Rating Performance of Corporate Finance and Financial Institutions –

Summary of 2017 and Aggregated

Special Report **|** March 2018

From time to time Midroog publishes special reports related to specific sectors or issuers. The special reports are not rating reports and/or rating methodologies from the aspect of their content or intent and do not intend to change assessment methods described in the methodological reports. In general, special reports are intended to: 1) publish Midroog views on certain issuers specific concerns and developments; 2) to describe macroeconomic or sector trends and to indicate the direction of effect on the ratings (for example: a change in demand in a certain sector, legislative or regulatory changes); 3) to explain a certain rating process in order to help investors understand how the rating was assigned, including how certain trends were taken into account in a rating.

Contact:
Avigail Konikov-Livne, Ph.D., Chief Credit Officer
avigail.k@midroog.co.il

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Preface

The objective of this report is to present Midroog's rating performance in 2017 and cumulatively since it began to operate as a rating company. The report includes the rate of transitions (transition matrixes) on an annual basis and cumulative on an annual basis, change in the distribution of ratings and in rating outlook, as well as the defaults by issuers rated by Midroog. In addition, a rating accuracy measure is presented, reflecting the average position of the default events along the rating scale[1] (Average Position - in the range between 0 and 1). This measure reflects the ordinal power of the rating and measures the location of credits that experienced default events in the distribution of ratings relative to non-defaulted credits.

Midroog collects and publishes the rating changes and the accuracy measures in order to create transparency with regard to rating performance. In this context, it should be noted that the sample from some of the rating groups, as well as the sample of defaults, is relatively limited and therefore individual observations may skew the results. The data presented below relates to all corporate finance issuers, financial institutions and government-related issuers. Midroog rates Structured Finance transactions and projects not included in the data presented in this report.

In this report, the number of issuers is defined as the number of active issuers that Midroog rates at the end of the calendar year. The rated issuers include public ratings and private ratings. The rating taken for the purpose of calculating the distribution of ratings is the issuer rating (or estimated issuer rating) or the deposits rating for banks or the financial strength rating for insurers (henceforth: **"the issuer rating"**). [2]

Rating Distribution

As of year-end 2017, Midroog had rated about 149 issuers[3]. The median rating of the issuers rated by Midroog is A2.il, as in previous years. More than 90% of the ratings range from the Aa.il group to the Baa.il group. The charts below describe the distribution of issuers according to rating. The right-hand

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[1] Calculation methodology accuracy measure is presented in Appendix 2.

[2] For the purpose of preparing the data presented in this report, the following updates were made in the database: Five ratings were updated in the database with year-end 2016 data 1) One rating downgrade and 4 single-notch upgrades compared with the data in the database that served for calculation at year-end 2016.

[3] Excluding ratings of project finance, structured finance or financial instruments.

chart shows the distribution of issuer ratings as of the end of 2017 compared with year-end 2016. All distribution ratings are in comparison with the end of 2016, after the database was updated as described above. The distribution of issuer ratings in these years, excluding financial institutions, is shown in the left-hand chart:

Distribution of issuers, end of 2017 vs. end of 2016 (W/O FI)

Distribution of issuers, end of 2017 vs. end of 2016
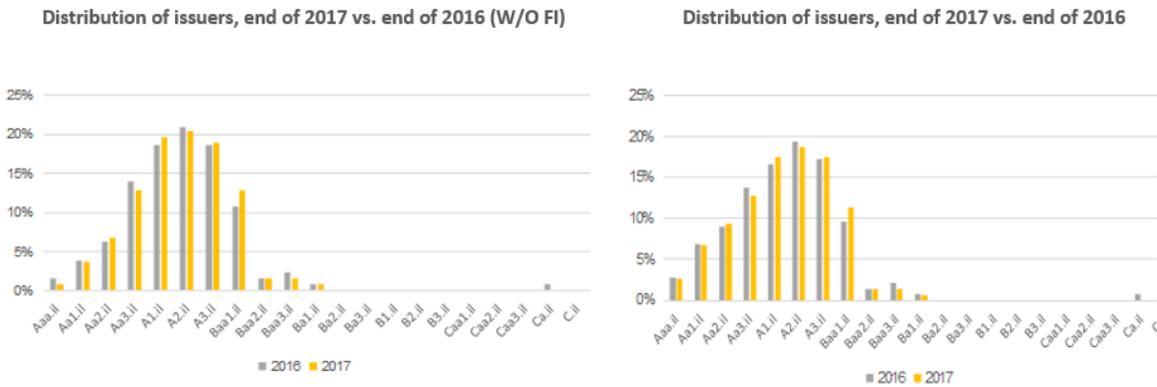
As of December 2017, issuers rated Aaa.il were about 3% of all issuers rated by Midroog at that time, about the same as in December 2016 (excluding financial institutions: decreased from about 2% to about 1%, respectively). The proportion of issuers in the Aa.il group fell from about 30% at year-end 2016 to about 29% at the end of 2017 (excluding financial institutions: decreased from about 24% to about 23%, respectively). The proportion of issuers in the A.il group increased from about 53% at year-end 2016 to about 54% at year-end 2017 (excluding financial institutions: from about 58% to about 59%, respectively). The proportion of issuers in the Baa.il group increased from about 13% at year-end 2016 to about 14% at the end of 2017 (excluding financial institutions: increased from about 15% to about 16%, respectively). The proportion of issuers rated Ba.il and below fell from about 1.4% in December 2016 to about 0.7% in December 2017 (excluding financial institutions: from 1.6% to 0.8%, respectively).

The following charts describing the distribution of ratings by rating group: the right-hand chart shows the distribution of issuer ratings between the years 2012-2017. The left-hand chart shows the distribution of issuer ratings in these years, excluding financial institutions:

Distribution of issuers by rating, 2012-2017 (W/O FI)

Distribution of issuers by rating, 2012-2017
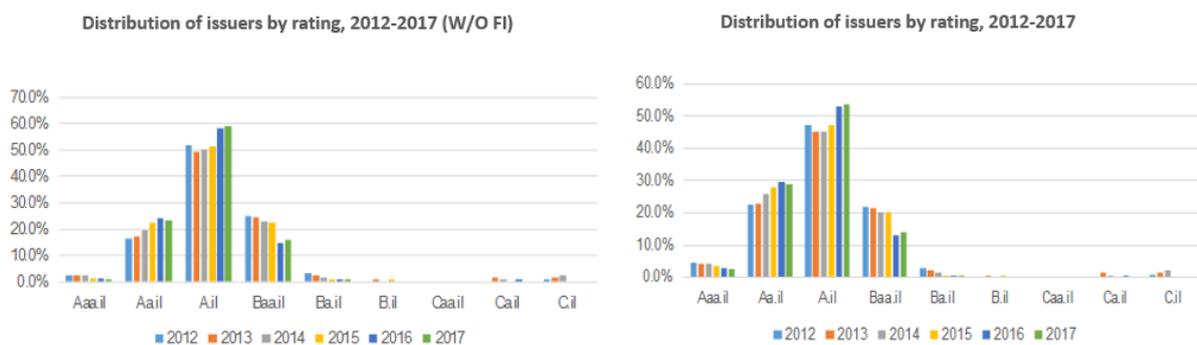
From the development of the ratings over time, it can be seen that:

- The proportion of issuers rated Aaa.il excluding financial institutions shrank in 2017. Note that the number of issuers rated Aaa.il is small, and the decrease in the proportion of issuers rated Aaa.il in 2017 was the result of a single rating withdrawal.

- The proportion of issuers in the Aa.il group remained without significant change in 2017, even decreasing slightly, in contrast to the uptrend in the proportion of issuers in that rating group in previous years. The main changes in this rating group are: two downgrades to the A.il rating group, which were offset by two upgrades to the Aa.il rating group and one rating withdrawal.

- The proportion of ratings in the A.il group remained without significant change in 2017, even rising slightly because of rating transitions to this group, both from the Aa.il group and from the Baa.il group. Also, the group gained more ratings (new ratings minus rating withdrawals).

- The proportion of ratings in the Baa.il group rose in 2017, mainly due to new ratings.

- The proportion of ratings in the Ba.il group remained unchanged in 2017 (one rating). In the Ca.il group, rating ceased in 2017 (one rating).

- As of December 2017, there were no corporates or financial institutions with ratings in the B.il, Caa.il, and C.il groups.

- It should be noted that most of the rating transitions were only of one notch, so some of the rating transitions remained within the level of the rating group.

- Details of the rating transitions between the categories are presented in Midroog's transition matrix below in this report.

Distribution of the Rating Outlook and Credit Reviews

Rating outlook is Midroog's assessment of the expected direction of the rating in the medium term. The rating outlook is divided into four categories: positive, stable, negative or developing. Stable outlook reflects low expectation of a rating change in the medium term. A positive, negative or developing outlook reflects higher expectation of change in the medium term.

When a rating is placed under Credit Review (CR), it means that a possibility of changing the rating in the short term is evaluated. The rating may be placed on review for upgrade - in which case the CR shall be said to have positive implications, for downgrade - in which case the CR shall be said to have negative implications, and in some cases the direction of the CR may be uncertain – CR with uncertain direction. The rating review may result in rating upgrade, rating downgrade, or reconfirmation of the rating.

Distribution of the rating outlooks of issuers between the years 2010-2017 is shown below. The negative outlook category includes both negative outlook and CR with negative implications and the category of "other", which includes developing outlooks and CR with uncertain direction.

Distribution of Issuers By Rating Outlook Direction

Distribution of issuers by rating outlook, 2009-2017
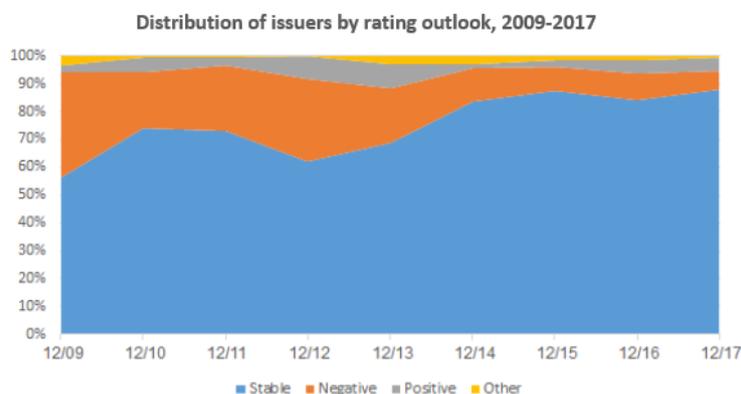
The proportion of issuers with stable outlook increased from about 84% at year-end 2016 to about 88% at year-end 2017. In addition, the proportion of issuers whose rating was given a negative outlook dropped from about 10% at year-end 2016 to about 7% at year-end 2017. The proportion of issuers with positive rating outlook remained at about 5%, unchanged from year-end 2016. The rest of the changes are in the "other" category, which includes, as of the end of 2017, one rating under CR with uncertain direction.

Below is a breakdown of changes in issuer ratings according to the direction of the outlook over a period of one year:

	Rating Transitions 2016 to 2017				
Outlook or credit review position, end of 2016	Upgrade	Downgrade	No Change	Withdrawn	Fully Paid
Stable	5%	2%	89%	3%	0%
Negative	0%	17%	67%	17%	0%
Positive	43%	0%	43%	14%	0%
Credit Review, Possible Downgrade	0%	0%	100%	0%	0%
Credit Review, Direction Uncertain	50%	0%	50%	0%	0%
Developing	0%	0%	0%	0%	0%

*The percentages shown in the tables are rounded to a whole percent, without adjustment to sum up the table rows to 100%.

The table shows that the ratings of about 89% of the issuers with stable outlook as of December 2016 remained unchanged as of December 2017.

Among the issuers with negative outlook as of December 2016, about 67% of the issuer ratings remained unchanged, about 17% (0%) of the issuers' ratings were downgraded (an increase) and about

17% were withdrawn and/or fully paid. Rating changes are for December 2017 in comparison to December 2016.

The rating of about 43% of the issuers with a positive outlook as of December 2016, rose (remained unchanged) as of December 2017. The same proportion of issuers with positive outlook remained unchanged as of December 2017. The rating of 14 issuers with positive outlook as of December 2016 had been withdrawn as of December 2017.

All the issuers that were under CR with negative implications as of December 2016 remained unchanged in rating as of December 2017.

The rating of about half the issuers that were as of December 2016 under CR with uncertain direction rose, as of December 2017, and half remained unchanged.

Note that the number of issuers under CR with uncertain direction and under CR with negative implications as of December 2016 was small, about 4 altogether.

Transition Tables[4]

Midroog collates information on rating changes between the years 2004-2017, based on a database that has been accumulated gradually during its years of operation. Each issuer is included in the database according to the number of years it was rated. For example, an issuer rated from 2004 to 2017 is counted in the database 13 times. For each calendar year, the issuer's last rating is what appears in the database. If the rating changed several times over a single year, only the last observation at the end of the calendar year will be added to the database, representing a cross-section at the end of the calendar year. The total number of observations for all the rating groups and the relevant cross section points (for the ends of the years 2005-2016) is approximately 1,385. Adding rating withdrawals, defaults and ratings at year end 2017, the total number of observations used in calculating the data at the end of the years 2004-2017 was about 1,660.

Each issuer in the database was assigned an issuer rating (total creditworthiness). In cases where no issuer rating exists, an issuer rating was estimated on the basis of the existing ratings of the issuer's rated debt instruments. For banking corporations, the data in the transition matrices includes the rating of the senior debt, that is, deposits and bonds, and does not include the rating of other debt instruments. The insurance companies in the transition matrixes include the inclusive financial strength rating (IFS).

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[4] The following updates were made in the calculation of the transition tables in comparison to the calculation in previous years: updates to the database as specified in the distribution of ratings.

Transition Tables, Corporate Finance and Financial Institutions, 2004-2017

Annual Aggregated Transition Table, 2004-2017

	Aaa.il	Aa1.il	Aa2.il	Aa3.il	A1.il	A2.il	A3.il	Baa1.i	Baa2.i	Baa3.i	Ba1.il	Ba2.il	Ba3.il	B1.il	B2.il	B3.il	Caa1.il	Caa2.il	Caa3.il	Ca.il	C.il	WR	Default
Aaa.il	91%	4%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%
Aa1.il	1%	95%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa2.il	0%	2%	87%	7%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
Aa3.il	0%	0%	5%	84%	7%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%
A1.il	0%	0%	0%	5%	75%	9%	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%
A2.il	0%	0%	0%	0%	7%	73%	10%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%
A3.il	0%	0%	0%	0%	0%	9%	69%	9%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	2%
Baa1.il	0%	0%	0%	0%	0%	0%	12%	63%	8%	5%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%	2%
Baa2.il	0%	0%	0%	0%	0%	0%	2%	18%	58%	5%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%	5%
Baa3.il	0%	0%	0%	0%	0%	0%	0%	0%	3%	56%	6%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	22%	6%
Ba1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	31%	8%	8%	0%	0%	0%	0%	0%	0%	0%	0%	15%	38%
Ba2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	50%
Ba3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%
B1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%
B2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
B3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	50%
Caa1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Caa2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Caa3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ca.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	0%	67%	0%
C.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	67%	0%

Annual Transition Table, 2017

	Aaa.il	Aa1.il	Aa2.il	Aa3.il	A1.il	A2.il	A3.il	Baa1.i	Baa2.i	Baa3.i	Ba1.il	Ba2.il	Ba3.il	B1.il	B2.il	B3.il	Caa1.il	Caa2.il	Caa3.il	Ca.il	C.il	WR	Default
Aaa.il	75%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	0%
Aa1.il	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa2.il	0%	0%	92%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa3.il	0%	0%	10%	75%	10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%
A1.il	0%	0%	0%	8%	92%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
A2.il	0%	0%	0%	0%	4%	86%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%	0%
A3.il	0%	0%	0%	0%	0%	4%	88%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%	0%
Baa1.il	0%	0%	0%	0%	0%	0%	14%	79%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%	0%
Baa2.il	0%	0%	0%	0%	0%	0%	0%	50%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Baa3.il	0%	0%	0%	0%	0%	0%	0%	0%	33%	67%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ba1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ba2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ba3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
B1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
B2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
B3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Caa1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Caa2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Caa3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ca.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
C.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

*The percentages shown in the tables are rounded to a whole percent, without adjustment to sum up the table rows to 100%.

For example, the meaning of the data appearing in the cumulative transition table is that about 84% of the Aa3.il ratings remained unchanged in the range of a year, the rating of about 5% was upgraded to Aa2.il, the rating of about 7% was downgraded to A1.il, and the rating of about 1% was downgraded to A2.il and so on. The calculation formula for the transitions rate is shown in Appendix 1 to this report.

Withdrawn Column (WR)

The WR column represents issuers for which monitoring was terminated after their rating. Principal circumstances for termination are: repayment in full of all the rated debt, debt

arrangement/bankruptcy of the issuer, insufficiency/deficiency of information that does not allow effective evaluation of creditworthiness, or a request from the issuer to withdraw the rating of its obligations. Note that the rating sample at the low end of the rating scale is small and primarily reflects the rating transitions of companies in default that have not yet completed a debt settlement, liquidation, etc., so that high rate of rating withdrawals stems from the rating withdrawal due to the end of the debt arrangement.

When calculating the marginal transitions rate in the transitions matrix adjusted for rating withdrawals (WR), ratings in which withdrawal occurred are not factored in at all, but only the last rating before the rating withdrawal. The cross-section periods for the purposes of calculating the transitions is the end of the calendar year. Therefore, the last rating factored in for an issuer whose rating has terminated will be the rating at the end of the calendar year prior to the rating termination. The formula for calculating the adjustment appears in Appendix 1 of this report. Appendix 3 shows the transition tables adjusted for WR.

<u>Default Column</u>

Similar to the estimation of the annual transitions rate, the default column represents the proportion of issuers for which a default event occurred in the relevant estimation period out of the total of issuers at that rating level rated at the end of the previous calendar year, and not necessarily in relation to the last rating prior to the default event.

Cases in which the rated entity asks that Midroog withdraw the rating due to an inability to meet its obligations were measured as default event and are indicated in the Default column.

Also, other rating transitions or rating withdrawals the issuer experienced upon default and afterwards have not been factored into the transition tables, but will apply in the year following the default date, insofar as a rating exists.

It should be noted that the default sample is relatively small and therefore individual observations may skew the results. Further note that the rating sample at the low end of the rating scale is small and mainly reflects the rating transitions of companies in default and that have not yet completed debt settlement, liquidation, etc.

Defaults[5]

During 2017, no default events were recorded among issuers rated by Midroog, in accordance with Midroog's default definitions. Since Midroog began operating in 2003 and as of December 2017, 21 default events among corporate finance issuers were recorded. The rated debt of these issuers is estimated to be about NIS 20 billion. The average rating of defaulted issuers 12 months prior to defaulting was Baa1.il. The ratings of about 62%[6] of the issuers in default had a negative outlook or a CR with negative implications 12 months before the default date.

The following table provides information about issuers rated by Midroog from its establishment and classified as defaulted, according to the scale of credit risk in Israel:

Issuer	Initial rating year	Year of default according to Midroog's definition	Industry	Amount of rated debt (NISm)*	Initial rating	Rating 12 months before default
Leadcom Integrated Solutions Ltd	2006	2009	Trade and services	120	A3.il	A3.il
Profit Building Industries Ltd.	2007	2009	Real estate and construction	205	Baa1.il	Baa1.il
Africa Israel Investments Ltd.	2005	2009	Real estate and construction	7,000	Aa2.il	Aa2.il
Malrag Engineering & Construction Ltd.	2008	2010	Real estate and construction	95	A3.il	Baa2.il
Agrexco Agricultural Export Company Lt	2007	2011	Trade and services	144	A2.il	A2.il
Olimpia Real Estate Holdings Ltd.	2008	2011	Real estate and construction	220	A3.il	Baa2.il
Polar Investments Ltd.	2007	2011	Real estate and construction	88	A3.il	Ba1.il
Ampal American Israel Corporation	2006	2011	Holdings	959	A3.il	A3.il
Suny Electronics Ltd.	2010	2012	Holdings	303	Baa2.il	Baa2.il
Scailex Corporation Ltd.	2009	2012	Holdings	1,800	A3.il	A3.il
Central European Estates NV	2007	2012	Real estate and construction	106	Baa1.il	Ba2.il
A.Levy Investments and Construction Lt	2005	2012	Real estate and construction	160	A3.il	Baa2.il
BSR Europe Ltd.	2005	2012	Real estate and construction	134	A3.il	Ba2.il
Israel Amlat Investments (1993) Ltd.	2007	2012	Holdings	57	A2.il	Ba1.il
Elbit Imaging Ltd.	2006	2013	Real estate and construction	2,306	A2.il	Baa1.il
Israel Petrochemical Enterprises Ltd.	2005	2013	Holdings	1,486	Aa3.il	Baa2.il
Unpublished**	2007	2014	Investment houses	66	A3.il	Baa3.il
Mirland Development Corporation Plc	2008	2014	Real estate and construction	979	A3.il	Baa1.il
Alon Blue Square Israel Ltd.	2010	2015	Retail	385	A1.il	A3.il
Urbancorp Inc	2015	2016	Real estate and construction	180	A3.il	A3.il
Africa Israel Investments Ltd.	2011	2016	Real estate and construction	3,300	Baa2.il	Baa1.il

*Around the default date.
**This default was fully recovered.
*** The initial rating year after the company's first debt settlement.

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[5] As defined in the "Midroog Rating Scales and Definitions" document on the Midroog website.
[6] The proportion of issuers with negative outlook or under CR with negative implications was unchanged relative to last year. The report "Rating Performance of Corporate Finance Institutions and Financial Institutions – Summary of 2016 and Aggregated" mistakenly recorded about 67%, not about 62%.

The chart below shows the distribution of ratings of issuers in default 12 months before the default date, as well as the initial rating of the issuers:
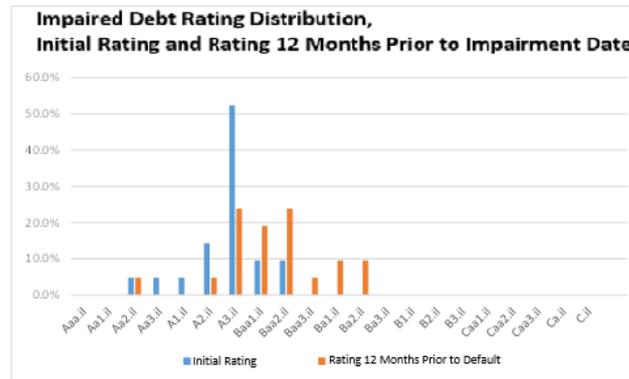
Accuracy Measure[7]

The ordinal power of the rating reflects the scale being a relative ordinal scale, along which obligations with higher credit ratings should reflect better creditworthiness than obligations with lower credit ratings. Midroog uses an Average Position measure as the main measure when testing the accuracy of the rating. The measure tests the average location of defaults along the rating scale (AP ranges from 0 to 1), and answers the question: what is the location of issuers that experienced defaults in the distribution of ratings relative to the other issuers.

A perfect rating system would achieve AP approaching 100%, which would mean the issuers that defaulted had all been rated in the lowest percentile of the ratings distribution at least one year before the default date, which would attest to a perfect correlation between the rating and the default probability. A random rating system would produce AP of around 50%, while a rating system with a strong negative correlation to defaults would produce AP approaching 0%. The following table shows the accuracy measure based on the rating 12 months before the default. We also show the accuracy measure adjusted for outlook - adjusted for negative rating outlooks or CRs for possible downgrade 12 months before default. As noted, about 62%[8] of the ratings of issuers in default were with a negative outlook or in CR for possible downgrade 12 months prior to default date, therefore the adjusted accuracy measure is also higher. It can be seen that the ordinal power of the Midroog ratings is relatively good, as reflected in the accuracy measure in recent years. Note that the small number of defaults events may skew the accuracy measure.

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[7] Calculation methodology for the Accuracy Measure is shown in Appendix 2.
[8] The proportion of issuers with negative outlook or under CR with negative implications was unchanged relative to last year. The report "Rating Performance of Corporate Finance Institutions and Financial Institutions – Summary of 2016 and Aggregated" mistakenly recorded about 67%, not about 62%.

When the proportion of default is 0%, the accuracy measure is rendered irrelevant and cannot be measured. As said, in 2017, there were no default events according to Midroog's definitions of default, so no accuracy measure is calculated for that year.

The following table shows the accuracy measure, the adjusted accuracy measure and the default rate between 2009 and 2017, as well as measures such as the average and median positions of the accuracy measure, and the default rate on those years:

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	Average	Median	Minimum	Maximum	Standard Deviation
Average Position	60%	94%	81%	91%	82%	85%	68%	77%	---	80%	81%	60%	94%	11%
Average Position (Outlook Adjusted)	68%	99%	84%	91%	89%	86%	68%	81%	---	83%	85%	68%	99%	11%
Default Rate (%)	2.7%	0.9%	2.9%	4.3%	1.4%	1.4%	0.7%	1.4%	0.0%	1.7%	1.4%	0%	4.3%	1.3%

* Default rate is defined as the ratio between the number of issuers who experiences a default according to Midroog's definition, during the year and the number of issuers rated at the beginning of that period.

** Note that the distribution of all issuers is the distribution at the end of the period prior to default (that is, the beginning of each calendar year).

Related Reports

- [For summaries of rating performance for the years 2009-2016, you are invited to view the Midroog website](#)

- [For Midroog's rating scales and definitions, you are invited to view the Midroog website.](#)

The reports are published on the Midroog Website www.midroog.co.il

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Appendix 1 – Calculating Transition Matrixes

Midroog groups the issuers into rating groups according to their rating and the relevant time period (T).[9] The marginal transition rate is the probability that the issuer who "survived" at a certain rating level up to the start of T will move to different rating (upgraded or downgraded) by the end of that period. The cumulative transition rate is the probability of a transition between the rating levels from the group's formation to the end of T. Mathematically, the marginal transition rate of T for a rating group that was created at time y with a rating of z is defined as the proportion between the number of companies x(t) that transitioned from a particular group to another group during the time range T divided by the total of issuers in that rating group at the beginning of the time period n(t).

$$\text{Marginal migration rate from z (t)} = \frac{Xy(t)}{ny(t)}$$

In calculating the marginal transition rate in the transitions matrix adjusted for WR, withdrawn ratings are not factored into the calculation at all, but the last rating before the WR.

Where:

$Z_{i,WR}$ – the rate of transitions from an i rating to WR.

We multiply each rating transition $Z_{i,WR}$ in the transitions matrix that is not WR adjusted with the coefficient $\frac{1}{(1-z_{i,WR})}$.

When: $Z_{i,WR}$ in the WR adjusted transitions matrix is defined as equal to zero.

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[9] The relevant time period is a year as published in this report.

Appendix 2 – Calculating the accuracy measure

Average Position (AP)

The position of a rating (that defaulted or did not) in a rating group[10], is as the percentage of the ratings in the rating group with ratings higher than it, plus half of the area in the rating category where it is located.

For example – If 5% of the ratings were rated Aaa.il, 6% were rated Aa1.il and 7% were rated Aa2.il, then:

1. The rating Aaa.il has the position of 5%/2=2.5.
2. The rating Aa1.il has the position of 5%+(6%/2)=8%.
3. The rating Aa2.il has the position of 5%+6%+(7%/2)=14.5%.

The average position is the calculation of the average position of ratings that have experienced default/impairment for a given point of time before default/impairment (12 months before default/ impairment, as the case may be). This measure reflects the ordinal power of the rating.

A strong rating system will present an AP of close to 100%, which means that the ratings in which a default event was recorded had all been rated at the bottom percentile of the ratings distribution at least 12 months before default date, demonstrating a very strong correlation between the rating and the default. A random rating system will show an AP in the area of 50% and a rating system with a strong negative correlation will show an AP close to 0%. Note that an AP of 100% or of 0% cannot be achieved, due to their share (distribution area) of the default events in the distribution, hence the AP must be standardized for them. For example, suppose that D represents the proportion of ratings that experienced a default event in the distribution.

- The maximum possible AP is D/2-100%, which will be achieved when all ratings that defaulted are rated the same, and all ratings with no recorded default events are rated higher than this rating.
- Similarly, the minimum possible AP is D/2, when all the ratings in which a default event has been recorded are the same and is higher than all the ratings that did not experience a default.

In order to standardize the AP, we define adjusted AP* (above and below: "Accuracy Measure" or "Average Position-AP") as follows: AP* = (AP-50%) / (100%-D) +50%

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[10] In accordance with the definition for calculation purposes: issuer, series, etc.

This adjustment allows AP* to achieve values of 0% or 100%.

In addition, it should be noted that the information provided can be embodied in a positive/negative outlook and credit reviews with positive/negative implications, and we present an adjusted AP measure for them. It is important to note that neither the AP measure nor any other single measure alone can explain the accuracy embodied in different rating systems at a given cutoff point. In addition, the paucity of defaults and/or a low number of observations in a particular rating group may skew the results.

Appendix 3 – The WR adjusted transition matrices

Annual Aggregated Transition Table (2004-2017) - adjusted for WR

	Aaa.il	Aa1.il	Aa2.il	Aa3.il	A1.il	A2.il	A3.il	Baa1.il	Baa2.il	Baa3.il	Ba1.il	Ba2.il	Ba3.il	B1.il	B2.il	B3.il	Caa1.il	Caa2.il	Caa3.il	Ca.il	C.il	Default
Aaa.il	**93%**	4%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa1.il	1%	**95%**	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa2.il	0%	2%	**90%**	7%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa3.il	0%	0%	5%	**86%**	7%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
A1.il	0%	0%	0%	6%	**79%**	10%	5%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
A2.il	0%	0%	0%	0%	7%	**78%**	10%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
A3.il	0%	0%	0%	0%	0%	0%	10%	**75%**	10%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Baa1.il	0%	0%	0%	0%	0%	0%	13%	**68%**	9%	5%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%
Baa2.il	0%	0%	0%	0%	0%	0%	2%	20%	**63%**	5%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%
Baa3.il	0%	0%	0%	0%	0%	0%	0%	0%	4%	**72%**	8%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
Ba1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**36%**	9%	9%	0%	0%	0%	0%	0%	0%	0%	0%	45%
Ba2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	**0%**	0%	0%	0%	25%	0%	0%	0%	0%	0%	50%
Ba3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**100%**	0%	0%	0%	0%	0%	0%	0%	0%	0%
B1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	0%	0%	0%	0%
B2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	0%	0%	0%
B3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	0%	100%
Caa1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	0%
Caa2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%
Caa3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%
Ca.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**100%**	0%	0%
C.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**100%**	0%

Annual Transition Table (2017) - adjusted for WR

	Aaa.il	Aa1.il	Aa2.il	Aa3.il	A1.il	A2.il	A3.il	Baa1.il	Baa2.il	Baa3.il	Ba1.il	Ba2.il	Ba3.il	B1.il	B2.il	B3.il	Caa1.il	Caa2.il	Caa3.il	Ca.il	C.il	Default
Aaa.il	**100%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa1.il	0%	**100%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa2.il	0%	0%	**92%**	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa3.il	0%	0%	11%	**79%**	11%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
A1.il	0%	0%	0%	8%	**92%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
A2.il	0%	0%	0%	0%	4%	**89%**	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
A3.il	0%	0%	0%	0%	0%	4%	**96%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Baa1.il	0%	0%	0%	0%	0%	0%	15%	**85%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Baa2.il	0%	0%	0%	0%	0%	0%	0%	50%	**50%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Baa3.il	0%	0%	0%	0%	0%	0%	0%	0%	33%	**67%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ba1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**100%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ba2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Ba3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	0%	0%	0%	0%	0%
B1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	0%	0%	0%	0%
B2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	0%	0%	0%
B3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	0%	0%
Caa1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%	0%
Caa2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%	0%
Caa3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%	0%
Ca.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%	0%
C.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	**0%**	0%