

RESEARCH INSIGHT

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Long-Run Economic Growth: Does Project Finance Matter?

Abstract

The answer is a definitive “Yes,” suggesting increased project finance investment could become an important tool for addressing sluggish growth concerns brought about by the Great Recession. Empirical results, based on a comprehensive and unique project finance loan database not previously available, show that increasing project finance by one percentage point of GDP could increase real GDP growth per capita by 6 to 10 percent, with growth effects higher for upper-middle income and advanced economies. In other words, in these countries, if GDP per capita is growing at three percent annually, the boost provided by project finance could deliver cumulative, additional growth as high as two percent during the next five years. These results suggest that proposals for stimulating economic growth and productivity via increased project finance merit careful consideration. In contrast, in low-income countries, project finance appears to have less of an impact, possibly owing to deficiencies and weaknesses in financial systems and regulatory frameworks. By addressing these deficiencies, less developed countries could unleash increased growth and productivity.

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1. Overview

Project finance is an efficient way to fund capital-intensive and strategically important projects such as long-term infrastructure, industrial, or public services. This financing method often funds the development of energy, natural resource, and social infrastructure assets, as well as the provision of associated public services. Although the scope of these projects is subjective, the general agreement is that they refer to capital-intensive projects deemed strategically important, and they fulfill major economic and social needs in areas such as energy, water, transportation, and communications. Usually, a project financing structure involves a number of equity investors, known as “sponsors,” as well as a “syndicate” of banks or other lending institutions that provide loans to the project.

Project finance may contribute to the real economy in both direct and indirect ways. Directly, it contributes to GDP formation by increasing an economy’s stock of capital and as an additional input in the production process of other sectors. Indirectly, project finance raises total factor productivity by reducing transaction and other costs as well as generating positive externalities, such as those derived from roads and public infrastructure, allowing a more efficient use of conventional productive inputs. The lack of an adequate infrastructure can pose major constraints on growth (Newbery, 2012). These observations raise important questions: How significant is the contribution of project finance to aggregate economic performance? Does it matter for long-run growth? Answering these questions is critical for guiding policy decisions — empirically assessing the long-run growth impact of project finance is the focus of our paper.

Earlier studies have analyzed the long-term impact of infrastructure investment and foreign direct investment (FDI) on economic growth separately, concluding that both have a positive effect, although estimates of these effects display considerable variation across studies. A majority of these studies have focused on the least-developed countries, where lifting the population from poverty remains a major concern and where infrastructure investment could partly address these needs if supported by long-term finance (World Bank, 2015). In advanced economies, secular stagnation and sluggish growth following the Great Recession has prompted an examination of whether public investment in infrastructure can support growth, as noted in the report of the Executive Office of the President of the United States (2011) and the London School of Economics Growth Commission (Bottini, et al., 2014). A recent study suggests growth is also the case both in the short- and long-term, provided the investment process is efficient (IMF, 2014).

Using a unique and large historical dataset, our study confirms and extends the previous results of the significantly positive impact of project finance on long-term economic growth. Our study differs from previous ones in a number of ways and dimensions. First, our study focuses on project finance, a broader and different category than infrastructure investment and foreign direct investment. Second, our dataset is the most comprehensive to date. In contrast to previous studies, our sample includes a larger number of countries at different economic stages and over a longer period. The sample includes 16 low-income countries, 34 lower middle-income countries (LMC), 35 upper middle income countries (UMC), and 56 high-income countries (HIC). Third, our dataset covers project finance loans for which non-government investors are involved. This characteristic is important, as the participation of private investors brings market discipline and scrutiny to these projects.

We find these projects’ contributions to economic growth significant and long-lasting, extending up to seven years. Results are robust over time and across countries. One unique insight we find from our study is that the positive impact is particularly stronger for high-income countries, possibly due to their enjoying stronger creditor rights, better legal enforcement, and a more-developed financial system.

To place the economic magnitude of project finance’s positive impact in context, we use the United States as an example. During 2010–2014, U.S. real GDP per capita, approximately \$49,000 (on average, in 2009 U.S. dollars — all figures are in USD unless otherwise noted), grew at annualized rate of 1.6 percent. Annual project finance loans amounted only to 0.1 percent of GDP on average, or just \$16 billion per year in a \$16 trillion economy. Raising project finance loans by a factor of 10, to 1 percent of GDP or \$160 billion per year, a somewhat modest increase relative to the size of the general economy, could increase GDP per capita by one additional percentage point over a five-year period, or roughly 0.2 percent more on an annualized basis. Over a five-year span, this is seemingly a small increase in GDP per capita, approximately \$500 to \$57,600 in 2009 U.S. dollars. At the current pace of population growth, however, it would add almost \$200 billion in real dollars to the U.S. economy, equivalent to the GDP of the Czech Republic, New Zealand, or Peru.

While a full discourse on the public policy implications of our study is beyond the scope of this report, it is nevertheless worthwhile briefly commenting on them. Results lend unequivocally strong empirical support to the widespread call for significant, additional investment in project finance projects such as infrastructure investment, especially in developed countries. Our results also implicitly highlight the importance and benefits of private investors’ participation in funding these projects.

Against this backdrop favoring project finance, one unintended consequence of recent regulatory reforms prompted by the global financial crisis of 2008 is to discourage the use of project finance loans in long-term financing. In a recent analysis, the Group of 30 (2013) indicates that Basel III raises the cost of issuing project finance loans vis-à-vis issuing mortgages and short-term loans, reducing project finance's attractiveness to bank syndicates. Faced with a potential reduction in banks' risk appetite for project finance, there is a need to develop alternative financing instruments that tap into a broader institutional investor base (Ehlers, 2014). Recent amendments to the Solvency II directive, which codifies and harmonizes the regulation of insurance companies in the European Union, will provide capital relief and promote investment in infrastructure investment (European Commission, 2015), helping to partly offset the envisaged diminishing role of banks.

The rest of the paper is organized as follows: Section 2 reviews the previous literature on the subject. Section 3 describes the data used in the analysis, and Section 4 details the specification of the econometric model and estimation procedures. Section 5 presents the results, followed by conclusions in Section 6.

2. Literature Review

The existing related literature falls into two broad categories, one focused on foreign direct investment (FDI) and the other on infrastructure investment. Earlier empirical literature builds on work discussing the impact of FDI on economic growth. For instance, Alfaro, Chanda, Kalemli-Ozcan, and Sayek (2004), analyzed the links among FDI, financial markets, and economic growth. They find that FDI, some of which comprises project finance, promotes economic growth, provided the country enjoys certain minimum levels of financial system development. The more developed the country's financial system, the more beneficial FDI is, a finding also supported by Borensztein, et al. (2004).

There is not a large body of empirical work that attempts to disentangle the effects of project finance from FDI or infrastructure, arguably due to the absence of adequate data. Kleimeier and Versteeg (2010) and La Cour and Muller (2014) extended the analysis in Alfaro, et al. to account explicitly for the effects of project finance. According to Kleimeier and Versteeg (2010), project finance is effective in filling the financing gap faced by countries with underdeveloped financial systems. Examining 90 countries during the period 1991–2005, they found that project finance had a positive effect on economic growth, especially in low-income countries. They speculate this effect is the result not only of additional investment but also of improved contractual relationships and corporate governance that substitutes for poor institutional and weak financial infrastructure.¹

Similarly, La Cour and Muller (2014) found that project finance, among other factors, contributed to higher economic growth in less developed countries. Their study, which covers 38 countries during 1994–2007, ranks project finance as a significant driver of economic growth and on par with other factors including high regulatory quality, lower government consumption, and higher education levels. Their finding, together with those of Kleimeier and Versteeg, seem consistent with those of Esty (2004), which indicate that the supply of long-term foreign bank loans is positively associated with regimes possessing stronger creditor rights, legal enforcement, less developed financial systems, and fewer government ownerships of banking assets. Our empirical analysis, described in detail later, supports most of these studies points and finds that the boost from project finance to economic growth could have long-lasting effects of up to five years.

Empirical studies have also examined the linkages between infrastructure investment, a form of investment related to project finance, on economic growth and productivity. Aschauer (1989) finds that a temporary surge in government spending on infrastructure could have positive multiplier effects in the economy, while Leduc and Wilson (2012) find that in the United States, at the output level, investment in highways could have positive effects. In a critical survey, Romp and Haan (2007) found that a majority of studies concluded there were significant positive effects of infrastructure investment on productivity and long-term growth. There was, however, considerable variation across studies, with earlier ones suggesting large returns to public infrastructure, equal or higher than private capital. Recent studies, however, find smaller effects. For instance, Calderon, et al. (2011), using 10 years of data for 88 countries, estimate that a one percent increase in infrastructure assets could increase GDP per capita by $\frac{3}{4}$ to one percent.

Infrastructure investment appears to contribute to productivity growth over and above non-infrastructure investment, according to results reported in Thoung, et al. (2015), based on time series data for 27 European Union countries, and reinforcing earlier results by Egert, et al. (2009). More generally, Henckel and Warwick (2010) summarize the issues and challenges of infrastructure investment in a globalized world, highlighting that, on a case-by-case basis, infrastructure investment has a mixed record, with success highly dependent on the delivery mechanisms and the regulatory oversight, the latter factor emphasized by Helm (2009) in the context of the United Kingdom.

¹See the surveys by Levine (2006) on the finance-growth nexus, and Acemoglu, Johnson, and Robinson (2006) and Ogilvie and Carus (2014) on the importance of the institutional framework for economic growth.

3. Data

Our project finance loan data, obtained from Thomson Reuters, covers 141 countries 1981–2013.² In contrast with the earlier studies reviewed above, the annual data sample includes a larger number of countries at different economic development stages, and it also covers a longer period. The different stages of economic development correspond to the income per capital classification proposed by the World Bank, and country classifications correspond to that reported as of end-2014. There were 16 low income countries (LIC), 34 lower middle income countries (LMC), 35 upper middle income countries (UMC), and 56 high income countries (HIC). Additionally, the dataset covers the debt portion of project finance for which private investors are involved. In other words, the data does not include equity investments nor projects 100% funded by governments.

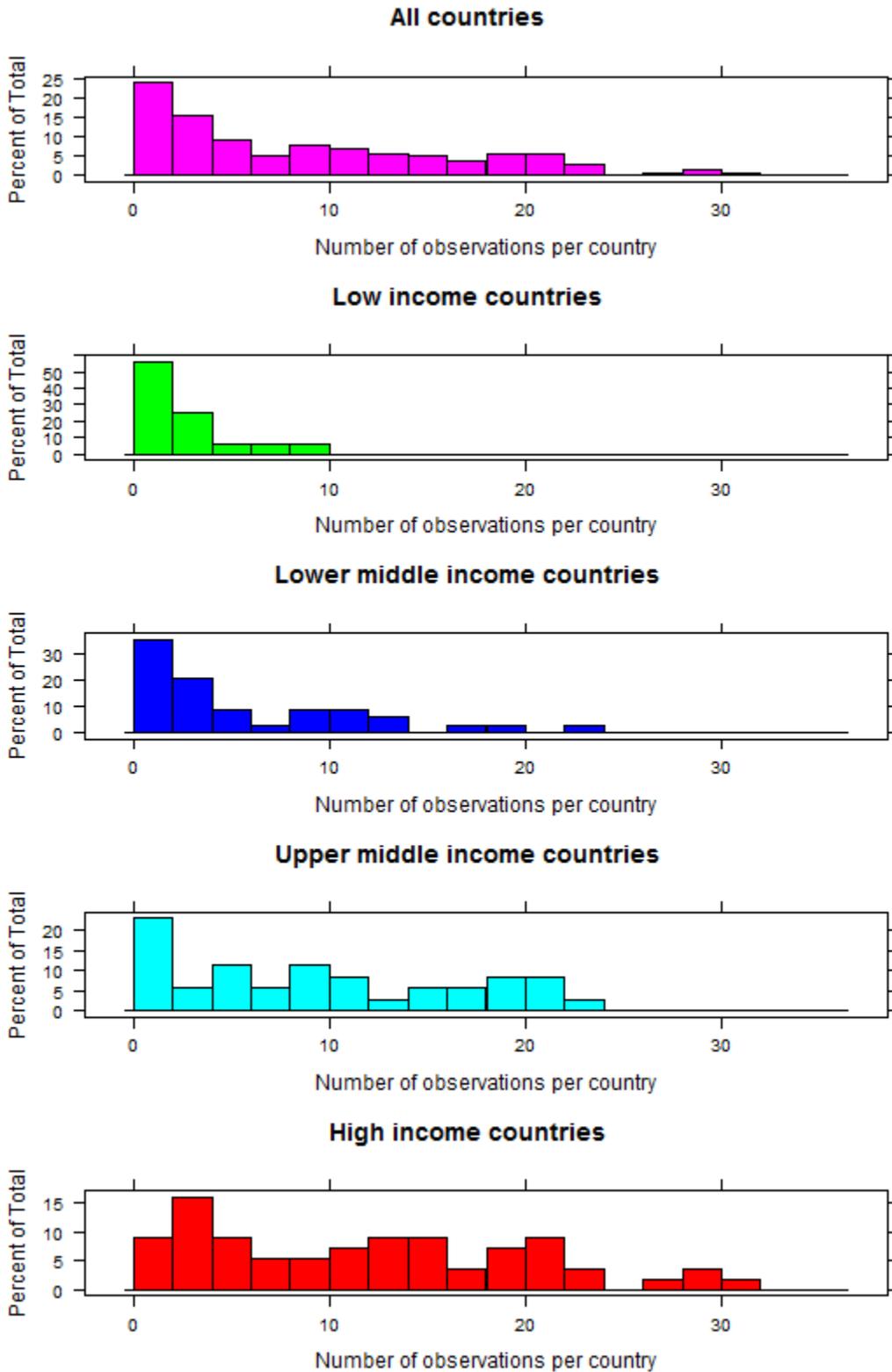
The project finance loan data includes the number of issues (or projects) and the total amount of loans in each country. The data is relatively sparse in certain countries, since in these countries project finance lending was sporadic with relatively few observations from time to time. Figure 1 shows a large number of countries with two observations or less, especially in the low-income and lower-middle-income groups. The data does not allow discernment between whether project finance proceeds correspond to either fresh new loans or the refinancing of old transactions.

The World Bank Data Indicators database, available online at data.worldbank.org/indicators, serves as the data source for the macroeconomics covariates used in the model specification described in detail in the next section. The covariates include real GDP per capita, exports and imports, total secondary education enrollment, government consumption, labor force, and labor force participation. The latter two variables serve to calculate the growth rate of the employed labor force. The growth rate for real GDP per capita, the population growth rate, and the labor force growth rate are calculated for horizons of three, five, and seven years ahead.

There are some data issues to keep in mind. Several data points in the series are missing, especially for government consumption, which reduces the number of countries and observations available for estimating the models. The effective number of countries ranges from a low of 92 to a high of 114, with the number of observations ranging from 373 to 867, depending on the model specification. The short sample problems associated with the data may affect the within estimation of fixed effect models.

² The original sample included 153 countries but was trimmed owing to lack of observations.

Figure 1 Histograms, number of observations per country.



Source: Thompson Reuters and authors' calculations.

4. Model Specification and Estimation

Model Specification

Building on the basic growth model of Solow (1956) and Swan (1956), we adopted a linear model specification motivated by earlier work linking project finance and growth (Kleimeier and Versteeg (2010) and La Cour and Muller (2014)). The benchmark model specification is

$$(1) \quad \text{GDP per capita}_{\text{growth rate}}(t, t+k) = \text{Intercept} + \sum_j \beta_j X_j$$

where the dependent variable is the annualized growth rate of real GDP per capita during period $[t, t+k]$, $\text{GDP_growth}(t, t+k)$, which depends on a number of covariates, X , measured in period t . We estimate different model variations, but all include the common set of covariates below:

- (a) The log of the level of GDP per capita, which captures the convergence effects implied by the neoclassical growth model;
- (b) Project finance, measured as total proceeds as a percentage of GDP;
- (c) Openness, defined as the total amount of imported and exported goods and services expressed as a percentage of GDP;
- (d) Education, defined as the total enrollment in secondary education expressed as a percentage of the population of official secondary education age.

The first model specification, Model I, only included the covariates above. We also attempted to capture the effects associated with changes in labor productivity not captured solely by the education variable. They could arise from skills learned on the job, a.k.a. learning by doing, or inefficiencies associated with hiring costs and training needs as the labor force expands rapidly. In Model IV, we included one covariate that possibly captures these effects, the growth rate of the employed labor force. But data on this variable were only available beginning 1990. Hence, in Model II, we approximated this covariate using the growth rate of the population, which required assuming the labor force participation and demographic structure of the country remained roughly constant during the period analyzed.

Finally, it was important to include government consumption, expressed as a percentage of GDP, among the covariates, which we did in Models III and V. If excessive, earlier empirical literature on economic growth suggests it may harm economic growth. In the context of project finance, however, there are associated government expenses classified as government consumption that should have a positive effect on growth. It was not possible to disentangle this beneficial component from total government consumption.

Table 1 summarizes the five different model specifications analyzed. Models IV and V differ from Models II and III in their choice of labor force growth variable, with the former two using the growth rate of the employed labor force, and the latter two using the total population. In addition, for all five models, we also estimated them by including dummy variables to account for the interaction between project finance and the country income classification.

Table 1 Model Specification: Dependent Variable, Growth Rate per Capita

	Model I	Model II	Model III	Model IV	Model V
log GDP	X	X	X	X	X
Project Finance	X	X	X	X	X
Openness	X	X	X	X	X
Education	X	X	X	X	X
Population growth		X	X		
Government consumption			X		X
Employed labor force growth				X	X

One variable not included in the regressions is FDI. In low income countries, and also in some middle income countries, a substantial amount of project finance can take the form of FDI. Data does not allow separating the FDI and non-FDI components of project finance, so we opt for excluding FDI in the analysis.

Estimation

Our analysis uses three different methods to estimate the parameters in the five model specifications: pooled ordinary least squares (OLS), within-fixed effects, and between-fixed effects estimation.³

For each horizon of interest (three, five, and seven years), the estimation pools all countries for which a project finance observation is available, regardless of the date of the observation, and calculates the growth rates from the date of the observation until the end of the chosen horizon. This sampling process is necessary, owing to the scarcity of project finance observations for some countries, and it differs from the use of fixed sample periods in earlier studies. One advantage is that sampling several countries at different dates may reduce the effect of the business cycle (Rajan and Subramanian, 2008).

Among the different estimator sets, theory suggests that the within-fixed effects may capture better individual country effects. Estimating model parameters, however, may be imprecise, since there are only short data series for some countries, and a number of countries have just one observation.

The short sample problems, therefore, favor the use of pooled OLS and between-fixed effects estimators despite their known shortcomings. Pooled OLS may overlook the variance within observations for individual countries, and there could be some biases associated with the potential correlation of the unobserved components with the covariates. We also use random effect estimators, but Hausman tests suggested random effects are not significant vis-à-vis fixed effect models, so we do not report those results here.

³ We estimated the models using the *R* package `plm` (Croissant and Milo, 2008).

5. Results

Table 2 reports results for each of the five model specifications using different estimators and the three growth horizons of three, five, and seven years. Table 3 reports results incorporating the effects of country income per capita classification in each of the model specifications.

Table 2 Project Finance Implications for Economic Growth

The dependent variable is the annualized growth rate of real GDP per capita, calculated from period t to $t+k$. Openness is calculated as the sum of exports and imports of goods and services expressed as a percentage of GDP; project finance is measured as the total loan amounts in a given year expressed as a percentage of GDP; education is measured as the total enrollment in secondary education expressed as a percentage of the population of official secondary education age; population growth is the annualized growth rate of the population from period t to $t+k$; government consumption are the cash payments for operating activities of the government in providing goods and services expressed as a percentage of GDP; employed labor growth rates are obtained from estimated measures of the total labor force employed, derived from figures on labor force and labor force participation. Random effect models' estimates are not reported, as their significance is rejected by Hausman tests. Sources: Moody's Investor Services, [Thomson Reuters], and The World Bank.

Variables	Model I		Model II		Model III		Model IV		Model V						
	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error					
<i>Panel A: Horizon, k = 3 years</i>															
Pooled model															
(Intercept)	8.538	0.642	***	8.762	0.635	***	9.494	0.728	***	8.890	0.661	***	9.447	0.739	***
log of GDP per capita, at time t	-0.927	0.109	***	-0.865	0.109	***	-1.035	0.129	***	-0.984	0.113	***	-1.133	0.129	***
Project finance to GDP, at time t	0.064	0.026	**	0.113	0.028	***	0.070	0.035	**	0.093	0.028	***	0.018	0.035	
Openness, at time t	0.004	0.002	**	0.005	0.002	**	0.005	0.002	**	0.005	0.002	**	0.005	0.002	**
Education, at time t	0.020	0.006	***	0.015	0.006	**	0.030	0.007	***	0.023	0.006	***	0.035	0.007	***
Population growth from time t to t+k				-0.293	0.058	***	-0.272	0.065	***						
Government consumption, at time t							-0.028	0.012	**				-0.017	0.012	
Employed Labor growth from time t to t+k										-0.088	0.033	***	-0.023	0.038	
<i>R squared</i>	0.124			0.149			0.198			0.141			0.173		
<i>Adjusted R squared</i>	0.123			0.148			0.195			0.140			0.171		
Fixed effects model, within estimation															
log of GDP per capita, at time t	-4.275	0.544	***	-4.125	0.533	***	-7.897	0.875	***	-5.142	0.615	***	-7.933	0.893	***
Project finance to GDP, at time t	0.049	0.037		0.061	0.036	*	0.042	0.045		0.049	0.037		0.019	0.046	
Openness, at time t	-0.004	0.007		-0.004	0.006		-0.005	0.009		-0.002	0.007		-0.007	0.009	
Education, at time t	0.050	0.011	***	0.046	0.010	***	0.048	0.014	***	0.051	0.011	***	0.047	0.014	*
Population growth from time t to t+k				-0.526	0.091	***	-0.722	0.172	***						
Government consumption, at time t							0.018	0.033	**	-0.026	0.038		0.030	0.034	
Employed Labor growth from time t to t+k													0.020	0.052	
<i>R squared</i>	0.101			0.139			0.244			0.116			0.195		
<i>Adjusted R squared</i>	0.087			0.120			0.184			0.099			0.160		
Fixed effects model, between estimation															
(Intercept)	5.018	1.323	***	5.585	1.310	***	7.310	1.352	***	5.438	1.346	***	7.302	1.382	***
log of GDP per capita, at time t	-0.572	0.239	**	-0.470	0.237	**	-0.704	0.253	***	-0.519	0.243	**	-0.846	0.255	***
Project finance to GDP, at time t	0.119	0.045	***	0.149	0.046	***	-0.016	0.060		0.148	0.047	***	-0.059	0.061	
Openness, at time t	0.009	0.005		0.008	0.005		0.007	0.005		0.008	0.005		0.008	0.005	*
Education, at time t	0.017	0.013		0.006	0.013		0.026	0.014	*	0.013	0.013		0.033	0.014	**
Population growth from time t to t+k				-0.410	0.162	***	-0.271	0.136	**	-0.224	0.110				
Government consumption, at time t							-0.045	0.027					-0.035	0.028	
Employed Labor growth from time t to t+k										-0.224	0.110	**	-0.003	0.095	
<i>R squared</i>	0.145			0.193			0.199			0.170			0.163		
<i>Adjusted R squared</i>	0.138			0.182			0.185			0.161			0.151		
<i>Number of countries</i>	114			114			95			114			95		
<i>Number of observations</i>	867			867			564			820			564		
<i>Number of years in sample</i>	28			28			16			21			16		

Significance levels: 1 percent (***), 5 percent (**), 10 percent (*)

Source: Thompson Reuters and authors' calculations

Variables	Model I			Model II			Model III			Model IV			Model V		
	Estimate	Std. error		Estimate	Std. error		Estimate	Std. error		Estimate	Std. error		Estimate	Std. error	
<i>Panel B: Horizon, k = 5 years</i>															
Pooled estimation															
(Intercept)	8.934	0.568	***	9.063	0.561	***	9.739	0.652	***	9.323	0.581	***	9.695	0.658	***
log of GDP per capita, at time t	-0.962	0.096	***	-0.910	0.095	***	-1.080	0.115	***	-1.008	0.099	***	-1.141	0.115	***
Project finance to GDP, at time t	0.024	0.024		0.070	0.026	***	0.028	0.037		0.062	0.025	**	-0.022	0.037	
Openness, at time t	0.003	0.002	*	0.004	0.002	**	0.005	0.002	**	0.004	0.002	**	0.005	0.002	**
Education, at time t	0.021	0.005	***	0.016	0.005	***	0.029	0.006	***	0.022	0.005	***	0.032	0.006	***
Population growth from time t to t+k				-0.237	0.053	***	-0.194	0.067	***						
Government consumption, at time t							-0.021	0.011	*				-0.014	0.011	
Employed Labor growth from time t to t+k										-0.107	0.031	***	-0.017	0.043	
<i>R squared</i>		0.172			0.194			0.259			0.200			0.246	
<i>Adjusted R squared</i>		0.171			0.192			0.255			0.198			0.242	
Fixed effects, within estimation															
log of GDP per capita, at time t	-4.795	0.461	***	-4.648	0.454	***	-8.476	0.774	***	-5.940	0.528	***	-8.338	0.786	***
Project finance to GDP, at time t	0.015	0.032		0.023	0.031		0.062	0.047		0.017	0.031		0.015	0.046	
Openness, at time t	-0.004	0.005		-0.005	0.005		0.002	0.007		-0.002	0.006		0.000	0.008	
Education, at time t	0.062	0.009	***	0.059	0.009	***	0.055	0.012	***	0.061	0.009	***	0.056	0.012	***
Population growth from time t to t+k				-0.409	0.084	***	-0.538	0.192	***						
Government consumption, at time t							0.107	0.035	***				0.108	0.035	***
Employed Labor growth from time t to t+k										-0.024	0.037		0.035	0.057	
<i>R squared</i>		0.194			0.223			0.363			0.233			0.351	
<i>Adjusted R squared</i>		0.165			0.189			0.289			0.195			0.279	
Fixed effects, between estimation															
(Intercept)	6.218	1.209	***	6.616	1.192	***	7.936	1.126	***	6.772	1.191	***	7.955	1.140	***
log of GDP per capita, at time t	-0.699	0.214	***	-0.612	0.212	***	-0.752	0.208	***	-0.691	0.210	***	-0.816	0.205	***
Project finance to GDP, at time t	0.056	0.041		0.085	0.042	**	-0.072	0.054		0.082	0.042	*	-0.097	0.054	*
Openness, at time t	0.007	0.005		0.007	0.005		0.009	0.004	**	0.007	0.004	*	0.009	0.004	**
Education, at time t	0.018	0.011		0.010	0.012		0.024	0.011	**	0.016	0.011		0.027	0.011	**
Population growth from time t to t+k				-0.348	0.141	**	-0.165	0.122							
Government consumption, at time t							-0.053	0.022	**				-0.050	0.022	**
Employed Labor growth from time t to t+k										-0.207	0.092	**	-0.029	0.087	
<i>R squared</i>		0.145			0.191			0.300			0.190			0.286	
<i>Adjusted R squared</i>		0.139			0.181			0.277			0.180			0.264	
<i>Number of countries</i>		112			112			92			112			92	
<i>Number of observations</i>		764			764			476			717			476	
<i>Number of years in sample</i>		26			26			15			19			15	

Significance levels: 1 percent (***), 5 percent (**), 10 percent (*)

Source: Thompson Reuters and authors' calculations

Variables	Model I		Model II		Model III		Model IV		Model V	
	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error
<i>Panel C: Horizon, k = 7 years</i>										
Pooled estimation										
(Intercept)	8.639	0.523 ***	8.764	0.515 ***	9.021	0.617 ***	8.988	0.527 ***	8.962	0.620 ***
log of GDP per capita, at time t	-0.925	0.087 ***	-0.880	0.086 ***	-1.005	0.106 ***	-0.950	0.088 ***	-1.030	0.106 ***
Project finance to GDP, at time t	0.013	0.023	0.064	0.025 **	0.017	0.042	0.065	0.025 ***	-0.014	0.041
Openness, at time t	0.006	0.002 ***	0.006	0.002 ***	0.009	0.002 ***	0.007	0.002 ***	0.009	0.002 ***
Education, at time t	0.019	0.005 ***	0.015	0.005 ***	0.024	0.005 ***	0.020	0.005 ***	0.025	0.005 ***
Population growth from time t to t+k			-0.231	0.051 ***	-0.130	0.076 **				
Government consumption, at time t					-0.012	0.011			-0.009	0.010
Employed Labor growth from time t to t+k							-0.136	0.031 ***	-0.028	0.049
<i>R squared</i>	0.217		0.242		0.310		0.262		0.305	
<i>Adjusted R squared</i>	0.216		0.240		0.304		0.260		0.299	
Fixed effects, within estimation										
log of GDP per capita, at time t	-3.947	0.426 ***	-3.694	0.418 ***	-6.594	0.815 ***	-5.197	0.508 ***	-6.407	0.822 ***
Project finance to GDP, at time t	0.002	0.027	0.001	0.027	0.020	0.044	0.009	0.026	-0.016	0.042
Openness, at time t	0.001	0.005	-0.001	0.005	0.010	0.008	0.006	0.006	0.009	0.008
Education, at time t	0.052	0.007 ***	0.048	0.007 ***	0.035	0.010 **	0.051	0.008 ***	0.037	0.010 ***
Population growth from time t to t+k			-0.413	0.077 ***	-0.463	0.276 *				
Government consumption, at time t					0.125	0.029 ***			0.134	0.029 ***
Employed Labor growth from time t to t+k							-0.053	0.036	0.083	0.067
<i>R squared</i>	0.181		0.223		0.339		0.235		0.336	
<i>Adjusted R squared</i>	0.150		0.185		0.260		0.191		0.257	
Fixed effects, between estimation										
(Intercept)	6.056	1.136 ***	6.324	1.116 ***	7.380	1.076 ***	6.710	1.089 ***	7.482	1.078 ***
log of GDP per capita, at time t	-0.668	0.194 ***	-0.592	0.192 ***	-0.702	0.196 ***	-0.675	0.185 ***	-0.743	0.191 ***
Project finance to GDP, at time t	0.068	0.045	0.107	0.047 **	0.050	0.072	0.102	0.045 **	0.029	0.070
Openness, at time t	0.013	0.004 ***	0.013	0.004 ***	0.014	0.004 ***	0.013	0.004 ***	0.014	0.004 ***
Education, at time t	0.013	0.010	0.006	0.010	0.018	0.010 **	0.012	0.010	0.020	0.010 **
Population growth from time t to t+k			-0.320	0.134 **	-0.153	0.131				
Government consumption, at time t					-0.046	0.020 **			-0.045	0.020 **
Employed Labor growth from time t to t+k							-0.208	0.085 **	-0.070	0.091 *
<i>R squared</i>	0.210		0.253		0.388		0.272		0.382	
<i>Adjusted R squared</i>	0.200		0.238		0.355		0.256		0.349	
<i>Number of countries</i>	105		105		81		105		81	
<i>Number of observations</i>	638		638		373		591		373	
<i>Number of years in sample</i>	24		24		13		17		13	

Significance levels: 1 percent (***), 5 percent (**), 10 percent (*)

Source: Thompson Reuters and authors' calculations

Table 3 Project Finance Implications for Economic Growth

The dependent variable is the annualized growth rate of real GDP per capita, calculated from period t to $t+k$. Openness is calculated as the sum of exports and imports of goods and services, expressed as a percentage of GDP; project finance is measured as the total loan amounts in a given year, expressed as a percentage of GDP; education is measured as the total enrollment in secondary education, expressed as a percentage of the population of official secondary education age; population growth is the annualized growth rate of the population from period t to $t+k$; government consumption is cash payments made for government operating activities in providing goods and services expressed as a percentage of GDP; employed labor growth rates are obtained from estimated measures of the total labor force employed, derived from figures on labor force and labor force participation. We do not report the random effect models' estimates, as their significance is rejected by Hausman tests. Sources: Moody's Investor Services, Thomson Reuters, and The World Bank.

Variables	Model I		Model II		Model III		Model IV		Model V	
	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error
<i>Panel A: Horizon, k = 3 years</i>										
Pooled model										
(Intercept)	8.670	0.683 ***	9.639	0.686 ***	10.654	0.786 ***	9.422	0.711 ***	10.052	0.803 ***
log of GDP per capita, at time t	-0.943	0.113 ***	-0.932	0.110 ***	-1.135	0.132 ***	-1.039	0.116 ***	-1.197	0.134 ***
Project finance to GDP, at time t	0.102	0.045 **	0.283	0.052 ***	0.242	0.058 ***	0.206	0.051 ***	0.102	0.057 **
Openness, at time t	0.004	0.002 *	0.004	0.002 *	0.005	0.002 **	0.004	0.002 **	0.005	0.002 **
Education, at time t	0.021	0.006 ***	0.013	0.006 **	0.028	0.007 ***	0.023	0.006 ***	0.034	0.007 ***
Population growth from time t to t+k			-0.405	0.065 ***	-0.387	0.071 ***				
Government consumption, at time t					-0.026	0.012 **			-0.015	0.012
Employed Labor growth from time t to t+k							-0.124	0.035 ***	-0.050	0.042
Project Finance to GDP, interacted with										
Low income country	-0.014	0.071	-0.178	0.075 **	-0.441	0.100 ***	-0.110	0.075	-0.314	0.102 ***
Low middle income country	-0.077	0.059	-0.253	0.064 ***	-0.207	0.074 ***	-0.179	0.063 ***	-0.076	0.075
High middle income country	0.115	0.201	-0.058	0.199	-0.393	0.239 *	0.098	0.201	-0.238	0.243
<i>R squared</i>	0.127		0.165		0.227		0.151		0.188	
<i>Adjusted R squared</i>	0.126		0.163		0.223		0.149		0.185	
Fixed effects model, within estimation										
log of GDP per capita, at time t	-4.252	0.547 ***	-4.088	0.536 ***	-7.800	0.881 ***	-5.109	0.619 ***	-7.876	0.899 ***
Project finance to GDP, at time t	0.064	0.060	0.094	0.059	0.103	0.063	0.080	0.060	0.050	0.064
Openness, at time t	-0.005	0.007	-0.005	0.006	-0.006	0.009	-0.002	0.007	-0.008	0.009
Education, at time t	0.049	0.011 ***	0.046	0.010 ***	0.048	0.014 ***	0.051	0.011 ***	0.047	0.014 ***
Population growth from time t to t+k			-0.530	0.092 ***	-0.756	0.174 ***				
Government consumption, at time t					0.014	0.033			0.029	0.034
Employed Labor growth from time t to t+k							-0.029	0.038	0.023	0.053
Project Finance to GDP, interacted with										
Low income country	-0.069	0.219	-0.091	0.214	0.389	1.162	-0.103	0.218	0.622	1.200
Low middle income country	-0.028	0.077	-0.057	0.076	-0.122	0.092	-0.052	0.077	-0.064	0.093
High middle income country	0.121	0.245	0.086	0.240	-0.196	0.301	0.069	0.252	-0.130	0.307
<i>R squared</i>	0.102		0.140		0.227		0.117		0.196	
<i>Adjusted R squared</i>	0.088		0.121		0.185		0.100		0.160	
Fixed effects model, between estimation										
(Intercept)	5.201	1.472 ***	7.591	1.574 ***	9.829	1.479 ***	7.631	1.629 ***	8.580	1.641 ***
log of GDP per capita, at time t	-0.597	0.254 **	-0.608	0.242 **	-0.887	0.245 ***	-0.702	0.253 ***	-0.963	0.266 ***
Project finance to GDP, at time t	0.123	0.143	0.517	0.180 ***	0.550	0.165 ***	0.583	0.197 ***	0.219	0.185
Openness, at time t	0.009	0.006	0.007	0.005	0.006	0.004	0.007	0.005	0.009	0.005 *
Education, at time t	0.018	0.013	-0.001	0.014	0.013	0.013	0.009	0.013	0.029	0.014 **
Population growth from time t to t+k			-0.689	0.205 ***	-0.645	0.160 ***				
Government consumption, at time t					-0.025	0.025			-0.024	0.027
Employed Labor growth from time t to t+k							-0.445	0.146 ***	-0.120	0.122
Project Finance to GDP, interacted with										
Low income country	0.013	0.153	-0.364	0.184 **	-0.731	0.177 ***	-0.438	0.202 **	-0.410	0.195 **
Low middle income country	-0.061	0.165	-0.460	0.197 **	-0.465	0.184 **	-0.514	0.213 ***	-0.161	0.210
High middle income country	0.033	0.411	-0.263	0.402	-0.966	0.448 **	-0.313	0.411	-0.771	0.486
<i>R squared</i>	0.150		0.233		0.365		0.214		0.252	
<i>Adjusted R squared</i>	0.139		0.215		0.327		0.197		0.226	
<i>Number of countries</i>	114		114		95		114		95	
<i>Number of observations</i>	867		867		564		820		564	
<i>Number of years in sample</i>	28		28		16		21		16	

Significance levels: 1 percent (***), 5 percent (**), 10 percent (*)

Source: Thompson Reuters and authors' calculations

Variables	Model I		Model II		Model III		Model IV		Model V	
	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error
<i>Panel B: Horizon, k = 5 years</i>										
Pooled estimation										
(Intercept)	9.136	0.608 ***	9.869	0.611 ***	10.820	0.722 ***	9.958	0.630 ***	10.424	0.737 ***
log of GDP per capita, at time t	-0.986	0.099 ***	-0.974	0.097 ***	-1.176	0.118 ***	-1.071	0.102 ***	-1.218	0.120 ***
Project finance to GDP, at time t	0.045	0.038	0.193	0.046 ***	0.171	0.052 ***	0.155	0.044 ***	0.074	0.052
Openness, at time t	0.004	0.002 *	0.004	0.002 **	0.005	0.002 **	0.004	0.002 **	0.005	0.002 **
Education, at time t	0.021	0.005 ***	0.014	0.005 ***	0.027	0.006 ***	0.022	0.005 ***	0.031	0.006 ***
Population growth from time t to t+k			-0.329	0.059 ***	-0.314	0.073 ***				
Government consumption, at time t					-0.019	0.011 *			-0.012	0.011
Employed Labor growth from time t to t+k							-0.143	0.034 ***	-0.065	0.046
Project Finance to GDP, interacted with										
Low income country	-0.016	0.060	-0.151	0.064 **	-0.368	0.085 ***	-0.121	0.063 *	-0.280	0.086 ***
Low middle income country	-0.051	0.054	-0.193	0.059 ***	-0.175	0.084 **	-0.151	0.058 ***	-0.095	0.085
High middle income country	-0.096	0.170	-0.235	0.168	-0.380	0.201 *	-0.153	0.168	-0.281	0.203
<i>R squared</i>	0.173		0.206		0.290		0.208		0.259	
<i>Adjusted R squared</i>	0.171		0.203		0.284		0.206		0.255	
Fixed effects, within estimation										
log of GDP per capita, at time t	-4.801	0.462 ***	-4.649	0.455 ***	-8.476	0.774 ***	-5.953	0.528 ***	-8.347	0.788 ***
Project finance to GDP, at time t	0.025	0.047	0.041	0.047	0.111	0.055 **	0.037	0.046	0.042	0.054
Openness, at time t	-0.004	0.005	-0.004	0.005	0.002	0.008	-0.002	0.006	0.000	0.008
Education, at time t	0.062	0.009 ***	0.058	0.009 ***	0.054	0.012 ***	0.060	0.009 ***	0.056	0.012 ***
Population growth from time t to t+k			-0.412	0.084 ***	-0.608	0.195 ***				
Government consumption, at time t					0.100	0.035 ***			0.104	0.035 ***
Employed Labor growth from time t to t+k							-0.020	0.037	0.036	0.058
Project Finance to GDP, interacted with										
Low income country	-0.022	0.276	-0.033	0.272	0.063	0.887	-0.084	0.271	0.280	0.912
Low middle income country	-0.006	0.065	-0.020	0.064	-0.116	0.115	-0.015	0.064	-0.049	0.114
High middle income country	-0.241	0.188	-0.264	0.185	-0.535	0.233 **	-0.394	0.190	-0.455	0.235
<i>R squared</i>	0.196		0.225				0.239		0.358	
<i>Adjusted R squared</i>	0.166		0.190				0.199		0.282	
Fixed effects, between estimation										
(Intercept)	6.307	1.354 ***	8.227	1.428 ***	9.825	1.290 ***	8.659	1.454 ***	9.696	1.426 ***
log of GDP per capita, at time t	-0.709	0.228 ***	-0.720	0.219 ***	-0.865	0.209 ***	-0.856	0.221 ***	-0.961	0.220 ***
Project finance to GDP, at time t	0.055	0.121	0.382	0.155 **	0.365	0.131 ***	0.437	0.162 ***	0.252	0.143 *
Openness, at time t	0.007	0.005	0.006	0.005	0.007	0.004 **	0.007	0.005	0.008	0.004 **
Education, at time t	0.018	0.011	0.004	0.012	0.013	0.011	0.013	0.011	0.023	0.011 **
Population growth from time t to t+k			-0.577	0.180 ***	-0.518	0.148 ***				
Government consumption, at time t					-0.042	0.021 **			-0.043	0.022 *
Employed Labor growth from time t to t+k							-0.390	0.122 ***	-0.233	0.115 **
Project Finance to GDP, interacted with										
Low income country	0.013	0.131	-0.300	0.159 *	-0.547	0.140 ***	-0.366	0.167 **	-0.441	0.153 ***
Low middle income country	-0.046	0.147	-0.376	0.175 **	-0.342	0.161 **	-0.425	0.180 **	-0.270	0.181
High middle income country	0.102	0.360	-0.141	0.353	-0.575	0.372	-0.198	0.351	-0.549	0.394
<i>R squared</i>	0.150		0.227		0.423		0.233		0.368	
<i>Adjusted R squared</i>	0.139		0.209		0.377		0.214		0.328	
<i>Number of countries</i>	112		112		92		112		92	
<i>Number of observations</i>	764		764		476		717		476	
<i>Number of years in sample</i>	26		26		15		19		15	

Significance levels: 1 percent (***), 5 percent (**), 10 percent (*)

Source: Thompson Reuters and authors' calculations

Variables	Model I		Model II		Model III		Model IV		Model V	
	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error	Estimate	Std. error
<i>Panel C: Horizon, k = 7 years</i>										
Pooled estimation										
(Intercept)	8.650	0.559 ***	9.260	0.562 ***	9.790	0.706 ***	9.414	0.573 ***	9.524	0.707 ***
log of GDP per capita, at time t	-0.932	0.089 ***	-0.925	0.088 ***	-1.074	0.111 ***	-0.997	0.091 ***	-1.087	0.112 ***
Project finance to GDP, at time t	0.004	0.035	0.132	0.043 ***	0.080	0.053	0.120	0.040 ***	0.024	0.053
Openness, at time t	0.006	0.002 ***	0.006	0.002 ***	0.009	0.002 ***	0.007	0.002 ***	0.009	0.002 ***
Education, at time t	0.020	0.005 ***	0.015	0.005 ***	0.023	0.005 ***	0.020	0.005 ***	0.025	0.005 ***
Population growth from time t to t+k			-0.284	0.057 ***	-0.189	0.083 **				
Government consumption, at time t					-0.012	0.011			-0.008	0.011
Employed Labor growth from time t to t+k							-0.160	0.034 ***	-0.043	0.055
Project Finance to GDP, interacted with										
Low income country	0.075	0.059	-0.040	0.063	-0.561	0.393	-0.035	0.061	-0.527	0.402
Low middle income country	-0.023	0.053	-0.143	0.057 **	-0.151	0.080 *	-0.122	0.055 **	-0.104	0.080
High middle income country	0.015	0.159	-0.115	0.158	-0.210	0.197	-0.076	0.155	-0.144	0.196
<i>R squared</i>	0.221		0.250		0.320		0.269		0.311	
<i>Adjusted R squared</i>	0.218		0.247		0.311		0.265		0.303	
Fixed effects, within estimation										
log of GDP per capita, at time t	-3.987	0.429 ***	-3.733	0.420 ***	-6.641	0.823 ***	-5.254	0.509 ***	-6.494	0.831 ***
Project finance to GDP, at time t	-0.021	0.039	-0.023	0.038	0.024	0.052	-0.016	0.037	-0.028	0.049
Openness, at time t	0.001	0.005	0.000	0.005	0.013	0.008 *	0.007	0.006	0.013	0.008
Education, at time t	0.053	0.007 ***	0.049	0.007 ***	0.034	0.010 ***	0.051	0.008 ***	0.035	0.010 ***
Population growth from time t to t+k			-0.417	0.077 ***	-0.480	0.284 *				
Government consumption, at time t					0.126	0.030 ***			0.138	0.029 ***
Employed Labor growth from time t to t+k							-0.050	0.036	0.091	0.067
Project Finance to GDP, interacted with										
Low income country	0.080	0.276	0.085	0.269	0.393	0.672	0.013	0.261	0.606	0.681
Low middle income country	0.059	0.055	0.062	0.054	0.075	0.102	0.074	0.053	0.126	0.099
High middle income country	-0.193	0.165	-0.213	0.161	-0.545	0.210 ***	-0.363	0.163 **	-0.485	0.209 **
<i>R squared</i>	0.185		0.228		0.357		0.247		0.355	
<i>Adjusted R squared</i>	0.153		0.188		0.271		0.200		0.259	
Fixed effects, between estimation										
(Intercept)	6.104	1.295 ***	7.524	1.368 ***	8.387	1.354 ***	8.267	1.366 ***	8.249	1.415 ***
log of GDP per capita, at time t	-0.679	0.208 **	-0.695	0.202 ***	-0.751	0.207 ***	-0.829	0.201 ***	-0.798	0.210 ***
Project finance to GDP, at time t	-0.003	0.117	0.294	0.160 *	0.225	0.139	0.355	0.158 **	0.155	0.153
Openness, at time t	0.013	0.005 ***	0.012	0.004 ***	0.013	0.004 ***	0.012	0.004 ***	0.014	0.004 ***
Education, at time t	0.014	0.010	0.004	0.010	0.013	0.011	0.011	0.009	0.019	0.010 *
Population growth from time t to t+k			-0.461	0.176 ***	-0.323	0.178 *	-0.329	0.113 ***		
Government consumption, at time t					-0.046	0.020 **			-0.046	0.020 **
Employed Labor growth from time t to t+k							-0.329	0.113 ***	-0.154	0.147
Project Finance to GDP, interacted with										
Low income country	0.118	0.128	-0.165	0.165	-0.564	0.596	-0.243	0.166	-0.305	0.642
Low middle income country	-0.051	0.153	-0.336	0.184 *	-0.224	0.152	-0.414	0.185 **	-0.169	0.168
High middle income country	0.382	0.320	0.191	0.319	0.119	0.416	0.078	0.314	0.129	0.428
<i>R squared</i>	0.248		0.298		0.416		0.325		0.398	
<i>Adjusted R squared</i>	0.229		0.272		0.364		0.297		0.349	
<i>Number of countries</i>	105		105		81		105		81	
<i>Number of observations</i>	638		638		373		591		373	
<i>Number of years in sample</i>	24		24		13		17		13	

Significance levels: 1 percent (***), 5 percent (**), 10 percent (*)

Source: Thompson Reuters and authors' calculations

Before analyzing how project finance affects growth, we review some of the results corresponding to the other covariates included in the regression. Consistent with neoclassical growth theory (Solow, 1956 and Swan, 1956), the initial GDP level per capita is negatively associated with economic growth, supporting the hypothesis that economies slow as they mature, owing to diminishing returns to capital. This finding is robust across all model specifications and after correcting for country income classification. Similarly, there is evidence that openness is beneficial to economic growth.

Government consumption affects economic growth negatively in most cases, suggesting that governments tend not to spend resources productively, perhaps owing to bad government and/or corruption, or that taxation has negative effects on production and investment in the non-government sector (Barro and Sala-i-Martin, 2003, and references therein). Nevertheless, the negative effects, while persistent, are quite small.

Higher levels of secondary education enrollment are associated with higher growth rates. Coefficients are positive, though they are insignificant in a few cases, especially when the model estimation is performed using between estimators. As noted in the discussion of the estimation methodologies, the between estimator yields biased coefficients if the unobserved component in the fixed effects regression is correlated with the covariates. This may be the case for secondary education enrollment, which likely correlates with GDP per capita, as enrollment increases the wealthier the population is, as well as government consumption, if some of it corresponds to public education.

The choice of variables for capturing improvements on labor productivity unrelated to technology or education, population growth, and growth of the employed labor force, seem not to work as well as expected. Both variables affect GDP growth per capita negatively. In the case of population growth, we may speculate that a larger population could only have a positive impact on growth provided its educational levels improve. Hence, the positive association between secondary education and growth offset the drag imposed by a growing population. This argument may also apply to a larger employed population, which, without the necessary skills, could also slow growth.

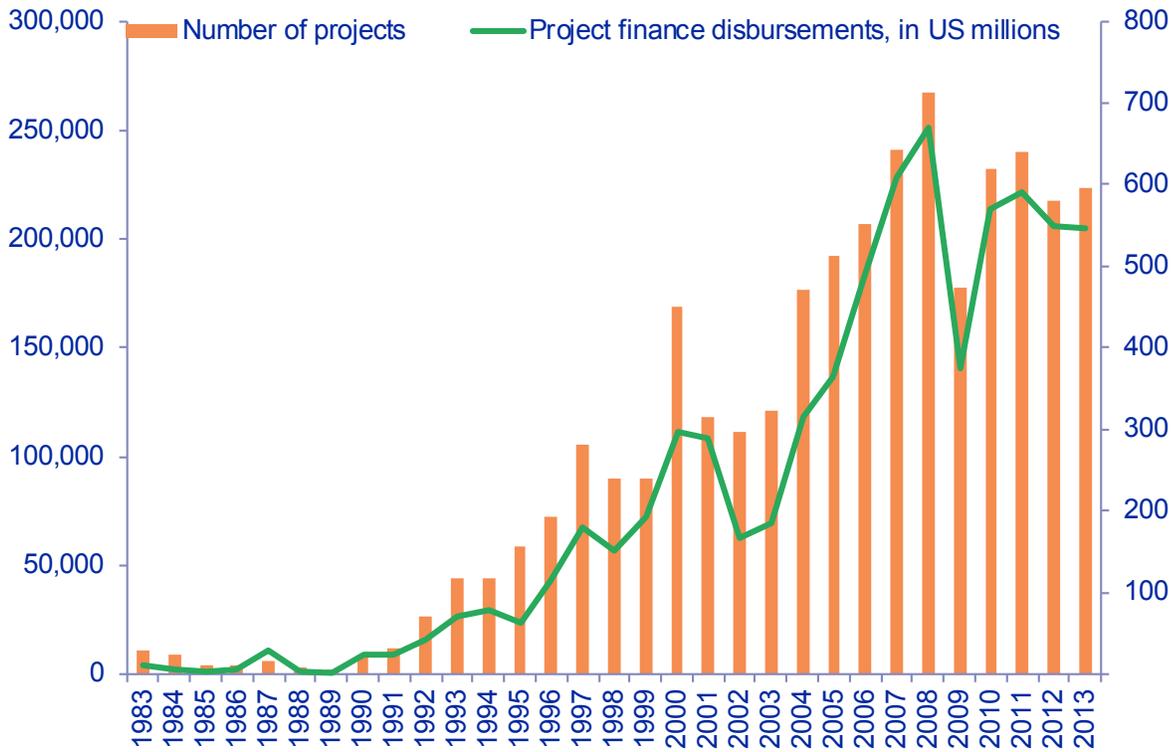
The evidence favoring project finance as a driver of economic growth is weak if only the within estimates are considered, with only some of the estimated coefficients being statistically significant (middle panel, Tables 2 and 3). The lack of evidence in the within estimations, in our view, is mainly related to the lack of enough observations within countries. As illustrated in Figure 1, there are less than six individual observations of project finance in many of the countries in the sample, rendering the within estimation suspicious. Note, the issues associated with short sample data may also affect the significance of the coefficients associated with openness.

Results using pooled OLS and the between estimator, however, point otherwise. Pooled OLS estimates suggest project finance has strong positive effects on growth for as long as five years after initial disbursement. When project finance increases by one percentage point of GDP, the annual growth rate of real GDP per capita would be 6 to 10 percent higher. In other words, for a country with real GDP per capita growing annually at three percent, the boost provided by project finance could deliver a cumulative additional growth as high as two percent over five years. Results are similar but stronger for the coefficients estimated with the between estimator. In this case, real GDP growth per capita would accelerate by 10 to 15 percent during the first three years following the initial disbursement of project finance loans.

Once we introduce dummy variables accounting for the interaction between project finance and a country's World Bank classification by income, an interesting result emerges (Table 3). The lower the country's income level, the lower the positive effect of project finance on growth. In some instances, the effect may be negative. This finding seems consistent with those of Alfaro, et al. (2004) and Borensztein, et al. (2004), who suggest that countries with stronger financial systems benefit the most from FDI. These systems are more likely present in upper-middle income and high-income economies. Project finance, hence, may not be able to substitute or offset deficiencies associated with weak and underdeveloped financial systems, contradicting the arguments presented in Kleinmeier and Versteeg (2010).

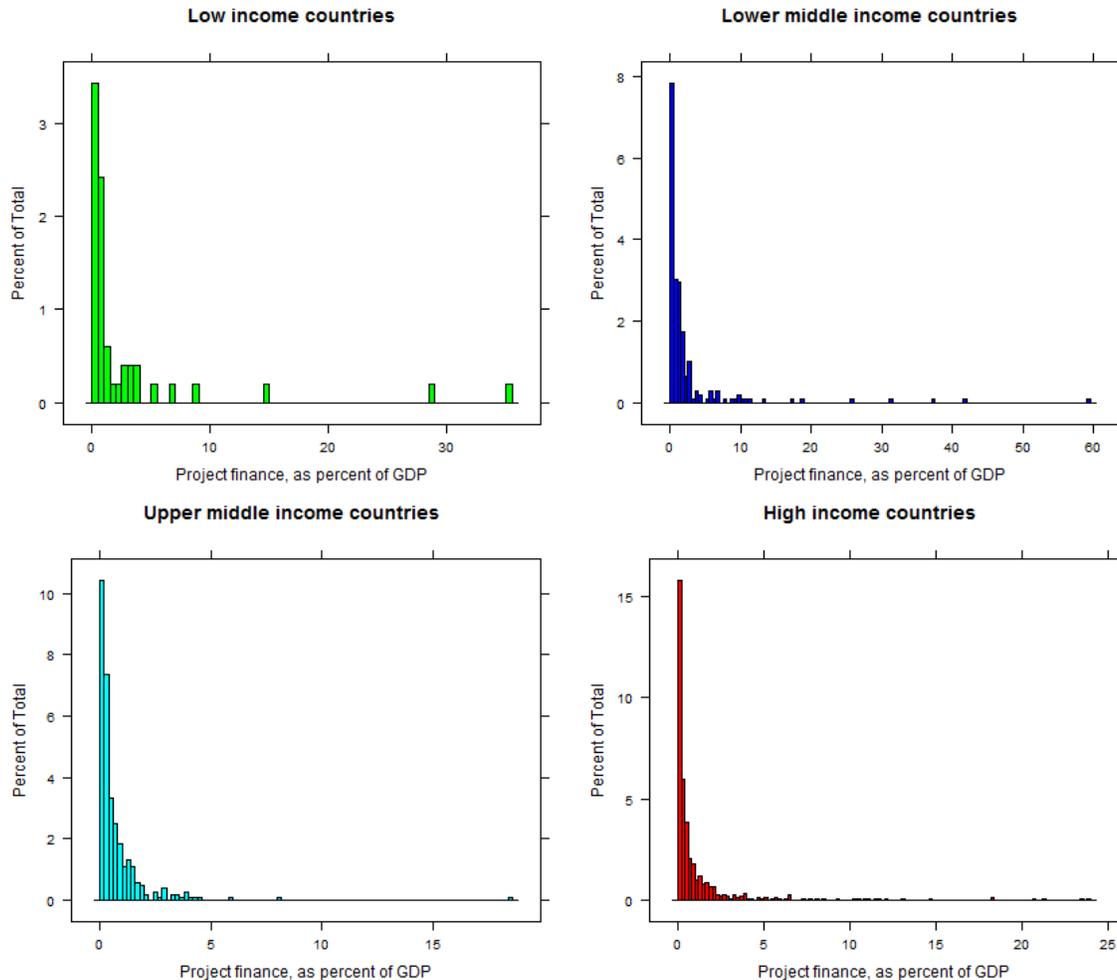
Despite its rapid growth during the past thirty years, interrupted briefly during the economic downturns in the early 2000s and the aftermath of the 2008–2009 global financial crisis (Figure 2), project finance investment is quite modest relative to GDP, and especially so in upper-middle income and high-income economies. Figure 3 shows the empirical distribution of project finance measured as a percentage of GDP for different country categories. On average, in any given year, the amount of project finance amounts to three percent of GDP in low-income countries, 2½ percent of GDP in low-middle income countries, ¾ percent of GDP in upper-middle income countries, and slightly more than one percent of GDP in high-income countries.

Figure 2 Project finance: number of projects and disbursements.



Source: Thompson Reuters and authors' calculations

Figure 3 Project finance as a percentage of GDP, empirical distribution.



Source: Thompson Reuters and authors' calculations

Moreover, the project finance investment figures reported above may overestimate the actual amount of project finance in most countries. As shown in Figure 2, the distributions are highly skewed to the right, with the average value reflecting the presence of large outliers. The median value indicates that half of the project finance debt in any given year amounts to less than one percent of GDP in lower-income and lower-middle income economies and less than ½ percent of GDP in upper-middle income and advanced economies.

There appears to be substantial scope for raising economic growth prospects by increasing project finance, given the low baseline levels observed in most countries, especially in middle-income and high-income economies. For instance, during 2010–2014, real GDP per capita in the United States, approximately \$49,000 (on average, in 2009 U.S. dollars), grew at annualized rate of 1.6 percent. Annual project finance investment has amounted only to 0.1 percent of GDP on average, or just \$16 billion⁴ per year in a \$16 trillion economy. If project finance investment increases by a factor of 10, to 1 percent of GDP, or \$160 billion, a somewhat modest increase relative to the size of the U.S. economy, GDP per capita would rise by one additional percentage point over a five-year period or roughly 0.2 percent more on an annualized basis.

This is a seemingly small increase in GDP per capita of approximately \$500 to \$57,600 in 2009 U.S. dollars, over a five-year span. At the current pace of population growth, however, it would add almost \$200 billion in real dollars to the U.S. economy, in-line with Lund, et al. (2013) estimates. This amount is not trivial, equivalent to the GDP of Oregon, Alabama, or South Carolina, in a domestic context, or the Czech Republic, New Zealand, or Peru, internationally.

⁴Note the number does not include equity portion the project finance nor 100% government funded projects.

6. Conclusions

Eight years have elapsed since the Great Recession, but the world economy remains mired in sluggish growth and low productivity, with the usual growth engines, the United States and China, performing below historic levels. Against this challenging background, policy makers have advocated for increased investment in infrastructure and project finance, arguing it may contribute to faster economic growth and higher productivity.

Our results suggest that there is merit to the proposed recommendations, as project finance has positive effects on long-run growth in high-middle income and advanced economies. More importantly, since project finance levels, measured relative to GDP, are low in these countries — a somewhat modest increase could yield substantial benefits. In general, if project finance increased by one percentage point of GDP, the rate of growth of GDP per capita may increase by as much as 10 to 15 percent. These numbers are not small: in an economy such as the United States, increasing project finance to \$160 billion would generate an additional \$40 billion per year during the next five years.

In contrast, low-income and lower-middle income economies do not appear to benefit as much from project finance. Based on empirical evidence from earlier studies, we speculate these results may reflect deficiencies associated with weak and underdeveloped financial systems, corporate governance, and the legal and regulatory oversight framework. Addressing these deficiencies would open up the possibility of unleashing rapid growth and help to lift living standards.

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