

CRISIL Default Study 2015



Annual default and ratings transition



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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 is the number of defaults among rated firms during a specified period, expressed as a percentage of the total number of outstanding ratings. Default rates may be calculated at each rating level, and over multiple periods.

What are transition rates?

The transition rate indicates the number of instances when credit ratings have changed over a specified period. Transition rates may be calculated for the entire rated population or for a specified rating level.

How are default and transition rates used?

Accurate and reliable default and transition rates are critical inputs for all debt market participants 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, or 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) Measuring credit risk

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, or above, a certain level.

d) Indicating efficacy of rating scale

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

Key variables for default rate computation

(i) Definition of default

A clear definition of default is necessary in computing default rates. CRISIL defines default as any missed payment on a rated instrument. If a rated debt obligation is not serviced in full by the due date, the rating moves to 'CRISIL D' or an equivalent. Furthermore, as 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 and its consistent application over time provide a strong 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 may 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 may be computed using different 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.

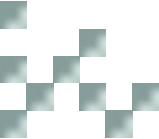
A 'normalisation' of the above variables must precede any comparison of default statistics across rating agencies.

What is unique about CRISIL's default and ratings transition study?

CRISIL's default and rating 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, application of the globally accepted marginal default rate method, and use of monthly frequency static pools as base data. In fact, CRISIL is India's only rating agency to use monthly static pools in computing default and transition rates. This rigorous method of computing default rates significantly enhances the study's ability to capture defaults and rating changes that have occurred during the year.

Moreover, CRISIL's default and transition statistics adequately represent the default characteristics of companies across sectors and industries. The study includes ratings assigned by CRISIL since its inception in 1987. The dataset is the largest and most comprehensive in the Indian debt market as it takes into account more than one full economic cycle.

The study also presents the default and transition statistics for the past 10 years to give a picture of the more recent rating performance. This addresses the views of many investors and policy makers that the huge surge seen in default rates in the late 1990s was because of structural changes in the Indian economy and is unlikely to recur, and hence, default rates in recent years would be more representative of the prevailing credit environment. CRISIL believes it is important to present both, the default rates for the recent period as well as since inception, to help stakeholders form an opinion on the default behaviour of the ratings and enable them to make an informed decision.



Executive summary

In 2015, 395 CRISIL-rated firms defaulted, the highest for any year (up from 378 in 2014), while the overall annual default rate remained high at 4.1 percent (4.4 percent in 2014). The high default rates may be attributed to a significant increase in the number of firms in the 'CRISIL BB' and lower rating categories in recent years. Of over 13,500 firms with outstanding ratings in CRISIL's portfolio as of December 2015, over three-fourths had ratings of 'CRISIL BB' or lower—as against a fifth of 900 firms with outstanding ratings seven years ago. The high default rate indicates credit quality pressures that corporate India continues to face, especially in commodity-linked sectors, where there have been sharp price corrections in 2015. The default rates are, nevertheless, lower than the levels between 1998 and 2001. The average default rates of long-term ratings are, therefore, lower for the period 1998-2015 than for 1998-2014.

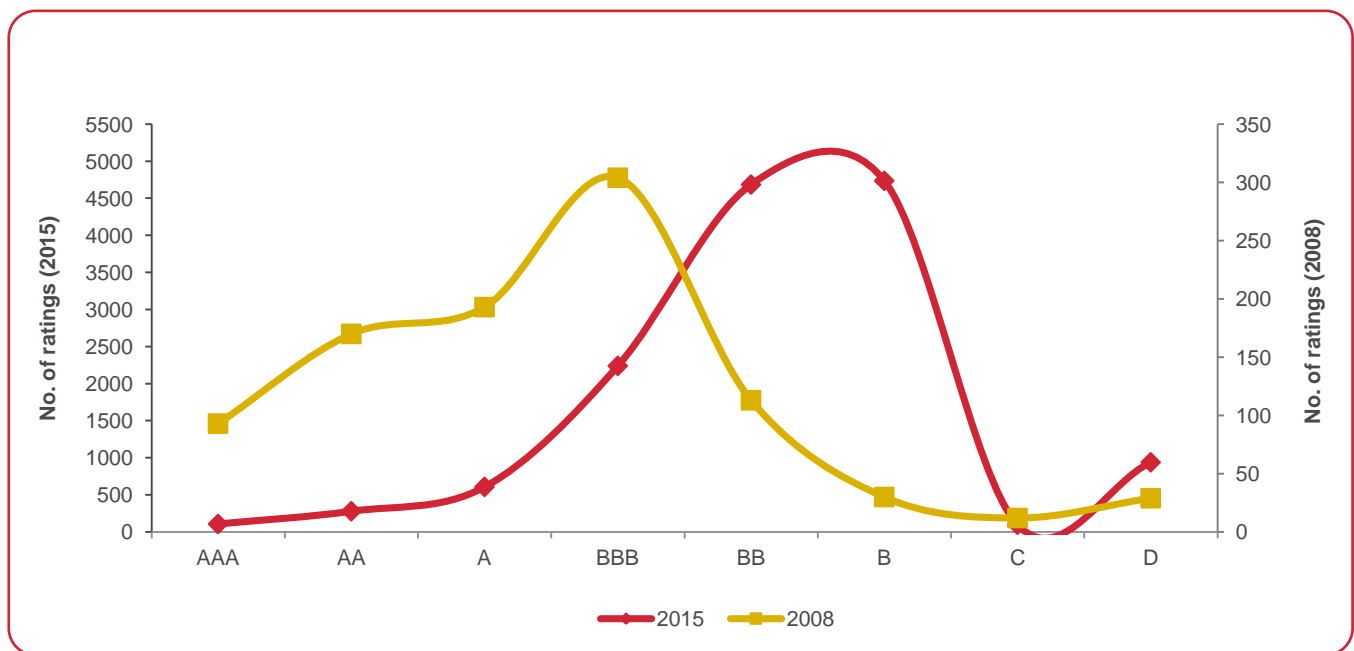
Key highlights of CRISIL's latest study are:

- The average default rates of long-term ratings are lower for the period 1988-2015 than for 1988-2014
- CRISIL's long-period average default rates continue to exhibit ordinality across all rating categories—in other words, the higher rating categories have lower default rates
- No long-term instrument rated 'CRISIL AAA' has ever defaulted
- The overall annual default rate remained high at 4.1 percent in 2015, despite reducing from 4.4 percent the previous year
- The stability rates of long-term ratings have improved steadily over the years – the overall stability rate across ratings exceeded 87 percent between 1988 and 2015
- The stability rates for short-term instruments continue to be strong across rating categories

I. CRISIL's rating distribution

CRISIL's outstanding long-term ratings exceeded 13,500 firms as of December 2015 as against 900, seven years ago. The growth in portfolio has been accompanied by changes in CRISIL's rating distribution—an increasing number of ratings has been assigned in lower rating categories. Over three-fourths of ratings were either 'CRISIL BB' or lower as of December 2015, as against around a fifth as of December 2008. Consequently, CRISIL's rating distribution has altered significantly—with the median rating moving to the 'CRISIL BB' category from 'CRISIL BBB' during the period (refer to Chart 1).

Chart 1: Shift in CRISIL's rating distribution



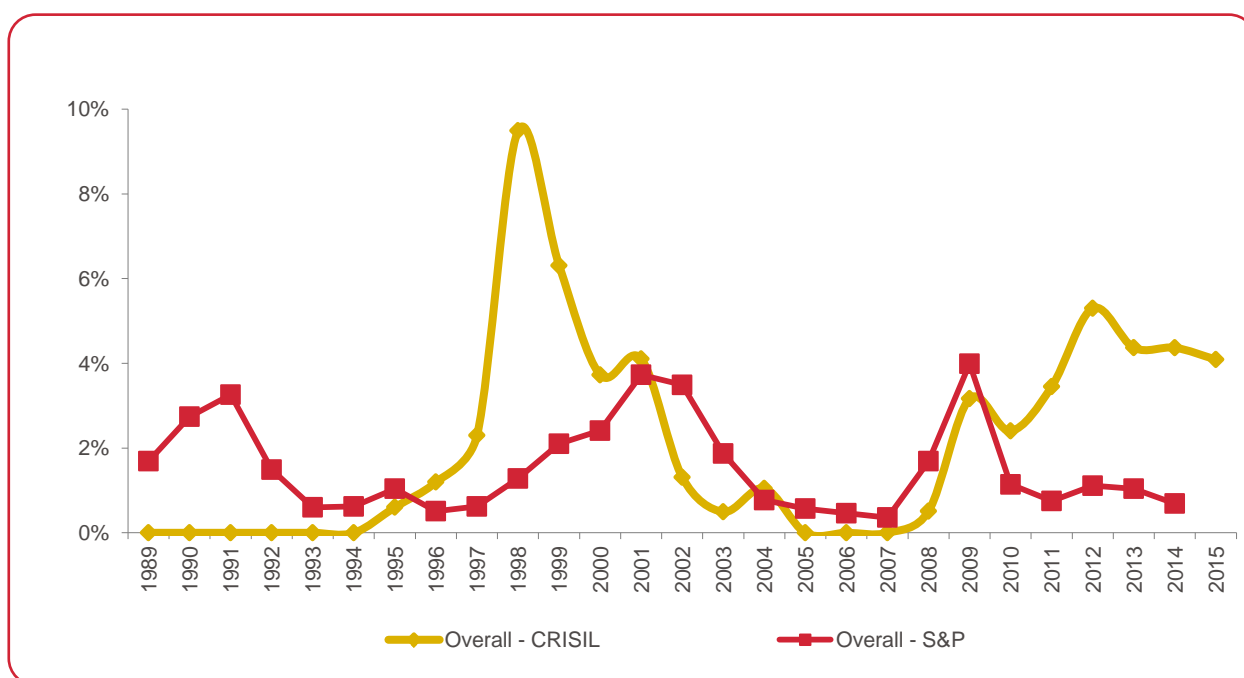
Source: CRISIL Ratings

II. Movements in overall annual default rates since inception

Annual default rate for corporate issuers¹ remains high

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

Chart 2: Trends in overall annual default rate



Source: CRISIL Ratings

The overall annual default rate remained high at 4.1 percent in 2015 (4.4 percent in 2014) largely because of a sharp increase in ratings in the lower rating categories (refer to Chart 1), where incidence of default is higher. The high annual default rate is also indicative of credit quality pressure that corporate India continues to face, especially in commodity-linked sectors where there were sharp price corrections in 2015

¹ The term 'corporate issuers' has been used generically—to include companies, both public and private limited, societies, trusts and partnership

III. For corporate issuers

One-, two-, and three-year CDRs

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 probability is desirable for rating agencies, and is called the test of ordinality. Table 1 shows CRISIL's one-, two-, and three-year withdrawal-adjusted CDRs across different rating categories from 1988 to end-2015 (*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 CDRs for long-term ratings (withdrawal-adjusted)

One-, two-, and three-year CDRs, between 1988 and 2015				
Rating	Issuer-months	One-year	Two-year	Three-year
CRISIL AAA	16565	0.00%	0.00%	0.00%
CRISIL AA	36605	0.03%	0.27%	0.77%
CRISIL A	47606	0.56%	2.31%	4.79%
CRISIL BBB	101414	1.09%	2.98%	5.72%
CRISIL BB	149114	4.17%	8.64%	13.07%
CRISIL B	131122	7.95%	15.85%	21.82%
CRISIL C	7034	20.60%	32.84%	40.42%
Total	489460			

Source: CRISIL Ratings

Average default rates for the period 1988-2015 were lower than those for 1988-2014. The average default rates (*refer to Table A3, Annexure 3*) for the decade through 2015, indicating rating behaviour over a more recent period, are also ordinal.

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

Transition rates indicate the instances of a given rating migrating to other rating categories (*refer to Table 2*). As credit ratings drive bond 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 to investors mandated to hold investments of a minimum credit quality.

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

Between 1988 and 2015									
Rating	Issuer-months	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	16565	97.31%	2.69%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	36605	1.46%	93.32%	4.44%	0.53%	0.18%	0.03%	0.02%	0.03%
CRISIL A	47606	0.00%	3.13%	88.67%	5.58%	1.67%	0.13%	0.26%	0.56%
CRISIL BBB	101414	0.00%	0.04%	2.62%	88.59%	6.93%	0.46%	0.28%	1.09%
CRISIL BB	149114	0.00%	0.02%	0.01%	3.97%	87.47%	3.85%	0.52%	4.17%
CRISIL B	131122	0.00%	0.00%	0.01%	0.05%	7.49%	83.98%	0.52%	7.95%
CRISIL C	7034	0.00%	0.00%	0.00%	0.17%	1.58%	17.93%	59.72%	20.60%
Total	489460								

Source: CRISIL Ratings

The highlighted diagonal of Table 2 indicates the stability rates of various rating categories. Between 1988 and 2015, around 93.3 percent of 'CRISIL AA' ratings remained in that category at the end of one year; 1.5 percent was upgraded to 'CRISIL AAA', and 5.2 percent was downgraded.

As with CRISIL's default rates, its 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 has also published the one-year transition rates over the decade through 2015 (see Table A6, Annexure 3; for transition rates based on the annual static pools methodology, refer to Tables A7 and A8, Annexure 3).

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 highlighted diagonal represent the proportion of upgrades, while those to the right represent the proportion of downgrades. The stability rate for the 'CRISIL A1+' rating is 97.25 percent over one year, and 9.65 percent of 'CRISIL A1' ratings have been upgraded to 'CRISIL A1+' during the year.

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

Between 1988 and 2015							
Rating*	Issuer-months	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	64976	97.25%	2.21%	0.31%	0.22%	0.02%	0.00%
CRISIL A1	17626	9.65%	84.23%	4.45%	0.74%	0.38%	0.56%
CRISIL A2	28562	0.23%	4.38%	86.84%	6.16%	1.65%	0.75%
CRISIL A3	56818	0.00%	0.05%	4.08%	86.14%	8.85%	0.88%
CRISIL A4	177062	0.00%	0.01%	0.02%	2.27%	92.42%	5.28%
Total	345044						

*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 84.2 percent and 86.8 percent, respectively. The stability rates for 'CRISIL A1' and 'CRISIL A2' were higher during the decade through 2015, as against CRISIL's entire 28-year rating history (refer to Table A9, Annexure 3; for transition rates based on the annual static pools methodology, refer to Tables A10 and A11, Annexure 3).

Movement in stability rates over the past four years

Stability rates indicate the proportion of ratings that have remained unchanged over a given period. CRISIL's ratings are ordinal. In other words, the higher the rating category, the greater the stability of CRISIL's ratings. Table 4 indicates CRISIL's one-year stability rates over the past 28 years. The stability rate for rating categories 'CRISIL BBB' and higher has increased in 1988-2015 over the period 1988-2014.

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

Table 4: One-year average stability rates since 1988				
Period	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB
1988-2015	97.3%	93.3%	88.7%	88.6%
1988-2014	97.3%	93.0%	87.8%	87.6%
1988-2013	97.1%	92.6%	87.1%	87.4%
1988-2012	97.0%	92.3%	86.7%	87.0%

Source: CRISIL Ratings

Table 5: One-year average stability rates for various 10-year periods				
Period	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB
2005-2015	97.7%	95.7%	91.9%	89.8%
2004-2014	97.9%	95.4%	91.2%	89.1%
2003-2013	97.8%	95.2%	91.0%	89.3%
2002-2012	97.9%	95.2%	91.4%	89.6%

Source: CRISIL Ratings

Table 5 indicates the one-year stability rates of each rating category over several decades. The stability rates for 'CRISIL AAA' and 'CRISIL AA' ratings, for instance, have consistently exceeded 97 and 95 percent, respectively, while those for 'CRISIL A' and 'CRISIL BBB' ratings have exceeded 91 and 89 percent, respectively.

IV. For structured finance instruments

CRISIL pioneered the rating of several complex structured finance instruments in the Indian market. Its dataset comprises **5262 issue years**, including 2799 issue years for retail asset-backed securities (ABS) and retail mortgage-backed securities (MBS) spanning over 20 years. CRISIL has outstanding ratings on a variety of structured finance instruments; in addition to ABS and MBS instruments, these include instruments backed by full or partial guarantee.

One-, two-, and three-year CDRs

Table 6 provides the one-, two-, and three-year average CDRs for each rating category between 1993² and 2015; refer to Table A12 in Annexure 3 for default rates between 2005 and 2015.

Table 6: CRISIL's average CDRs for ratings on structured finance instruments

One-, two-, and three-year CDRs, between 1993 and 2015				
Rating	Issue-years	One-year	Two-year	Three-year
CRISIL AAA(SO)	3250	0.03%	0.13%	0.20%
CRISIL AA(SO)	762	0.13%	0.34%	0.65%
CRISIL A(SO)	769	1.04%	3.18%	5.90%
CRISIL BBB(SO)	413	0.24%	1.89%	2.78%
CRISIL BB(SO) and below	68	19.12%	25.34%	25.34%
Total	5262			

Source: CRISIL Ratings

The one-year CDR for instruments rated 'CRISIL AAA (SO)' is 0.03 percent. 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. The default was subsequently cured, the investors were paid in full, and the rated instrument was redeemed.

The spike in one-, two-, and three-year CDRs for 'CRISIL A (SO)' rated structured obligations has been on account of default in the structured instruments of Andhra Pradesh Power Finance Corporation (APPFC) in 2015. CRISIL had placed APPFC's ratings on 'Rating Watch with Developing Implications' following the formation of a new state, Telangana, from the erstwhile state of Andhra Pradesh (AP). One of the key aspects being monitored under 'Rating Watch' was how the assets and liabilities (specifically for CRISIL-rated bonds) would be bifurcated between the respective government entities for the states of Telangana and AP. Due to disputes between APPFC and Telangana State Power Finance Corporation, relating to distribution of assets and liabilities, the interest payment on some of the rated bonds was not made in full by APPFC, on the due date. This led to a downgrade to default category for these instruments.

² CRISIL assigned its first structured finance rating in January 1992, which forms a part of the 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.

One-year transition rates

Around 62 percent of all structured finance ratings—3250 of 5262 issue years—are rated ‘CRISIL AAA (SO)’ and show a high stability rate of over 98 percent. Table 7 shows the one-year average transition rates between 1993 and 2015 for structured finance instruments.

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

Between 1993 and 2015									
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)	3250	98.31%	1.48%	0.15%	0.00%	0.00%	0.00%	0.03%	0.03%
CRISIL AA(SO)	762	5.25%	91.08%	3.41%	0.13%	0.00%	0.00%	0.00%	0.13%
CRISIL A(SO)	769	1.04%	4.55%	88.69%	1.69%	2.86%	0.13%	0.00%	1.04%
CRISIL BBB(SO)	413	2.91%	2.18%	11.86%	81.84%	0.48%	0.24%	0.24%	0.24%
CRISIL BB(SO)	57	3.51%	3.51%	7.02%	17.54%	52.63%	0.00%	0.00%	15.79%
CRISIL B(SO)	9	0.00%	0.00%	0.00%	0.00%	0.00%	77.78%	0.00%	22.22%
CRISIL C(SO)	2	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Total	5262								

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 & 9: 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)
1993-2015	98.3%	91.1%	88.7%	81.8%
1993-2014	98.3%	90.6%	90.6%	80.6%
1993-2013	98.2%	89.6%	90.1%	77.2%
1993-2012	98.1%	88.9%	90.9%	79.0%

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)
2005-2015	98.3%	92.7%	89.1%	82.0%
2004-2014	98.4%	91.8%	89.0%	80.8%
2003-2013	98.3%	90.8%	89.1%	77.4%
2002-2012	98.2%	89.7%	91.2%	79.1%

Source: CRISIL Ratings

CRISIL rated structured finance instruments exhibit high stability rates. India’s securitisation market has been largely ‘CRISIL AAA (SO)’-centric, as reflected in the large number of issue years for this rating category. However, there has been improvement in data density in other rating categories such as ‘CRISIL BBB (SO)’ of late, largely explaining a move towards ordinality in stability rates.

V. Retail ABS and MBS issuances' one-year transition rates

CRISIL's database of retail ABS and MBS transactions consists of 2799 issue years across 23 years (1993-2015). 2011 witnessed the first-ever default among 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 1993-2015. 'CRISIL AAA (SO)'-rated ABS or MBS instruments, which account for more than three-fourth of the ratings in the database, have a stability rate of 98.3 percent.

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

Between 1993 and 2015									
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)	2201	98.27%	1.50%	0.23%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA(SO)	183	14.21%	82.51%	2.73%	0.55%	0.00%	0.00%	0.00%	0.00%
CRISIL A(SO)	88	9.09%	14.77%	72.73%	3.41%	0.00%	0.00%	0.00%	0.00%
CRISIL BBB(SO)	310	3.87%	2.90%	14.52%	78.07%	0.00%	0.32%	0.32%	0.00%
CRISIL BB(SO)	12	16.67%	16.67%	16.67%	25.00%	25.00%	0.00%	0.00%	0.00%
CRISIL B(SO)	4	0.00%	0.00%	0.00%	0.00%	0.00%	75.00%	0.00%	25.00%
CRISIL C(SO)	1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Total	2799								

Source: CRISIL Ratings

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

Conclusion:

The overall annual default rate remained high in 2015 because of continued credit quality pressures faced by corporate India, especially in commodity-linked sectors, where there were sharp price corrections. However, the default rates were lower in 2015 than in the period 1998-2001. Average default rates were, therefore, lower across rating categories for the period, 1988-2015 than in 1988-2014.

The strength of CRISIL's rating process is demonstrated by the ordinal nature of its default rates and high stability of its ratings. These processes have been set up, stabilised, and refined over the 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 28 years, covering multiple credit cycles. Because of the quality, vintage, and diversity of the instruments, the size of 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 publish industry-wise classifications and a chronological account of all defaults in its portfolio that form part of the static pools used for computing default rates. Since CRISIL's inception, there have been 1862 defaults by issuers with long-term ratings. Over the past 28 years, five industries (textile, metal and mining, distributors, food products, and construction and engineering) accounted for around 46 percent of these defaults, as shown in Table A1.

Table A1: Industry-wise and chronological break-up of defaults on long-term instruments over the past 28 years

Industry	1988 to 1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Sum	
Textiles- Apparel & luxury goods		1	1	3	1	3	1	1		1					3	8	12	26	50	45	53	46	255	
Metals & Mining			2	1	6	2	2	2			1					2	6	28	34	31	23	35	175	
Distributors																1	3	6	31	35	45	54	175	
Food products				1	2	3					1					3	6	7	23	30	44	43	163	
Construction & Engineering					1			1								3	4	4	16	21	28	20	98	
Machinery					2	2	1									3	3	6	17	19	18	20	91	
Real estate development						1		1								1	2	4	7	14	35	25	90	
Diversified consumer services																1	1	8	10	22	11	16	69	
Hotels restaurants & Leisure						1										2	5	7	16	10	8	4	53	
Pharmaceuticals			1		1	2		1								4	2	5	7	4	13	7	47	
Construction materials			1		2	2	1		1							2	1	3	8	12	5	3	41	
Containers & Packaging					2	1										1	3	1	13	10	6	12	49	
Electrical equipment						1	1										2	7	6	11	9	7	44	
Auto components			1		1	1		1								1	1	2	11	9	6	5	39	
Specialty retail																		2	8	11	13	13	47	
Independent power producers & energy traders								1								1	1	3	4	7	10	6	38	
Paper & Forest products				1	1	1										1	1	5	4	4	6	4	34	
Chemicals				1	2	2	3	3	1									1	1	6	3	4	7	34
Household durables		1	1		3				1							3		1	5	2	4	5	26	
Non Banking financial company				4	12	2												2					20	
Electronic equipment instruments & Components							1									1		4	1	2	8	3	20	
Road & Rail				1														5	4	3	4	2	19	
Beverages																	1	4	5	3	3	2	18	
Building products															1			2	9	1	3	8	24	
Commercial services & Supplies						1										3		1	5	2	4	7	23	
Transportation infrastructure																1	2		4	5	4	2	18	
Health care providers & Services																	1	2	4	4	2	6	19	
Media					1													1	5	2	4	4	17	
Oil gas & Consumable fuels																	1		6	2			9	
Others				1	8	2	2	0	0	0	1	0	0	0	0	1	3	14	19	17	11	28	107	
Total defaults	0	2	7	13	45	27	12	11	3	1	3	0	0	0	6	43	68	161	341	346	378	395	1862	
Outstanding ratings at year ending December 31	353#	466	607	592	526	507	420	355	317	274	244	230	226	231	943	3002	5178	7525	10588	11699	12500	13695		
Overall annual default rate**	0.0%	0.6%	1.2%	2.3%	9.5%	6.3%	3.7%	4.1%	1.3%	0.5%	1.0%	0.0%	0.0%	0.0%	0.5%	3.2%	2.3%	3.5%	5.3%	4.4%	4.4%	4.1%		

** 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 2015. However, it should be noted that these defaults were on a much higher base (of over 13,500 outstanding ratings) than in previous years. Moreover, there has been an increase in the number of firms in the lower rating categories, which are traditionally more likely to default. The higher default rates between 1997 and 1999 were because of factors such as economic slowdown and structural/regulatory changes, especially in the financial sector. Distributors had the largest number of defaults in 2015.

Annexure 2: Analysis of defaults: Time to default

Higher ratings farther away from default

Analysis of the 1862 defaults (refer to Table A2) indicates that the higher-rated firms were farther away from default than lower-rated firms. While issuers rated in the 'CRISIL B' or 'CRISIL C' categories defaulted in 14 and 13 months, respectively, issuers rated 'CRISIL A' and 'CRISIL AA' did so in 42 and 57 months, respectively. No issuers in the 'CRISIL AAA' rating category defaulted.

Table A2: Average time to default (of defaulted firms)

Rating category	Months to default
CRISIL AAA	No defaults
CRISIL AA	57
CRISIL A	42
CRISIL BBB	31
CRISIL BB	19
CRISIL B	14
CRISIL C	13

Source: CRISIL Ratings

Annexure 3: Comparative default and transition rates for different periods

Table A3: CDRs for long-term ratings – monthly static pools

One-, two-, and three-year CDRs, between 2005 and 2015				
Rating	Issuer-months	One-year	Two-year	Three-year
CRISIL AAA	9785	0.00%	0.00%	0.00%
CRISIL AA	20469	0.00%	0.02%	0.15%
CRISIL A	31352	0.24%	1.06%	2.17%
CRISIL BBB	94518	0.87%	2.35%	4.53%
CRISIL BB	145829	3.86%	8.17%	12.43%
CRISIL B	130608	7.92%	15.75%	21.64%
CRISIL C	6166	18.89%	29.85%	36.65%
Total	438727			

Source: CRISIL Ratings

Table A4 & A5: CDRs for long-term ratings – annual static pools

Table A4: One-, two-, and three-year CDRs, between 1988 and 2015				
Rating	Issuer-years	One-year	Two-year	Three-year
CRISIL AAA	1431	0.00%	0.00%	0.00%
CRISIL AA	3143	0.00%	0.18%	0.66%
CRISIL A	4197	0.38%	2.06%	4.26%
CRISIL BBB	9104	1.03%	2.68%	5.30%
CRISIL BB	13855	4.07%	8.29%	12.55%
CRISIL B	12277	8.08%	15.83%	21.78%
CRISIL C	609	20.20%	33.62%	43.41%
Total	44616			

Source: CRISIL Ratings

Table A5: One-, two-, and three-year CDRs, between 2005 and 2015				
Rating	Issuer-years	One-year	Two-year	Three-year
CRISIL AAA	895	0.00%	0.00%	0.00%
CRISIL AA	1852	0.00%	0.00%	0.08%
CRISIL A	2846	0.14%	0.91%	1.76%
CRISIL BBB	8538	0.87%	2.12%	4.19%
CRISIL BB	13570	3.75%	7.80%	11.95%
CRISIL B	12235	8.03%	15.72%	21.63%
CRISIL C	535	18.51%	31.02%	39.83%
Total	40471			

Source: CRISIL Ratings

Table A6: One-year average transition rates for long-term ratings: monthly static pools

Between 2005 and 2015									
Rating	Issuer-months	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	9785	97.66%	2.34%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	20469	0.96%	95.72%	2.76%	0.56%	0.00%	0.00%	0.00%	0.00%
CRISIL A	31352	0.00%	2.80%	91.91%	4.62%	0.32%	0.05%	0.07%	0.24%
CRISIL BBB	94518	0.00%	0.00%	2.36%	89.83%	6.50%	0.30%	0.13%	0.87%
CRISIL BB	145829	0.00%	0.00%	0.01%	4.00%	87.89%	3.87%	0.37%	3.86%
CRISIL B	130608	0.00%	0.00%	0.01%	0.04%	7.51%	84.02%	0.50%	7.92%
CRISIL C	6166	0.00%	0.00%	0.00%	0.00%	1.80%	20.45%	58.86%	18.89%
Total	438727								

Source: CRISIL Ratings

Table A7 & A8: One-year average transition rates for long-term ratings: annual static pools

Table A7: Between 1988 and 2015									
Rating	Issuer-years	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	1431	97.41%	2.59%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	3143	1.50%	93.22%	4.45%	0.64%	0.13%	0.06%	0.00%	0.00%
CRISIL A	4197	0.00%	3.17%	88.90%	5.43%	1.74%	0.10%	0.29%	0.38%
CRISIL BBB	9104	0.00%	0.03%	2.65%	88.77%	6.77%	0.43%	0.32%	1.03%
CRISIL BB	13855	0.00%	0.01%	0.01%	4.08%	87.48%	3.92%	0.43%	4.07%
CRISIL B	12277	0.00%	0.00%	0.01%	0.05%	7.66%	83.70%	0.51%	8.08%
CRISIL C	609	0.00%	0.00%	0.00%	0.16%	1.48%	18.72%	59.44%	20.20%
Total	44616								

Source: CRISIL Ratings

Table A8: Between 2005 and 2015									
Rating	Issuer-years	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	895	97.88%	2.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	1852	1.03%	95.36%	2.97%	0.65%	0.00%	0.00%	0.00%	0.00%
CRISIL A	2846	0.00%	2.88%	92.02%	4.50%	0.39%	0.04%	0.04%	0.14%
CRISIL BBB	8538	0.00%	0.00%	2.37%	89.96%	6.34%	0.27%	0.20%	0.87%
CRISIL BB	13570	0.00%	0.00%	0.01%	4.12%	87.88%	3.93%	0.32%	3.75%
CRISIL B	12235	0.00%	0.00%	0.01%	0.03%	7.68%	83.76%	0.48%	8.03%
CRISIL C	535	0.00%	0.00%	0.00%	0.00%	1.68%	21.31%	58.51%	18.51%
Total	40471								

Source: CRISIL Ratings

Table A9: One-year average transition rates for short-term ratings – monthly static pools

Between 2005 and 2015							
Rating*	Issuer-months	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	35730	97.29%	2.18%	0.21%	0.32%	0.00%	0.00%
CRISIL A1	13318	6.39%	86.59%	4.97%	0.88%	0.50%	0.67%
CRISIL A2	28037	0.05%	4.22%	87.06%	6.23%	1.67%	0.77%
CRISIL A3	56796	0.00%	0.05%	4.09%	86.14%	8.85%	0.88%
CRISIL A4	177055	0.00%	0.01%	0.02%	2.27%	92.42%	5.28%
Total	310936						

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

Source: CRISIL Ratings

Table A10 & A11: One-year average transition rates for short-term ratings – annual static pools

Table A10: Between 1988 and 2015							
Rating*	Issuer-years	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	5608	97.34%	2.12%	0.27%	0.25%	0.02%	0.00%
CRISIL A1	1591	9.30%	84.92%	4.34%	0.75%	0.31%	0.38%
CRISIL A2	2562	0.23%	4.37%	86.57%	6.21%	1.72%	0.90%
CRISIL A3	5099	0.00%	0.06%	4.24%	86.19%	8.69%	0.82%
CRISIL A4	16279	0.00%	0.01%	0.01%	2.36%	92.34%	5.28%
Total	31139						

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

Source: CRISIL Ratings

Table A11: Between 2005 and 2015							
Rating*	Issuer-years	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	3247	97.17%	2.28%	0.19%	0.37%	0.00%	0.00%
CRISIL A1	1204	6.65%	86.63%	4.98%	0.83%	0.42%	0.50%
CRISIL A2	2511	0.04%	4.26%	86.74%	6.29%	1.75%	0.92%
CRISIL A3	5096	0.00%	0.06%	4.24%	86.21%	8.69%	0.81%
CRISIL A4	16278	0.00%	0.01%	0.01%	2.36%	92.34%	5.28%
Total	28336						

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

Source: CRISIL Ratings

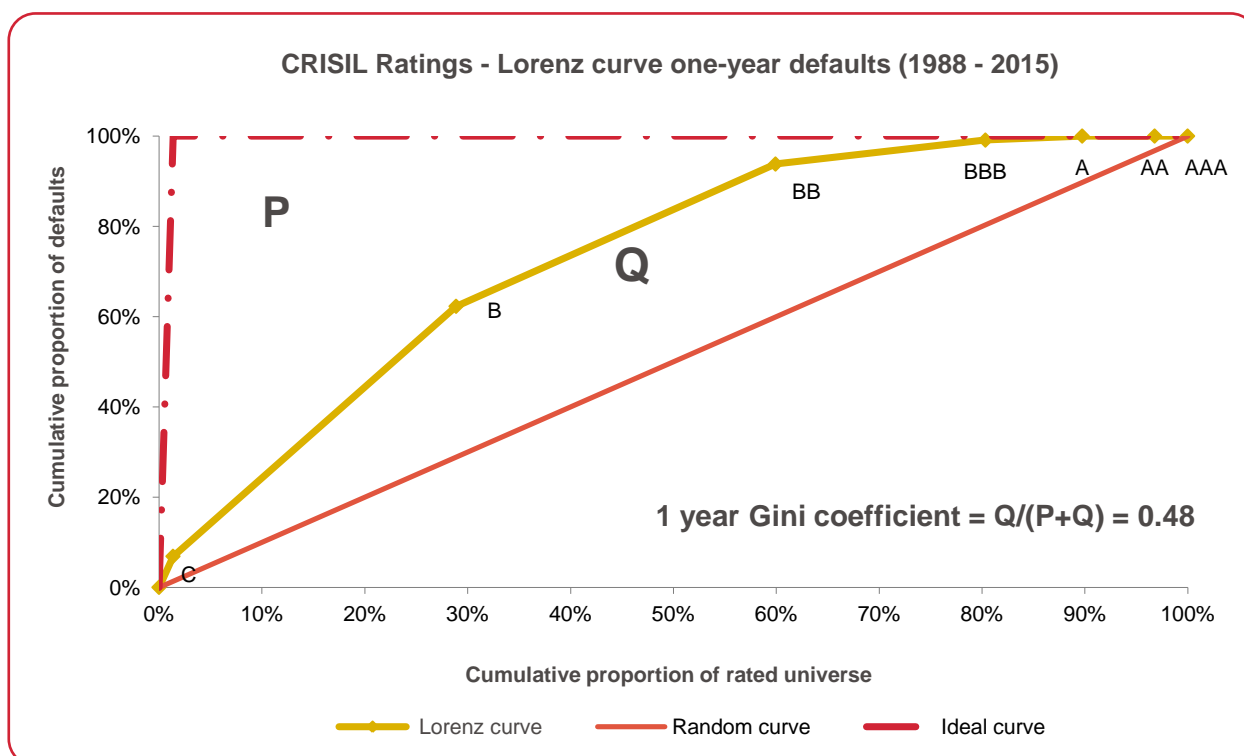
Table A12: CDRs for ratings of structured finance securities – for last 10 years

One-, two-, and three-year CDRs, between 2005 and 2015				
Rating	Issue-years	One-year	Two-year	Three-year
CRISIL AAA(SO)	2569	0.00%	0.00%	0.00%
CRISIL AA(SO)	643	0.16%	0.41%	0.82%
CRISIL A(SO)	458	1.75%	3.61%	6.43%
CRISIL BBB(SO)	408	0.25%	1.93%	2.86%
CRISIL BB(SO) and below	37	13.51%	35.14%	35.14%
Total	4115			

Source: CRISIL Ratings

Annexure 4: Cumulative default curve (Lorenz curve) and Gini coefficient for CRISIL ratings

Chart 3: Graphical representation of Gini coefficient – Lorenz curve



Source: CRISIL Ratings

CRISIL's Gini coefficient for one-year defaults for 1988-2015 was 0.48. In addition to the challenging credit environment, the following factors have impacted CRISIL's Gini coefficient:

- Typically, a 'CRISIL C' rating is assigned when the firm defaults on unrated debt, while continuing to service its rated debt on time. 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 (which recognises default as a 'single-rupee shortfall or single-day delay') and the credit culture of the Indian banking system (where non-performing assets are recognised at 90 days past due). For the Gini coefficient to improve, there needs to be a shift towards timely payments.
- More than three-fourths of CRISIL's rated portfolio consists of issuers in categories 'CRISIL BB' and lower. Not only are these categories marked by limited availability of information about the firms, but also by their inherent vulnerability to sharp rating changes.

Reading 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 companies that have defaulted (10 per cent of the defaulted population), as 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 the 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 the random curve (area 'Q' in Chart 3) in relation to the area between the ideal curve and the 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

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 in default at the end of the year), against the total proportion of issuers up to that category. For instance, in Chart 3, around 94 percent of the defaults recorded were in categories 'CRISIL BB' and lower; these categories included around 60 percent of the total ratings outstanding. In other words, the lower 60 percent of the ratings accounted for 94 percent of all defaults.

Random curve

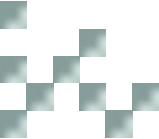
The random curve is a plot of the cumulative proportion of issuers against the cumulative proportion of defaulters, assuming that defaults are distributed equally across rating categories. In such a plot, the lower 60 percent of the issuers would account for exactly 60 percent of defaults; the plot would, 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 4.1 percent, the lower 4.1 percent of issuers would have accounted for all defaults if the ratings were perfect default predictors, and 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

In calculating default and transition rates, CRISIL moved to the monthly static pool method from the annual static pool method with 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 CDRs, 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 method 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 12 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- 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 2015)

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^{th} year of the M-month static pool

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

Illustration³: 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. If there is one default in the pool in the first year (2000), three in the second year (2001), and none in the third year (2002), and no withdrawals in any year, then:

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

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

For rating category R, the t^{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, $MDR_t^M(R)$, is defined as

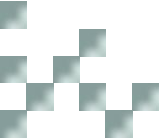
as

$$MDR_t^M(R) = P_t^M(R)/Q_t^M(R)$$

Therefore, $MDR_1^{\text{Jan-2000}}(\text{CRISIL BB}) = P_1^{\text{Jan-2000}}(\text{CRISIL BB})/Q_1^{\text{Jan-2000}}(\text{CRISIL BB}) = 1/100 = 0.01$

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.

³ 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,

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

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 obtaining the rating, the firm can move to one of three states—it can be timely on payments (and have a non-default rating outstanding), it can default on debt repayments, or it 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, as 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 it 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 t years. In the computation of t -year transition rates, ratings at a point of time and at the end of the t^{th} year are considered.

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

Table A13: Various approaches to computing default rates		
Withdrawal adjustments	<p><u>Approach 1: Full-year withdrawal adjustments</u> Exclude all ratings withdrawn during a year from the base in calculating default rates.</p> <p><u>Approach 2: Mid-year withdrawal adjustments</u> Exclude half of the ratings withdrawn during a year from the base in calculating default rates.</p> <p><u>Approach 3: No withdrawal adjustments</u> Take all ratings outstanding at the beginning of a year as the base, even though some are withdrawn during the year.</p>	CRISIL follows Approach 1, as it believes issuers whose ratings are withdrawn are not immune to the risk of default after withdrawal. More importantly, reliable information about the timeliness of debt repayment, which meets CRISIL's stringent requirements, is not available post withdrawal of the rating. Approach 1 results in the most conservative estimate of default rates among the three.
Calculating CDR	<p><u>Approach 1: Calculate CDR directly, without using marginal default rate</u> 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><u>Approach 2: Average marginal default rate methodology</u> Calculate <u>marginal default rate</u>, weigh it by sample size and accumulate it over a period to arrive at average CDR.</p>	CRISIL follows Approach 2, and takes into account only the ratings that are not withdrawn at the end of each year as base. This results in a more accurate and conservative estimate of default rates. Approach 1 is not comprehensive as it ignores a large portion of the credit history of firms which may have been rated soon after the static pool was formed.
Post-default return of a firm	<p><u>Approach 1: Treat default as an 'absorbing state'</u> 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><u>Approach 2:</u> 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 2nd year and recovers in the 3rd year, it will not be treated as a defaulted firm in the 3rd year <u>marginal default rate</u> calculation.</p>	<p>CRISIL follows Approach 1. As credit ratings are an opinion on 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, the firm is treated as a new firm, and part of a different static pool from the time its rating is revised from 'CRISIL D'.</p>
Data pooling	<p><u>Approach 1: Static pool</u> Charge defaults against all the ratings of the issuer during the period.</p> <p><u>Approach 2:</u> Charge defaults against the initial rating of the issuer.</p> <p><u>Approach 3:</u> Charge defaults against the most recent year's rating of the issuer.</p>	CRISIL follows Approach 1. Debt instruments are tradable and can be held by different investors at different points of time. As 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.

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