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Dynamics of Spread Between New and Old Bonds of the Same Issuer

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- It is well known that on-the-run (ONR) Treasury bonds trade at a premium relative to their off-the-run (OFR) peers. Is the same true for corporate bonds?
- We measure this ONR-OFR spread premium and explore its dependence on various explanatory variables. We find that coupon difference is the strongest single factor.
- We then study month-over-month changes in ONR-OFR spreads. We find that excess spread premium (beyond the fair compensation for coupon difference) tends to revert over time.
- We show that for investors who seek to avoid paying for liquidity by delaying their purchases of new corporate bonds, a selective delay policy based on a simple rule of thumb can outperform an unconditional delay policy.
- These results should be relevant to all corporate bond managers as they evaluate the timing of rolling their positions in bonds of frequent issuers from older to newer issues.

Motivation

Due to the nature of bonds and bond markets, managers of corporate bond portfolios have many more dimensions to consider than those of equity portfolios. Beyond the common question of which names to own, in many cases the bond market offers managers several different ways to gain exposure to a given issuer – bonds of different maturities, bearing different coupons, and with different features. The natural cycle of a bond portfolio includes a constant rotation from older issues to newer ones – either by reinvestment of the proceeds of maturing bonds, or by selling older bonds prior to maturity. Issuers, as well, often issue new bonds periodically; new bonds may be issued to refinance maturing bonds, as part of regular financing activities, or for special purposes. Thus, whenever a new corporate bond issuance is announced, portfolio managers need to decide whether they would like to buy some of the new issue. The considerations include: the pricing of the new issue – relative to other similarly rated bonds on offer, or relative to existing bonds from the same issuer; the additional liquidity offered by holding the newer bond compared to older issues; and the timing of buying the new bond.[1]

To address this issue, we have carried out a detailed study of the spreads of on-the-run (ONR) vs. off-the-run (OFR) corporate bonds. This nomenclature is firmly entrenched in the Treasury bond market, where it is widely understood that the ONR bond – the most recent issue of a given maturity – tends to trade at a premium (higher price, lower yield) to its OFR peers. We investigate to what extent this phenomenon can be identified in the corporate bond market, and try to identify the factors that will cause this spread to be higher or lower. We then look further into the dynamics of these spreads, and see if we can identify when they are likely to widen or tighten.

This research is closely related to an earlier article on inclusion-delay corporate bond indices, in both topic and methodology.[2] In that study, we investigated the performance of a strategy of never buying brand new corporate issues, but instead adding them to the portfolio after some fixed seasoning period.[3] The careful analysis of these strategies required an adjustment to index prices, to reflect the fact that index pricing conventions use ask-side prices when a bond first enters the standard index, and bid-side pricing thereafter. In this article we use the same adjustment of first-month prices, but address a more selective delay question: if an issuer issues a new ONR bond for which we already own a corresponding OFR bond, should we roll to the new issue and when?

Data and Methodology

The first step in our study is to identify pairs of ONR and OFR bonds. In an effort to focus on pairs of bonds between which there is a clear relationship, and a likelihood of having investors consider rolling from one bond to the next, we have set a fairly strict set of criteria for identifying bonds as ONR-OFR pairs. We chose bonds from the Bloomberg Barclays US Investment-Grade Corporate Index as follows. We include callable bonds only if the call has little effect on the bond's duration.[4] We include only issues with 500mn or more outstanding. We include only relatively recently issued senior debt in three standard maturity ranges, corresponding to 5-year, 10-year and 30-year bonds. Our data sample begins on 31 January 2007, the first date for which liquidity cost scores (LCS) are available.

[1] Note that in this article, we do not consider the effect of concessions that may be available to institutions that buy bonds in the primary issuance market. For a study of corporate bond concessions, see A, Ben Dor and J. Xu, *Concessions in Corporate Bond Issuance: Magnitude, Determinants, and Post-Issuance Dynamics*, Barclays Research, 23 January 2015. The earliest purchase considered in this article is a secondary market purchase as of the first month-end date on which the bond is considered part of the Bloomberg Barclays Corporate Bond Index.

[2] See B. Phelps and K. Y. Ng, *The Value of Waiting to Buy: Inclusion-Delay IG Corporate Indices*, Barclays Research, 27 October 2016.

[3] This "inclusion delay" approach was indeed found to improve long-term returns, but most of the outperformance was found to be due to issuance dynamics – the resulting active weights to sectors and issuers – and not necessarily due to liquidity effects.

[4] We would prefer to work with bullet bonds only, in order to have clearly defined maturities. However, many bonds in today's corporate market are issued with an embedded call option shortly before the formal maturity date; excluding these would unnecessarily restrict our universe. We therefore include any bond for which, at issuance, the time to first call date is more than 7/8 of the time to maturity. (eg. a 10-year bond not callable for 9 years would be included.)

FIGURE 1

Definition of Standard Maturity Ranges for Identifying ONR-OFR Corporate Bond Pairs

Bellwether Maturity	Minimum Maturity (years)	Maximum Maturity (years)
5-year	3.5	5.5
10-year	8	10.5
30-year	25	31

Source: Barclays Research

For a bond to be included in our study as either an ONR or OFR bond in a given maturity range, both the original maturity and the remaining time to maturity must fall within the corresponding maturity range shown in Figure 1. These definitions allow for the inclusion of new on-the-run issues with a long first coupon period, but prevent the comparison of a current 5-year bond with a seasoned 10-year or 30-year issue. To form an eligible ONR-OFR pair, we seek groups of bonds from the same issuer (as defined by the first six digits of the CUSIP) that meet the above criteria within the same maturity range and carry the same quality rating[5]. The most recently issued of these bonds is defined as the ONR, and the 2nd-most-recently issued is defined as the OFR.

FIGURE 2

Profile of data sample: average number of bonds and total market value, subject to sequence of filters applied, January 2007 – August 2016

	New and Seasoned Bonds		New Issues Only	
	Number of Bonds	Market Value ($, Billions)	Number of Bonds	Market Value ($, Billions)
Corporate Index	4,126	3,155	62	51.1
Large, non-callable, senior bonds	3,634	2,833	58	48.1
Bellwether maturity range	1,208	979	45	37.2
Paired ONR bonds in study	241	223	20	18.3

Source: Barclays Research

Figure 2 shows the effect of each of these constraints on our data sample, in terms of both the number of bonds and the total market value they represent. Our filter for callable bonds eliminates just a small part of the corporate index; the filter for bellwether maturity ranges is much more exclusive. The corporate index contains many seasoned bonds, which are excluded by the constraint that bonds need to be in one of our bellwether maturity ranges – i.e. recently issued. This constraint also excludes bonds issued at other maturities (e.g. 2-yr, 3-yr, 7-yr, and 20-yr); however, we can see that the primary effect of this constraint is to exclude seasoned bonds. The imposition of this constraint reduces our overall universe to an average of 1208 bonds per month, which is about 30% of the bonds in the index. However, an average of 45 new issues per month satisfy this constraint out of 62 per month overall, so over 75% of the new issues are retained. A similar effect is observed on the final constraint applied, the requirement that we can find two bonds from the same issuer that meet the same recent bellwether criterion. This constraint also excludes a much greater percentage of the overall bonds in the index than it does within the new issue population. This is because even a pair of bonds that both meet this constraint at the time of issuance of the ONR is likely to be excluded after several months, as the OFR bond ages. The net result of all the constraints is that although our dataset of bond pairs covers only about 5% of all index bonds, it includes about a third of all new issues.

[5] This condition is meant to exclude cases in which a specific bond has additional features, such as bond-specific collateral or unusual covenants, that make its credit risk materially different than that of other bonds from the same issuer.

What are the Key Drivers of the ONR Spread Premium?

Based on the established pattern in Treasury space that the ONR bond carries a premium that makes it trade rich relative to equivalent OFR bonds (higher price, lower spread), we define the ONR spread premium as

$$prem = S_{OFR} - S_{ONR}.$$

Thus, the premium will be positive if the spread of the OFR bond is higher than that of the ONR. Should this be the case?

If a given company has just issued a new 10-year bond, and it has outstanding a similar 10-year bond that was issued one year earlier, how should we expect the spreads of the two bonds to differ? From a pure credit perspective, one might expect that the required compensation for default risk should be nearly identical, and that therefore the spread difference should be quite small. However, several effects might cause the spreads of the two bonds to diverge. First of all, corporate bonds are far from uniform in their terms. They may differ in seniority, one bond may be backed by a specific type of collateral, they may have different call features and/or covenants, and so on. We have tried to exclude such cases from our study[6]. Second, the two bonds may pay substantially different coupons. This could be due to changes in Treasury rates between the dates of issuance of the two bonds, or to changes in the company's situation. A significant difference in coupon would cause the bonds to have very different prices even if they were priced at the same yield; this effect alone would likely cause investors to prefer the lower-coupon, and hence lower-priced, bond due to its lower exposure to default risk. We have devoted a prior article to a detailed investigation of this effect.[7] Third, the mere fact that the two bonds have somewhat different maturities can often give rise to a spread difference whose magnitude will depend on the slope of the corporate spread curve. In a typical environment, this slope is positive, meaning that the ONR bond, being longer-dated, should have a higher spread. Fourth, liquidity considerations might cause some investors to favour the more recent ONR bond, which would be presumed to be more liquid; this would be expected to raise the price, or lower the spread, of the ONR bond relative to the OFR. Finally, as the behaviour of the ONR-OFR spread premium is closely related to the issuance cycle, we may well find that these effects are different in the first month after a bond is issued than in subsequent months.[8]

In the following panel of figures, we demonstrate the dependence of spread premium on some of these effects using a one-dimensional ranking technique. In each case, we choose a ranking variable, and proceed as follows. Within each BW maturity each month, we sort the pairs and partition them into five quintiles by the ranking variable. We then take the time-series average of both the ranking variable and the spread premium to show the dependence of the spread premium on the ranking variable. Figure 3 shows a clear dependence between coupon difference (OFR coupon – ONR coupon) and spread premium. As to liquidity effects, there are a number of different metrics that could be related to liquidity; here we make use of our Liquidity Cost Scores (LCS) in two different ways. Figure 4 shows a dependence on LCS difference (OFR LCS – ONR LCS) – a positive difference indicates that the ONR bond is more liquid (i.e. has a lower LCS), and this is associated with a positive ONR spread premium (i.e. the ONR spread is lower). Figure 5 shows how the spread premium relates to the LCS level (of the OFR bond). Less liquid bonds are again seen to have higher spread premia. Figure 6 shows the effect of the age of the ONR bond.

[6] As described above, we have allowed only senior bonds that are non-callable except for a clean-up call near the maturity date. We have also required that the two bonds have the same quality rating. Furthermore, the same-issuer constraint is rather strictly enforced by requiring the first 6 digits of CUSIP to match – this should exclude some cases in which bonds are issued by materially different entities within a large corporation.

[7] J. Hyman, A. Ben Dor, L. Dynkin and J. Xu, *Coupon Effects on Corporate Bonds: Pricing, Empirical Duration and Spread Convexity*, Barclays Research, 29 May 2014.

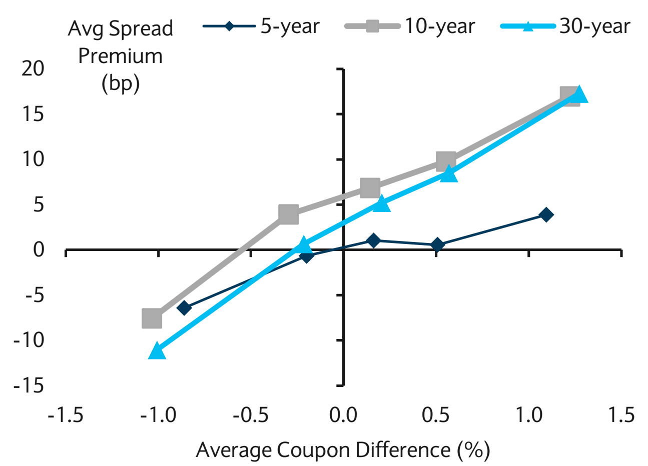
[8] Note that in this article, we attempt to focus on differences in bid-side prices between the two bonds. Liquidity cost scores (LCS) are used to adjust the first-month prices of the ONR bonds and thereby facilitate this comparison; and we use LCS to try to explain the observed pricing effects; but we do not analyze how LCS themselves change over the first few days and weeks after issuance. This is the topic of another article: V. Konstantinovsky and B. Phelps, *Liquidity Dynamics of Newly Issued Bonds*, Barclays Research, 27 October 2016.

We see here that in the first month after the issuance of a new ONR bond, the spread premium seems to be significantly lower than subsequently. This could be consistent with the idea that immediately after the issuance of a new ONR bond, liquidity-conscious investors may choose to roll their positions from the old ONR to the new one; this would keep the new OFR bond liquid for some time, after which the spread premium would tend to rise.

As we contemplate what conclusions to draw from Figure 6, it is important to keep in mind that the data from these first-month observations differ in a significant way from all the others. In the first month a bond enters the index, the index prices the bond at the ask side, whereas all subsequent marks are at the bid side. We have therefore adjusted the first-month prices for all new bonds using LCS in order to calculate ONR-OFR premia on a bid-to-bid basis. Had we produced Figure 6 without adjusting for this convention, we would have erroneously seen that the first month premium is higher than in any subsequent month, not lower.[9]

FIGURE 3

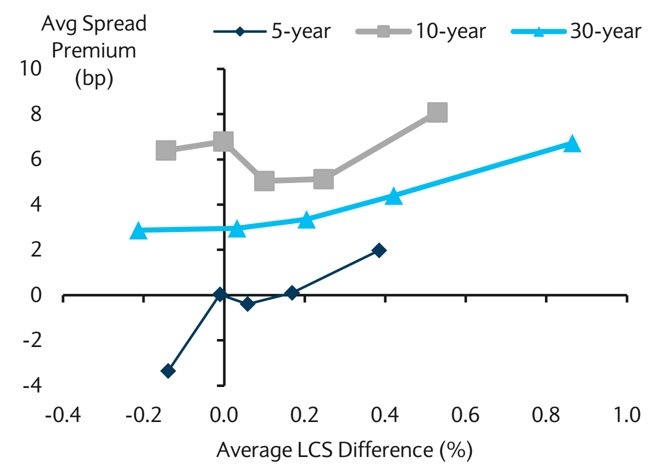
Average ONR Spread Premium for Quintiles by Coupon Difference, January 2007 – August 2016



Source: Barclays Research

FIGURE 4

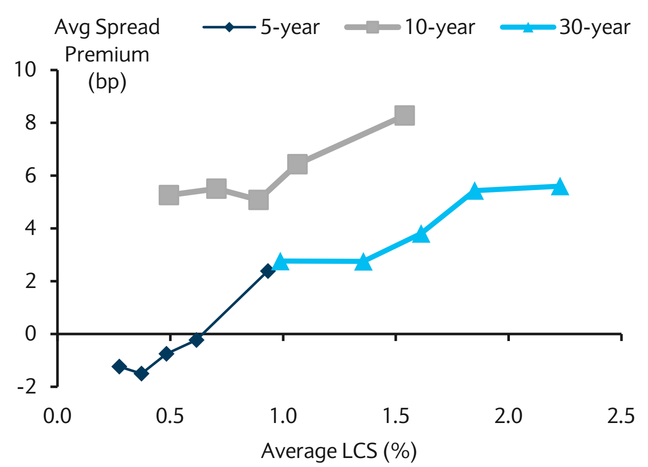
Average ONR Spread Premium for Quintiles by LCS Difference, January 2007 – August 2016



Source: Barclays Research

FIGURE 5

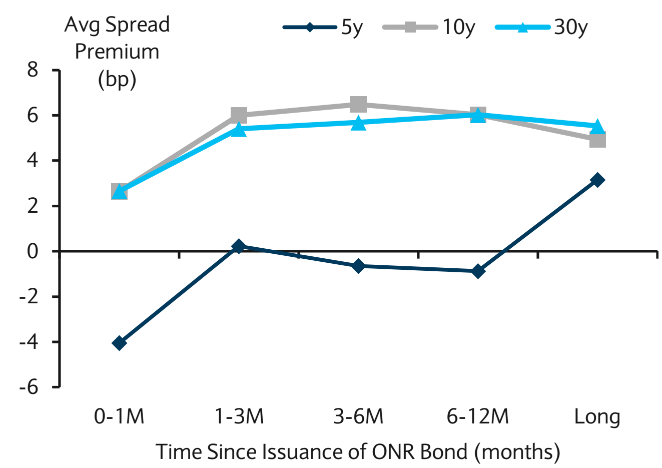
Average ONR Spread Premium for Quintiles by LCS, January 2007 – August 2016



Source: Barclays Research

FIGURE 6

Average ONR Spread Premium by ONR Age Category, January 2007 – August 2016



Source: Barclays Research

[9] This raises the possibility that the lower premia found in first-month observations indicate that we have systematically overcompensated for this bid-offer spread. However, we do not believe this to be the case; care has been taken to ensure that the LCS numbers used for this adjustment correspond to trader-quoted bid and offer prices as of the dates in question. For details, see B. Phelps and K. Y. Ng, *The Value of Waiting to Buy: Inclusion-Delay IG Corporate Indices*, Barclays Research, 27 October 2016.

These one-dimensional charts illustrate that some of the issues we have highlighted can indeed play a role in determining ONR spread premia. Furthermore, the partition by coupon difference shown in Figure 3 can be seen to provide the most insight into what causes the spread premium to be particularly high or low. Here we see that when coupon difference is positive the spread premium is positive, and when it is strongly negative, the spread premium is negative. Note that in the lowest quintile by coupon difference, the average observed premium is negative for all three maturities. The other three figures, which do not partition by coupon difference, all show a positive average spread premium in all five quintiles for 10-year and 30-year bond pairs. This can lead us to wonder whether there really is a significant dependence on LCS or LCS difference, or whether the apparent dependence shown in Figure 4 and Figure 5 might be due to interactions between liquidity and coupon effects. Perhaps the different liquidity quintiles are picking up observations from different time periods, when different coupon differences were more prevalent. To tease apart the effects of these different factors and show which have the most influence, we use regression analysis.

We have carried out regressions using a number of different combinations of explanatory variables. For the sake of brevity, we have chosen to defer a full description of these efforts to the Appendix, and focus here on the results that we found to be most significant.

Confirming our intuition from the above one-dimensional partitions, our regressions revealed that the single most significant variable by far is the coupon difference. The slope of the spread curve was also found to be significant, as was the distinction between bond pairs containing a newly issued ONR and subsequent observations of the same pair. The regression results for these three factors are shown in Figure 7. Over the full time period covered by our study, from January 2007 to August 2016, these three factors were sufficient to explain 67% of the observed variation in spread premia for 30-year bonds, and 59% for 10-year bonds, but much less for 5-year bonds. The coefficient for coupon difference, for the 10-year and 30-year bonds, is close to 0.1. That is, for every 1% by which the OFR coupon is higher than that of the ONR (likely bringing its price above par), its spread will be higher by about 10bp. This result is consistent with the findings of our earlier study of coupon effects in corporate bonds.[10] Furthermore, the coefficient for credit curve slope is close to 1, especially for 10-year bonds. The intercept is positive and statistically significant – it is +4.5bp for 10-year bonds and +2.6bp for 30-year bonds – indicating that even after adjusting for the coupon and slope effects, there is still a spread premium pushing ONR spreads lower than those of the corresponding OFR bonds. But – the exception to this rule is when a new ONR bond appears. In this case, there is an additional negative effect of about -3bp on spread premium that largely negates this ONR-OFR premium.

FIGURE 7

Regression Results of Key Drivers of ONR-OFR Spread Premia, Jan 2007 – Aug 2016

		Intercept		Coupon Difference		Credit Curve Slope		New ONR Issue Flag	
BW	R-Squared	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat
5	0.13	0.008	3.5	0.055	26.5	0.350	10.1	-0.031	-5.8
10	0.59	0.045	44.1	0.097	101.9	0.958	60.0	-0.031	-9.5
30	0.67	0.026	33.8	0.123	144.6	0.576	14.1	-0.034	-10.2

Source: Barclays Research

[10] J. Hyman, A. Ben Dor, L. Dynkin and J. Xu, *Coupon Effects on Corporate Bonds: Pricing, Empirical Duration and Spread Convexity*, Barclays Research, 29 May 2014.

How closely does this spread premium correspond to available liquidity measures? For example, based on Figure 4, might we find that larger differences in liquidity cost scores (LCS) are associated with larger spread premia? Surprisingly, we were unable to document a very strong relationship of this type. The details of the explanatory variables we tested – based on LCS and associated measures of trading volume – and the regression results are reported in the Appendix, but none gave any significant improvement in explaining the variations in spread premia.

We have found that the observations representing new ONR-OFR pairs – e.g. as a new ONR joins the index – have unique properties. We now run our regressions again using only these new observations. While this gives us a substantially smaller dataset, it also has a number of advantages. First, we are most likely to have liquid markets in both the ONR and OFR bonds. Second, this is the moment at which many managers need to make the decision of whether to buy the new issue or not. Adding the new bond to a portfolio exactly when the index does is the most passive course of action. Third, these regressions using just a single observation of each bond pair give more correct t-stats.[11] Figure 8 shows the results of these regressions using only observations of bond pairs with newly issued ONR bonds. We also show separate regression results for two sub-periods of our data sample covering very different economic environments, as a test of the stability of our results. We find that for 30-year bonds we now get very stable results, with a coefficient of about 0.12 for coupon difference in both halves of the time period. The 10-year results vary a bit more, with the coupon difference coefficient falling from 0.11 in 2007-2010 to 0.05 in the more recent period; but this factor is statistically significant for all maturities in all time periods studied. The curve slope dependence is strongest and most consistent for the 10-year bonds.

FIGURE 8

Regression Results of Key Drivers of ONR-OFR Spread Premia over Different Time Periods, using only observations of bond pairs with newly issued ONR bonds

			Intercept		Coupon Difference		Credit Curve Slope	
Period	BW	R-Squared	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat
2007 - 2016	5	0.09	-0.037	-5.2	0.046	7.3	0.063	0.7
	10	0.47	0.017	5.2	0.088	27.4	0.599	12.3
	30	0.64	-0.009	-2.4	0.126	31.1	0.601	3.4
2007 - 2010	5	0.14	-0.051	-3.2	0.047	3.5	-0.161	-0.8
	10	0.55	0.011	1.2	0.108	19.2	0.643	6.5
	30	0.56	-0.039	-4.9	0.123	13.7	0.105	0.3
2011 - 2016	5	0.07	-0.008	-0.9	0.038	4.9	0.480	4.5
	10	0.37	0.026	7.7	0.054	13.4	0.734	12.0
	30	0.65	0.002	0.6	0.123	27.3	0.579	2.7

Source: Barclays Research

[11] The regression results shown in Figure 7 may be observed to have unusually high t-statistics. This is due to the fact that these are pooled regressions of all observed ONR-OFR pairs in all time periods. A single pair of bonds from a given issuer may appear in several consecutive months, for as long as both bonds fit our maturity criteria and the issuer does not issue another ONR bond. Thus, if a single ONR-OFR pair with a large coupon difference has an accordingly large premium that remains stable over several months, this one bond pair will generate a number of nearly identical data points; these are clearly not independent data points, as assumed by standard regression calculations. One approach to this problem would be to adjust the t-statistics to reflect this lack of independence. Instead, we choose to focus exclusively on the observations with new ONR bonds. In this way, we have a sample in which each ONR-OFR pair appears just once in our study, such that we indeed have independent samples, and the t-statistics will be valid. Furthermore, this dataset is in a way the most pertinent to the decision faced by portfolio managers of whether to buy the new ONR bond or not.

The results for the intercept are now much less clear. In the first month of observation of a new ONR-OFR bond pair, the spread premium is largely explained by the coupon difference and the curve slope. After adjusting for these effects, there is no consistent ONR-OFR premium in either direction. The remaining premium seems to be positive on average for 10-year bonds (but significant only during 2011-2016), and negative on average for 30-year bonds (but significant only during 2007-2010). The dependence of spread premium on coupon seems largely unchanged, although the value of the coefficient is somewhat reduced for 10-year bonds in the most recent period.

What drives changes in the ONR-OFR Spread Premium?

Once we have developed an understanding of ONR-OFR spread premia, the natural next step is to investigate what may cause them to change from one month to the next. This is potentially an even more relevant question for investors. Interestingly, the primary determinant of spread premium – the coupon difference between the ONR and OFR bonds – can be ruled out as a cause for changes to this premium, since coupon level in this market is typically constant for the life of the bond[12]. We thus need to identify other factors that can help us explain month-over-month changes in spread premium.

To help analyze this, we first define a very simple metric that provides a first-order adjustment for the coupon difference. For each pair, we calculate a "fair value" of spread that adjusts for coupon difference using a constant factor of 0.1, and define "excess spread premium" as spread difference – 0.1 * coupon difference:

$$prem_{exc} = S_{OFR} - S_{ONR} - 0.1(C_{OFR} - C_{ONR})$$

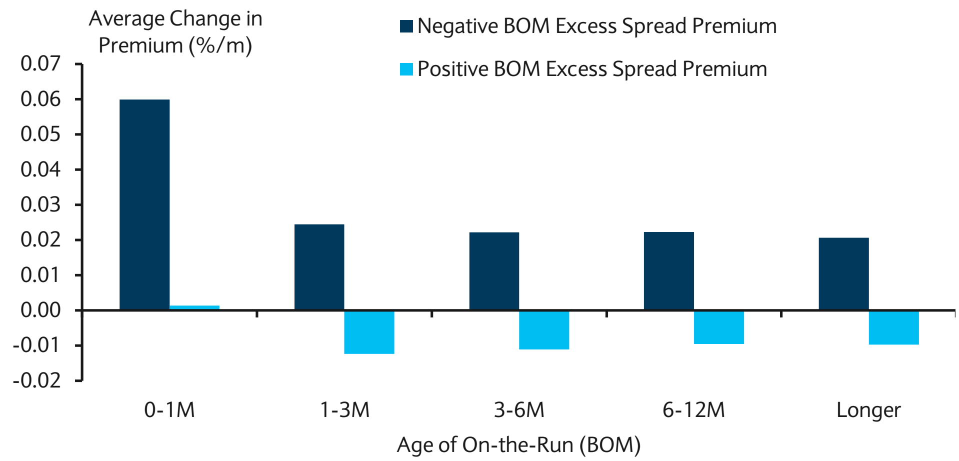
We then match up pairs that represent the same two bonds as of the start and end of a given month, and calculate the change in the premium between them. Note that in the above definition of excess spread premium, the spreads change over time, but the coupon levels remain constant. As a result, the monthly change in the excess premium is exactly the same as the monthly change in the (unadjusted) premium.

Starting from the viewpoint that this spread premium is driven by liquidity differences between the ONR and OFR bonds, we sought to show that changes in the liquidity of the two bonds are closely linked to changes in the spread premium. We were unable to demonstrate a very strong relationship of this type; specific details of the liquidity measures tested and the regression results are reported in the Appendix. The explanatory variable that we found to be most closely linked to changes in spread premium was the beginning-of-month excess spread premium. When this was positive, indicating that the premium was above fair value, it tended to contract; when it was negative, it tended to rise. This effect is shown clearly in Figure 9, which shows the average monthly change in spread premium for pairs in which the beginning excess premium was positive or negative, partitioned by the age, in months, of the ONR bond as of the beginning of the month. The upwards shift in premium for bonds with negative excess premium is seen across all age categories, but is strongest in the first month after a new ONR is issued. In cases of positive excess premium, the average shift is downward except in the first month.

[12] The index universe in which this study is carried out is based on the Bloomberg Barclays Corporate Index, whose basic inclusion rules require fixed-rate coupons. The one exception to this rule is bonds with step-up coupons, which are included but quite rare. Floating-rate debt is excluded from the index and is beyond the scope of this article. (Even in floating-rate debt, though, differences in the contractual spread between two similar floaters from the same issuer would remain constant over time regardless of fluctuations in LIBOR.)

FIGURE 9

Average changes in ONR-OFR premium by age (time since issuance) of ONR and sign of beginning-of-month excess spread premium, February 2007 – August 2016

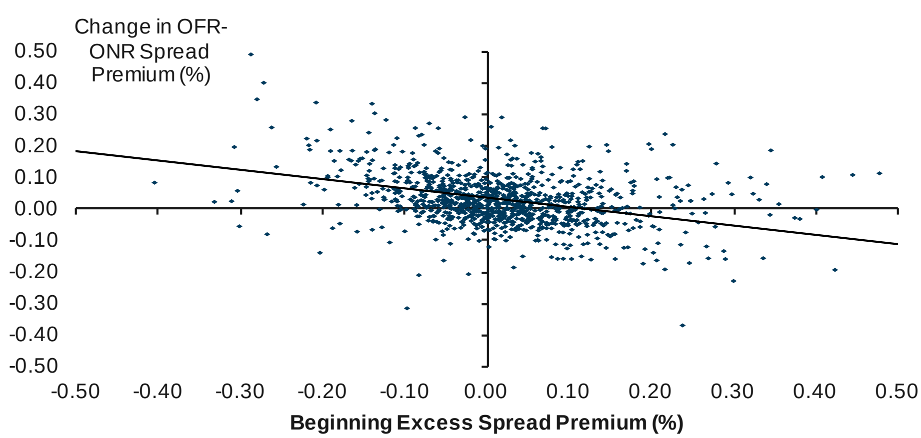


Source: Barclays Research

As this effect is strongest in the first month after the issuance of a new ONR bond, we focus on these observations. Figure 10 shows a scatter plot of the change in spread premium against the beginning-of-month excess premium, for all of the observations of 10-year ONR-OFR pairs in which the ONR was newly issued. We see a clear evidence of a negative relationship between the two. When the spread premium starts out of line with our fair value relationship, it tends to mean-revert.

FIGURE 10

Change in Spread Premium vs. Beginning-of-Month Excess Spread Premium, New ONR 10-year Bonds, 2007-2016



Source: Barclays Research

We then carry out regressions to explain these premium changes in terms of two explanatory variables: beginning of month excess spread premium and month-over-month change in spread curve slope. Figure 11 reports regression results for bond pairs with newly issued ONR bonds of all three maturity groups studied, for different time periods.

FIGURE 11

Regression of changes in spread premium against beginning-of-month excess spread premium and monthly change in spread curve slope, using only observations of bond pairs with newly issued ONR bonds, over different time periods

			Intercept		Excess Spread Premium (BOM)		Change in Credit Curve Slope	
Period	**BW**	**R-Squared**	**Coeff**	**T-Stat**	**Coeff**	**T-Stat**	**Coeff**	**T-Stat**
2007 - 2016	5	0.35	0.000	0.1	-0.47	-11.0	-0.71	-3.3
	10	0.12	0.017	5.6	-0.16	-5.4	0.21	2.0
	30	0.22	0.021	7.5	-0.33	-8.8	0.79	2.6
2007 - 2010	5	0.47	0.001	0.0	-0.55	-5.9	-0.74	-2.2
	10	0.13	0.053	6.5	-0.03	-0.5	0.40	2.5
	30	0.40	0.023	3.3	-0.50	-6.2	0.01	0.0
2011 - 2016	5	0.20	0.000	-0.1	-0.39	-7.5	-0.15	-0.4
	10	0.23	0.008	2.6	-0.30	-9.3	1.04	4.1
	30	0.16	0.018	5.8	-0.26	-6.0	1.32	3.4

Source: Barclays Research

The positive intercept, observed throughout the table for 10-year and 30-year bonds, means that there has been a bias for ONR-OFR spread premia at these maturities to increase after the first month by about 2bp (although for the 10-year bonds the number is larger during the crisis period of 2007-2010 and below 1bp in the more recent period). This is consistent with Figure 6, where we saw that spreads tend to be lower in the first month than in subsequent months. One possible explanation for this would be that in the first month of the new ONR bonds, the first OFR bond, which was the old ONR, is still in the hands of many liquidity-conscious investors, who may be rolling their positions to the new ONR; this could make the OFR more liquid at this point than subsequently. However, we have not succeeded in demonstrating that this increase in premium is linked to an increase in the LCS of the OFR bond.

The strongest result in Figure 11 is that the beginning-of-month excess spread premium is a very good predictor of the subsequent change in premium. The coefficient for this factor is negative in every case, and strongly significant except for the case of the 10-year bonds in 2007-2010. During the recent 2011-2016 time period, this coefficient is about -0.3 for all three maturities. This means that when the premium started high (low) relative to fair value (even after our relatively crude adjustment for coupon difference) by 10bp, it would tend to decrease (increase) by 3bp over the following month.

The predictive power of the beginning-of-month excess spread premium is not limited to the first month observations of new ONR issues. We have carried out similar regressions using subsequent observations, and obtained similarly strong results. An additional set of regression results, using observations of ONR-OFR pairs for which the ONR age is from one to three months, is presented in the Appendix.

Portfolio Management Implications

We have found that a simple rule of thumb can give a reliable indication of future changes in ONR-OFR spread premia, based on whether the spread is rich or cheap to fair value. Can we construct a long-short strategy that capitalizes on this result? Unfortunately, while there is a predictable relationship, the magnitude of the effect is too small to justify the transaction costs. However, it can certainly be used in the ongoing management of a portfolio.

As described in the introduction, a fundamental part of bond portfolio management is a constant rotation from older issues to newer ones. In this context, every time a new bond is issued and joins the index, portfolio managers are faced with the question: to buy or not to buy? The most passive, index-hugging response is to buy every new issue; choosing not to do so creates an active underweight relative to the index. However, there may be good reasons to not blindly follow the index in every case. In an earlier study[13], we showed that a wave of issuance is often followed by poor performance – at both the sector and issuer levels. Furthermore, new issues are typically more liquid than seasoned bonds, and may thus carry a liquidity premium. For some portfolios, maintaining liquidity is an important part of their ongoing management; for others, liquidity is less important, and buying new issues may entail an undesirable liquidity premium. For the latter case, we recently introduced the idea of "inclusion delay" indices, which systematically avoid buying any new issue until it has seasoned for a certain number of months.[14]

In the study of inclusion delay, we found that imposing an unconditional 24-month delay on the purchase of any new bond led to significant outperformance of the standard US IG Corporate index. However, a good part of this outperformance was due to issuance dynamics effects at two levels. Sectors experiencing heavy issuance would be implicitly underweight in the delayed index, leading to outperformance; we adjusted for this effect by rebalancing sector weights to match those of the index without the new bonds. The inclusion delay index, even after this adjustment, continued to outperform; a large part of this was traced to underweights to "problem bonds" that experienced downgrades shortly after issuance. This is closely related to the underperformance of "aggressive issuers" that is discussed in our article on issuance dynamics. In fact, a comparison of the index outperformance of the sector-adjusted inclusion delay index and the "moderate issuers" subset of the index from the issuance dynamics study shows that there is a correlation of 0.36 between the two strategies from February 2007 through December 2015. In the current work, we have tried to address the liquidity aspect of ONR-OFR bond spreads in a fully issuer-neutral framework.

To investigate the practical application of our findings, we carried out a minor variation on the inclusion delay study. Rather than unconditionally delaying the inclusion of all new bonds, we first check whether a given new issue has a clearly identifiable OFR equivalent. If we do find that our new bond is part of an ONR-OFR pair, we then make our decision to buy the new bond immediately or not contingent on the ONR-OFR spread. When the excess spread premium (after adjusting for coupon difference) is negative – either in the month of issuance or any month thereafter, we buy the new bond. As long as the excess spread is positive, we enforce the delay policy up to the specified delay horizon. The difference between this selective delay policy and the unconditional delay policy affects just a very small percentage of the index, so we do not expect the effect to be large in any case; but it is instructive to zero in on the performance differences between the two. Figure 12 shows pairwise comparisons among this selective delay index, the unconditional delay index, and the 0-delay index (all equivalently marked on a bid-to-bid basis).

[13] L. Dynkin, A. Desclée, A. Maitra and S. Polbennikov, *Issuance Dynamics and Performance of Corporate Bonds*, Barclays Research, 15 September 2014.
[14] B. Phelps and K. Y. Ng, *The Value of Waiting to Buy: Inclusion-Delay IG Corporate Indices*, Barclays Research, 27 October 2016.

FIGURE 12

Performance comparison of indices using unconditional delay, selective delay, and no delay (standard corporate index), February 2007 – August 2016

	Unconditional Delay Indices vs. 0-delay Index					
Delay (months)	**1**	**3**	**6**	**12**	**18**	**24**
Average Outperformance (bp/mo)	-0.7	-0.5	0.1	1.1	2.3	3.2
Stdev of Outperformance (bp/mo)	1.2	2.8	4.6	8.6	12.2	15.6
Information Ratio	-1.89	-0.63	0.07	0.45	0.66	0.72
	Selective Delay vs. Unconditional Delay					
Delay (months)	**1**	**3**	**6**	**12**	**18**	**24**
Average Outperformance (bp/mo)	0.2	0.2	0.2	0.1	0.0	0.0
Stdev of Outperformance (bp/mo)	0.5	1.0	2.0	3.5	4.6	5.6
Information Ratio	1.43	0.81	0.40	0.10	-0.01	-0.02
	Selective Delay Indices vs. 0-delay Index					
Delay (months)	**1**	**3**	**6**	**12**	**18**	**24**
Average Outperformance (bp/mo)	-0.5	-0.3	0.3	1.2	2.3	3.2
Stdev of Outperformance (bp/mo)	0.9	2.1	3.5	6.1	9.2	12.0
Information Ratio	-1.75	-0.44	0.32	0.68	0.87	0.92

Source: Barclays Research

The selective exceptions seem to reduce some of the initially adverse effects of the delay strategy. For delays of 1 and 3 months, selective delay outperforms the pure delay strategy with a high IR (e.g. at 1mo, it adds 0.2bp/mo with a TEV of only 0.5bp/mo, for IR=1.4), but this only partially reverses the underperformance of the delay indices relative to the 0-delay index at these horizons; the strategy still does worse than no delay.

At horizons of 6 months and 12 months, the selective delay performs best (by a small amount), outperforming both the 0-delay index and the standard delay.

At horizons of 18 and 24 months, where the standard delay index does best (an effect that has been shown to be about issuer exposures, not about liquidity effects), the selective delay has almost no impact on the overall performance, but it does reduce the tracking error relative to the 0-month delay, thus improving the IR. This is presumably because it reduces the differences in issuer exposures for frequent issuers, but keeps the differences in exposures to new or occasional issuers which would not tend to be represented in our OFR-ONR pairs.

It might be interesting to carry out a fully issuer-controlled study using only bonds of frequent issuers, in which all strategies maintained identical issuer exposures, and the only difference was the timing of the roll from older to newer issues. In our estimation, such a study would likely show that a selective roll policy based on excess ONR-OFR premium outperforms any unconditional roll timing policy, either immediate or delayed.

Conclusions

Our study of ONR-OFR spreads leaves us with some clear conclusions. First, we find that any study of same-issuer bond spreads needs to start by adjusting for coupon difference (or price difference); an approximate rule of thumb is 10bp of spread per 1% in coupon difference. The coupon effect is larger in magnitude than the other effects we are seeking to explain; if not accounted for, it could easily overwhelm any analysis of relative pricing. Second, even after accounting for the coupon effect, there is clearly a positive spread premium – ONR bonds trade rich on average relative to their OFR siblings – with the possible exception of the first month of ONR issuance. Third, while there can be significant deviation around these averages, they tend to mean-revert towards fair value. When ONR-OFR excess spread premia – after being adjusted for coupon difference by this simple rule of thumb – are high, they are likely to come down; when they are low, or even negative, they are likely to rise. This is corroborated by our selective delay experiment: the selective delay policy that bought any bond with a negative excess premium and delayed all others clearly outperformed both the unconditional delay policy and the index at delay horizons of 6-12 months.

We are also left with some puzzles for future research. Why have we been unable to establish a strong link between ONR-OFR spreads and liquidity measures? Why does it seem that ONR-OFR premia are unusually low in the first month?

As we try to integrate these results with those of our prior research on inclusion delay and issuance dynamics, a complex picture begins to emerge. As a portfolio manager looks over the collection of new issues on offer in a given month, there are many factors to consider in determining which ones to buy, and when. Does a particular bond issue represent a significant increase in a company's debt burden – perhaps beyond what we would consider prudent? If this is the case, the response called for may be not only to avoid this new issue, but even to reduce existing holdings in that issuer. If the issuance is part of the regular financing activity of a healthy firm, there may be no signal on whether to increase or decrease holdings. In this case, one may wish to keep the portfolio exposure to the issuer constant – in which case the key decision may be whether to roll positions in existing bonds into the new issue. Here is where relative pricing comes front and centre. Depending on how much they value liquidity, different investors will have different thresholds on how much spread premium they are willing to pay for the privilege of owning the newest bond; we hope that the research provided here will help them assess this premium.

APPENDIX

Details of Regressions to find Key Drivers of Spread Premia

In our regressions for levels of spread premium, we tried a wide range of different variables, in different combinations. As most of these did not produce significant results, we have not included a full accounting of these studies in the main body of the text; but the comparison among these different models emphasizes the strength of the signal from coupon difference. We first trimmed outliers from the dataset[15], and then regressed the spread premia of our ONR-OFR bond pairs against various models that use one or more explanatory variables chosen from the following list:

- Coupon difference: OFR coupon – ONR coupon
- ONR Age (time since ONR issuance)
- Age difference: OFR age – ONR age
- Amount outstanding: % by which OFR outstanding is less than that of ONR
- Issuer spread level: cross-sectional Z-score (OAS – avg OAS) / std(OAS)
- Issuer outstanding: cross-sectional Z-score
- Slope Adjustment: calculated based on maturity difference, issuer-specific slope
- Slope Adjustment Generic: uses market-wide curve slope instead
- LCS Difference: OFR LCS – ONR LCS
- Trading volume: % by which OFR volume is less than that of ONR
- Issuer turnover: cross-sectional Z-score of issuer turnover (total monthly issuer trading volume / total issuer outstanding)

The results of these regressions are shown in Figure 13. The first set of regressions uses just one variable at a time. Here we find clear evidence that the single most dominant explanatory factor for spread premium is the coupon difference between the ONR and OFR bonds. The only other effect that is able to explain a significant amount of variation in spread premia is the spread curve slope. Here we have estimated slope adjustments in two ways – one based on the estimation of issuer-specific spread curves, and one based on the estimation of market-wide spread curves. We find that the spread correction based on the market-wide curve estimate has much better explanatory power – presumably because we can estimate it more accurately. (Many issuers do not have sufficient numbers of outstanding bonds to construct a meaningful curve.)

[15] To trim outliers, we first partitioned our observations of ONR-OFR pairs by BW maturity and by year; within each such group we discarded the largest 1% and smallest 1% of observations of spread premium.

FIGURE 13

Results of different regression models for ONR-OFR spread premium, 10-year bonds, all observations, February 2007 – August 2016

Model		Intercept	Coupon Diff	New ONR Flag	Age Diff	Issue Size Ratio	Issuer Spread	Issuer Size	Spread Curve Slope (Issr)	Spread Curve Slope (Market)	LCS Diff	Volume Ratio	Issuer Volume	R-squared
Coupon	Coeffs	0.042	0.104											0.45
	T-stats	*37.8*	*94.5*											
CoupNew	Coeffs	0.046	0.104	-0.032										0.45
	T-stats	*34.4*	*95.0*	*-8.4*										
Age	Coeffs	0.010			0.058									0.02
	T-stats	*3.0*			*15.7*									
Outst	Coeffs	0.058				-0.010								0.00
	T-stats	*38.5*				*-3.8*								
IssrSpr	Coeffs	0.060					0.008							0.00
	T-stats	*39.3*					*4.4*							
IssrOut	Coeffs	0.062						-0.003						0.00
	T-stats	*36.2*						*-3.8*						
SlopeAdj	Coeffs	0.058							0.322					0.04
	T-stats	*39.4*							*22.3*					
SlopeAdjGen	Coeffs	0.057								1.147				0.20
	T-stats	*42.5*								*51.7*				
AllNonLCS	Coeffs	0.028	0.103		0.021	0.000	0.014	-0.001	0.305					0.50
	T-stats	*10.6*	*96.8*		*7.7*	*0.0*	*11.2*	*-1.7*	*29.0*					
AllNonLCS2	Coeffs	0.025	0.096		0.024	0.000	0.014	-0.001		0.964				0.60
	T-stats	*10.7*	*100.7*		*10.0*	*-0.1*	*12.2*	*-1.3*		*60.8*				
LCS	Coeffs	0.057									0.011			0.00
	T-stats	*35.3*									*2.4*			
Volume	Coeffs	0.059										0.000		0.00
	T-stats	*39.3*										*0.3*		
IssrTurnover	Coeffs	0.057											0.004	0.00
	T-stats	*35.3*											*2.2*	
All	Coeffs	0.024	0.104		0.017	-0.004	0.014	-0.001	0.295		0.042	0.000	0.000	0.51
	T-stats	*9.1*	*98.2*		*6.4*	*-2.3*	*11.1*	*-1.4*	*28.1*		*12.6*	*-0.9*	*0.1*	
All2	Coeffs	0.023	0.098	-0.041	0.026	-0.004	0.013	0.000		0.942	0.035	0.000	0.001	0.61
	T-stats	*9.5*	*102.6*	*-12.0*	*10.4*	*-2.2*	*11.4*	*-0.9*		*59.7*	*11.7*	*-1.0*	*1.3*	
Best2	Coeffs	0.042	0.097							0.958				0.59
	T-stats	*43.1*	*101.2*							*59.8*				
Best3	Coeffs	0.045	0.097	-0.031						0.958				0.59
	T-stats	*44.1*	*101.9*	*-9.5*						*60.0*				

Source: Barclays Research

For the version of the model presented in Figure 7, which includes a flag for new ONR issues as well as coupon difference and credit curve slope, the results of the model in the two sub-periods are shown in Figure 14.

FIGURE 14

Regression Results of Key Drivers of ONR-OFR Spread Premia over Different Time Periods

			Intercept		Coupon Difference		Credit Curve Slope		New ONR Issue Flag	
Period	BW	R-Squared	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat
2007 - 2016	5	0.13	0.008	3.5	0.055	26.5	0.350	10.1	-0.031	-5.8
	10	0.59	0.045	44.1	0.097	101.9	0.958	60.0	-0.031	-9.5
	30	0.67	0.026	33.8	0.123	144.6	0.576	14.1	-0.034	-10.2
2007 - 2010	5	0.16	0.030	6.0	0.058	16.0	0.129	2.2	-0.075	-5.4
	10	0.67	0.073	28.6	0.122	72.7	0.885	32.4	-0.076	-9.7
	30	0.50	0.007	4.6	0.102	54.8	0.238	3.2	-0.045	-7.0
2011 - 2016	5	0.08	0.008	2.6	0.042	15.5	0.585	12.4	-0.009	-2.0
	10	0.52	0.041	41.2	0.070	61.7	0.988	44.7	-0.015	-5.1
	30	0.68	0.031	32.8	0.124	125.7	0.566	11.5	-0.029	-7.5

Source: Barclays Research

Details of Regressions to Explain Changes in Spread Premia

As with our regressions for level, our research investigated a number of variables and models not described in the main body of the article. We tested the effect of the following variables on monthly changes in the OFR-ONR spread premium:

- Beginning-of-month Excess Spread Premium
- Age (months since issuance) of the ONR bond
- Change in the slope of the credit curve
- Change in trading volume of ONR bond
- Change in trading volume of OFR bond
- Change in LCS of ONR bond
- Change in LCS of OFR bond
- Change in level of issuer turnover relative to market [change in z-score]

Figure 15 shows the results of regressions on different combinations of these factors for the entire population of changes in same-pair premium for 10-year bonds. The single variable that explains the most of the changes in spread premium is the beginning of month excess spread premium.

Next we do the same regression only using the new observations. Here we do not need to do this in order to improve the t-stats, because even for the same bond pair, spread changes in successive months are not necessarily positively correlated. The key issues here are that the first month should give us better pricing, and that it is special in terms of its behaviour. These results are shown in Figure 16.

FIGURE 15

Regressions of Changes in Spread Premium on Different Combinations of Explanatory Variables, all observed pairs of 10-year bonds, February 2007 – August 2016

Model		Intercept	BOM Exc Premium	Curve Slope Change	OFR Volume Change	ONR Volume Change	OFR LCS Change	ONR LCS Change	Change in Issuer Turnover	R-Squared
ExcPrem	Coeffs	0.01	-0.17							0.09
ExcPrem	*T-Stats*	*6.9*	*-22.8*							
SlopeAdjGen	Coeffs	0.00		0.39						0.02
SlopeAdjGen	*T-Stats*	*0.8*		*9.3*						
NonLCS	Coeffs	0.01	-0.16	0.15						0.09
NonLCS	*T-Stats*	*6.7*	*-21.0*	*3.5*						
Volumes	Coeffs	0.00			0.00	0.00				0.00
Volumes	*T-Stats*	*0.7*			*-0.6*	*-0.7*				
LCS	Coeffs	0.00					-0.01	0.01		0.00
LCS	*T-Stats*	*0.5*					*-3.1*	*1.6*		
IssrTurnover	Coeffs	0.00							0.00	0.00
IssrTurnover	*T-Stats*	*-0.1*							*1.2*	
All	Coeffs	0.00	-0.16	0.15	0.00	0.00	0.00	0.00	0.00	0.09
All	*T-Stats*	*4.6*	*-21.0*	*3.5*	*-0.4*	*-0.6*	*-0.7*	*-0.9*	*2.9*	

Source: Barclays Research

FIGURE 16

Regressions of Changes in Spread Premium on Different Combinations of Explanatory Variables, only using pairs with new ONR 10-year bonds, February 2011 – August 2016

Model		Intercept	BOM Exc Premium	Curve Slope Change	OFR Volume Change	ONR Volume Change	OFR LCS Change	ONR LCS Change	Change in Issuer Turnover	R-Squared
ExcPrem	Coeffs	0.01	-0.33							0.20
ExcPrem	*T-Stats*	*2.8*	*-10.0*							
SlopeAdjGen	Coeffs	0.00		1.47						0.07
SlopeAdjGen	*T-Stats*	*1.5*		*5.4*						
NonLCS	Coeffs	0.01	-0.30	1.04						0.23
NonLCS	*T-Stats*	*2.6*	*-9.3*	*4.1*						
Volumes	Coeffs	0.01			0.00	0.00				0.01
Volumes	*T-Stats*	*1.8*			*1.4*	*-1.5*				
LCS	Coeffs	0.01					0.04	-0.04		0.01
LCS	*T-Stats*	*2.1*					*1.8*	*-1.4*		
IssrTurnover	Coeffs	0.01							0.00	0.00
IssrTurnover	*T-Stats*	*2.2*							*-1.4*	
All	Coeffs	0.01	-0.30	1.04	0.00	0.00	0.01	-0.04	0.00	0.24
All	*T-Stats*	*2.5*	*-9.0*	*4.1*	*1.0*	*-1.5*	*0.4*	*-1.7*	*0.0*	

Source: Barclays Research

Finally, we corroborate the results of Figure 11 by zooming in on a different set of observations, those for which the ONR is not making its first appearance in the index, but where it is within 3 months of its issuance. This population has the advantage of being a pure comparison of bid-side prices from the index, while still being in a time period when the OFR bond is likely to be well-priced. Once again, we see consistently negative and significant coefficients for the BOM excess spread premium, indicating that the ONR-OFR spreads tend to mean-revert.

FIGURE 17

Regression of changes in spread premium against beginning-of-month excess spread premium and monthly change in spread curve slope, using only observations of bond pairs with ONR age 1-3 months, over different time periods

			Intercept		Excess Spread Premium (BOM)		Change in Credit Curve Slope	
Period	BW	R-Squared	Coeff	T-Stat	Coeff	T-Stat	Coeff	T-Stat
2007 - 2016	5	0.05	0.000	0.1	-0.16	-5.7	0.01	0.1
	10	0.05	0.003	1.6	-0.13	-8.1	-0.06	-0.6
	30	0.11	0.009	5.3	-0.20	-9.5	0.47	2.4
2007 - 2010	5	0.01	0.023	2.2	-0.05	-0.7	0.12	0.5
	10	0.03	0.011	1.6	-0.09	-2.9	-0.17	-1.0
	30	0.41	0.000	0.1	-0.44	-9.3	-0.34	-1.3
2011 - 2016	5	0.11	-0.006	-2.4	-0.24	-8.3	-0.09	-0.4
	10	0.13	0.003	1.7	-0.22	-11.2	0.59	3.9
	30	0.10	0.009	5.0	-0.17	-7.3	1.03	4.1

Source: Barclays Research

Analyst Certification

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