Ratings

CRISIL default study

Default and rating transitions in 2017

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Meaning and significance of default rates, definition of default, 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 in 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 these 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 time frames, 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 for the past 10-year periods, which are representative of the prevailing credit environment. CRISIL also publishes 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 has implications for the numeric outcome as explained in Table A16. 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 8.

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[1] 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. CRISIL is India's only rating agency to use monthly static pools in computing default and transition rates. This rigorous method significantly enhances the ability of the study 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 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.

The study also includes the performance of 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. 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.

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[1] For computation of default and transition rates, this study include ratings on all cooperative issuers, along with the ones classified in the 'Issuer not cooperating' category and have defaulted *(see Annexure 8 for details on treatment of non-cooperative issuers for computing the default statistics).*

Executive summary

The overall annual default rate for CRISIL-rated firms was 4.1% in 2017, with 364 defaults during the year. Out of more than 12,000 cooperative firms with outstanding ratings in CRISIL's portfolio as of December 2017, nearly three-fourths had ratings of 'CRISIL BB' category or lower.

It is pertinent to note that despite a decline in defaults in 2017, the overall default rate remains elevated at 4.1% (4.2% in 2016), largely because of higher proportion of ratings in lower rating categories – 'CRISIL BB' category or lower *(see Chart 1),* which are inherently vulnerable to default.

Key highlights

- The average default rates of long-term ratings were lower for 2007-2017 than for 2006-2016
- CRISIL's average default rates continue to exhibit ordinality across all rating categories—the higher rating categories have lower default rates
- No long-term instrument rated 'CRISIL AAA' has ever defaulted
- The overall annual default rate marginally fell to 4.1% in 2017, from 4.2% in the previous year
- The stability rates of long-term ratings have continued to strengthen over the years – the overall stability rate across ratings exceeded 87% for the period 2007-2017
- The stability rates for short-term ratings continue to be strong across rating categories

I. CRISIL's rating distribution

CRISIL had outstanding long-term ratings on more than 12,000 firms as of December 31, 2017, up from 900 eight years ago. The growth in portfolio has been accompanied by changes in CRISIL's rating distribution—an increasing number of ratings have been assigned in lower rating categories. Nearly three-fourths of ratings were at 'CRISIL BB' category or lower as of December 2017, as against one-fifth as of December 2008. Consequently, CRISIL's rating distribution has altered significantly, with the median rating moving to the 'CRISIL BB' category in 2017 from 'CRISIL BBB' in 2008 (*see Chart 1*).

Chart 1: Shift in CRISIL's rating distribution
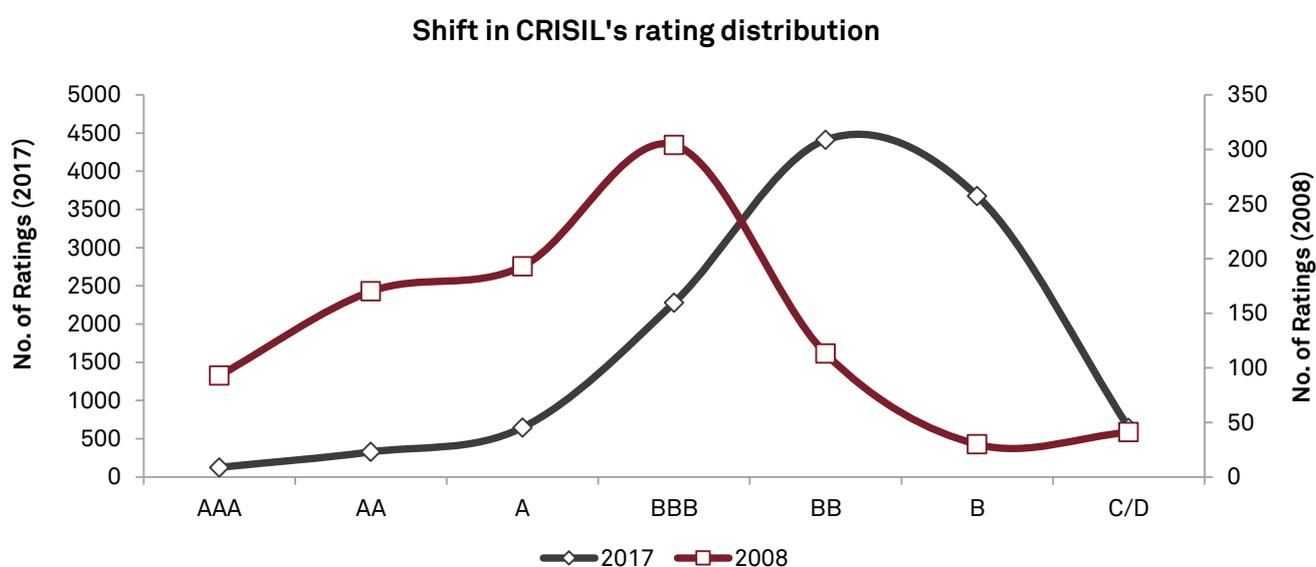
Source: CRISIL Ratings

II. Overall annual default rates since inception

Annual default rate for corporate issuers[2] remains elevated

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: Overall annual default rates
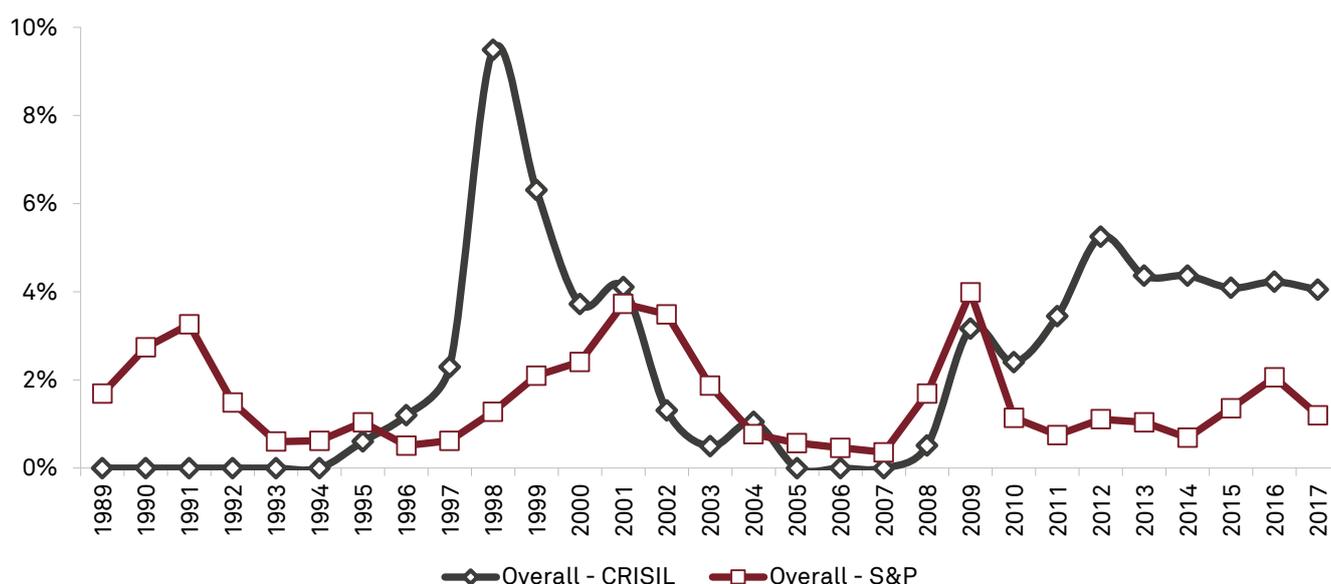
Source: CRISIL Ratings and S&P Global Ratings

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[2] The term 'corporate issuers' has been used generically—to include companies, both public and private limited, societies, trusts and partnership and proprietorship firms, across the manufacturing, financial, and infrastructure sectors—for entities that have availed of long-term ratings from CRISIL and are, therefore, part of this default study.

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 2007 to end-2017 (*see Annexure 8 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)

Rating category	Issuer-months	One-year	Two-year	Three-year
		One, two and three-year CDRs (2007-2017)		
CRISIL AAA	10,508	0.00%	0.00%	0.00%
CRISIL AA	24,798	0.02%	0.10%	0.20%
CRISIL A	44,064	0.22%	0.98%	1.90%
CRISIL BBB	138,838	0.84%	2.10%	3.89%
CRISIL BB	227,711	3.55%	7.44%	11.17%
CRISIL B	208,363	7.74%	15.25%	20.99%
CRISIL C	7,785	20.15%	32.14%	39.01%
Total	662,067			

Source: CRISIL Ratings

The average default rates (*see Table A3, Annexure 3*) since 1988 through 2017, indicating rating behaviour over a prolonged period, were 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 (*see 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 (2007-2017)

Rating category	Issuer-months	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	10,508	97.78%	2.22%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	24,798	1.19%	95.27%	3.04%	0.47%	0.00%	0.00%	0.00%	0.02%
CRISIL A	44,064	0.02%	2.75%	91.70%	4.97%	0.27%	0.03%	0.05%	0.22%
CRISIL BBB	138,838	0.00%	0.00%	2.48%	90.59%	5.78%	0.21%	0.09%	0.84%
CRISIL BB	227,711	0.00%	0.00%	0.00%	3.85%	88.27%	4.03%	0.29%	3.55%
CRISIL B	208,363	0.00%	0.00%	0.00%	0.05%	7.46%	84.25%	0.50%	7.74%
CRISIL C	7,785	0.00%	0.00%	0.00%	0.00%	1.57%	19.51%	58.77%	20.15%
Total	662,067								

Source: CRISIL Ratings

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The highlighted diagonal of Table 2 indicates the stability rates of various rating categories. During 2007-2017, around 95.3% of 'CRISIL AA' ratings remained in that category at the end of one year; 1.2% were upgraded to 'CRISIL AAA', and 3.5% were downgraded to 'CRISIL A' category or lower.

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 for the past 10 years and are representative of the prevailing credit environment. CRISIL has also published the one-year transition rates over a longer period since the first rating was assigned, which include multiple business cycles (*see Table A6, Annexure 4; for transition rates based on the annual static pools methodology, see Tables A7 and A8, Annexure 4*).

Table 3 provides the average 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 97.3% over one year, and 7.0% 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 (2007-2017)

Rating*	Issuer-months	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	40,225	97.34%	2.14%	0.21%	0.29%	0.01%	0.01%
CRISIL A1	17,354	7.02%	86.06%	5.31%	0.70%	0.39%	0.52%
CRISIL A2	39,231	0.07%	4.24%	87.67%	5.93%	1.39%	0.70%
CRISIL A3	81,726	0.00%	0.05%	4.28%	86.92%	7.89%	0.85%
CRISIL A4	264,854	0.00%	0.00%	0.01%	2.20%	92.74%	5.04%
Total	443,390						

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

CRISIL has also published the one-year transition rates over a longer period, since the first rating was assigned, which include multiple business cycles (*see Table A9, Annexure 4; for transition rates based on the annual static pools methodology, see Tables A10 and A11, Annexure 4*).

Movement in stability rates over the past four years for long-term ratings

Stability rates indicate the proportion of ratings that have remained unchanged over a given time horizon. CRISIL's stability rates remained high for investment-grade ratings and have increased over the years, indicating lower volatility in these categories. Table 4 indicates CRISIL's one-year stability rates over the past decade. The stability rate for 'CRISIL BBB' and higher categories has increased in 2007-2017 when compared with 2006-2016. The stability rates for 'CRISIL AAA' and 'CRISIL AA' ratings, for instance, have consistently exceeded 97% and 95%, respectively, while those for 'CRISIL A' and 'CRISIL BBB' ratings have exceeded 91% and 89%, respectively.

Table 4: Average one-year stability rates for various 10-year periods

Period	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB
2007-2017	**97.8%**	**95.3%**	**91.7%**	**90.6%**
2006-2016	97.6%	95.3%	91.6%	90.2%
2005-2015	97.7%	95.7%	91.9%	89.8%
2004-2014	97.9%	95.4%	91.2%	89.1%

Source: CRISIL Ratings

Table 5: Average one-year stability rates since 1988

Period	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB
1988-2017	**97.5%**	**93.5%**	**89.2%**	**89.7%**
1988-2016	97.4%	93.3%	88.9%	89.2%
1988-2015	97.3%	93.3%	88.7%	88.6%
1988-2014	97.3%	93.0%	87.8%	87.6%

Source: CRISIL Ratings

Table 5 indicates the average one-year stability rates of each rating category over several periods since 1988; these continue to display higher stability each year.

IV. For structured finance instruments

CRISIL pioneered the rating of several complex structured finance instruments in the Indian market. Its dataset comprises 5,786 issue years, including 3,023 issue years for retail asset-backed securities (ABS) and retail mortgage-backed securities (MBS) spanning over 25 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 during 1993[3]-2017; *see Table A12 in Annexure 5 for default rates during 2007-17.*

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

Rating category	One, two and three-year CDRs (1993-2017)			
	Issue-years	One-year	Two-year	Three-year
CRISIL AAA(SO)	3,447	0.03%	0.12%	0.19%
CRISIL AA(SO)	895	0.11%	0.28%	0.52%
CRISIL A(SO)	833	0.96%	3.79%	7.31%
CRISIL BBB(SO)	507	1.18%	3.46%	4.16%
CRISIL BB(SO) and below	104	26.92%	39.45%	47.02%
Total	**5,786**			

Source: CRISIL Ratings

The one-year CDR for instruments rated 'CRISIL AAA (SO)' is 0.03%. That's 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.

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[3] 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 the annual static pool methodology as defaults in structured finance securities have been rare.

One-year transition rates

Around 60% of all structured finance ratings – 3,447 of 5,786 issue years – are rated 'CRISIL AAA (SO)' and show a high stability rate of over 98%. Table 7 shows the average one-year transition rates during 1993-2017 for structured finance instruments.

Table 7: CRISIL's average one-year transition rates for structured finance instruments (1993-2017)

Rating category	Issue-years	CRISIL AAA(SO)	CRISIL AA(SO)	CRISIL A(SO)	CRISIL BBB(SO)	CRISIL BB(SO) and below	CRISIL D(SO)
CRISIL AAA(SO)	3,447	98.40%	1.39%	0.15%	0.00%	0.03%	0.03%
CRISIL AA(SO)	895	5.59%	91.28%	2.91%	0.11%	0.00%	0.11%
CRISIL A(SO)	833	1.20%	4.56%	88.36%	1.80%	3.12%	0.96%
CRISIL BBB(SO)	507	2.37%	1.78%	11.83%	80.47%	2.37%	1.18%
CRISIL BB(SO) and below	104	1.92%	1.92%	3.85%	10.58%	54.81%	26.92%
Total	5,786						

Source: CRISIL Ratings

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

Movement in stability rates over the past four years

Table 8: Average one-year stability rates of structured finance ratings since 1993

Period	CRISIL AAA(SO)	CRISIL AA(SO)	CRISIL A(SO)	CRISIL BBB(SO)
1993-2017	**98.4%**	**91.3%**	**88.4%**	**80.5%**
1993-2016	98.4%	91.5%	88.6%	80.4%
1993-2015	98.3%	91.1%	88.7%	81.8%
1993-2014	98.3%	90.6%	90.6%	80.6%

Source: CRISIL Ratings

Table 9: Average one-year stability rates of structured finance ratings for various 10-year periods

Period	CRISIL AAA(SO)	CRISIL AA(SO)	CRISIL A(SO)	CRISIL BBB(SO)
2007-2017	**98.3%**	**92.2%**	**86.9%**	**79.5%**
2006-2016	98.3%	93.1%	88.2%	80.0%
2005-2015	98.3%	92.7%	89.1%	82.0%
2004-2014	98.4%	91.8%	89.0%	80.8%

Source: CRISIL Ratings

CRISIL-rated structured finance instruments exhibit high stability rates. India's securitisation market has largely been '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. One-year transition rates of retail ABS and MBS issuances

CRISIL's database of retail ABS and MBS transactions consists of 3,023 issue years across 25 years (1993-2017). 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 1993-2017. '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%.

Table 10: CRISIL's average one-year transition rates for ABS and MBS ratings (1993-2017)

Rating category	Issue-years	CRISIL AAA(SO)	CRISIL AA(SO)	CRISIL A(SO)	CRISIL BBB(SO)	CRISIL BB(SO) and below	CRISIL D(SO)
CRISIL AAA(SO)	2,293	98.34%	1.44%	0.22%	0.00%	0.00%	0.00%
CRISIL AA(SO)	233	15.45%	81.97%	2.15%	0.43%	0.00%	0.00%
CRISIL A(SO)	117	8.55%	11.97%	72.65%	4.27%	2.56%	0.00%
CRISIL BBB(SO)	358	3.35%	2.51%	13.69%	78.77%	0.84%	0.84%
CRISIL BB(SO) and below	22	9.09%	9.09%	9.09%	18.18%	40.91%	13.64%
Total	**3,023**						

Source: CRISIL Ratings

The announcement of demonetisation in November 2016 impacted loan repayments in various retail asset classes. The impact was most pronounced in the microfinance industry, severely affecting collections in certain geographies. As a result, a few instruments, rated 'CRISIL BBB (SO)' category and lower, backed by microfinance pools defaulted, as collection from underlying assets and available credit enhancement was insufficient to cover future investor payouts.

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 declined marginally in 2017. Despite a decrease in number of defaults, the overall default rate remains high, largely because of higher proportion of ratings in lower rating categories—'CRISIL BB' category or lower—which are inherently vulnerable to default. Average default rates were, therefore, lower across rating categories for 2007-2017 than for 2006-2016.

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 almost three 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 30 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 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 2,629 defaults by issuers with long-term ratings. Over the past 30 years, five industries (textiles, distributors, food products, metal and mining, and real estate development) accounted for around 47% 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 30 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	2016	2017	Total
Textiles- Apparel & Luxury Goods		1	1	3	1	3	1	1		1					3	8	12	26	50	45	53	46	55	52	362
Distributors																1	3	6	31	35	45	54	46	30	251
Food Products				1	2	3					1					3	6	7	23	30	44	43	51	35	249
Metals & Mining			2	1	6	2		2	2		1					2	6	28	34	31	23	35	19	23	217
Real Estate Development						1			1							1	2	4	7	14	35	25	38	35	163
Construction & Engineering				1				1								3	4	4	16	21	28	20	25	23	146
Machinery				2	2	1										3	3	6	17	19	18	20	27	16	134
Diversified Consumer Services																1	1	8	10	22	11	16	17	9	95
Containers & Packaging				2	1											1	3	1	13	10	6	12	12	7	68
Hotels Restaurants & Leisure																2	5	7	16	10	8	4	6	9	68
Specialty Retail																		2	8	11	13	13	9	16	72
Pharmaceuticals			1		1	2		1								4	2	5	7	4	13	7	4	3	54
Auto Components			1		1	1		1								1	1	2	11	9	6	5	10	9	58
Construction Materials			1		2	2		1		1						2	1	3	8	12	5	3	6	11	58
Electrical Equipment						1	1										2	7	6	11	9	7	2	2	48
Independent Power Producers & Energy Traders									1					1		1	3	4	7	10	6	5	6	13	57
Chemicals			1	2	2		3	3	1								1	1	6	3	4	7	6	8	48
Paper & Forest Products			1	1	1									1		1	5	4	4	6	4	6	4	4	42
Building Products														1			2	9	1	3	8	10	9		43
Household Durables		1	1		3					1						3	1	5	2	4	5	4	3		33
Commercial Services & Supplies						1										3	1	5	2	4	7	7	5		35
Beverages																	1	4	5	3	3	2	5	2	25
Health Care Providers & Services																	1	2	4	4	2	6	3	6	28
Road & Rail				1													5	4	3	4	2	2	2		23
Non Banking Financial Company				4	12	2											2							1	21
Electronic Equipment Instruments & Components								1								1		4	1	2	8	3		6	26
Media					1												1	5	2	4	4	3	3		23
Trading Companies & Distributors																	3		2	3	5	7	9		29
Transportation Infrastructure																1	2		4	5	4	2	1	2	21
Others				1	8	2	2	0	0	0	1	0	0	0	0	1	4	11	25	17	8	23	18	11	132
Total Defaults	**0**	**2**	**7**	**13**	**45**	**27**	**12**	**11**	**3**	**1**	**3**	**0**	**0**	**0**	**6**	**43**	**68**	**161**	**341**	**346**	**378**	**395**	**403**	**364**	**2629**
Oustanding 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	12979	12114	
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%	4.2%	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 as on December 31, 1994
Source: CRISIL Ratings

The lowest number of defaults, in absolute terms, over the past four years was in 2017. Moreover, despite a sharp decline in number of defaults, the annual default rate remains high due to a drop in the outstanding ratings compared with a few previous years. The higher default rates during 1997-99 were because of factors such as economic slowdown and structural/regulatory changes, especially in the financial sector. Textiles witnessed the largest number of defaults in 2017 as well, in line with observed past trends.

Annexure 2: Analysis of defaults: Time to default

Higher ratings farther away from default

Analysis of the 2,629 defaults (*see Table A2*) indicates that the higher-rated firms were farther away from default than lower-rated ones. Issuers that were rated in the 'CRISIL B' or 'CRISIL C' categories and which defaulted, did so in 16 months; issuers rated 'CRISIL A' and 'CRISIL AA' and which defaulted, did so in 49 and 56 months, respectively. No issuers in the 'CRISIL AAA' rating category defaulted.

Table A2: Average time to default (for defaulted firms) in number of months

Rating category	Months to default
CRISIL AAA	No defaults
CRISIL AA	56
CRISIL A	49
CRISIL BBB	35
CRISIL BB	21
CRISIL B	16
CRISIL C	16

Source: CRISIL Ratings

Annexure 3: Comparative default rates for different periods

Table A3: CDRs for long-term ratings (1988-2017) – monthly static pools

Rating category	Issuer-months	One-year	Two-year	Three-year
	One, two and three-year CDRs (1988-2017)			
CRISIL AAA	19,077	0.00%	0.00%	0.00%
CRISIL AA	42,818	0.04%	0.27%	0.69%
CRISIL A	60,900	0.47%	1.96%	3.95%
CRISIL BBB	145,950	0.99%	2.55%	4.71%
CRISIL BB	231,043	3.76%	7.75%	11.58%
CRISIL B	208,879	7.76%	15.31%	21.08%
CRISIL C	8,653	21.41%	34.27%	41.66%
Total	717,320			

Source: CRISIL Ratings

Table A4: CDRs for long-term ratings (2007-2017) – annual static pools

Rating category	Issuer-years	One-year	Two-year	Three-year
	One, two and three-year CDRs (2007-2017)			
CRISIL AAA	962	0.00%	0.00%	0.00%
CRISIL AA	2,223	0.00%	0.05%	0.12%
CRISIL A	3,907	0.18%	1.10%	2.07%
CRISIL BBB	12,213	0.93%	2.07%	3.91%
CRISIL BB	20,175	3.61%	7.47%	11.28%
CRISIL B	18,176	7.93%	15.49%	21.28%
CRISIL C	670	19.70%	33.99%	41.98%
Total	58,326			

Source: CRISIL Ratings

Table A5: CDRs for long-term ratings (1988-2017) – annual static pools

Rating category	Issuer-years	One-year	Two-year	Three-year
	One, two and three-year CDRs (1988-2017)			
CRISIL AAA	1,643	0.00%	0.00%	0.00%
CRISIL AA	3,668	0.00%	0.19%	0.59%
CRISIL A	5,307	0.36%	1.93%	3.88%
CRISIL BBB	12,797	1.04%	2.46%	4.67%
CRISIL BB	20,464	3.83%	7.80%	11.70%
CRISIL B	18,218	7.96%	15.56%	21.37%
CRISIL C	744	20.97%	35.80%	44.57%
Total	62,841			

Source: CRISIL Ratings

Annexure 4: Comparative transition rates for different periods

One-year transition rates for long-term ratings

Table A6: Average one-year transition rates (1988-2017) – monthly static pools

Rating category	Issuer-months	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	19,077	97.49%	2.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	42,818	1.53%	93.48%	4.30%	0.45%	0.15%	0.03%	0.02%	0.04%
CRISIL A	60,900	0.01%	3.06%	89.24%	5.59%	1.33%	0.10%	0.20%	0.47%
CRISIL BBB	145,950	0.00%	0.03%	2.65%	89.68%	6.11%	0.34%	0.20%	0.99%
CRISIL BB	231,043	0.00%	0.01%	0.00%	3.84%	87.98%	4.01%	0.39%	3.76%
CRISIL B	208,879	0.00%	0.00%	0.00%	0.05%	7.44%	84.22%	0.52%	7.76%
CRISIL C	8,653	0.00%	0.00%	0.00%	0.14%	1.41%	17.55%	59.48%	21.41%
Total	717,320								

Source: CRISIL Ratings

Table A7: Average one-year transition rates (2007-2017) – annual static pools

Rating category	Issuer-years	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	962	97.92%	2.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	2,223	1.39%	94.96%	3.10%	0.54%	0.00%	0.00%	0.00%	0.00%
CRISIL A	3,907	0.03%	2.79%	91.91%	4.71%	0.33%	0.03%	0.03%	0.18%
CRISIL BBB	12,213	0.00%	0.00%	2.52%	90.54%	5.66%	0.20%	0.15%	0.93%
CRISIL BB	20,175	0.00%	0.00%	0.01%	3.97%	88.16%	4.00%	0.25%	3.61%
CRISIL B	18,176	0.00%	0.00%	0.01%	0.04%	7.85%	83.67%	0.51%	7.93%
CRISIL C	670	0.00%	0.00%	0.00%	0.00%	1.34%	20.45%	58.51%	19.70%
Total	58,326								

Source: CRISIL Ratings

Table A8: Average one-year transition rates (1988-2017) – annual static pools

Rating category	Issuer-years	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	1,643	97.57%	2.43%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	3,668	1.64%	93.35%	4.31%	0.55%	0.11%	0.05%	0.00%	0.00%
CRISIL A	5,307	0.02%	3.07%	89.49%	5.35%	1.41%	0.08%	0.23%	0.36%
CRISIL BBB	12,797	0.00%	0.02%	2.71%	89.67%	5.99%	0.33%	0.23%	1.04%
CRISIL BB	20,464	0.00%	0.01%	0.01%	3.94%	87.89%	3.99%	0.32%	3.83%
CRISIL B	18,218	0.00%	0.00%	0.01%	0.05%	7.83%	83.63%	0.52%	7.96%
CRISIL C	744	0.00%	0.00%	0.00%	0.13%	1.21%	18.41%	59.27%	20.97%
Total	62,841								

Source: CRISIL Ratings

Ratings

One-year transition rates for short-term ratings

Table A9: Average one-year transition rates (1988-2017) – monthly static pools

Rating*	Issuer-months	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	74,615	97.39%	2.11%	0.29%	0.19%	0.02%	0.01%
CRISIL A1	22,174	9.41%	84.48%	4.75%	0.60%	0.30%	0.46%
CRISIL A2	39,831	0.20%	4.38%	87.49%	5.87%	1.37%	0.69%
CRISIL A3	81,748	0.00%	0.05%	4.28%	86.93%	7.89%	0.86%
CRISIL A4	264,861	0.00%	0.00%	0.01%	2.20%	92.74%	5.04%
Total	483,229						

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

Source: CRISIL Ratings

Table A10: Average one-year transition rates (2007-2017) – annual static pools

Rating*	Issuer-years	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	3,632	97.38%	2.06%	0.22%	0.33%	0.00%	0.00%
CRISIL A1	1,545	6.93%	86.28%	5.44%	0.65%	0.32%	0.39%
CRISIL A2	3,450	0.12%	4.32%	87.59%	5.80%	1.36%	0.81%
CRISIL A3	7,144	0.00%	0.07%	4.45%	86.86%	7.78%	0.84%
CRISIL A4	23,181	0.00%	0.00%	0.01%	2.29%	92.58%	5.10%
Total	38,952						

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

Source: CRISIL Ratings

Table A11: Average one-year transition rates (1988-2017) – annual static pools

Rating*	Issuer-years	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	6,414	97.55%	1.95%	0.27%	0.22%	0.02%	0.00%
CRISIL A1	1,972	8.98%	85.09%	4.77%	0.61%	0.25%	0.30%
CRISIL A2	3,508	0.26%	4.48%	87.40%	5.73%	1.34%	0.80%
CRISIL A3	7,147	0.00%	0.07%	4.45%	86.85%	7.78%	0.85%
CRISIL A4	23,182	0.00%	0.00%	0.01%	2.29%	92.58%	5.10%
Total	42,223						

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

Source: CRISIL Ratings

Annexure 5: Comparative default rates for structured finance securities

Table A12: CDRs for ratings of structured finance securities – (2007-2017)

Rating category	One, two and three-year CDRs (2007-2017)			
	Issue-years	One-year	Two-year	Three-year
CRISIL AAA(SO)	2,114	0.00%	0.00%	0.00%
CRISIL AA(SO)	702	0.14%	0.37%	0.74%
CRISIL A(SO)[4]	459	1.74%	5.56%	11.29%
CRISIL BBB(SO)	474	1.27%	3.80%	4.63%
CRISIL BB(SO) and below	72	27.78%	53.27%	76.63%
Total	3,821			

Source: CRISIL Ratings

Annexure 6: Comparative default and transition rates for past 10-year periods– including ratings on non-cooperative issuers[5]

Table A13: CDRs for long-term ratings (2007-2017) – monthly static pools

Rating category	One, two and three-year CDRs (2007-2017)			
	Issuer-months	One-year	Two-year	Three-year
CRISIL AAA	10,508	0.00%	0.00%	0.00%
CRISIL AA	24,804	0.02%	0.10%	0.20%
CRISIL A	44,127	0.22%	0.98%	1.90%
CRISIL BBB	139,747	0.84%	2.09%	3.86%
CRISIL BB	233,845	3.46%	7.25%	10.87%
CRISIL B	216,610	7.44%	14.70%	20.20%
CRISIL C	8,023	19.56%	31.34%	38.05%
Total	677,664			

Source: CRISIL Ratings

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[4] Higher default rates in 'CRISIL A(SO)'category are largely on account of defaults on multiple instruments of two issuers, backed by the same guarantor.

[5] For computation of these default statistics, the issuers which were classified under 'Issuer not cooperating' category were considered as a part of the static pools, and were not treated as withdrawals upon their classification.

Ratings

Table A14: Average one-year transition rates for long term ratings (2007-2017) – monthly static pools

Rating category	Issuer-months	CRISIL AAA	CRISIL AA	CRISIL A	CRISIL BBB	CRISIL BB	CRISIL B	CRISIL C	CRISIL D
CRISIL AAA	10,508	97.78%	2.22%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
CRISIL AA	24,804	1.19%	95.27%	3.04%	0.47%	0.00%	0.00%	0.00%	0.02%
CRISIL A	44,127	0.02%	2.74%	91.64%	5.02%	0.29%	0.03%	0.05%	0.22%
CRISIL BBB	139,747	0.00%	0.00%	2.47%	90.16%	6.11%	0.33%	0.09%	0.84%
CRISIL BB	233,845	0.00%	0.00%	0.00%	3.75%	87.13%	5.36%	0.29%	3.46%
CRISIL B	216,610	0.00%	0.00%	0.00%	0.04%	7.19%	84.83%	0.49%	7.44%
CRISIL C	8,023	0.00%	0.00%	0.00%	0.00%	1.52%	18.98%	59.94%	19.56%
Total	**677,664**								

Source: CRISIL Ratings

Table A15: Average one-year transition rates for short term ratings (2007-2017) – monthly static pools

Rating*	Issuer-months	CRISIL A1+	CRISIL A1	CRISIL A2	CRISIL A3	CRISIL A4	CRISIL D
CRISIL A1+	40,233	97.34%	2.15%	0.21%	0.29%	0.01%	0.01%
CRISIL A1	17,385	7.01%	86.06%	5.30%	0.70%	0.41%	0.52%
CRISIL A2	39,304	0.07%	4.23%	87.54%	5.95%	1.50%	0.70%
CRISIL A3	82,205	0.00%	0.05%	4.26%	86.55%	8.29%	0.85%
CRISIL A4	271,662	0.00%	0.00%	0.01%	2.15%	92.91%	4.92%
Total	**450,789**						

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

Source: CRISIL Ratings

Annexure 7: Lorenz curve and Gini coefficient for CRISIL Ratings

Chart 3: Graphical representation of Gini coefficient – Lorenz curve

CRISIL Ratings - Lorenz curve
One-year defaults (1988 - 2017)

1 -Yr Gini Coeff. = Q/(P+Q) = 0.46
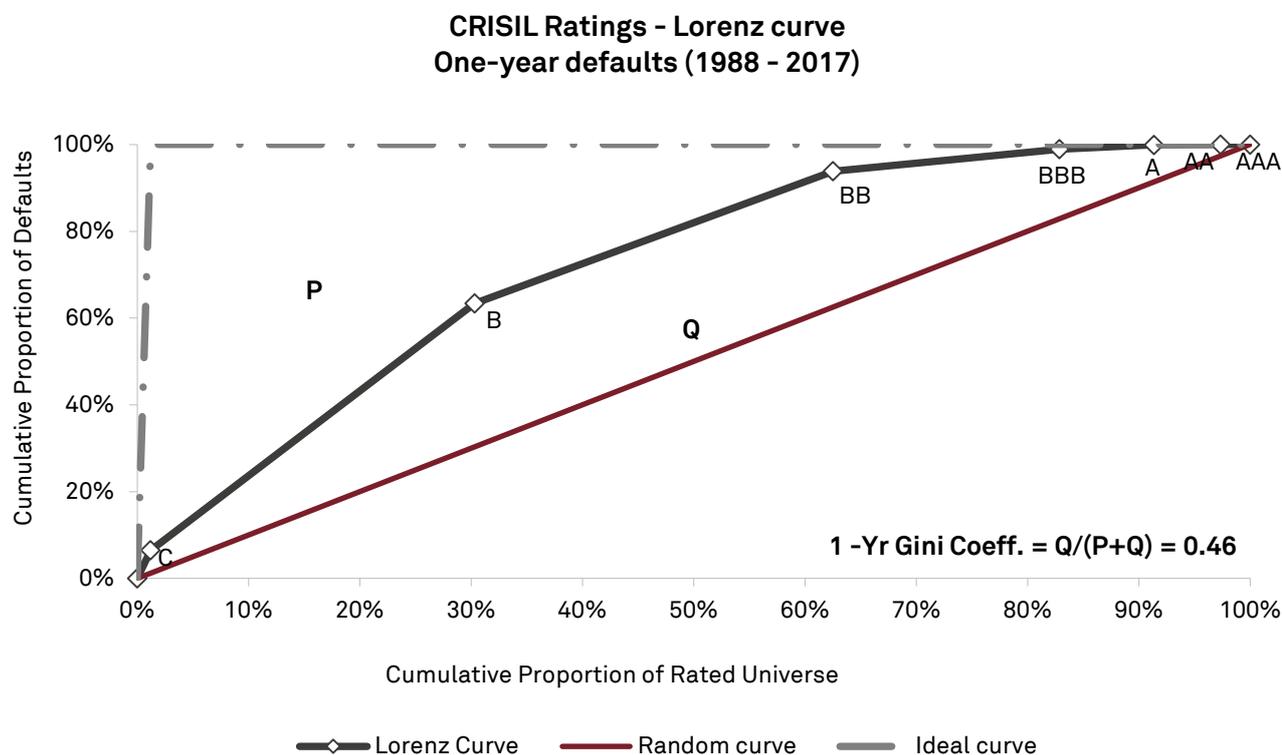
Source: CRISIL Ratings

CRISIL's Gini coefficient for one-year defaults for 1988-2017 was 0.46. In addition to the challenging credit environment, the following factors have impacted the coefficient:

a. 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 'CRISIL C' category—the lowest non-default rating category.

b. 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.

c. 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%). For a randomly selected set of 100 companies (10% of the rated population), one would expect to have three companies that have defaulted (10% 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 this example, the lowest 30 ratings should capture all the defaults. This is represented by the ideal curve.

As 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 category-wise defaults (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% of the defaults recorded were in categories 'CRISIL BB' and lower; these categories included nearly 63% of the total ratings outstanding. In other words, the lower 63% of the ratings accounted for 94% 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 63% of the issuers would account for exactly 63% 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%, the lower 4.1% 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 8: 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 similar 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 and so on.. 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.

Ratings

Weighted average marginal default rate

Notations:

For CRISIL's data,

M: Month of formation of the static pool (1988-2017)

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 tth year of the M-month static pool

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

Illustration[6]: 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 (2001), and none in the third (2002), and no withdrawals in any year, then:

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

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

For rating category R, the tth 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

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

Therefore, $MDR_1^{Jan-2000}$ (CRISIL BB) = $P_1^{Jan-2000}$ (CRISIL BB)/$Q_1^{Jan-2000}$(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.

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[6] 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, the cumulative probability of a firm defaulting is calculated as follows:

The cumulative probability of a firm defaulting by the end of (t+1) years	=	[	Cumulative probability of the firm defaulting by the end of t years + Probability of the firm defaulting in the (t+1)th year	]

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

Probability of the firm defaulting in the (t+1)th year	=	[	Probability of the firm not defaulting until the end of the tth year * Marginal probability of the firm defaulting in the (t+1)th year	]

Now,

Probability of the firm not defaulting until the end of the tth year	=	1- Cumulative probability of the firm defaulting by the end of t years

Hence,

Probability of the firm defaulting in (t+1)th year	=	[	(1- Cumulative probability of the firm defaulting by the end of t years) * Marginal probability of the firm defaulting in the (t+1)th year	]

Therefore, returning to the first expression,

The cumulative probability that a firm defaults by the end of (t+1) years	=	Cumulative probability of the firm defaulting by the end of t years	+	[	(1- Cumulative probability of the firm defaulting by the end of t years) * (Marginal probability of the firm defaulting in (t+1)th year)	]

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

$CPD_t(R) = MDR_t(R)$;   for t = 1

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

Withdrawal adjustment

Within one year from obtaining the rating, the firm can move to one of three states: timely payments (non-default rating outstanding), default on debt repayment, or full repayment of the debt and withdrawal of 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 firms on which the rating is withdrawn is an appropriate measure of marginal default probability. As mentioned earlier, $Q_t^M(R)$ is also adjusted for 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:

$Q_t^M(R)$ = Number of firms in the static pool formed at the beginning of month M with rating category R

> *less* Number of defaults till the end of period (t-1)

> *less* Number of withdrawn firms until the end of period t

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. 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 on which the rating has been 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 tth year are considered.

How CRISIL treats non-cooperative issuers

The Securities and Exchange Board of India (SEBI) circular, *'Enhanced standards for credit rating agencies (CRAs)'* issued on November 1, 2016, makes it mandatory for CRAs to continue to rate non-cooperative issuers on a best-effort basis. To highlight the non-cooperation, SEBI has insisted that all such ratings will use the suffix 'Issuer Not Cooperating'[7]. CRISIL uses the '*Framework for assessing information adequacy risk*' for arriving at credit ratings that are commensurate with the extent of information received from issuers that CRISIL categorises as non-cooperative.

For computation of default and transition rates in this study, all such issuers (except defaulters) are removed from the static pools in the subsequent months (treatment similar to a withdrawn rating), because such ratings lack a forward-looking perspective as they are arrived at without any management interaction, and are based on best available, limited, or dated, information about the firm.

In case a firm defaults post its classification under issuer not cooperating category, it is treated as a default from its last cooperative rating. For example, ABC had an outstanding rating of 'CRISIL BB' as on December 31, 2016. The company became non-cooperative and the rating was subsequently migrated to 'CRISIL B – Issuer not cooperating' in March 2017. Then, in June 2017, assume that CRISIL came to know of delays in repayment (from the banker or other public sources) by ABC, and hence the rating was downgraded to 'CRISIL D'. Therefore, for computation of default statistics, ABC would be considered to have defaulted from 'CRISIL BB' and not 'CRISIL B'.

For the sake of completion, CRISIL has also published the default and transition statistics including ratings on non-cooperative issuers in *Annexure 6*. It should be noted that for the computation of these default and transition statistics, the static pool for December 2016 does not include non-cooperative issuers, as SEBI had mandated all CRAs to categorise issuers in issuer not cooperating category from January 2017. However, from 2018, all non-cooperative issuers will form a part of each month's static pool.

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[7] SEBI had, in its original circular, directed CRAs to append 'Issuer did not cooperate; based on best available information' with the rating symbol in the same font size for non-cooperative issuers. However, in joint representation to SEBI, CRAs clarified that, for sake of brevity, they will use the suffix 'Issuer not cooperating'. This will be followed by an asterisk mark, which will read as 'Issuer did not cooperate; based on best available information'.

Ratings

Table A16: Various approaches to computing default rates

Withdrawal adjustments	**Approach 1: Full-year withdrawal adjustments** Exclude all ratings withdrawn during a year from the base in calculating default rates. **Approach 2: Mid-year withdrawal adjustments** Exclude half of the ratings withdrawn during a year from the base in calculating default rates. **Approach 3: No withdrawal adjustments** Take all ratings outstanding at the beginning of a year as the base, even though some are withdrawn during the year.	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	**Approach 1: Calculate CDR directly, without using marginal default rate** Calculate CDR over a period as a ratio of the number of firms defaulting to the number of firms at the beginning of the period, ignoring intra-period withdrawals. **Approach 2: Average marginal default rate methodology** Calculate marginal default rate, weigh it by sample size and accumulate it over a period to arrive at average CDR.	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	**Approach 1: Treat default as an 'absorbing state'** 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. **Approach 2:** 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 second year and recovers in the third year, it will not be treated as a defaulted firm in the third year marginal default rate calculation.	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'. If a firm emerges from default and has a non-default rating on its debt instruments, it is treated as a new firm, and part of a different static pool from the time its rating is revised from 'CRISIL D'.

| **Data pooling** | **Approach 1: Static pool**
Charge defaults against all the ratings of the issuer during the period.

Approach 2: Charge defaults against the initial rating of the issuer.

Approach 3: Charge defaults against the most recent year's rating of the issuer. | 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. |

Ratings

Notes

About CRISIL Limited

CRISIL is a leading, agile and innovative global analytics company driven by its mission of making markets function better.

It is India's foremost provider of ratings, data, research, analytics and solutions, with a strong track record of growth, culture of innovation and global footprint.

It has delivered independent opinions, actionable insights, and efficient solutions to over 100,000 customers.

It is majority owned by S&P Global Inc, a leading provider of transparent and independent ratings, benchmarks, analytics and data to the capital and commodity markets worldwide.

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