Fallen Angels in the US credit market

Characteristics, historical performance and differences between the current credit cycle and earlier regimes

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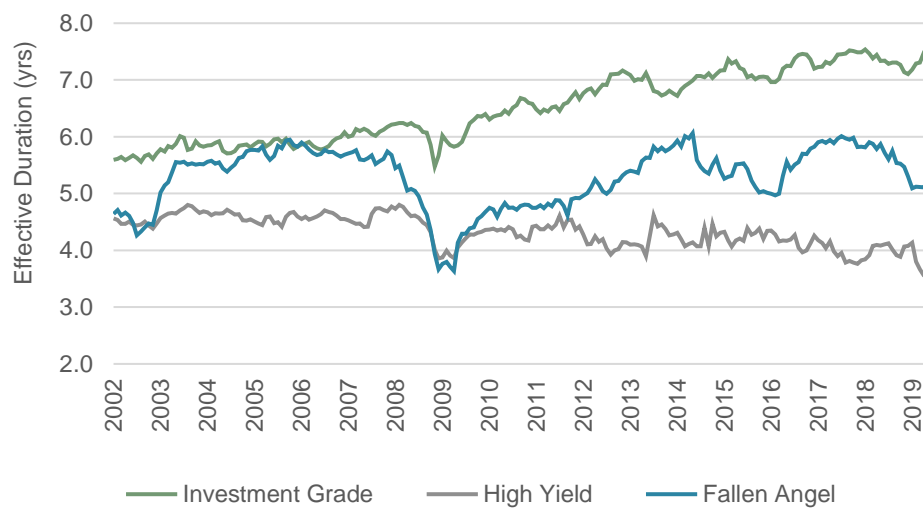FTSE Russell

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What is a Fallen Angel?

A Fallen Angel (FA) is a corporate, or sovereign, bond downgraded from Investment Grade (IG) (minimum rating of BBB- with S&P, Moody's or Fitch) to a High Yield credit rating (of BB+, or below with S&P, Moody's or Fitch). Thus, the downgrade from Investment Grade (IG) to High Yield (HY) is far more significant than a downgrade for a bond staying within the same asset class. FAs tend to have higher credit-beta than other HY issues as a result. Given the distinct nature of the two asset classes, even the risk of an issue leaving the IG universe can cause advance selling of the bond, because an active IG portfolio manager wishes to avoid being caught with a sub-IG holding. An indexed IG fund has no choice but to sell the FA. These factors may be compounded by institutional investors over-reacting to the bad news of the downgrade.

Characteristics of fallen angels versus other high yield issues

Because FAs were issued as IG credits, they tend to have different characteristics than other HY issues. Most notably they have (a) longer duration; (b) concentration in sectors subject to a recent specific shock (e.g., TMT after 2000/01, financials after the Global Financial Crisis (GFC), and energy after the oil price collapse in 2014/15), when investors underweight the sector; (c) lower coupons (since the bonds were issued at lower yields, increasing price volatility, versus HY issuers); (d) higher credit ratings; (e) weaker covenants (since they were issued as IG credits); and (f) lower default rates relative to HY issuers, not least because most FAs are B, or BB rated (see table). Chart 1 shows US Broad Investment Grade issues have increased duration significantly since the GFC, while FAs have simply returned to about the same duration as before the GFC but have greater duration than other high yield issues.

FAs tend to have longer duration than other HY issues, be concentrated in sectors subject to specific shocks, lower coupons, higher credit ratings, weaker covenants (since they were issued as IG credits), and lower default rates.

Chart 1. Duration of US Fallen Angels versus US High Yield and Investment Grade issues

Source: FTSE Russell as of April 30, 2019, using effective duration.

Why have Fallen Angels shown higher risk-adjusted returns than other High Yield issues

Fallen Angel bond indexes, like the FTSE Time-Weighted US Fallen Angel Bond Index (FABI)[1] measure the performance of FAs after they enter the sub-IG asset class. The FABI measures the performance of bonds issued by companies domiciled in the US and Canada. Index weights for FAs are highest for the first 12 months, and then fall from months 13 to 61, using the formula 61 minus (number of months). It outperformed market-cap weighted HY issues in the period 2002 - 2016 (see Chart 2). It also has more duration than the broader HY index, which would have helped relative performance during the 2011-16 period, given very low interest rates, and a benign credit environment. As noted earlier, FAs tend to have more duration than the rest of the HY asset class, since HY issuers may struggle to issue longer maturity bonds.

Apart from the migration rate from IG to HY, historically FAs have outperformed other HY bonds after credit downgrades to HY. FAs' outperformance in the corporate bond market is based on FAs becoming oversold due to forced selling, after the downgrade to sub-investment grade, by funds which cannot hold sub-IG issues, so the bond suffers a "cliff-edge" effect on departure from the IG asset class.

Since the formal downgrade to sub-IG by ratings agencies is also generally well flagged to markets (with the issuer going on "negative watch", etc.) and IG-restricted funds are forced sellers, FA bonds tend to be oversold when entering HY indexes and driven to artificially low prices relative to equivalent credits in the HY asset class. More generally, there is some evidence regulated investors can exploit sluggish adjustment in credit ratings to conduct regulatory arbitrage, taking advantage of the difference between actual credit risk, and the risk implied by imperfect credit ratings.[2] FAs also benefit from a higher proportion of subsequent credit upgrades than equivalent HY issues. This may be because previous spikes in the proportion of FAs have reflected temporary financial pressure on long-standing businesses.
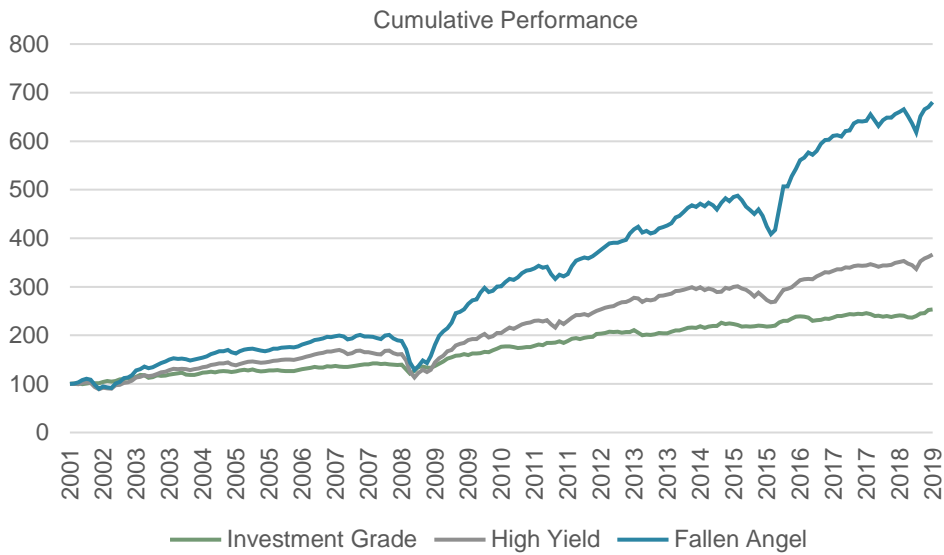
[1] FTSE Time-Weighted US Fallen Angel Bond Index, please see Appendix.

[2] Does the bond market want informative credit ratings? J. Cornaggia and K. Cornaggia, May 2011.

Chart 2. US Fallen Angels have outperformed US High Yield and Investment Grade issues (USD)

Cumulative Performance

Source: FTSE Russell as of April 30, 2019. Investment Grade data represents FTSE US Broad Investment Grade Corporate Index, High Yield by The FTSE High-Yield Market Index, Fallen Angel by the FTSE Time-Weighted US Fallen Angel Bond Index, total returns in USD. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

Fallen Angel Bond Indexes, timing and empirical evidence

From an investor point of view, if FA join HY indexes at undervalued levels relative to equivalent HY credits, they should outperform the HY asset class, all being equal, over the credit cycle, and FA bond indexes should outperform HY indexes. Given the short-term negative impact of FAs leaving IG indexes, due to enforced selling, empirical evidence suggests FAs will see the sharpest drop in performance shortly after a downgrade from IG is announced, provided FAs do not subsequently continue to fall through credit-rating zones. This is the logic behind time-weighting a fallen angels bond index, like the FTSE FABI. There is some evidence that this phenomenon is not unique to credit markets and has been also observed in equity markets. The timing effect of stocks leaving or joining market indexes has been identified, but often short-lived[3], reflecting the precise reasons for stocks leaving or joining the specific index (e.g., whether on performance enhancement grounds alone).

Most FAs will be downgraded to BB status in the initial move, and the back-testing on the impact of migration to HY has focused on the performance of the BB-rated FA, before and after the downgrade. The Cass Business School study[4] found FAs fell by 1.4% - 4.1%, depending on maturity, from 24 days before the downgrade to seven days after, before recovering most of those losses in the subsequent 23 days.

Given the short-term negative impact of FAs leaving IG indexes, due to enforced selling, empirical evidence suggests FAs will see the sharpest drop in performance shortly after the downgrade from IG is announced, provided FAs do not subsequently continue to fall through credit-rating zones.

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[3] Changes in the Constituents of the S&P 500 Index and the Performance of the Index; E. Asem and S. Alam, University of Lethbridge, 2011.

[4] Fallen Angels: the Investment Opportunity. September 2016, Cass Business School using Yield Book data.

Using Yield Book data, the short-run performance of the FTSE FABI is shown in Chart 3 for the sub-periods around the global financial crisis, when there was a sudden surge in the number of Fallen Angels. It is interesting to note that FAs quickly recovered their underperformance during the downgrade process relative to other corporate bonds, and subsequently showed steady outperformance.

Chart 3. US Fallen Angels performance during (top) and after the global financial crisis (bottom)

Cumulative Performance: Jan 2008 - Feb 2009

Cumulative Performance: Mar 2009 - Dec 2013
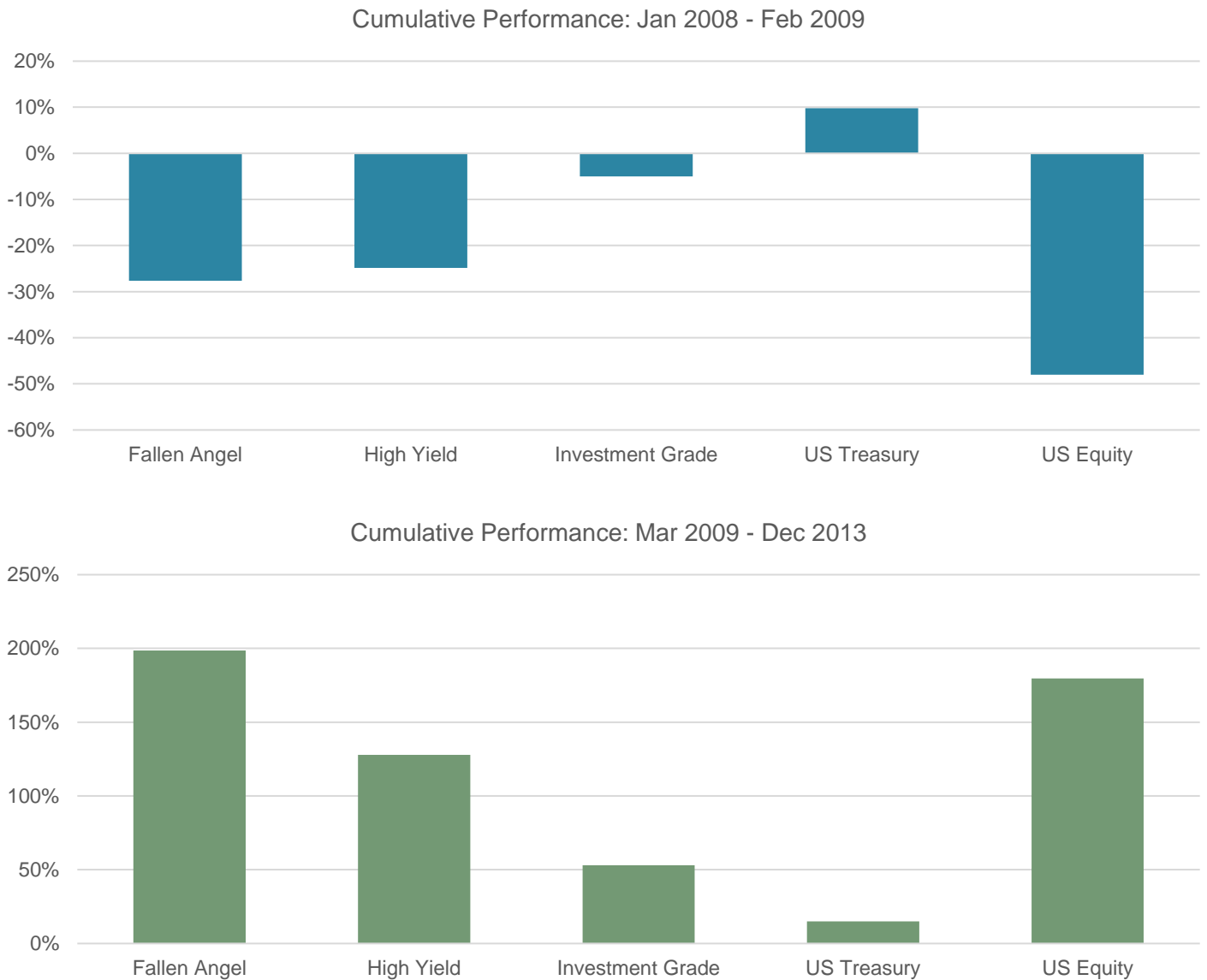
Source: FTSE Russell. Investment Grade data represented by FTSE US Broad Investment Grade Corporate Index, High Yield, by The FTSE High-Yield Market Index, Fallen Angel, by the FTSE Time-Weighted US Fallen Angel Bond Index, US Treasury, by FTSE US Broad Investment Grade Treasury Index, US equity, by FTSE USA Index, total returns in USD. Past performance is no guarantee of future results. Please see the end for important disclosures.

Return and performance characteristics

Looking at the full time series since 2002, Table 1 shows higher annual returns from FAs versus other fixed-income asset classes, with more volatility. Reflecting on the impact of the downgrade from IG to HY, FAs display higher standard deviation of returns than HYs, though risk-adjusted returns were still higher. This is demonstrated in Chart 4, on option-adjusted spreads (OAS), which shows the spike in spreads after the three major sector-specific shocks since 2000 caused the sharp increase in the size of the FA population relative to other HY issues. The correlation of returns with US equities (FTSE USA index) is also lower for FAs than HYs more generally, illustrating the slightly higher credit quality.

Since 2002, FAs have shown higher risk-adjusted returns than HYs, US Treasuries, and US equities. Correlation with US equities is also lower for FAs than HYs.

Table 1. US FA performance and correlation characteristics relative to other US asset classes (January 2002 to end-April 2019)

Monthly Returns	Fallen Angel	High Yield	Investment Grade	US Treasury (10 Years)	US Equity
Mean	0.98	0.66	0.46	0.33	0.72
Standard deviation	3.35	2.69	1.56	1.25	4.06
Risk adjusted	0.29	0.25	0.29	0.26	0.18

Annual Returns	Fallen Angel	High Yield	Investment Grade	US Treasury (10 Years)	US Equity
Mean	12.44	8.25	5.67	3.98	8.93
Standard deviation	11.59	9.33	5.41	4.32	14.05
Risk adjusted	1.07	0.88	1.05	0.92	0.64

Correlation of Returns	Fallen Angel	High Yield	Investment Grade	US Treasury (10 Years)	US Equity
Fallen Angel	1.00				
High Yield	0.93	1.00			
Investment Grade	0.49	0.53	1.00		
US Equity	0.61	0.69	0.21		1.00
US Treasury (10 Yrs)	-0.18	-0.20	0.60	1.00	-0.33

Source: FTSE Russell as of April 30, 2019. Investment Grade data represented by FTSE US Broad Investment Grade Corporate Index, High Yield, by FTSE High-Yield Market Index, Fallen Angel, by FTSE Time-Weighted US Fallen Angel Bond Index, US Treasury, by FTSE US Broad Investment Grade Treasury Index, US equity, by FTSE USA Index. Past performance is no guarantee of future results. Please see the end for important disclosures.

There are also different elements to FA performance. Most performance measurement is relative to the HY asset class, but FAs also appear to be negatively correlated to US Treasuries and have shown favorable historical risk-adjusted returns (see Table 1).

However, FAs and other HYs have typically underperformed IG credits and US Treasuries during a cyclical downturn. This has occurred when liquidity effects become severe and the credit carry in HYs has become strongly negative. But FAs have outperformed during cyclical upturns when credit quality improved, as was the case from 2011-16 (see Chart 4).

Therefore, the presumption that the FA migration impact from IG to HY on individual credits can be reliably captured by the current spread difference between IG and HY indexes may prove unhelpful and is likely to be more regime-specific.

**Chart 4. Option-adjusted spreads of FA, IG and HY, each relative to US Treasuries**
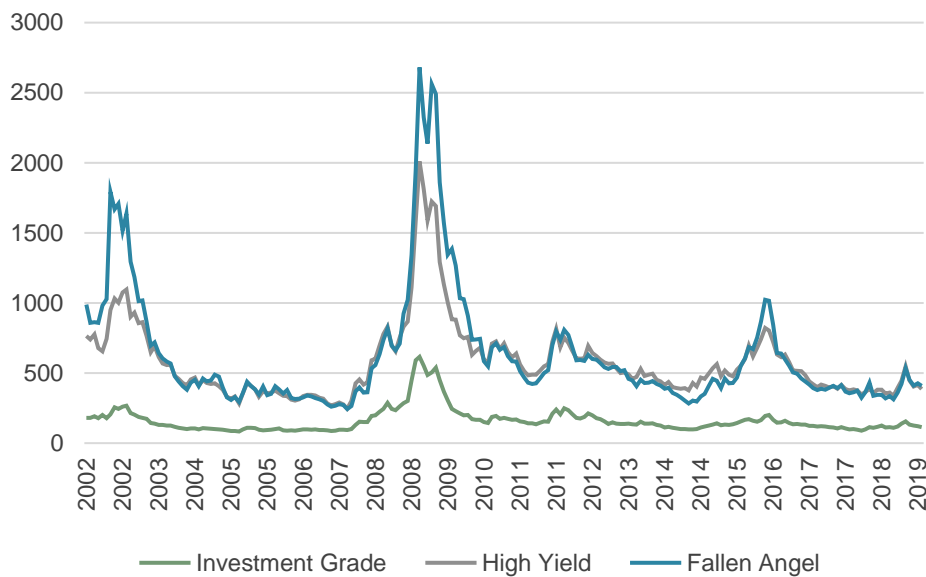
Source: FTSE Russell as of April 30, 2019. Investment Grade data represented by FTSE US Broad Investment Grade Corporate Index, High Yield, by FTSE High-Yield Market Index, Fallen Angel, by the FTSE Time-Weighted US Fallen Angel Bond Index, US Treasury, by FTSE US Broad Investment Grade Treasury Index. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

The share of FAs in the HY market has generally increased in a downturn, but credit ratings are already more defensive, and the build-up of BBB debt is partly M&A driven. Companies also have a strong incentive to avoid migration into the HY market, given the increase in the cost of capital that follows.

Size of Fallen Angel sector in Corporate Bond market

Both default rates (DRs) and the share of FAs in the HY market remain low by historical standards, despite weakening global growth and the general decline in the credit quality of market indexes. This may be due to a long period of stable US corporate earnings growth, a decrease in the use of key covenants for non-IG bonds, and the absence of a recent sector-specific shock. The share of FAs in the overall HY market was much higher after the sector-specific shocks in 2014/15 (energy sector), 2008/09 (financials), 2001/02 (TMT), as Chart 5 shows below.

Of course it is quite possible that the share of FAs in the HY market now increases as generally happens in a downturn, but credit ratings are already more defensive, and the build-up of BBB debt may be partly M&A driven. Companies also have a strong incentive to avoid migration into the HY market, given the increase in the cost of capital that follows when credits lose their IG status.

Chart 5. US Fallen Angels as a share of the US High Yield market
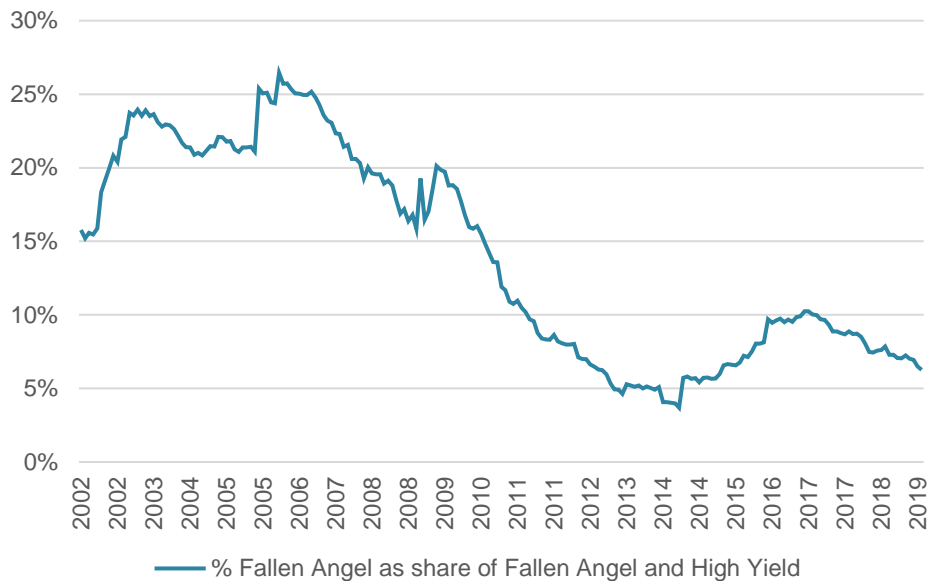
Legend: —— % Fallen Angel as share of Fallen Angel and High Yield

Caveats and concerns about the FA asset class

Much of the recent coverage of FA credits focuses on the aggregate build-up in the size of the (non-financial) corporate bond market, since the GFC, and the decline in aggregate credit quality. The recent OECD paper[5], points out that the (non-financial) corporate bond market has almost doubled in size in real terms since 2008 (growing to US$13 trillion in 2019). The surge in issuance has occurred in both developed and emerging markets, with the US and China the biggest net issuers. The Bank of International Settlements reinforced the OECD warnings about the risks in the corporate debt market in its latest Quarterly Report.[6]

Global issuance by non-financial companies has averaged US$1.7 trillion per annum versus US$864 billion per annum with the peak years of issuance at US$2 trillion in 2016 and 2017. The fastest growth has been in EM, growing from US$70 billion p.a. pre-crisis to a peak of US$711 billion in 2016, before falling by 28.6% in 2017. The OECD also points out that within IG issues, declining credit quality is reflected in the increased share of BBB-rated bonds (54% vs only 30% in 2008), alongside a decline in AAA- and AA-rated issues. Thus, the OECD's global corporate bond rating index has been in a downtrend since 1980 and has remained below BBB+ for 9 years.

Recent OECD paper points out that non-financial corporate bond market has almost doubled in size in real terms since 2008. Surge in issuance has occurred in both developed and EM.

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[5] Corporate Bond Markets in a Time of Unconventional Monetary Policy", 2019, OECD, February 2019.

[6] BIS Sounds Alarm on Risk of Corporate Debt Fire Sale, Financial Times, March 6, 2019.

But different theories can fit the same set of facts and corporates gain financial flexibility from being in the BBB bucket, as opposed to A-rated, so a higher share of BBB-rated issuers may partly be voluntary in this cycle for companies issuing debt with very low coupons to finance M&As. It has also been suggested that after rating agencies, and financial markets, failed to spot the contagion risks in sub-prime credit ratings before the GFC, they have overstated risks in rating corporate bonds since then. A related issue is how the independence problem faced by information intermediaries, like rating agencies, may reduce the information content of their ratings.[7]

At the aggregate level, given the quantity of corporate issuance now sitting in the BBB-rating bucket (US$3.6trn, or over 25% of the total market size), or just in the IG space, the OECD highlights the risk of an increase in downgrades to sub-IG, or potential FAs, should a sharp cyclical downturn materialize. This is because the proportion of bonds with the lowest IG rating is high historically (even if the share of FA is low) and large-scale rating migrations have been linked historically to major macro-economic distress in downturns or recessions.

On FA migration rates, the OECD notes that in 2009, 7.5% of BBB-rated issuers were downgraded to sub-IG by the end of the year, compared to only 2.8% in 2017. Therefore, if downgrades matched the 2009 levels (7.5%) that would equate to US$274bn migrating to the sub-IG sector, or a Fallen Angel sector size close to US$500bn. But this appears to be a worst-case scenario, given that 2008/09 was an extreme financial sector and systemic shock in a sector with high leverage and correlation risk to other sectors.

Large-scale rating migrations have been linked historically to major macro-economic distress in downturn or recessions.

This appears to be a worst-case scenario, given that 2008/09 was an extreme financial sector and systemic shock, in a sector with high leverage, and correlation risk.

Covenant protection

Less covenant protection has also been part of the decline in credit quality in HY issues, as the OECD points out. The search for yield has weakened covenants on North American non-IG corporate bonds, although the covenants on IG bonds have been more stable.

The types of covenants on non-IG bonds may explain this, since specific covenants, (1) restricting payouts to shareholders and (2) restricting the issuance of additional debt, have become much less common – this being consistent with bond investors trading off higher yields for less protection in a low interest rate regime.

Weaker covenants on HY issues during this cycle is a positive for potential FAs, since other HY issues are less well protected than during previous credit cycles, compared to FAs.

Low default rates (DR) may mask the risk that DRs tend to be clustered during crises, so a 2.4% DR in 2017 among non-IG issuers may be artificially low, though it may also reflect lower corporate borrowing costs. The decline in covenant protection may also be artificially restricting default rates among HY issuers but note that FAs are generally B- or BB-rated and have higher credit ratings than HY issues.

The search for yield has allowed covenants to weaken on North American non-IG bonds, though IG covenants have been more stable. Weaker covenants on HY is a positive for potential FAs, since other HY issues are less well protected compared to FAs.

Low default rates (DR) may mask risk that DRs tend to be clustered during crises, though it may also reflect lower corporate borrowing costs.

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[7] The Informational Effects of Firm-Funded Certification: Evidence from the Bond Rating Agencies, S. Bonsall IV, Pennsylvania State University, January 2012.

# Sector-specific nature of FA spikes

Empirical data also confirms the sector-specific nature of previous spikes in FAs. Apart from 2008/09, increases in FAs have been confined to one sector and to sectors closely linked to the epicenter of the shock, as in energy in 2014/15. Charts 6 and 7 show the weight composition by sectors and the greater volatility in sector weightings among FAs relative to HYs.

Chart 6. US Fallen Angel sector weights (%)
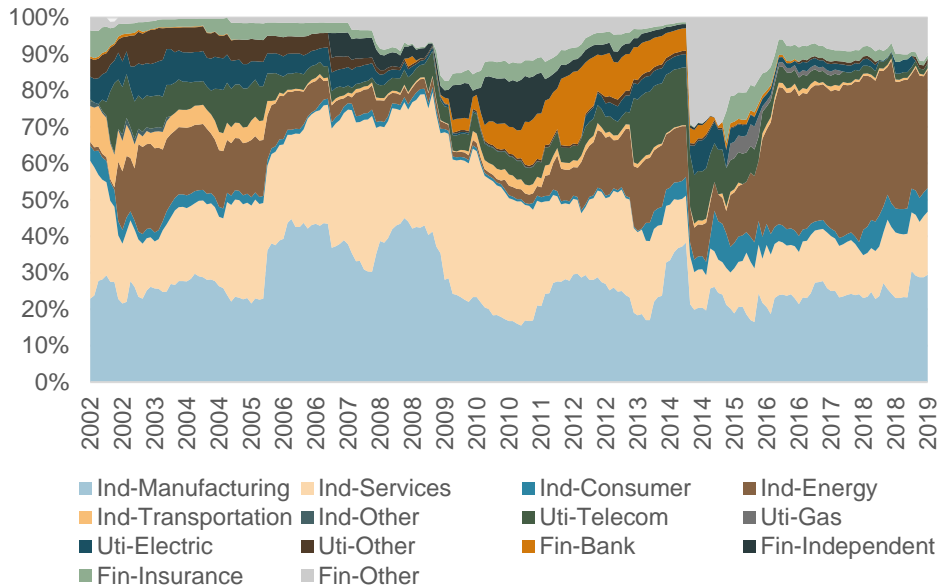
Source: FTSE Russell as of April 30, 2019. FTSE High Yield data represented by FTSE High-Yield Market Index, Fallen Angel, by FTSE Time-Weighted US Fallen Angel Bond Index. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

Chart 7. US High Yield sector weights (%)
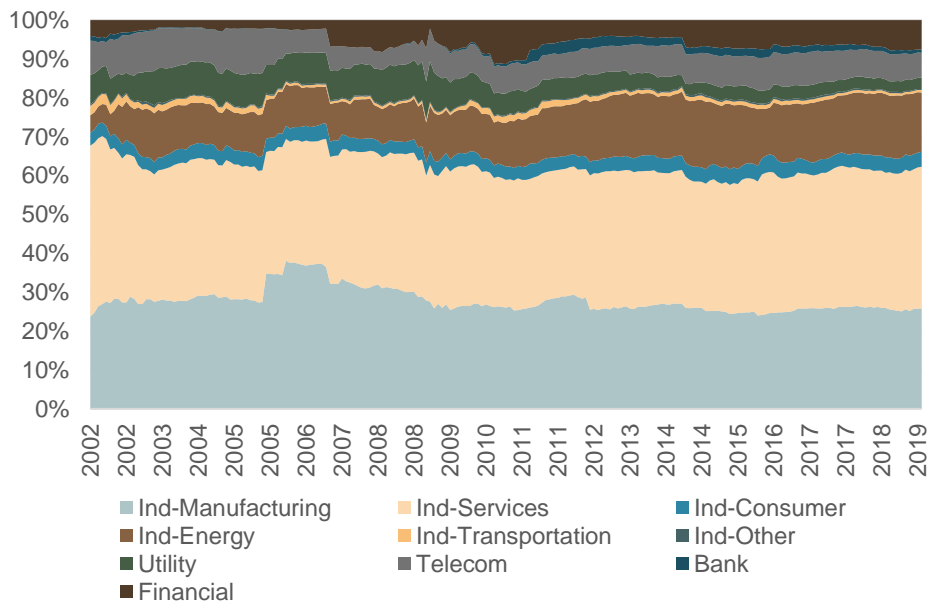
Source: FTSE Russell as of April 30, 2019. FTSE High Yield data represented by FTSE High-Yield Market Index. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

Fitch[8] points out the build-up in low IG US corporate sector debt is also due to M&A activity, accompanied by EBITDA growth, and that credit ratings should withstand normal cyclicality. Similarly, Fitch expects de-leveraging after the surge in M&A activity, which is expected to drive leverage lower in 2019/20 in REITs, food, beverage and tobacco, building materials and construction companies. Corporates have also taken advantage of the historically low cost of debt, both in spread and absolute terms, to issue more debt.

Furthermore, Moody's[9] notes that although potential FAs in the US rose to 49 in Q4, 2018, potential rising stars (bonds upgraded to IG from HY status) also increased to 31 from 28 − the highest since the time series began in 2012. During 2018, potential rising stars rose to 44, from only 16 in 2017, reflecting stable growth, positive credit fundamentals and low DRs.

Risks for investors − when do FAs become value traps?

Most of the work to date on the performance in FAs has focused on either (1) ratings downgrade/timing issues (e.g., the FTSE FABI), (2) sector-specific shocks (e.g., oil price collapse in 2014/15, telecoms and technology bust in 2001/02) or (3) aggregate credit indicators, like credit spreads, the ratio of credit upgrades to downgrades, and historical migration rates from Investment grade to High Yield (see the recent OECD study and also Venizelos[10]). This may reflect previous historical experience when FA rose, like the telecoms bubble in 2001/02, or the crash in financials in 2008/09.

This raises the question of FA performance over a full credit cycle, and relative to other asset classes, apart from HY. There is some evidence, for an earlier period between 2001 and 2005, from Ellul et al (2011)[11], when interest rates were rising. This suggests that after a downgrade from IG, FAs were subject to 'fire' sales, resulting in -9% abnormal returns, while other downgraded bonds suffered -3% returns (the difference disappearing after only 30 weeks). However, the main cause of the short-term underperformance by FAs was regulatory-induced selling by insurance companies after a downgrade from IG to HY, and not rising interest rates.

The OECD also points out that because regulations since the GFC have led dealer banks to reduce their inventories and market making, the effect of such fire sales may be stronger in a future downturn.[12] But the FTSE FABI shows outperformance since 2001 versus other HY issues (see Chart 2 on cumulative returns), which captures a full credit cycle, and the shift to a lower inflation and nominal GDP growth regime in 2008/09.

Most of the work to date on FAs has focused on either ratings downgrades/timing issues, sector-specific shocks, or aggregate credit indicators.

Previous credit cycles in 1990, 2000 and 2008 did show strong relationship between a decrease in credit quality and default rates, but FAs rarely move from IG to outright default.

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[8] Fitch Ratings; Surge in BBB US corporate debt may not yield more fallen angels, January 28, 2019.

[9] Moody's on Fallen Angels.

[10] Bond Investors Beware Fallen Angels ", Greg Venizelos, Axa Research and Strategy, January 31, 2018.

[11] Andrew Ellul et al, Regulatory Pressure and Fire Sales in the Corporate bond Market, Journal of Financial Economics, vol 101, No 3, 2011.

[12] Celik, Demirtas and Isaksson; Corporate Bonds, Bondholders and Corporate Governance, OECD Corporate. Governance Working Papers, No 16, 2015.

Previous credit cycles in 1990, 2000 and 2008, did show a strong relationship between a decrease in credit quality and an increase in default rates, but FAs rarely moved from IG to outright default, apart from cases of outright fraud (Parmelat and Enron), or systemic failure (Lehman's etc., in 2008/09). FAs have also benefited from a higher proportion of subsequent credit upgrades than equivalent HY issues. This may be because previous spikes in the proportion of FAs have reflected temporary financial pressure on long-standing businesses.

A series of FA rating downgrades, across sectors, following the initial downgrade to sub-IG, and strong default contagion, would be the most adverse scenario for FA valuations, and pose a value trap for investors. But previous sector-specific shocks have not developed in this way (even if the 2008/09 financial shock showed higher default contagion) and corporates have been able to borrow at much lower interest rates in this cycle, than in 2007/08. Concentration of corporate debt in cyclically or structurally exposed sectors (like retailing) with low revenue growth, would increase the risk of a value trap. But in the US, much of the corporate debt build-up in recent years has been in more defensive sectors (like telecoms and utilities) with the debt issued at much lower yields than in 2007/08, or 2002/03. Chart 8 shows this concentration of debt, and the spike in the energy sector's net debt after the sector-specific shock of 2014/15.

> A series of FA rating downgrades, across sectors, following initial downgrade to sub-IG, and strong contagion, would be most adverse scenario for FA valuations, but previous sector shocks have not developed in this way.

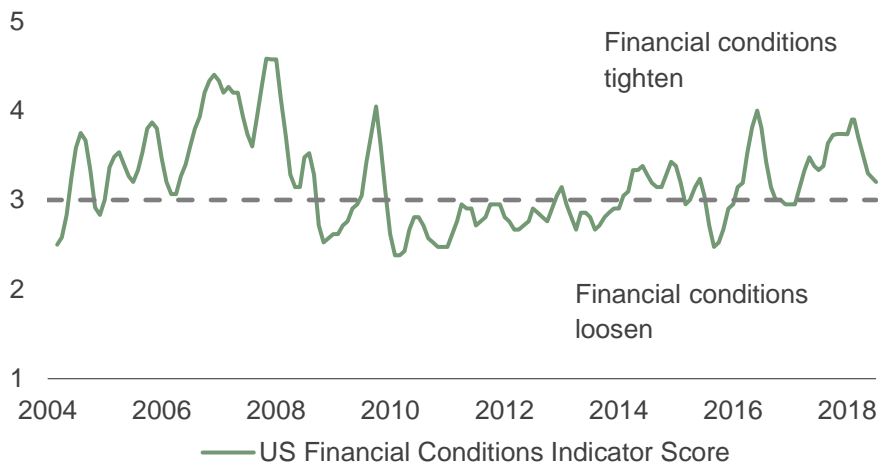**Chart 8. US Equity Sector Net Debt/EBITDA**
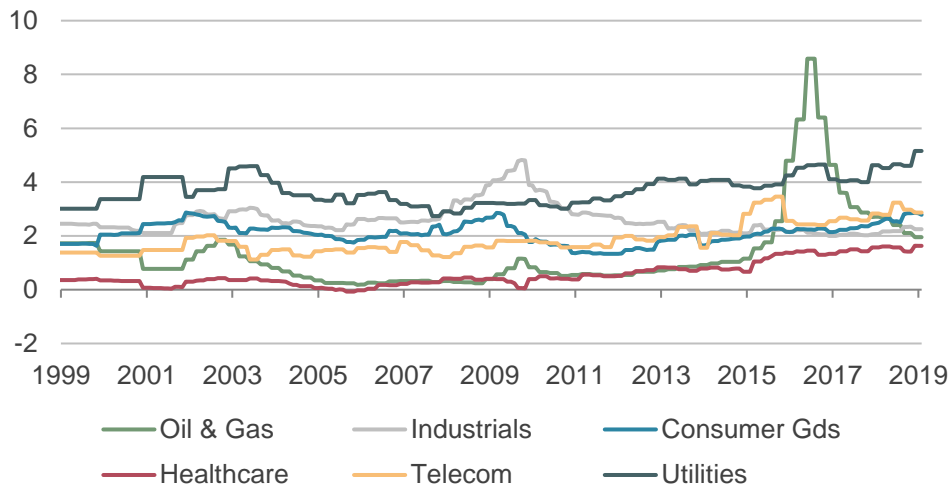
Source: FTSE Russell and Refinitiv as of April 30, 2019. Past performance is no guarantee of future results. Please see the end for important legal disclosures.

This reinforces the case for the OECD projection being a worst-case scenario. S&P (December 2018) scenario analysis projects the size of the sector at US$200-250bn in the next recession, in line with previous cycles as a share of the HY market, suggesting BBB-downgrade risks may be overstated. This is based on the view that 84% of BBB-debt leveraged above 5x EBITDA is in the real estate, regulated utilities and transmission/transport sectors. Nor do financial conditions suggest the same type of deep recession and default contagion that occurred in 2008/09 is likely. Chart 9 shows financial conditions remain significantly less restrictive. This does not mean a sector-specific shock and spike in FAs can be ruled out, but macro-economic and financial stress indicators for the US do not suggest risks are high relative to the 2008/09 highs.

> OECD projection for growth in FA market may prove a worst-case scenario, given that 84% of BBB-leveraged debt is in real, estate, utilities and transport sectors.

Chart 9. US Financial Conditions

Financial conditions tighten

Financial conditions loosen

US Financial Conditions Indicator Score

Source: FTSE Russell as of April 30, 2019. US FCI scores calculated using Z-Score methodology based on 5=greater than -1.5 standard deviation (SD) from average, 4= greater -0.5 less than -1.5; 3=between-0.5 and -0.5; 2= greater than 0.5 less than 1.5; and 1=greater than 1.5.

Summary and conclusions

A comprehensive and systematic approach for FA risks and performance measurement includes (1) macro-economic indicators, like the credit cycle/corporate earnings growth, corporate indebtedness, and monetary policy settings, as well as (2) aggregate credit indicators (ratio of upgrades to downgrades, migration rates, spreads), and (3) the risk of sector-specific shocks (e.g., retailing at present, as the business migrates to the internet).

Looking at these indicators can help investors assess the potential changes in the number of FAs, and how they may perform over longer time periods compared to other asset classes, as opposed to other HY issues only. Previous FA migration rates from IG may then be adjusted for the credit and economic cycle.

High migration rates/probabilities from IG to HY, and higher default rates have characterized previous periods of economic stress, like 2001/2002, and particularly 2008/2009. But the share of FAs in the HY market was notably higher before these shocks (Chart 3), when financial conditions were more stressed (Chart 8 on Financial Conditions), and when average yields were notably higher on the corporate debt raised in those cycles.

Empirical evidence from 2001 - 2016 for North America shows the historical outperformance of FAs relative to HYs particularly, but also versus IG (Yield Book data).

Historical FA migration rates from IG may then be adjusted for the credit and economic cycle.

Empirical evidence from 2001 - 2016 shows outperformance by FAs relative to HY particularly, but also versus IG.

Appendix

FTSE Time-Weighted US Fallen Angel Bond Index

Credit | US Dollar

The FTSE Time-Weighted US Fallen Angel Bond Index measures the performance of "fallen angels" – bonds which were previously rated investment-grade but were subsequently downgraded to high-yield.[13] The index includes US Dollar-denominated bonds issued by corporations[14] domiciled in the US or Canada, that meet the inclusion criteria described in Figure 1. Any such bonds, with a rating changed from investment-grade to high-yield in the previous month, are eligible for inclusion in the index, and will be held in the index for a period of 60 months from inclusion, provided they continue to meet the inclusion criteria. If a bond exits and then re-enters the index, the inclusion period is reset.

Unlike traditional indexes, where constituent weights are based on market value, the index's constituent weights are determined based on the time from inclusion in the index. Higher weights are assigned to bonds that have more recently become "fallen angels". This time-based weighting approach aims to capture the price rebound effect that fallen angels tend to experience soon after their initial downgrade to high-yield. Furthermore, issuers' weights are capped at 15% and constituents' time-based weights are capped at five times their respective market value-based weights to help manage concentration risk. The index provides an alternatively-weighted benchmark for the North American high-yield bond market.

Design criteria and the calculation methodology

Figure 1. FTSE Time-Weighted US Fallen Angel Bond Index design criteria

Coupon	Fixed-rate.
Currency	USD.
Minimum maturity	At least one year.
Maximum inclusion period	60 months[15].
Minimum issue size	USD 250 million.
Minimum credit quality	**Maximum Quality:** BB+ by S&P and Ba1 by Moody's. **Minimum Quality:** C by S&P and Ca by Moody's (excluding defaulted bonds).
Composition	Cash-pay, zero-to-full (ZTF), pay-in-kind (PIK), step-coupon bonds, and Rule 144A bonds issued by corporations domiciled in the United States or Canada.

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[13] The index also includes bonds that were originally rated high yield, subsequently rated investment grade, then downgraded again to high yield.

[14] Includes industrial, utility and finance sectors.

[15] The inclusion period for each bond is measured in terms of consecutive months. The maximum inclusion period rule will be suspended should the number of issuers in the index falls below 10 to mitigate issuer concentration risk. Such suspension of the rule will be maintained until at least 10 issuers are eligible for inclusion in the index.

Figure 2. FTSE Time Weighted US Fallen Angel Bond Index calculation methodology

Weighting	Constituent weights are based on the time from inclusion of the newly eligible bond in the index with higher weights assigned to bonds that have more recently become "fallen angels". Please refer to the Weighting Methodology section for more details.
	Additionally, issuers' weights are capped at 15% and individual bonds' time-based weights are capped at 5 times their respective market-value based weights.
Rebalancing	Once a month at the end of the month.
Reinvestment of cash flow	At daily average of the one-month Eurodeposit rate, calculated from the actual scheduled payment date of the cash flow through the end of the reporting period.
Pricing	Third-party pricing source.
Calculation frequency	Daily.
Settlement date	Monthly – Settlement is on the last calendar day of the month.
	Daily – Same day settlement except if the last business day of the month is not the last calendar day of the month; then, settlement is on the last calendar day of the month.
Fixing date	Each month, the upcoming month's index constituents are "fixed" on the profile fixing date. Each year's scheduled fixing dates are published on the website.
Base date	December 31, 2001.

Weighting methodology

Unlike traditional indexes where constituent weights are based on market value, the index's constituent weights are determined based on the time from inclusion in the index. Any bond entering the index is given a predefined time score. Starting from the 13th-month upon entering the index, the time score is gradually reduced. On each monthly rebalance, the time scores for all bonds in the index are normalized to weights that sum up to 100%. The time-based weighting methodology aims to assign higher weights to bonds that have more recently become "fallen angels". Furthermore, issuers' weights are capped at 15% and individual bonds' time-based weights are capped at five times their respective market value-based weights to help manage concentration risk.

Related indexes

FTSE US High-Yield Market Index

The FTSE US High-Yield Market Index is a US Dollar-denominated index which measures the performance of high-yield debt issued by corporations domiciled in the US or Canada. Recognized as a broad measure of the North America high-yield market, the index includes cash-pay, deferred-interest securities, and debt issued under Rule 144A in unregistered form.

Sub-indexes are available in any combination of corporate sector, maturity, and rating.

Design criteria and calculation methodology

The US High-Yield Market Index includes cash-pay and deferred-interest securities. All the bonds are publicly placed, have a fixed coupon, and are non-convertible. Bonds issued under Rule 144A are included in their unregistered form.

Figure 3. FTSE US High-Yield Market Index design criteria and calculation methodology

Coupon	Fixed-rate.
Minimum maturity	At least one year.
Minimum issue size	USD 250 million.
Credit quality	Maximum quality: BB+ by S&P and Ba1 by Moody's. Minimum quality: C by S&P and Ca by Moody's (excludes defaulted bonds).
Composition	Cash-pay, Zero-to-Full (ZTF), Pay-in-Kind (PIK), step-coupon bonds, and Rule 144A bonds issued by corporations domiciled in the United States or Canada only.
Weighting	Market capitalization.
Rebalancing	Once a month at the end of the month.
Reinvestment of cash flow	At daily average of the one-month Eurodeposit rate, calculated from the actual scheduled payment date of the cash flow through the end of the reporting period.
Pricing	Primarily external pricing source.
Calculation frequency	Daily.
Settlement date	Monthly – Settlement is on the last calendar day of the month. Daily – Same day settlement except if the last business day of the month is not the last calendar day of the month; then, settlement is on the last calendar day of the month.
Fixing date	Each month, the upcoming month's index constituents are "fixed" on the profile fixing date. Each year's scheduled fixing dates are published on the website.
Base date	December 31, 1988.

FTSE US Broad Investment-Grade Bond Index (USBIG)

Multi-asset | US Dollar

The FTSE US Broad Investment-Grade Bond Index (USBIG) tracks the performance of US Dollar-denominated bonds issued in the US investment-grade bond market. Introduced in 1985, the index includes US Treasury, government-sponsored, collateralized, and corporate debt and provides a reliable representation of the US investment-grade bond market.

The index covers a broad array of asset classes and sub-indexes are available in any combination of asset class, maturity, and rating.

Design criteria and calculation methodology

The index includes institutionally traded US Treasury, government-sponsored (US agency and supranational), mortgage, asset-backed, and corporate investment-grade securities.

Figure 4. FTSE US Broad Investment-Grade Index design criteria

Coupon	Fixed-rate.
Minimum maturity	At least one year.
Minimum issue size	US Treasuries: USD 5 billion public amount outstanding. US agencies and supranationals: USD 1 billion. Corporate and asset-backed: USD 250 million. Non-US sovereign and provincial: USD 500 million. Mortgage: Entry: USD 1 billion minimum amount outstanding per origination year generic when the coupon has a minimum amount outstanding of USD 5 billion. Exit: An origination year generic will exit when its amount outstanding falls below USD 1 billion. If the amount outstanding for the coupon falls below USD 2.5 billion, all corresponding origination year generics will be removed from the index.
Minimum credit quality	BBB- by S&P or Baa3 by Moody's.
Minimum denomination	Par value: USD 1,000.
Composition	US Treasuries (excluding Federal Reserve purchases, inflation-indexed securities and STRIPS); US agencies (excluding callable zeros and bonds callable less than one year from issue date); supranationals; mortgage pass-throughs; asset-backed; credit (excluding bonds callable less than one year from issue date); Yankees, globals, and corporate securities issued under Rule 144A with registration rights.
Redemption features	Bullet, sinking fund, putable, extendable, or callable.

Figure 5. FTSE USBIG calculation methodology

Weighting	Market capitalization.
Rebalancing	Once a month at the end of the month.
Interest	Fully taxable (federal).
Yield curve	Citi Treasury Model (off-the-run) Curve.
Volatility	Non-mortgages: 10% single volatility. Mortgages: Market-implied volatility (LMM Skew model).
Reinvestment of cash flow	At daily average of the one-month Eurodeposit rate, calculated from the actual scheduled payment date of the cash flow through the end of the reporting period.
Pricing	Primary source is Citi trader pricing except for Foreign Sovereign US Dollar denominated bonds (provided by Thomson Reuters). Prices are generally taken as of local market close. Third-party pricing is used as a supplement. Effective from September 17, 2018, Citi trader prices will be replaced by Thomson Reuters prices for Agency, ABS and Credit bonds. Effective from November 12, 2018, Citi trader prices will be replaced by Thomson Reuters prices for Treasury bonds.
Pricing adjustments	Mortgages: Carry-adjusted to reflect the difference between the index settlement dates and standard SIFMA settlement dates.
Calculation frequency	Daily.
Settlement date	Monthly – Settlement is on the last calendar day of the month. Daily – Same day settlement except if the last business day of the month is not the last calendar day of the month; then, settlement is on the last calendar day of the month.
Fixing date	Each month, the upcoming month's index constituents are "fixed" on the profile fixing date. Each year's scheduled fixing dates are published on the website.
Base date	December 31, 1979.

FTSE USBIG Corporate Index

This index includes US and non-US corporate securities (excludes US government-guaranteed and non-US sovereign and provincial securities).

FTSE USBIG Treasury Index

This index includes fixed rate US Treasury bonds with USD 5 billion public amount outstanding and greater than one year to maturity. The index excludes Federal Reserve purchases, inflation-indexed securities and STRIPS.

About FTSE Russell

FTSE Russell is a leading global provider of benchmarks, analytics and data solutions with multi-asset capabilities, offering a precise view of the markets relevant to any investment process. For over 30 years, leading asset owners, asset managers, ETF providers and investment banks have chosen FTSE Russell indices to benchmark their investment performance and create investment funds, ETFs, structured products and index-based derivatives. FTSE Russell indices also provide clients with tools for performance benchmarking, asset allocation, investment strategy analysis and risk management.

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