Impact of Interest and FX Rate on Breach of DSCR in Project Finance

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ABSTRACT
Project financing (PF) is a technique that lenders finance based on a project’s future cash flow and asset value. PF based on business feasibility has emerged and is being adopted in the global market to promote and facilitate infrastructure projects. In this study, key financial factors impacting the status of project finance will be reviewed. System dynamics model of causal relations between the factors will be created, utilizing the stock-flow diagram and simulated with time series data available for the key elements, using Monte Carlo simulation. In particular, the authors will start with a hypothesis that a financial covenant will provide a strong link with default situation of a project and the debt coverage service rate (DSCR) has the function. Volatilities of interest rate and FX rate will be examined regarding the sensitivity towards the DSCR. This article will eventually present the theoretical basis for the decision behavior of hedging to mitigate fluctuation risks of financial factors and some implications.

KEYWORDS
Debt Service, Debt Service Coverage Ratio (DSCR), Default, Monte Carlo Simulation, Project Finance, System Dynamics

INTRODUCTION
Project finance (PF) is the structured financing of a specific economic entity created by sponsors for which the lenders consider cash flows as being the primary source of loan disbursement, whereas assets represent only collateral (Gatti, 2008). Since the 1980s, owing to the ample liquidity in the global financial market, PF has become widely used as a funding source for infrastructure projects of public facilities requiring large amounts of capital. These include roads, ports, and railways. Project finance is also used in the private sector, including natural resource development and power plant construction. In public-private partnership (PPP) projects and domestic private investments (i.e., build-operate-transfer [BOT] and build-transfer-lease [BTL]), project finance is now a popular method to fund the gap between total project cost and equity investments of sponsors. It has been more noted since the recent launch of the Asia Infrastructure Investment Bank (AIIB) in Asia, along with the increasing expectation of the revitalization of the global construction market.

Approximately $2.5 trillion is invested a year globally in the power, road, telecom, water, and transportation. It is estimated that institutional investors and banks have $120 trillion in their assets that support infrastructure projects (Woetzel et al., 2016). Given the nature of large-scale financing, financial institutions have been primary providers of project finance. Since the 2007-2008 financial crisis, they have been strategically downsizing long-term lending because it consumes a substantial burden of capital under the new BASEL III guideline. Financial institutions have been more...
conservative and selectively participate in PF transactions with tightened risk monitoring. In the meantime, real estate PF, prevailing in Korea rather as a form of corporate finance attached with a corporate guarantee on the non-payment of debts, has started to be replaced with a strict project finance. As the local construction market stays sluggish and local financial institutions are suffering bad loans, market demands more project finance transactions based on business feasibility and bankability. At the same time, more diversified players (i.e., pension funds and institutional investors) look to PF as alternative investment assets. Along with the expectation on AIIB’s ambitious plan to support the Asian infrastructure projects of $730 billion annually by 2020, Korean companies entering global markets wish to understand PF and develop the business strategies.

In this study, key financial factors impacting the status of project finance will be reviewed and identified through literature review. Based on the findings, a simple model of causal relations between the factors will be created, utilizing the stock-flow diagram and simulated with time series data available for the key elements. In particular, the authors will start with a hypothesis that a financial covenant will provide a strong link with default situation of a project and the debt coverage service rate (DSCR) has the function. Under that hypothesis, volatility of interest rate and FX rate applicable to the debt of a project will be examined regarding the sensitivity towards the DSCR. This article will eventually present the theoretical basis for the decision behavior of hedging to mitigate fluctuation risks of financial factors and some implications.

**LITERATURE REVIEW AND THEORETICAL BACKGROUND**

The authors will examine previous research on the core risk factors of the project, which is the subject of project finance.

**Risk Factors of Project Finance**

The risk is crucial as it causes unexpected changes of the project’s debt serviceability and incurs losses to not only sponsors but also lenders. Hence, it is necessary to carry out identification and analysis of all the risks the project will bear during its economic life. There are so far numerous studies about the risks of a project. In the relevant studies on the main risk factors, the followings are named: (1) overseas construction costs; (2) project completion time; (3) O&M (operation & maintenance) cost; (4) market requirements; (5) sales price; (6) inflation rate; (7) FX rate; and (8) interest rate (Ye & Tiong, 2000). Lee and Kim (2009) distinguished five factors: (1) construction risk; (2) financial risk; (3) developer risk; (4) legal risk; and (5) market risk. Ali et al. (2008) added foreign currency exchange risk in the core risks jeopardizing the success of a project. From the risk perspective, Kim et al. (2011) noted that (1) financial risk, (2) business risk, (3) developer risk, (4) construction company risk, (5) market risk, and (6) bond preservation risk are identified as core risks. Lee and Cha (2013, 2014) conducted fuzzy-AHP analysis on the key success factors influencing the success of the project. In many different ways and from diversified angles of researchers, risk factors were differently categorized and quantified, and the forecast model was developed for the successful execution of a PF initiative. Most of the various domestic and overseas studies examining a project’s risk factor assessment reached a common conclusion that financial risk, associated with interest rate and exchange rate, is one of the key risk and success factors of a project.
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