

Default, Transition, and Recovery:

# 2019 Annual Taiwan Ratings Corp. Corporate Default And Rating Transition Study

June 1, 2020

## Key Takeaways

- Ratings stability among Taiwan Ratings Corp. (TRC)'s corporate ratings--as measured by the percentage of issuers with the same ratings at the end of the year as at the beginning--rose in 2019 to 88.4% from 85.6%, with a 21-year weighted average of 77.4% stability.
- Upgrades fell to 4.1% from 10.8%, and downgrades climbed to 3.4% from zero. There were no defaults for the third consecutive year.
- TRC's ratings continue to show a clear correspondence between rating and default remoteness, with default rates among investment-grade ratings well below those of speculative-grade ratings across all timeframes--consistent with the performance of S&P Global Ratings' (S&PGR) global scale ratings.

Among corporate entities and financial services companies rated by TRC, the upgrade ratio (the proportion of upgrades among total rating actions) in 2019 fell by more than half, to 4.1% from 10.8%, while downgrades rose to 3.4% from zero in 2018. Ratings stability was up to 88.4%--higher than the historical weighted average of 77.4%.

This default and rating transition study examines the record of the 316 corporate issuer credit ratings that TRC has assigned since operations began in 1998. We primarily measure ratings migration over time and provide quantitative measures of ratings distribution and movement. Ratings covered in this study are those on Taiwan-based obligors in the nonfinancial, utility, insurance, and financial services sectors. These include public and confidentially rated entities, as well as those with ratings that were later withdrawn. The negative relationships between higher ratings and both ratings volatility and default frequency are consistent with those observed in other S&P Global Ratings Research default studies.

The default risks for S&P Global Ratings' global scale ratings and the ratings on TRC's scale, which is a national scale, differ. National scale credit ratings are calibrated to better distinguish the relative credit risk within a country. (S&PGR affirmed the rating on the government of Taiwan at 'AA-/A-1+' with a stable outlook in April 2020.) Because of the differences in the two ratings scales, we do not make any direct comparisons between S&PGR's and TRC's ratings in this report. But generally, both scales display the same principle: higher ratings exhibit lower default rates and greater stability than lower ratings.

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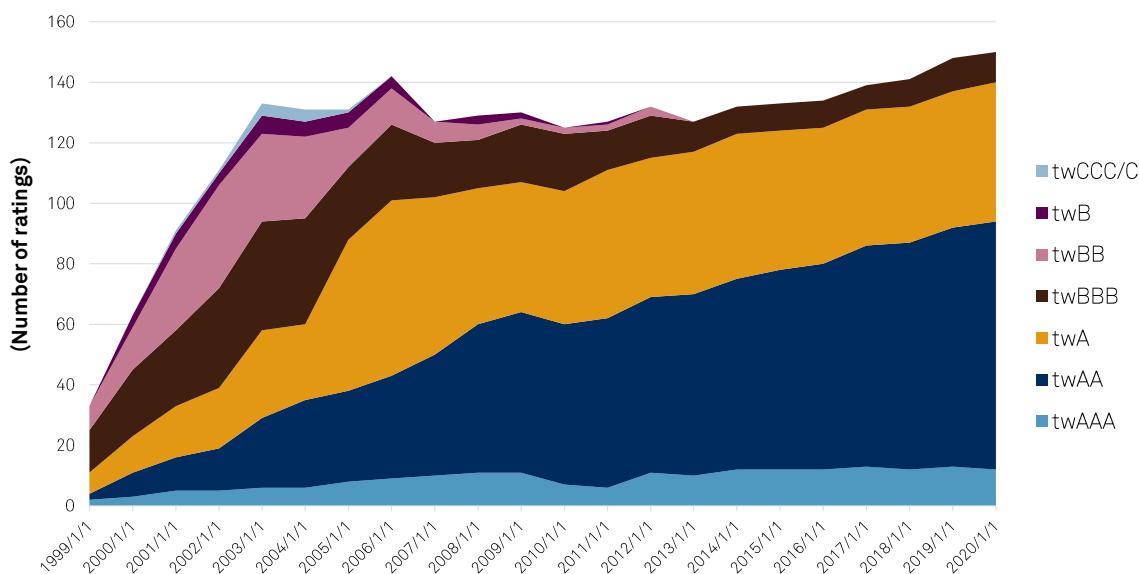
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The Taiwanese economy grew 2.7% in 2019, and our current prediction for 2020 is for the economy to decline by 1.2%, followed by a growth of 4% in 2021 (see "Up Next: The Complicated Transition From COVID-19 Lockdown," published April 16, 2020, on RatingsDirect).

The number of TRC ratings on corporate and financial services firms (including insurance companies) has been small but meaningful over time, starting at 33 active ratings in 1999 and increasing to 150 by the start of 2020. Historically, TRC corporate ratings have been heavily skewed toward investment grade ('twBBB-' or higher), and this trend has only been increasing (see chart 1). In fact, for the eighth year in a row, all TRC corporate and financial services ratings were investment grade at the start of 2020. Speculative-grade ('twBB+' or lower) TRC ratings have been steadily decreasing as a portion of all of its ratings since they peaked at 36% at the start of 2001.

Chart 1

### Taiwan National Scale Corporate Rating Distribution



Data are as of Jan. 1. Source: S&P Global Fixed Income Research. Copyright © by Taiwan Ratings Corp. All rights reserved.

### Ratings Move Downward In 2019

To analyze rating actions during the year, we look at the ratings at the start and end of the year. In 2019, there were six upgrades (down from 15) and five downgrades (up from zero) with no defaults (see table 1). This was the third year in a row with no defaults TRC ratings. Ratings stability rose to 88.4% in 2019 from 85.6% in 2018. In general, higher ratings tend to be more stable than lower ratings, and TRC's rated entities have been exclusively investment grade for eight consecutive years.

Table 1

**Summary Of Annual Ratings Changes In Taiwan (1999-2019)**

Year	Issuer count as of Jan. 1	Upgrades (%)	Downgrades (%)*	Defaults (%)	Withdrawn ratings (%)	Unchanged ratings (%)	Changed ratings (%)	Downgrade/upgrade ratio
1/1/1999	33	9.1	0.0	0.0	0.0	90.9	9.1	0.0
1/1/2000	63	3.2	12.7	1.6	3.2	79.4	20.6	4.0
1/1/2001	91	2.2	11.0	0.0	3.3	83.5	16.5	5.0
1/1/2002	111	17.1	18.0	0.0	12.6	52.3	47.8	1.1
1/1/2003	132	15.2	3.8	0.0	13.6	67.4	32.6	0.3
1/1/2004	131	57.3	2.3	0.0	9.2	31.3	68.7	0.0
1/1/2005	134	13.4	0.8	0.8	5.2	79.9	20.2	0.1
1/1/2006	147	15.7	2.7	0.7	17.0	64.0	36.1	0.2
1/1/2007	134	17.9	4.5	3.7	6.7	67.2	32.8	0.3
1/1/2008	131	4.6	5.3	1.5	5.3	83.2	16.8	1.2
1/1/2009	129	0.8	16.3	0.0	9.3	73.6	26.4	20.9
1/1/2010	125	4.8	3.2	0.0	7.2	84.8	15.2	0.7
1/1/2011	122	12.3	5.7	0.0	2.5	79.5	20.5	0.5
1/1/2012	132	3.0	3.0	0.0	11.4	82.6	17.4	1.0
1/1/2013	124	6.5	3.2	0.0	4.0	86.3	13.7	0.5
1/1/2014	129	3.1	1.6	0.0	3.9	91.5	8.5	0.5
1/1/2015	133	6.0	3.8	0.0	3.8	86.5	13.5	0.6
1/1/2016	133	6.0	3.0	0.8	1.5	88.7	11.3	0.5
1/1/2017	137	6.6	0.0	0.0	5.1	88.3	11.7	0.0
1/1/2018	139	10.8	0.0	0.0	3.6	85.6	14.4	0.0
1/1/2019	146	4.1	3.4	0.0	4.1	88.4	11.6	0.8
Weighted average (1999-2019)		10.8	4.7	0.4	6.7	77.4	22.6	0.4

\*Excludes downgrades to 'D', shown separately in default column. Note: Rating changes measured from rating as of Jan. 1 to rating as of Dec. 31 exclude all intermediate rating changes. Source: S&P Global Fixed Income Research. Copyright © by Taiwan Ratings Corp. All rights reserved.

Of the 15 upgrades in 2018, four were for companies under the umbrella of Formosa Group, whose various subsidiaries were upgraded in October to 'twAA' from 'twAA-' on improving debt leverage. In total, nine financial or insurance companies were upgraded, and six corporate issuers were upgraded--all by one notch.

Of the six upgrades in 2019, five were movements within rating categories, with three upgrades to 'twAA+' from 'twAA', and two upgrades to 'twA+' from 'twA' (see table 2). The one upgrade that changed categories, the upgrade of Taishin International Bank Co. Ltd, in October to 'twAA-' from 'twA+' reflected capitalization "improving to strong from adequate" and anticipated prudent capital management over the next one to two years."

Of the five downgrades in 2019, four were only by one notch, all within the 'twA' category, while one downgrade was by three notches--LCY Chemical Corp. was downgraded to 'twBBB' from 'twA' in January 2019.

Table 2

**1 Year Most Recent Transitions**

Taiwan Ratings Corp.'s issuer ratings (2019-2019)

(Number of ratings)																				
From/to	Total	twAAA	twAA+	twAA	twAA-	twA+	twA	twA-	twBBB+	twBBB	twBBB-	twBB+	twBB	twBB-	twB+	twB	twB-	twCCC/C	D	NR
twAAA	13	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
twAA+	23	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
twAA	25	0	3	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
twAA-	29	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
twA+	20	0	0	0	1	18	1	0	0	0	0	0	0	0	0	0	0	0	0	0
twA	16	0	0	0	0	2	10	3	0	1	0	0	0	0	0	0	0	0	0	0
twA-	9	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	1
twBBB+	6	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	1
twBBB	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2
twBBB-	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
twBB+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
twBB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
twBB-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
twB+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
twB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
twB-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
twCCC/C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

D--Default. NR--Not rated. Source: S&P Global Fixed Income Research. Copyright © by Taiwan Ratings Corp. All rights reserved.

Table 3

### New Issuer Sector Breakdown

(Number of issuers)	Financial institutions	Industrials and utilities	Total
1/1/1998	31	2	33
1/1/1999	25	5	30
1/1/2000	26	5	31
1/1/2001	9	14	23
1/1/2002	28	11	39
1/1/2003	8	8	16
1/1/2004	6	9	15
1/1/2005	10	9	19
1/1/2006	6	8	14
1/1/2007	10	3	13
1/1/2008	7	2	9
1/1/2009	2	3	5
1/1/2010	1	5	6
1/1/2011	4	4	8
1/1/2012	3	2	5
1/1/2013	7	1	8
1/1/2014	3	5	8
1/1/2015	2	3	5
1/1/2016	3	1	4
1/1/2017	1	7	8
1/1/2018	1	6	7
1/1/2019	4	6	10
<b>Total</b>	<b>197</b>	<b>119</b>	<b>316</b>
% of total	62.3	37.7	100.0

Source: S&P Global Fixed Income Research. Copyright © by Taiwan Ratings Corp. All rights reserved.

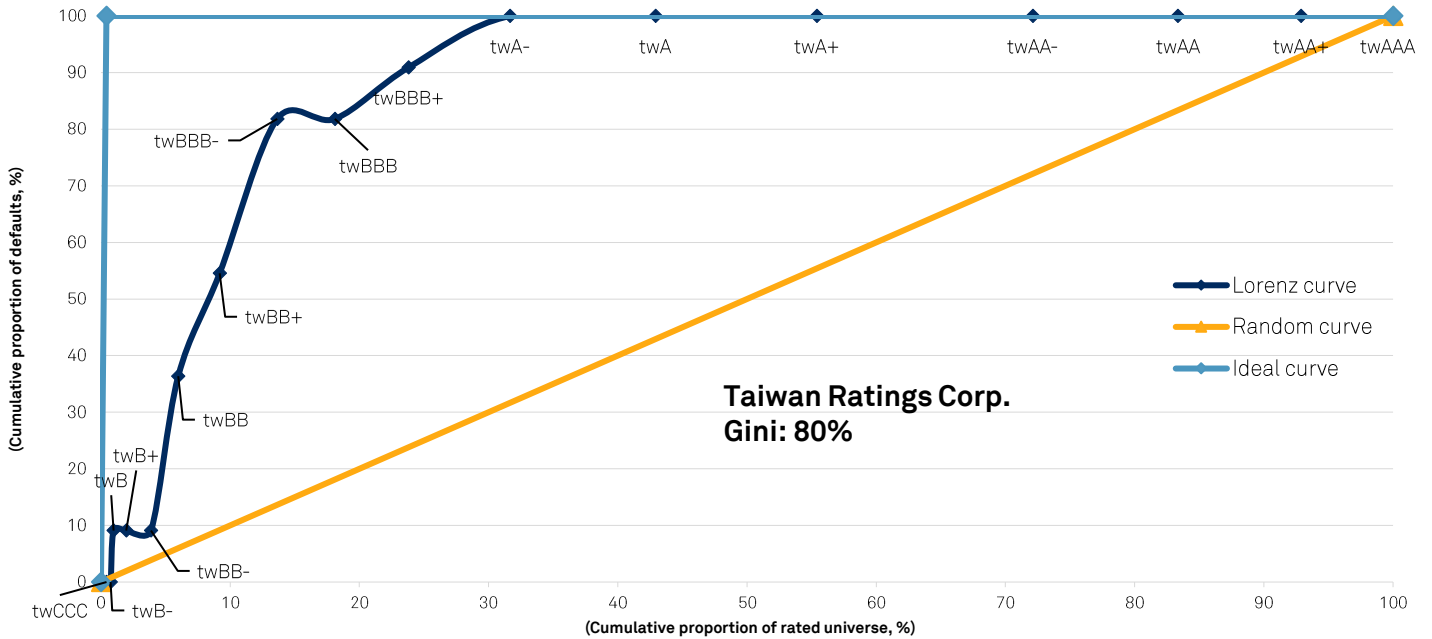
### Lorenz Curves And Gini Coefficients

Gini ratios measure the rank-ordering power of ratings over a given timeframe. They are ratios of actual rank-ordering performance to theoretically perfect rank ordering. Over each period, lower ratings corresponded to higher default rates (see charts 2-4). For example, in the one-year Lorenz curve, 54.5% of defaults occurred in the speculative-grade category, while speculative-grade ratings constituted only 9.2% of all corporate ratings. If the rank ordering of ratings had little predictive value, the cumulative share of defaulting corporate entities and

the cumulative share of all entities at each rating would be nearly the same, producing a Gini ratio of zero (see "Appendix II: Gini Methodology" below).

Chart 2

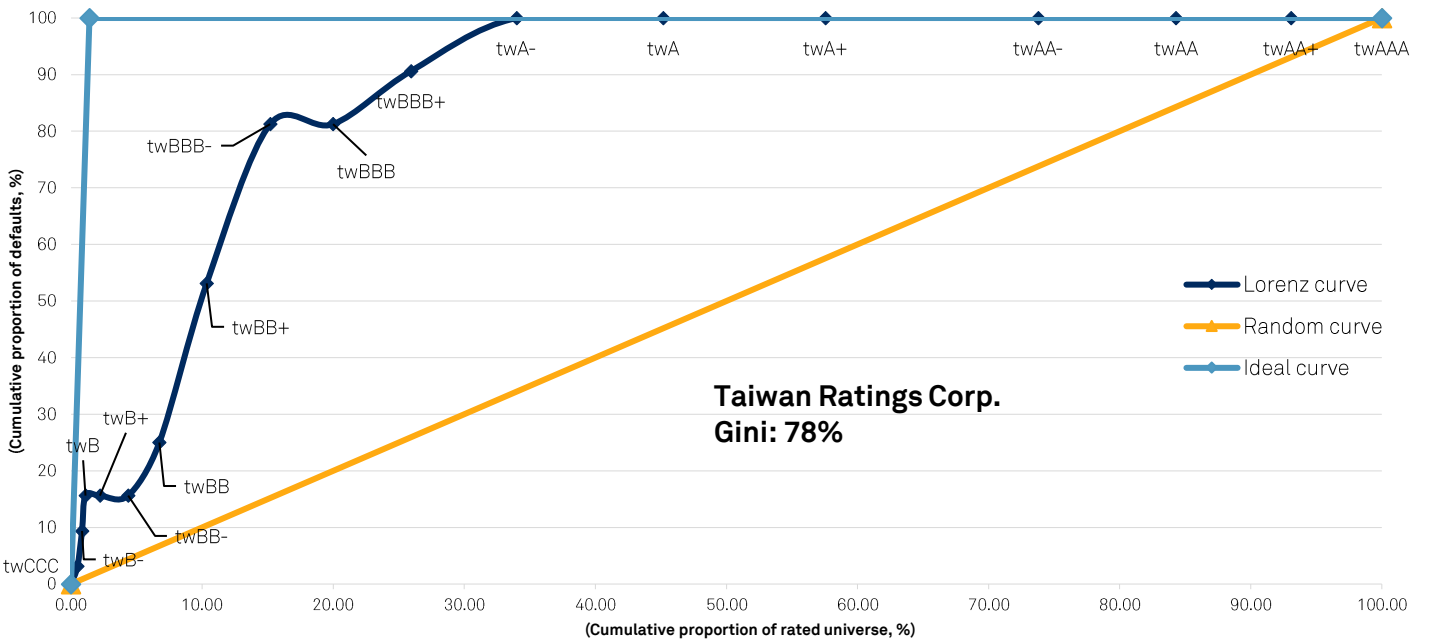
**Taiwan Corporate One-Year Lorenz Curve and Gini Coefficient**



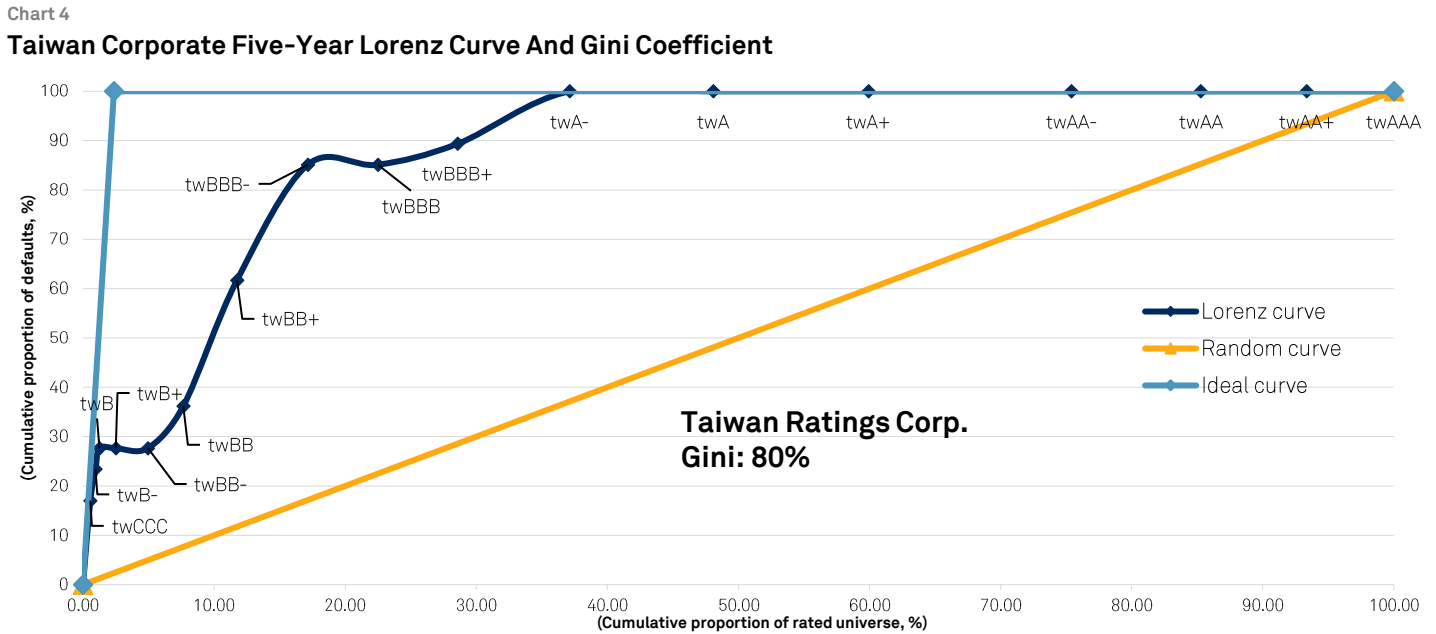
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Chart 3

**Taiwan Corporate Three-Year Lorenz Curve And Gini Coefficient**



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### Ratings And Cumulative Default Rates Remain Negatively Correlated

We found that defaults and ratings are negatively correlated, consistent with all of S&P Ratings Research's default studies. The higher the rating, the lower the incidence of default. This relationship remains true even for a smaller dataset, as is the case with TRC's ratings. One exception is the 'twCCC'/ 'twCC' category due to its very small number of rated entities, for which there is no default activity until the three-year horizon. By year four, however, this category's default rate is well above the 'twB' level's--in line with our expectations.

Table 4  
**Taiwan Cumulative Average Default Rates 1999-2019**

--Time horizon (years)--

(%)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
twAAA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
twAA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
twA	0.13	0.27	0.42	0.58	0.75	0.94	1.14	1.14	1.14	1.14
twBBB	1.09	2.49	3.34	3.93	3.93	4.24	4.87	5.54	6.24	6.24
twBB	2.70	4.86	6.49	7.03	8.65	10.27	11.89	12.99	13.55	13.55
twB	2.56	7.69	10.26	10.26	12.82	15.38	20.51	25.64	28.30	28.30
twCCC/C	0.00	0.00	9.09	45.45	72.73	90.91	100.00	n/a	n/a	n/a
Investment grade	0.23	0.52	0.74	0.91	0.97	1.10	1.32	1.48	1.65	1.65
Speculative grade	2.55	5.11	7.23	9.36	12.34	14.89	17.45	19.18	20.05	20.05
All rated	0.46	0.99	1.41	1.81	2.24	2.70	3.26	3.67	3.96	3.96

N/A--Not applicable. Source: S&P Global Fixed Income Research. Copyright © by Taiwan Ratings Corp. All rights reserved.

## Transition Matrices

Transition matrices show how ratings behave over time, including changes to other rating categories, movements to default, and rating withdrawals (see tables 5-8). The results are consistent with our other default studies in that there is a clear correspondence between higher ratings and lower default activity, over both the short and long terms.

Ratings stability is also generally higher among investment-grade ratings than speculative-grade ones. Over a one-year timeframe, an average of 95% of 'twAA' rated issuers maintain this rating, higher than 59.5% of 'twBB' rated issuers. This correlation is also true over longer periods. A key observation when analyzing transition matrices that present averages computed over multiple static pools is that the standard deviations associated with each transition point in the matrix are large relative to the averages (outside of stability rates).

Table 5

### Average One-Year Transition Rates (%)

Taiwan Ratings Corp.'s issuer ratings (1999-2019)

From/to	twAAA	twAA	twA	twBBB	twBB	twB	twCCC/CC	D	NR
twAAA	89.01 (15.50)	6.04 (14.07)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	4.95 (6.58)
twAA	1.36 (2.14)	95.62 (3.96)	0.83 (1.56)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	2.19 (2.28)
twA	0.00 (0.00)	5.94 (6.75)	88.24 (7.70)	1.73 (3.15)	0.12 (0.52)	0.00 (0.00)	0.00 (0.00)	0.12 (0.55)	3.84 (4.15)
twBBB	0.00 (0.00)	0.27 (1.10)	8.82 (21.03)	75.13 (22.93)	1.34 (2.07)	0.00 (0.00)	0.00 (0.00)	1.07 (3.25)	13.37 (11.77)
twBB	0.00 (0.00)	0.00 (0.00)	0.54 (1.36)	12.43 (17.32)	59.46 (27.35)	0.54 (2.83)	0.54 (1.18)	2.70 (6.81)	23.78 (17.17)
twB	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	7.69 (9.78)	46.15 (31.77)	7.69 (17.04)	2.56 (9.36)	35.90 (35.84)
twCCC/CC	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	36.36 (45.17)	0.00 (0.00)	63.64 (45.17)	0.00 (0.00)	0.00 (0.00)

Note: Parenthetical numbers are standard deviations. D--Default. NR--Not rated Source: S&P Global Fixed Income Research. Copyright © by Taiwan Ratings Corp. All rights reserved.



Table 6

**Average Three-Year Transition Rates (%)**

Taiwan Ratings Corp.'s issuer ratings (1999-2019)

From/to	twAAA	twAA	twA	twBBB	twBB	twB	twCCC/CC	D	NR
twAAA	73.25	15.92	0.00	0.00	0.00	0.00	0.00	0.00	10.83
	(23.19)	(23.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(10.02)
twAA	3.47	88.72	1.86	0.00	0.00	0.00	0.00	0.00	5.95
	(3.96)	(5.11)	(1.87)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(2.33)
twA	0.00	14.90	70.33	3.76	0.56	0.00	0.00	0.42	10.03
	(0.00)	(11.55)	(11.53)	(4.96)	(1.34)	(0.00)	(0.00)	(0.86)	(5.32)
twBBB	0.00	2.82	18.93	44.35	1.98	0.00	0.00	3.39	28.53
	(0.00)	(3.79)	(26.31)	(26.42)	(3.85)	(0.00)	(0.00)	(5.45)	(14.85)
twBB	0.00	0.00	5.41	23.78	18.38	0.00	1.08	6.49	44.86
	(0.00)	(0.00)	(7.91)	(14.11)	(20.97)	(0.00)	(2.25)	(13.80)	(16.86)
twB	0.00	0.00	2.56	2.56	5.13	2.56	15.38	10.26	61.54
	(0.00)	(0.00)	(6.34)	(7.99)	(9.95)	(6.34)	(26.02)	(12.40)	(35.06)
twCCC/CC	0.00	0.00	0.00	0.00	72.73	9.09	9.09	9.09	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(40.34)	(32.14)	(32.14)	(13.45)	(0.00)

Note: Parenthetical numbers are standard deviations. D--Default. NR--Not rated. Source: S&P Global Fixed Income Research. Copyright © by Taiwan Ratings Corp. All rights reserved.

Table 7

**Average Five-Year Transition Rates (%)**

Taiwan Ratings Corp.'s issuer ratings (1999-2019)

From/to	twAAA	twAA	twA	twBBB	twBB	twB	twCCC/CC	D	NR
twAAA	63.91	23.31	0.00	0.00	0.00	0.00	0.00	0.00	12.78
	(20.91)	(21.43)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(9.18)
twAA	4.63	84.30	2.09	0.00	0.00	0.00	0.00	0.00	8.97
	(5.33)	(5.70)	(1.38)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(2.24)
twA	0.00	20.41	58.21	3.35	0.48	0.00	0.00	0.80	16.75
	(0.00)	(13.43)	(14.01)	(3.73)	(1.05)	(0.00)	(0.00)	(1.01)	(7.28)
twBBB	0.00	6.82	24.04	28.19	0.30	0.00	0.00	3.86	36.80
	(0.00)	(6.46)	(26.96)	(19.44)	(1.47)	(0.00)	(0.00)	(5.31)	(17.29)
twBB	0.00	1.08	7.57	20.00	3.78	0.00	0.00	8.65	58.92
	(0.00)	(1.62)	(7.77)	(12.62)	(4.08)	(0.00)	(0.00)	(13.11)	(15.62)
twB	0.00	0.00	2.56	0.00	12.82	0.00	2.56	12.82	69.23
	(0.00)	(0.00)	(7.05)	(0.00)	(20.04)	(0.00)	(7.99)	(12.62)	(32.94)

*Default, Transition, and Recovery: 2019 Annual Taiwan Ratings Corp. Corporate Default And Rating Transition Study*

twCCC/CC	0.00	0.00	0.00	0.00	18.18	9.09	0.00	72.73	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(43.12)	(13.45)	(0.00)	(40.34)	(0.00)

Note: Parenthetical numbers are standard deviations. D--Default. NR--Not rated. Source: S&P Global Fixed Income Research. Copyright © by Taiwan Ratings Corp. All rights reserved.

Table 8

**Average 10-Year Transition Rates (%)**

*Taiwan Ratings Corp.'s issuer ratings (1999-2019)*

From/to	twAAA	twAA	twA	twBBB	twBB	twB	twCCC/CC	D	NR
twAAA	44.58	42.17	0.00	0.00	0.00	0.00	0.00	0.00	13.25
	(19.03)	(12.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(10.25)
twAA	5.46	78.14	2.19	0.00	0.00	0.00	0.00	0.00	14.21
	(3.86)	(4.09)	(1.69)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(3.57)
twA	0.00	27.89	39.45	3.27	0.00	0.00	0.00	1.01	28.39
	(0.00)	(10.23)	(10.18)	(2.22)	(0.00)	(0.00)	(0.00)	(1.05)	(9.46)
twBBB	1.06	12.77	19.86	15.96	0.00	0.00	0.00	6.38	43.97
	(1.48)	(7.44)	(17.48)	(8.50)	(0.00)	(0.00)	(0.00)	(6.74)	(17.85)
twBB	0.00	2.22	3.33	6.11	0.00	0.00	0.00	13.89	74.44
	(0.00)	(2.47)	(3.58)	(5.39)	(0.00)	(0.00)	(0.00)	(11.64)	(7.22)
twB	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.95	71.05
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(31.33)	(31.33)
twCCC/CC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

Note: Parenthetical numbers are standard deviations. D--Default. NR--Not rated. Source: S&P Global Fixed Income Research. Copyright © by Taiwan Ratings Corp. All rights reserved.

**Appendix I: Default Methodology And Definitions**

TRC's issuer credit ratings reflect its opinion of a company's overall capacity to pay its obligations (fundamental creditworthiness). This focuses on an obligor's ability and willingness to meet its financial commitments on a timely basis, and it generally indicates the likelihood of default regarding all financial obligations of the firm. It is not necessary for a company to have rated debt in order to be assigned an issuer credit rating.

Specific issues are typically rated as high as or lower than the issuer rating, depending on their relative priority within the company's debt structure. For lower-rated entities, the issuer credit ratings are generally two notches higher than the subordinated debt ratings; otherwise, they are generally one notch higher. Therefore, though a 'twBB+' issuer credit rating is generally paired with a 'twBB-' subordinated debt rating, a 'twAA' issuer credit rating usually corresponds to a 'twAA-' subordinated rating.

S&P Ratings Research's ongoing enhancement of the default database we used to generate this study may lead to outcomes that differ to some degree from those reported in previous studies. But this poses no continuity problem because each study reports statistics since Dec. 31, 1998. Therefore, each annual default study is self-contained and effectively supersedes all previous versions.

### ***Issuers included in this study***

This study analyzes the rating histories of 316 companies to which TRC had assigned ratings as of Dec. 31, 1998, or that were first rated between that date and Dec. 31, 2019. These include industrials, utilities, insurance companies, financial holding companies, banks, securities firms, and other financial services in Taiwan with long-term credit ratings. The study includes publicly and confidentially rated entities, as well as those with ratings that were withdrawn after initial assignment. The analysis excludes public information (pi) ratings and ratings based on the guarantee of another company. Structured finance vehicles, public-sector issuers, and sovereign issuers are the subjects of separate default and transition studies, and so are excluded from this study.

To avoid over counting, we exclude subsidiaries with debt that's fully guaranteed by a parent or with default risk we consider identical to that of a parent--where both the parent and subsidiaries have Taiwan national scale ratings. The latter are companies with obligations not legally guaranteed by a parent, but that have operating or financing activities that are so inextricably entwined with those of the parent that it would be impossible to imagine the default of one and not the other. At times, however, some of these subsidiaries might not have been covered by a parent's guarantee, or the relationship that combines the default risk of parent and subsidiary might either have come to an end or might not have begun. We include such subsidiaries for the period during which they had distinct and separate risk of default.

### ***Definition of default***

A default event is recorded on the first occurrence of a payment default on any financial obligation, rated or unrated, other than a financial obligation subject to a bona fide commercial dispute; an exception occurs when an interest payment missed on the due date is made within the grace period. Preferred stock is not considered a financial obligation, so, a missed preferred stock dividend is not normally equated with default. But we consider distressed exchanges to be defaults when debtholders are coerced into accepting substitute instruments with lower coupons, longer maturities, or any other diminished financial terms.

TRC will usually lower an issue rating to 'D' following a company's default on the corresponding obligation. TRC uses 'SD' (selective default) when it thinks an obligor that has selectively defaulted on a specific issue or class of obligations will continue to meet its payment obligations on other issues or classes of obligations in a timely matter. An 'R' (regulatory intervention) issuer rating indicates that an obligor is under regulatory supervision due to its financial condition. This does not necessarily indicate a default event, but a regulator may have the power to favor one class of obligations over others or pay some obligations and not others.

We deem 'D', 'SD', and 'R' issuer ratings to be defaults for the purpose of this study. We assume a default takes place on the earliest of: the date TRC revised the ratings to 'D', 'SD', or 'R'; when a debt payment was missed; when a distressed exchange offer was announced; or the date the debtor filed for, or was forced into, bankruptcy.

### ***Static pool methodology***

S&P Ratings Research's conducts its default studies on the basis of groupings called static pools. These are formed by grouping issuers by rating category at the beginning of each year covered by the study. We follow each such static pool thereafter. We assigned all companies included in the study to one or more static pools. When an issuer defaults, we assign that default to all of the static pools to which the issuer belongs.

We use the static pool methodology to avoid certain pitfalls in estimating default rates, ensuring that default rates account for rating migration and allowing us to calculate them across numerous timeframes. Some methods for calculating default and rating transition rates might charge defaults against only the initial rating on the issuer-- ignoring more-recent rating changes that supply more-current information. Other methods may calculate default rates using only the most recent year's default and rating data, which may yield comparatively low default rates during periods of high rating activity because they ignore prior years' default activity.

The pools are static in the sense that their membership remains constant over time. Each static pool can be interpreted as a buy-and-hold portfolio. Because we correct errors, if any, in every new update and the criteria for inclusion, or exclusion, of companies in our study are subject to minor revisions, it is not possible to compare static pools across different studies. Therefore, every update revises results back to the same starting date--Dec. 31, 1998--to avoid continuity problems.

We survey entities with ratings that have been withdrawn--or revised to not rated (NR)— in order to capture potential defaults. We exclude these companies, as well as those that have defaulted, from subsequent static pools. For instance, the 1999 static pool comprises all companies rated as of 12:01 a.m. on Jan. 1, 1999. Adding those companies first rated in 1999 to the surviving members of the 1999 static pool forms the 2000 static pool. All rating changes that took place are reflected in the newly formed 2000 static pool. This same method was used to form static pools for 2001-2019.

If an issuer is originally rated 'twBB' in mid-1998 and is downgraded to 'twB' in 2000, and subsequently the rating is withdrawn (NR) in 2002 with a default ('D') in 2005, this company would be included in the 1999 and 2000 pools with the 'twBB' rating assigned to it at the beginning of those years. Likewise, that issuer would be included in the 2001 and 2002 pools with the 'twB' rating. It would not be part of the 1998 pool because it was not rated as of the first day of that year, and it would not be included in any pool after the last day of 2002 because the rating had been withdrawn by then. Yet each of the four pools in which this company was included (1999-2002) would record its 2005 default at the appropriate time.

Ratings are withdrawn when an entity's entire debt is paid off or when the program or programs rated are terminated and the relevant debt extinguished. Withdrawals may

also occur as a result of mergers and acquisitions. Other ratings are withdrawn because of a lack of cooperation, particularly when a company is experiencing financial difficulties and refuses to provide all the information needed to continue surveillance on the ratings.

### ***Default rate calculation***

Annual default rates are calculated for each static pool, first in units and later as percentages of the number of issuers in each rating category. We combine these percentages to obtain cumulative default rates for the 21 years covered by the study.

### ***Issuer-weighted default rates***

We calculate the averages in this study based on the number of issuers rather than the dollar amounts affected by defaults or rating changes. Although dollar amounts provide information about the portion of the market affected by defaults or rating changes, issuer-weighted averages are more useful measures of ratings performance.

Many investors use statistics from our default studies to estimate the probability of default and rating transition. We note that we do not imply a specific probability of default, but our historical default rates are frequently used to estimate these characteristics.

### ***Average cumulative default rate calculation***

We derive cumulative default rates that average the experience of all static pools by calculating marginal default rates, depending on survival (non-defaulters) for each possible timeframe and for each static pool, weight-averaging the conditional marginal default rates, and accumulating the average conditional marginal default rates. We calculate conditional default rates by dividing the number of issuers in a static pool that default at a specific time by the number of issuers that survived (did not default) to that point. We weight the number of issuers in each static pool. Cumulative default rates are one minus the product of the proportion of survivors.

### ***Time sample***

This update limits the reporting of default rates to the selected timeframe, though we have gathered the data over 21 years; we base all our calculations on the rating history during that period. The maturities of most obligations are much shorter than the selected timeframe. Average default statistics become less reliable over time because the sample size becomes smaller and the cyclical nature of default rates increases its effect on averages.

Default patterns share broad similarities across all static pools, suggesting TRC's rating standards have been consistent. Adverse business conditions tend to coincide with default upswings for all pools. Speculative-grade issuers have been hit the hardest by these upswings, but investment-grade default rates also rise in stressful periods.

### ***Transition analysis***

Transition rates compare issuer ratings at the beginning of a period with ratings at the end of the period. To compute one-year rating transition rates by rating category, the

rating on each entity at the end of a particular year is compared with the rating at the beginning of the same year. An issuer that remained rated for more than one year is counted as many times as the number of years it was rated. For instance, an issuer continually rated from mid-1998 to mid-2003 would appear in the four consecutive one-year transition matrices from 1999-2002. All 1999 static pool members still rated on Dec. 31, 2018, had 20 one-year transitions, while companies first rated between Jan. 1, 2018, and Dec. 31, 2019, had only one.

Each one-year transition matrix displays all rating movements between letter categories from the beginning of the year through year-end. For each rating listed in the matrix's leftmost column, there are nine ratios listed in the rows, corresponding to the ratings from 'twAAA' to 'D', plus an entry for NR.

### ***Practical application of transition rates***

Rating transition rates are useful to investors and credit professionals for whom rating stability is important. Investors who are restricted by law or are inclined to invest in top-grade bonds would want to assess the likelihood that TRC analysts will assign high ratings to their investments. Conversely, investors buying high-yield bonds in hopes of profiting from an upgrade would be able to gauge that expectation.

The credit community might also use rating transition information in part to determine maturity exposure limits or to measure credit risk in the context of the value-at-risk models. Rating transition matrices could also be constructed to produce stressed default rates. Such matrices are often used for credit risk measurement. Multiyear transition matrices are valuable tools for forecasting future rating distributions and are often better suited for certain applications than one-year transition matrices.

### ***Comparing transition rates with default rates***

Rating transition rates may be compared with the marginal and cumulative default rates. For example, the one-year default rate column of table 4 is equivalent to column 'D' of the average one-year transition matrix in table 5. Average cumulative default rates are the summary of all static pools from 1998-2019, while the number of pools used in the average transition rate is limited by the transition's timeframe.

## **Appendix II: Gini Methodology**

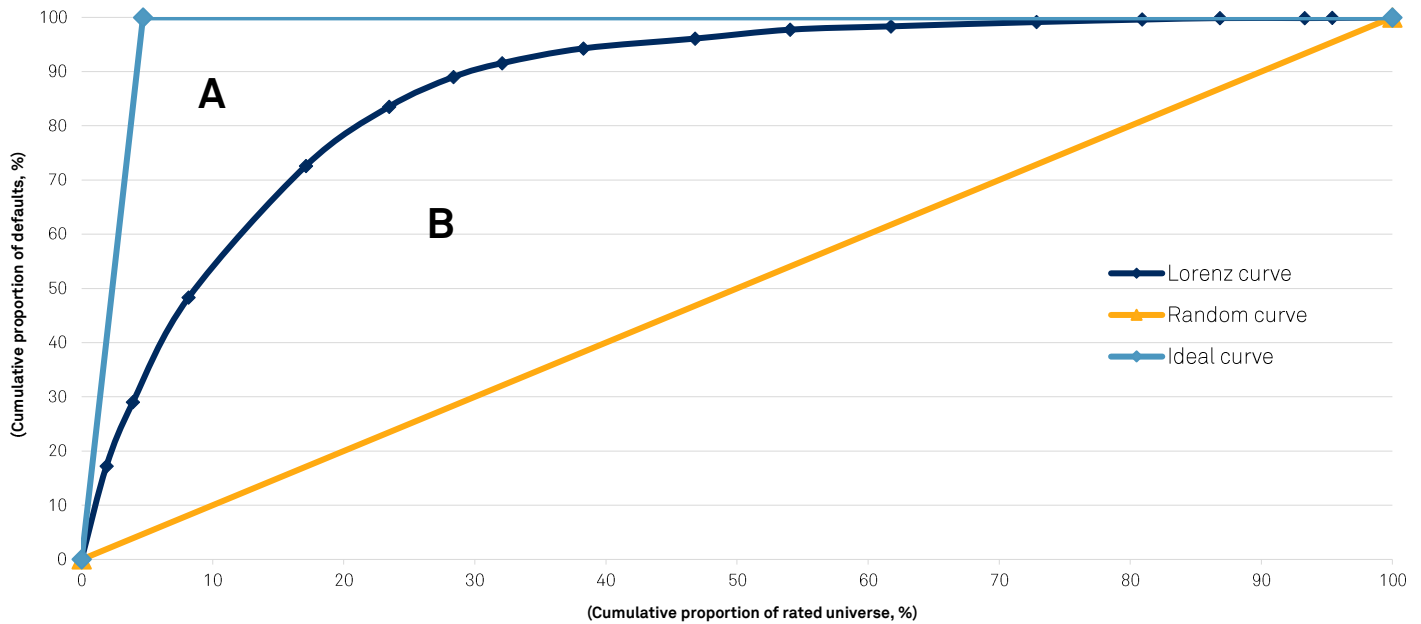
To measure relative ratings performance, we utilize the Lorenz curve as a graphical representation of the proportionality of a distribution, and we summarize this via the Gini coefficient. For this study, the Lorenz curve is plotted with the x-axis showing the cumulative share of issuers, arranged by rating, while the y-axis represents the cumulative share of defaulters, also arranged by rating. For both axes of the Lorenz curve, the observations are ordered from the low end of the ratings scale ('twCCC'/'twC') to the high end ('twAAA').

If 'twCCC'/'twC' rated entities made up 10% of the total population of issuers at the start of the timeframe examined (x-axis) and 50% of the defaulters (y-axis), then the coordinate (10, 50) would be the first point on the curve. If S&PGR's corporate ratings only randomly approximated default risk, the Lorenz curve would fall along the diagonal. Its Gini coefficient--

a summary statistic of the Lorenz curve--would therefore be zero. If corporate ratings were perfectly rank ordered so that all defaults occurred only among the lowest-rated entities, the curve would capture all of the area above the diagonal on the graph (the ideal curve), and its Gini coefficient would be 1 (see chart 5).

Chart 5

### Sample Lorenz Curve



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The procedure for calculating the Gini coefficients is illustrated in chart 5. Area B is bounded by the random curve and the Lorenz curve, while area A is bounded by the Lorenz curve and the ideal curve. The Gini coefficient is defined as area B divided by the total of area A plus area B. In other words, the Gini coefficient captures the extent to which actual ratings accuracy diverges from the random scenario and aspires to the ideal scenario.

### Related Research

- 2019 Annual Global Corporate Default And Rating Transition Study, [www.capitaliq.com](http://www.capitaliq.com) - April 30, 2020
- Up Next: The Complicated Transition From COVID-19 Lockdown, [www.taiwanratings.com](http://www.taiwanratings.com) – April 17, 2020
- Taishin International Bank Co. Ltd. And Holding Company Upgraded On Strong Capitalization; Outlooks Stable, [www.taiwanratings.com](http://www.taiwanratings.com) - Oct. 17, 2019
- Taiwan Ratings Corp.: 2019 Ratings Roundup Report, [www.taiwanratings.com](http://www.taiwanratings.com) - January 6, 2019

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