

Expected and Unexpected Components of Corporate Total Returns

- When investing in corporates, portfolio managers often think about separating the expected and unexpected components of total returns. The expected component reflects the current Treasury yield curve (yield level and rolldown), as well as the current credit spread curve (OAS level and rolldown). The unexpected component reflects the re-shaping of these curves.
- Investors sometimes view the expected component of total return as a buffer against the unexpected. High Treasury yields and/or credit spreads cushion adverse Treasury and spread curve movements.
- We perform a simple performance attribution exercise and decompose realized corporate returns into expected and unexpected components over the past 25 years.
- Since 1990, corporate total returns have been very strong (with an annual average of 7.1%). Approximately 6.4% out of this annual average is from the expected component of return and only 0.7% from the unexpected. The annual volatility of the expected component is relatively low (1.5%) compared with that of the unexpected component (6.4%). The unexpected component is, by definition, hard to forecast, so it is not surprising to see a long-term realized average unexpected return close to zero yet highly volatile.
- The expected component of return is now much smaller than it has been historically. However, the volatility of the unexpected component of return has not shown a commensurate decline. Consequently, there is now a much smaller buffer of protection from future negative unexpected returns.

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Methodology

For each year since 1990, we decompose the USD Investment Grade Corporate Index total return into an expected component and an unexpected component. We further break these down into a Treasury component and a corporate (spread) component. We perform this decomposition each month and then aggregate into annual returns.

To do this decomposition, we first construct, for each bond in the Corporate Index, a portfolio of hypothetical Treasury bonds that matches the bond's key-rate duration profile. We refer to it as the bond's "matched-duration Treasury portfolio." The aggregation across all bonds produces the matched-duration Treasury portfolio for the Corporate Index.

We use these Treasury portfolios to break down corporate returns into the following (annual) components:

<i>ExpTsyRet</i>	the expected Treasury ¹ return (rolldown and carry); and
<i>UnexpTsyRet</i>	the unexpected Treasury return (caused by curve reshaping – parallel and non-parallel).

From each corporate bond's total return we subtract the return of its matched-duration Treasury portfolio. This leaves us with the corporate bond's *excess return*. Aggregating across all bonds, we obtain the excess return for the Corporate Index.

We proceed to compute two more components of the Corporate Index annual returns:

<i>ExpExRet</i>	the expected excess return, consisting of OAS carry, spread curve rolldown (assuming OAS curve is unchanged), and volatility decay; and
<i>UnexpExRet</i>	the unexpected excess return, consisting of OAS change, convexity effects, and volatility surface change.

The sum of *ExpExRet* and *UnexpExRet* is the full excess return.

The sum of *ExpTsyRet* and *ExpExRet* is the full expected component of the total return.

The sum of *UnexpTsyRet* and *UnexpExRet* is the full unexpected component of the total return.

So, we have

$$\text{Corporate Index TotalRet} = \text{ExpTsyRet} + \text{UnexpTsyRet} + \text{ExpExRet} + \text{UnexpExRet}$$

We look at these return components on an annual basis for the period from 1990 to 2014.

For our return breakdown, we rely on the Barclays return attribution software. The current Hybrid Performance Attribution Model in POINT was launched in 2004. Its predecessor, the PC Product Return Attribution Model, was developed in 1995 and was in use for nine years before being superseded by the POINT model.

To extend our study back to 1990, we perform a manual approximation of the relative return components, making a bold assumption that the index can be represented by a single "average" bond. Of course, the sophisticated attribution models are more accurate (especially because they operate at the individual bond level), but we found our calculations acceptable for the purposes of this study. A detailed example of this estimation can be found in the Appendix.

¹ Here and going forward, "Treasury" means non-spread related components of corporate returns.

To summarize, the tools used in the study are as follows.

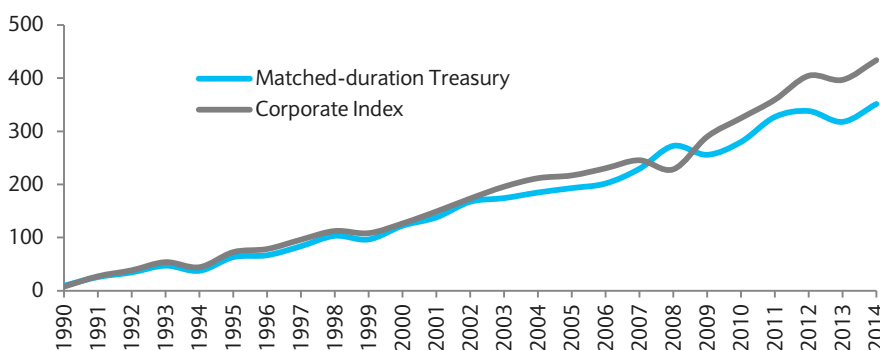
- a. 2004- 2014: Hybrid Performance Attribution Model in POINT
- b. 1995- 2003: Legacy performance attribution model (PC Product platform)
- c. Pre 1995: Manual “single-bond” index representation

The POINT and PC Product models, while very similar, are not exactly the same. In particular, POINT links daily returns (using Menchero linkage²) to produce monthly returns. PC Product uses monthly returns. Fortunately, at least for corporates, the two systems produce similar results. As a check, we used the PC Product model to run the return attribution for the period after 2003 and found that the return components produced by the two models are very similar.

Results

Figure 1 shows the cumulative total return of the Corporate Index and the cumulative total return of the matched-Treasury component. The plot makes it clear that, until the post-crisis period, corporate total returns were driven primarily by non-spread-related factors. Only recently, with Treasury yields at extreme lows, have spreads started playing a more significant role.

FIGURE 1
Cumulative Total Return, Corporate Index and Matched-Duration Treasury Index, %, 1990–2014



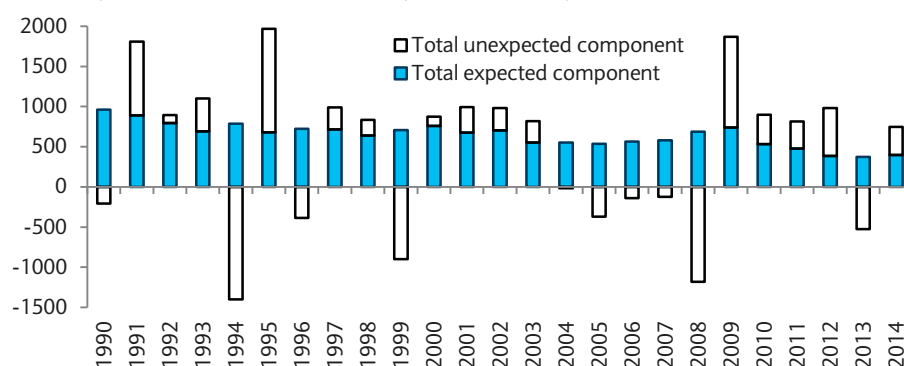
Source: Barclays Research

To better understand the dynamics of Corporate total returns over this long period, we look at their various components (Figures 2-8).

Figure 2 shows the expected and unexpected components of corporate total returns. We immediately notice two things: First, the expected component of corporate return ($ExpTsyRet + ExpExRet$) has always been positive and relatively stable. Second, the unexpected component has been very volatile, with frequent annual reversals.

² Jose Menchero, “Optimized Geometric Attribution,” *Financial Analysts Journal*, Vol. 61, Num. 4, 2005.

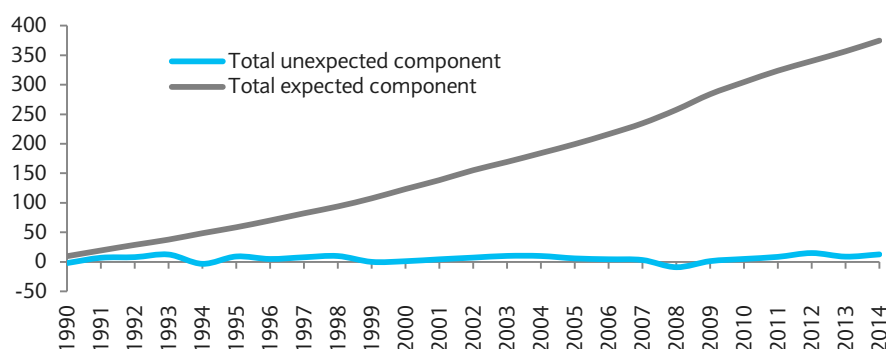
FIGURE 2

Two Components of Total Return, Corporate Index, bp, 1990–2014

Source: Barclays Research

Figure 3 shows that, in cumulative terms, the unexpected component of corporate returns is miniscule compared with the expected.

FIGURE 3

Cumulative Total Expected and Unexpected Components, Corporate Index, bp, 1990–2014

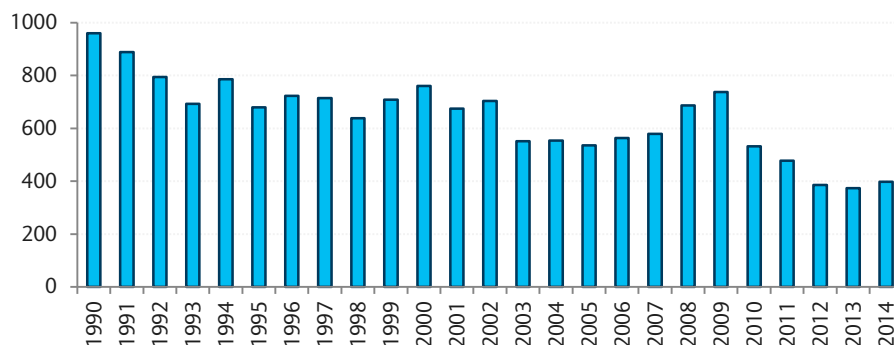
Source: Barclays Research

Let us examine the two components, one at a time. Figure 4 shows the expected component ($ExpTsyRet + ExpExRet$). It is quite stable, but with a definite downtrend. Currently, it stands at 60% of its level at the beginning of the 2000s and at 40% of its level at the beginning of the 1990s. Given that, as we just saw in Figure 1, most of the performance came from the non-spread related factors, it is logical to assume that the Treasury expected return ($ExpTsyRet$) dominated most of the time.

Figure 5 confirms that. For most of the 1990s, the corporate expected return ($ExpExRet$) was but a fraction of the Treasury expected return ($ExpTsyRet$). After the spread widening in August 1998, its share increased somewhat but was still less than a third most of the time. Only the crisis of 2008 changed that. In 2008, 2009, and 2012, the two were almost equal. Over the entire period, the average $ExpTsyRet$ was 509bp with a volatility of 173bp, compared with 135bp and 76bp, respectively, for $ExpExRet$.

FIGURE 4

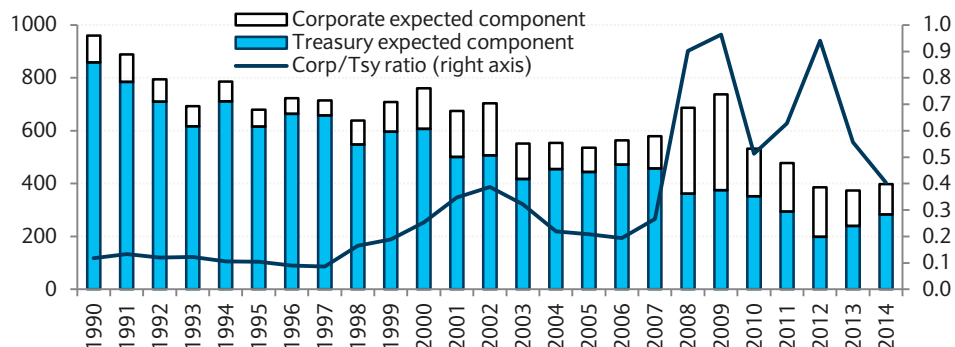
Total Expected Component, bp, Corporate Index, 1990–2014



Source: Barclays Research

FIGURE 5

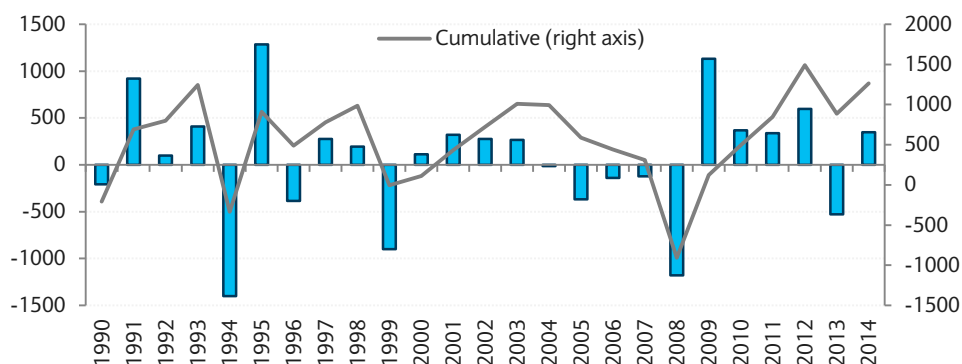
Expected Components of Return, Corporate Index, bp, 1990–2014



Source: Barclays Research

Next, we look at the unexpected component of returns (Figure 6). As expected, this is a volatile series. Also noticeable are the multiple next-year reversals (e.g., 94-95, 96-97, 08-09, 12-13), with the cumulative return frequently crossing zero. As a result, the average of the unexpected component over the full period is just 68bp, but with an annual volatility of 637bp!

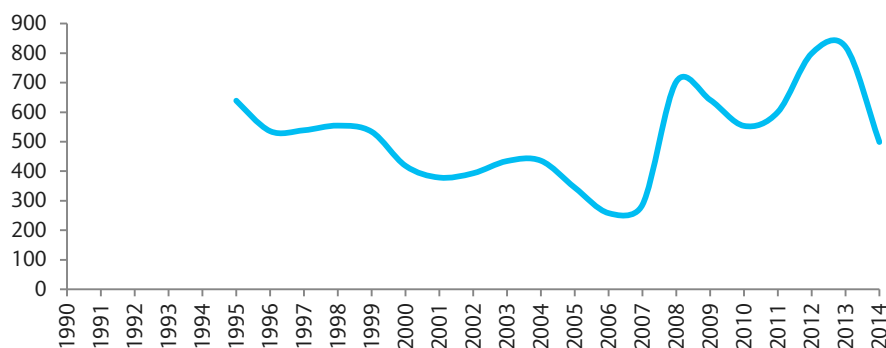
FIGURE 6

Total Unexpected Component, Corporate Index, bp, 1990–2014

Source: Barclays Research

Importantly, while the volatility of the unexpected component does seem to have quiet periods and volatile periods, there is no indication that volatility has been declining very much. If we measure the volatility for two half-periods, 1990-2002 and 2003-2014, we find that the standard deviation of the second period is not that much lower: 594bp versus 700bp for the first half-period. Figure 7 shows the rolling six-year standard deviation of the annual unexpected component of corporate total returns. Some rather bad news for corporate investors is that while the buffer provided by the expected return component has declined significantly, the risk of the unexpected component has not.

FIGURE 7

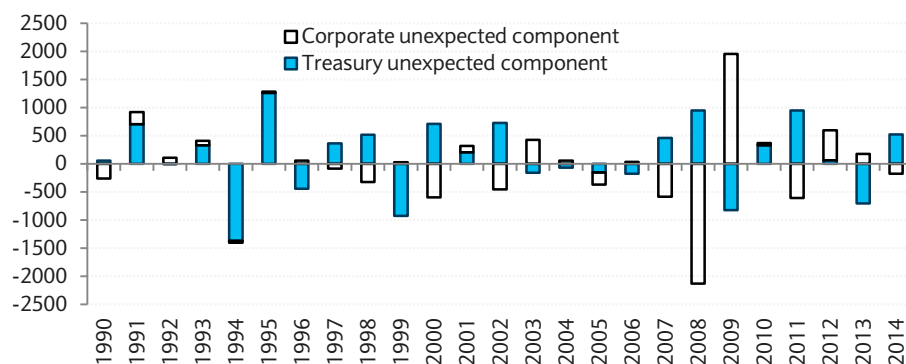
Running 6y Standard Deviation of Total Unexpected Component, bp, 1990–2014

Source: Barclays Research

What drives these volatile unexpected returns? Figure 8 breaks down the overall unexpected return into its Treasury and corporate parts (*UnexpTsyRet* and *UnexpExRet*). Of the average annual unexpected return of 68bp, 132bp was from the Treasury component and -64bp from the corporate component. The large Treasury component is not surprising, as rates have fallen substantially since 1990. However, this component accounts for only 19% (132/712) of average annual corporate total returns over the same period. Also, somewhat surprisingly, the volatility of the unexpected Treasury component (640bp) is comparable with that of the unexpected corporate component (658bp). The correlation between these unexpected components is -0.51, reflecting the well-known negative correlation between rates and spreads during this period.

Next, we examine the pattern of unexpected returns. Many have commented on negative autocorrelation in corporate spread movements, but while the first-order autoregressive coefficient is negative (-0.34), it is not quite significant (t-stat of -1.73). In contrast, the autoregressive coefficient for unexpected Treasury returns is both more negative (-0.49) and statistically significant (t-stat of -2.59). The negative annual autocorrelation in unexpected Treasury returns is a bit of a surprise given the broad downward movement in rates over much of the period.

FIGURE 8

Unexpected Components of Return, Corporate Index, bp, 1990–2014

Source: Barclays Research

Finally, Figure 9 presents a detailed summary report of the total return attribution for the USD IG Corporate Index, for 25 years from 1990 through 2014.

FIGURE 9

Treasury and Corporate Return Components, bp, 1990–2014

Year	Tsy expected return	Tsy unexpected return	Tsy total return	Corp expected return	Corp unexpected return	Corp excess return	Corp total return
1990	859.0	54.7	913.7	100.8	-262.4	-161.6	752.1
1991	784.3	701.7	1,486.0	104.5	217.8	322.3	1,808.2
1992	709.3	-6.1	703.2	84.9	106.3	191.2	894.4
1993	616.5	327.6	944.1	75.7	82.8	158.5	1,102.6
1994	710.9	-1,369.8	-658.9	75.4	-32.4	43.0	-615.9
1995	615.7	1,258.5	1,874.2	64.3	27.4	91.8	1,966.0
1996	663.3	-444.0	219.3	59.3	58.4	117.7	337.0
1997	657.6	362.0	1,019.6	57.0	-87.4	-30.3	989.3
1998	547.8	518.0	1,065.8	90.5	-323.6	-233.0	832.8
1999	596.3	-928.0	-331.7	112.7	27.2	140.0	-191.8
2000	606.9	708.0	1,314.9	153.8	-594.9	-441.1	873.8
2001	501.1	206.0	707.1	173.8	113.9	287.7	994.8
2002	506.9	729.0	1,235.9	196.3	-452.4	-256.1	979.8
2003	417.4	-160.0	257.4	134.2	427.5	561.6	819.0
2004	454.4	-69.4	385.0	99.4	54.4	153.8	538.8
2005	443.8	-150.9	292.9	92.3	-217.6	-125.3	167.6
2006	472.2	-175.3	297.0	91.6	36.0	127.6	424.6
2007	457.4	459.7	917.1	121.8	-582.8	-461.0	456.1
2008	361.3	948.6	1,309.9	326.0	-2,129.4	-1,803.4	-493.6
2009	375.6	-826.2	-450.6	361.9	1,956.8	2,318.7	1,868.0
2010	352.2	327.8	680.0	180.4	39.2	219.6	899.6
2011	293.7	945.9	1,239.6	184.4	-609.4	-425.0	814.6
2012	199.1	60.2	259.3	187.2	535.2	722.5	981.7
2013	240.2	-704.9	-464.7	133.5	177.9	311.4	-153.4
2014	283.4	525.1	808.6	114.4	-176.6	-62.3	746.3

Source: Barclays Research

Conclusion

Our simple return attribution exercise has uncovered several features of corporate total returns over the past 25 years:

1. Corporate total returns have been very strong, averaging 712bp per year. However, more than 90% (644bp) of this performance was the expected component of total return. Furthermore, 79% (509bp) of this 644bp was the expected component of Treasury returns, with only 135bp coming from the expected component of corporate returns;
2. The 2014 expected component of returns was much smaller (398bp) than the historical 644bp, providing a smaller cushion against adverse unexpected returns;
3. Unexpected returns have, on average, been very small (68bp), but very volatile (637bp);
4. Unexpected returns have tended to revert on an annual basis, but this has been more true for the Treasury component of unexpected returns than for the corporate component of unexpected returns; and
5. While the expected component of return has declined significantly over the years, the volatility of the unexpected component has not declined commensurately. Effectively, now corporate investors have a much smaller buffer of protection from future negative unexpected returns.

Appendix: Return Decomposition Estimation

In this detailed example, we will apply the manual “single bond” estimation method to an out-of-sample year of 2012.

On December 31, 2011, we have the following:

- a. OAS of USD IG Corporate Index (Statistics universe) = 233.9bp
- b. OAD of USD IG Corporate Index (Statistics universe) = 6.87
- c. Short Corporate Index OAS = 183bp
- d. Long Corporate Index OAS = 243bp
- e. US Treasury Index yield = 1.03%
- f. Short Treasury Index yield = 0.26%
- g. Long Treasury Index yield = 2.68%
- h. Yield on a 7y duration Treasury = 1.60%

On December 31, 2012, the corresponding values are:

- a. OAS of USD IG Corporate Index (Statistics universe) = 140.7bp
- b. OAD of USD IG Corporate Index (Statistics universe) = 7.09
- c. Short Corporate Index OAS = 80bp
- d. Long Corporate Index OAS = 185bp
- e. US Treasury Index yield = 0.86%
- f. Short Treasury Index yield = 0.26%
- g. Long Treasury Index yield = 2.66%
- h. Yield on a 7y duration Treasury = 1.44%

Over the year, the average seven-year duration Treasury yield was 1.52%. Ignoring rolldown, the expected component of Treasury return = 152bp. Over the year, the Treasury yield changed by 16bp. For a duration of seven years, this produces an unexpected Treasury return of approximately 112bp.

Using the notation introduced earlier:

ExpTsyRet estimated matched-duration Treasury expected return = 152bp

UnexpTsyRet estimated matched-duration Treasury unexpected return = 112bp

ExpTsyRet + *UnexpTsyRet* full estimated Treasury total return = 264bp

At the beginning of the year, OAS levels were relatively high, so we should expect a relatively large expected component of excess returns. We can roughly estimate carry by the average OAS level of 188bp. OAS tightened considerably over the year – by approximately 90bp. With a duration of approximately seven years, this should produce an unexpected excess return of approximately 630bp. This value likely overstates the actual

unexpected excess return, because bonds that were downgraded and left the Investment Grade Index are ignored in this “single-bond” calculation.

ExpExRet estimated expected corporate excess return = 188bp

UnexpExRet estimated unexpected corporate excess return = 630bp

ExpExRet + UnexpExRet estimated corporate excess return = 818bp

The estimated Corporate Index total return:

$ExpTsyRet + UnexpTsyRet + ExpExRet + UnexpExRet = 152 + 112 + 188 + 630 = 1,082\text{bp}$.

The actual corporate total return was 981bp, the actual excess return was 722bp, and the actual matched-duration Treasury return was 259bp. Our simple methodology comes reasonably close.

We can now compare these results with those of the POINT Return Attribution model, which computes *ExpTsyRet*, *UnexpTsyRet*, *ExpExRet*, and *UnexpExRet* for every bond in the Corporate Index, on a daily basis. The results are aggregated first to the monthly level and then annualized.

The model results:

ExpTsyRet matched-duration Treasury expected return = 199bp

UnexpTsyRet matched-duration Treasury unexpected return = 60bp

ExpTsyRet + UnexpTsyRet full estimated Treasury total return = 259bp

ExpExRet expected corporate excess return = 187bp

UnexpExRet unexpected corporate excess return = 535bp

ExpExRet + UnexpExRet estimated corporate excess return = 722bp

The Corporate Index total return:

$ExpTsyRet + UnexpTsyRet + ExpExRet + UnexpExRet = 199 + 60 + 187 + 535 = 982\text{bp}$.

The Return Attribution Model’s results both conform to our “single bond” methodology and tie-out closely with the actual published index-level values.

We conduct this analysis both on an annual basis and on an annualized monthly basis. Not surprisingly, the monthly results are closer to the published index total and excess returns. Consequently, we chose the monthly basis for our “single bond” analysis.

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