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Bank-led infrastructure financing in India has subsided in a reflection of the micro-prudential risks faced by banks. Bond-based financing is constrained by an incomplete bond market. Foreign borrowing is particularly inappropriate as it forces currency mismatch upon infrastructure projects. In the search for innovative methods of infrastructure financing this paper introduces the possibility of "User right" as one component of infrastructure financing. The key insight is to harness users, from amongst the universe of investors, as financiers with a high yield tradeable debt instrument that derives its value from a rebate on user charges. Liquidity would come about through trading at exchanges, which would yield a liquidity premium. Users as bond-holders would have the incentive to perform monitoring functions, which would enhance accountability. Public interest vested in public infrastructure may improve existing institutional mechanism.

Keywords: financial instruments, institutional accountability, investment analysis

JEL Code: G12, G23, H54, O22, R42

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Manish K Singh (manish.singh@barcelonagse.eu) is with the University of Barcelona, Spain. S. Ramann (ramanns@cag.gov.in) is at the Finance Research Group, IGIDR. We thank Susan Thomas and Ajay Shah for insightful discussions, as also executives at IDFC and HDFC for providing an industry perspective to debt financing of infrastructure. This work has been supported by project funding from ICSI-CCGRT. The views expressed herein are those of the authors and do not necessarily reflect the views of the Finance Research Group. All remaining errors are solely the authors responsibility.

User right as a mezzanine capital instrument; innovations in infrastructure debt financing

Manish K. Singh S. Ramann*

July 16, 2014

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Contents

1 Introduction

Traditional modes of financing infrastructure have slowed down in the wake of the global financial crisis and an increasing asset-liability mismatch for commercial banks. Structural constraints of infrastructure projects lead to low ratings, thereby precluding institutions with long term liabilities from financing them. In India, the bond market is incomplete and Central Bank policies over exchange control create moral hazard problems for entities that raise funds abroad. Yet the estimates of demand for and financing of infrastructure in India rise relentlessly, leading to policy initiatives to attract financing. In the search for innovative methods of infrastructure financing, this paper introduces the possibility of "User right" (UR) as one component of infrastructure financing. It is argued that investment in urban infrastructure projects could be effectively sourced from greater numbers, if consumption were to be an integral part of the investment instrument.

For a fixed sum, a "User right" is the right to the purchaser to receive a rebate in the course of accessing an identified infrastructure facility over a fixed period of time. It can be designed for attractive returns on investment; for example, 18.7% return on an investment of Rs.16,000 entailing a 16% rebate on two way fares for 25 years on Delhi metro phase III. The ease of exit from the instrument by sale on the exchange or transfer to another would be provided by the capital market. Issues of shorter tenure are also possible which may be repeated with flexibility on parameters of tenure, quantum of capital and rebate offered.

The public, whether investor or user, would obtain improved welfare through higher returns or privileged use of superior modes of services, if URs were added to the menu for financing infrastructure projects. The demand for urban infrastructure is not matched by its supply and government has fallen behind in sustaining essential services to cities, which have been identified as the engines of economic growth. If financial contracts offered by infrastructure projects are purchased by users, the political economy of infrastructure financing may inject direct pressure on elected governments and hold them to account on such projects.

The benefits of URs as a capital raising instrument for projects, are several:

- Reduction of costly debt and mitigation of spikes in outflows from upon maturity of bonds;
- Deferring outflows leading to superior alignment of cost and revenue flows of the project;
- An effective instrument of take-out financing while simultaneously galvanising consumption of services in the initial years of operation;
- A interest free debt during construction period;

This paper illustrates the effectiveness of URs with an example of a calculation that feeds on data of metro projects currently underway in India, by substituting potential market borrowing with URs. The results suggest that introduction of URs can lead to a significant improvement in net present value (NPV) ranging from 14% to 70% and even beyond, as the NPV for certain projects turned positive. Another inference is the greater the leverage at market rates, more beneficial is the impact on the project NPV.

The resulting firm value and debt default probability suggests that theoretical credit spreads of the project will be significantly lower for other debt holders when URs will be used to raise part of the capital. This is because the face value of commercial debt shrinks and the value of the firm is better placed to meet the debt burden. This has a significant implication of possible higher ratings of the project leading to opening up of funding of infrastructure projects by insurance companies and pension funds.

The pivot of the UR scheme lies in strict compliance with project delivery schedules alongside lower interest outgo during construction. Such reduction in risk or accretion of surplus could be shared between users/investors and project operator. Delayed commencement of services would cause it to evaporate and the complete failure of a project would constitute a huge breach of trust to the investing pubic. Such a fear may cause contracting parties to generate constructive friction that promotes accountability.

The UR suffers from the classical market failure of information asymmetry, wherein the project operator holds the aces with regard to the status of critical clearances and possible pitfalls in project implementation. To protect public interest as investor, a regulatory solution could envisage strict and accurate disclosures prior to public issue of URs, post-issue monitoring and additional mechanisms of oversight of the project. The proposed framework can be summarised as:

1. A specialized monitoring agency that facilitates participation by stakeholders of a project that issues URs;
2. Exploiting the depository system to enable interface with UR holders;
3. Empowering the voice of UR holders through voting on critical issues;
4. A multi-way channel or information highway for the use of all stakeholders.

The rest of the paper is organized as follows. Section 2 summarizes problems in financing infrastructure projects. Section 3 provides the conceptual underpinning to URs, instrument details and pricing. Section 4 incorporates URs in sample infrastructure projects in order to demonstrate its potential theoretical benefits. Section 5 dwells on accountability issues and the implementation framework. Section 6 concludes with recommendations.

2 Problems in financing infrastructure

Infrastructure financing is generally characterized by non-recourse i.e. the lender can only be repaid from the revenues generated by the project. Rastogi and Rao (2011) stated that despite the asset-liability mismatch, which banks suffer when they provide project loans to large infrastructure projects, alternative sources of financing have not emerged. Banks face tougher lending conditions due to Basel III norms. They state that rating agencies are unsure of cash flows and hence necessarily give sub-investment grade rating to special purpose entities whose operations are limited to the acquisition and financing of infrastructure assets, which impedes entry of insurance companies and pension funds.

Huge initial investments, long gestation periods, construction delays, wrong projections, collection risk of payables and reneging of contracts are often cited as the major risks in the financing of infrastructure projects, that retard the entry of private funds. Specifically in an emerging market like India, markets can be incomplete in terms of availability of hedging products or due to restrictions on participation. Further, a pegged currency and its associated moral hazard problems for firms that raise foreign borrowings (Patnaik and Shah (2010)), induces dangers when infrastructure firms, which have cashflows in rupees, borrow in dollars.

The Government of India recognized that commercial debt is usually not available because of the (1) absence of benchmark rates for raising long term debt from the market; (2) asset-liability mismatch of the tenor of debt; (3) high cost of long term debt.[1] Current OECD[2] estimates portend, that after the global financial crisis it is unlikely that banks will return as major players in the provision of long term capital investment in infrastructure projects.[3]

This shortfall of investment capital for infrastructure has led to a search for innovative mechanisms. Is there a possibility of a return of the State to debt financing, after the "rolling back of the State" in the 1980-90s? While there have been instances of "project bonds" in the case of Latin American countries, these relied on banks and institutional investors. China issued a corporate bond for investment in long term railway projects (Huang and Zhu (2007)). A recent G-20 summit discussions analyzed and reviewed reforms that encourage the issuance, ownership and accountability of new debt products. Exploring new debt products arises from an imperative need

[1] Scheme (2009): Financing Infrastructure Projects through the India Infrastructure Finance Company Limited (IIFCL). Secretariat for Infrastructure, Planning Commission, New Delhi.

[2] The Organization for Economic Co-operation and Development.

[3] Financial Stability Board, paper for the G-20 meeting April 2013.

of public institutions in the BRIC[4] countries to raise investment.

The data for India illustrates these concerns. It is estimated that desired infrastructure investment during the Indian 12^{th} Five year plan period (2012-17) would be approximately $1 trillion, but most of the available debt is of seven to twelve years maturity while infrastructure projects require a longer pay back period. the banking sector reported, as of December 2010, an asset-liability-mismatch (ALM) positive gap to the extent of 14% of long-term assets, indicating that creation of long-term assets exceeded the mobilization of long-term liabilities.[5] It was reported that banks have repayment schedules higher than 15 years with most deposits maturing in 1 to 3 years.[6] From September 2005 to December 2010, the share of bank credit to the infrastructure sector (part of non-food sector) increased from 8.18% to 14.54% and as of December 2013, this share stood at only 16.7%. The disaggregated figures of sectoral deployment of bank credit, as released by the central bank, indicate a deceleration in the rate at which credit to the infrastructure sector greew, with all figures emerging negative as we trace backwards over the period December 2013 to 2009. The year-on-year decline was 55.5%, 20.7% and 5% for credit to the infrastructure sector as compared to corresponding figures of 42%, 8.2% and Nil for the total bank credit to the economy. This could be an apparent affirmation of global apprehensions of the banking sector to lend to infrastructure projects.

A consequence of low availability and high cost of finance for the infrastructure sector is that it leads to front loading of tariffs during the initial years of the project cycle, in order to ensure repayment of debt, thereby adversely affecting the users and the competitiveness of infrastructure projects.The High Powered Expert Committee (HPEC) for *Estimating the Investment Requirements for Urban Infrastructure Services (March 2011)* concluded that India's economic growth momentum cannot be sustained if urbanization is not actively facilitated, as cities will have to become the engines of national development. Innovation in financing and fixing accountability on elected governments for provision of basic services, may emerge as complementary.

[4]Brazil, Russia, India and China

[5]http://www.rbi.org.in/scripts/PublicationsView

[6]http://www.livemint.com/Money/Loandeposit-mismatch-may-hit-bank-lending-to-infra-sector

3 User rights

3.1 Consumer as stakeholder

To understand the trigger for creation of URs, we revisit the interplay between investors and consumers. The accepted view, hitherto, has been that shareholders of a firm have an adversarial relationship with its customers, which gets accentuated in monopoly conditions. This is succinctly explained by Hansmann and Pargendler (2013) while describing infrastructure development in 19th century USA, "The investors benefit most by having the firm charge monopoly prices, while the customers are best served by having the firm charge competitive prices or, in fact, even prices that do no more than cover marginal cost, so that the firm effectively provides no return at all to the shareholders investment. Consequently, if the firm is controlled by shareholders who are also major customers of the firm, the shareholders may prefer to keep the firms prices low, and get the return on their investment in the form of low prices rather than high dividends."

This paper argues that investment in infrastructure projects could be effectively sourced from greater numbers, if consumption were to be an integral part of the investment instrument. Therefore, crowd-funding for infrastructure from potential consumers may emerge from twinning of privileged consumption with the investment instrument. The catalyst for this will be the financial infrastructure developed in the Indian capital markets, especially at the level of the individual. Paradoxically, 21^{st} century India may not be dissimilar from 19^{th} century USA when it comes to access to basic infrastructure. This paper posits that given additional institutional mechanisms to protect stakeholders, exploiting the hunger for physical infrastructure combined with attractive returns on investment could lead to interesting outcomes that could generate surplus for both consumers and infrastructure projects, as explained below:

1. Raising capital through URs by tapping the potential of different segments that are impacted by infrastructure projects:
   - "Pure investor"- seeks safety of investment and high monetary return;
   - "Investor-User"- rate of return may be tempered by desire to consume basic infrastructure services, which triggers intangible and direct returns;
   - "Pure User"- interested in timely completion of projects and consumption of services that bring intangible and quantifiable returns.
2. Substituting costly debt by URs and deferring costs of servicing capital till revenues are generated, or issue of URs as a measure of take-out financing;
3. Acknowledging the public interest residing in crowd-funded infrastructure and concomitant issues of information asymmetry of individual stakeholders and their inability to effectively monitor service providers. Holders of UR,

which is public debt, arguably have a greater right to protection than do holders of risk capital.

Consumption of superior goods is equally a goal of rational consumers, who are not limited to returns on investments. Therefore, segmentation of public to cater to their specific needs may unlock a market for URs; for example, higher the number of URs held, greater is the ability of hedging of future price increases in project output. The UR is a flexible instrument that can simultaneously straddle both return on investment and return from consumption, while increasing the project viability by better aligning its cash flows.

The social imagery described above as classes of investors and consumers, will transform itself into investment and consumption under economic laws, which overlook the person as user or investor. Investments will come channelized through banks, government, pension funds and host of other investing agencies for the sake of assured interest receipts, only if investment is protected against insolvency of infrastructure, i.e. below its economic viability, debt financing will fail. Converting some part of interest, into tradeable URs that secure goods and services of the infrastructure at a discounted price, does not improve protection per se, since it is subject to both construction and political risk that loom large in such projects. Unlike equity funding, types of mezzanine funding, UR being one such, require stronger covenants and judicial support. This paper emphasizes the need for strong enforcement of covenants in the proposed instrument.

3.2 Pricing

"URs": For a fixed sum, a "UR" is the right to the holder of the instrument to receive a fixed rebate (absolute or ad valorem) in the course of accessing an identified infrastructure facility for a fixed period of time. It is a listed security held in dematerialized form that can be sold on the exchange or transferred to another at any time. The context of further discussions is urban rail metro projects that are underway in India.

An individual UR is priced at the NPV basis of a future stream of rebates on ticket price. The value realizable in a UR is calculated over a period of years assuming a ticket price of P (today) that will grow at a rate $g\%$ (per year) and construction period of t years. The ticketing expense E in year $(t+i)$ for the user will be (assuming 365 days in a year with multiple journey):

$$E_{t+i} = 2 * P * (1+g)^{t+i-1} * 365$$

Consider a rebate of $x\%$ to the holder, the saving S in year $(t+i)$ will be:

$$S_{t+i} = E_{t+i} * x/100$$

The UR price can be computed by discounting this future saving streams

$$UR_0 = \sum_{i=1}^{T} \frac{S_{t+i}}{(1+r)^{t+i}}$$

where r is the discount rate that the holder desires from investment in a UR, other than the rebate on the ticket price.

To put this in perspective, a UR could be created at a price of Rs.13,978 that offers a 45% rebate on fares for journeys on Mumbai metro phase I line I[7] for a period of 30 years from the commencement of its operation. The saving for the user will be Rs.1,381 in the first year which will increase up to Rs.2,825 in the final year. This offer ensures a return of 10.5%, which is higher than the return from investment in tax free bonds floated by government agencies (about 8.7%). By sharing the gains accruing to the project, a promotional price of Rs.13,000 can be offered for this UR resulting in a total return on investment of 17.5%. Added to this is an advantage of zero liability towards income tax, since the consideration received is in the form of consumption and not income.

Table 1 Basic assumption

These assumptions reflect the estimates used in planning Mumbai Metro Phase I Line 1.

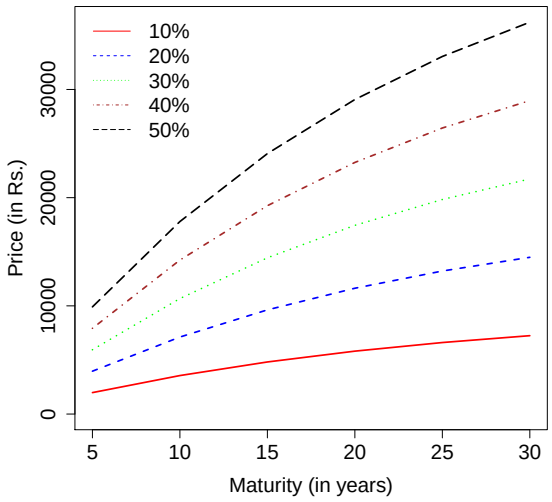
Variables	*Values*	*Explanation*
Ticket cost	8	One way
yoy increase	2.5%	In ticket price
Rebate	45%	On current ticket price
NPV discount rate	10.5%	Yearly
Project tenure	35	Years
Construction period	1	Operation expected in 1 Year
Days	365	Operational days (in a year)
Ridership estimate	6,17,675	For today (one way)
Ridership growth rate	3%	
Revenue carve out	45%	Of total revenue
Number of instruments to be sold	12,15,727	

Assumptions required to price a UR, based on NPV, are listed in Table 1, while Figure 1 provides an array of different rebates on ticket price with varying tenures of a UR. It may be noted that as long as the "project tenure" is higher than the maturity of UR, its value doubles with the rate of rebate.

Implicit in the design is the assignment of a certain percentage of revenue to service the cost of URs. Consider the same metro project issues an

[7]For project detail and estimates, please refer to Appendix C

Figure 1 Variation in UR price



instrument, which holds a direct claim of $x\%$ of the revenue (similar to revenue bonds). To price this instrument, additional estimates like ridership, ridership growth rate are required, which are listed in the latter part of Table 1. Pricing is a function of, the percentage of carve-out from revenue that is required for the desired quantum of capital to be raised and the number of instruments to be sold. Also, given that the rebate offered in a UR is cumulative in its benefit to the holder, it incentivises purchase or holding of multiple URs based on the utility function of each individual.

URs can be constructed with varying maturity or rebate on price; e.g., the same capital can be raised by issuing URs for 20 years with 30% rebate or URs for 15 years with 40% rebate. The flexibility of the UR is also visible - one free UR, with a return of 10.5%, mixed with a standard debt offer, where interest is lower, say 6.25% instead of a market rate of 12.5%. Alternatively, total return is split across products and over time - a standard debt paper carrying 12.5% interest during the risky construction period, followed by a lower coupon (say 6.25%) for its remaining life, plus a detachable UR with a return of 10.5%. Refer Appendix A for versatility of URs.

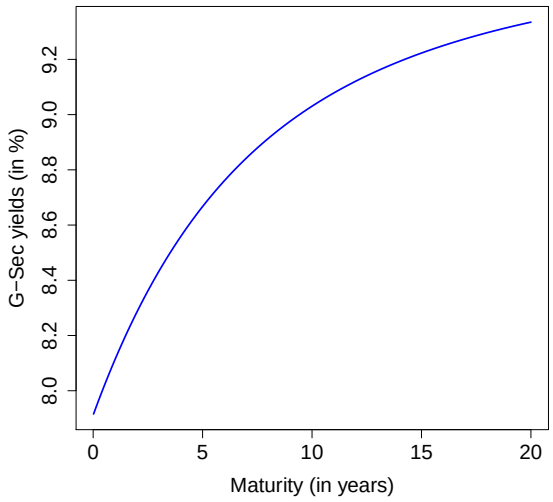
3.3 Yield curve effect

URs can be issued for different tenures with pricing based on a spread over the current yield curve. So a short maturity UR will give lower returns compared to long term URs. As the market develops and URs become liquid, they will help discover the yield requirement for long term debt issues. The

intuition is very similar to the interest rate markets where swaps are more liquid than interest rate forwards.

To understand this further, assume that the zero coupon yield curve for government security is described as in Figure 2.[8] Figure 3 plots the price of UR based on a flat discount rate of 9% against the price of UR based on government securities (G-Sec) yield curve.

Figure 2 Indian G-Sec yield curve (6^{th} November 2013)



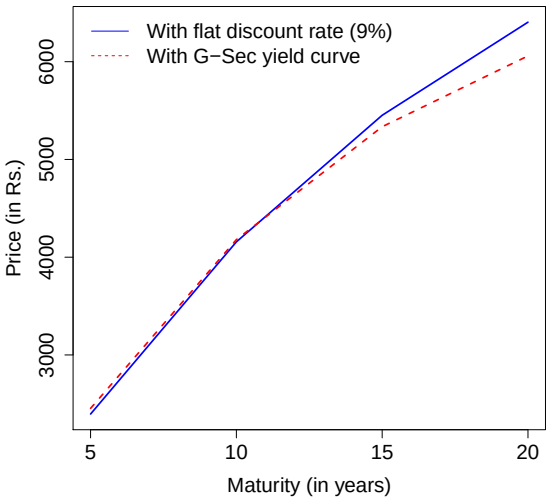
If the UR prices were available in the market, using bootstrap techniques we can compute the implied yield curve, which will help set up the standard for future long term issuances. For India, where a long term debt market is missing, it may provide an additional avenue for price discovery.

3.4 Risk assessment

The initial ticket price, its year-on-year change and the discount rate that would be similar to yields of competing investments, significantly affect UR prices. Infrastructure projects are also sensitive to political, business and credit risks. But to their advantage, URs are easy to price in any of these scenarios. In case an agency were to consider guaranteeing an issue of URs, a sensitivity analysis would reveal its existing price as well as stressed or worst case price. Figure 4 provides the impact on price of UR considering different scenarios of delay in construction of Mumbai metro phase I line I.

[8]Indian government securities yield curve as on 6^{th} November 2013; Data source: National Stock Exchange of India.

Figure 3 Price of UR



Refer Appendix C for project specifications and Appendix B for sensitivity analysis to other risks.

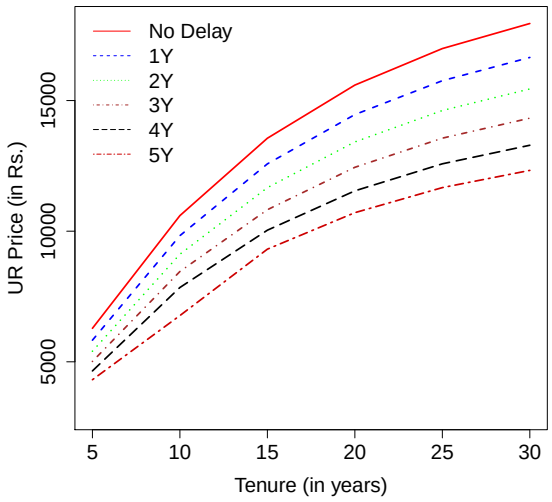
If the construction delay can be anticipated in advance, the price of the UR will change immediately to what is described in Figure 4. But in case the delay happens post issuance of UR, its holder can be compensated in two different ways based on the following scenarios:

- If the holder wants to exit: The compensation will be based on a pre-determined market rate. The holder will get the principal and cumulative interest based on the initial UR price.
- If the holder wants to retain UR: The holder desires that its investment remain protected and the terms of contract be maintained. The new price will be calculated in a similar way as done before but by going one year forward. This will make URs more valuable or higher on an NPV basis, as shown in Table 2.

Table 2 Value of UR (20Y/45% rebate) with delay

Delay (in years)	NPV of UR (in Rs.)
0	23693.3
1	24285.6
2	24892.8
3	25515.1
4	26153.0
5	26806.8

Figure 4 Variation due to construction delay



4 Analysis

4.1 The sample

For this study, we selected five Indian metro projects viz. Delhi phase III, Mumbai metro phase I line I and line III, Bangalore metro and Hyderabad metro and one road project "Sardar Patel Ring Road" in Ahmadabad. Data was taken from the public domain and official websites and in most cases validated with that received from respective project authorities. The sample comprises projects of susbsantial investment replete with public impact with diversity in terms of quantum of market borrowing, greenfield or brownfield status, recently commenced or near completion, a few with committed concessional funding and finally projects executed directly by government companies or those through a public-private partnership (PPP) mode. The key financing details, assumptions and estimates are summarized in Table 3. Individual project details are summarized in Appendix C.

4.2 Theoretical analysis

To analyze the spread between infrastructure project bond and the risk free bond, we use the structural model of default developed by Black and Scholes (1973) and Merton (1974). The foundation for this model lies in the isomorphic relationship between insurance and common stock put options (Merton (1977)). The model uses a no arbitrage condition together with

Table 3 Project summary

CP: Construction period, gr: Growth rate, 1 cr: 10^7, DMP-III: Delhi Metro Phase III, MMP-I L-1: Mumbai Metro Phase I Line 1, MMP-I L-3: Mumbai Metro Phase I Line 3, BM: Bangalore Metro, SPRR: Sardar Patel Ring Road, HM: Hyderabad Metro

Variables	*BM*	*DMP-III*	*HM*	*MMP-I L-1*	*MMP-I L-3*	*SPRR*
Tenure (years)	35	30	30	35	35	20
CP (years)	5	5	5	1	5	2
Financing requirement (in Rs. cr)						
Amount raised	12000	7271	9906	3159	1404	367
Cost of funds(%)	12.5	12.5	12.5	11.25	12.5	11
Operational cost	218	436	218	92	109	30
Maintenance cost	64	128	64	0	32	0
Staff cost	106	213	107	0	53	0
Key assumptions						
Ridership (daily)	875000	1300000	1200000	617675	817000	35000
Ridership gr	0.06	0.06	0.05	0.03	0.03	0.06
Ticket Price (in Rs.)	15	17.5	16.5	8	13	24
Ticket Price gr	0.035	0.034	0.05	0.025	0.025	0.05
Operating days (yearly)	365	365	365	365	365	365
Yearly capital requirement (as a fraction of total cost)						
0	0.05	0.05	0.05	1.00	0.05	0.70
1	0.05	0.05	0.05	0	0.05	0.30
2	0.10	0.10	0.10	0	0.10	0
3	0.25	0.25	0.25	0	0.25	0
4	0.40	0.40	0.40	0	0.40	0
5	0.15	0.15	0.15	0	0.15	0
Common data on discounting rates and other growth rates						
Risk free	0.08	0.08	0.08	0.08	0.08	0.08
Bond	0.085	0.085	0.085	0.085	0.085	0.085
URs	0.105	0.105	0.105	0.105	0.105	0.105
Concessional Loan	0.06	0.06	0.06	0.06	0.06	0.06
Operational cost gr	0.09	0.09	0.09	0.09	0.09	0.06
Maintenance cost gr	0.06	0.06	0.06	0.06	0.06	0
Staff cost gr	0.06	0.06	0.06	0.06	0.06	0

frictionless market assumption. The stochastic process generating the firm's assets return are described by the diffusion process with a constant variance per unit time. We assume that financial distress and bankruptcy are costless. Firm has a simple capital structure with N shares of common stock with market capital S and zero coupon bonds with a face value of F. The bonds are due to mature on date T and the current date is t. The estimation methodology is as follows.

We use the value conservation equation:

$$V_t = S_t + D_t$$

where V_t is the present value of the firm, S_t is the value of equity, and D_t is the market value of corporate debt.

The payoff to debt holders at time T can be written as follows:

$$max[F, V_T] = F - max[0, F - V_T]$$

The value of corporate debt D_t is computed using Black-Scholes option pricing formula,

$$D(V_t, t) = F\ e^{-r(T-t)}\ N(d_2) + V_t\ N(-d_1).$$

where,

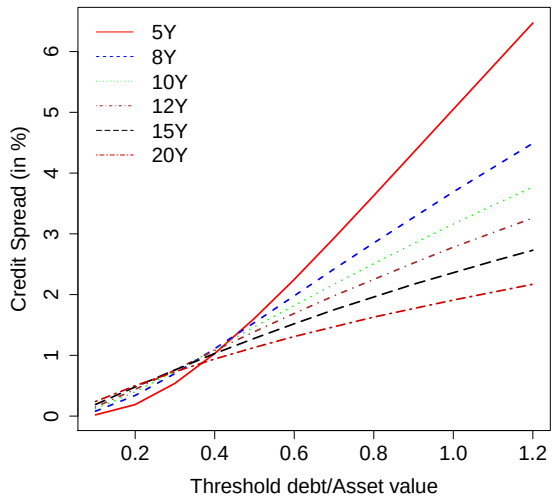
$$d_1 = [ln(V_t/F) + (r + 0.5\sigma_v^2)(T-t)]/[\sigma_v\sqrt{(T-t)}]$$
$$d_2 = d_1 - \sigma_v\sqrt{(T-t)}.$$

Value of the corporate debt will consists of: (1) F_t which is exactly what the buyer of a default-free discount bond will get, (2) the value of a put option on the assets of the firm, with strike price equal to face value of corporate debt. The yield to maturity, R, of the corporate discount bond at date t is:

$$D_t = F\ e^{-R(T-t)}$$

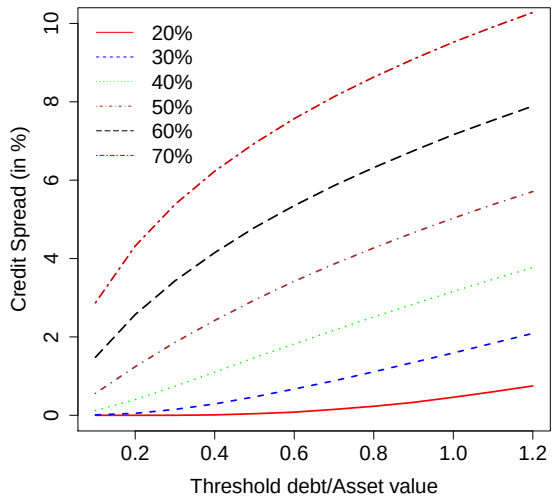
Credit spread is computed as the yield on project bond less the yield on risk-free bond. The spread will be $(R - r)$, which reflects the value of the put option. Given that the credit spread depends on (i) volatility of cash flows, (ii) value of the firm, and (iii) face value of debt and maturity, theoretically it can increase or decrease, subject to change in any combination of these variables, which are interlinked in the model. To understand the interplay between tenor of the debt, volatility of the firm value and the credit spread, we plot the iso-curves. Figure 5 shows variation in credit spread for varying tenure and firm leverage while Figure 6 plots the level of credit spread for varying volatility and firm leverage. Since infrastructure projects are highly leveraged, it suggests that increasing the tenor or lowering volatility are the only options for reducing credit spread.

Figure 5 Credit spreads for fixed volatility (40% annual)



In practice it may be difficult to get loans of longer than 10 years tenor. If it is possible to do some financial engineering to meet the servicing of

Figure 6 Credit spread for fixed tenure (10 years)



the debt component of the project, together with smoothening of its cash outflows, that may well become a different project. At such an impasse, introduction of URs appear to fit this vacuum neatly. The cash flow and sensitivity analysis revealed that introduction of URs led to crashing of debt and superior alignment of cash flows in the riskier stages of the projects. This resulted in lower credit spreads for the risky debt taken by the project when compared to risk-free debt, given the value of the firm. The theoretical model simulation is presented in Table 4, using data for the sample projects that were analyzed. We followed the methodology suggested by Rastogi and Rao (2011) to compute the cash flow volatility based on different scenarios related with change in ticket prices, growth rates, project delay and interest rate.

The results reveal significantly lower credit spreads when URs substitute market borrowings to raise capital; lesser the concessional financing in a project larger is the fall in credit spread. The probability of default falls as face value of debt reduces. The value of the firm is better placed to meet its debt burden. Therefore, projects may obtain an investment grade rating given the lower debt servicing and the significantly lower credit spreads. This may lead to funding by insurance companies and pension funds. The innovation of URs, by substituting some part of commercial bonds or loans, could potentially assist in opening up a vital flow of funds for infrastructure projects.

Table 4: Theoretical Credit Spreads

1. BM:Bangalore Metro, 2. DMP-III: Delhi Metro Phase III, 3. HM: Hyderabad Metro, 4. MMP-I L-1: Mumbai Metro Phase I Line I, 5. MMP-I L-3: Mumbai Metro Phase I Line III, 6. SPRR: Sardar Patel Ring Road.
All amounts are in Rs. cr, 1 cr: 10^7.

	MMP-I L-3		BM		DMP-III		HM		MMP-I L-1		SPRR	
Input	w/o UR	with UR	w/o UR	with UR	w/o UR	with UR	w/o UR	with UR	w/o UR	with UR	w/o UR	with UR
Face value of debt (F)	94545	90497	19481	6234	125860	109369	38948	5842	3964	594	1124	168
Risk free rate (r)	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
Time to maturity (T-t)	29	29	17	17	26	26	15	15	15	15	14	14
Firm value (present)	6146	6146	6507	6507	21090	21090	9206	9206	1383	1383	445	445
Asset volatility	51.9%	51.9%	43.1%	43.1%	38.6%	38.6%	44.2%	44.2%	51.9%	51.9%	28.8%	28.8%
Value of put option	8074	7700	2878	560	9840	8216	7677	488	790	59	130	1
Value of risk free debt	9291	8894	5000	1600	15724	13664	11731	1760	1194	179	367	55
Value of risky debt	1218	1193	2122	1040	5884	5447	4054	1272	404	120	237	54
YTM of risky debt	15.01%	14.93%	13.04%	10.53%	11.78%	11.54%	15.08%	10.16%	15.22%	10.66%	11.12%	8.20%
Theoretical credit spread	7.01%	6.93%	5.04%	2.53%	3.78%	3.54%	7.08%	2.16%	7.22%	2.66%	3.12%	0.2%

4.3 Financial analysis

What is the effectiveness of URs, when replacing commercial debt, in better aligning the cost and revenue flows across stages of the project life and its impact on project viability?

This was tested by part replacement of market borrowing with URs for the sample projects. Market borrowing of a project is calculated as the difference or gap between all committed financing available with the project and its total estimated cost. Based on the inputs given in Table 3, a detailed cash flow and sensitivity analysis was conducted wherein closing negative or positive cash balances were calculated at 7.25% and 7%, respectively. Project NPV is the key metric for evaluating its effect on project viability.

We present three scenarios for fund raising: (1) funds raised via bonds at 12 .5% for 15 years, or as per actual project specifications (2) 85% of market borrowing is raised through URs and 15% via bonds and (3) market borrowing is raised equally through URs and bonds. Table 5 summarizes the NPV results. For individual projects the separate columns give the amount raised via UR, NPV of the project, the price of one UR and the number of URs required to raise the requisite amount, ticketing price and its yoy growth rate, ridership estimate and its growth rate, respectively. There are three rows for each project corresponding to the three scenarios.

Table 5 NPV Analysis

Each project is presented in three rows in the NPV analysis done for the three scenarios. BM: Bangalore Metro, DMP-III: Delhi Metro Phase III, HM: Hyderabad Metro, MMP-I L-1: Mumbai Metro Phase I Line 1, MMP-I L-3: Mumbai Metro Phase I Line 3, SPRR: Sardar Patel Ring Road.
All amounts are in Rs. cr, where 1 cr is 10^7.

Project	Amount (UR)	NPV	Price /No. of UR (in lakhs)	Ticket price/ Growth rate	Rebate/RoR on UR (in %)	Rider est./ Growth Rate
BM	0	-2162				
	10197	-569	28000 / 36.43	15/3.5%	60.0/ 17.5	8.75L/6%
	6000	-1812	19000 / 31.53		40.0/ 16.3	
DMP-III	0	-2029				
	6179	-645	12500 / 49.40	17.5/3.4%	25.0/ 18.7	13.00L/6%
	3630	-1495	8000 / 45.30		16.0 /18.7	
HM	0	-1289				
	8420	1762	24000 / 35.08	13/5.0%	40.0/ 16.3	12.00L/5%
	4950	307	12000 / 41.25		25.0/ 17.0	
MMP-I L-3	0	-1559				
	1192	-1323	6300 / 18.92	13/2.5%	10.0/ 17.5	8.17L/3%
	701	-1386	3500 / 20.02		10.0/ 16.9	
MMP-I L-I	0	-3269				
	2867	-2933	17000 / 11.68	8/2.5%	80.0/ 18.0	6.17L/3%
	1580	-3003	13000 / 12.15		45.0/ 17.5	
SPRR	0	-112				
	312	-45	33000 / 00.94	24/5.0%	40.0/ 18.2	0.35L/6%
	183	-77	21000 / 00.87		25.0/ 16.0	

The results suggest that introduction of URs leads to significant improvement in project viability with NPV rising by 14% to 70% and even beyond, as the NPV for certain projects became positive. Secondly, higher the leverage especially at market terms the more effective is the impact of UR on the NPV. Third, more robust is the revenue base of the project over the years, greater is the flexibility of pricing the UR. This inference is demonstrated in the case of Mumbai Line 1, where due to the combined effect of a lower coupon rate at 11.25% and both low initial ridership estimates and rate of growth of ticket price, the project did not benefit from raising UR levels to 85%. Iin comparison, Hyderabad metro witnessed NPV turning positive at the 85% level of URs, on account of coupon rate at 12%, both robust ridership estimates and ticket prices that translated into high growth of revenues.

For investors, the return was above 16% (with a high of 18.7%) by providing incentives at purchase, such that returns were significantly higher than those on quasi-government bonds (8.7%), on a post tax basis. URs do not attract income tax since there is no interest paid to the investor, but the benefit accrues in the privileged consumption of physical output. Even after allowing for planned higher returns to the investors, the project NPVs improved significantly.

The challenging aspect of introduction of URs would be the number of URs to be sold in order to raise the target funds; the ratio of number of URs to the ridership estimate was four times in case of Bangalore metro. It implies that either each holder of UR is induced to purchase more than one UR to obtain higher levels of rebate (rebate is cumulative) or it may not be possible to raise the entire target amount in a single tranche and it may be spread over a period of time in conjunction with growth in ridership

To understand the mechanics of improvement in NPV, we specifically plot the revenues and cash flows on the same three scenarios for Delhi Metro Phase III, a brownfield project with a robust ridership on its lines that are functional. Capital raised through URs under scenario (2), namely 85% of market borrowing amounts to Rs.6,179 cr and that under the equal scenario(3) is Rs.3,630 cr. The respective cost of URs (1-way) is Rs.12,500 and rebate is 25% for 25 years and Rs.8,000 with a rebate of 16% for 25 years, in the two scenarios. The fall in negative NPV and impact on cash flows of the project are shown in Table 6 and Figure 7. The project NPV (negative in all cases) is Rs.645 cr in scenario 2 and Rs.1,495 cr in scenario 3. Comparatively, the alternative of full bonds (scenario 1) raised at 12.5% for 15 years results in a project NPV of negative Rs.2,029 cr, ceteris paribus.

The plot clearly reveals superior alignment of cost and revenue flows on account of significant fall in interest ouflows in the construction period and mitigation of the spike in outflows due to bond or loan repayment, thereby

Figure 7 Cash flow alignment - Delhi Metro Phase III

The figure shows the financial flows for two scenarios: (1) when the complete funding is raised via bonds and (3) when half the funds are raised via UR

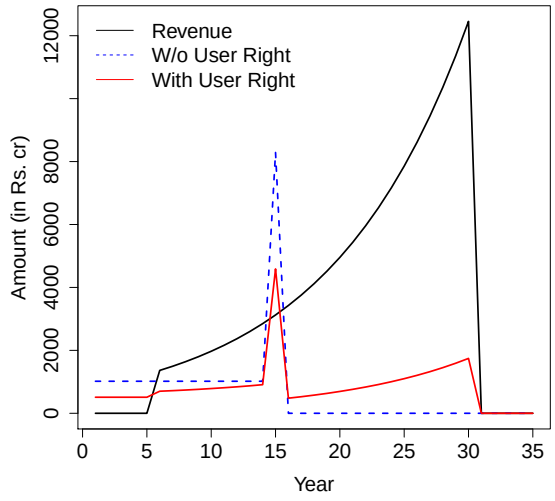


Table 6 Based on cash flow analysis

All amounts are in Rs. cr, where 1 cr: 10^7.

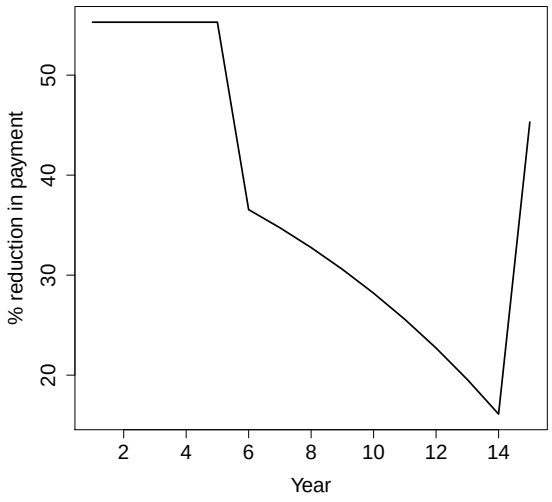
Instruments	**Scenario 1**		**Scenario 2**		**Scenario 3**	
	Amount	IR or Rebate	Amount	IR or Rebate	Amount	IR or Rebate
Bonds	7271	12.5% (15 years)	1092	12.5% (15 years)	3641	12.5% (15 years)
URs	0.0		6179	25% (25 years)	3630	16% (25 years)
Project NPV	**-2029**		**-645**		**-1495**	

keeping it within reach of the revenue flows. Servicing of borrowings or capital raised by URs is deferred to phases of the project when the revenue stream has commenced. This leads to superior cash management and lower working capital requirements. The carve out from annual revenue to service URs gets progressively diluted as revenues grow on account of increase in ridership and ticket price. Figure 7 shows the alignment graphically, while Figure 8 highlights the reduction in scheduled payments towards servicing of debt when URs partly replace bonds in market borrowing.

To highlight the robustness of the results, Figure 9 presents an analysis done for all the sample projects wherein half the market borrowing is raised via URs. Appendix C shows the superior alignment in cost and revenue flows and reduction in cash outflow for each project separately.

The divergence in investment behaviour of bondholders and UR holders may

Figure 8 Percentage reduction in cash outflow - Delhi Metro Phase III



arise from the dual goals of the latter. These newly minted stakeholders have a desire for usage of infrastructure projects, such as fast and clean travel, or efficient hospital services or continuous power supply. It is argued in this paper that a strong latent demand for consumption of output can make them to commit funds to such projects. That the URs carry a high tangible return of 18.7% on an investment of Rs 16,000 (2-way on Delhi metro III) is an attractive additional incentive, given the risks in such projects. In contrast, an institutional lender does a maximum return calculation, apart from other benefits, as a holder of senior debt, pertaining to security, repayments and progress reports. To the extent revenue generation is critical for repayment of principal to the bondholders, Commence Operations Date (COD) of the project would also constitute a priority goal for them.

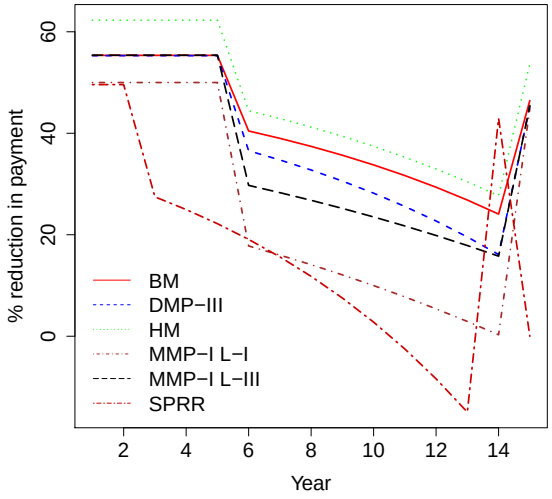
5 Accountability, regulations and markets

5.1 Accountability to investors

The flip side of tapping the public for investment is increased accountability to them. Infrastructure projects in which potential users purchase URs, may bring with it a legitimate expectation of timely delivery of services and therefore challenges of completion as per contract. There is an imperative to explode the avenues for calling to account agencies responsible for delivery of infrastructure projects, including involvement of stakeholders in the

Figure 9 Reduction in payment (in %)

BM: Bangalore Metro, DMP-III: Delhi Metro Phase III, HM: Hyderabad Metro, MMP-I L-1: Mumbai Metro Phase I Line 1, MMP-I L-3: Mumbai Metro Phase I Line 3, SPRR: Sardar Patel Ring Road.



monitoring of the project. There is an element of reflexivity inherent in such an accountability framework that may augur well for both project viability and consumer welfare.

The construction phase is the biggest risk to investors in an urban infrastructure project. As per a classification of projects, large capital intensive projects like metros are characterized by a combination of user fees and initial capital grant, partial risk allocation to the private partner for construction and a government that gains through a revenue share. To attract investments in URs issued by a project with high construction risks, the challenges to be tackled are the failure or abandonment of a project, delay in COD and maintenance of continuous output, at identified levels of quality over the life of the URs. This was confirmed in discussion with industry experts that both assurance of investment and delivery of services are pre-requisites for a successful attempt at crowdfunding for infrastructure projects.

The complete failure of the project would constitute a huge breach of trust. When such projects have a sovereign equity stake, like in the case of several metro projects underway in India, the UR holders may not fear abandonment of the project. Better still would be for the balance of construction risk tilting away from the private partner. In other projects it may take the

form of a debt reserve ratio or guarantees by insurance companies or large multilateral institutions. Given the relatively low purchase cost of URs, as observed from the sample data, such safety net mechanisms would protect retail investors of debt instruments, especially when such measures are in the offing for issuances of risk capital.

5.2 Accountability through participation

Important project milestones warrant close and strict monitoring on behalf of UR holders, who are dependent on pooling of information and the combined strength of non-state actors in holding a project to its stipulated COD. This is neither an unusual demand nor disruptive to the project, as borne out from similar initiatives observed around the globe, as also within India. Such a framework becomes effective manifold, when it has the power of the State backing it.

A blog sums it up aptly that citizen engagement matters for transparency in monitoring of infrastructure projects, especially when they know such a need or opportunity exists and the incentive structure is clear. There need to be low barriers to participation; bandwidth constraints and user-centric software design matter for effectiveness.[9] It is recognized that multiple and effective steps to increase transparency is only one aspect of the empowerment effort, which hinges more on participation leading to greater accountability. This was summed up "*as transparency does not automatically generate participation and use of information, so participation does not assure accountability. Those who seek accountability may lack effective avenues and channels. Or targets of accountability, government and other politically powerful groups, may be so dominant that they can ignore or easily resist information-based campaigns and shaming strategies.*"[10]

Making accountability a cornerstone, the HPEC did not mince words in its report - "*Social audit reports, independently verified by third parties and published on a regular basis, will serve as key levers in keeping city administration accountable. Citizen Report Cards like the ones prepared by the Public Affairs Centre in Bangalore must be replicated... Citizen forums that adopt an outcome-based approach in measuring effectiveness of city management will help reduce the disconnect... Use of Information and Communication Technology (ICT) and continuous monitoring based on mobile phones as is being currently practised in Greater Hyderabad Municipal*

[9] http://blog.transparencypolicy.net/

[10] Sanger Khagram, Paolo de Renzio, and Archon Fung. *Overview and Synthesis: The Political Economy of Fiscal Transparency, Participation, and Accountability around the World.* http://internationalbudget.org/wp-content/uploads/The-Political-Economy-of-Transparency-Participation-and-Accountability.pdf

Corporation, has to be strongly encouraged."[11]

Taking on board such bold initiatives in the area of stakeholder participation, it is proposed to leverage the existing technology platforms in the infrastructure institutions of the capital markets to support the interest of UR holders in infrastructure projects, as under:

1. A specialized designated agency that will be funded by the project and serve as the key link between the regulator, the UR holders and the project.
2. Such agency may consult and train with experts in oversight of project implementation, given its required skill-sets.
3. The depository system facilitates an interface of the agency with holders of URs as it maps each holder to a mobile number, if not also to an email.
4. Each holder of an instrument can be awarded the power to vote on any issue within the legal boundaries of their agreement.
5. A multi-way channel or an information highway is established for uploading of photos or data by any stakeholder - the agency, other authorities, financiers, external and internal auditors of the project, regulator and UR holders.
6. The stakeholders can choose their representatives to the agency and grievances may be redressed through it.

This paper argues for the greater exploitation of inexpensive methods of consolidating voices of users to achieve their participation on the ground, which can only improve the chances for on-time execution. The framework of URs may thus achieve both goals of capital raising and enhancing the accountability quotient in civil society.

5.3 Regulatory issues

Debt regulations applicable to UR: The UR provides a fixed return based on the schedule of future fares; its residual value can be calculated like that of a bond and can vary with market demand and future ticket price. The UR is a corporate debt and protection of the promised rebate would need to be covenanted in unambiguous terms. The regulations relevant to issue and listing of debt securities would apply to URs.

Enhanced regulatory framework for mitigation of risks: Vulnerability to political and operational vagaries warrants commensurate compensation to UR holders upon disruption in schedules due to such events. Given the enormous benefit a project stands to derive from raising funds through URs, there is a strong commercial case for payouts to be made to UR holders for each period of delay (refer subsection on risk assessment). Notwithstanding the

[11] ibid page 4

disclosure of risks in the prospectus, additional oversight on important and critical milestones of the project thorugh a specialised monitoring agency is proposed in this paper. This would add a desirable layer of due diligence, over and above that by senior debt holders in the project or by rating agencies. The role of regulators must be seen as a corollary to the expanding boundaries of public interest, the protection of which brooks few limits.

5.4 Market mechanism

Easy transferability of URs: The raison d'etre of the UR is its realtime availability as a security in the demat account of the holder. It can be transparently and instantly transacted on an Exchange or transferred to another, thereby imparting a high degree of marketability to the instrument. The delivery systems in the Indian capital markets allow transactions to be executed with high efficiency and negligible cost. Transfer of beneficial ownership occurs on the same day and in case of primary and secondary sale of debt, on a $T + 1$ basis.

Outreach for electronic interface with URs: An entire ecosystem needs to be built up around URs for a seamless utilization by holders of these rights. The proposed interface between UR holders and the Issuer will exploit the existing technology of a centralized system of depositories that has been intensively used for over a decade. The access points for UR holders to pay for the services can be numerous or through an Internet portal with electronic linkage to individual dematerialized accounts that will verify the applicable rebate based on number of URs held. Failure at the interface level will cause loss of return to users and lack of trust in such instruments in future. The success of the URs based debt financing would also depend on the ability of users to encash their rights at will, at no cost to them. The business model for the agency that provides interface would depend on a minuscule part of the revenues flowing to them from the projects that they support.

Market making issues for URs: Once commencement date has been achieved a market maker could provide liquidity at pre-specified exit points in the life of a UR or even on a regular basis, such that an investor has certainty of exit and accompanying costs that it would incur upon exit. A well calibrated incentive scheme that encourages the holding of URs could give investors opportunities to purchase further URs at lower costs. The gamut of market making could be handed over to intermediaries and banks thereby insulating the protect once the initial sale of URs is made in the market. As per contract with UR holders the rebate on URs will be secured by a charge on revenue of the project; some wastage of URs (our study factored 10 percent) may occur, which will benefit the project.

6 Conclusion and recommendations

This paper introduces "User right" as an innovative debt instrument to raise capital based on legitimate expectations of urban residents for consuming infrastructure services. It emphasises the consumers' role as a stakeholder. As an independent instrument, it could be sold to segments of the public - pure investor, investor-user or pure users. In summary, UR is an interest free debt during construction period. It reduces the debt raised via bonds or loans with consequent reduction in interest payment. It provides the holder a rebate on the output, for example metro rail, for a fixed period of time. The cost of servicing the capital raised through URs is deferred to a stage when revenues of the project start flowing, which helps in mitigating the spikes in cash outflows (upon maturity of bonds) and leads to superior alignment of costs with revenues of the project; this is accompanied by significant improvement in NPV of the project.

A robust starting point for issue of URs may be projects with lower risk in which government is the developer or operator and where parts of an ongoing project are visible to and in use by the public. It makes the investment climate for raising funds through URs more conducive. For large projects of wide public impact like mass transit systems, part ownership by government is preferrable for on-time delivery and zero delay during the risky construction stage. This assumes criticaliity since savings in this phase alone, permit an attractive return to be offered to UR holders, above 16%, as well as improved NPV to the project. The results arising from the sample projects revealed significant increases in NPV values of the projects when URs replaced market borrowing, in itself a small component.

The additional oversight mechanisms for the protection of the public interest vesting in URs to be institutionalized under the overall supervision of the financial regulator is a strong recommendation of this paper. The backstop for URs must remain a commercial decision and in projects operated by private companies it may be a tripartite contract between it, the designated agency on behalf of UR holders and an entity that can assess and bear risks. Further, the credit spread analysis of risky debt over risk-free debt in selected projects, reveals a significant reduction that may help improve their credit ratings.

It is possible that an agency provides a single interface, wherein a full bouquet of basic services from different infrastructure projects are offered to residents or consumers and utilization of URs runs across such a network.

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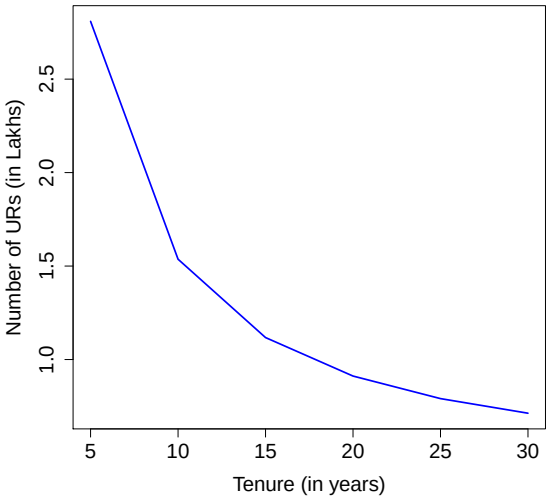
A Flexibility

The number of URs required for a fixed amount of funding will be the quotient of capital to be raised by value of individual UR. Figure 10 plots the number of URs required to raise Rs.1,000 cr using 45% rebate on ticket costs for varying tenures for Mumbai metro phase I line 1 estimates.

Figure 10 Number of URs based on varying tenure (Rebate = 40%)

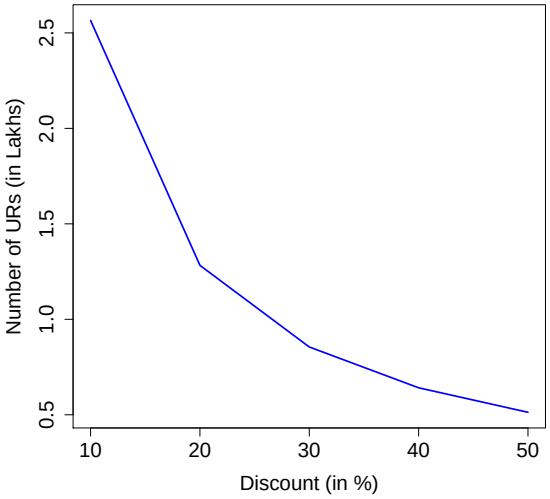


As the rebate rate doubles, the amount raised will be double but the relationship with tenure will be concave due to the time value of money. Figure 11 shows a similar plot for fixed tenure (20 years) and varying rebates to raise an equivalent amount (Rs.1,000 cr).

Capital raising through URs is limited by ridership estimates, tenure of UR and rebate offered. For example, the maximum rebate that can be offered is a free ride and the tenure cannot extent beyond the concession period. Based on this assumption, the maximum amount that can be raised for Mumbai metro phase I line I is roughly Rs.2,900 cr. Ridership estimates are a key determinant for project approval and are consistently overestimated as famously seen in the case of Eurotunnel, so realized funds could be lower than the amount predicted.[12]

[12]The Channel Tunnel Rail Link, Report by The Comptroller and Auditor General, HC 302 Session 2000-2001: 28 March 2001

Figure 11 Number of URs based on varying rebate rate (Tenure = 20Y)



B Variability

Figure 12, 13 and 14 provides a similar analysis for the price of UR considering (1) change in base fare, (2) year-on-year change in ticket price and (3) changes in discount rate based on the assumptions in Table 1. Based on the figure, it can be interpreted that long tenure UR price will be highly sensitive to the risk factors.

Figure 12 Variation due to changes in ticket price

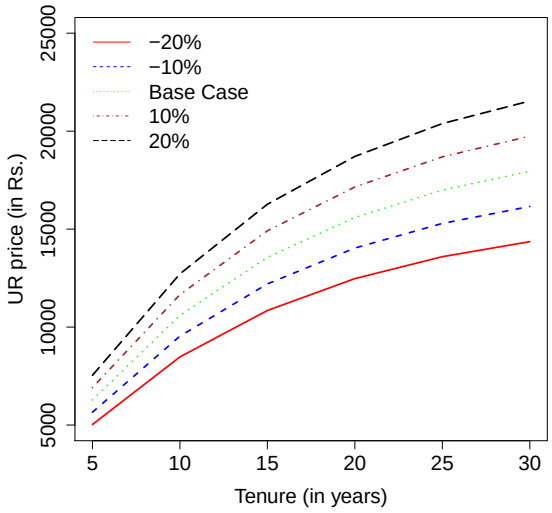


Figure 13 Variation due to year-on-year changes in ticket price

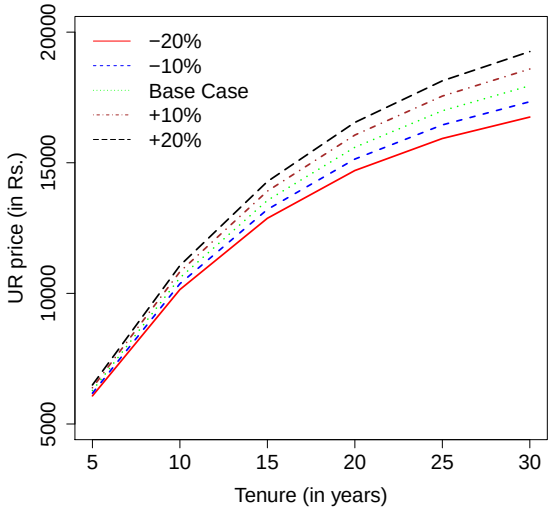
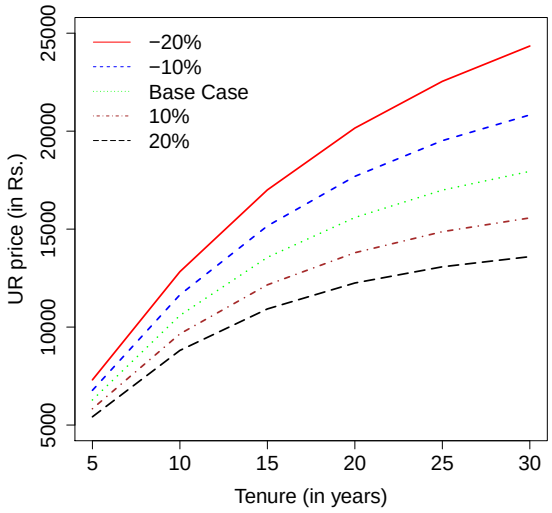


Figure 14 Variation due to changes in discount rate



C Project details

Bangalore Metro (BM)

Running 72 km it is estimated to cost Rs.27,000 cr as per the Karnataka government approved budget. As per the agreement, the State and Central Governments will bear 30% and 20% of the project cost of phase II respectively. This gives the project a debt-equity ratio of 55:45. The ADB[13] signed an agreement to lend $250 million at between 6-8% per year for 20 years. The remaining amount will be obtained through senior term loans and it was announced that the company was planning to issue 10-year bonds (non-tax-free and non-convertible debentures) through private placement. This would have been the first "Metro Bond" issued in India. The proposed bonds received a credit rating of "IND AA" from India Ratings & Research (Ind-Ra). The rating authority defines the "IND AA" as instruments to have high degree of safety regarding timely servicing of financial obligations and carry very low credit risk". For reasons attributed to adverse market conditions this issue was later called off. The annual operational costs is estimated at Rs.315 cr while the ridership estimate is an average of 8.75 lakh per day for 2016.

Delhi Metro Phase III (DMP-III)

Delhi Metro is being built and operated by the Delhi Metro Rail Corporation Limited (DMRC), a state-owned company with equal equity participation from Government of India and Government of National Capital Territory of Delhi. This phase will add 140 km (193 km exists) at a cost of Rs.40,970 cr. The funding proposed is - equity from Central and State Governments of Rs.13,749 cr (including interest free subordinate debt to cover taxes) giving the project a debt equity ratio of 65:35. Japan International Cooperation Agency (JICA) would fund a total of Rs.19,950 cr with a repayment period of 30 years with grace period of 10 years and would carry a soft interest of 1.40%. Property development by DMRC will bring in Rs.1,586 cr, Delhi Development Authority will grant Rs.1,500 cr and loans from India infrastructure Finance Company Limited (IIFCL) and such other financial institutions will add to the tune of Rs.377 cr. The gap will be met from loans or borrowings. The operational cost of phase III is estimated at Rs.778 cr including all expenses on staff and interest but without depreciation. The ridership estimates suggest, upon completion of phase III in 2016, a rise to 3.9 mn from the current 2.5 mn per day. Of the total public transport system trips projected at 21.37 mn per day in 2025, the ridership contribution of Delhi Metro Rail will be about 27%, as DMRC has projected 5.86 mn trips per day in 2025/26 on the Delhi Metro.

[13] Asian Development Bank

Hyderabad Metro (HM)

The HM project is considered to be the worlds largest project under public-private partnership with the state government holding a minority equity stake. The Central Government bears 10% while L&T bears the remaining 90% of the cost. The phase I of the project includes 3 lines covering a distance of around 71 km and is targeted to be operational by March 2015. The Indian government has approved phase II which is expected to start construction in 2013. It includes around 80 km. The ridership is projected at 1.53 mn in March 2016 which will grow to 1.65 and 1.75 in the succeeding financial years. The expected growth in ridership is also high at 15.21% with an expected figure of 2.5 mn in 2025. The city is densely populated and deemed to be suited for supporting the investment in a metro. The private partner, L&T, has arranged financing from a consortium of banks. Though inputs for the financial analysis have been received from the project authorities, for the purpose of this study a more conservative figure of 1.2 mn is fitted in to match the overall future projections of ridership.

Mumbai Metro Phase I Line I (MMP-I L-I)

The 11.07 km line is fully elevated, and consists of 12 stations and connects the eastern and western suburbs of Mumbai. It will cost approximately Rs.4,321 cr (US $660 mn) and is operated by Mumbai Metro One Pvt Ltd (MMOPL). The MMOPL is a consortium of Reliance Infrastructure, Veolia Transport and the MMRDA. Reliance Infrastructure and Veolia Transport hold a 74% stake. However, the agreement signed between the Government of Maharashtra and MMOPL, also stated that the Mumbai Metropolitan Region Development Authority (MMRDA) would not have to share the escalated cost. The entire escalation was borne by the MMOPL - Rs.1,965 cr (US $300 million) through a loan, and the balance was raised through debt. Line 1 is scheduled to begin operations in December 2013. It is included in the study as a possible candidate for URs to serve as an effective instrument of take-out financing to replace high cost debt with significantly lower costs for the project thereby precluding construction risk being borne by the users.

Mumbai Metro Phase I Line III (MMP-I L-III)

Mumbai Metro Rail Corporation (MMRC), an existing state-level special purpose vehicle was converted into a joint venture company of the governments of India and Maharashtra with a debt-equity ratio of 80:20 with the equity shared between the Centre and the State. The project cost is estimated at Rs.23,136 cr (US$3.5 billion). Of the State equity, 45% was proposed to be through a loan from the JICA which agreed to lend Rs.4,553 cr in a soft loan at an interest rate of 1.44% to be repaid in 30 years, including a 10-year moratorium period. The state and central governments will infuse

an equity of Rs.2,040 cr each and another Rs.2,640 cr will come from subsidiary debt funding from the central and state governments. The Mumbai International Airport Limited (MIAL) will contribute Rs.777 cr, property development and impact fee for Rs.1000 cr and MMRDA grant/aside funding of Rs.679 cr. The rest of the project cost will be obtained from JICA as soft loan for Rs.13,235 cr. Ridership estimates for Line 1 was 5.1 lakh per day and it is expected that 12,75 lakh would use the phase I of Mumbai metro, though Line 2 has been scrapped and may not be available by the time Line 3 is ready. Line 3 is planned for 33 km and its operational cost is estimated at Rs.160 cr.

Sardar Patel Ring Road (SPRR)

The project was conceptualized in the revised development plan of Ahmadabad Urban Development Authority (AUDA) in 2011. It provides additional two lanes which is in progress using the Build-Operate-Transfer (BOT) model. Under the BOT contract, the private party will be responsible for designing, engineering, financing, procuring and constructing the road during the construction period, which is 18 months and get a concession period of 20 years. The concessionaire will be given toll collection and advertisement rights. The revenue from this is estimated at Rs.12 cr per year in 2006 to Rs.220 cr per year in 2026. Total revenue over the period of 20 years is estimated at Rs.2,350 cr. Assumptions related to traffic include upward revision of toll rates by 5% every year and rate of growth in traffic as 6% per year. The estimated total project cost is Rs.456 cr while the debt-equity ratio is pegged at 80:20. The debt raised will be Rs.367 cr for 14 years at 11%, project IRR is 14.91% and the debt service coverage ratio is 1.67. As viability gap funding, AUDA will have to pay Rs.36 cr as grant to the concessionaire in two years period.

Figure 15 Estimated cash flows

The figure represents cash inflows from revenue and expected cash payment to bonds and URs holders for scenario (1) w/o UR - when the complete debt requirement is raised via bond issuance and (2) with UR - when URs are used to raise half the debt requirement. The details of the bond and UR specifications are described in Table 5