

# Rating Performance of Corporate Finance and Financial Institutions –

## Summary of 2016 and Aggregated

### Special Report I March 2017

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.

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### Preface

The objective of this report is to present Midroog's rating performance in 2016 and cumulatively since the beginning of its activity as a rating company. The report includes the rate of transitions (transition matrixes) at the annual basis and cumulative on an annual basis, the change in the distribution of ratings and the 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<sup>1</sup> (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 measure 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.

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<sup>2</sup>. The rated issuers include public ratings and private ratings. Midroog rates structured finance credits and projects finance credits that are not included in the data presented in this report. The rating taken for the purpose of calculating the rating distribution is the issuer rating (or an estimate of the issuer rating) or the deposits rating for banks or the financial strength rating insurers (henceforth: **"the issuer rating"**).

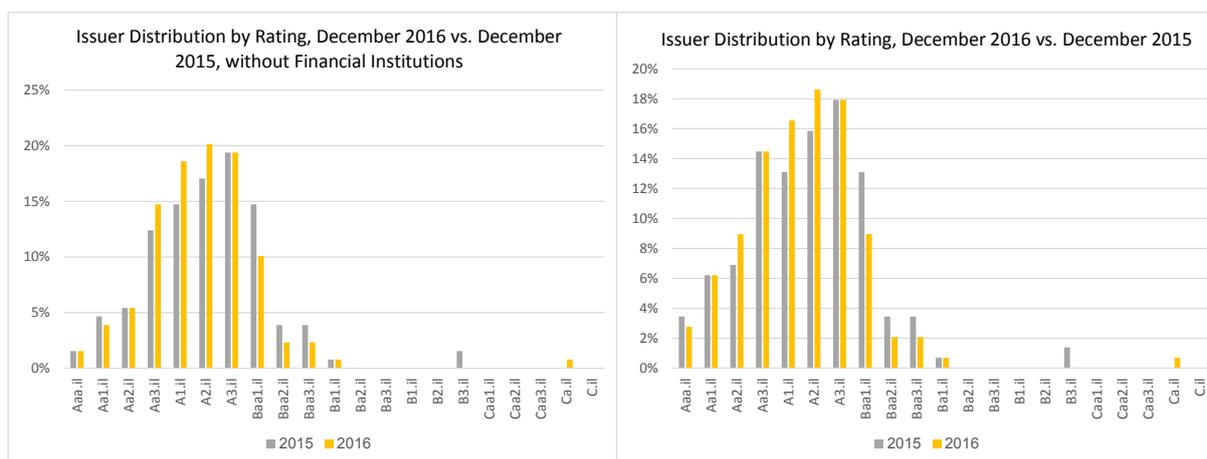
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<sup>1</sup> Calculation methodology accuracy measure is presented in Appendix 2.

<sup>2</sup> For the purpose of preparing the data presented in this report, the following updates were made in the database: 1) The database was updated with two rating downgrades that occurred during 2015; 2) The database was updated with a withdrawal of rating that occurred during 2015, which was counted as active as of the end of 2015.

## Rating Distribution

As of the end of 2016, Midroog has rated about 145 issuers<sup>3</sup>. 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 chart shows the distribution of issuer ratings as of the end of 2016 compared as of the end of 2015. All distribution ratings are in comparison with the end of 2015, after updating the database as described above. The distribution of issuer ratings in these years, excluding financial institutions are shown in the left-hand chart:

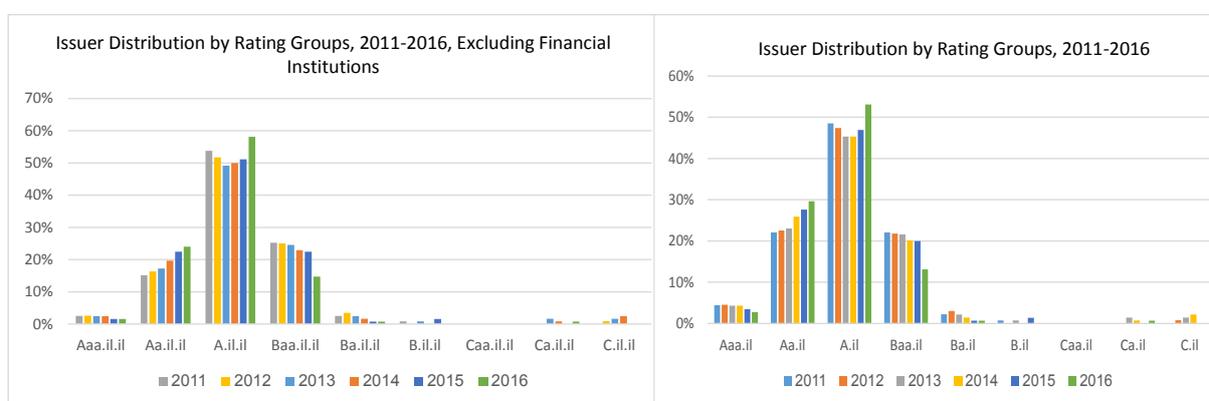


As of December 2016, issuers rated Aaa.il were about 3% of all issuers rated by Midroog at that time, which is similar to December 2015 (excluding financial institutions: about 2%). The proportion of issuers in the Aa.il group rose from about 28% at the end of 2015 to about 30% at the end of 2016 (excluding financial institutions: which rose from about 22% to about 24%, respectively). The proportion of issuers in the A.il group increased from about 47% at the end of 2015 to about 53% at the end of 2016 (excluding financial institutions, which went from about 51% to about 58%, respectively). The proportion of issuers in the Baa.il group decreased from about 20% at the end of 2015 to about 13% at the end of 2016 (excluding financial institutions, which fell from about 22% to about 15%, respectively). The proportion of issuers rated Ba.il and below fell from about 2.1% in

<sup>3</sup> Excluding project finance, structure finance or financial instrument ratings.

December 2015 to about 1.4% in December 2016 (excluding financial institutions, which fell from about 2.3% to about 1.5%, respectively).

Charts describing the distribution of ratings by rating groups follow: the right-hand chart shows the distribution of issuer ratings between the years 2011-2016. The left-hand chart shows the distribution of issuer ratings in these years, excluding financial institutions.



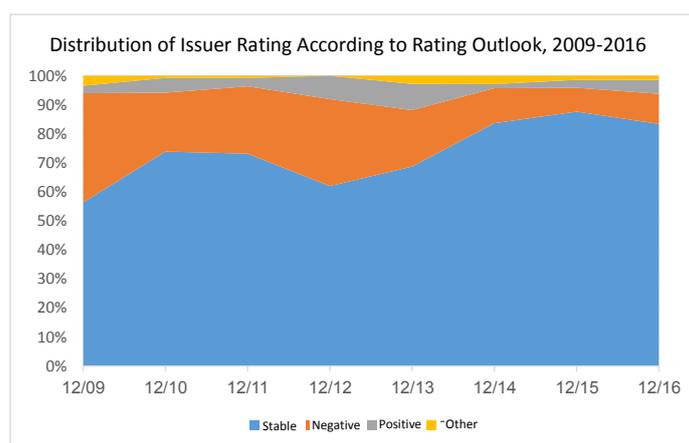
From the development of the ratings over time, it can be seen that there is an increase in the proportion of issuers in the Aa.il group, along with a decrease in the Aaa.il rating. It should be noted that the number of Aaa.il-rated issuers is small, so that the 2016 drop in Aaa.il is the result of a single rating downgrade. The proportion of the Aa.il group continued to rise in 2016, both as a result of rating transitions (from the A.il group as well) and as a result of new ratings. The rating of the A.il group also rose in 2016, as a result of new ratings in this group and increases in rating from the Baa.il group. The proportion of ratings in the Baa.il group in 2016 fell, due to both increases in the rating of the A.il group and due to rating withdraws and a downgrade of one rating (of defaulted company). In 2016, the proportion of ratings in the Ba.il group fell and the Ca.il group was added to the rating distribution (as a result of default). As of the end of 2016, there are no corporates and financial institutions with ratings in the B.il, Caa.il, and C.il groups. It should be noted that most of the rating transitions are only of one notch so that some of the rating transition are still within the level of the rating group. Details of the rating transitions between the categories are presented in Midroog's transition matrix later on 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, downgrade and in some cases direction uncertain. The conclusion of the rating review may result in rating upgrade, rating downgrade, or confirmation of the rating. Ratings under CR are sometimes referred to as being on a "watch list".

Distribution of the rating outlooks of issuers between the years 2009-2016 can be seen below. A negative outlook category includes both a negative outlook and a CR for downgrade and a category of "other", including a developing outlook and a CR with direction uncertain.

### Distribution of Issuers According to the Rating Outlook Direction (end of period)



The data shows that the proportion of issuers with a stable outlook declined from about 88% at the end of 2015 to about 83% at the end of 2016. In addition, the proportion of issuers whose rating was placed in a negative outlook increased from around 8% at the end of 2015 to around 10% at the end of 2016. The rate of issuers whose rating was positive rose from about 3% at the end of 2015 to about

5% at the end of 2016. The rest of the changes are in the "other" category, which includes, as of the end of 2016, ratings under CR with direction uncertain.

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

**Rating Transitions – December 2016 Compared to December 2015**

<b>Outlook or CR Position, December 2015</b>	<b>Upgrade</b>	<b>Downgrade</b>	<b>Unchanged</b>	<b>Withdrawn</b>	<b>Fully Paid</b>
Stable	7%	5%	78%	8%	2%
Negative	0%	29%	43%	14%	14%
Positive	75%	0%	25%	0%	0%
CR, Possible Downgrade	40%	20%	20%	20%	0%
CR, Direction Uncertain	100%	0%	0%	0%	0%
Developing	0%	0%	100%	0%	0%

The table shows that the ratings of about 78% of the issuers with stable outlook as of December 2015 remained unchanged as of December 2016.

Of the issuers whose outlook was negative as of December 2015, about 43% of the issuers' ratings remained unchanged, about 29% (0%) of the issuers' ratings were downgraded and about 28% were withdrawn and/or fully paid. Rating changes are for December 2016 in comparison to December 2015.

The rating of about 75% (25%) of the issuers with a positive outlook as of December 2015, rose (remained unchanged) as of December 2016.

Of the issuers in CR for possible downgrade, as of December 2015, the rating of about 20% were downgraded, the rating of about 20% remained unchanged and about 40% were upgraded. The ratings of another 20% were withdrawn as of December 2016. It should be noted that the number of issuers in CR for possible downgrade whose rating increased in the following year is only two<sup>4</sup>.

All issuers that were placed on CR with direction uncertain as of December 2015 were upgrade in as of December 2016. It should be noted that the number of issuers in CR with direction uncertain as of the end of 2015 was only one. All issuers whose ratings were with developing outlook as of December 2015 - their rating remained unchanged as of December 2016.

<sup>4</sup> In both ratings, material events occurred in the companies: Jerusalem Economy Ltd. and Blue Square Real Estate Ltd. It should also be noted that in one rating, the company was placed in CR for possible upgrade prior to the rating upgrade.

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## Transition Tables<sup>5</sup>

Midroog collates information on rating changes between the years 2004-2016, based on a database that has been accumulated gradually during its years of operations. Each issuer is included in the database according to the number of years it was rated. For example, an issuer rated from 2004 to 2016 is counted in the database 12 times. The issuer's last rating for each calendar year is included in the database. If the rating has been changed several times over a single year, only the last observation at the end of the calendar year will be added to the database. The total number of observations for all the rating groups and the relevant cross section points (for the ends of the years 2005-2015) is approximately 1,241. Adding rating withdrawals, defaults and ratings at year end 2016. The total number of observations serving in the calculation of the data (including rating withdrawals and defaults) at the end of the years 2004-2016 was about 1,505.

Each issuer in the database was assigned an issuer rating. In cases where there is no issuer rating, an issuer rating was estimated on the basis of the existing ratings of the issuer's rated debt instruments. The data in the transition matrices for banking corporations 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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<sup>5</sup> 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, 2004-2016

Annual Aggregated Transition Table, 2004-2016																					WR	Default
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		
Aaa.il	93%	5%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa1.il	1%	93%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa2.il	0%	2%	85%	7%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Aa3.il	0%	0%	5%	85%	7%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%
A1.il	0%	0%	0%	5%	73%	11%	5%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%
A2.il	0%	0%	0%	0%	7%	72%	10%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%
A3.il	0%	0%	0%	0%	0%	9%	68%	10%	2%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	7%
Baa1.il	0%	0%	0%	0%	0%	11%	61%	9%	5%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
Baa2.il	0%	0%	0%	0%	0%	2%	17%	59%	5%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	8%
Baa3.il	0%	0%	0%	0%	0%	0%	0%	55%	7%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	24%
Ba1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	8%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	17%
Ba2.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	25%	0%	0%	0%	0%	25%	0%	0%	0%	0%	0%	0%	0%
Ba3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%	0%	0%	0%	0%	0%	0%	0%	0%	0%	50%
B1.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	100%
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%	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%
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%	33%
C.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%
																						67%
																						67%

Annual Transition Table, 2016																					WR	Default
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		
Aaa.il	80%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa1.il	0%	78%	22%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa2.il	0%	10%	70%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Aa3.il	0%	0%	19%	76%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
A1.il	0%	0%	0%	5%	89%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
A2.il	0%	0%	0%	0%	9%	78%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	13%
A3.il	0%	0%	0%	0%	0%	8%	81%	0%	0%	4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
Baa1.il	0%	0%	0%	0%	0%	11%	58%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	21%
Baa2.il	0%	0%	0%	0%	0%	20%	20%	20%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	40%
Baa3.il	0%	0%	0%	0%	0%	0%	0%	0%	0%	40%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	60%
Ba1.il	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%
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%	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%	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%

For example, the meaning of the data appearing in the cumulative transition table is that about 85% of the Aa3.il ratings remained unchanged in a range of a year, the rating of about 5% upgraded to Aa2.il, the rating of 7% downgraded to A1.il, about 1% were 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 terminated after their rating. Principal circumstances for termination are: complete repayment of all the rated debt, debt arrangement/bankruptcy of the issuer, insufficiency/deficiency of information that does not allow effective evaluation of the credit worthiness, or a request from the issuer to withdraw the rating of its

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obligations. It should be noted that the rating sample at the low end of the rating scale is small and primarily reflects the rating transitions of companies in default and have not yet completed the debt settlement, liquidation, etc., so that high rate of rating withdrawals results from the withdraw of rating due to the end of the debt arrangement.

#### Default Column

Similar to the estimate 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. It should also be noted 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<sup>6</sup>

During 2016, two default were recorded among issuers rated by Midroog, in accordance with Midroog's default definitions. The amount of the rated debt for these issuers was about NIS 3.4 billion. Since the beginning of Midroog's operations in 2003 and as of December 2016, 21 default events totaling about NIS 20 billion were recorded. The average rating of defaulted issuers, 12 months prior to default was Baa1.il. The ratings of about 67% of the issuers in default had a negative outlook or a CR for possible downgrade 12 months before default date.

The following table provides information about issuers, rated by Midroog from its establishment and classified as defaulted:

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

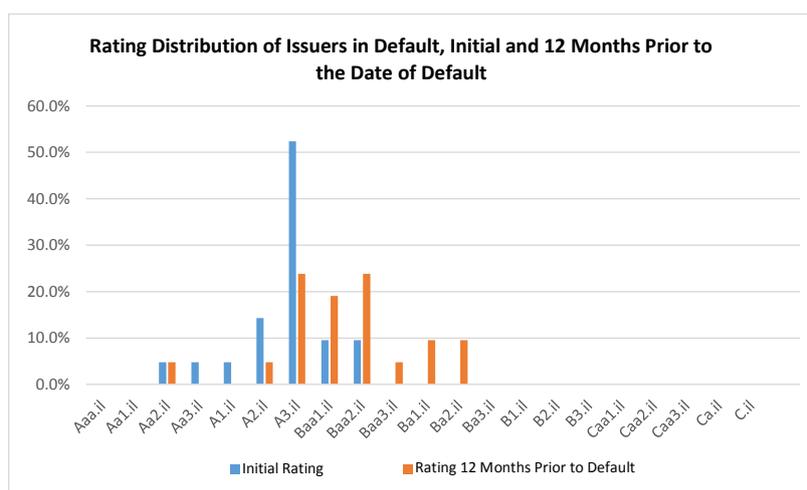
\*Around the default date.

\*\*This default was fully recovered.

\*\*\* The initial rating year after the Company's first debt settlement.

<sup>6</sup> As defined in the "Midroog Rating Scales and Definitions" document on the Midroog website.

The chart below shows the distribution of ratings of issuer in default 12 months before default date, as well as the initial rating of the issuers:



### Accuracy Measure<sup>7</sup>

The ordinal power of the rating means the ratings positioned on an ordinal scale, along which higher ratings of credits should reflect better creditworthiness than lower ratings of credits. 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, according to rating, relative to the remainder of the 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 67% 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

<sup>7</sup> Calculation methodology for the Accuracy Measure is shown in Appendix 2.

accuracy measure is higher. It can be seen that the ordinal power of the Midroog ratings is relatively good, as reflected in the accuracy measure over recent years. It should be noted that the small number of defaults events may skew the accuracy measure.

The following table shows the accuracy measure, the adjusted accuracy measure and the default rate between 2009 and 2016:

Year	2009	2010	2011	2012	2013	2014	2015	2016
<b>Average Position</b>	60%	94%	81%	9%	82%	85%	68%	77%
<b>Average Position (Outlook Adjusted)</b>	68%	99%	84%	91%	89%	86%	68%	81%
<b>Default Rate</b>	2.7%	0.9%	2.9%	4.3%	1.4%	1.4%	0.7%	1.4%

\* 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.

\*\* It should be noted that the distribution of all issuers is the distribution at the end of the previous period of default (that is, the beginning of each calendar year).

## Related Reports

- [For summaries of rating performance for the years 2009-2015, 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](http://www.midroog.co.il)

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## Appendix 1 – Calculating Transition Matrixes

Midroog groups the issuers to rating groups according to their rating and the relevant time period (T).<sup>8</sup> The marginal transition rate is the probability that the issuer “who survived” at a certain rating level up to the T period will change to another rating (upgrade or downgrade) by the end of that period. The cumulative transition rate is the probability of a transition between the rating level at the time the group was formed up to the end of period T. From the mathematical aspect, the marginal transition rate of period T for a rating group that was created at time y in rating 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).

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

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<sup>8</sup> The relevant time period is a year as published in this report.

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## Appendix 2 – Calculating the accuracy measure

### Average Position (AP)

The position of a rating (that defaulted or did not) in a rating group<sup>9</sup>, is as a 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).

A strong rating system will present an AP of close to 100%, which means that the rating in which a default event was recorded have all been rated at the bottom percentile of the ratings distribution at least 12 months before default date, indicating 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%. It should be noted that an AP of 100% or of 0% cannot be obtained, due to their share (distribution area) of the default events in the distribution so that the AP must be standardized for them. For example, suppose that D – represents the rate of ratings that experienced a default event in distribution.

- The maximum AP possible is  $100\% - D / 2$ , which will be achieved when all ratings with a default are rated the same and all ratings in which no default event has been recorded are rated above this rating.

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<sup>9</sup> In accordance with the definition for calculation purposes: issuer, series, etc.

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- In a similar manner, the minimum AP possible is D/2, where all the ratings in which a default event has been recorded are the same and that it is higher than all the ratings that did not experience a default.

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

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 for upgrade/downgrade and we present an adjusted AP measure for them. It is important to note that the AP measure or any other single measure alone does not explain the accuracy embodied in different rating systems at a given cutoff point. In addition, a small number of defaults and/or a low number of observations in a particular rating group may skew the results.

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