



OECD Workshop on Data Collection

Moody's Infrastructure-relevant Data Sets

Moody's PF Bank Loan Default and Recovery Study

MARCH 6, 2017 INFRASTRUCTURE

Moody's
INVESTORS SERVICE

SECTOR IN-DEPTH

Default Research
Default and Recovery Rates for Project Finance Bank Loans, 1983-2015

This study is an update to the previous study published by Moody's Investors Service in [March 2016](#), examining the default and recovery performance of unrated project finance bank loans. The study data set is 9% larger than in our March 2016 report and now accounts for some 62% of all project finance transactions originated globally during a 33 year period from 1 January 1983 to 31 December 2015. Our findings, which are based on a data set from a consortium of leading project finance lenders and investors, are similar to last year's report but for the first time include the impact of a project's location on its credit performance, based on the World Bank Group's Country Classification.

» **The 10-year cumulative default rate for unrated project finance bank loans is 6.7%.** The rate is consistent with the 10-year cumulative default rate for corporate issuers of low investment-grade credit quality and with the rate reported in last year's study (6.4%).

» **Marginal annual default rates are consistent with marginal default rates of high speculative-grade credits in the first three years.** However, they trend towards marginal default rates that are consistent with single A category corporate ratings by year seven from financial close.

» **Ultimate recovery rates for project finance bank loans average 79.5%.** However, the most likely ultimate recovery rate is 100% - that is, there is no economic loss - the outcome in almost two-thirds of cases. This observation is consistent with last year's study.

» **Project jurisdiction matters in the initial years of a project.** Jurisdiction tends to be a less critical driver of default rates once a project has started to build an operating track record. Average ultimate recovery rates show a degree of variation by World Bank Group Country Classification, but do not show significant variation when segmented by the broader classification of OECD and non-OECD countries.

» **Infrastructure projects and PPP (Public-Private-Partnership) projects experienced an increase in the 10-year cumulative default rate compared to the previous study.** Both sectors have a lower cumulative default rate than the study sector average, but the cumulative default rate for PPP projects increased to 5.2% (Basel II) from 3.9% cited in the previous study and for all infrastructure projects to 5.8% (Basel II) from 4.7% as the larger dataset added additional default counts to 2015 and 2014.

» Ultimate recovery rates for construction-phase defaults are lower than ultimate recovery rates for operation-phase defaults.

» On average, ultimate recovery rates realized through work-outs exceed ultimate recovery rates achieved through distressed sale exits.

Table of Contents:

1. UPDATE TO THIS YEAR'S STUDY 2
2. SUMMARY OF KEY FINDINGS 3
3. OVERVIEW OF THE PROJECT FINANCE INDUSTRY 5
4. DATA AND METHODOLOGY 9
5. DISTRIBUTION OF PROJECTS 13
6. DISTRIBUTION OF DEFAULTS 16
7. DEFAULT RATE ANALYSIS 17
8. RECOVERY ANALYSIS 25
9. FURTHER ANALYSIS OF TIME TO DEFAULT AND TIME TO EMERGENCE BY INDUSTRY 45
10. EXPOSURE AT DEFAULT 46
11. APPENDICES 48
12. MOODY'S RELATED RESEARCH 73
13. ACKNOWLEDGEMENT 74
14. NOTICE RE DATA CONSORTIUM 74

Analyst Contacts:

LONDON +44.20.7772.5454
Andrew Davison +44.20.7772.5552
Senior Vice President
andrew.davison@moody's.com

NEW YORK +1.212.553.1653
Kathrin Heitmann
Assistant Vice President - Analyst
kathrin.heitmann@moody's.com

Walter Wirerow +1.212.553.7943
Managing Director - Global Project and
Infrastructure Finance
walter.wirerow@moody's.com

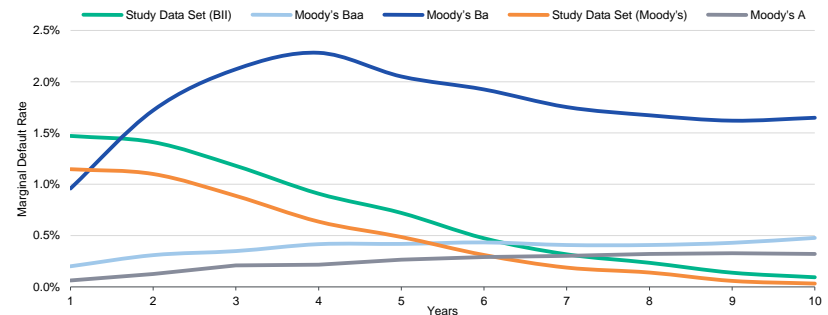
AJ Sabatella +1.212.553.4136
Associate Managing Director - Project Finance
angeljo.sabatella@moody's.com

Michael Mulveney +1.212.553.3665
Managing Director - Project Finance
michael.mulveney@moody's.com

- » Moody's latest study of the historical performance of unrated project finance bank loans was published in March 2017
 - Now includes 6,389 projects representing 62% of all project finance transactions originated worldwide over the 33-year period 1983-2015
 - Provides strategic insight into the behaviour of project finance debt

» Key findings include


- Marginal default rates trend towards levels consistent with single-A ratings by year 10 from financial close:



- Ultimate recovery rates are high, averaging 80%.
- Defaults in the Infrastructure industry sector 2009-15 are largely due to demand risk
- Projects face significant incremental risk during the construction phase and/or the commencement and ramp-up of operations.
- Project jurisdiction matters
- PPP projects are a discrete sector with a default rate lower than the Study average, and a slightly higher recovery rate than the Study average

Moody's Infrastructure Default and Recovery Study

INFRASTRUCTURE AND PROJECT FINANCE



DATA REPORT
18 July 2016

[Rate this Research](#) >>

TABLE OF CONTENTS

Introduction	3
Characteristics of Moody's-Rated Infrastructure Universe	4
Ratings Performance of Moody's-Rated Infrastructure Universe	14
Appendices	35
Moody's Related Research	55

Default Research
Infrastructure Default and Recovery Rates, 1983-2015

This study is an update to our previous publication, "[Infrastructure Default and Recovery Rates, 1983-2014](#)," published in March 2015, and focuses on the credit and ratings performance of Moody's-rated infrastructure universe from 1983-2015.^{1,2} We first characterize the infrastructure universe on the basis of its regional and sectoral distributions, overall default and credit loss rates, ratings distribution, and ratings stability. We then compare the ratings performance of the infrastructure universe vis-à-vis non-financial corporate (NFC) issuers by examining migration rates, default and credit loss rates by rating as well as rating accuracy metrics.^{3,4} Our main findings are:

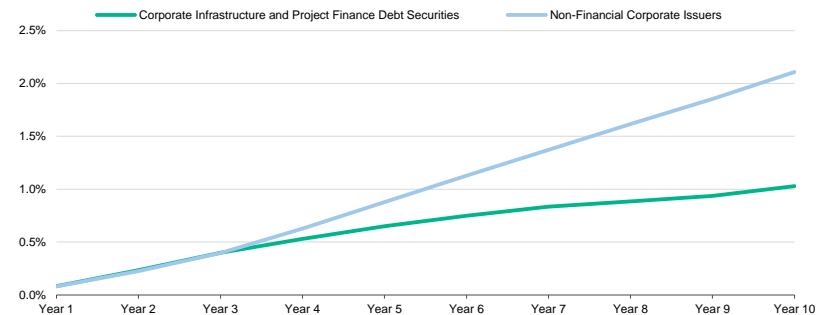
- » In the aggregate, infrastructure debts are less likely to incur credit losses than NFC issuers, especially over longer horizons. On average, a total infrastructure debt security loses 0.3% of its face value over a five-year horizon and 0.4% of its face value over a ten-year horizon, compared to 6.0% and 8.9%, respectively, for a typical NFC issuer.^{5,6,7}
- » Being assessments of expected loss, Moody's infrastructure ratings are predominantly investment-grade.⁸ As of year-end 2015, 92% of total infrastructure ratings held an investment-grade rating compared to 41% for NFC issuer ratings.⁹
- » Infrastructure ratings are more stable than NFC ratings, driven in large part by the US municipal infrastructure sector. On average, ratings on total infrastructure securities have been 40% as volatile as NFC ratings. The corresponding figures for ratings on US municipal infrastructure securities and corporate infrastructure and project finance securities are 19% and 84%, respectively.¹⁰
- » Credit loss rates for single-A and Baa-rated corporate infrastructure and project finance debt securities and NFC issuers are similar up through a five-year horizon.¹¹ Default rates for both single-A and Baa-rated corporate infrastructure and project finance debt securities are higher than NFC issuers up through a five-year horizon. However, corporate infrastructure and project finance debt securities suffer lower losses given default than NFC issuers, resulting in similar loss rates up through a five-year horizon.¹²
- » As measured by the Average Defaulter Position (AP), Moody's corporate infrastructure and project finance debt ratings are as accurate as NFC issuer ratings over one- and three-year horizons. The average one-year (three-year) AP for corporate infrastructure and project finance debt securities was 90.9% (85.9%) versus 89.6% (86.6%) for NFC issuers.^{13,14,15}

Contacts

Federico Beckmann	212-553-1953
Analyst	federico.beckmann@moody.com
Vasun Agarwal	212-553-4899
AVP-Analyst	vasun.agarwal@moody.com
Suzanne Wingo	212-553-0571
Global Group Credit Officer, Project & Infrastructure Finance	suzanne.wingo@moody.com
Sharon Ou	212-553-4403
VP-Sr Credit Officer	sharon.ou@moody.com
Andrew Davison	44-20-7772-5552
Senior Vice President, Project & Infrastructure Finance	andrew.davison@moody.com
Kumar Karthan	212-553-1428
Senior Vice President	kumar.karthan@moody.com

- » In July 2016, Moody's published an updated study of the historical performance of rated infrastructure debts, now covering the 33-year period 1983-2015
- » The study focuses on the comparison of corporate infrastructure (i.e. excluding municipal infrastructure) vs non-financial corporates
 - Infrastructure ratings are more stable than those of non-financial corporates
 - Credit loss rates for infrastructure debts are lower over the medium/long term compared with like-rated non-financial corporates

Baa Credit Loss Rates:



MOODY'S

INVESTORS SERVICE

moodys.com

Andrew Davison

Senior Vice President

Project and Infrastructure Finance

Moody's Investors Service Ltd.

+44.20.7772.5552

andrew.davison@moodys.com



This publication does not announce a credit rating action. For any credit ratings referenced in this publication, please see the ratings tab on the issuer/entity page on www.moodys.com for the most updated credit rating action information and rating history.

© 2017 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates (collectively, "MOODY'S"). All rights reserved.

CREDIT RATINGS ISSUED BY MOODY'S INVESTORS SERVICE, INC. AND ITS RATINGS AFFILIATES ("MIS") ARE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND MOODY'S PUBLICATIONS MAY INCLUDE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES. MOODY'S DEFINES CREDIT RISK AS THE RISK THAT AN ENTITY MAY NOT MEET ITS CONTRACTUAL, FINANCIAL OBLIGATIONS AS THEY COME DUE AND ANY ESTIMATED FINANCIAL LOSS IN THE EVENT OF DEFAULT. CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO: LIQUIDITY RISK, MARKET VALUE RISK, OR PRICE VOLATILITY. CREDIT RATINGS AND MOODY'S OPINIONS INCLUDED IN MOODY'S PUBLICATIONS ARE NOT STATEMENTS OF CURRENT OR HISTORICAL FACT. MOODY'S PUBLICATIONS MAY ALSO INCLUDE QUANTITATIVE MODEL-BASED ESTIMATES OF CREDIT RISK AND RELATED OPINIONS OR COMMENTARY PUBLISHED BY MOODY'S ANALYTICS, INC. CREDIT RATINGS AND MOODY'S PUBLICATIONS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES. NEITHER CREDIT RATINGS NOR MOODY'S PUBLICATIONS COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR. MOODY'S ISSUES ITS CREDIT RATINGS AND PUBLISHES MOODY'S PUBLICATIONS WITH THE EXPECTATION AND UNDERSTANDING THAT EACH INVESTOR WILL, WITH DUE CARE, MAKE ITS OWN STUDY AND EVALUATION OF EACH SECURITY THAT IS UNDER CONSIDERATION FOR PURCHASE, HOLDING, OR SALE.

MOODY'S CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT INTENDED FOR USE BY RETAIL INVESTORS AND IT WOULD BE RECKLESS AND INAPPROPRIATE FOR RETAIL INVESTORS TO USE MOODY'S CREDIT RATINGS OR MOODY'S PUBLICATIONS WHEN MAKING AN INVESTMENT DECISION. IF IN DOUBT YOU SHOULD CONTACT YOUR FINANCIAL OR OTHER PROFESSIONAL ADVISER.

ALL INFORMATION CONTAINED HEREIN IS PROTECTED BY LAW, INCLUDING BUT NOT LIMITED TO, COPYRIGHT LAW, AND NONE OF SUCH INFORMATION MAY BE COPIED OR OTHERWISE REPRODUCED, REPACKAGED, FURTHER TRANSMITTED, TRANSFERRED, DISSEMINATED, REDISTRIBUTED OR RESOLD, OR STORED FOR SUBSEQUENT USE FOR ANY SUCH PURPOSE, IN WHOLE OR IN PART, IN ANY FORM OR MANNER OR BY ANY MEANS WHATSOEVER, BY ANY PERSON WITHOUT MOODY'S PRIOR WRITTEN CONSENT.

All information contained herein is obtained by MOODY'S from sources believed by it to be accurate and reliable. Because of the possibility of human or mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. MOODY'S adopts all necessary measures so that the information it uses in assigning a credit rating is of sufficient quality and from sources MOODY'S considers to be reliable including, when appropriate, independent third-party sources. However, MOODY'S is not an auditor and cannot in every instance independently verify or validate information received in the rating process or in preparing the Moody's publications.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability to any person or entity for any indirect, special, consequential, or incidental losses or damages whatsoever arising from or in connection with the information contained herein or the use of or inability to use any such information, even if MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers is advised in advance of the possibility of such losses or damages, including but not limited to: (a) any loss of present or prospective profits or (b) any loss or damage arising where the relevant financial instrument is not the subject of a particular credit rating assigned by MOODY'S.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability for any direct or compensatory losses or damages caused to any person or entity, including but not limited to by any negligence (but excluding fraud, willful misconduct or any other type of liability that, for the avoidance of doubt, by law cannot be excluded) on the part of, or any contingency within or beyond the control of, MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers, arising from or in connection with the information contained herein or the use of or inability to use any such information.

NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY SUCH RATING OR OTHER OPINION OR INFORMATION IS GIVEN OR MADE BY MOODY'S IN ANY FORM OR MANNER WHATSOEVER.

Moody's Investors Service, Inc., a wholly-owned credit rating agency subsidiary of Moody's Corporation ("MCO"), hereby discloses that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by Moody's Investors Service, Inc. have, prior to assignment of any rating, agreed to pay to Moody's Investors Service, Inc. for appraisal and rating services rendered by it fees ranging from \$1,500 to approximately \$2,500,000. MCO and MIS also maintain policies and procedures to address the independence of MIS's ratings and rating processes. Information regarding certain affiliations that may exist between directors of MCO and rated entities, and between entities who hold ratings from MIS and have also publicly reported to the SEC an ownership interest in MCO of more than 5%, is posted annually at www.moodys.com under the heading "Investor Relations — Corporate Governance — Director and Shareholder Affiliation Policy."

Additional terms for Australia only: Any publication into Australia of this document is pursuant to the Australian Financial Services License of MOODY'S affiliate, Moody's Investors Service Pty Limited ABN 61 003 399 657AFSL 336969 and/or Moody's Analytics Australia Pty Ltd ABN 94 105 136 972 AFSL 383569 (as applicable). This document is intended to be provided only to "wholesale clients" within the meaning of section 761G of the Corporations Act 2001. By continuing to access this document from within Australia, you represent to MOODY'S that you are, or are accessing the document as a representative of, a "wholesale client" and that neither you nor the entity you represent will directly or indirectly disseminate this document or its contents to "retail clients" within the meaning of section 761G of the Corporations Act 2001. MOODY'S credit rating is an opinion as to the creditworthiness of a debt obligation of the issuer, not on the equity securities of the issuer or any form of security that is available to retail investors. It would be reckless and inappropriate for retail investors to use MOODY'S credit ratings or publications when making an investment decision. If in doubt you should contact your financial or other professional adviser.

Additional terms for Japan only: Moody's Japan K.K. ("MJKK") is a wholly-owned credit rating agency subsidiary of Moody's Group Japan G.K., which is wholly-owned by Moody's Overseas Holdings Inc., a wholly-owned subsidiary of MCO. Moody's SF Japan K.K. ("MSFJ") is a wholly-owned credit rating agency subsidiary of MJKK. MSFJ is not a Nationally Recognized Statistical Rating Organization ("NRSRO"). Therefore, credit ratings assigned by MSFJ are Non-NRSRO Credit Ratings. Non-NRSRO Credit Ratings are assigned by an entity that is not a NRSRO and, consequently, the rated obligation will not qualify for certain types of treatment under U.S. laws. MJKK and MSFJ are credit rating agencies registered with the Japan Financial Services Agency and their registration numbers are FSA Commissioner (Ratings) No. 2 and 3 respectively.

MJKK or MSFJ (as applicable) hereby disclose that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by MJKK or MSFJ (as applicable) have, prior to assignment of any rating, agreed to pay to MJKK or MSFJ (as applicable) for appraisal and rating services rendered by it fees ranging from JPY200,000 to approximately JPY350,000,000.

MJKK and MSFJ also maintain policies and procedures to address Japanese regulatory requirements.