

Collateralised Loan Valuations: Methods and

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Over the spring and summer of 2009, Collateralised Loan Obligations (CLOs) emerged as the darling of the structured credit investment community. During the credit market meltdown that began in the summer of 2007, CLOs outperformed several other CDO sub-sectors. Without exposure to the US mortgage market, they did not suffer the sheer destruction experienced by their ABS CDO counterparts (of which over 335 transactions have already triggered Events of Default¹), and with negligible exposure to banks and REITs, they did not share the magnitude of defaults and payment deferrals of Trust Preferred CDOs.

Admittedly, CLO portfolios have witnessed substantial increases in their exposure to defaulted and triple-C rated assets, which has led to the breach of some overcollateralisation (OC) tests and the diversion of current cash flows away from mezzanine and subordinate (equity) tranches, and has helped prompt negative rating actions across the CLO universe. These transactions were designed, however, to handle reasonably stressful economic cycles, and to compensate for

underperforming collateral through cash flow diversion mechanisms in their pre-established payment waterfalls. CLOs also have a history as a relatively stable asset class. Early CLOs (circa 1999-2002) emerged largely intact from the default cycle in the early years of the new millennium, and soared in popularity during the bull market years of 2004 through mid-2007.

Accordingly, with the spring and summer 2009 rally in global risk-assets, the investment community determined not to throw out the proverbial baby of CLOs with the bathwater of other CDO sub-sectors. Many market participants have scaled back the stressful assumptions that they had used to project future cash flows, and in price terms, CLO tranches have rallied significantly from their April 2009 lows.

However, not all CLOs were created equal and the prognosis for future performance cannot be overly generalised. The colourful spectrum of CLO issuance is divided by the market into invisible but clearly delineated tiers, based upon portfolio composition, investment constraints, collateral manager, and structural features. The recent market distress has exposed

Obligation Challenges

investors' propensity to discriminate among these tiers, both with regard to pricing and liquidity, and has shed some light on how particular managers respond to changes in their portfolios. This article touches upon some of the important distinctions, approaches and challenges that impact CLO valuation.

Structural features

CLOs are like snowflakes. From a distance, the general format and structure appear remarkably similar from deal to deal. But a more detailed inspection reveals substantial differences, which can vastly impact the value of individual CLO tranches.

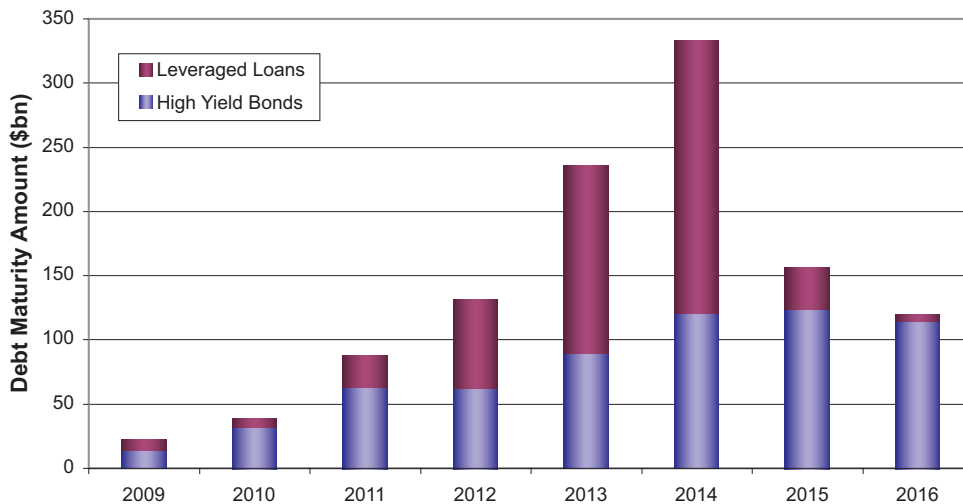
Some transaction details are more readily apparent, such as:

- Large percentages of riskier collateral holdings (such as non-senior secured loans, triple-C rated assets, and tranches of other CLOs)
- OC Test cushions, measuring the protection to tranche cash flows before trigger levels are breached
- Mezzanine tranches that benefit from so-called 'turbo' prepayments

Other details are more nuanced, and include:

- Reinvestment constraints (including minimum purchase prices and the treatment of prepayments after the end of the reinvestment period)
- Whether triple-C rated assets impact the onset of an Event of Default
- The priority ranking of current coupon payments, relative to previously deferred payments on more senior tranches
- Differences in how OC Tests are calculated
- When collateral principal proceeds may be used to cover issued tranche interest shortfalls
- The CLO's payment and liquidation rules following an Event of Default

Each of these factors, among others, can significantly alter the quantum and timing of cash flows moving through the payment waterfall, and lead to a wide disparity of value between seemingly similar transactions. It is also important to note that while subscription-based third-party model providers have improved

Figure 1: Corporate Debt Maturity Profile

Source: Banc of America Securities/Merrill Lynch and Dynamic Credit Partners

the accuracy of their models over time, it is not uncommon to find in their analysis incomplete renderings of some important structural nuances. When using third party models, practitioners should pay close attention to the provider's modelling notes and review the relevant deal documentation to ensure that the model conforms to the transaction's actual calculation and payment rules.

Cash flow assumptions

The assumptions used to project future cash flows are the heart and soul of CLO valuation. While it is critical to understand how the blood flows through the veins of the payment structure, the amount and timing of what flows through is entirely dependant upon the portfolio that backs the transaction. Assessing the collateral pool's potential for future defaults, recoveries, and prepayments are the primary keys to proper valuation. Below, we highlight several approaches to future cash flow projection.

One approach is to estimate a tranche's value by calculating its Net Asset Value (NAV) coverage, rather than conducting a full-blown cash flow analysis. This approach considers the market value coverage of a CLO tranche, by assuming that the underlying loan portfolio is liquidated at its current market value and sale proceeds are used to repay the CLO's liabilities. While NAV coverage is a useful data point, particularly for a deal's senior-most tranche, it is an incomplete proxy of actual

tranche value. The NAV does not account for the CLO's structural features or the fact that the transaction can most likely not be liquidated for many years to come. With portfolios that have yet to ride out the remainder of this credit cycle, survive the mounting challenge of loan maturities occurring in 2011-2014 (as set forth in **Figure 1**), and potentially experience part of a successive credit cycle, NAV is an oversimplified substitute for a discounted cash flow approach.

Default rates:

When approaching cash flow projections, the most significant assumption – but arguably the most difficult to estimate – is the portfolio default rate. The relatively long-term nature of CLOs requires a multi-year forward perspective on high-yield corporate defaults, while today's environment makes it challenging to predict even short-term rates. Below, we discuss three approaches to modelling future defaults. All three intentionally focus on a portfolio perspective rather than an in-depth understanding of each specific underlying credit. An individual CLO typically has very small exposures to each loan issuer, so there is more value in understanding *how many* loans are expected to default over time and the impact they will have on the payment structure, rather than *which ones* they are likely to be.

At the same time, it is useful to identify risky portfolio characteristics, such as particularly concentrated or large exposures,

loans that pose an imminent default risk, and large proportions of weaker industry groups or loan types. (Some of these can be identified on a relative basis by reference to current loan prices or CDS spreads.) Asset-specific default assumptions can be applied to loans within these identified risk buckets, and then combined with a general default rate for the remainder of the portfolio.

Conditional default rates (CDR): The easiest default rate approach to use, but the least accurate in practice, is to assume a constant percentage of annual portfolio defaults, commonly referred to as the CDR. Based upon historical experience, market participants traditionally assumed a constant rate of 2%-3%, but more recently have been using multiples of several times that range. A CDR approach, however, does not account for the expected timing of future defaults, in which near-term bankruptcies and refinancing failures are likely to remain elevated, but longer-term defaults will likely trend downwards to their historical average rates.

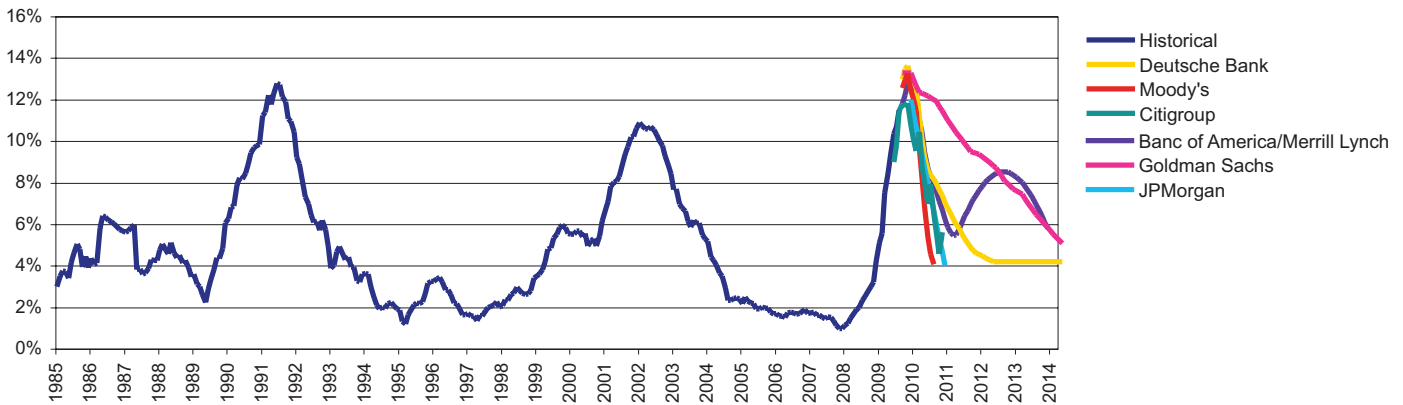
One variation is to divide a CLO's total outstanding life into several time horizons, and use different CDRs for each time horizon. While superior to a constant CDR, this approach is still not customised to the characteristics the specific loan portfolio. Also, applying CDRs generally becomes unrealistic in later projection periods when the CLO pool has substantially amortised, as CDRs assume progressively smaller absolute defaults across the balance of an amortising portfolio, while

each remaining loan actually comprises a larger proportion of the remaining pool.

Cumulative default rates: A second approach is to project an expected lifetime default rate for the loan pool and then apply that rate over time. For example, one might assume that a total of 30% of the CLO's collateral pool will default over the next five years, and account for stressful periods during the credit cycle by staggering the total defaults by varying degrees over the five year period.

One way to determine the expected lifetime default rate is by historical precedent – based on the performance of similar loans over average or specific time periods in the past. Historical default data, both long-term average data as well as data for specific cohort years, is often available from rating agencies and other data providers. The challenge is determining what historical data is relevant for a specific CLO pool. Current collateral rating levels may be a good starting point, but adjustments are needed to account for disproportional exposures to particular loan types, sectors, or otherwise risky collateral.

The main drawback of historical data is that it may not reliably predict future performance. With today's unique economic environment, highly-levered companies, and unconventional loan products (such as so-called 'covenant-lite' loans), using smoothed, long-term historical averages or specific cohort year sets may not realistically project future performance.

Figure 2: 12-month Trailing High-Yield Corporate Default Rates (Historical and Forecasted)

Sources: Banc of America Securities/Merrill Lynch, Moody's Investors Service, Deutsche Bank, Goldman Sachs, JP Morgan, Citigroup, and Dynamic Credit Partners

An alternative to using historical data is to independently project future default rates based on a macroeconomic outlook, and then fit the expected macroeconomic rate to the specific CLO portfolio. Recent annualised high-yield default projections from leading Wall Street research groups (as well as historical default rates) are summarised in **Figure 2**.

A challenge to practically applying this approach is how to fit the expected macroeconomic default rate to a specific CLO portfolio, which can have different characteristics than the overall high-yield market. In order to determine an appropriate application, it is important to understand how economists have determined the macroeconomic rate. Some rates are inferred from prior recession cycles, while others are calculated by regressing one or more variables against historical default rates and extrapolating those rates into the future. Still others are based on market-implied rates, with the idea that current market prices imply an expected default rate (given a fixed assumed recovery rate). Properly calibrating a macroeconomic default rate with the CLO's collateral pool requires an evaluation of the source and methodology of the projection.

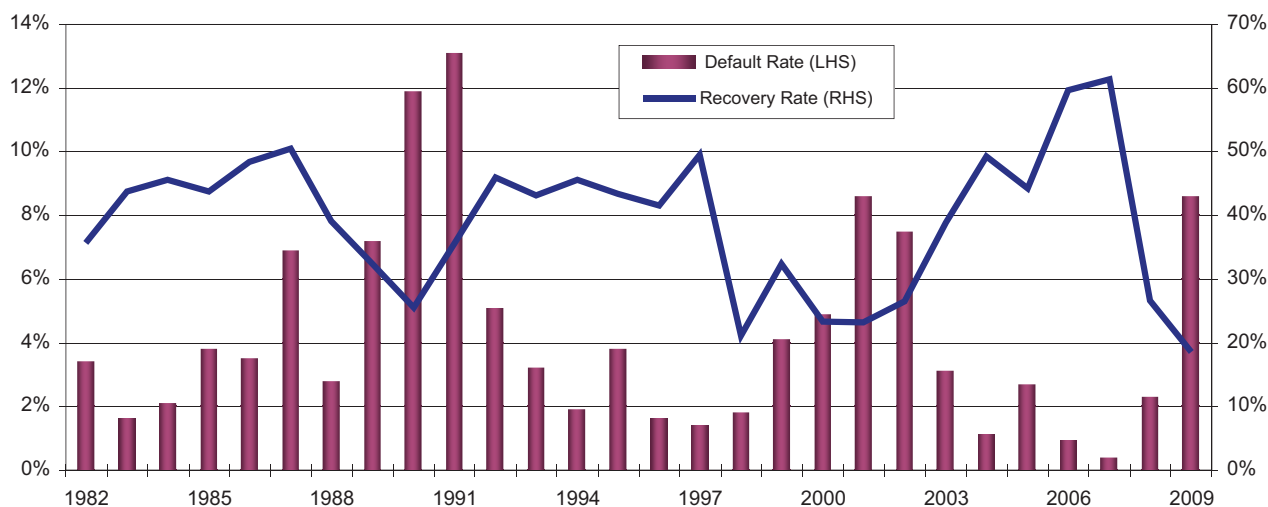
Monte Carlo simulation: A third approach, clearly the most computationally advanced, is to simulate future default rates by modelling the performance of each loan in the CLO's portfolio to maturity or default. A ratings transition matrix can be used to simulate the probability of each future period's change in credit quality and possible jump to default. This calculation is performed for every individual asset within the CLO and

combined to generate various paths of lifetime portfolio defaults. This process is repeated thousands of times, and modelled in conjunction with the structural rules of the CLO's payment waterfall, to simulate all possible future outcomes for the CLO. A simulation approach can also apply dynamic recovery or prepayment rates that vary as a function of each path's simulated default rate.

In some ways, simulations provide for more realistic modelling of CLO cash flows. By predicting defaults on an asset-level basis, the simulation can capture the disproportional shock to the CLO structure from the loss of specific large, high-coupon paying, or low recovery assets, as opposed to the other default rate approaches which implicitly model defaults of assets with average characteristics. (In fact, the higher-yielding assets may actually have a greater probability of default, and their loss more quickly erode the amount of cash flow that can be diverted through the payment waterfall to act as credit support.) Also, simulation results can be used for risk measurement – to quantify more extreme scenarios or specific confidence intervals, or to evaluate a tranche's sensitivity to particular cash flow assumptions.

While simulations provide for superior structural analysis, they are somewhat limited by the data sets that are used as model inputs. Historical rating transition matrices as well as corporate industry and asset correlations tend to change over time, and may not be fully relevant for future periods. In addition, from a practical perspective, subscription-based

Figure 3: Relationship between Corporate Default and Recovery Rates



Source: JP Morgan, Moody's Investors Service and Dynamic Credit Partners
 Note: Recovery rates are based upon security prices thirty days after the date of default

third-party CLO models with Monte Carlo capability can be difficult to come by. To address this, Dynamic Credit Partners has fully reverse-engineered more than four hundred CLO transactions into a proprietary model, allowing for the greatest control and flexibility in valuation and risk-modelling.

All three of the default rate approaches described above can be applied in practice, each with its own benefits and drawbacks. Sometimes it is beneficial to apply more than one approach to the same transaction. Analysts should first assess the qualities of the particular CLO structure and loan pool to determine what risks or qualities are most important to evaluate. Then they can select an approach that best addresses their modelling and valuation needs.

Recovery rates:

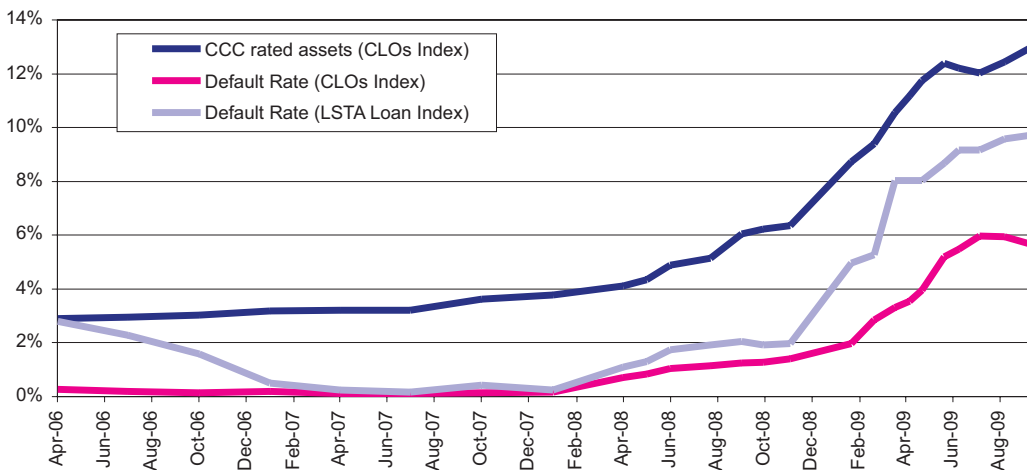
The seniority of leveraged loans in the corporate capital structure has historically resulted in high post-default recovery rates. Market participants have generally assumed flat average rates of 70% or higher. Future recoveries, however, at least in the near-term, are expected to fall below their historical averages. With the bull market's hallmarks of high leverage, soft loan covenants and weak underwriting standards, in addition to new constituents and potential legal backlogs in the workout process, realised recoveries are expected to be lower and the workout period longer than in the past. In addition, default rates have tended to be inversely related to recovery rates (as shown in **Figure 3**), and with the expectation of above-average default

rates in the near-term, it follows that recoveries may be lower than their long-term averages.

In practice, there are several ways to implement current recovery rate assumptions. One is to apply lower average recovery rates. Another is to use a multi-step vector, with lower recovery rates in the short term, but higher rates in the future as defaults are expected to taper off. Finally, as mentioned earlier, recovery rates can also be modelled in a Monte Carlo simulation as a function of each path's projected default rate. In all of these approaches, the assumed rates should be adjusted, either explicitly or as a weighted-average, to account for collateral holdings other than broadly syndicated senior-secured loans (such as second-lien security, general high yield bonds, and loans to middle market companies).

To account for the longer expected timing of the workout process in times of higher corporate stress, the cash flow analysis should also incorporate explicit recovery lag assumptions. These assumptions can have a notable impact on a CLO's senior-most tranche, which faces extension risk from delays in realising recovery amounts.

In general, it is important to note that actual recoveries are sometimes realised in the form of equity or warrants in the reorganised company, rather than as lump sum cash payments. CLO models typically assume that recoveries are received as cash and deployed to reinvest or to amortise the senior notes. Non-cash recoveries have a different impact on the CLO structure, probably best captured in a model with a very low

Figure 4: Average Triple-C and Default Buckets in US CLOs

Source: Citigroup, Intex, S&P LCD and Dynamic Credit Partners

Note: Default rates and Triple-C percentages shown are calculated by outstanding par amount

assumed recovery rate, which should be considered when projecting future cash flows.

Prepayment rates:

Prepayment rates are largely a function of interest rates and refinancing ability, neither of which has been especially favourable for speculative-grade corporations since the credit crisis began in the summer of 2007. In the past, market participants had assumed that an average of 15%-20% of the portfolio would prepay each year, and at times prepayment rates actually spiked into the 20%-30% range. Current rates have slowed, however, and future rates are expected to remain relatively low. This can either be modelled with a lower conditional prepayment speed (CPR), or by using a prepayment curve with low current rates that slowly step up to more normalised levels. The use of different prepayment assumptions primarily impacts the value of a CLO's senior-most tranche.

Other structural considerations:

There are two other noteworthy structural issues that can play significant and related roles in cash flow analysis: Par Value Haircuts and Events of Default.

Par value haircuts: CLOs are par value structures, in which collateral market value fluctuations generally have no direct impact on measurement tests or cash flow waterfall mechanisms. There are two main exceptions. Defaulted assets, including loans that have a defaulted rating even while they are still financially performing, and so-called excess triple-C rated assets, which are the proportion of triple-C rated assets beyond a certain prescribed threshold, are typically required to be reported at some form of market value. These adjustments away from the asset's par value are referred to as haircuts. The

calculation and application of these haircuts is not uniform across CLOs, and at times differs even within test calculations for the same CLO.

With growing proportions of defaulted and triple-C rated assets in CLO portfolios (as shown in **Figure 4**), the impact of par value haircuts has become more pronounced, causing OC Tests to fluctuate slightly along with movements in collateral market values. While the loan market rally over the spring and summer of 2009 has actually caused this to be a source of strength for some CLOs, it could also act to harm the structures in the future.

Haircut assumptions can be explicitly incorporated into future cash flow projections. They are, however, particularly subjective assumptions, as estimates are required for both the amount and value of haircut assets on each of the CLO's future payment dates. Considering that these assumptions can have a significant impact upon projected tranche cash flows, they should be approached with appropriate caution.

Event of default: Severe deterioration of a CLO's portfolio, such that there are either insufficient funds to pay required interest coupons, or the measured portfolio par value does not fully collateralise the transaction's senior notes, often constitutes an Event of Default (EOD). There are many important aspects relating to EOD, including: whether the onset of an EOD is only a cash-flow driven event or if there are ratings-based or market-value sensitivities, if post-EOD adjustments are made to the priority of payments, and the rules that govern deal liquidation. These provisions can vary widely among transactions and are often nestled in ambiguous language in the CLO's Indenture.

In the first half of 2009, research desks made headlines predicting that more than 50% of the CLO universe could experience Events of Default by the end of 2010.² As loan prices have

subsequently rallied, market participants have been more cognizant, but not quite as concerned, about the prospects for massive CLO EODs. While the recent rally in leveraged loan prices has caused some current fundamental improvement (because market-value haircuts have been somewhat less punitive), the risk of EOD is not off the table. The provisions relating to EOD must be carefully assessed, in conjunction with future cash flow projections, in order to produce an accurate CLO valuation.

Discount rates:

Once expected cash flows are generated, the final piece in the valuation puzzle is the selection of an appropriate discount rate. Several rates can be used, depending upon what value is being assessed. Current market values can be determined by inferring discount rates from observed trades or offerings of similar securities, but adjustments may be necessary to account for differences between the characteristics of the observed transactions and the CLO to be valued. Also, the degree of stress built-in to the cash flow projections must be considered relative to the markets' expected stress rates for the observed transaction.

Alternately, intrinsic or accounting-based impairment values can be determined by using discount rates that do not reflect market distress. One approach, based upon an IFRS accounting convention, is to discount the expected cash flows at their stated coupon rate. However, when calculating intrinsic or impairment values, it is important to distinguish between

the changes in expected performance (as applied through more stressful cash flow assumptions), versus the various risk premia that the market attaches to those cash flows.

Conclusion

We have discussed some of the collateral and structural considerations that impact CLO valuation, identified some of the factors that distinguish between seemingly similar transactions, and touched upon several methods to generate relevant cash flow assumptions. While this provides a useful framework, it is not the complete or final word on the topic. There are other structural features and assumptions to be considered, as well as manager-specific factors that can impact both cash flow expectations and trading levels. Also, as new information and developments occur in the marketplace, adjustments may be warranted to the substance or emphasis of the assumption sets. The recent rally in the CLO and corporate loan market is one of those significant developments, and market participants have begun to perceive it as a demonstration of the sector's strength and resilience. With an understanding of the fundamental factors and assumptions that impact CLOs, we can better judge for ourselves what the future holds for this unique asset class. ●

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Notes

The authors thank James Finkel, Tonko Gast, David Schwartz, and Mark Salama for their contributions to the article and for their helpful suggestions and comments.

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¹ 'Cash Flow and Hybrid CDO Event of Default Notices Received As Of Sept. 8, 2009,' Standard & Poor's, September 14, 2009.

² 'Projecting Events of Default: A Refined Analysis of EOD and Liquidation', D. Preston and J. Pauley, Wachovia Capital Markets, March 23, 2009

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