THE GAMBIA—FINANCING THE INFRASTRUCTURE GAP[1]

Building infrastructure is a key strategic priority of The Gambian government's National Development Plan. The Gambia's status of infrastructure is broadly at the average of peer SSA countries but is significantly below the level needed to achieve the SDGs in 2030. This analysis estimates that, under current and planned policies, The Gambia's infrastructure gap will reach about 15 percent of GDP in 2030. Strong government's active policies – to improve domestic revenue mobilization, enhance spending efficiency, and attract private investment – could cover about two-thirds of this infrastructure gap. Support from development partners will be important to address the remaining gap. Reliance on borrowing would lead to a significantly higher public debt, in the current context of limited fiscal space.

A. Background

1. Building infrastructure is a key strategic priority of The Gambian government's National Development Plan (NDP). Specific objectives include: (1) investing in energy infrastructure to face the nation's energy (especially electricity) crisis characterized by a significant mismatch between supply and demand, obsolete equipment for energy generation and distribution, a highly indebted and dysfunctional national utility company, and a policy environment not conducive to private sector investment; and (2) transforming the transportation sector by enhancing land, sea and air transport to boost affordability, accessibility, and competitiveness.

2. The Mid-Term Evaluation (MTE) of the NDP in February 2021 shows that, three years into its implementation, progress on achieving the authorities' objectives on infrastructure is mixed. About 50 percent of the 22 indicators (and 3 out of 5 outcomes) set to track this infrastructure strategic priority were achieved or on track to be achieved. The remaining 50 percent were perceived as constrained and not expected to be achieved.

3. Besides low capacity and delays caused by the COVID-19 pandemic, limited funding is cited as one of the main challenges to the implementation of this strategic priority. Out of the US$700 million estimated to be the cost of projects tied to the infrastructure strategic priority, the mid-term evaluation found that only 38 percent (US$270 million) was disbursed three years into the implementation of the four-year plan. Among the constraints is the fact that more than 60 percent of pledges from the international community to support the NDP's financing gap were made in the form of loans, while the country's debt sustainability situation prevents it from acquiring non-concessional debt.

4. Against this background, this paper analyzes the infrastructure gap in key SDG areas and evaluates the authorities' options for financing this gap without jeopardizing debt

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sustainability. The paper shows that (i) The Gambia's current status of infrastructure is broadly at the average of peer countries but is significantly below the SDG needs; and (ii) closing this infrastructure gap requires a combination of strong policies (i.e. domestic revenue mobilization and spending efficiency), international support, and private sector participation.

B. Stylized Facts

5. The Gambia has mixed performance relative to Sub-Saharan African (SSA) peers on the quantity and quality of, and citizens' access to, infrastructure (Figure 1). While The Gambia's capital stock-to-GDP ratio is below average, the World Economic Forum's measure of overall infrastructure quality is above average (Panel A). The Gambia also fares slightly better than the average SSA country on access to critical infrastructure, such as electricity and mobile telecommunications.[2] The Gambia's situation improves slightly when the indicators are assessed against the countries' real GDP per capita. The capital stock is close to the level suggested by The Gambia's development status while the indicators of quality and access are significantly above.

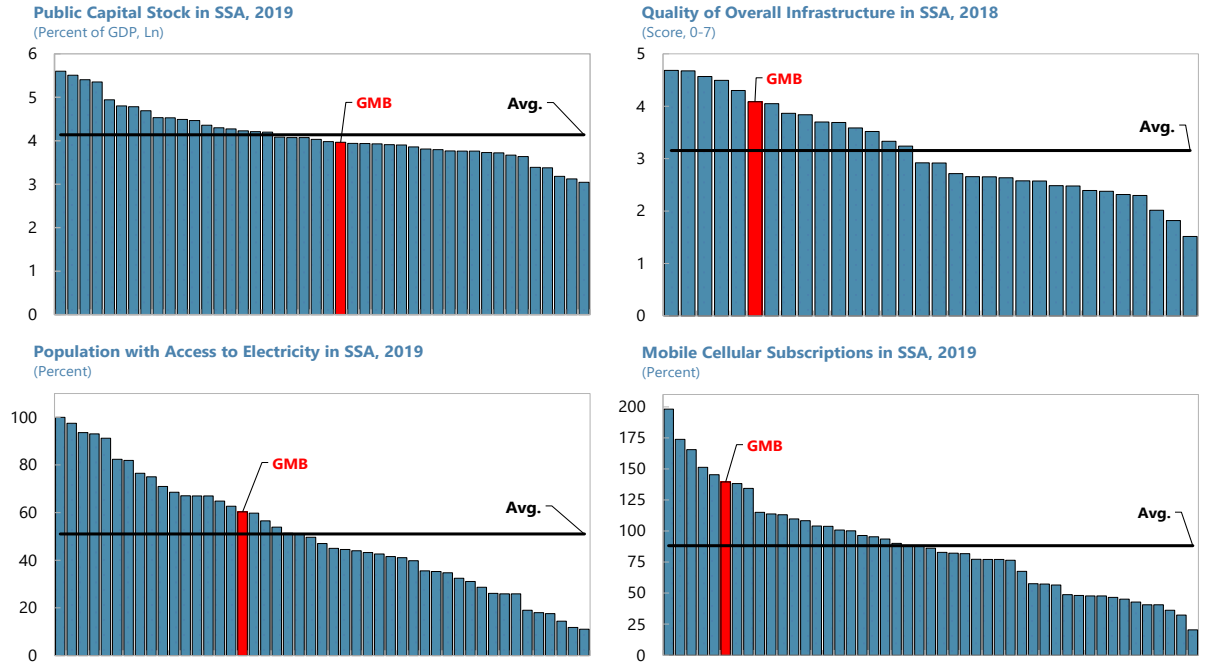
6. However, this mixed performance masks substantial infrastructure gaps in terms of the level of infrastructure required to achieve major development goals, in particular the 2030 SDGs. Ensuring universal access to some basic services remains a challenge. Close to 40 percent of the population lack access to electricity and more than 30 percent do not have access to safely managed drinking water. Besides, even though the quantity and quality of the overall infrastructure seems slightly better in The Gambia relative to the SSA average, the consensus remains that this average is far behind other regions, implying that there is ample room for improvement, including for The Gambia.

7. The IMF projects that under current and planned policies, The Gambia's infrastructure gap will reach 14.7 percent of GDP in 2030 (Gaspar et al., 2019; Bartolini et al., 2021). The infrastructure gap is estimated as the amount of investment spending needed in 2030 to achieve the SDGs targets in three particular sectors: electricity, roads, and water and sanitation. Taking into account the country's initial capital stock, its level of investment spending efficiency and the capital depreciation rate, this infrastructure gap translates into an average annual investment need of about 5.3 percent of GDP between 2021 and 2030.

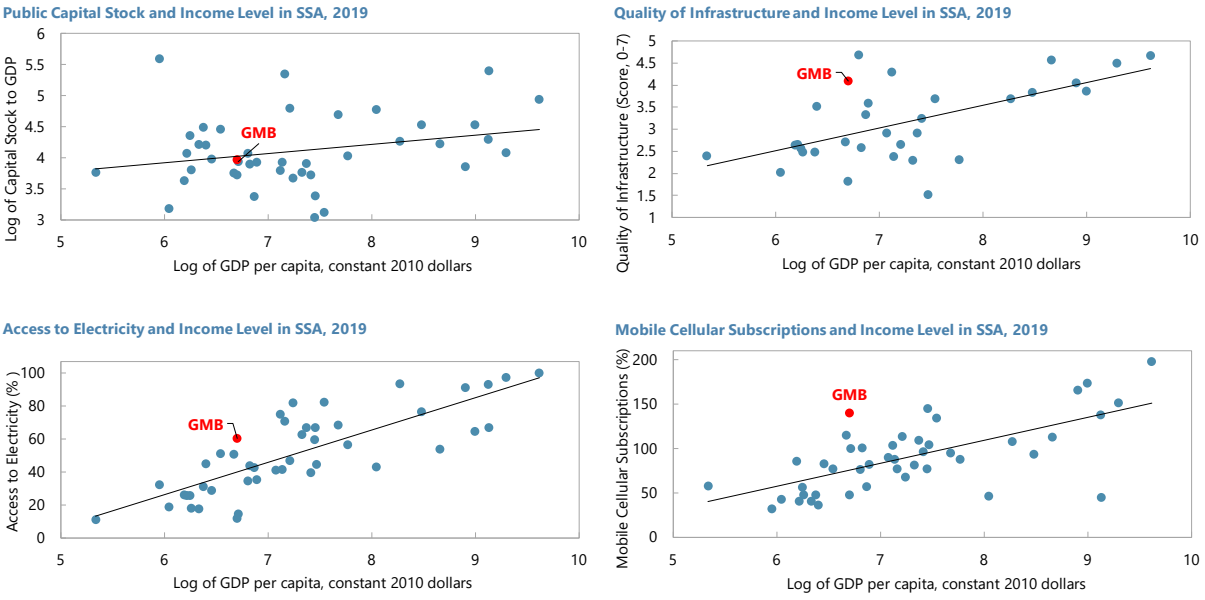
[2] Indicators of access to water (not shown) portray a similar situation to that of access to electricity.

Figure 1. Measures of Quantity and Quality of Infrastructure in SSA Countries

Panel A: Quantity and quality of infrastructure in The Gambia versus SSA peers.



Panel B: Relation between infrastructure quantity/quality and income level.

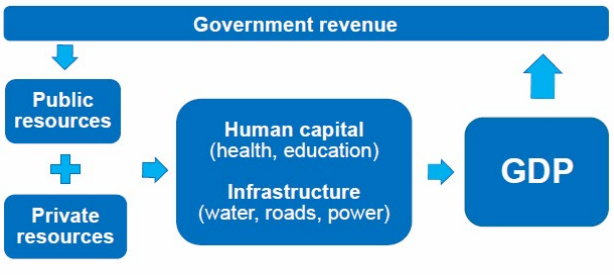


Sources: IMF Investment and Capital Stock Database, World Bank WDI, and World Economic Forum

C. Scenarios for Financing the Infrastructure Gap

8. This study evaluates the effect of numerous financing scenarios on the infrastructure gap and on the timing of achieving the infrastructure SDG goals. This exercise is based on a dynamic macroeconomic SDG financing framework developed by Bartolini et al. (2021) and calibrated to the Gambian economy (see Figure 2., and Annex 1 for more details). This model is a long-term, macroeconomically consistent, dynamic framework—it abstracts from business cycle fluctuations and monetary developments—in which output growth is driven by investment in physical and human capital. Bartolini et al. (2021) use the model to: (i) assess the role of the public and private sectors to generate the funding to achieve the SDGs in 5 sectors: education and health (human capital sectors), and electricity, roads, and water and sanitation (infrastructure sectors); (ii) assess various financing scenarios to close the SDGs financing gap; and (iii) evaluate the impact of shocks and structural reforms on the SDGs financing gap.

Figure 2. Dynamic Financing Framework

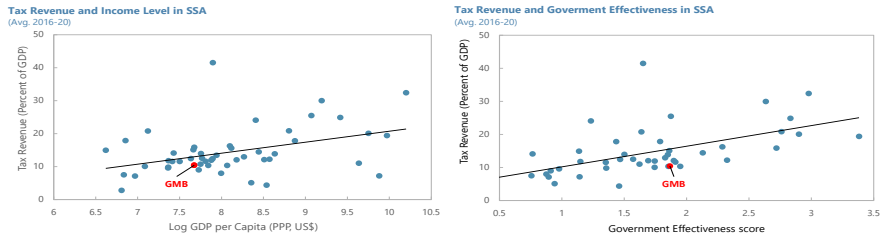


Source: Bartolini and Hellwig (2021)

Domestic Revenue Mobilization

9. One of the options available to the authorities to finance the infrastructure gap is through improved Domestic Revenue Mobilization (DRM). The data show that tax collection in The Gambia is lower than the level suggested by both the country's level of development and its institutional capacity, measured by the level of government effectiveness (Figure 3). To assess the extent to which enhanced revenue administration measures could increase tax revenue, this analysis estimates The Gambia's tax effort (i.e. how does the level of tax revenue collected compare to the frontier) and derive its tax potential (i.e. how much more can be collected if the authorities use their full potential) using Stochastic Frontier (SF) models.

Figure 3. Tax Revenue in SSA Countries



Sources: The Gambian authorities and World Bank

10. Model results show that The Gambia's tax effort is between 6 and 16 percent below the frontier and the tax revenue-to-GDP ratio could be increased by up to 1.8 percentage points (Table 1, and Annex 2). The analysis shows results from two alternative approaches to estimating the tax effort and tax potential. The first approach estimates the Stochastic Frontier model using the total level of tax revenue, while the second approach estimates the models for individual components of tax revenue and aggregates the results. Both approaches yield similar results. For the first approach, the tax effort ranges between 86 percent and 93 percent, and the tax potential ranges between 0.8 and 1.5 percent of GDP. Similarly, for the second approach, the tax effort ranges between 84 percent and 94 percent, and the tax potential ranges between 0.7 and 1.8 percent of GDP. In the SDG financing simulations, we assess the impact of increasing tax collection between 2022 and 2024 by the maximum tax potential provided by first approach (i.e. 1.5 percentage points).[3]

Table 1. The Gambia: Tax Effort and Tax Potential

	Tax Effort Range (%)		Tax Potential Range (% of GDP)	
	Min	Max	Min	Max
Total Tax revenue Model	**86%**	**93%**	**0.8**	**1.5**
Total (Model Aggregation)	**84%**	**94%**	**0.7**	**1.8**
G&S Tax Model	87%	90%	0.4	0.6
Income Tax Model	82%	91%	0.3	0.6
Trade Tax Model	82%	99%	0.0	0.5

Sources: The Gambian authorities and IMF staff estimates

Public Spending Efficiency

11. Another option available to narrow the infrastructure gap is to improve the efficiency of public spending in several areas. Such an improvement can help make savings that could be re-invested on infrastructure, as well as help get the most economic bang for the public investment buck (IMF, 2015).[4] Once again, this analysis uses SF models to estimate the efficiency of public spending in the sectors captured by the SDG financing framework. In particular, this analysis estimates three models for public spending on health, education, and investment.

12. Estimation results show that there is ample room to improve the efficiency of public spending, especially on education and investment (Table 2, and Annex 2). The Gambia appears to be close to the frontier when it comes to heath spending efficiency. However, the models show that educational outcomes could be improved by about 10 percent with the same amount of public education spending, given the country's initial conditions. Similarly, the outcomes associated with public investment could be improved by 10 to 13 percent with the same level of infrastructure spending. These efficiency parameters estimated are fed into the SDG financing model and simulations are made to assess the impact of increasing public spending efficiency on the SDG

[3] Simulation results are virtually the same if tax collection is increased by the maximum tax potential provided by second approach (i.e. 1.8 percentage points).
[4] See IMF (2015), *Making Public Investment More Efficient*, Washington, D.C.

financing gap as well as on the timing of achievement of the SDGs.

Table 2. The Gambia: Public Spending Efficiency and Potential Savings

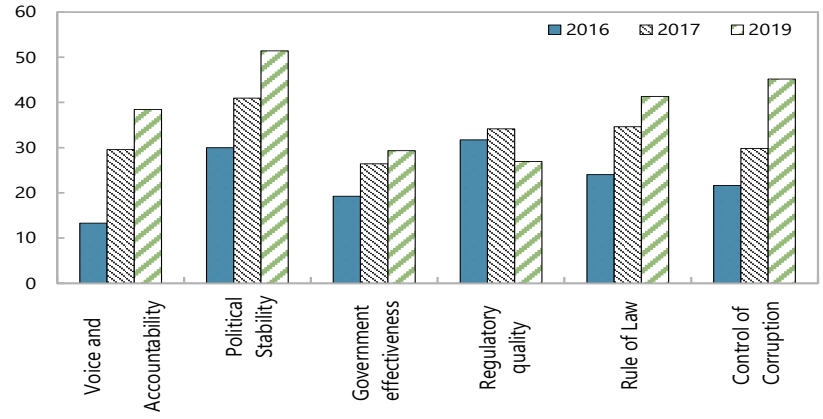
	Efficiency of Public Spending (%)		Potential Savings (% of GDP)	
	Min	Max	Min	Max
Health Spending	97%	97%	0.9	0.9
Education Spending	90%	91%	2.3	2.3
Investment	87%	90%	3.0	3.0

Sources: The Gambian authorities and IMF staff estimates

Private Sector Participation

13. Financing could also be leveraged from fostering private sector participation to close the infrastructure gap. This could be done through public private partnerships, and by improving the business environment to attract more domestic and foreign investors. Governance will need to be strengthened further to remove bottlenecks that hinder the development of private sector activity (Figure 4). Therefore, this analysis devises a scenario which assumes that the government takes measures to improve the business environment, leading to an additional one percentage point increase in private sector financing of SDGs. The impact of this measure on the infrastructure gap is presented in Section IV below.

Figure 4. Governance Indicators, 2016–19
(Percentile ranking)



Source: Worldwide Governance Indicators database.

D. Simulation Results

14. Each fiscal measure could help reduce the infrastructure financing gap by about 20 percent. Taking measures that increase tax collection by ½ percentage point each year between 2022 and 2024 helps reduce the infrastructure gap by 3.4 percentage points of GDP to 11.3 percent of GDP in 2030. This lowers the additional infrastructure investment need per year to 4.1 percent of GDP. Boosting spending efficiency to the frontier, not only for investment but also for education and health, leads to similar results on the infrastructure gap and the additional investment need; however, unlike the revenue measure, this scenario leads to a significant improvement in the debt ratio in 2030 (by 2.7 percentage points), most likely due to the more important effect of increased investment efficiency on growth. Together, these two measures could cover more than 45 percent of the infrastructure gap.

15. Gradually increasing private sector investment by only one percentage points by 2030 also helps reduce the infrastructure gap significantly. Under this scenario, the infrastructure gap is reduced by almost 3 percent of GDP; the annual investment need to close the gap by 2030 is lowered by 1 percentage point to 4.3 percent of GDP. Altogether, active policies (combining fiscal measures and private sector participation) could cover almost two-thirds of the infrastructure gap, and reduce the additional annual investment effort needed the achieve the SDGs to 1.8 percent of GDP.

16. Even with active policies, The Gambia will still need support from the international development partners to close its infrastructure gap by 2030. Additional grants needed from development partners would amount to 1.8 percent of GDP per year if all active policies are implemented as described above, and 2.8 percent of GDP if only fiscal measures are taken. Without this support and assuming that the Gambian authorities commit to closing the infrastructure gap by 2030, the alternative would be incurring public debt to invest in infrastructure. In the extreme scenario in which no policy action is taken, the government would need to increase debt by at least 5.3 percent of GDP per year between 2021 and 2023, leading to a significant increase in public debt,

by about 30 percentage points of GDP in 2030 relative to the baseline scenario. This option is difficult to envisage given the current limited fiscal space.

Table 3. The Gambia: Dynamic Infrastructure Financing Framework Scenarios[1]

Scenario	Infrastructure SDG targets met by	Additional grants per year	Residual infrastructure gap in 2030	Additional investment need per year	Public debt in 2030
Baseline Settings	2034	0.0	14.7	5.3	38.4
Domestic Revenue Mobilization	2033	0.0	11.3	4.1	38.4
Increased Spending Efficiency	2033	0.0	11.1	4.0	35.7
Combined Fiscal Measures	2032	0.0	7.8	2.8	35.6
Private Sector Participation	2033	0.0	11.8	4.3	38.2
Active policies without Grants	2032	0.0	5.0	1.8	35.4
Baseline plus Grants	2030	5.3	0.0	0.0	37.7
Fiscal Measures plus Grants	2030	2.8	0.0	0.0	35.0
Active policies plus Grants	2030	1.8	0.0	0.0	35.1
Debt Financing	2030	0.0	0.0	0.0	70.7

Source: IMF staff estimates
1/ In percent of GDP.

Annex 1. A Dynamic Macroeconomic Framework for SDG Financing

The macroeconomic framework developed by Bartolini et al. (2021), to evaluate the financing strategies to achieve the SDGs, consists of a set of accounting and behavioral equations covering the real, fiscal and external sectors of the economy, with the overriding objective of ensuring macroeconomic consistency while maintaining flexibility and tractability. The framework focuses on the ability of public and private economic actors to mobilize funding to achieve the SDGs in five keys areas, namely education, health, roads, electricity, water and sanitation. The framework ensures that economic growth is consistent with human and physical capital investment and follows demographic developments. The model is used to simulate the effect of policies over the 2020-50 horizon. The main features of the framework are described below (see Bartolini et al., 2021 for a detailed description of the model):

On the real side, the model relies on the IMF's Debt, Investment and Growth (DIG) model that addresses the public-investment-growth nexus and fiscal adjustments in low income and emerging economies. The production function is given by:

$$Y = A\left(K_{G,nb} + \theta K_{G,b}\right)^{\beta} K_P^{\alpha}\left[L\left(\frac{H}{L}\right)^{\sigma}\right]^{1-\alpha}$$

where H is human capital, A is total factor productivity, $K_{G,b}$ and $K_{G,nb}$ are public bankable (i.e. financed with private resources) and public non-bankable capital stocks respectively. K_P is private capital stock. L is the labor force and $\frac{H}{L}$ is the stock of human capital per worker. The elasticities $\alpha, \beta \in (0,1)$ and $\sigma > 0$ are, respectively, the private capital share of output, the output elasticity of public capital, and the parameter that determines how human capital is transformed into effective labor.

Investment $\left(I_{i,t}\right)$ and depreciation $\left(\delta_{i,k}\right)$ determine the dynamics of capital stocks according to the following law of motion:

$$K_{i,t} = \left(1 - \delta_{i,k}\right)K_{i,(t-1)} + \epsilon I_{i,t} \qquad i = G, P$$

where $0 < \epsilon \leq 1$ is the efficiency with which investment spending is transformed into effective capital.

Similarly, schooling and improvements in health, represented by $\xi > 0$, and depreciation (δ_h) determine the dynamics of human capital according to:

$$H_t = (1 - \delta_h)H_{t-1} + \omega\xi_{t-1} \qquad i = G, P$$

where $\omega \in (0,1)$ is the rate at which human capital increases with the previous period of schooling. Human capital generated through schooling and health accumulates according to the following law of motion:

$$\xi_t = (1 - \omega)\xi_{t-1} + \left[(e * h)^{\phi} * n^{\gamma}\right]_{t-1}$$

where h is the annual nominal spending on health and education, which translates into new human capital according to an efficiency parameter $e > 0$, with elasticity $\phi > 0$. n is the share of school-age population and $\gamma > 0$ is the elasticity of schooling to n.

The fiscal balance determines the amount of resources available for SDGs spending, according the following identity:

$$SDG\ resources = Revenue - NonSDG\ Expenditures - Net\ public\ lending$$

The framework takes the quantification of SDG targets by Gaspar et al. (2019). These targets are used to derive the gap between the actual annual investment spending in infrastructure and the spending required to meet the SDG targets. Therefore, the framework calculates the amount of additional financing (on top of resources in staff's baseline scenario) needed to reach the SDG goals within a given timeframe.

Annex 2. Stochastic Frontier Models for Estimating Tax Potentials and Spending Efficiency

Methodology

A stochastic frontier analysis uses econometric models to link measures of input (or resources) with a measure of output, while controlling for other determinants of the output variable, with the final goal of assessing whether: (1) the inputs produce the highest level of output (maximum efficiency); or (2) less resources could be used to achieve the same outcomes. The stochastic frontier model used in this paper (see Greene, W. H., 2008; Parmeter, C. F. and Kumbhakar, S. C.,2014 for more details) specifies a production technology, $f(X_i, \alpha)$ using inputs for country i, $X_i = (x_i^1, X_i^{-1})$, to produce the optimal output: $y_i^* = f(X_i, \alpha)$. The model assumes that the government only achieves a fraction of y_i^*, namely $y_i = f(X_i, \alpha)\varepsilon_i \exp(v_i)$, where $0 < \varepsilon_i \leq 1$ is the level of efficiency, and v_i is a random shock. Assuming k inputs, a log-linear production function, and defining $\varepsilon_i = \exp(-u_i) \leq 1$, the SFA estimates the following econometric model: $\ln(y_i) = \alpha_0 + \sum_{j=1}^{k} \alpha_j \ln(x_i^j) + v_i - u_i$.

Tax Potential Analysis

Following the literature in this line of research, economic and socio-political variables are used to explain the behavior of several tax revenue indicators (Total tax, Goods & Services, Income, and Trade) in several sub-group of countries to which The Gambia belongs (Fragile and conflict-affected states, ECOWAS, Low-income countries, Sub-Saharan Africa, and Low-income Sub-Saharan African countries). The estimations use panel datasets with varying numbers of countries depending on the subgroup, over the period of 1996-2019. Specifically, the explanatory variables include the PPP-adjusted real GDP per capita, consumption, CPI inflation, financial deepening index, share of urban population, agricultural value-added, investment, and government effectiveness. Data was obtained from *World Economic Outlook*, *World Development Indicators*, *International Financial Statistics*, and *World governance indicators*.

Estimation results for the total tax revenue model are presented in Annex Table 2.2.1, Panel A.[1] Model results are used to compute the tax effort (TE_i), the tax frontier (TF_i) and the tax potential (TP_i) respectively as: $TE_i = \varepsilon_i$, $TF_i = \frac{y_i}{TE_i}$, and $TP_i = TF_i - y_i$. These calculations are shown in Table 2.1.

Spending Efficiency Analysis

The efficiency of public spending is analyzed in three key sectors: education, health, and infrastructure (investment). For the education sector, the outcome indicator combines measures of out-of-school children, mean schooling years, and school enrollment and attainment. For the health sector, the outcome indicator combines measures of life expectancy, infant, child and maternal mortality, and treatment outcomes of tuberculosis, diphtheria and measles. Following IMF (2015),

[1] Results from the three other models are available from the authors upon request.

measures of public investment efficiency include measures of coverage (World Development indicators' measures of access to electricity, water, telecommunications) and a measure of infrastructure quality (from the World Economic Forum). Explanatory variables for each model include public spending, private spending (where data is available), the level of development measured by real GDP per capita, as well as other relevant determinants of the outcome variable. Data are obtained from the *World Economic Outlook*, *World Development Indicators*, *International Financial Statistics*, World Health Organization, and UNICEF.

Estimation results for the Public Investment Spending model are presented in Annex 2. Table 1, Panel B.[2] Model results are used to compute the efficiency of public spending shown in Table 2.

[2] Results from the *Education* and *Health* models are available from the authors upon request.

Annex 2. Table 1. The Gambia: Stochastic Frontier Estimation Results

Panel A: Total Tax Model

	FCS	ECOWAS	LICs	SSA	SSA LICs
GDP per capita	0.037	0.180***	0.063	0.069	0.063
	[0.000]	[0.044]	[0.056]	[0.046]	[0.075]
Inflation, CPI (annual percent change)	-0.000***	-0.004	-0.001	0.000	-0.001
	[0.000]	[0.003]	[0.003]	[0.001]	[0.003]
Imports (percent of GDP)	-0.007***	0.006*	-0.001	0.003	-0.001
	[0.000]	[0.003]	[0.004]	[0.003]	[0.005]
Exports (percent of GDP)	0.012***	-0.003	0.001	0.001	0.002
	[0.000]	[0.004]	[0.005]	[0.002]	[0.006]
Agriculture Value-Added (percent of GD	-0.000***	-0.000	0.002	-0.002	0.001
	[0.000]	[0.003]	[0.004]	[0.004]	[0.004]
Consumption (percent of GDP)	0.003***	-0.007*	0.001	-0.005	0.001
	[0.000]	[0.004]	[0.003]	[0.003]	[0.004]
GFCF (percent of GDP)	0.012***	0.001	0.004	0.001	0.003
	[0.000]	[0.003]	[0.004]	[0.002]	[0.005]
Urban population (percent of total)	0.013***	-0.007	0.016*	0.006	0.012
	[0.000]	[0.008]	[0.008]	[0.006]	[0.009]
Natural resource rents (percent of GDP	-0.003***	0.003	-0.004	0.004	-0.004
	[0.000]	[0.006]	[0.004]	[0.004]	[0.005]
Broad money (percent of GDP)	0.006***	0.008**	0.011***	0.005**	0.012**
	[0.000]	[0.004]	[0.004]	[0.002]	[0.005]
Government effectiveness (score)	-0.019	-0.005	0.041	0.119*	0.046
	[0.000]	[0.073]	[0.120]	[0.066]	[0.142]
Observations	360	273	357	720	314
Number of countries	25	15	21	42	18

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Panel B: Investment Spending Model

	FCS	ECOWAS	LICs	SSA	SSA LICs
Public investment (percent of GDP)	-0.030	0.081**	-0.063***	0.017***	-0.071***
	[0.040]	[0.040]	[0.000]	[0.000]	[0.000]
Private investment (percent of GDP)	0.001	0.006	-0.173***	-0.017***	-0.148***
	[0.044]	[0.066]	[0.000]	[0.000]	[0.000]
Real GDP per capita	0.634***	0.153***	0.185***	0.713***	0.176***
	[0.198]	[0.035]	[0.000]	[0.000]	[0.000]
Business environment index	-0.054	-0.075	-0.281	0.054***	-0.222
	[0.054]	[0.053]	[0.000]	[0.000]	[0.000]
Observations	357	247	389	707	324
Number of countries	24	15	24	44	20

Robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Source: IMF staff estimations

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