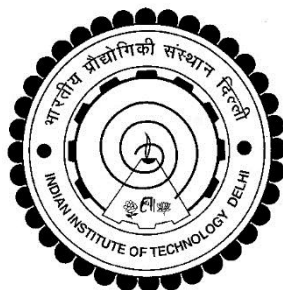


**ENABLING BOND MARKET FINANCING FOR
INFRASTRUCTURE PROJECTS IN INDIA**

DHRUBA PURKAYASTHA



**DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY, DELHI**

MAY 2018

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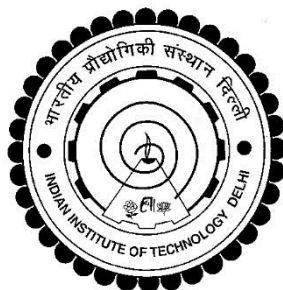
by

DHRUBA PURKAYASTHA

Submitted

in fulfillment for the award of the degree of Doctor of Philosophy

to the



**DEPARTMENT OF CIVIL ENGINEERING
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MAY 2018

CERTIFICATE

This is to certify that the thesis titled “**ENABLING BOND MARKETS FINANCE INFRASTRUCTURE PROJECTS IN INDIA**” being submitted by **Dhruba Purkayastha** (Entry Number 2012CEZ8548) to the Indian Institute of Technology, Delhi for the award of degree of Doctor of Philosophy is a bona fide record of the research work carried out by him under our supervision and guidance. The thesis work, in our opinion has reached the requisite standard, fulfilling the requirements of the said degree. The results contained in this thesis have not been submitted in part or full to any other university or institute for award of any degree or diploma.

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Dhruba Purkayastha

ABSTRACT

Infrastructure PPP projects are mainly financed by commercial bank debt in India, and there is limited participation of bond markets in financing infrastructure in India. The usual reasons given for unsustainability of commercial bank-financed infrastructure investments are lack of long term sources and tenure mismatches in their asset liability profiles, between sources and uses of funds. Given the continued increase in the share of infrastructure, commercial banks in India are now facing regulatory limits on sector exposure, and asset quality has also been deteriorating. It is, therefore, important that bank exposure to operating infrastructure projects be reduced and taken out by issuing infrastructure project bonds and through other long-term financing sources from insurance, pensions, and specialized financial institutions focused on infrastructure. However, there have been only a handful of infrastructure projects which have been able to issue project bonds in the Indian bond market.

A number of reasons have been advanced for the mismatch between global long-term finance and private infrastructure investments, which include, among others, lack of investable projects, improper risk allocation between private and public sector, the complex nature of infrastructure projects, unclear credit risk assessment, and lack of appropriate financing instruments. Inadequate credit information and lack of historical data at the infrastructure project level leads to a credit market failure in infrastructure project finance, leading to mispricing of risk and poor capital allocation to infrastructure in the economy. Infrastructure projects are considered risky by rating agencies because cash flows come from a single asset and there are higher non-commercial risks, therefore, credit ratings are usually at BBB levels. The rationale for higher risk grade for infrastructure PPP projects is,

however, not very clear. Given the lack of credible evidence to the contrary, the financial sector regulators also provide for increased risk weights for infrastructure exposures.

This research work examines historical credit default data for a set of infrastructure projects at the global level, compares credit defaults in infrastructure debt and corporate debt for given credit ratings, and analyses the implications of the same for long-term financing of infrastructure. For India, the study looked at yearly migration of credit ratings assigned infrastructure projects, tracked actual defaults, and compared them with expected defaults for BBB-rated debt as given by rating agencies for that year.

At a global level, the findings indicate that for the same rating grade, infrastructure debt exhibits significantly lower defaults and lower credit losses relative to corporate debt. Indian Infrastructure PPP projects also exhibit lower rates of default than that expected from the credit rating grades given to the infrastructure project debt.

It is recommended that a practical external credit enhancement facility using credit ratings as a benchmark with the target of achieving higher investment grade ratings be set up. Large public financial institutions in India are well placed to do so as a separate business and this may pave the way for market entry of other international insurance and reinsurance companies in this business. This would also provide a huge boost to bond markets in India and also reduces the exposure of commercial banks to infrastructure, and hence spurs credit growth.

Key Words: Financing Infrastructure, Project Finance, Credit Risk, Infrastructure PPP projects in India, Credit Ratings

सार

भारत में, बुनियादी ढांचे पीपीपी परियोजनाओं को मुख्य रूप से वाणिज्यिक बैंक ऋण द्वारा वित्त पोषित किया जाता है और इन में बॉन्ड बाजारों की सीमित भागीदारी होती है। वाणिज्यिक बैंक वित्त पोषित बुनियादी ढांचे निवेश की अस्थिरता के लिए दिए गए सामान्य कारणों में दीर्घकालिक स्रोतों की कमी और धन की स्रोतों और उपयोगों के बीच उनकी परिसंपत्ति देयता प्रोफाइल में कार्यकाल की कमी है। बुनियादी ढांचे के हिस्से में निरंतर वृद्धि को देखते हुए, भारत में वाणिज्यिक बैंकों को अब क्षेत्र के जोखिम पर नियामक सीमा का सामना करना पड़ रहा है, और संपत्ति की गुणवत्ता में भी गिरावट आई है। इसलिए, यह महत्वपूर्ण है कि ऑपरेटिंग इंफ्रास्ट्रक्चर परियोजनाओं के लिए बैंक एक्सपोजर को इंफ्रास्ट्रक्चर प्रोजेक्ट बॉन्ड जारी करके और इंश्योरेंस पर ध्यान केंद्रित बीमा, पेंशन और विशेष वित्तीय संस्थानों के अन्य दीर्घकालिक वित्त पोषण स्रोतों के माध्यम से हटा दिया जाए। हालांकि, केवल कुछ हद तक बुनियादी ढांचा परियोजनाएं रही हैं जो भारतीय बॉन्ड मार्केट में प्रोजेक्ट बॉन्ड जारी करने में सक्षम हैं।

वैश्विक दीर्घकालिक वित्त और निजी आधारभूत संरचना निवेश के बीच विसंगति के लिए कई कारण उन्नत किए गए हैं, जिनमें दूसरों के बीच, निवेश योग्य परियोजनाओं की कमी, निजी और सार्वजनिक क्षेत्र के बीच अनुचित जोखिम आवंटन, आधारभूत संरचना परियोजनाओं की जटिल प्रकृति, अस्पष्ट क्रेडिट जोखिम मूल्यांकन और उचित वित्त पोषण उपकरणों की कमी। बुनियादी ढांचे परियोजना स्तर पर अपर्याप्त क्रेडिट जानकारी और ऐतिहासिक डेटा की कमी से आधारभूत संरचना परियोजना वित्त में क्रेडिट बाजार की विफलता होती है, जिससे अर्थव्यवस्था में बुनियादी ढांचे के लिए जोखिम और खराब पूंजी आवंटन का गलत कारण बनता है। आधारभूत संरचना परियोजनाओं को रेटिंग एजेंसियों द्वारा जोखिम भरा माना जाता है क्योंकि नकद प्रवाह एक ही सहायक से उत्पन्न होता है और उच्च गैर-वाणिज्यिक जोखिमों के लिए और क्रेडिट रेटिंग आमतौर पर बीबीबी स्तर पर होती है। बुनियादी ढांचे के लिए उच्च जोखिम ग्रेड के लिए तर्क पीपीपी परियोजनाओं, हालांकि, बहुत स्पष्ट नहीं है। इसके विपरीत विश्वसनीय साक्ष्य की कमी को देखते हुए, वित्तीय क्षेत्र के नियामक बुनियादी ढांचे के एक्सपोजर के लिए जोखिम में वृद्धि के लिए भी उपलब्ध कराते हैं।

शोध कार्य वैश्विक स्तर पर आधारभूत संरचना परियोजनाओं के एक सेट के लिए ऐतिहासिक क्रेडिट डिफॉल्ट डेटा की जांच करता है, बुनियादी ढांचे ऋण में क्रेडिट चूक और क्रेडिट रेटिंग के लिए कॉर्पोरेट ऋण की तुलना करता है, और बुनियादी ढांचे के दीर्घकालिक वित्तपोषण के लिए इसके प्रभावों का विश्लेषण करता है। भारत के लिए, इस अध्ययन के लिए रेटिंग एजेंसियों द्वारा दिए गए अनुसार बीबीबी रेटेड ऋण के लिए अनुमानित चूक के

साथ तुलनात्मक रूप से क्रेडिट रेटिंग की आवंटित बुनियादी रेटिंग परियोजनाओं, वास्तविक चूक को ट्रैक करने और अध्ययन की तुलना में उन्हें वार्षिक रेटिंग में देखा गया।

वैश्विक स्तर पर, निष्कर्ष बताते हैं कि, समान रेटिंग ग्रेड के लिए, आधारभूत संरचना ऋण कॉर्पोरेट ऋण के सापेक्ष काफी कम चूक और कम क्रेडिट नुकसान दर्शाता है। भारतीय आधारभूत संरचना पीपीपी परियोजनाएं बुनियादी ढांचा परियोजना ऋण को दिए गए क्रेडिट रेटिंग ग्रेड से अपेक्षाकृत डिफॉल्ट की कम दर भी प्रदर्शित करती हैं।

यह अनुशंसा की जाती है कि उच्च निवेश ग्रेड रेटिंग प्राप्त करने के लक्ष्य के साथ बेंचमार्क के रूप में क्रेडिट रेटिंग का उपयोग कर एक व्यावहारिक बाह्य क्रेडिट वृद्धि सुविधा स्थापित की जाए। भारत में बड़े सार्वजनिक वित्तीय संस्थानों को अलग-अलग व्यवसाय करने के लिए अच्छी तरह से रखा जाता है और इससे इस व्यवसाय में अन्य अंतरराष्ट्रीय बीमा और पुनर्वित्त कंपनियों के बाजार में प्रवेश के लिए मार्ग प्रशस्त हो सकता है। इससे भारत में बॉन्ड बाजारों में भी भारी वृद्धि होगी और वाणिज्यिक बैंकों के बुनियादी ढांचे में भी कमी आएगी, और इसलिए क्रेडिट वृद्धि में वृद्धि होगी।

मुख्य शब्द: वित्त पोषण बुनियादी ढांचा, परियोजना वित्त, क्रेडिट जोखिम, भारत में बुनियादी ढांचा पीपीपी परियोजनाएं, क्रेडिट रेटिंग

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ABBREVIATIONS

ADB	Asian Development Bank
BOOT	Build Own Operate Transfer
BOT	Build, Operate, Transfer
COD	Date of Commercial Operations
DBFO	Design, Build, Finance, Operate
DBFOT	Design, Build, Finance, Operate, and Transfer
DPR	Detailed Project Report
EAT	Exposure at Default
ECB	External Commercial Borrowing
EIB	European Investment Bank
EPC	Engineering Procurement and Construction
EPEC	European PPP Expertise Centre
FDI	Foreign Direct Investments
FIMMDA	Fixed Income Money Market and Derivatives Association of India
GDP	Gross Domestic Product
GoI	Government of India
G-Secs	government security rates
ICT	Information and Communication Technology
IDF	Infrastructure Debt Funds
IFC	Infrastructure Finance Company
IFC - MF	IFC- Mutual Fund
IIFCL	India Infrastructure Finance Company Limited
IRDA	Insurance Regulatory and Development Authority
LGD	Loss Given Default
MGI	McKinsey Global Institute
MSCI	Morgan Stanley Composite Index

NBFC	Non-Banking Finance Company
NPA	Non-Performing Assets
O & M	Operation and Maintenance
PD	Probability of Default
PDAI	Primary Dealers Association of India
PFI	Private Finance Initiative
PFRDA	Pension Funds Regulatory and Development Authority
PSUs	Public Sector Undertakings
RBI	Reserve Bank of India
ROW	Right of Way
SPV	Special Purpose Vehicle
TEN	Trans-European Network

GLOSSARY

Asset Liability Mismatch: A maturity mismatch is a financial situation of a financial institution or company in which assets held to meet future liabilities are not aligned in terms of maturity time. A condition that arises in the following situation: The primary source of funds for the banks is deposits, and most deposits have short- to medium-term maturities, and thus need to be paid back to the investor in 3–5 years.

Bond Market: Also called the debt market, it is a financial market in which the participants are provided with the issuance and trading of debt securities. The bond market primarily includes government-issued securities and corporate debt securities, facilitating the transfer of capital from savers to the issuers or organizations requiring capital for government projects, business expansions and ongoing operations.

Capital Markets: Markets for buying and selling equity and debt instruments. Capital markets channel savings and investment between suppliers of capital such as retail investors and institutional investors, and users of capital like businesses, government, and individuals.

Concession and BOT: The right granted by the government for a private company to undertake an otherwise public-sector project and operate that project over a period. Build Operate Transfer (BOT) is a type of concession in which the project is transferred back to the government and also referred to as DBFO (Design Build Finance Operate). BOT and DBFO are used interchangeably

Credit Enhancement: A method whereby a company attempts to improve its debt or credit worthiness. Through credit enhancement, the lender is provided with reassurance that the borrower will honor the obligation through additional collateral, insurance, or a third party guarantee – which usually leads to a higher rating.

Credit Rating: An evaluation of the credit risk of a prospective debtor (an individual, a business, company, or a government), predicting their ability to pay back the debt, and an implicit forecast of the likelihood of the debtor defaulting.

Credit Risk: The risk/chance of default on a debt that may arise from a borrower failing to make required payments. In the first resort, the risk is that of the lender and includes lost principal and interest, disruption to cash flows, and increased collection costs.

DBFO: Design–Build–Finance–Operate refers to the typical concession structure of an infrastructure PPP project – also referred to as BOT.

Default Probability: The degree of likelihood that the borrower of a loan or debt will not be able to make the necessary scheduled repayments. Should the borrower be unable to pay, they are then said to be in default of the debt, at which point the lenders of the debt have legal avenues to attempt obtaining at least partial repayment. Generally speaking, the higher the default probability a lender estimates a borrower to have, the higher the interest rate the lender will charge the borrower (as compensation for bearing higher default risk).

Default Rate: The rate of borrowers who fail to remain current on their loans. It is a critical piece of information used by lenders to determine their risk exposure and economists to evaluate the health of the overall economy.

Expected Loss: The sum of the values of all possible losses, each multiplied by the probability of that loss occurring. Three factors are relevant in analyzing expected loss: Probability of default (PD), exposure at default (EAD), and loss given default (LGD).

Financial Closure: Occurs when all the project and financing agreements have been signed and all the required conditions contained in them have been met. It enables funds (e.g. loans, equity, grants) to start flowing so that project implementation can actually start.

Financial Intermediation: A productive activity in which an institutional unit incurs liabilities on its own account for the purpose of acquiring financial assets by engaging in financial transactions on the market; the role of financial intermediaries is to channel funds from lenders to borrowers by intermediating between them.

Infrastructure Projects: Commercially developed infrastructure projects which could be PPP Infrastructure Projects owned under DBFO contracts and privately or publicly owned and operated infrastructure projects.

Investment Grade Ratings: A bond is considered investment grade or IG if its credit rating is BBB – or higher by Standard & Poor’s, or Baa3 or higher by Moody’s. Generally they are bonds that are judged by the rating agency as likely enough to meet payment obligations that banks are allowed to invest in them.

Loss Given Default (LGD): The amount of money a bank or other financial institution loses when a borrower defaults on a loan. The most frequently used method to calculate this loss compares actual total losses to the total amount of potential exposure sustained at the time that a loan goes into default. In most cases, LGD is determined after a review of a bank’s entire portfolio, using cumulative losses and exposure for the calculation.

Nonperforming Asset (NPA): A classification for loans on the books of financial institutions that are in default or are in arrears on scheduled payments of principal or interest. In most cases, debt is classified as nonperforming when loan payments have not been made for a defined period.

Private Finance Initiative (PFI): A method of providing funds for major capital investments where private firms are contracted to complete and manage public projects. Under a private finance initiative, the private company, instead of the government, handles the up-front costs.

Project Finance: The financing of long-term infrastructure, industrial projects, and public services based upon a non-recourse or limited recourse financial structure, in which project debt and equity used to finance the project are paid back from the cash flow generated by the project.

Public–Private Partnership (PPP): A long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance.

Public Procurement: The acquisition, whether under formal contract or not, of works, supplies and services by public bodies. It ranges from the purchase of routine supplies or services to formal tendering and placing contracts for large infrastructural project