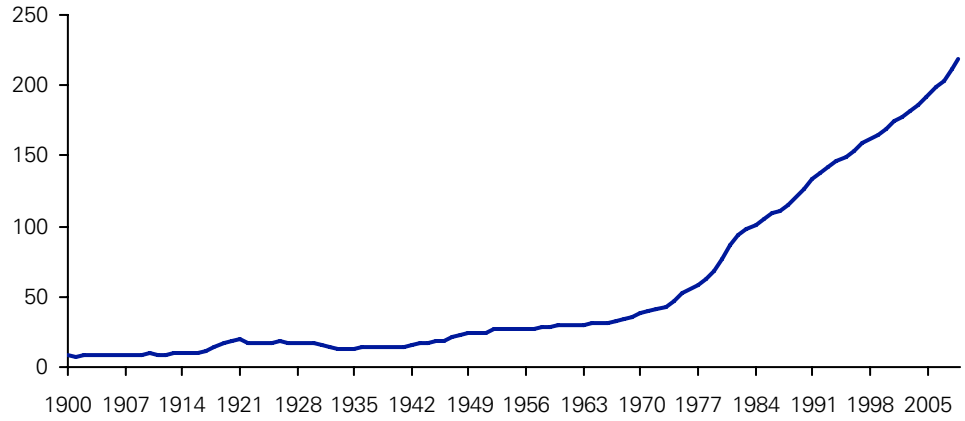


Source: Irrational Exuberance (second edition) (Robert Shiller), S&P/Case-Shiller

Inflation series

For inflation we decided to use the consumer price index for all urban consumers (CPI-U) from the US Department of Labour Bureau of Labour Statistics. The series goes as far back as 1913, so prior to this date we used data from Robert Shiller's "Irrational Exuberance" to complete the inflation series. Figure 41 charts the full inflation series history.

Figure 41: CPI/Inflation Series



Source: Irrational Exuberance (second edition) (Robert Shiller), US Department of Labour Bureau of Labour Statistics

Other data series

There were a number of other data series that we used within this document for shorter periods and they are listed below.

- IG Corporate Bond data from the iBoxx Bond indices (Euro, Sterling and Dollar)
- HY Bond data from the Deutsche Bank HY Bond index
- For the Oil data we have used Brent Crude Oil futures data

Calculating Bond returns

Basic total returns

We now have the appropriate yield series for both Corporate and Government bonds. We also know that the series has an average life of around 30 years. To compile an index we needed to make an assumption about the coupon rate. The assumption we made was to assume at the start of each year that the index was trading at par and therefore the yield at

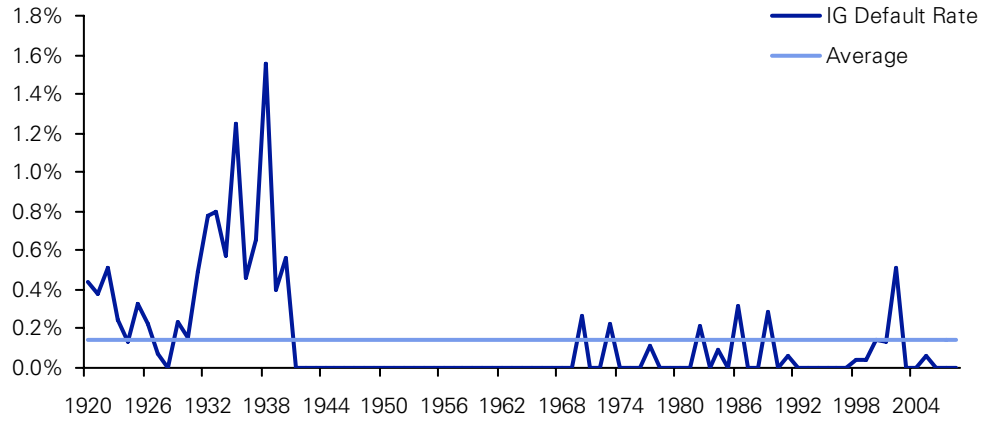
the start of the year was the coupon. We then calculated the yearly total returns based on the change in price and the yearly reinvestment of coupons.

Adjustment for default

Since we used a yield series to calculate returns there was the possibility that in times of significant Credit deterioration and default that we would overestimate returns. In order to guard against extreme spikes up and down in yield caused by fallen angels Moody's avoid including particularly volatile credits in their index. Therefore, Moody's series represents some sort of median series for Corporate yields, which is likely to smooth returns. Of particular concern is that we would overstate returns in years when defaults were high.

In order to account for this discrepancy we decided to adjust down the returns each year based on the historic default rate and the spread required to compensate for default probability (Default Study 2008). Figure 42 shows the yearly default rate, since 1920, for companies that started the year with a Moody's IG rating and defaulted by the end of the year.

Figure 42: Investment Grade Default Rate since 1920



Source: Moody's

Figure 43 is a snapshot of the spreads required to compensate for default given different ratings and maturity of bonds. It also assumes the historic average recovery rate for investment grade bonds of 46.9%.

Figure 43: Spread Required to Compensate for Default for IG (1920-2008)

Years	IG	AAA	AA	A	BBB
5	18	2	8	12	35
10	22	4	12	16	39
20	23	5	14	17	38

Source: Deutsche Bank

The spread required to compensate for default gives, on average, the amount of spread that needs to be provided each year to compensate for default risk. Rather than just subtract this amount of spread off total returns each year we felt it would be more accurate to adjust more in years of higher default.

The assumptions we made were:

- The average of our adjustments must equal the average spread required to compensate for default.
- When the IG default rate was at its historical average level (0.14%) the default adjustment would be the spread required to compensate for default.

Therefore in years where the default rate was above the long-term average we would attribute a greater amount for default risk than when the default rate was below the average. In years when there were no defaults there would be no adjustment for default.

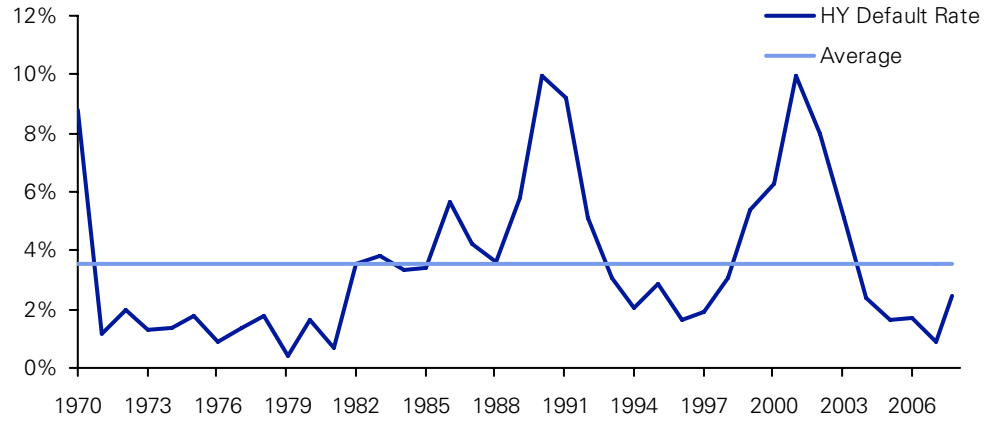
The spread required to compensate for default was decided by the average life of the particular Corporate Bond series. We can only calculate default adjustment out to 20 years but as the amount required to compensate for default for IG Bonds tends to flat-line soon after 10-years, we felt comfortable applying 20-year default adjustment to 30-year bonds.

High Yield

We have a total return series back to 1999 and have therefore used this to calculate returns over the last 10 years. For the longer-term calculations we used yield data as we did with the Moody's IG data, we therefore also needed to make similar adjustments for default risk. For the HY market, where defaults are much higher this is by no means perfect but we are confident that over a cycle the returns will be similar to an established HY index.

We used a similar process for default adjustment but only used default data from 1970 as we felt this was a period that better represented the growth of the HY market. For more on this please see our February note (2008 Default Study). Figure 44 shows the HY default rate since 1970.

Figure 44: High Yield Default Rate since 1970



Source: Moody's

Figure 45 shows a selection of default compensation spreads for HY Bonds assuming the average recovery rate of 40.4%.

Figure 45: Spread Required to Compensate for Default for HY (1970-2008)

Years	HY	BB	B
5	264	125	349
10	230	125	332
20	200	131	273

Source: Deutsche Bank

Once the default adjustment is decided for each year it is simply subtracted from the calculated total return for that year.

Calculating other returns

Equity returns

For Equities we have assumed that dividends are received and reinvested at the end of each year. Therefore our total returns take account of both the income gain as well as any capital gain. We make no adjustment for stocks entering or leaving the index and assume that investors can buy and sell securities as and when they join/leave the index.

Cash returns

As Cash is seen very much as the risk-free option we have therefore assessed that the return is made up entirely of income gain and that it is impossible to make a nominal capital loss. We assumed the rate at the beginning of the year was the amount earned during that year.

Property and Oil returns

Since we only have price data for both of the series returns are simply based on the price return of each of these series.

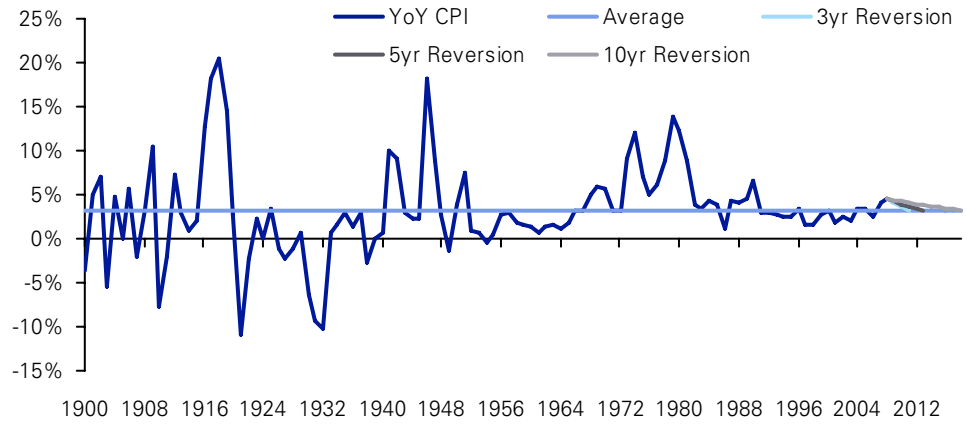
Mean reversion calculations

In the following section we outline the variables that were mean reverted in order to calculate potential expected returns. We have decided to mean revert the data over three different time horizons (3 years, 5 years, and 10 years) as different assets tend to have very different cycle lengths.

CPI mean reversion

In order to calculate expected real returns we need to find an appropriate future CPI time series. To accomplish this we have simply reverted the YoY growth in CPI back to the long-term average, which is about 3.2%. The results of this mean reversion are plotted in Figure 46.

Figure 46: US YoY US CPI



Source: Deutsche Bank, Irrational Exuberance (second edition) (Robert Shiller), US Department of Labour Bureau of Labour Statisitics

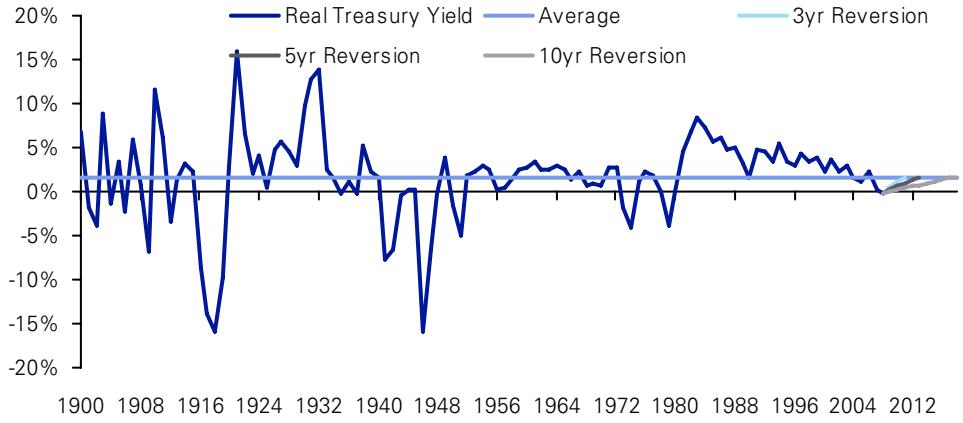
Now we have calculated one of the main building blocks for our mean reversion analysis we can now work through the various asset classes. We will begin with the Treasury market as along with the inflation data this provides a key building block to calculating future Corporate Bond returns.

Treasury mean reversion

In order to calculate expected Treasury returns we have to calculate the expected path for yields. Firstly we have calculated the average long-term real yield (Treasury yields - CPI) and mean reverted back to this level. The results of which can be seen in Figure 47.

This gives us a series of inflation adjusted yields, which when added to our CPI mean reversion series can be used to back out nominal Treasury yields. Once we have these we can calculate expected returns in the same way as we calculated historic returns.

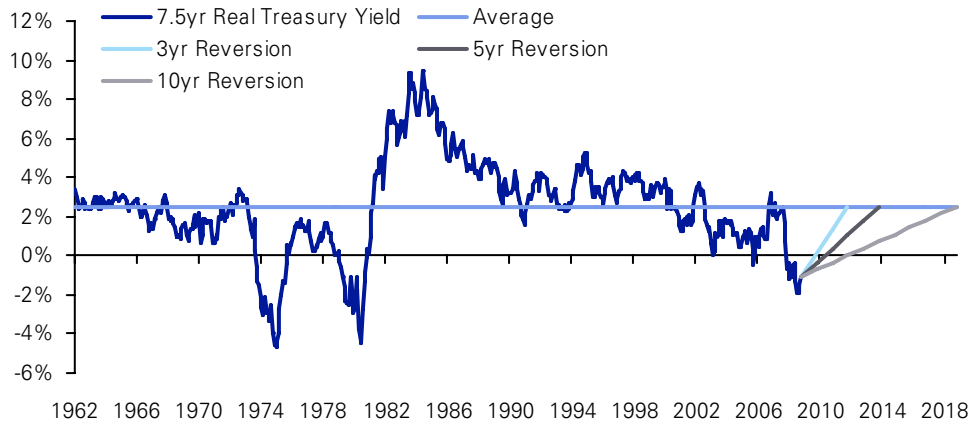
Figure 47: US Long-Dated Real Treasury Yield



Source: Deutsche Bank, Bloomberg, Moody's, Irrational Exuberance (second edition) (Robert shiller)

We should also say that this is a long-dated (c.30 year maturity) series of Treasury yields. In order to calculate HY returns we need a much shorter dated Treasury yield. As the average life of the HY index is around 7.5 years we have used an average of the 5yr and 10yr Treasury yield. Figure 48 shows the results from this mean reversion which allows us to calculate prospective returns as previously mentioned.

Figure 48: US 7.5yr Real Treasury Yield

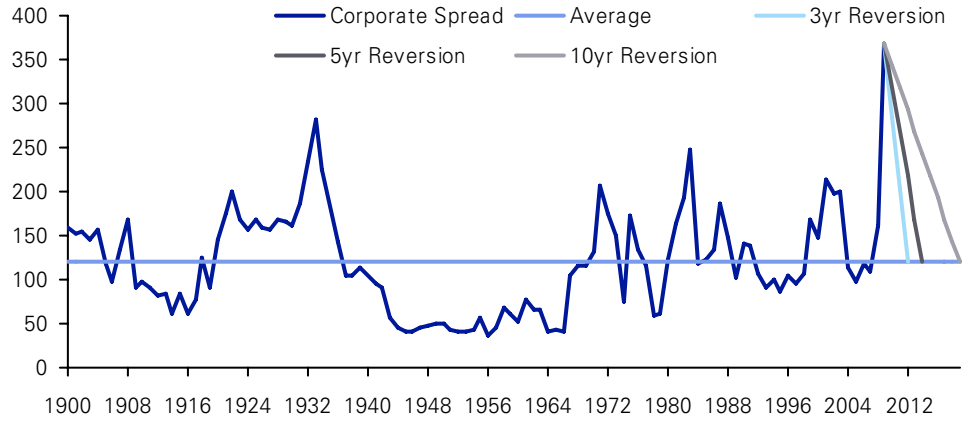


Source: Deutsche Bank, Bloomberg

Corporate Bond mean reversion

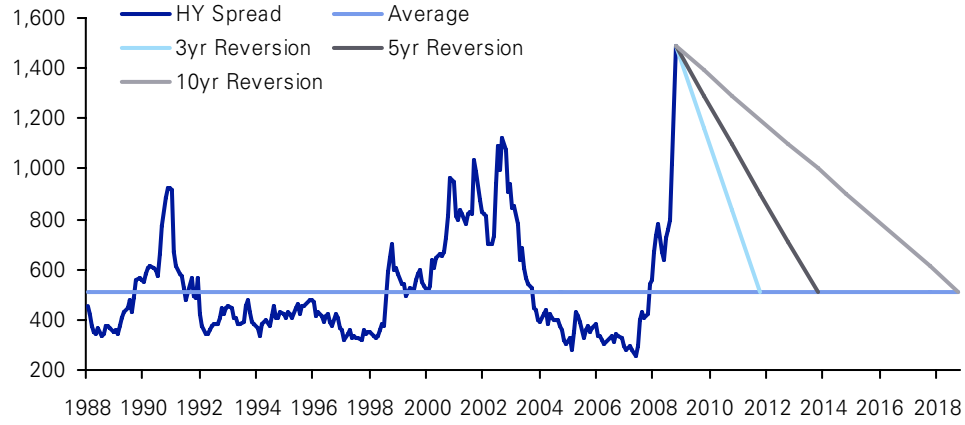
The mean reversion for Corporate Bonds focuses on mean reverting spreads to their long-term historic average. Figure 49 and Figure 50 show the spread mean reversions for overall IG Corporates and HY Corporates.

Figure 49: US Corporate Spreads (bp)



Source: Deutsche Bank, Moody's, NBER

Figure 50: US HY Spreads (bp)



Source: Deutsche Bank

Then using these mean reverted spread levels, in conjunction with the Treasury yields already discussed, we can calculate future Corporate Bond yields. With these yields we can calculate returns using the same method previously used to calculate historic returns although we do still need to make an assessment for default risk.

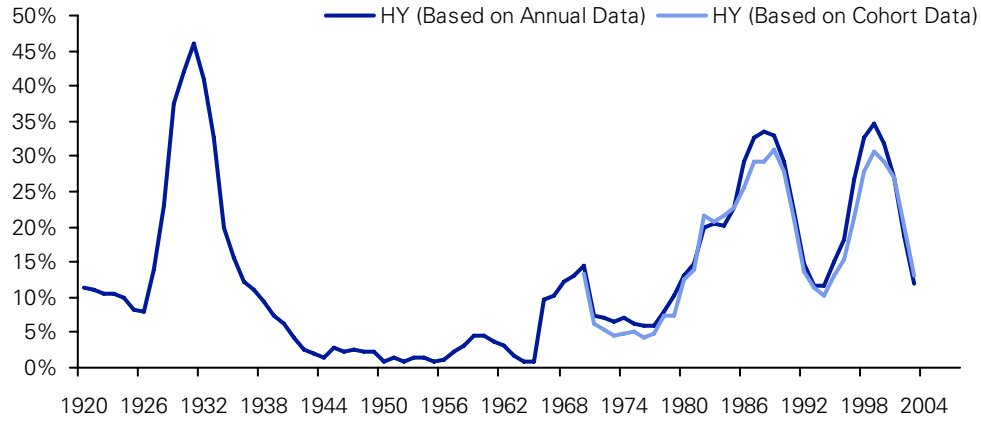
Our starting point for this is to use the average spread required to compensate for default as calculated in our 25 February note (2008 Default Study). For IG data we use the averages based on data back to 1920 and for HY we use averages based on data back to 1970. The simple reason for this is that this gives us the most conservative results across the rating spectrum. Please see our 25 February note (2008 Default Study) for further information on this.

When we have previously looked at defaults one of our main overriding conclusions has been that IG corporates rarely default. However the same certainly cannot be said for HY. So given that we are probably at the beginning of a significant pick-up in defaults we felt it would be prudent to make some more aggressive assessments for default when looking at HY returns.

First of all we used data from our cohort analysis in our 25 February note. The data we have used here is based on the worst 3 year, 5 year and 10 year period of defaults since 1970. In addition we also wanted to assess the impact of an Armageddon situation based on a "depression" scenario but we unfortunately only have cohort data back to 1970. Therefore we have spliced together a series of annual default rates dating back to 1920 in order to get an idea of how much more severe defaults were during the "Great Depression". Looking at

Figure 51 we can see that this method gives us numbers broadly in line with the actual HY cohort data.

Figure 51: 5 Year Cumulative Default Rates



Source: Deutsche Bank, Moody's

Figure 52 details the various different default compensation levels that we have used when calculating possible HY returns based on mean reversion.

Figure 52: Compensation Spreads and Different Scenarios

	Based on Cohorts since 1970				
	Average	**Worst 3yr**	**Worst 5yr**	**Worst 10yr**	**"Depression"**
HY Corp	250	557	472	332	761

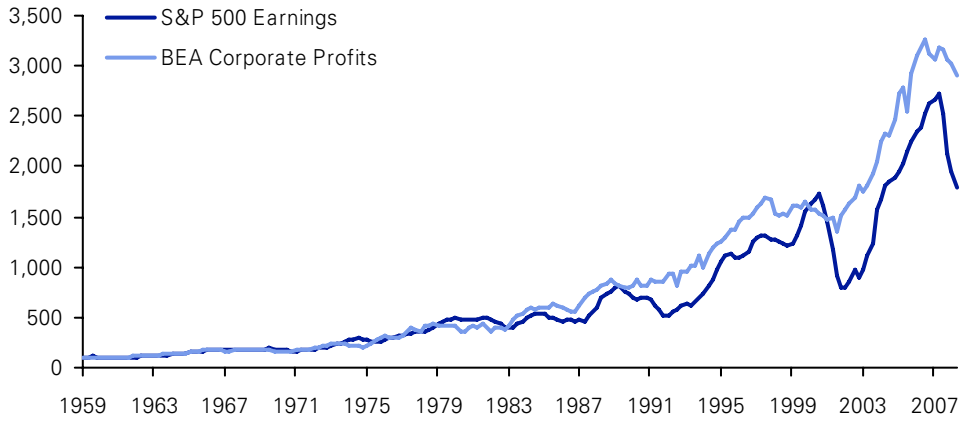
Source: Deutsche Bank

Now that we have all the necessary information we are able to calculate the possible future returns using the same method of calculation as was used to calculate the historic returns.

Equity mean reversion

The mean reversion for Equities requires a number of methodical steps. The first of which is looking at corporate profits as a percentage of nominal GDP. Previously we have used the corporate profit series from the Bureau of Economic Analysis (BEA), however as you can see from Figure 53 this series does not seem to account for the full extent of the drop off in earnings that we have seen over the past year or so. We have therefore decided to mean revert the actual S&P 500 earnings as a percentage of nominal GDP. This will hopefully better reflect that earnings have corrected notably in the last 12 months.

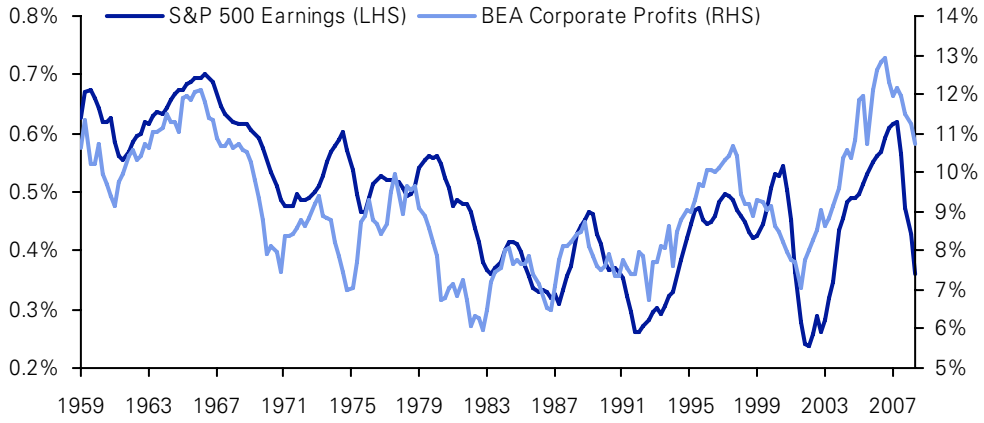
Figure 53: S&P 500 and BEA Corporate Profits Re-Based to 100 in 1959



Source: Deutsche Bank, Bureau of Economic Analysis, Irrational Exuberance (second edition) (Robert Shiller), S&P

As Figure 53 and Figure 54 show, S&P 500 earnings follow a similar pattern as the BEA corporate profits data with the added benefit of better reflecting the recent downturn in earnings.

Figure 54: Profits as a Percentage of Nominal GDP

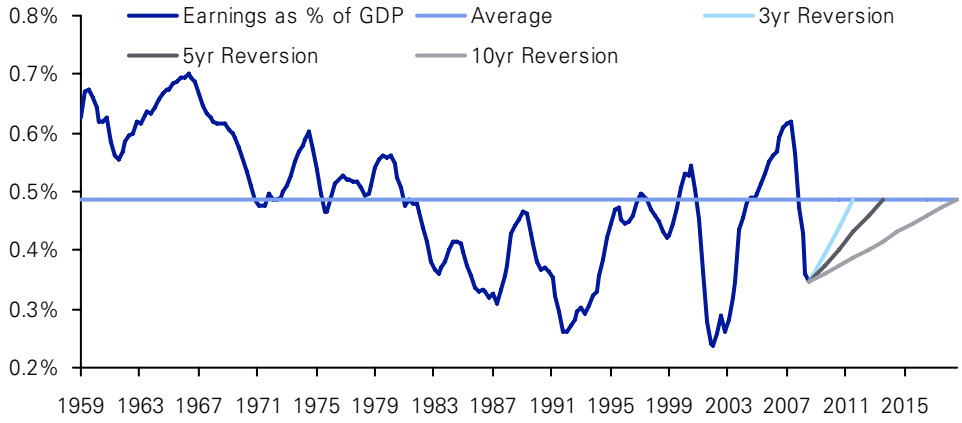


Source: Deutsche Bank, Bureau of Economic Analysis, Irrational Exuberance (second edition) (Robert Shiller), S&P

Figure 55 then shows the full mean reversion analysis. We should note here that we decided to base this mean reversion on data back only 50 years rather than the full 109 years as this period was more representative of current trends. The earnings data in the early part of this century was volatile, had little connection with GDP and was indicative of a rapidly developing market and economy.

So this gets us as far as having earnings as a percentage of nominal GDP going forward. Now we need to make an assessment of future nominal GDP growth to abstract an actual forward earnings stream. For this analysis we have simply assumed that nominal GDP grows at its long-term YoY average of around 6.7%.

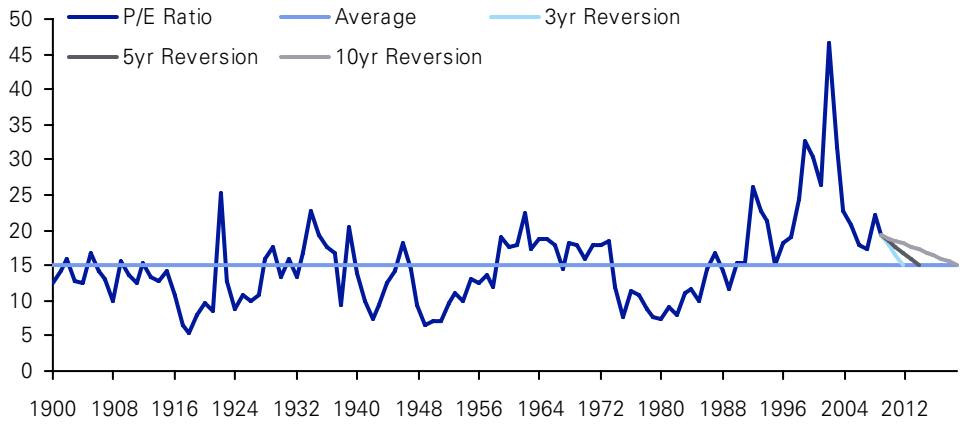
Figure 55: S&P 500 Earnings as a Percentage of Nominal GDP



Source: Deutsche Bank, Irrational Exuberance (second edition) (Robert Shiller), S&P

Now that we have calculated the future path of earnings we move on to the second stage of the mean reversion analysis where we look to mean revert the P/E ratio in order to assess the future possible levels for the S&P 500. Figure 56 shows the results of the mean reversion of the P/E ratio.

Figure 56: S&P 500 P/E Ratio



Source: Deutsche Bank, Irrational Exuberance (second edition) (Robert Shiller), S&P

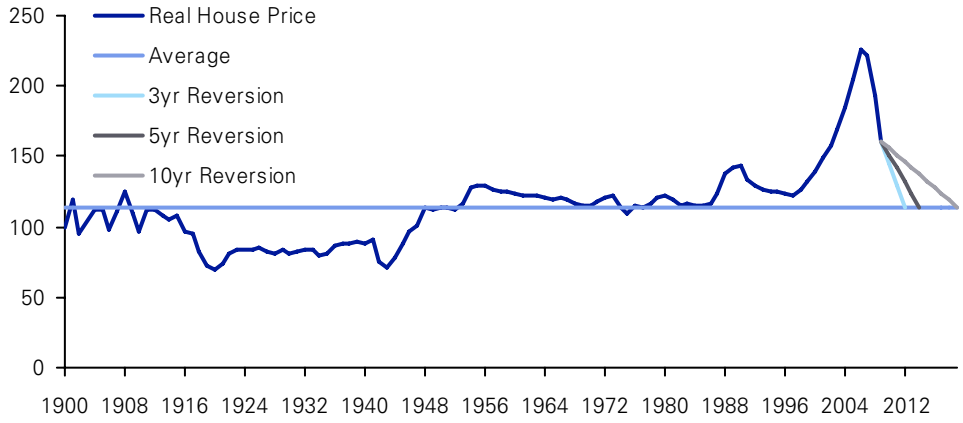
Essentially we can now calculate a future expected price return for the S&P 500 but we need to assess what happens to dividends in order to calculate total returns. For our analysis we have simply assumed that dividends grow in line with the long-term average growth of nominal GDP (6.7%).

Therefore we now have future expected price levels for the S&P 500 as well as future dividends and can therefore calculate expected returns.

Property and Oil mean reversion

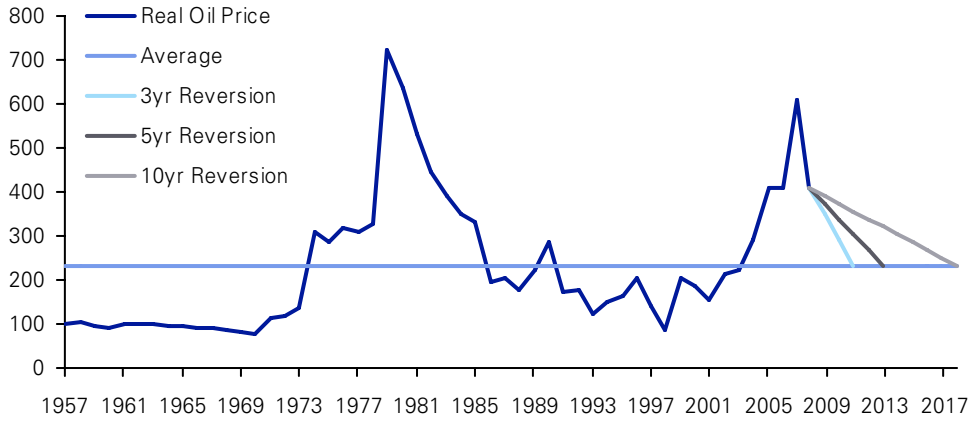
For the mean reversion of Property prices and Oil prices we have simply looked to mean revert to the long-term average real adjusted price as seen in Figure 57 (Property) and Figure 58 (Oil).

Figure 57: US Real House Price



Source: Deutsche Bank, Irrational Exuberance (second edition) (Robert Shiller), S&P/Case-Shiller

Figure 58: Oil Prices



Source: Deutsche Bank, Bloomberg, Datastream

Mean reversion of iBoxx indices

The main advantage in using US spread data is that we have an extremely long-term term history. However the same exercise is impossible to repeat for the European or UK Credit markets. The European market only begun to develop from around 1999, and the Sterling market only reached critical mass from around the middle of the 1990s. In this chapter we try to provide a framework for assessing where Euro and Sterling spreads are relative to the long-term US credit cycle, which we have used throughout this study. We then use the results to help estimate Euro and Sterling returns going forward.

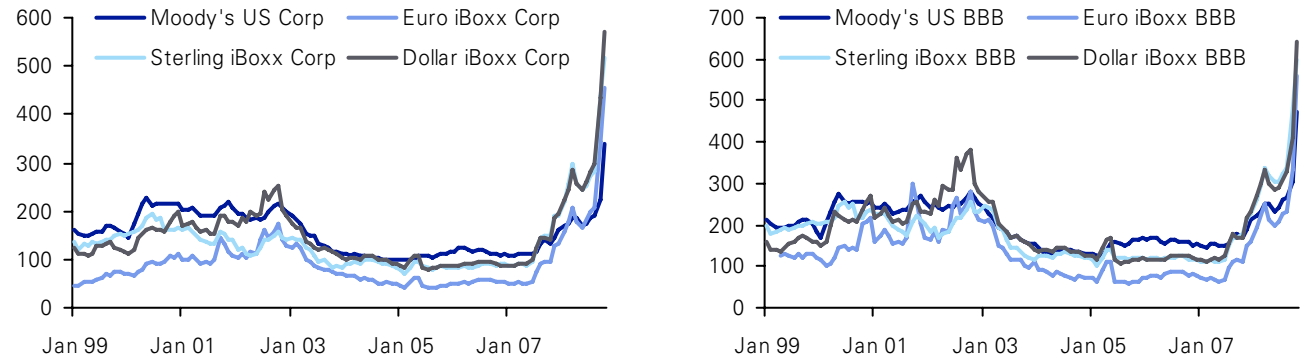
The long-term US spread series used throughout this study represents a relatively small universe (currently 90 issuers) of Bonds with an average life of about 30 years. We think it provides an extremely useful insight into the depth, scale and duration of typical global credit cycles. However at any one point in time it is perhaps not entirely representative of where either a broader index of Credit trades or more particularly where Euro and Sterling spreads currently are within the credit cycle.

We have also used dollar iBoxx spreads in this exercise. These spreads are more in-line with those seen in Europe and the UK and we therefore need to make the same adjustments.

Looking at Figure 59 we can see that the Moody's spread data generally follows a similar trend to the iBoxx data although given the more restricted nature of the index methodology tends to move less aggressively through the cycles. This is most evident with where spreads

are at the current point as over the last year or so all three of the iBoxx Corporate indices have gone from being tighter than the Moody's spreads to being wider now.

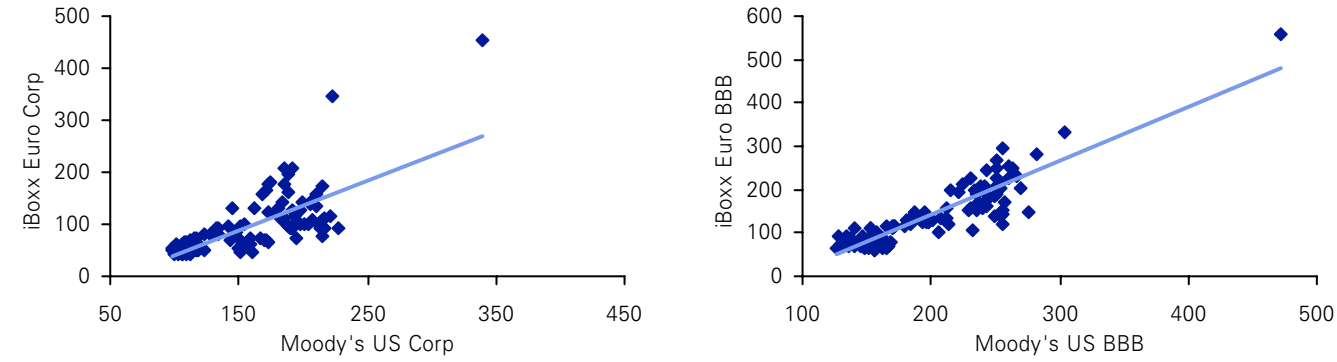
Figure 59: iBoxx Euro, Sterling and Dollar Spreads vs. Moody's Long-Term US Spreads: Corporates (left), BBB (right)



Source: Deutsche Bank, Moody's

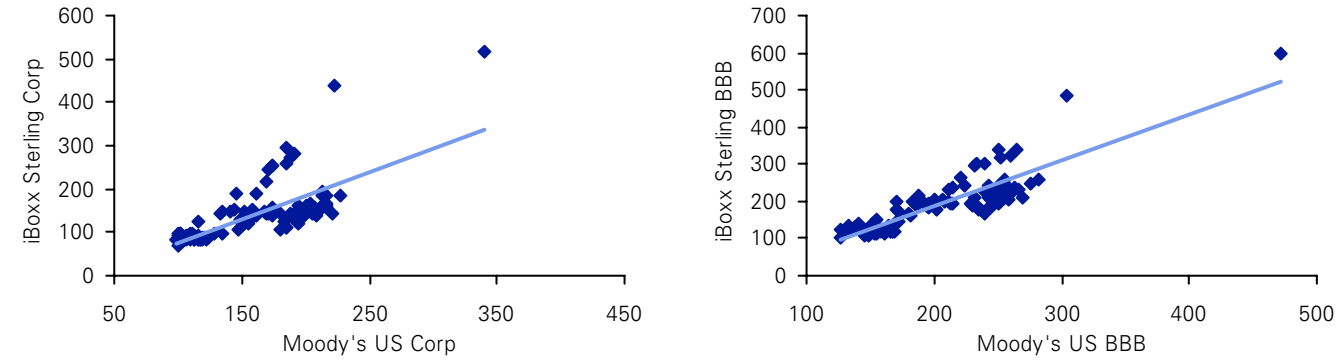
In the next section we have attempted to approximate a long-term average spread for the iBoxx indices. This is extremely difficult to do with only 6-8 years worth of history. However we have regressed monthly iBoxx data against the long-term Moody's data (Figure 60-Figure 62) and have then used this regression to calculate an approximation for long-run yearly spread histories for the iBoxx universe. (Figure 63-Figure 65).

Figure 60: iBoxx Euro Spreads vs. Moody's US Spreads (bp): Corporates (left), BBB (right)



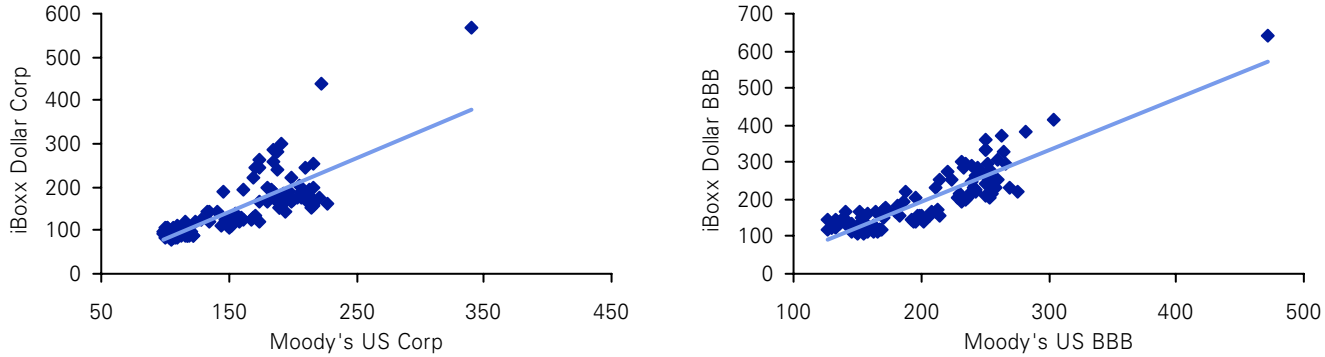
Source: Deutsche Bank, Moody's

Figure 61: iBoxx Sterling Spreads vs. Moody's US Spreads (bp): Corporates (left), BBB (right)



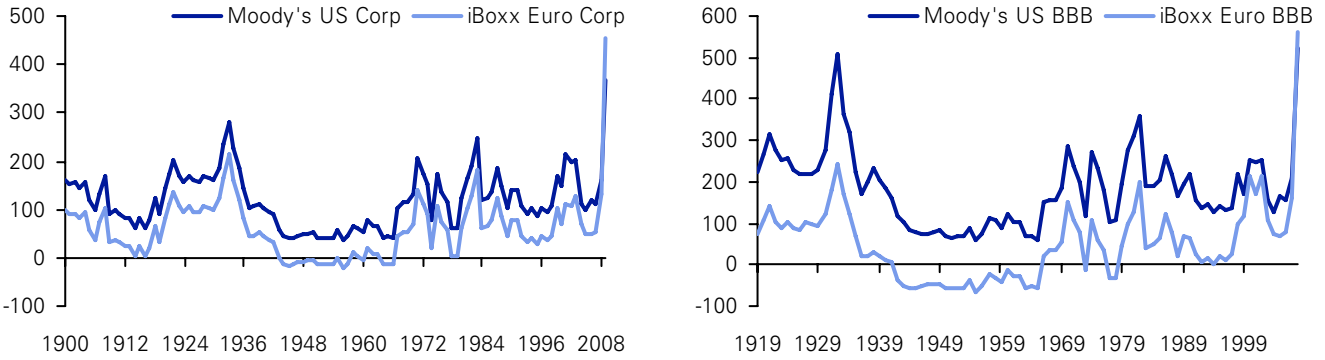
Source: Deutsche Bank, Moody's

Figure 62: iBoxx Dollar Spreads vs. Moody's US Spreads (bp): Corporates (left), BBB (right)



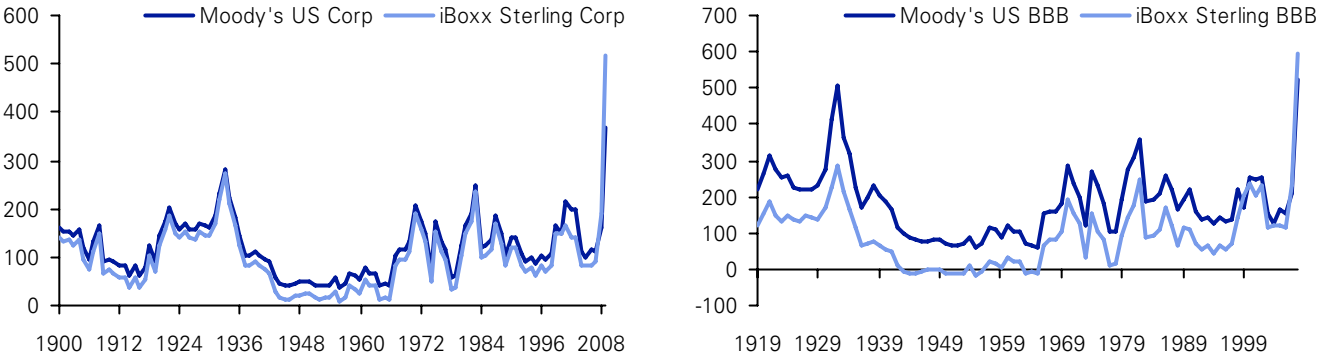
Source: Deutsche Bank, Moody's

Figure 63: iBoxx Euro Regressed Spread Histories: Corporate (left), BBB (right)



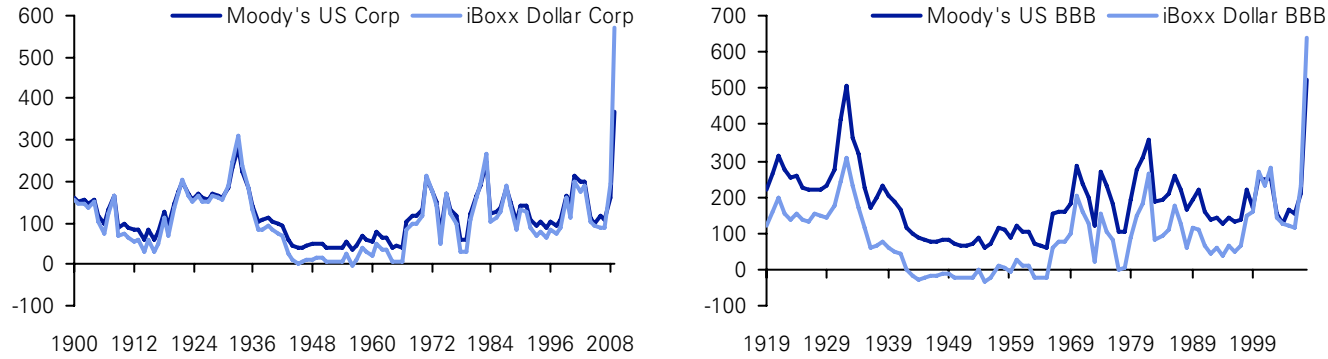
Source: Deutsche Bank, Moody's

Figure 64: iBoxx Sterling Regressed Spread Histories: Corporate (left), BBB (right)



Source: Deutsche Bank, Moody's

Figure 65: iBoxx Dollar Regressed Spread Histories: Corporate (left), BBB (right)



Source: Deutsche Bank, Moody's

We accept that this is highly simplistic, but we believe that it will produce a more accurate idea of where long-run "average" spreads should be for the iBoxx universe. To look simply at the last 10 years would arguably be more misleading as it does encompass an extraordinary period of spread volatility.

Figure 66 contains the long-term averages for the iBoxx indices based on the regression with Moody's spread data.

Figure 66: Long-Term Average Spreads and Current Spreads

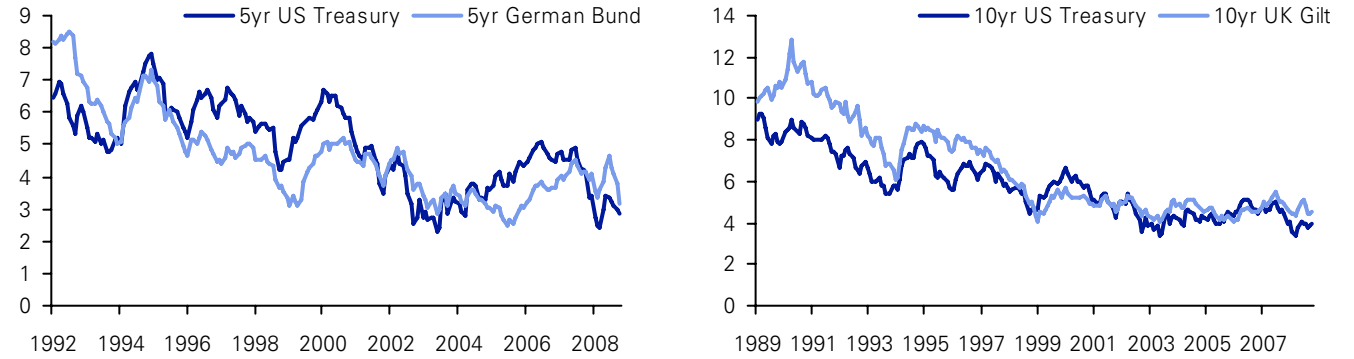
	iBoxx Euro		iBoxx Sterling		iBoxx Dollar	
	Corporate	BBB	Corporate	BBB	Corporate	BBB
Current	456	560	517	598	569	641
Average	61	50	99	96	104	95

Source: Deutsche Bank

In order to calculate mean reverted total returns we also need to calculate relevant Government yields and inflation data. Clearly the different indices have different average maturities, both the iBoxx Sterling and Dollar indices are around 10 years whilst the iBoxx Euro index has an average life of just over 5 years. Therefore in order to keep things simple we will use a 10 year Government yield for the Sterling and Dollar indices and a 5 year Government yield for the Euro index.

Since we don't have a long enough data series (either Government yields or CPI) for the UK or Europe we have decided to revert these series to a long-term US average. As you can see from Figure 67 the time series we have for German and UK Government yields are not significantly different from the US equivalent. In addition we believe that the globalisation trend over the past 15 years or so has generally led to a convergence in yields in developed countries.

Figure 67: Government Bond Yields: 5yr Treasury vs. 5yr Bund (left), 10yr Treasury vs. 10yr Gilt (right)



Source: Bloomberg

Trying to work out an appropriate future CPI series for Europe and the UK based on mean reversion was difficult as we had nowhere near as long a time series as we did in the US. In the end we decided not to over complicate things and simply use the long-term US figure of 3.2%. As with our Government bond assumptions above, we feel relatively comfortable with this given the globalised nature of the current world.

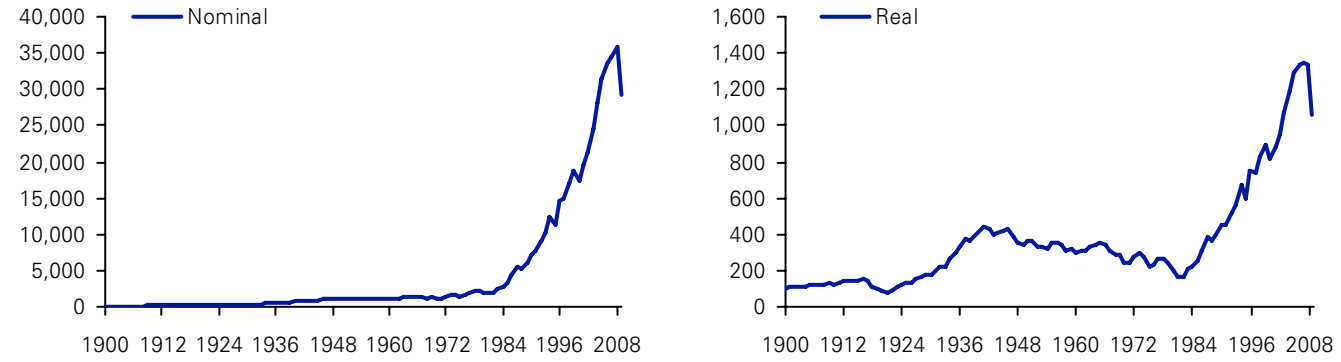
It is therefore now possible to calculate potential mean reverted returns for the iBoxx indices using the same methodology as we used when calculating prospective returns for the long-dated US data.

Time series charts

Total/Price return history charts

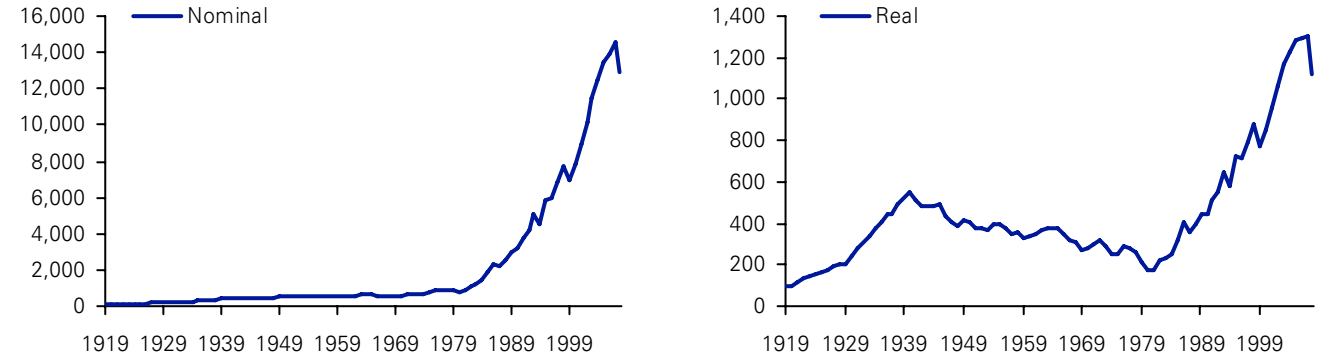
Figure 68-Figure 75 look at the total return series histories for each of the different asset featured in our analysis in both nominal and real terms.

Figure 68: Corporate Bond Total Return Series: Nominal (left), Real (right)



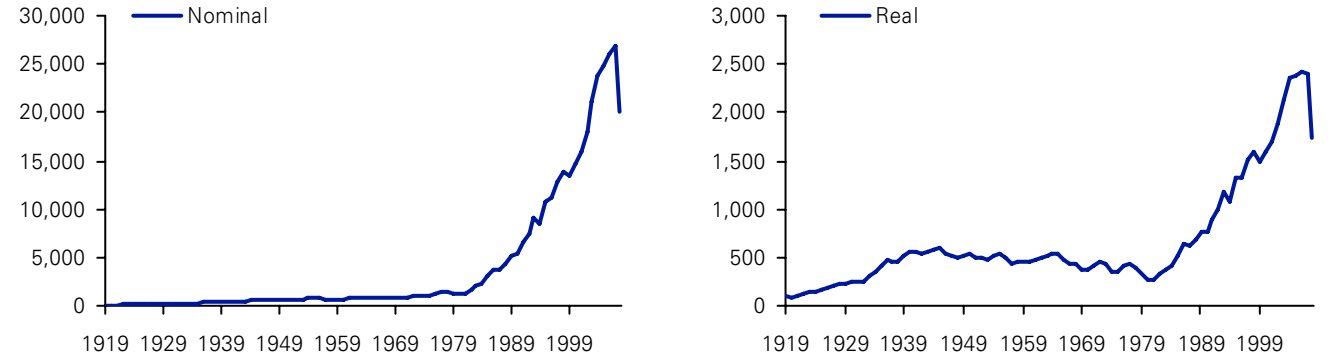
Source: Deutsche Bank

Figure 69: AAA Bond Total Return Series: Nominal (left), Real (right)



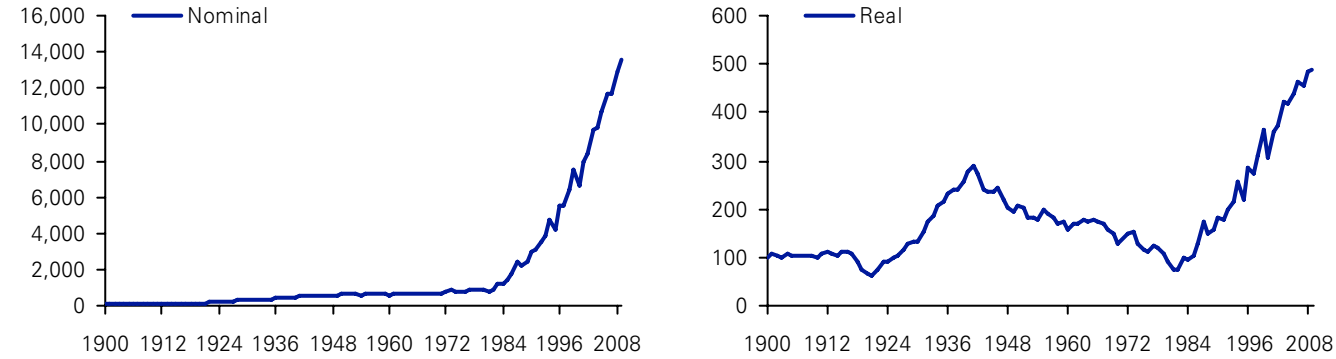
Source: Deutsche Bank

Figure 70: BBB Bond Total Return Series: Nominal (left), Real (right)



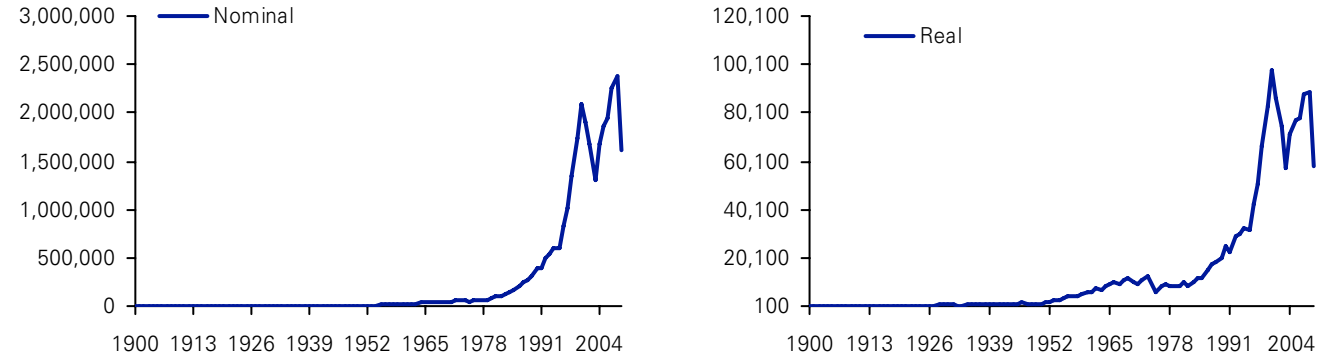
Source: Deutsche Bank

Figure 71: Treasury Bond Total Return Series: Nominal (left), Real (right)



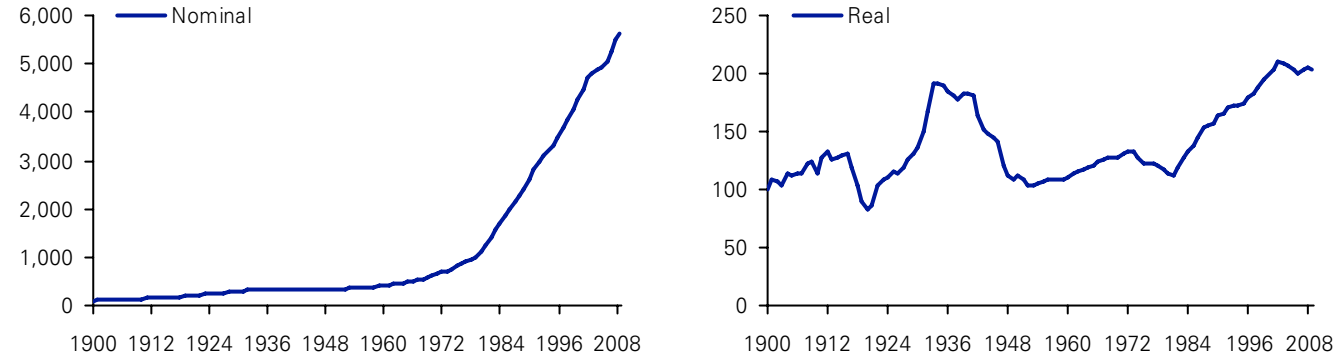
Source: Deutsche Bank

Figure 72: Equity Total Return Series: Nominal (left), Real (right)



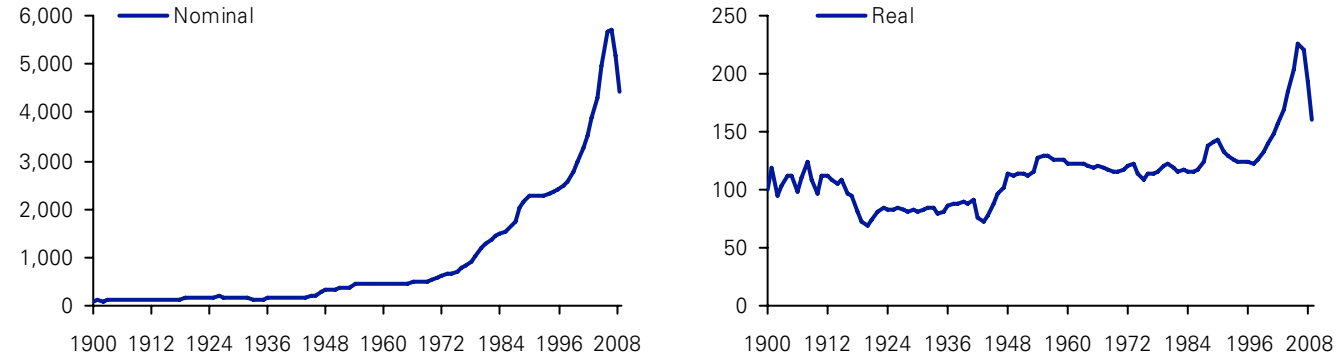
Source: Deutsche Bank

Figure 73: Cash Total Return Series: Nominal (left), Real (right)



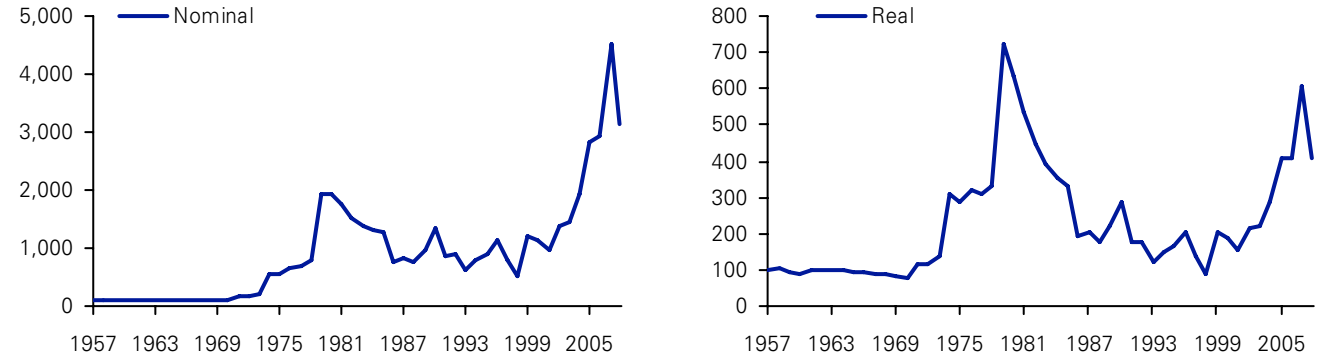
Source: Deutsche Bank

Figure 74: Property Price Return Series: Nominal (left), Real (right)



Source: Deutsche Bank

Figure 75: Oil Price Return Series: Nominal (left), Real (right)

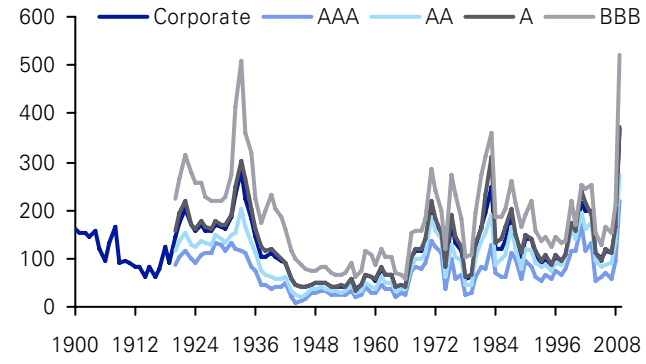


Source: Deutsche Bank

Spread histories

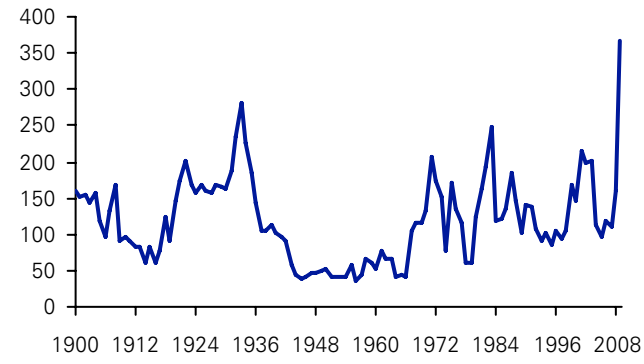
Figure 76-Figure 81 look at the spread histories for the long-dated Corporate Bond series used in our analysis.

Figure 76: Long-term Spreads All Ratings



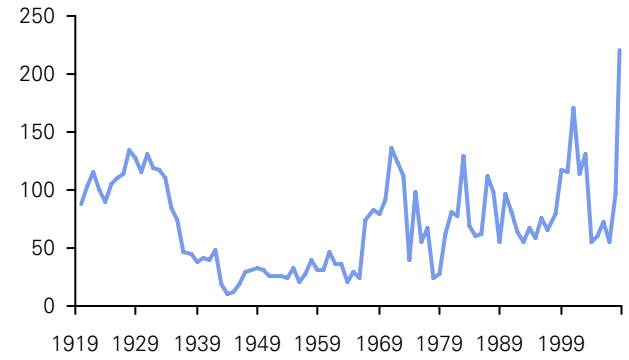
Source: Deutsche Bank, Bloomberg, Moody's, NBER, Irrational Exuberance (second edition) (Robert Shiller)

Figure 77: Corporate Spreads



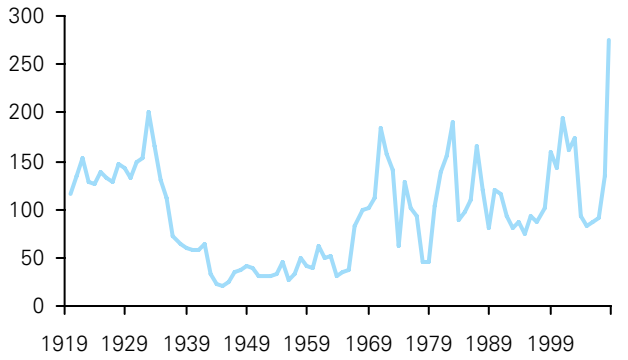
Source: Deutsche Bank, Bloomberg, Moody's, NBER, Irrational Exuberance (second edition) (Robert Shiller)

Figure 78: AAA Spreads



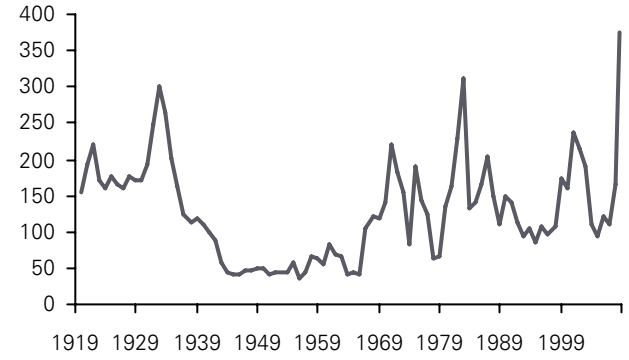
Source: Deutsche Bank, Bloomberg, Moody's, NBER, Irrational Exuberance (second edition) (Robert Shiller)

Figure 79: AA Spreads



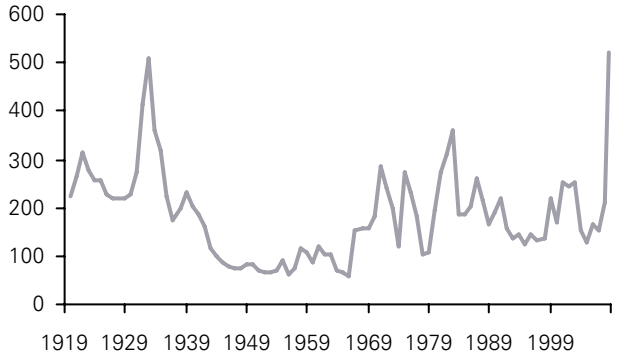
Source: Deutsche Bank, Bloomberg, Moody's, NBER, Irrational Exuberance (second edition) (Robert Shiller)

Figure 80: Single-A Spreads



Source: Deutsche Bank, Bloomberg, Moody's, NBER, Irrational Exuberance (second edition) (Robert Shiller)

Figure 81: BBB Spreads



Source: Deutsche Bank, Bloomberg, Moody's, NBER, Irrational Exuberance (second edition) (Robert Shiller)

Appendix 1

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