5 September 2013 │ 17 pages

Global

Global Structured Credit Strategy

CLO AAAs valuable despite refinancing risk

- **CLO AAAs need 10-15bp for their early call** — Equity investors will call high coupon CLO AAAs if able, and will try to extend low coupon CLOs – we think the refinancing risk is worth 10-15bp in current CLO 2.0 structures.
- **Differences in CLO 1.0 amortization should concern investors** — The difference between slowest and fastest amortization rates of CLO 1.0 AAAs implies that some AAA holders can expect up to an 18 month extension in WALs.
- **Extension risk is low for CLO 2.0 AAA tranches** — Using the dispersion in CLO 1.0 AAA amortizations as a guide, we calculate the extension risk in CLO 2.0 AAAs at 17bp, but restrictive reinvestment guidelines should reduce that risk dramatically.
- **Recent CLO 2.0 equity returns also impacted by call option** — Second-half 2012 CLOs illustrate best the vintage effect in CLOs – the ability to reprice their triple-As at 90bp would increase equity IRR by 2%.
- **CLO debt still attractive net of option costs** — Relative to peer structured finance assets, CLOs still look attractive; investors can benefit from the call optionality in several high coupon CLO 2.0s and in legacy CLOs.
- **Strong issuance and return outperformance shows investor support** — With a year-to-date issuance of $50bn in the US and €4bn in Europe despite difficult CLO arbitrage conditions, CLOs continue to show popularity with investors.
- **CLO Monitor shows value in CLO debt over equity** — The positive migration in collateral ratings, interest diversion cushions, and stressed loan buckets versus the tightening in collateral spreads supports legacy CLO debt investment over equity.

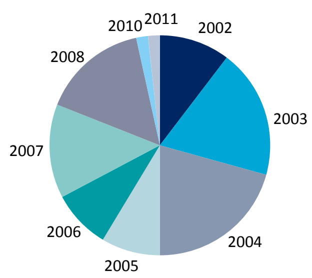
Ratul Roy
+44-20-7986-9003
ratul.roy@citi.com

Anindya Basu
+1-212-723-6453
anindya.basu@citi.com

Triple-As – Repricing or Extension?

Calls Part of CLO Life

Figure 1. Deals that got called during 2012



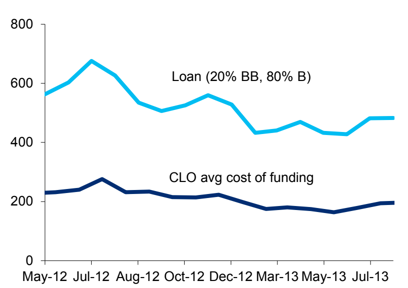
Source: Citi Research

Talk to any CLO investor left holding CLO 1.0 AAAs from 2007 with a L+25bp coupon, or a brave early CLO 2.0 investor from 2010 who briefly enjoyed a L+190bp coupon, and it is clear how triple-A investors have suffered from negative convexity. As Figure 1 shows, several 2010 and 2011 deals got called last year; the next 18 months should see many more calls as deals exit their non-call periods. Equity investors and managers will prefer to extend the lives of low-coupon liabilities and pay down high-coupon liabilities, in both cases to maximize equity returns (CLO Call or Extension Candidates, Global Structured Credit Strategy).

Stated differently, CLO debt holders have sold a put option on CLO spreads, which can be exercised at any time after the non-call period expires, and this is the source of negative convexity. The option sold by CLO 2.0 AAA investors is even more valuable than that sold by legacy deals for two reasons. First, many deals done in late 2012 are already in-the-money – that is, new issue spreads are tighter than where deals were originally done. Second, the coupons of many CLO 2.0s can be simply re-priced with minimal cost (a more common variant is where a tranche is refinanced but both refinancing and re-pricing lead to new coupons) without the cost of a full-blown redemption. In our analysis below, we (somewhat loosely) use the terms call option and repricing option interchangeably, and use empirical data on called deals and spread volatility to guide us in estimating the value of the option.

Valuing the Option

Figure 2. Loan spreads versus average cost of funding for CLO 2.0, bps



Source: Citi Research, S&P LCD

To calculate the value of the option, we must remember that the decision to call or re-price a deal will depend on whether the equity cashflows can be improved as a result of the repricing. Looking at liability spreads will not be sufficient to make this decision. For example, it is possible that loan spreads tighten so much that the deal does not generate sufficient equity cashflows in the future (despite tighter liability spreads) to pay for the upfront costs. In such a tight-loan price scenario, the best course of action may be to wait for the difference between loan and liability spreads to widen, or to simply redeem the deal and pay cash proceeds to equity holders. Conversely, even with wider CLO and loan spreads, an equity investor my refinance a deal to lock in a new period of term financing. The take-away is that one should focus not just on the liability costs, but also on where loan prices and spreads are currently.

We have created a simple option pricing model that takes into account the issues outlined above. In our model, the decision to reprice a CLO AAA tranche is determined by the difference between the loan and CLO liability spreads (asset-liability basis), the cost of re-pricing, and the absolute level of loan spreads. We use CLO AAA spreads as a proxy for CLO liability spreads. We assume that a CLO AAA bond re-prices only if the asset-liability spread is reasonably higher than the repricing cost (on an annualized basis) since it is the leveraged basis that generates future equity cashflows. We also have an additional constraint that loan prices are below a certain threshold (or equivalently loan spreads are not too tight) since equity investors might prefer outright redemption and selling the loan collateral to the unattractive future residual cashflows[1].

Using this model, we estimate that the price difference between a hypothetical non-callable AAA bond and a normal callable AAA bond is roughly 125bp, if the repricing

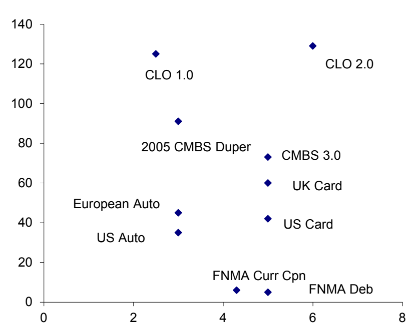
[1] For details about the option pricing model, please call us.

Figure 3. Universe of CLO 2.0 outside non-call period

Called		Callable, but not called	
Deal	**Manager**	**Deal**	**Manager**
COA Tempus CLO	FS COA Mgt	Doral CLO I	Doral Asset Mgt
ALM Loan Funding 2010-1	Apollo Credit Mgt	Golub Capital BDC 2010-1	GC Advisors
Garrison Funding 2010-1	Garrison Inv Group	NZCG Funding	Guggenheim Inv Mgt
Morningside Park CLO	GSO/Blackstone	Plymouth Rock CLO	PineBridge Investments
Freeport Offshore / Onshore 2010-1	Freeport Financial	ALM Loan Funding 2010-3	Apollo Credit Mgt
Fraser Sullivan CLO V	WCAS Fraser Sullivan	OHA Intrepid Loan Fund	Oak Hill Advisors
Riverside Park CLO	GSO/Blackstone	Ares XVI CLO	Ares CLO Mgt XVI
LCM VIII	LCM Asset Mgt	Madison Park Funding VII	CSAM
		Symphony CLO VII	Symphony Asset Mgt
		ING IM CLO 2011-1	ING Asset Mgt
		LCM IX	LCM Asset Mgt
		ALM IV	Apollo Credit Mgt
		Carlyle Global Markets Strategies 2011-1	Carlyle Inv Mgt
		Central Park CLO	GSO/Blackstone

Source: Citi Research

Figure 4. First-pay bond spreads of various structured finance assets, bps



Source: Citi Research

cost is 50bp.This implies that AAA investors are giving up about 28bp in spread, using the calculated average life of a typical AAA bond.

Decision not always economic

However, the re-pricing decision may not always be purely economic, as in our model. For example, a first time CLO manager may choose to not re-price/call a deal in order to demonstrate the performance of the original deal to prospective CLO buyers for future deals. Even if CLO AUM is not a prime concern, managers may choose to focus their attention at any point on creating a new deal rather calling or refinancing an old one (especially if the exercise is more cumbersome than simply resetting a tranche coupon). In several cases there has been enough secondary trading in the equity so that the identity of the holders is not easily available. For all these reasons several CLO 2.0 deals that are currently callable have not been called (Figure 3).

Given that less than half of the callable-deals have actually been called, we adjust the price of the option downward to a 10-15bp range. Thus, the option adjusted spread for a typical AAA bond is roughly 115-120bp (current quoted AAA DM of 130bp less the 10-15bp option). When comparing assets, investors should therefore consider using this net spread.

Despite the embedded optionality, AAA CLOs still remain one of the cheapest low-risk assets available for investors (Figure 4). From a return on regulatory capital perspective, CLO 2.0 seniors look attractive to many other asset classes for most traditional investors in this part of the capital structure. The only exceptions are some US banks whose CLO purchases have been impacted by a significant increase in FDIC insurance charges. Many such smaller banks (see FDIC versus Basel? Global Structured Credit Strategy) have moved further down the capital structure (typically AA rated) to meet their yield targets.

Extension risk low for CLO 2.0 AAA

While we have focused so far on the call risk faced by CLO 2.0 AAA bondholders, there is the opposite risk of extension that many CLO 1.0 holders, with their low coupon bonds, are facing. For CLO 2.0 AAA holders, the risk only arises if loan spreads and AAA spreads widen far beyond current 130bp type coupons. In such an environment, equity holders will try to lengthen AAA WAL by continuing CLO reinvestment after the reinvestment period to the limited extent that CLO 2.0 documents allow.

We have built a simplified model to compute the value of the extension risk which can also be viewed as an option on the issuer's part to *continue reinvestment* beyond the end of the official reinvestment period. In our model, we specify that the extension option is only exercised if the spread between the AAA bond coupon and the current AAA DM is sufficiently high (implying a negative carry for the bondholder), and assume that the period for which the extension occurs goes up with this spread differential. In other words, the issuer tries to take advantage of the low cost of funding (compared to market) for longer as the spread differential rises.

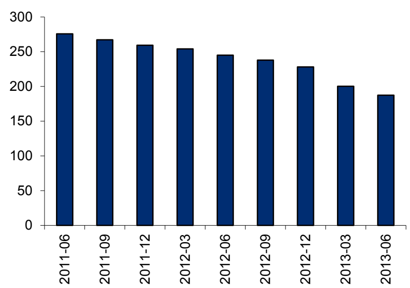
To get an idea of how much extension is possible, we looked at the dispersion between the slowest and fastest amortizing CLO 1.0s and found that the slower ones were amortizing 10% a year slower, which could lead to a 15 to 18 month longer WAL for AAAs. Using this model, we estimated the present value of the loss

due to a longer WAL and the implied negative carry between a new AAA and the current 130bp coupon to be 17bp on an annualized basis.

However, investors should recognize the significantly stronger reinvestment constraints that CLO 2.0s have compared to legacy CLOs. In particular, most newer CLOs restrict new investments after the reinvestment period to match the maturity of the assets they are replacing, though some do so on a weighted average basis rather than on an individual basis. In addition, many CLOs also have collateral WAL tests that need to be maintained even after the reinvestment period ends. Taken together, these restrictions lead us to believe that we should not see as much divergence in amortization rates as we see in older deals, and extension is a less significant problem. We therefore adjust our estimate of the extension costs downward to no more than a quarter of the 17bp.

Some dispersion in CLO 1.0 paydown

Figure 5. CLO 1.0 Outstanding, $bn



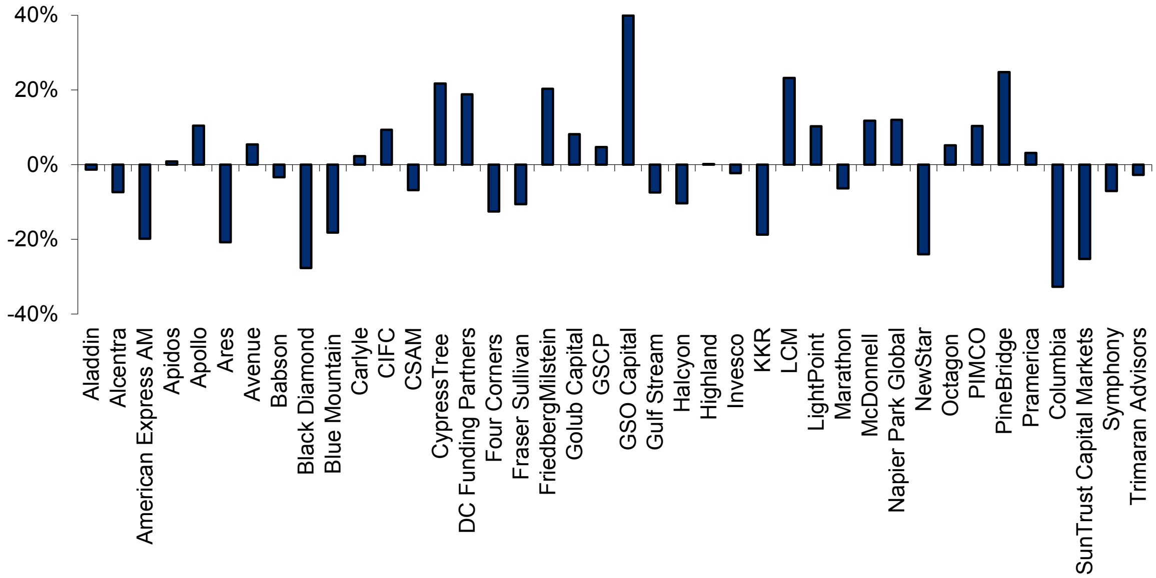
Source: Citi Research

CLO 1.0s have less standardized terms and therefore their paydown has been steady but not uniform. Deals differ in their reinvestment opportunities after the reinvestment period as well as the constraints they have to satisfy. See CLO 1.0 – life after reinvestment for some of these typical differences. Broadly, though, the continuing amortization of CLO 1.0 vehicles (Figure 5) has led to the total CLO universe, including the issuance of CLO 2.0, to mitigate any supply pressure on the market. The universe has been further reduced by older deals getting called or refinanced as we saw in Figure 1.

In Figure 6, we show the deviation from the median of the senior tranche bond factor over the universe of deals that are post their reinvestment period. Though it is natural to expect deviations from a median in any deal universe, we believe that the scale of some of these deviations is significant. The data is grouped by the original deal manager (thus ignoring the recent consolidation in the manager universe) and is averaged across their deals that form part of the universe. We have cleaned the data for specific structures subject to volatile notional changes such as pro-rata structures and revolving tranches.

We feel that structure and manager behavior (we would argue that the two are somewhat linked as the original manager would have been involved with the creation of the structure) account for most of the differences. With more upgrades of previously downgraded tranches, more managers are able to invest in new collateral from credit-improved sales and the rapid prepayments that the loan markets have seen. Though many deals are hitting against their collateral average-life triggers, many loan issuers have been able to create shorter-dated tranches to fit the reinvestment lives of these legacy CLOs. Structural differences combined with the managers' interpretation have led to the differences seen in the figure.

Figure 6. Deviation from median amortization rate (38%) across CLO universe of deals post-reinvestment period by select original deal manager. Positive signifies faster amortization



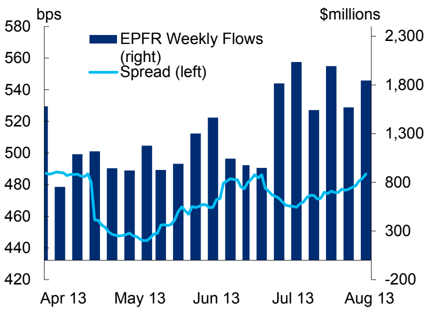
Only deals that exited reinvestment during 2011-2012 were included and only managers with 2 or more deals were included
Source: Citi Research

Call Optionality Important for Equity

Grappling with hunger for loans

The CLO market is competing for collateral with a vigorous loan mutual fund market. According to EPFR data, retail investors bought $47.4bn of retail loan funds from the beginning of the year up to the week ending 21st August. The pick-up in demand is illustrated in Figure 7 – the trailing 4-week average is a weekly $1.74bn compared to a trailing 20-week average of $1.3bn. As a point of comparison, full-year 2012 saw only $11.6bn of inflows. Demand from funds and CLOs is often not keeping pace with loan issuance. For example, the first four weeks of July saw an aggregate total demand of $12.1bn which exceeded net new loan supply by $1.3bn according to LCD data. The strength of the market is affecting CLO investors in a couple of ways. After a recent dip, covenant-lite issuance has once again increased though (as we have argued previously) loan credit quality and recovery prospects are at least as important as the presence of covenants. Greater loan supply, such as a developing M&A market, may weaken the impact of recent spread tightening driven by fund-flows but it is too early to tell whether that will shift the main driver for loan supply this year, which has been opportunistic repricings.

Figure 7. Loan fund flows versus spreads

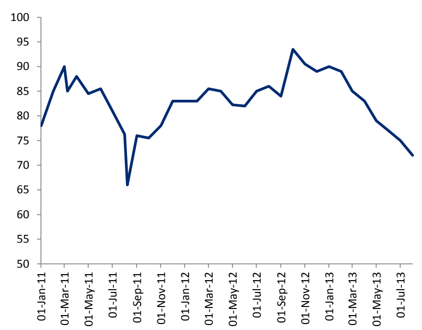


Source: Citi Research

Equity price dip reflects loan pressure

As CLO equity investors know, their cashflows can be negatively impacted by tightening of loan spreads as well as rising defaults, which is usually accompanied by widening credit spreads – this causes negative convexity in their product. The negative impact of spread tightening as well as loan defaults on equity cashflows had motivated us to suggest using credit options to mitigate the price risk in CLO Equity: To Hedge or not to Hedge? A big reason for the recent significant price drops in CLO equity (Figure 8) has been the volume of loan repricings which has compressed loan spreads. Two other reasons were the deleveraging of legacy CLOs with rising loan prepayment and the inability of CLO managers to find loan investments that would satisfy CLO constraints (such as a collateral WAL test). We feel investors could still look for value among these broad moves by finding deals which still allow reinvestment (see earlier section on extension risk). Buying equity at lower dollar-prices will also provide upside if supply pressures in the future lead to cheaper loans

Figure 8. CLO 1.0 Equity Price



Source: Citi Research

Trades around CLO 2.0 call

As with much of accepted CLO wisdom, many features that are detrimental for AAA investors may help equity. The call option on prices that equity investors have from AAA owners (or expressed differently, a put option on spreads sold by AAA holders) can be valuable for the equity owners. CLO deals done in the latter part of 2012 – during which time new issue AAA spreads were around 150bps – stand to gain at least 2 points in IRR if the AAAs can be repriced at 90bps relative to their hold-to-maturity IRR (Figure 9). Though these high coupon triple-As are attractive for many senior tranche investors, it is likely that they will not trade at a significant premium because of their call likelihood. In many cases, as we saw in Figure 3, a call or repricing may face logistical difficulties. Investors who can take a view on the likelihood of a particular deal being called may reap gains from these higher coupon bonds remaining outstanding beyond their call date. Conversely, secondary equity buyers who buy equity tranches from such deals may find upside if they buy these bonds at prices that reflect their lower cashflows.

Figure 9. Impact of Call on Q3 2012 issued CLO versus Q2 2013 deals

	Marea (Invesco)	ING 2012-3	OHAC P8	Babs on 2013-1
Price Date	13/09/2012	08/08/2012	17/04/2013	06/05/2013
Triple-A	152	153	112	110
Refi AAA at 90	10.44%	9.46%	12.69%	13.93%
Refi AAA at 110	9.79%	8.89%	11.97%	13.15%
To Maturity	8.34%	7.46%	11.90%	13.15%
Call 2y after reinv	9.04%	8.10%	12.76%	13.59%

Source: Citi Research

Strong CLO and Loan Market

Outperformance in CLOs

Figure 10. Yield changes across assets, %

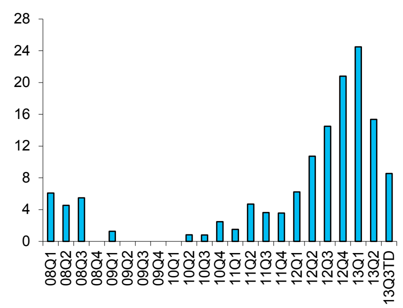
Asset*	Apr-13	Aug-13
IG Cash	2.78	3.38
HY Cash	5.69	6.30
Agency	0.95	1.37
SPX	10.43	7.33
US TSY	0.95	1.31
Lev Loans	5.41	5.90
CDX IG	1.08	1.08
CDX HY	4.27	4.30
CLO AAA	1.69	1.55
CLO BBB	5.28	4.60
IG9 3-7 10y	7.45	5.66

*US TSY across all maturities; SPX is annualized return using '14E; CLOs are CLO 1.0s
Source: Citi Research

The spread pick-up over many other assets plus the attraction of a floating-rate coupon, have led CLOs to outperform the market (Figure 10). Leveraged loan funds have benefitted from inflows post the Fed commentary on QE tapering as opposed to bond funds, which have suffered significant outflows (see CLOs in a Post-Fed World for a detailed discussion). We believe that this dynamic will continue in the short term, given the latest statements from the Fed which indicate that a tightening in monetary conditions will only happen when labor market and growth conditions are favorable. At the same time, the Fed's implementation of Basel III for computing capital ratios has been supportive of CLOs from a regulatory perspective, given the lower volatility of this asset class (especially CLO AAAs) compared to others, such as Agency MBS.

Tighter Arbitrage, Tighter Structures

Figure 11. US CLO Issuance by Quarter, $bn

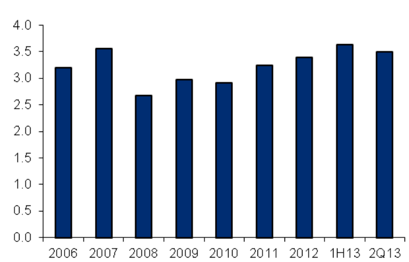


Source: Citi Research

Despite some of the headwinds in CLO issuance post Q1 2013, most notably a tight CLO arbitrage environment created by resilient loan spreads and wider CLO spreads, the primary market has not stayed still. Issuance to date including a handful of middle-market CLOs, is now close to $50bn. Dealers have adapted by seeking slightly lower-rated tranche ratings, and by inserting a single-B tranche between the double-B and equity tranches. Nearly half of the deals issued in 2013 have such a tranche compared with a relatively small minority in 2012. In the latest Madison Park deal from Credit Suisse Asset Management, for example, the triple-B and double-Bs are actually at the lower end of the range being rated Baa3 and Ba3, respectively, by Moody's. In addition, there is a single-B (B2) tranche. The equity tranche is $47m out of a $521m deal – a thinner slice than seen in the first generation of CLO 2.0s. Deals with a step-up coupon on the triple-A tranche satisfy the need to reduce liability costs in the short-term while providing upside in the case of a non-call to the AAA buyer. The step-up also increases the call likelihood and reduces the expected maturity of the triple-A tranche.

Strong Loan Demand Encouraging Borrowers

Figure 12. Rising Ratio of First-Lien Debt to EBITDA

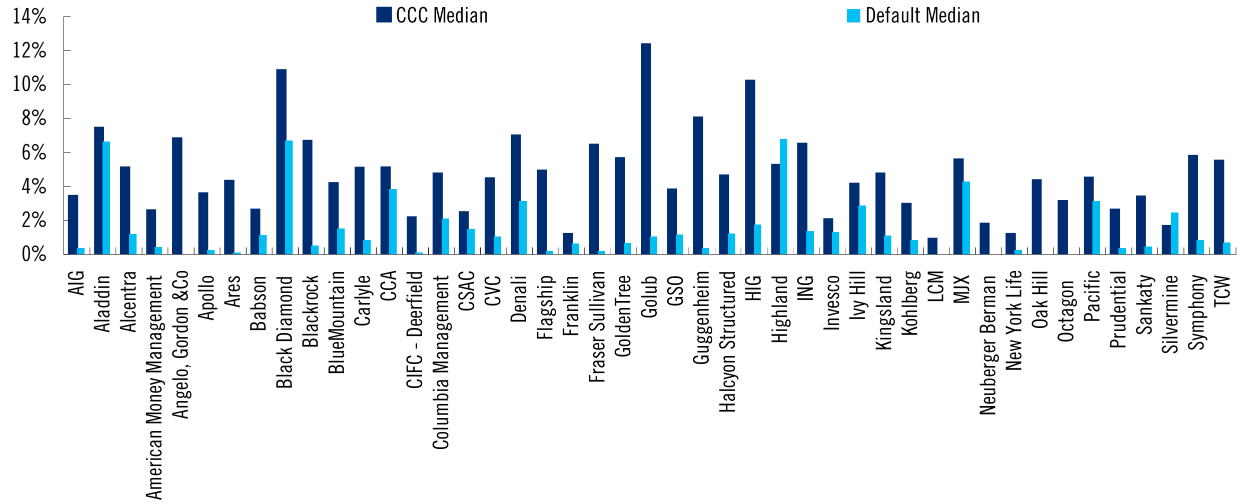


Source: S&P LCD

Other than a recent downturn, borrowers have been taking advantage of strong retail and, until June, strong CLO demand to obtain better terms though the market which is probably not as heated as in the first half of the year. As mentioned earlier, covenant-lite loan issuance is increasing again after a brief drop. The percentage of covenant-lite issuance as a percentage of total new issuance is about 47% which is lower than the 60% seen in January but significantly higher than the approximately 28% seen in June. Deal leverage has been rising (Figure 12) and new issue yield-to-maturity is also marginally down from the second quarter. Moreover, the volume of repricings and dividend recaps, which S&P LCD calls opportunistic issuance, showed some increase in the last two weeks of July after being almost zero during the first two weeks.

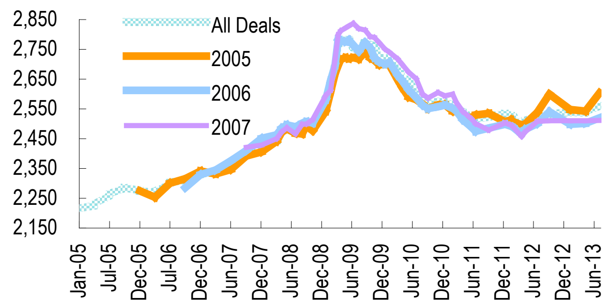
US CLO Monitor

Figure 13. Median of Default and Triple-C Baskets for Large US CLO Managers[a]



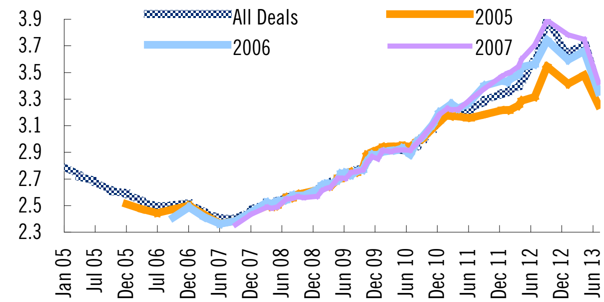
[a] Minimum of S&P and Moody's deal-defined ratings.
Source: Intex and Citi Research

Figure 14. Weighted Average Rating Factor (WARF) Migration



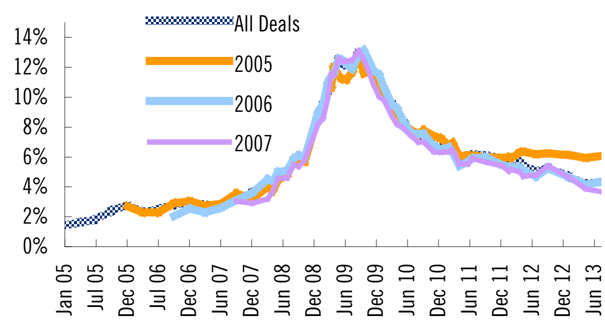
Source: Intex and Citi Research

Figure 15. Weighted Average Spread (WAS) Migration



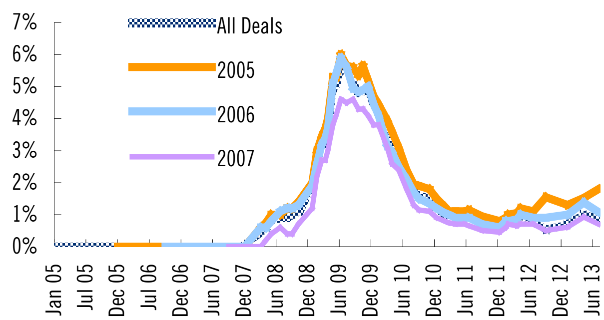
Source: Intex and Citi Research

Figure 16. Triple-C Basket Size



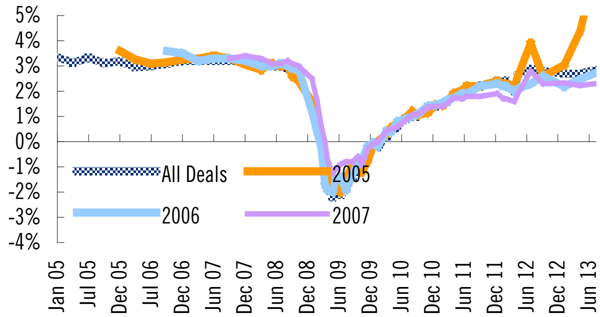
Source: Intex and Citi Research

Figure 17. Median Portfolio Default Rate



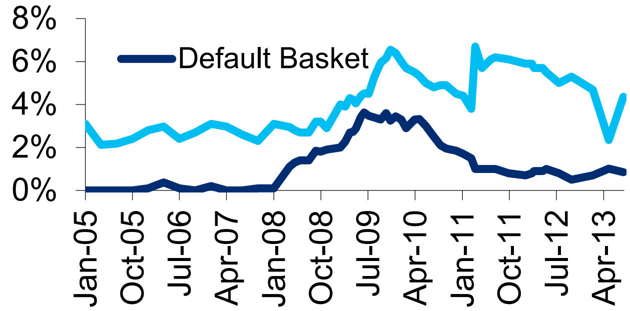
Source: Intex and Citi Research

Figure 18. Median Interest Diversion Trigger Cushion



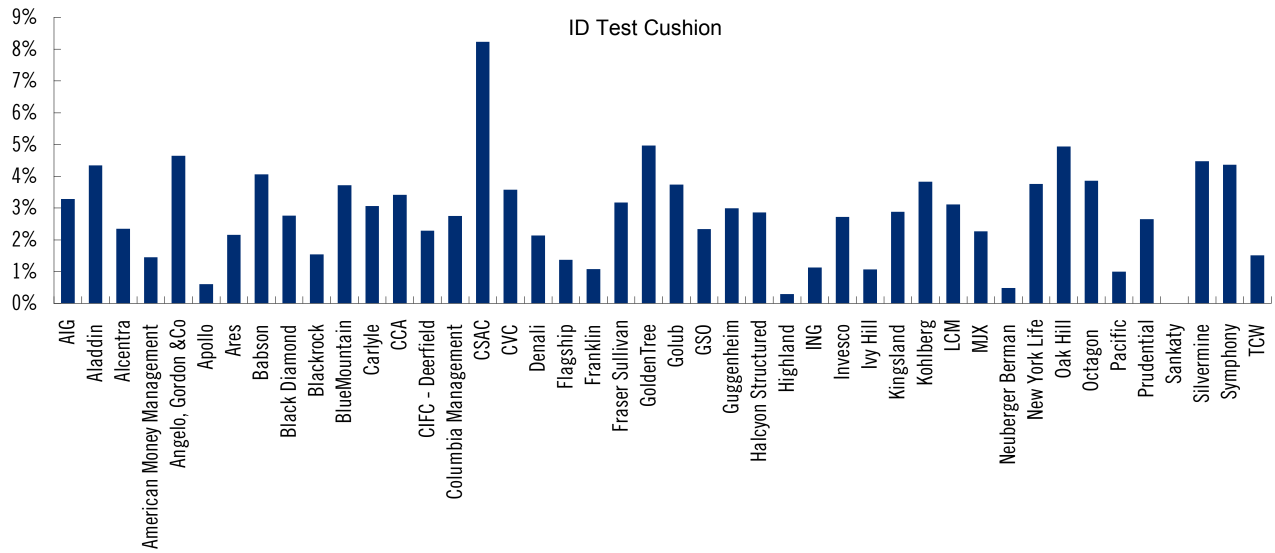
Source: Intex and Citi Research

Figure 19. Dispersion in Deal Performance: 25–75 Percentile



Source: Intex and Citi Research

Figure 20. Median Interest Diversion Test Cushion in US CLOs by Manager



Source: Intex and Citi Research

Appendix

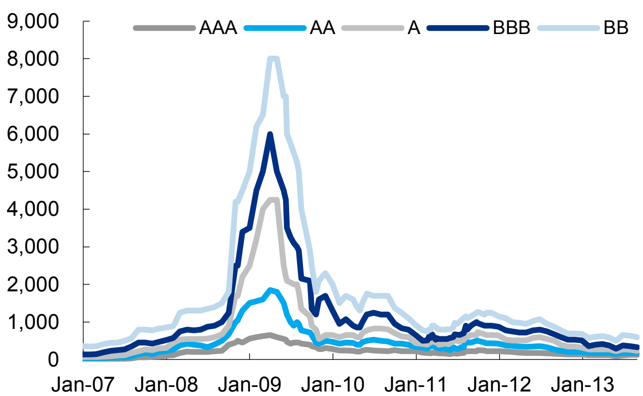
Cash Flow CDO Market

Figure 21. Secondary Cash Flow CDO Spreads/Prices

Collateral Type	AAA	AA	A	BBB	BB
US HY CLO 1.0 (Spreads) – 1-*Sep-13*	130	175	235	330	600
US HY CLO 1.0 (Prices) – 1-*Sep-13*	Mid 90s – High 90s	Low 90s – High 90s	High 80s – Mid 90s	Low 90s – Mid 90s	High 80s – Mid 90s
US HY CLO 2.0 (Spreads) – 1-*Sep-13*	136	205	330	425	625
US HY CLO 2.0 (Prices) – 1-*Sep-13*	High 90s - Par	High 90s – Par	Mid 90s – High 90s	Low 90s – Mid 90s	Mid 80s – Low 90s
Euro HY CLO (Spreads) – 1-*Sep-13*	155	250	390	645	1070
Euro HY CLO (Prices) – 1-*Sep-13*	Mid 90s – High 90s	Mid 80s – Mid 90s	Mid 80s – Low 90s	High 70s – Mid 80s	High 70s – Mid 80s

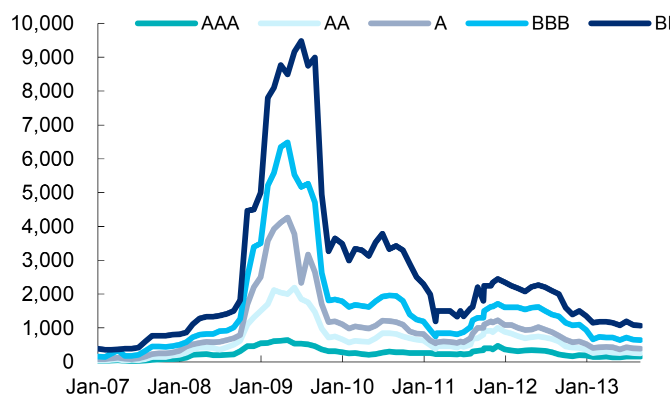
Source: Citi Research

Figure 22. US CLO Tranche Spreads



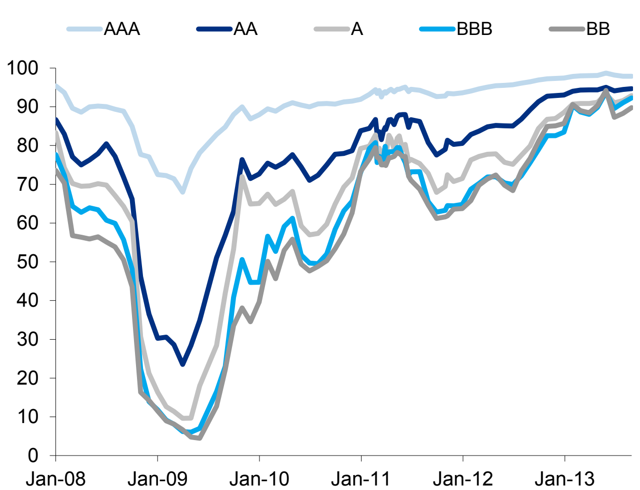
Source: Citi Research

Figure 23. European CLO Tranche Spreads



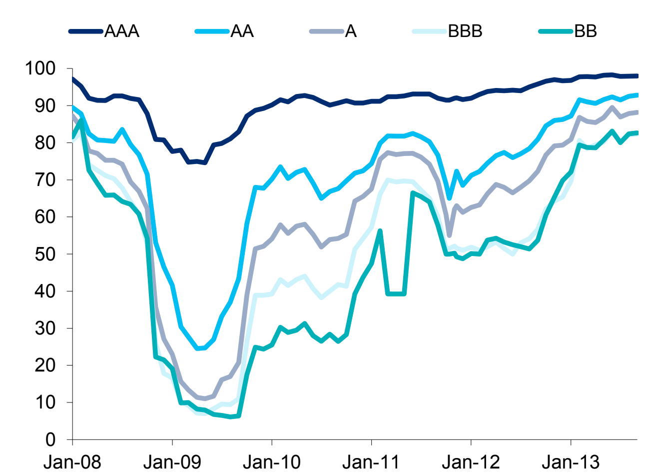
Source: Citi Research

Figure 24. US CLO Tranche Prices



Source: Citi Research

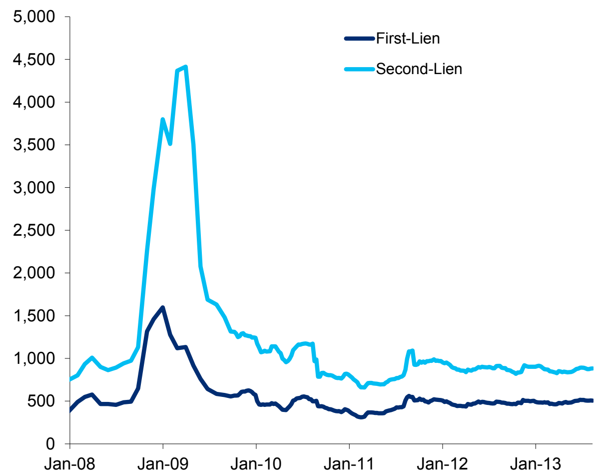
Figure 25. European CLO Tranche Prices



Source: Citi Research

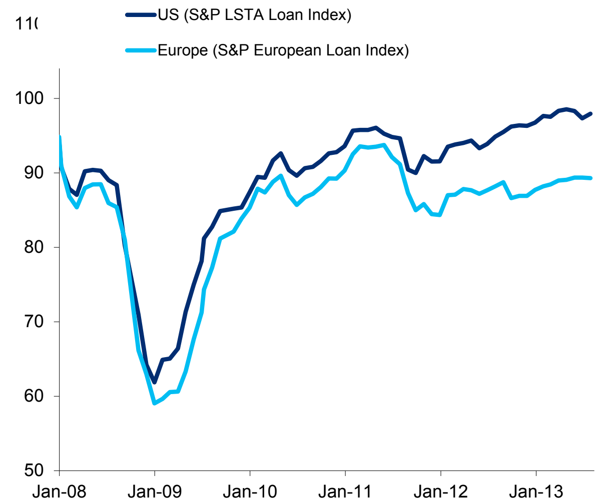
CLO Collateral

Figure 26. Avg First and Second-Lien Secondary Spreads to Maturity



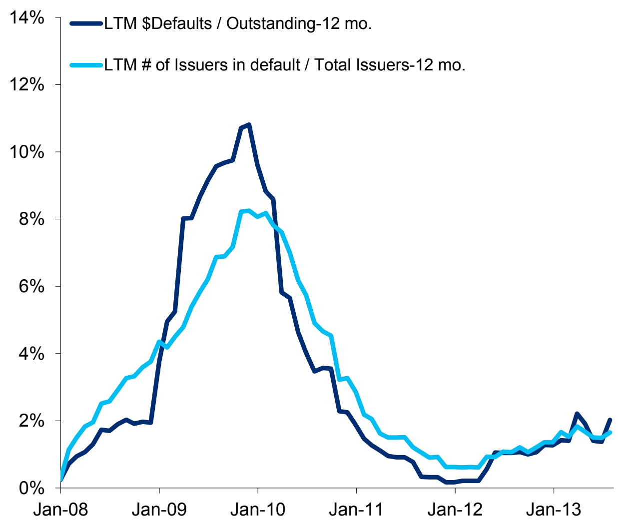
Source: S&P

Figure 27. Weighted Average Bid



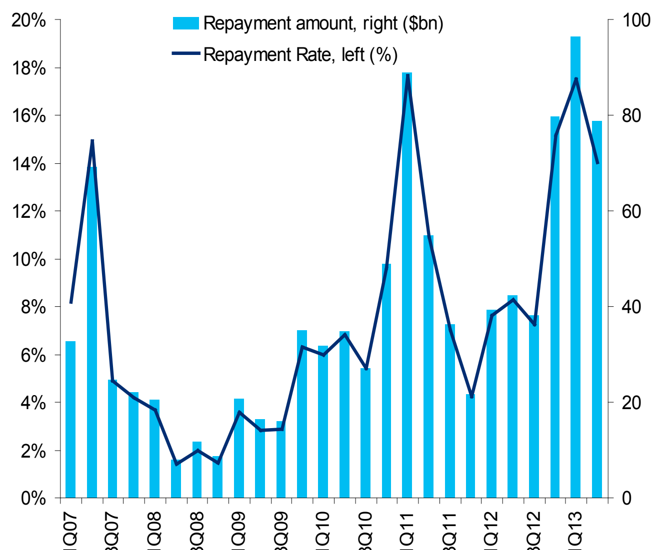
Source: S&P

Figure 28. US Lagging 12mo. Default Rate by Principal and # of Issuers



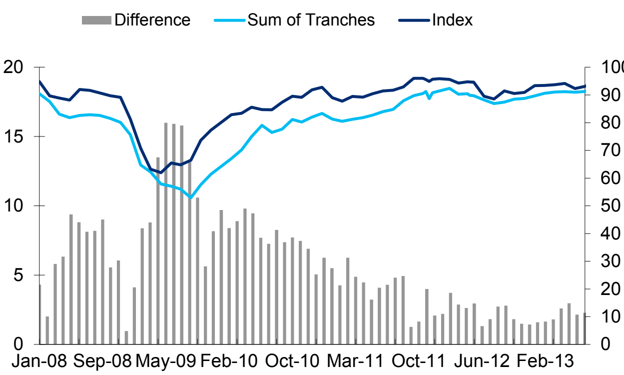
Source: S&P

Figure 29. US Quarterly Repayment Rate and Repayment Amount



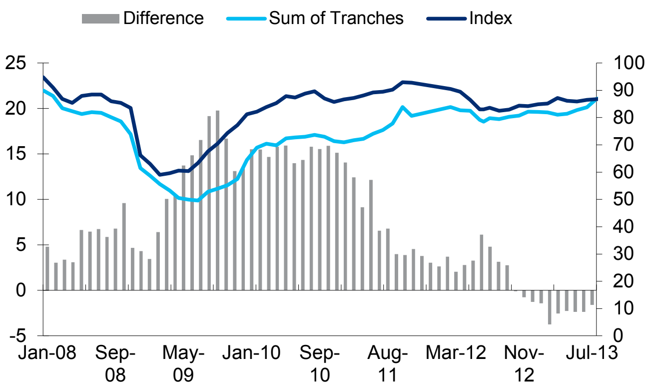
Source: S&P

Figure 30. Collateral/Tranche Arbitrage (US Deals)



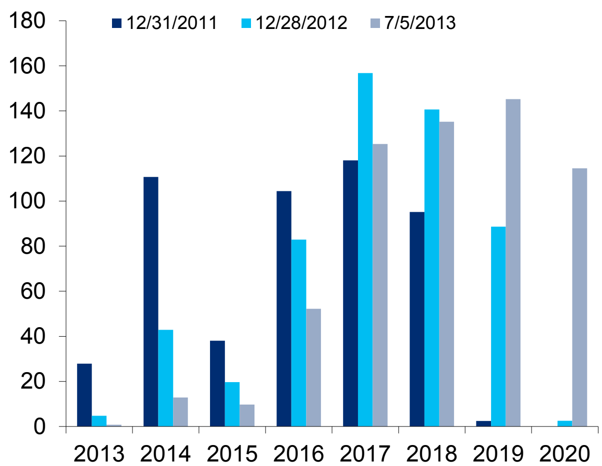
Source: Citi Research

Figure 31. Collateral/Tranche Arbitrage (EUR Deals)



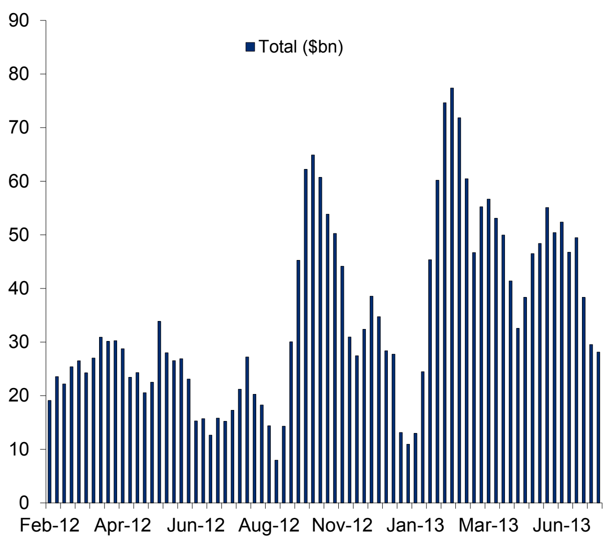
Source: Citi Research

Figure 32. US Loan Distribution by Year of Maturity



Source: S&P

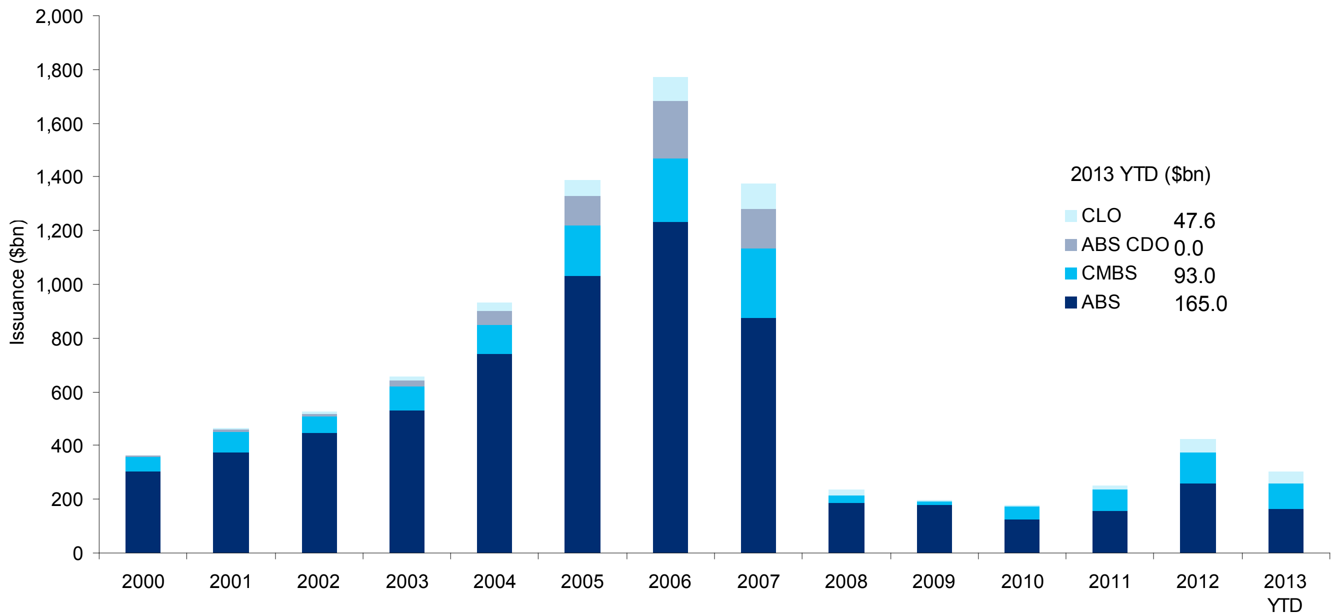
Figure 33. US Institutional Loans Launched to Market, $bn (Rolling 30-Days)



Source: S&P

Securitized Products Issuance

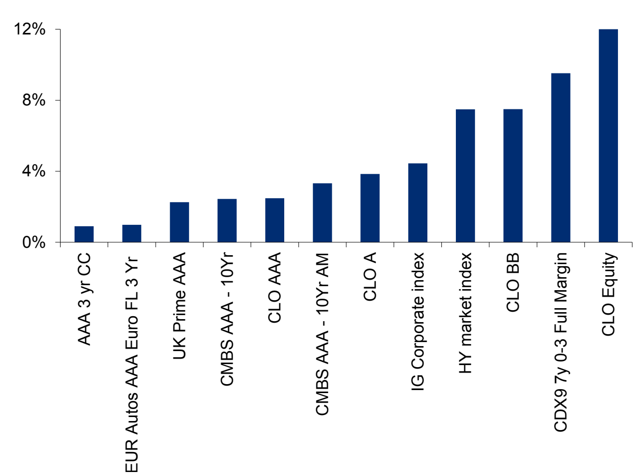
Figure 34. Year-to-Date CDO Issuance and Securitization Market Historical Issuance ($bn)



Source: Bloomberg, Citi Research

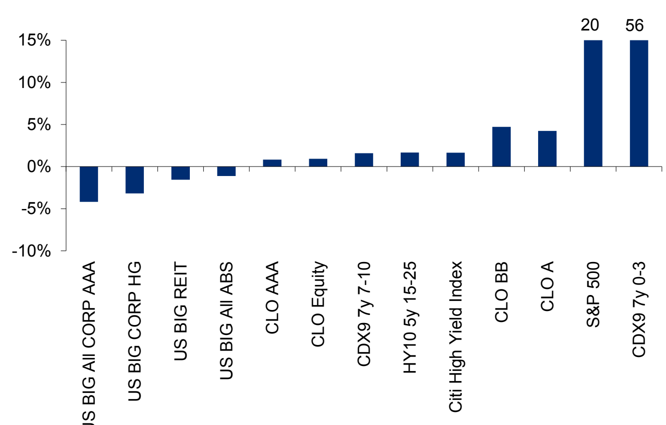
Securitized and Non-securitized Products Returns

Figure 35. Simple Yield



Source: Citi Research

Figure 36. Total Returns, 2013 YTD



Source: Citi Research

Appendix A-1

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