# DONOR-INTERVENTION AND DEBT CAPACITY IN PRIVATE INFRASTRUCTURE PROJECT FINANCE IN DEVELOPING COUNTRIES

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The popular application of project finance (PF) for private infrastructure projects (PIPs) in developing countries (DCs) in the 1990s has highlighted a number of issues and constraints, when arranged through bank-dominated financial systems with comparatively weak economic institutions in DCs. Multilateral and bilateral agencies' participation in PIPs works to ease these constraints and create an enabling environment for private financing of infrastructure in DCs. Their intervention gives incentives for mobilization of private capital for PIP finance. Based upon this premise, this paper empirically examines implication of donor-intervention on the debt capacity of PIPs arranged through PF arrangements. Econometric results confirm that the development agencies' instruments, namely credit support/enhancement and guarantees function to improve the debt capacity of PIP finance and thereby improve the viability of PIPs in weak legal, political and financial environments. These results shed light into the structuring of PF arrangements into PIPs and effectiveness of development agencies' participation towards a sustainable PIP finance in DCs.

Key words: debt capacity**,** development agencies, institutional environment, project finance, private infrastructure project finance.

## INTRODUCTION

A widely followed articulation of project finance (PF) is that it is "a financing of a particular economic unit in which a lender is satisfied to look initially to the cash flows and earnings of that economic unit as the sources of funds from which a loan will be repaid and to the assets of the economic unit as collateral" (Nevitt and Fabozzi, 1998). The economic unit in this definition typically refers to a capital investment project incorporated as a single venture company (economic unit) with a set of legally and economically independent assets with a single industrial use (Esty, 2000). In idealised PF arrangements, creditors have recourse only to the project's cash flow and assets, since each project is legally independent. Nevitt and Fabozzi (1998) suggest that the key to a successful PF is structuring the financing of a project with as little recourse as possible to the sponsor, while at the same time providing sufficient credit support through guarantees or undertakings from a sponsor or third party, so that lenders will be satisfied with the credit risk. In PF, creditors share much of the venture's business risk, because a project debt ratio are typically high, and is often supported not just by the project's assets, but also by a variety of additional contracts and guarantees. PF has been playing a vital role in mobilizing private capital into

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private infrastructure project (PIP) finance in DCs. According to Dias (1994: 34), definition of PIP finance could be;

> *" A method that relies on an infrastructure project's potential to produce the necessary cash flows, within a private-sector ownership period, to pay for loans and give a return on investment for project promoters (and investors) compatible with the risks they face during the different project phases. The group of promoters forms a new company to build and operate the project, the owning company. Consequently, project debt appears only on the balance-sheet of the "new-formed" company and not on the balance-sheets of the individual promoting teams".*

With the advent of private based financing of infrastructure, different PF arrangements in PIP finance emerged in DCs in the 1990s. PF arrangements evolved along with the different scales of private sector participation in infrastructure development, which span from simple, short-term contracting for the supply of defined goods or services through longer-term management, leasing or concession to full private sector ownership. PF was increasingly used to finance greenfield projects where full private sector participation was allowed. PF arrangements in greenfield projects included mainly Build-Operate-Own (BOO) projects, Build-Operate-Transfer (BOT) projects, and merchant financing projects, particularly in DCs. According to the World Bank's Private Participation of in Infrastructure (PPI) Project Database, greenfield projects accounted for 57 percent of investment in PIPs in East Asia and 86 percent in South Asia in 1990-2000. Cumulative investment in these two regions amounted to 34 percent of total US $ 689 billion in infrastructure project with private participation in DCs in 1990-2000 (World Bank, 2002).

Emergence of the above-mentioned modalities of PIP finance in DCs is not free from issues. While the underlying strategy for designing contracts to manage economic risks in PIP finance continued to emphasize exogenous risks, we thus continued to observe normally expected attempts to match a project's cash flow profile with debt service requirements through off-take contracts, and both foreign and local currency arrangements to overcome the issues arising from local currency instability in foreign debt financing (Devapriya, 2003). Other than the management of demand and supply risks, several additional phenomena have however gained prominence, including attempts to manage risks emanating from informational and institutional factors surrounding PF arrangements. Possibly the most significant of these include the role of additional financial intermediation functions such as credit enhancement and/or guarantees, third party guarantees for off-taker's creditworthiness, and extensive use of export credit facilities for capital intensive imports provided all of which have become the norm for mobilizing (almost exclusively) bank-led syndicated loans for PIP finance in DCs (Devapriya, 2003). In this respect multilateral and bilateral agencies play an important role in providing these credit enhancement, guarantees, and export credit facilities to improve viability of PIPs in DCs. This is very important since loan contracts in PIP finance are typically internationally syndicated, and lenders seek some measures/comfort in response to week legal, political and financial environments in the host country. Therefore, objective of this research is to empirically investigate the implication of donor intervention on the debt capacity of PIPs arranged through PF arrangements in DCs. Findings of the empirical analysis will highlight some lessons for effective application of PF for PIPs in developing regions.

# DONOR INTERVENTION AND PRIVATE INFRASTRUCTURE PROJECT FINANCE

Promotion of private participation in infrastructure has become an important feature of development agencies' assistance to private sector development in DCs in the recent past. Both multilateral and bilateral donors introduce specific programs and instruments to promote private sector participation in infrastructure development in DCs. According to Gibbon and Schulpen (2002) the group of bilateral donors with some form of specific programs or instruments for promoting PIPs comprises Australia, Canada, Denmark, Germany, Japan, New Zealand, Norway, the Netherlands, the United States, and the United Kingdom at the end of the 1990s and the beginning of the new century. Similarly, multilateral donors, namely World Bank Group, Asian Development Bank, African Development Bank Group, Inter-American Development Bank, Islamic Development Bank, and the European Bank for Reconstruction and Development have introduced specific programs and instruments for PIPs in the 1990s (Gibbon and Schulpen, 2002). The programs and financial instruments include subordinate loans, equity participation, co-financing, partial credit guarantees, political risk guarantees, and export credit facilities for PIPs in DCs. Among bilateral agencies Export-Import Bank of Japan (JBIC), Kredietanstalt für Wiederaufbau (KfW) from Germany, and Overseas Private Investment Corporation (OPIC) from the United States actively involve in PIPs, while World Bank Group, African Development Bank and Asian Development Bank provide financial instruments for most of PIP finance transaction in DCs.

In addition to the participation of multilateral and bilateral agencies, we can observe that to promote PIPs through PF arrangements specifically designed institutions, particularly project specific institutions created by legislation (for example BOT laws and standard concession contracts), have been put in place in many DCs. Project specific institutions are created to improve the viability of the PIPs and additional measures such as donor intervention work to address traditional issues in application of PF in PIPs in unstable environments (Devapriya, 2003). The donor intervention in a form of credit support functions as a bonding mechanism in the mobilization of private debt capital and thus minimize the traditional issues in PIP finance.

# ASSESSMENT OF DEBT CAPACITY IN PRIVATE INFRA-STRUCTURE PROJECTS IN DEVELOPING COUNTRIES

From the perspective of structuring credit transaction, Devapriya (2003) develops an econometric model (1) to assess the debt capacity in PIP finance in DCs. Structuring credit transactions is related to traditional factors that affect credit transactions, such as informational and agency issues and other issues that affect the performance of the loan, such as legal and economic conditions in the host country (Geenbaum and Thakor, 1995). In the assessment of debt capacity in this research, main focus is on measures for the traditional agency and information issues in decomposition of PIP finance transaction when factors affecting the performance of the loan contract occur in weak institutional environments. Because traditional agency and information issues are minimized in PF, lenders' main attention in screening, searching, contracting and post-contractual monitoring is thus largely associated with the "project" itself (the special vehicle company of the PIP) as the nexus of contracts through which credit risk is managed with respect to the institutional environment.

The model for the assessment of debt capacity of PIPs consists of a regression formula in the following form.

$$Y1 = P1 + a1X1 + b1X2 + c1X3 + d1X4 + e1X5 + f1X6 + g1X7 + h1X8 + C1 \quad -----(1)$$

Where

Y1= Debt capacity in the capital structure (debt ratio) of PIP
X1= Stability of political environment
X2= Guarantees and incentives for the loan
X3= Stability and enforceability of institutions
X4= Instability of local currency
X5= Credit support for the loan
X6= Availability of public information
X7= Availability of private information
X8= Level of local financial market development (Control variable)
C1=Error term

Following Devapriya (2003) the variables can be classified into two categories: institutional environment-specific variables (X1, X3, X4, X6 and X8), and transaction-specific variables (X2, X5, and X7). The institutional variables capture the creation of project-specific institutions to facilitate credit transactions in PIPs in DCs. The transaction-specific variables capture the traditional agency and information issues, as well as credit enhancement from multilateral and bilateral agencies in structuring syndicated loans in PIPs. The measurement of the dependent variable Y1, represents project financial structure as proxy for debt capacity. Therefore, in the assessment of debt capacity, debt ratio represents the outcome arising from the decomposition of the credit transaction in relation to the riskiness of the particular PIP in the DC concerned. According to Devapriya (2003) variables in the present research assume following measurements in the regression equation (1).

**Stability of political environment (X1)**
This variable represents the stability of the political environment in the host country. The International Country Risk Guide (ICRG) "political risk variable" is adjusted to reflect only the political characteristics of the selected DCs as at September 2001 in a scale from 0 to 10, with higher scores for more stable political environments. As described in the review of previous measurements, the ICRG's "political risk variable" has been widely used as a measure of political characteristics in finance empirical work.

**Guarantees and incentives for the loan (X2)**
Guarantees and incentives indicate whether the loan has a third party guarantee or any incentive for the syndicated loan. The guarantees and incentives are identified quite differently from credit support in the way that the former provides a form of collateral for the lender, while the latter is represents more a measurement of the risk of debt agency problems. Following Nevitt and Fabozzi (1998) guarantees provide a basis for allocating certain risks in a PF transaction to interested parties, who have no desire to become directly involved in the operation of the project, or to provide directly the capital for the project. It is measured as a dummy variable taking the value of 1 if the loan has third party guarantee and incentives and 0 otherwise. Binary variables have been used to capture the same variable in a PF loan sample used by Kleimeier and Megginson's (2000) in an analysis of loan spread in PF.

**Stability and enforceability of institutions (X3)**

Stability and enforceability of institutions indicates the general legal environment, specific legal and administrative mechanisms that govern the PF arrangements, such as the regulatory framework in the power sector, and BOO/BOT legal mechanisms in the host country. These institutional characteristics are captured by a composite measurement, which is constructed based on three individual measurements. The general legal environment is measured based on ICRG with an adjustment to reflect only the institutional characteristics in the "political risk variable", for the selected DCs as at September 2001. For specific institutions, another measurement is taken for the governance element of the regulatory framework in the power sector in the relevant Asian countries. Specific institutions such as BOO/BOT and related legal and administrative procedures is the third underlying factor in the composite measurement. A predefined criterion on Governance and Regulatory Regimes for Private Sector Participation in Infrastructure Development, namely the clarity of roles and objectives, autonomy, participation, accountability, and transparency drawn from the NARA (1998) was applied to measure the regulatory practice in particular DCs based on content analysis of official and policy documents, and interviews with experts in the relevant area. This criterion was cross-checked with Standard and Poor's (2000) debt rating criteria for infrastructure project finance. Observations on 30 factors encompassing the above mentioned six criteria (which was explained by five sub factors in each) was performed under binary observations for each factor. Finally, they were converted to a scale score from 0 to 30, with higher scores for better regulatory practice. The same procedure was adopted to develop the measurement for specific institutions on a scale from 0 to 6, with higher scores for better specific institutional environments. The two scale scores of regulatory framework and specific institutions were adjusted to a 1 to 10 scale so that three different scales were transformed to a common form from 1 to 10 to indicate the level of stability and enforceability of institutions in a composite measurement for the countries concerned, with higher scores for better institutional environments.

**Instability of local currency (X4)**

This is a measure of the change in the real exchange rate from 1990 to 2001 in the Asian countries concerned. The change is measured by the variance of real exchange rate movements during the period concerned. In order to build up the real exchange rate, a nominal exchange rate is multiplied by the ratio of foreign to domestic price levels with reference to a particular country. For this purpose, the nominal exchange rates and price level information is taken from International Financial Statistics (IFS)-2002. The nominal exchange rates in IFS-2002 are calculated based on a time series analysis of the fluctuation of domestic currency on a daily basis. The sampling of the underlying construct of instability of local currency is influenced by a similar measurement constructed by Edward and Ng, (1985) in the construction of an index for a real effective exchange rate. A higher change in the real effective exchange rate indicates higher fluctuations of the currency, higher instability, and a higher currency risk in the country concerned.

**Credit support (X5)**

Credit support indicates whether the lenders enjoy any credit enhancement from multilateral and bilateral institutions' participation in the capital structure, either as equity or debt holders. "Multilateral and bilateral lender" also includes export credit agencies. The underlying theoretical construct of credit support is such that it

functions as a bonding mechanism in the mobilization of private debt capital in PIPs. This form of credit enhancement in the capital structure in PIP finance is deemed applicable to the syndicated loans, since all lenders may be party to the same inter-creditor or common term agreement and such a structure is expected to provide lenders with meaningful risk reduction. This is measured as a dummy variable taking the value of 1 if the capital structure has such credit enhancement and 0 otherwise. Kleimeier (1993) used the same procedure to measure credit supports in PF loans.

### Availability of public information (X6)

This variable measures availability of public information about legal, administrative and customary systems and institutions, and information on the general economic environment that affect the PIP finance transactions in the host country. A six-factor scale that explains the underlying construct of the variable was used as a criterion for the content analysis of official and policy documents from the DCs concerned and for interviews with experts. The factors included the legal mechanisms controlling BOO/BOT transactions, administrative functions relating to BOO/BOT transactions, level of accessibility to these institutions, regulatory practice with respect to the changes in these institutions, conduct of reviews of regulatory practice, and procedures on introducing and enacting new laws. The factors were taken from NARA (1998) and they were subsequently cross-checked with Standard and Poor's (2000) debt rating criteria for infrastructure project finance. An observation was recorded as a binary variable for each factor to arrive at a scale score from 1 to 6 with higher scores for a higher level of availability of particular information.

### Availability of private information (X7)

This variable captures the availability of private information about the main sponsor in the PIP finance transaction. This measurement is taken as a proxy for asymmetries of information, measured as a dummy variable taking the value of 1 if the main sponsor is a listed company either in the USA or in an Asian stock markets and 0 otherwise. Dennis and Mullineaux (2000) use the same measurement to measure the quality of the information available on borrowers in loan syndication.

### Level of local financial market development (X8)

This variable measures the level of credit provided by the domestic banking sector from 1990 to 2001. It is treated here as a proxy for the level of local financial market development in the DCs concerned. Having referred to the International Financial Statistics (2002), the variable is constructed as the level change in the credit provided by the banking sector to the private sector as a percentage of GDP, in each year within the particular period. A similar form of measurement was used by Aylward and Glen (1998) and Beck *et al.* (2000) to proxy the level of domestic financial market development using the form of "domestic credit provided by the banking sector", based on the ratio of long-term private debt issues to GDP. A positive higher change in the current variable indicates an increasing level of credit provided by the local banking sector in the host country.

When the above-described variables account for debt capacity, the following relationships are expected in the present analysis (in the forthcoming section). It is expected that the level of debt in PIP finance (Y1), to be related positively to all variables except instability of local currency (X4), which is expected to be negatively related to the level of debt.

# EMPIRICAL RESULTS AND DISCUSSION ON DEBT CAPACITY IN PRIVATE INFRASTRUCTURE PROJECT FINANCE

The regression analysis was conducted on a sample of 70 PIP finance loans selected from six DCs, namely China, Thailand, India, Philippines, Pakistan, and Indonesia where PF arrangements have widely been used for PIP finance in the 1990s (Devapriya 2003). The sample selection consists of two stages. First, a sample of suitable PF arrangements from the PPI database was selected to represent PIPs in DCs from 1990 to 2001. The PPI database contains specific details on PIP finance in DCs in different parts of the world from 1990 to the present. Second, using this PIP finance sample, the Projectware Dealogic Capital DATA was screened to identify a syndicated PF loan sample, which includes measures for the transaction specific variables. Dealogic Capital DATA (Hong Kong) is a London-based joint venture company between Euromoney plc and Computasoft Ltd. The Projectware database contains information on PIP finance lending in Asian countries concerned after 1994.

While the Table 1 indicates descriptive statistics of first regression results of the model (1), the correlation matrix is shown in Table 2

**Table 1** Descriptive statistics of initial results of the model (1)

|  | Mean | Std. Deviation | N ( Sample size) |
|---|---|---|---|
| Y1 | 66.30 | 16.27 | 70 |
| (X1) | 53.86 | 6.67 | 70 |
| (X2) | 0.40 | 0.49 | 70 |
| (X3) | 16.58 | 2.14 | 70 |
| (X4) | 278604.65 | 687346.28 | 70 |
| (X5) | 0.34 | 0.48 | 70 |
| (X6) | 0.66 | 0.11 | 70 |
| (X7) | 0.53 | 0.50 | 70 |

**Table 2:** Correlation matrix of initial results of the regression model (1)

| Variable | Y | X1 | X2 | X3 | X4 | X5 | X6 | X7 |
|---|---|---|---|---|---|---|---|---|
| Non-recourse debt capacity | 1.00 | | | | | | | |
| Stability of political environment (X1) | 0.021 | 1.00 | | | | | | |
| Guarantees and incentives for the loan (X2) | 0.302 | 0.154 | 1.00 | | | | | |
| Stability and enforce-ability of institutions(X3) | 0.148 | 0.803 | 0.122 | 1.00 | | | | |
| Instability of local currency (X4) | 0.152 | -0.515 | -0.083 | -0.560 | 1.00 | | | |
| Credit support for the loan (X5) | 0.363 | 0.020 | 0.577 | 0.037 | 0.049 | 1.00 | | |
| Level of availability of information (X6) | 0.154 | 0.822 | 0.176 | 0.746 | -0.582 | 0.123 | 1.00 | |
| Information about status of the promoters (X7) | 0.196 | -0.206 | 0.070 | -0.140 | 0.222 | 0.381 | -0.142 | 1.00 |

In order to achieve better regression results, regression diagnostics and model development were undertook in the following manner. The Table-II indicates a high correlation among institutional variables (namely X1, X3 and X6) and thus the model was corrected (as shown in Reg. 1-2 in the Table III) for multicollinearity. This

resulted in improvements in t-statistics of the remaining variables except guarantees and incentives (X2).

In the next step, the insignificant variable availability of private information (X7) was removed which yielded better overall results, shown in Reg.1-3 (Table III). Additionally, guarantees and incentives (X2) were removed, which indicated a reduction in the significance level in the previous two regression cases, to identify a comparatively higher significant effect of credit support (X5) on debt capacity of PIP finance (see Reg 1-4 in Table III). Also, in order to check whether the level of local financial market development (X8) is complementary to a decrease in the instability of local currency, the former was introduced into the model in Reg.1-5 as a control variable instead of the latter. As such, the level of local financial market development (X8) indicates a significant positive effect on debt capacity, although the significance of stability and enforceability of institution (X3) and credit support (X5) are reduced in comparisons with Reg. 1-4. Against this background, the best overall results are indicated in Reg. 1-3 in Table III. After correction for multicollinearity, results in subsequent tests (i.e. from Reg.1-2 to Reg.1-5) did not indicate violation of autocorrelation and hetreoscedocity conditions. When the significance of t-statistics is considered along with model performance in all four cases, Reg. 1-3 is identified as the benchmark for discussion of results at 95% confidence level. Given the condition of limited project sample size from six DCs, the degrees of freedom is restricted to 95% level in the current regression analysis. A 95% confidence interval is considered as appropriate for the present test when compared to previous similar studies (Kleimeier,1993; for example).

Once the model is corrected all explanatory variables confirm the expected signs except the instability of local currency (i.e. results from Reg.1-2 to Reg.1-5). In keeping with expectations, t-statistics indicate that both institution-specific variables, namely stability and enforceability of institutions (X3) and level of local financial market development (X8); and transaction specific variables mainly credit support (X5); positively and significantly affect the debt capacity of the PIP finance. This suggests that stable institutional environment and financial instruments/guarantees from development agencies increase debt capacity in PIPs financed through bank-type intermediaries.

Among the institutional environment specific variables, the positive significant t-statistics of stability and enforceability of institutions (x3) (in all three cases from 1-2 to 1-4) confirms that in order to mobilize private debt to pips or to gain the full potential of project debt capacity in pip finance in a weak institutional environment, existing institutions benefit from being supplemented with specifically created institutional infrastructure. However, the instability of the local currency (x4) shows a positive and significant impact on the debt capacity, while a negative relationship with debt capacity was expected. a satisfactory level of financial market development (x8) complements the instability of local currency (x4) confirmed in regression reg. 1-5. These results therefore confirm that inadequate long term financial sources in the domestic market result in dependency on foreign financing, which requires the contracts to be designed to address exogenous risks such as currency risk.

**Table 3**: Regression results on variables and model parameters on the debt capacity

| Explanatory variable | Reg. 1-1 | Reg. 1-2 Exclude-X1, X6 and X8 | Reg. 1-3 Exclude-X1, X6, X7 and X8 | Reg. 1-4 Exclude-X1, X2, X6, X7 and X8 | *Reg. 1-5* Exclude-X1, X4,and X6 Include X8 |
|---|---|---|---|---|---|
| Constant | 29.405 (1.597) | 20.075 (1.153) | 21.546 (1.254) | 21.527 (1.252) | 30.376 (1.923)* |
| Stability of political Environment (X1) | -1.153 (-2.139)* | Excluded | Excluded | Excluded | Excluded |
| Guarantees and incentives for the loan (X2) | 6.239 (1.404) | 5.351 (1.179) | 4.859 (1.092) | Excluded | 4.605 (1.027) |
| Stability and enforceability of institutions(X3) | 3.120 (2.156)* | 2.306 (2.282)* | 2.278 (2.267)* | 2.341 (2.331)* | 1.677 (1.838) |
| Instability of local currency (X4) | 8.74xE-06 (2.684) | 7.26xE-06 (2.285)* | 7.55xE-06 (2.411)* | 7.27xE-06 (2. 326)* | Excluded |
| Credit support for the loan (X5) | 5.328 (1.069) | 7.254 (1.443) | 8.542 (1.867)* | 11.447 (3.070)* | 8.702 (1.885) |
| Availability of public Information (X6) | 60.131 (1.978)* | Excluded | Excluded | Excluded | Excluded |
| Information about status of the promoters (X7) | 1.980 (0.505) | 2.523 (0.632) | Excluded | Excluded | Excluded |
| Level of local financial market development (X8) | Not Included | Not Included | Not Included | Not Included | 0.110 (2.133)* |
| Number of observations | 70 | 70 | 70 | 70 | 70 |
| R-Square | 29.5% | 23.3% | 22.8% | 21.4% | 21.4% |
| Adjusted R -Square | 21.6% | 17.3% | 18.1% | 17.9% | 16.6% |
| F-Statistic | 3.712 | 3.892 | 4.810 | 5.998 | 4.344 |
| Prob.> F-Statistics | 0.002 | 0.004 | 0.002 | 0.001 | 0.003 |
| DW statistic | 2.489 | 2.342 | 2.355 | 2.459 | 2.317 |

* Significance at 95% confidence level

With reference to the transaction-specific variables as represented by bonding mechanisms to manage the risk of traditional agency problems, credit support (X5) reflects a significant positive effect on the debt capacity of PIPs. This reveals that participation of additional financial intermediaries or credit enhancement can increase debt capacity or help to reap the full potential of debt capacity in PIP finance in weak institutional environments. It functions to manage credit risk in the overall capital structure of the PIP finance transaction, thus effectively working to address loan default risk of agency conflicts associated with the project company.

## CONCLUSIONS

This paper presented the results of an empirical investigation into the implication of donor intervention on structuring credit transactions in PIPs in DCs, based upon the premise that PIP finance faces characteristic problems due to weak institutions and poor information accessibility. Therefore, in order to reap the full potential of debt capacity in PIPs in an underdeveloped institutional environment, credit support from multilateral and bilateral agencies is often necessary even within specifically created institutional and informational infrastructure. Project capital structure in PIPs is largely financed through bank-lead syndications in DCs, and the ability to arrange credit support from multilateral banks, enabled an increase in the commercial debt

financing in the capital structure; or enabled a raise in the level of commercial debt. In effect, this confirms the importance of the presence of bilateral and multilateral agencies' in PIP finance in weak institutional environments. Therefore, donor intervention and specifically created institutions work to effectively manage the lender's risk and improve chances of arriving at early financial closure of PIPs.

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