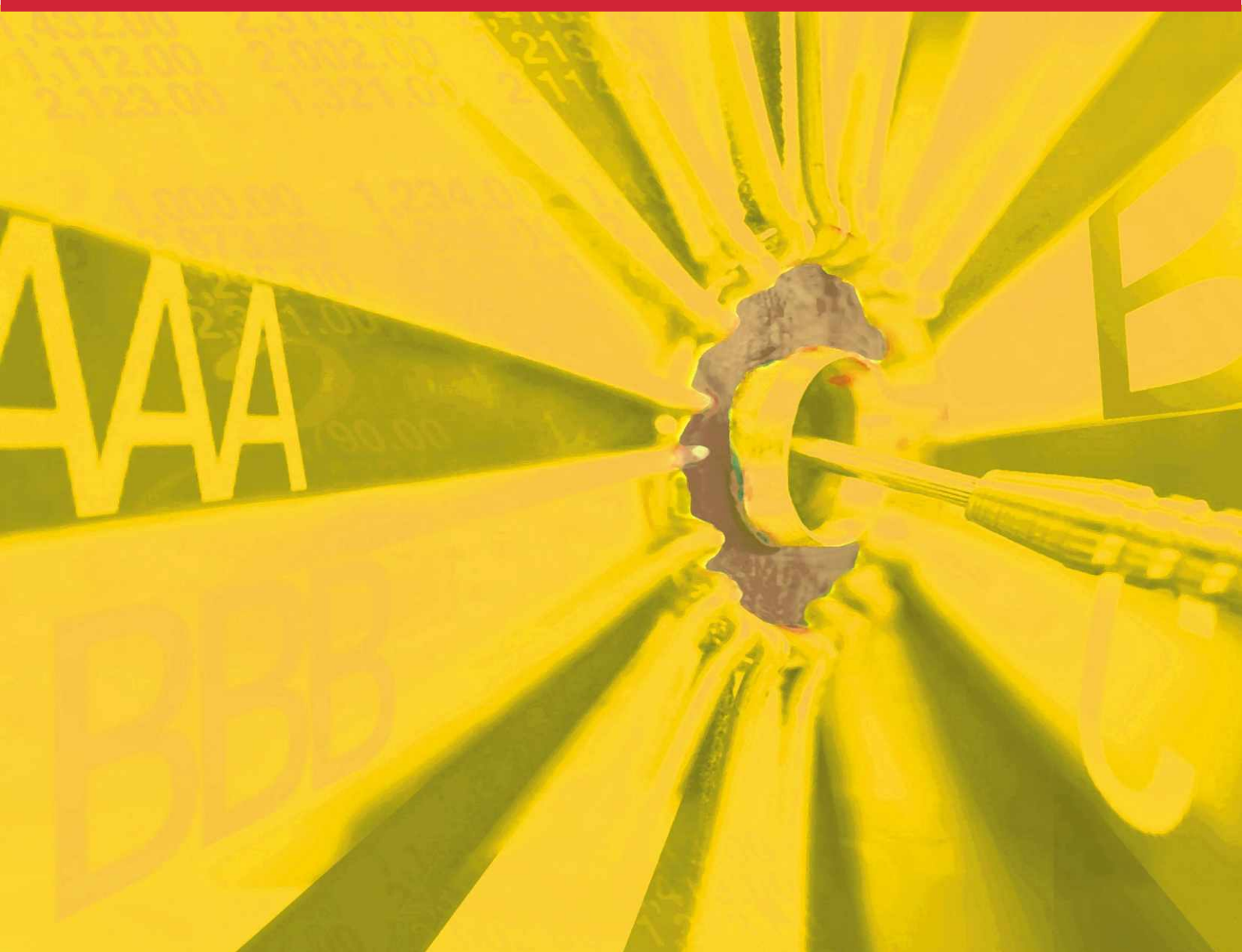


# CRISIL Default Study 2013



CRISIL Annual Default and  
Ratings Transition Study - 2013



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## Box 1: Meaning and Significance of Default Rates, Default Definition, and Method of Computation

### Default Rates

#### What are default rates?

The default rate for a specified period is the number of defaults among rated firms during the period, expressed as a percentage of the total number of rated firms whose ratings were outstanding throughout the period. Default rates can be calculated at each rating level, and can be calculated over multiple periods.

#### What are transition rates?

A transition rate measures the instances of a change in credit rating over a specified period. Transition rates can be calculated for the entire rated population, or can refer to a specified rating level.

#### How are default and transition rates used?

For all debt market participants, accurate and reliable default and transition rates are critical inputs in formulating the following decisions:

##### a) Pricing debt

Default and transition rates are critical inputs for pricing a debt instrument or loan exposure. Default probabilities associated with ratings help investors and lenders quantify credit risk in their debt exposures, and provide inputs on whether and how much to lend, and at what price.

##### b) Structuring and pricing credit-enhanced instruments

The structuring, rating, and pricing of credit-enhanced instruments depend heavily on the default and transition rates of underlying borrowers and securities.

##### c) Credit risk measurement

Default and transition rates are key inputs for many quantitative risk assessment models. Investors in rated instruments can manage their risk exposures effectively if they have access to reliable default and transition rates. Transition rates are also important for debt funds that need to maintain a certain threshold of credit quality in their portfolios, and for investors who are, because of regulations or otherwise, mandated to invest only in securities that are rated at a certain level or above.

##### d) Indicating efficacy of rating scale

CRISIL's credit ratings are an indicator of probability of default. If ratings are reliable, the default rates should decrease as one moves up the rating scale. Default and transition rates can therefore be used to validate rating scales and quantify rating stability.

### Key Variables for Default Rate Computation

#### (i) Definition of default

For the purpose of computing default rates, there needs to be a clear definition of default. CRISIL defines default as any missed payment on a rated instrument. This means that if a rated debt obligation is not serviced in full by the due date, the rating moves to 'CRISIL D' or an equivalent. Furthermore, since CRISIL's credit ratings are an opinion on the timely repayment of debt, any post-default recovery is not factored into CRISIL's credit ratings. CRISIL believes that such an objective definition of default, coupled with its consistent application over time provides a firm foundation for the meaningful third-party use of its default rates. Thus, **CRISIL's default rates are free from default recognition bias.**

#### (ii) Period of computation

Default rates can be computed over varying timeframes, potentially exposing such computation to period selection bias. For example, if default rates were published over a period of economic strength, they would appear to be artificially low, and hence, would be of limited use to market participants. CRISIL publishes its default rates from inception to date, ensuring that they are **free from period selection bias.**

#### (iii) Computation methodology

Default rates can be computed using different computation methodologies. Each methodology has implications for the numeric outcome as explained in Table A13. CRISIL's default rates are computed using the Annual Average Cumulative Default Rate approach, using the weighted annual marginal default rate methodology, with full year-withdrawal adjustments as explained in Annexure 5.

**A 'normalisation' of the above variables must, therefore, precede any comparison of default statistics across rating agencies.**

## CRISIL Annual Default and Ratings Transition Study – 2013

The overall annual default rate for CRISIL-rated firms stood at 4.4 per cent in 2013. Instances of default by CRISIL-rated firms increased to 346, the highest for any year, from 341 in 2012. The increasing number of defaults and the high default rates are attributable to a significant increase in the number of firms in the 'CRISIL BB' and lower rating categories. As on December 31, 2013, more than 75 per cent of CRISIL's rated portfolio had ratings of 'CRISIL BB' or lower, up from around 20 per cent five years ago. The high default rate was also driven by tight systemic liquidity and demand slowdown during the year. Though the default rates in 2013 were high, they were still lower than the historical highs witnessed between 1998 and 2001. Hence, there was an overall decrease in the average default rates of long-term ratings.

The stability rates of long-term ratings have consistently improved over the years. The overall stability rate across ratings was high at over 87 per cent between 1988 and 2013. These trends were witnessed on a significantly expanded portfolio of around 11,700 ratings as on December 31, 2013, as against around 900 ratings as on December 31, 2008. Similarly, the stability rates for short-term instruments remain strong across rating categories. CRISIL's ratings on structured finance instruments witnessed two defaults in 2013, leading to a rise in the average default rates of structured finance instruments rated 'CRISIL BBB (SO)' and below.

CRISIL's Default and Transition Study incorporates all global best practices in the computation of default rates. These include a digital definition of default, elimination of period selection bias, using globally accepted marginal default rate method, and employing the monthly frequency static pools as base data. From the 2009 edition of Default Study, CRISIL has been using static pools of a monthly frequency in computing default and transition rates; its previous studies factored in only the year-end status of ratings. This method significantly enhances the study's ability to capture defaults and rating changes that have occurred during the year. CRISIL is India's only rating agency to adopt this rigorous method to compute its default rates. CRISIL has also published default and transition statistics over the past 10 years to provide investors with information on the more recent performance of ratings.

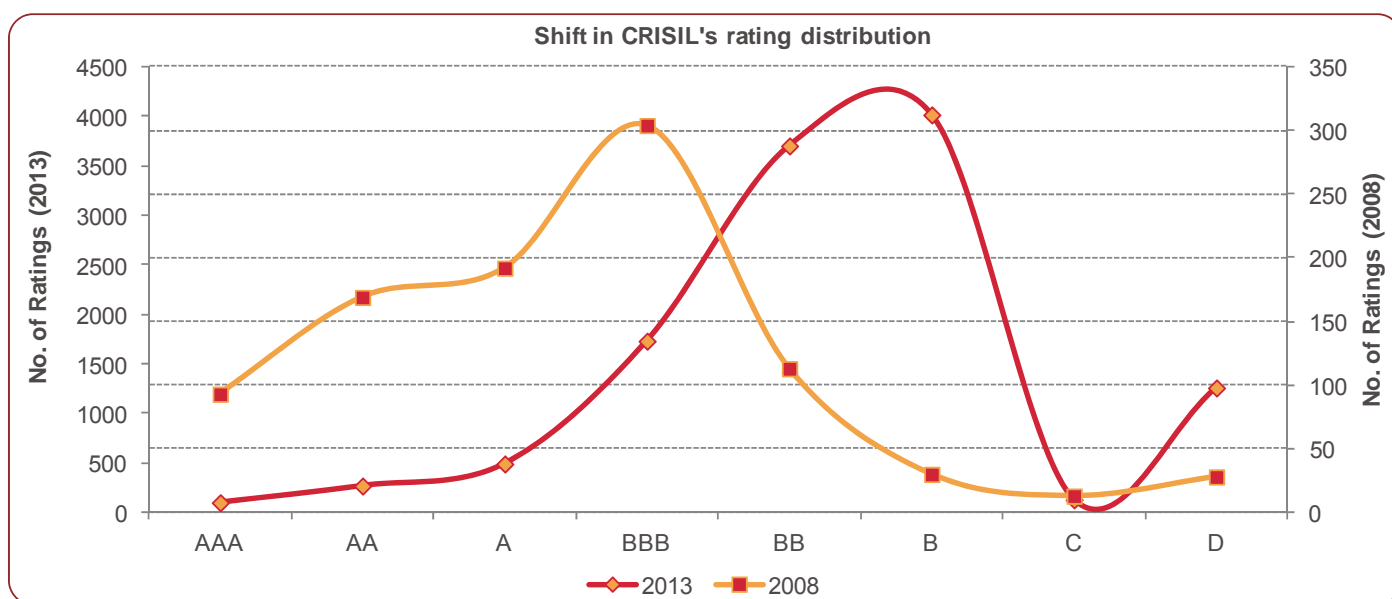
## I. A Significant Shift in CRISIL's Rating Distribution

### CRISIL's rated portfolio continues to expand: Outstanding ratings more than doubles in three years

The advent of bank loan ratings has been a significant development in India's credit rating landscape. CRISIL's portfolio of outstanding ratings has expanded considerably in recent years. The portfolio maintained its growth momentum in 2013, and more than doubled to around 11,700 ratings as on December 31, 2013 from about 5100 three years ago.

The expansion in rating portfolio has been accompanied by changes in CRISIL's rating distribution, with an increasing number of ratings assigned in lower rating categories. As on December 31, 2013, more than 75 per cent of ratings were either 'CRISIL BB' or lower, up from around 20 per cent five years ago. Consequently, the median rating has been stable at the 'CRISIL BB' category over the past four years, unlike on December 31, 2008, when the median rating was at 'CRISIL BBB' (refer to Chart 1). This indicates increasing penetration and acceptance of credit ratings in the bank loan market, leading to more robust and informative default and transition statistics.

Chart 1: CRISIL's rating distribution



Source: CRISIL Ratings

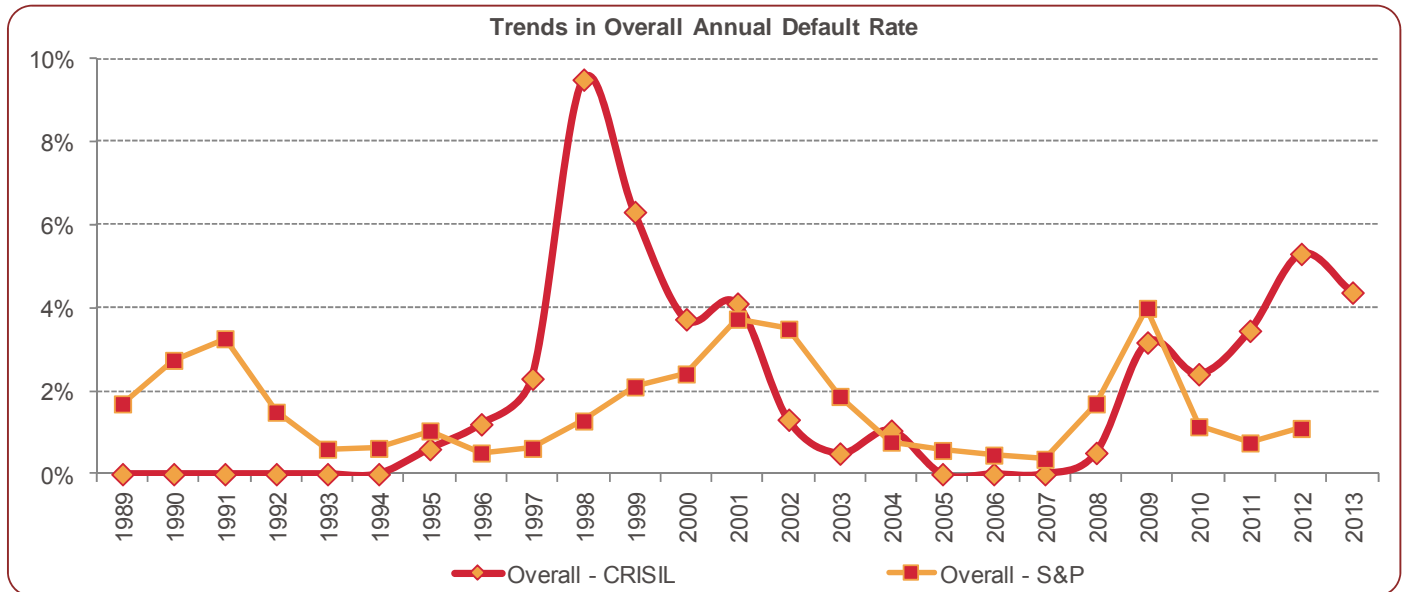
## II. Movements in Overall Annual Default Rates Since Inception

### Annual default rates for corporate issuers<sup>1</sup> remains high

Default rates have to be both low and stable, over a given time horizon, to be usefully factored for pricing debt. Chart 2 indicates the trend for CRISIL's annual default rate (the proportion of total defaults in a particular year to total non-default ratings outstanding during the year).

<sup>1</sup> Corporate issuers' is a generic term used here to refer to various types of firms, which have availed of credit ratings from CRISIL and form a part of the Default Study. The term includes companies, both public and private limited, societies, partnerships, proprietorship, and trusts, across the manufacturing, financial, and infrastructure sectors.

**Chart 2: Overall Annual Default Rates**



Source: CRISIL Ratings

The continued high default rate at 4.4 per cent in 2013—the second highest since 1999—is on account of a sharp increase in ratings in the lower rating categories (*refer to Chart 1*), which have traditionally been more susceptible to defaults. It can also be attributed to the difficult credit quality environment in 2013. The continued pressure on corporate India’s credit quality in 2013 was also highlighted by CRISIL in its semi-annual publication *Ratings Roundup*, which analyses CRISIL’s rating actions and its link to macroeconomic factors.

The decline in annual default rate in 2013 from that seen in 2012 should not be seen as a reversal in the downward trend in credit quality. CRISIL has observed that many firms, especially in the lower rating categories, stop sharing information and choose to become non-cooperative with the rating surveillance process in a weak environment. CRISIL believes that lack of cooperation from a rated firm could be the first warning signal of potential decline in credit quality. Since most firms are unlisted, there is no information about their performance in the public domain. In such cases, non-cooperation by the rated firm limits CRISIL’s ability to keep the rating under surveillance, and therefore, leads to suspension of the rating.

### III. For Corporate Issuers

#### One-year, two-year and three-year cumulative default rates (CDRs)

As credit ratings are opinions on default risk, the higher the rating, the lower the probability of default should be. The inverse correlation between credit ratings and default probabilities is desirable for rating agencies, and is called the test of ordinality. Table 1 shows CRISIL’s one-, two-, and three-year withdrawal-adjusted cumulative default rates across different rating categories from 1988 until December 2013 (*refer to Annexure 5 for methodology used in calculation of default rates*). CRISIL’s default rates continue to be ordinal. Notably, not a single long-term instrument rated ‘CRISIL AAA’ has ever defaulted.

**Table 1: CRISIL's average cumulative default rates for long-term ratings (withdrawal-adjusted)**

One-, Two-, and Three-Year CDRs, between 1988 and 2013				
Rating	Issuer-months	One-Year	Two-Year	Three-Year
CRISIL AAA	14164	0.00%	0.00%	0.00%
CRISIL AA	30341	0.03%	0.33%	0.92%
CRISIL A	36374	0.70%	2.92%	6.19%
CRISIL BBB	62714	1.48%	3.95%	7.89%
CRISIL BB	75431	4.98%	10.28%	15.19%
CRISIL B	53954	8.86%	17.93%	24.02%
CRISIL C	4642	18.89%	30.63%	39.41%
<b>Total</b>	<b>277620</b>			

Source: CRISIL Ratings

There was in general, an overall decrease in average default rates for 1988-2013 compared with 1988-2012. CRISIL also publishes the average default rates of the past 10 years (2003-2013), to provide a picture of rating behaviour over more recent periods. These are presented in Table A3 in Annexure 3. These default rates are also ordinal.

## One-year transition rates for ratings on both long-term scale and short-term scale

Transition rates indicate the instances of a given rating migrating to other rating categories. Since credit ratings drive bonds' yields and, therefore, their prices, transition rates are relevant for investors who do not intend to hold debt instruments to maturity, or need to mark their investments to market regularly. Additionally, they are of crucial importance for investors who are mandated to only hold investments that are of a certain minimum credit quality. Table 2 presents CRISIL's transition rates for various rating categories.



**Table 2: CRISIL's average one-year transition rates for long-term ratings**

One-year average transition rates: between 1988 and 2013									
Rating	Issuer-months	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	14164	97.13%	2.87%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	30341	1.43%	92.59%	5.04%	0.64%	0.21%	0.04%	0.03%	0.03%
CRISIL A	36374	0.00%	3.43%	87.14%	6.11%	2.14%	0.17%	0.31%	0.70%
CRISIL BBB	62714	0.00%	0.07%	2.83%	87.37%	7.19%	0.65%	0.42%	1.48%
CRISIL BB	75431	0.00%	0.03%	0.01%	3.40%	87.25%	3.59%	0.74%	4.98%
CRISIL B	53954	0.00%	0.00%	0.02%	0.09%	6.58%	83.71%	0.75%	8.86%
CRISIL C	4642	0.00%	0.00%	0.00%	0.26%	2.15%	16.93%	61.76%	18.89%
<b>Total</b>	<b>277620</b>								

Source: CRISIL Ratings

As can be seen, between 1988 and 2013, around 92.6 per cent of the instruments rated in the 'CRISIL AA' category remained in that category at the end of one year; around 1.4 per cent was upgraded to a higher rating ('CRISIL AAA'), and around 6 per cent was downgraded to a lower rating. The highlighted diagonal of Table 2 indicates the stability rates of various rating categories.

As with CRISIL's default rates, CRISIL's one-year transition rates are also comprehensive and reliable because they have been compiled using monthly static pools that cover data since the first rating was assigned by CRISIL and include multiple business cycles. CRISIL also publishes the one-year transition rates of the past 10 years (2003-2013). These are presented in Table A6 in Annexure 3; *for transition rates based on the annual static pools methodology, refer to Tables A7 and A8 in Annexure 3.*

Stability of ratings assigned on the short-term ratings scale is critical for investors with a short-term investment horizon. This is because the sensitivity of the credit risk of their investments to rating transitions is more than that for an investor with a long-term investment horizon. Table 3 provides the one-year transition rates for CRISIL's short-term ratings. The diagonal displays the stability rates for each rating. The numbers to the left of the diagonal represent the proportions of upgrades, while that to the right represent the proportion of downgrades. A 'CRISIL A1+' rating has a stability rate of around 97 per cent over one year, and a 'CRISIL A1' rating has almost 11 per cent rate of transition to a higher rating 'CRISIL A1+' over one year.

**Table 3: CRISIL's average one-year transition rates for short-term ratings**

One-year average transition rates: between 1988- 2013							
Rating*	Issuer-months	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	55771	97.05%	2.32%	0.36%	0.25%	0.02%	0.00%
CRISIL A1	13055	10.97%	83.13%	4.11%	0.78%	0.31%	0.69%
CRISIL A2	18955	0.30%	4.80%	86.33%	5.79%	1.91%	0.89%
CRISIL A3	34075	0.00%	0.06%	3.89%	85.80%	9.08%	1.18%
CRISIL A4	87276	0.00%	0.01%	0.02%	2.07%	92.20%	5.70%
<b>Total</b>	<b>209132</b>						

\*CRISIL A2, CRISIL A3 and CRISIL A4 include ratings of the respective modifier levels.

Source: CRISIL Ratings

'CRISIL A1' and 'CRISIL A2' ratings show stability of 83.1 per cent and 86.3 per cent, respectively. The stability rates for 'CRISIL A1' were significantly higher during the more recent period between 2003 and 2013 as against during the entire 26-year rating history of CRISIL (refer to Table A9 in Annexure 3); for transition rates based on the annual static pools methodology, refer to Tables A10 and A11 in Annexure 3.

## Movement in stability rates over the past four years

Stability rates indicate the proportion of ratings remaining unchanged over a given time horizon. The stability of CRISIL's ratings increases with movement up the rating scale; in other words, CRISIL's stability rates are also ordinal. Table 4 shows CRISIL's one-year stability rates over the past 26 years. The stability rate for 'CRISIL A' has increased to 87.1 per cent for 1988-2013 from 86.7 per cent for 1988-2012.

**Table 4 and 5: Stability rates of CRISIL's long-term ratings**

<b>Table 4: One-year average stability rates since 1988</b>				
<b>Period</b>	<b>CRISIL AAA</b>	<b>CRISIL AA</b>	<b>CRISIL A</b>	<b>CRISIL BBB</b>
<b>1988-2013</b>	<b>97.1%</b>	<b>92.6%</b>	<b>87.1%</b>	<b>87.4%</b>
1988-2012	97.0%	92.3%	86.7%	87.0%
1988-2011	96.8%	91.9%	85.7%	85.8%
1988-2010	96.4%	91.3%	84.6%	81.6%

Source: CRISIL Ratings

<b>Table 5: One-year average stability rates for various 10-year periods</b>				
<b>Period</b>	<b>CRISIL AAA</b>	<b>CRISIL AA</b>	<b>CRISIL A</b>	<b>CRISIL BBB</b>
<b>2003-2013</b>	<b>97.8%</b>	<b>95.2%</b>	<b>91.0%</b>	<b>89.3%</b>
2002-2012	97.9%	95.2%	91.4%	89.6%
2001-2011	97.5%	95.1%	90.7%	89.8%
2000-2010	96.9%	93.9%	88.8%	87.2%

Source: CRISIL Ratings

Table 5 shows the one-year stability rates at individual rating levels for various 10-year periods. 'CRISIL AAA' and 'CRISIL AA' stability rates have been consistently above 96 and 93 per cent, respectively. Likewise, 'CRISIL A' and 'CRISIL BBB' ratings have also displayed high stability rates.

## IV. For Structured Finance Instruments

CRISIL was the pioneer in rating several complex structured finance instruments in the Indian market. CRISIL's data set comprises **4606 issue years**, including 2410 issue years for retail asset-backed securities (ABS) and retail mortgage-backed securities (MBS) spanning over 20 years. CRISIL has ratings outstanding on a variety of structured finance instruments; in addition to ABS and MBS instruments, these include single-loan sell-downs and instruments backed by full or partial guarantee.

### One-, two-, and three-year cumulative default rates (CDRs)

Table 6 provides the one-, two-, and three-year average CDRs at each rating category level between 1993<sup>2</sup> and 2013; refer to Table A12 in Annexure 3 for default rates between 2003 and 2013.

**Table 6: CRISIL's average CDRs for ratings on structured finance instruments (between 1993 and 2013)**

One-, Two-, and Three-Year CDRs, between 1993 and 2013				
Rating	Issue-Years	One-Year	Two-Year	Three-Year
CRISIL AAA(SO)	3005	0.03%	0.14%	0.22%
CRISIL AA(SO)	589	0.17%	0.43%	0.81%
CRISIL A(SO)	663	0.30%	1.59%	3.33%
CRISIL BBB(SO)	298	0.34%	2.06%	2.06%
CRISIL BB(SO) and below	51	23.53%	30.48%	30.48%
<b>Total</b>	<b>4606</b>			

Source: CRISIL Ratings

The one-year cumulative default rate for instruments rated 'CRISIL AAA (SO)' is 0.03 per cent. This is on account of a central-government-guaranteed 'CRISIL AAA (SO)'-rated instrument that defaulted in 2005, because the trustee delayed the invocation of the guarantee, resulting in a delay in payments to investors; under its rigorous default recognition norms, CRISIL treated this as a default. This default was subsequently cured, the investors were paid in full, and the rated instrument was redeemed.

### One-year transition rates

Around 65 per cent of all structured finance ratings—3005 of 4606 issue years—are rated 'CRISIL AAA (SO)' and show a high stability rate of over 98 per cent. Table 7 shows the one-year average transition rates between 1993 and 2013 for structured finance instruments.

<sup>2</sup> CRISIL assigned its first structured finance rating in January 1992, which forms a part of 1993 annual static pool. For calculating default and transition rates for structured finance ratings, CRISIL has used annual static pool methodology as defaults in structured finance securities have been rare.

**Table 7: CRISIL's average one-year transition rates for structured finance instruments**

One year Average Transition Rates - 1993 - 2013									
Rating	Issue-years	CRISIL AAA(SO)	CRISIL AA(SO)	CRISIL A(SO)	CRISIL BBB(SO)	CRISIL BB(SO)	CRISIL B(SO)	CRISIL C(SO)	CRISIL D(SO)
CRISIL AAA(SO)	3005	98.20%	1.56%	0.17%	0.00%	0.00%	0.00%	0.03%	0.03%
CRISIL AA(SO)	589	5.94%	89.64%	4.08%	0.17%	0.00%	0.00%	0.00%	0.17%
CRISIL A(SO)	663	1.06%	4.68%	90.05%	1.21%	2.56%	0.15%	0.00%	0.30%
CRISIL BBB(SO)	298	3.69%	2.69%	15.10%	77.18%	0.34%	0.34%	0.34%	0.34%
CRISIL BB(SO)	44	2.27%	4.55%	9.09%	18.18%	47.73%	0.00%	0.00%	18.18%
CRISIL B(SO)	5	0.00%	0.00%	0.00%	0.00%	0.00%	60.00%	0.00%	40.00%
CRISIL C(SO)	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
<b>Total</b>	<b>4606</b>								

Source: CRISIL Ratings

The highlighted diagonal in Table 7 shows the stability rates for various rating categories.

## Movements in stability rates over the past four years

Tables 8 and 9 present the one-year stability rates of structured finance ratings for different periods.

Table 8: One-Year Stability Rates Since 1993				
Period	CRISIL AAA(SO)	CRISIL AA(SO)	CRISIL A(SO)	CRISIL BBB(SO)
<b>1993-2013</b>	<b>98.2%</b>	<b>89.6%</b>	<b>90.1%</b>	<b>77.2%</b>
1993-2012	98.1%	88.9%	90.9%	79.0%
1993-2011	97.9%	87.7%	90.6%	82.5%
1993-2010	97.8%	83.1%	87.8%	84.0%

Source: CRISIL Ratings

Table 9: One-Year Stability Rates for various 10-year periods				
Period	CRISIL AAA(SO)	CRISIL AA(SO)	CRISIL A(SO)	CRISIL BBB(SO)
<b>2003-2013</b>	<b>98.3%</b>	<b>90.8%</b>	<b>89.1%</b>	<b>77.4%</b>
2002-2012	98.2%	89.7%	91.2%	79.1%
2001-2011	98.1%	89.0%	90.5%	83.2%
2000-2010	97.7%	85.1%	86.7%	84.5%

Source: CRISIL Ratings

These stability rates are high; however, the Indian securitisation market has been 'CRISIL AAA (SO)'-centric, as reflected in the large number of issue years for this rating. There has been a recent improvement in data density in the other higher rating categories up to 'CRISIL BBB(SO)', largely explaining a move towards ordinality in stability rates since 2010.

## V. Retail ABS and MBS Issuances' One-Year Transition Rates

CRISIL's database of retail ABS and MBS transactions consists of 2410 issue years across 21 years (1993 -2013). 2011 saw the first-ever default in CRISIL-rated ABS instruments, with defaults in two CRISIL-rated ABS pools. However, investors continued to receive payments and their losses were small.

Table 10 shows the transition rates for ABS and MBS ratings for the period between 1993 and 2013. 'CRISIL AAA (SO)'-rated ABS or MBS instruments, which account for around 85 per cent of the ratings in the database, have stability rates of 98.2 per cent.

**Table 10: CRISIL's average one-year transition rates for ABS and MBS ratings**

One-year average transition rates between 1993 and 2013									
Rating	Issue-years	CRISIL AAA(SO)	CRISIL AA(SO)	CRISIL A(SO)	CRISIL BBB(SO)	CRISIL BB(SO)	CRISIL B(SO)	CRISIL C(SO)	CRISIL D(SO)
CRISIL AAA(SO)	2049	98.19%	1.56%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA(SO)	92	25.00%	68.48%	5.44%	1.09%	0.00%	0.00%	0.00%	0.00%
CRISIL A(SO)	37	18.92%	24.32%	48.65%	8.11%	0.00%	0.00%	0.00%	0.00%
CRISIL BBB(SO)	224	4.91%	3.57%	19.20%	71.43%	0.00%	0.45%	0.45%	0.00%
CRISIL BB(SO)	6	16.67%	33.33%	33.33%	16.67%	0.00%	0.00%	0.00%	0.00%
CRISIL B(SO)	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
CRISIL C(SO)	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
<b>Total</b>	<b>2410</b>								

Source: CRISIL Ratings

The stability rate of 'CRISIL AAA (SO)' rating category is comparable with that of 'CRISIL AAA' ratings assigned by CRISIL. Data density is sparse below 'CRISIL AAA (SO)', largely explaining the non-ordinal stability rates below 'CRISIL AAA (SO)'. Furthermore, a significant number of 'CRISIL AA (SO)' and 'CRISIL A (SO)' rated instruments have performed well, resulting in upgrades.



## CRISIL Default Study 2013

### **Conclusion:**

The overall annual default rate remained high in 2013 because of continued credit quality pressures on corporate India and a change in rating composition, resulting from a surge in the number of firms in the lower rating categories. However, the default rates in 2013 were still lower than the historical highs witnessed in 1998-2001, leading to a general decline across rating categories in the overall average default rates for 1988-2013, compared with 1988-2012.

The ordinal nature of default rates and high stability of CRISIL's ratings demonstrate the strength of CRISIL's rating process. These processes have been set up, stabilised, and refined in the light of two decades of CRISIL's rating experience. Their robustness is today recognised by issuers and investors. This study is based on CRISIL's ratings assigned over more than 26 years, covering multiple credit cycles. Because of the quality, vintage, and diversity of the instruments, the size of the database, and use of monthly static pool methodology, this remains the most comprehensive study on corporate defaults and rating transitions in India.

## VI. Annexures

### Annexure 1: Industry-wise Classification of Defaults

CRISIL is the first rating agency in India to have published an industry-wise classification and a chronological account of all the defaults in its portfolio that form part of the static pools used for computing default rates. Since CRISIL's inception, there have been 1089 defaults by issuers carrying a long-term rating. Over the past 26 years, five industries (textile, metal and mining, food products, distributors, and machinery) accounted for around 44 per cent defaults on CRISIL-rated long-term debt instruments, as shown in Table A1.

**Table A1: Industry-wise and chronological break-up of defaults on long-term instruments over the past 26 years**

Industry	1988 to 1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Sum
<b>Textiles- Apparel &amp; Luxury Goods</b>		1	1	3	1	3	1	1		1					3	8	12	26	50	45	156
<b>Metals &amp; Mining</b>			2	1	6	2	2	2			1					2	6	28	34	31	117
<b>Distributors</b>																1	3	6	31	35	76
<b>Food Products</b>				1	2	3					1					3	6	7	23	30	76
<b>Machinery</b>					2	2	1									3	3	6	17	19	53
Construction & Engineering					1			1								3	4	4	16	21	50
Diversified Consumer Services																1	1	8	10	22	42
Hotels Restaurants & Leisure						1										2	5	7	16	10	41
Construction Materials			1		2	2	1		1							2	1	3	8	12	33
Containers & Packaging					2	1										1	3	1	13	10	31
Real Estate Development						1		1								1	2	4	7	14	30
Auto Components			1		1	1		1								1	1	2	11	9	28
Electrical Equipment						1	1										2	7	6	11	28
Independent Power Producers & Energy Traders								1							1	1	3	4	7	10	27
Pharmaceuticals			1		1	2		1								4	2	5	7	4	27
Paper & Forest Products				1	1	1									1	1	5	4	4	6	24
Chemicals				1	2	2	3	3	1								1	1	6	3	23
Specialty Retail																		2	8	11	21
Non Banking Financial Company				4	12	2												2			20
Household Durables		1	1		3				1							3		1	5	2	17
Beverages																	1	4	5	3	13
Building Products															1			2	9	1	13
Road & Rail				1														5	4	3	13
Commercial Services & Supplies						1												1	5	2	12
Transportation Infrastructure																3			4	5	12
Health Care Providers & Services																1	2	4	4	4	11
Electronic Equipment Instruments & Components							1									1		4	1	2	9
Media					1													1	5	2	9
Oil Gas & Consumable Fuels																	1		6	2	9
Industrial Conglomerates					1														4	1	6
Others				1	7	2	2				1					1	3	14	15	16	62
<b>Total Defaults</b>	<b>0</b>	<b>2</b>	<b>7</b>	<b>13</b>	<b>45</b>	<b>27</b>	<b>12</b>	<b>11</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>43</b>	<b>68</b>	<b>161</b>	<b>341</b>	<b>346</b>	<b>1089</b>
Outstanding ratings at year ending December 31	353 <sup>#</sup>	466	607	592	526	507	420	355	317	274	244	230	226	231	943	3002	5178	7525	10588	11699	
<b>Overall Annual Default Rate**</b>	<b>0.0%</b>	<b>0.6%</b>	<b>1.2%</b>	<b>2.3%</b>	<b>9.5%</b>	<b>6.3%</b>	<b>3.7%</b>	<b>4.1%</b>	<b>1.3%</b>	<b>0.5%</b>	<b>1.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.5%</b>	<b>3.2%</b>	<b>2.3%</b>	<b>3.5%</b>	<b>5.3%</b>	<b>4.4%</b>	

\*\* The proportion of total defaults in a particular year to total non-default ratings outstanding at the beginning of the year (adjusted for withdrawals)

# Outstanding ratings at year ending December 31, 1994

Source: CRISIL Ratings

The highest number of defaults, in absolute terms, since inception, was reported in 2013. However, it should be noted that these defaults were on a much higher base of around 11,700 outstanding ratings. Moreover, this increase was also aided by an increase in the lower rating categories, which have traditionally been more susceptible to defaults. The large number of defaults between 1997 and 1999 was because of a combination of factors, including economic slowdown, and structural/regulatory changes, especially in the financial sector.

Textile, and metal and mining industries had the largest number of defaults in 2013. These industries have always reported the largest number of defaults; this is because their high leverage makes them more vulnerable to economic cycles.

## Annexure 2: Analysis of Defaults: Time to Default

### Higher ratings farther away from default

An analysis of the 1089 defaults since CRISIL's inception by issuers carrying a long-term rating indicates that the higher-rated firms were farther away from a default in terms of the number of months prior to default than lower-rated firms. While issuers rated in the 'CRISIL B' or 'CRISIL C' categories that defaulted did so in about 12.5 months on an average, the few firms that defaulted from higher categories did so after a much longer period. For instance, the 3.6 per cent of firms that defaulted from the 'CRISIL AA' category did so after 57 months on an average (see Table A2).

Table A2: Average Time to Default (of Defaulted Firms) (In number of months)	
Rating Category	Months to Default
CRISIL AAA	No Defaults
CRISIL AA	57
CRISIL A	42
CRISIL BBB	29
CRISIL BB	16
CRISIL B	12
CRISIL C	13

Source: CRISIL Ratings

## Annexure 3: Comparative Default and Transition Rates for different periods

### Three-year CDRs for long-term ratings – monthly static pools

Table A3: One-, Two-, and Three-Year CDRs, between 2003 and 2013				
Rating	Issuer-months	One-Year	Two-Year	Three-Year
CRISIL AAA	8897	0.00%	0.00%	0.00%
CRISIL AA	16258	0.00%	0.03%	0.11%
CRISIL A	20690	0.32%	1.32%	2.70%
CRISIL BBB	56023	1.17%	2.91%	5.77%
CRISIL BB	72212	4.37%	9.33%	13.76%
CRISIL B	53465	8.78%	17.64%	23.43%
CRISIL C	3787	16.00%	25.25%	32.66%
<b>Total</b>	<b>231332</b>			

Source: CRISIL Ratings



### Three-year CDRs for long-term ratings – annual static pools

Table A4: One-, Two-, and Three-Year CDRs, between 1988 and 2013				
Rating	Issuer-years	One-Year	Two-Year	Three-Year
CRISIL AAA	1227	0.00%	0.00%	0.00%
CRISIL AA	2619	0.00%	0.23%	0.82%
CRISIL A	3229	0.50%	2.67%	5.70%
CRISIL BBB	5799	1.35%	3.54%	7.09%
CRISIL BB	7570	4.86%	10.09%	14.99%
CRISIL B	5808	8.39%	16.77%	22.70%
CRISIL C	438	18.95%	31.13%	43.91%
<b>Total</b>	<b>26690</b>			

Source: CRISIL Ratings

Table A5: One-, Two-, and Three-Year CDRs, between 2003 and 2013				
Rating	Issuer-years	One-Year	Two-Year	Three-Year
CRISIL AAA	811	0.00%	0.00%	0.00%
CRISIL AA	1502	0.00%	0.00%	0.11%
CRISIL A	1927	0.21%	1.30%	2.54%
CRISIL BBB	5250	1.11%	2.67%	5.19%
CRISIL BB	7291	4.29%	9.19%	13.78%
CRISIL B	5769	8.29%	16.48%	22.25%
CRISIL C	366	16.67%	26.97%	38.55%
<b>Total</b>	<b>22916</b>			

Source: CRISIL Ratings

### One-year transition rates for long-term ratings – monthly static pools

Table A6: One-year average transition rates: between 2003 and 2013									
Rating	Issuer- months	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	8897	97.84%	2.16%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	16258	1.05%	95.22%	3.03%	0.71%	0.00%	0.00%	0.00%	0.00%
CRISIL A	20690	0.00%	3.23%	90.96%	4.95%	0.41%	0.07%	0.05%	0.32%
CRISIL BBB	56023	0.00%	0.01%	2.48%	89.28%	6.47%	0.40%	0.19%	1.17%
CRISIL BB	72212	0.00%	0.00%	0.01%	3.44%	88.11%	3.62%	0.45%	4.37%
CRISIL B	53465	0.00%	0.00%	0.02%	0.07%	6.63%	83.81%	0.70%	8.78%
CRISIL C	3787	0.00%	0.00%	0.00%	0.00%	2.64%	20.76%	60.60%	16.00%
<b>Total</b>	<b>231332</b>								

Source: CRISIL Ratings

## One-year transition rates for long-term ratings – annual static pools

Table A7: One-year average transition rates: between 1988 and 2013									
Rating	Issuer- years	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	1227	97.23%	2.77%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	2619	1.38%	92.59%	5.04%	0.76%	0.15%	0.08%	0.00%	0.00%
CRISIL A	3229	0.00%	3.31%	87.40%	6.10%	2.20%	0.12%	0.37%	0.50%
CRISIL BBB	5799	0.00%	0.05%	2.79%	86.91%	7.74%	0.66%	0.50%	1.35%
CRISIL BB	7570	0.00%	0.03%	0.01%	3.36%	87.46%	3.74%	0.54%	4.86%
CRISIL B	5808	0.00%	0.00%	0.02%	0.07%	6.35%	84.52%	0.65%	8.39%
CRISIL C	438	0.00%	0.00%	0.00%	0.23%	2.06%	16.90%	61.87%	18.95%
<b>Total</b>	<b>26690</b>								

Source: CRISIL Ratings

Table A8: One-year average transition rates: between 2003 and 2013									
Rating	Issuer- years	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	811	98.03%	1.97%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	1502	1.07%	94.94%	3.20%	0.80%	0.00%	0.00%	0.00%	0.00%
CRISIL A	1927	0.00%	3.17%	90.97%	5.09%	0.47%	0.05%	0.05%	0.21%
CRISIL BBB	5250	0.00%	0.00%	2.44%	88.59%	7.12%	0.42%	0.32%	1.11%
CRISIL BB	7291	0.00%	0.00%	0.01%	3.40%	88.21%	3.74%	0.34%	4.29%
CRISIL B	5769	0.00%	0.00%	0.02%	0.04%	6.40%	84.66%	0.61%	8.29%
CRISIL C	366	0.00%	0.00%	0.00%	0.00%	2.46%	20.22%	60.66%	16.67%
<b>Total</b>	<b>22916</b>								

Source: CRISIL Ratings

## One-year transition rates for short-term ratings – monthly static pools

Table A9: One-year average transition rates between 2003 and 2013							
Rating*	Issuer-months	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	31383	97.27%	2.13%	0.24%	0.36%	0.00%	0.00%
CRISIL A1	9158	7.15%	85.89%	4.66%	0.97%	0.45%	0.87%
CRISIL A2	18471	0.08%	4.66%	86.52%	5.87%	1.95%	0.91%
CRISIL A3	34053	0.00%	0.06%	3.89%	85.79%	9.08%	1.18%
CRISIL A4	87269	0.00%	0.01%	0.02%	2.07%	92.20%	5.70%
<b>Total</b>	<b>180334</b>						

\*CRISIL A2, CRISIL A3 and CRISIL A4 include ratings of the respective modifier levels.

Source: CRISIL Ratings

## One-year transition rates for short-term ratings – annual static pools

Table A10: One-year average transition rates between 1988 and 2013							
Rating*	Issuer-years	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	4843	97.21%	2.19%	0.29%	0.29%	0.02%	0.00%
CRISIL A1	1210	9.75%	83.39%	4.96%	0.99%	0.41%	0.50%
CRISIL A2	1753	0.34%	4.62%	85.23%	6.56%	2.17%	1.08%
CRISIL A3	3179	0.00%	0.09%	3.87%	84.93%	10.07%	1.04%
CRISIL A4	8845	0.00%	0.01%	0.01%	1.99%	92.55%	5.44%
<b>Total</b>	<b>19830</b>						

\*CRISIL A2, CRISIL A3 and CRISIL A4 include ratings of the respective modifier levels.

Source: CRISIL Ratings

Table A11: One-year average transition rates between 2003 and 2013							
Rating*	Issuer-years	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	2890	97.27%	2.15%	0.17%	0.42%	0.00%	0.00%
CRISIL A1	858	6.53%	84.97%	6.06%	1.17%	0.58%	0.70%
CRISIL A2	1706	0.12%	4.57%	85.29%	6.68%	2.23%	1.11%
CRISIL A3	3176	0.00%	0.09%	3.87%	84.95%	10.08%	1.01%
CRISIL A4	8844	0.00%	0.01%	0.01%	1.99%	92.55%	5.44%
<b>Total</b>	<b>17474</b>						

\*CRISIL A2, CRISIL A3 and CRISIL A4 include ratings of the respective modifier levels.

Source: CRISIL Ratings

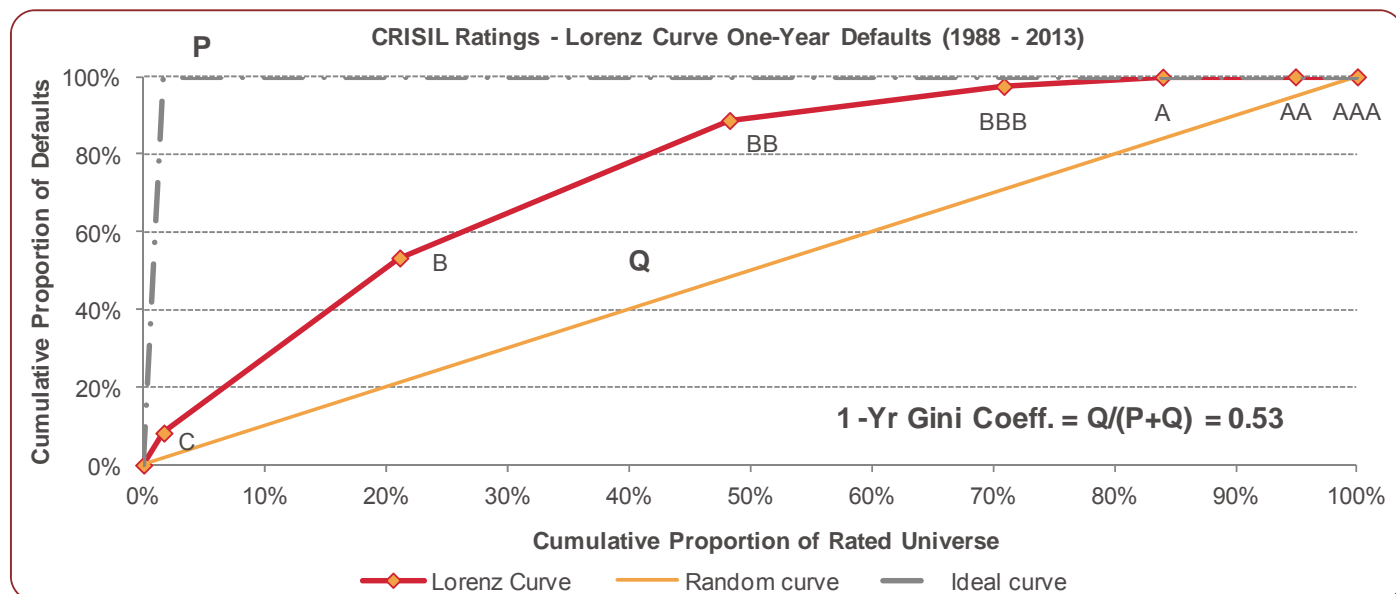
## Three-year CDRs for ratings of structured finance securities – for last 10 years

Table A12: One-, Two-, and Three-Year CDRs, between 2003 and 2013				
Rating	Issue-years	One-Year	Two-Year	Three-Year
CRISIL AAA(SO)	2679	0.04%	0.04%	0.04%
CRISIL AA(SO)	511	0.20%	0.51%	0.97%
CRISIL A(SO)	448	0.45%	0.45%	0.82%
CRISIL BBB(SO)	297	0.34%	2.08%	2.08%
CRISIL BB(SO) and below	31	16.13%	32.90%	32.90%
<b>Total</b>	<b>3966</b>			

Source: CRISIL Ratings

## Annexure 4: Lorenz Curve and Gini Coefficient for CRISIL Ratings

Chart 3: Graphical Representation of Gini Coefficient – Lorenz Curve



Source: CRISIL Ratings

The Gini coefficient for one-year defaults for 1988-2013 stands at 0.53. This needs to be seen in the light of the following aspects:

- Typically, a 'CRISIL C' rating is assigned when the firm services its rated debt on time, but defaults on its unrated debt. In most instances, firms rated 'CRISIL C' continue to default on unrated debt, but service their rated bank loan facilities (typically a revolving working capital facility) on time, thereby avoiding a rating of 'CRISIL D'. Ideally, for a high Gini Coefficient, a large portion of defaults should be from the 'CRISIL C' category—the lowest non-default rating category.
- There is an inherent mismatch between the credit discipline required by credit rating agencies such as CRISIL (default is recognised on a 'single rupee shortfall or single day delay' basis) and the credit culture of the Indian banking system (non-performing assets—NPAs—are recognised at 90 days past due). There needs to be a change in this culture towards a discipline of making timely payments for the Gini coefficient to improve.
- Rating categories 'CRISIL BB' and lower constitute more than three-fourths of its portfolio. These rating categories are marked by the limited information available about them, and their inherent vulnerability to sharp rating changes.

These factors, coupled with the ongoing difficult credit environment, have impacted CRISIL's Gini Coefficient.

## How to read the chart on Gini Coefficient, a measure of rating accuracy

If ratings had no ability to predict default, then default rates and ratings would not be correlated. For example, consider that 30 defaults occur in one year out of 1000 ratings (that is, a default rate of 3 per cent). For a randomly selected set of 100 companies (10 per cent of the rated population), one would expect to have three defaulted companies (10 per cent of the defaulted population), since the number of defaults one would expect in a sample is proportional to the selected number of companies. This is represented by the random curve, which will be a diagonal straight line. On the other hand, if ratings are perfect predictors of default, in the aforementioned example, the lowest 30 ratings should capture all the defaults. This is represented by the ideal curve.

Since no rating system is perfect, the actual predictive power of ratings lies between these two extremes. The cumulative curve (Lorenz curve) represents the actual case. The closer the cumulative curve is to the ideal curve, the better the predictive power of the ratings. This is quantified by measuring the area between the cumulative curve and random curve (area 'Q' in Chart 3) in relation to the area between the ideal curve and random curve (the sum of the areas 'P' and 'Q' in Chart 3). This ratio of  $Q/(P+Q)$ , called the Gini Coefficient or the accuracy ratio, will be 1 if ratings have perfect predictive ability, as the cumulative curve will coincide with the ideal curve. On the other hand, it will be close to zero if ratings have poor predictive power, as in this case, the cumulative curve will almost coincide with the random curve. Thus, a higher Gini Coefficient indicates the superior predictive ability of any rating system.

## Definitions

### Cumulative default curve (also called Lorenz curve)

The Lorenz curve is a plot of the cumulative proportion of defaults category-wise (of issuers with ratings outstanding at the beginning of the year and being in default at the end of the year), against the total proportion of issuers up to that category. For instance, in Chart 3, 89 per cent of the defaults recorded were in the 'CRISIL BB' and lower categories; these categories included only 48 per cent of the total ratings outstanding. In other words, the bottom 48 per cent of the ratings accounted for 89 per cent of all the defaults that occurred.

### Random curve

The random curve is a plot of the cumulative proportion of issuers against the cumulative proportion of defaulters, assuming that defaults are distributed equally across rating categories. In such a plot, the bottom 48 per cent of the issuers would account for exactly 48 per cent of the defaults; the plot would, therefore, be a diagonal straight line, and the ratings would have no predictive value.

### Ideal curve

The ideal curve is a plot of the cumulative proportion of issuers against the cumulative proportion of defaulters, if ratings were perfectly rank-ordered, so that all defaults occurred only among the lowest-rated firms. As CRISIL's overall default rate is 4.4 per cent, the bottom 4.4 per cent of issuers would have accounted for all the defaults if the ratings were perfect default predictors and any rating categories above this level would have no defaults at all.

## Accuracy ratio/Gini coefficient

Accuracy ratio = (Area between the Lorenz curve and the random curve)/(Area between the ideal curve and the random curve)

## Annexure 5: Methodology used by CRISIL in this study

### Concept of static pools

CRISIL, for calculating default and transition rates, has moved to a monthly static pool methodology from the annual static pool methodology, since the 2009 edition of the default and transition study. The monthly static pool methodology captures more granular monthly data such as intra-year transition and defaults, ensuring that default and transition rate estimates are more accurate and useful.

A static pool of a particular date is composed of a set of firms with a given rating outstanding as on that date. CRISIL forms static pools on the first day of every month for its default and transition study. As CRISIL calculates one-, two-, and three-year cumulative default rates, the static pools formed are of one-, two-, and three-year lengths. Once formed, the pool does not admit any new firms. For a firm to be included in an n-year static pool, its rating has to be outstanding through the entire period of n years. Firms whose ratings are withdrawn or are placed in default in the interim will continue to be withdrawn or in default for the remaining years. Therefore, a firm that ceases to be rated and is subsequently rated again, or a firm in the pool that defaults and recovers later, is not considered for re-inclusion in the pool.

A firm that remains rated for more than one month is counted as many times as the number of months over which it was rated. The methodology assumes that all ratings are current through an ongoing surveillance process, which, in CRISIL's case, is the cornerstone of the ratings' value proposition.

For instance, a firm that had ratings alive (not withdrawn) from January 1, 2000, to January 1, 2002, would appear in twelve consecutive static pools of one-year lengths, such as January 2000 to January 2001; February 2000 to February 2001; March 2000 to March 2001. On the other hand, a firm first appearing on January 1, 2002, and having an outstanding rating until February 1, 2003, will appear only in the January 2002 to January 2003 and February 2002 to February 2003 static pools of one-year lengths. The static pools of two-year and three-year lengths are formed in a similar manner.

## Weighted average marginal default rate

Notations:

For CRISIL's data,

M: Month of formation of the static pool (between 1988 and 2013)

R: A given rating category on the rating scale ('CRISIL AAA' to 'CRISIL C')

t: Length of the static pool in years on a rolling basis (1, 2, 3)

$P_t^M(R)$  = Defaults from rating category 'R' in the  $t^{\text{th}}$  year of the M-month static pool

$Q_t^M(R)$  = Non-defaulted ratings outstanding at the beginning of the  $t^{\text{th}}$  year in the rating category R from the M-month static pool

Illustration<sup>3</sup>: Consider a hypothetical static pool formed in January 2000, and having 100 companies outstanding at a rating of 'CRISIL BB' at the beginning of the month. Suppose that, in this pool, there is one default in the first year (ending December 2000), three in the second year (ending December 2001), and none in the third year (ending December 2002). Also, assume there are no withdrawals in any year. Then, using the above notation,

$$P_1^{\text{Jan-2000}}(\text{CRISIL BB}) = 1; P_2^{\text{Jan-2000}}(\text{CRISIL BB}) = 3; \text{ and } P_3^{\text{Jan-2000}}(\text{CRISIL BB}) = 0$$

$$Q_1^{\text{Jan-2000}}(\text{CRISIL BB}) = 100; Q_2^{\text{Jan-2000}}(\text{CRISIL BB}) = 99; \text{ and } Q_3^{\text{Jan-2000}}(\text{CRISIL BB}) = 96$$

For rating category R, the  $t^{\text{th}}$  year marginal default rate for the M-month static pool is the probability of a firm, in the static pool formed in the month M, not defaulting until the end of period (t-1), and defaulting only in year t.

Mathematically, the marginal default rate for category 'R' in year t from the M-month static pool,  $\text{MDR}_t^M(R)$ , is defined as

$$\text{MDR}_t^M(R) = P_t^M(R)/Q_t^M(R)$$

$$\text{Therefore, } \text{MDR}_1^{\text{Jan-2000}}(\text{CRISIL BB}) = P_1^{\text{Jan-2000}}(\text{CRISIL BB})/Q_1^{\text{Jan-2000}}(\text{CRISIL BB}) = 1/100 = 0.01$$

The average marginal default rate is calculated as the weighted average of the MDRs of all the static pools of similar lengths in the period, with the number of ratings outstanding at the beginning of the period (with appropriate withdrawal adjustments discussed later) as weights.

<sup>3</sup> This illustration is for explanation only, and does not indicate the actual or observed default rates in any rating category.

## Cumulative average default rate

The concept of survival analysis is used to compute the cumulative default probabilities. Using the average marginal default rate, we calculate the cumulative probability of a firm defaulting as follows:

$$\text{The cumulative probability of a firm defaulting by the end of } (t+1) \text{ years} = \left[ \begin{array}{c} \text{Cumulative probability of the firm defaulting by the end of } t \text{ years} \\ + \\ \text{Probability of the firm defaulting in the } (t+1)^{\text{th}} \text{ year} \end{array} \right]$$

Furthermore, for a firm to default in the  $(t+1)^{\text{th}}$  year, it should survive until the end of  $t$  years. So,

$$\text{Probability of the firm defaulting in the } (t+1)^{\text{th}} \text{ year} = \left[ \begin{array}{c} \text{Probability of the firm not defaulting until the end of the } t^{\text{th}} \text{ year} \\ * \\ \text{Marginal probability of the firm defaulting in the } (t+1)^{\text{th}} \text{ year} \end{array} \right]$$

Now,

$$\text{Probability of the firm not defaulting until the end of the } t^{\text{th}} \text{ year} = 1 - \text{Cumulative probability of the firm defaulting by the end of } t \text{ years}$$

Hence,

$$\text{Probability of the firm defaulting in } (t+1)^{\text{th}} \text{ year} = \left[ \begin{array}{c} (1 - \text{Cumulative probability of the firm defaulting by the end of } t \\ \text{years}) \\ * \\ \text{Marginal probability of the firm defaulting in the } (t+1)^{\text{th}} \text{ year} \end{array} \right]$$

Therefore, returning to the first expression,

$$\text{The cumulative probability that a firm defaults by the end of } (t+1) \text{ years} = \text{Cumulative probability of the firm defaulting by the end of } t \text{ years} + \left[ \begin{array}{c} (1 - \text{Cumulative probability of the firm defaulting by the} \\ \text{end of } t \text{ years}) \\ * \\ \text{(Marginal probability of the firm defaulting in } (t+1)^{\text{th}} \\ \text{year)} \end{array} \right]$$

Restating the above in notation, if  $CPD_{t+1}(R)$  = cumulative default probability of a firm rated R defaulting in  $t+1$  years, then,

$$CPD_t(R) = MDR_t(R); \quad \text{for } t = 1$$

$$CPD_{t+1}(R) = CPD_t(R) + (1 - CPD_t(R)) * MDR_{t+1}(R) \quad \text{for } t = 2, 3$$



## Withdrawal adjustment

In a one-year period, from the month of having obtained the rating, the firm can move to three different states—it can be timely on payments (and have a non-default rating outstanding), can default on its debt repayments, or can repay the debt fully and withdraw the rating. As firms are not monitored post-withdrawal, the ‘true state’ (whether default or no default) of a firm whose rating has been withdrawn remains unknown in subsequent months. Therefore, a modified  $MDR_t^M(R)$  that ignores withdrawn firms is an appropriate measure of marginal default probability. As mentioned earlier,  $Q_t^M(R)$  is also adjusted for the firms that belong to the static pool and have defaulted by the beginning of year  $t$ . The modified  $Q_t^M(R)$  is as follows:

$$Q_t^M(R) = \begin{aligned} & \text{Number of firms in the static pool formed at the beginning of month } M \text{ with rating category } R \\ & \textit{less} \text{ Number of defaults till the end of period } (t-1) \\ & \textit{less} \text{ Number of withdrawn firms until the end of period } t \end{aligned}$$

CRISIL uses full-year withdrawal adjustment, as against no-withdrawal adjustment or mid-year withdrawal adjustment since the issuers whose ratings were withdrawn are not immune to the risk of default. Moreover, reliable information meeting CRISIL’s stringent requirements is not available post-withdrawal.

## Post-default return of a firm

Post-default, firms sometimes recover, and consequently, receive a non-default rating in subsequent years. As CRISIL’s credit rating is an indicator of the probability of default, default is considered an ‘absorbing state’, that is, a firm cannot come back to its original static pool post-default. In static pool methodology, the recovered firm is considered a new firm, which, if continues to be rated, appears in the static pool of the month in which it recovered.

## Methodology for transition rates

The  $t$ -year transition rate (from rating  $R1$  to rating  $R2$ ) for a static pool, is the proportion of firms rated  $R1$  at the beginning of the static pool, that are found to be in  $R2$  at the end of  $t$  years. This proportion is called the  $t$ -year transition probability from  $R1$  to  $R2$ . The  $t$ -year transition matrix is formed by computing transition probabilities from various rating categories (except CRISIL D) to other rating categories.

Withdrawal-adjusted transition rates are computed as mentioned above, but excluding firms that are withdrawn at the end of the  $t$  years. In the computation of  $t$ -year transition rates, ratings at a point of time, and at the end of the  $t^{\text{th}}$  year thereafter, are considered.

Table A13 lists various elements of default rate computation and the competing approaches.

Table A13: Various Approaches to Computing Default Rates		
<p><b>Withdrawal Adjustments</b></p>	<p><b><u>Approach 1: Full-year withdrawal adjustments</u></b> Exclude all the ratings withdrawn during a year from the base for calculating default rates.</p> <p><b><u>Approach 2: Mid-year withdrawal adjustments</u></b> Exclude half of the ratings withdrawn during a year from the base for calculating default rates.</p> <p><b><u>Approach 3: No withdrawal adjustments</u></b> Take all the ratings outstanding at the beginning of a year as the base, notwithstanding some of them were withdrawn during the course of the year.</p>	<p>CRISIL follows Approach 1 since it believes that the issuers whose ratings were withdrawn are not immune to the risk of default subsequent to the withdrawal. More importantly, reliable information about the timeliness of debt repayments, which meets CRISIL's stringent requirements, is not available post withdrawal of the rating. Approach 1 results in the most conservative estimate of the default rates among the three approaches.</p>
<p><b>Calculating Cumulative Default Rate (CDR)</b></p>	<p><b><u>Approach 1: Calculate CDR directly, without using Marginal Default Rate (MDR)</u></b> Calculate CDR over a period as the number of firms defaulting as a ratio of the number of firms at the beginning of the period, ignoring intra-period withdrawals.</p> <p><b><u>Approach 2: Average MDR Methodology</u></b> Calculate MDR, weigh it by sample size and accumulate it over a period to arrive at average CDR.</p>	<p>CRISIL follows Approach 2, which takes into account only the ratings that are were not withdrawn at the end of each year as the base. So it results in a more accurate and conservative estimate of default rate. Approach 1 is not comprehensive since it ignores a large portion of the credit history of firms who may have been rated just a little while after the formation of the static pool.</p>
<p><b>Post Default Return of a firm</b></p>	<p><b><u>Approach 1: Treat default as an 'Absorbing State'</u></b> Retain the status of a defaulted firm as default even after recovery. Treat the recovered firm as a new firm from the point of recovery.</p> <p><b><u>Approach 2:</u></b> Treat a defaulted and subsequently recovered firm as a non-defaulted firm from the point of recovery. So, if a non-defaulted firm defaults in the 2<sup>nd</sup> year and recovers in the 3<sup>rd</sup> year, it will not be treated as a defaulted firm in the 3<sup>rd</sup> year MDR calculation.</p>	<p>CRISIL follows Approach 1. Since credit ratings are an opinion of the likelihood of default, the default state is treated as an absorbing state or an end point, and the firm's rating continues to be in 'default.'</p> <p>If a firm emerges from default and has a non-default rating on its debt instruments, this firm is treated as a new firm forming a part of a different static pool from the time its rating is revised from 'CRISIL D'.</p>
<p><b>Data Pooling</b></p>	<p><b><u>Approach 1: Static Pool</u></b> Charge defaults against all the ratings of the issuer during the period.</p> <p><b><u>Approach 2:</u></b> Charge defaults against the initial rating of the issuer.</p> <p><b><u>Approach 3:</u></b> Charge defaults against the most recent year's rating of the issuer.</p>	<p>CRISIL follows Approach 1. Debt instruments are tradable in nature and can be held by different investors at different points of time. Since credit ratings, which convey an opinion on the likelihood of default are intended to benefit the investors through the life of the instrument, CRISIL believes that charging defaults against all the ratings of the issuer during the period is the most appropriate approach in computing default rates. Other approaches may have limited utility. For instance, Approach 2 may be of relevance only to the investor who invests in the first-rated debt issuance of a firm and holds it to maturity. Approach 3 may be relevant only to those investors who happen to be holding the instrument just a year prior to its default.</p>

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A decorative graphic in the bottom right corner consisting of several overlapping rectangular blocks in shades of orange and red, arranged in a stepped, ascending pattern.

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