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MIND THE RURAL INVESTMENT GAP

Disparities in Access to Basic Infrastructure and Directions for Mozambique's Public Investment Program

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Overview

This report asks three questions about public investment in basic infrastructure in Mozambique: first, it asks whether disparities in access to basic infrastructure between Mozambique's lagging and leading regions are growing or declining? Using data from the *Inquérito sobre Orcamento Familiar (IOF)* household surveys, a physical infrastructure database and other sources such as night-time lights data, the analysis finds that overall, disparities have been growing between rural and urban areas, especially in the rural parts of Mozambique's central and northern provinces. Notably, the results indicate that the two provinces with the highest access levels in 2009 (Maputo and Gaza) improved their access levels further in 2015, thus maintaining their position. Two provinces that were lagging in terms of access in 2009 have caught up to be amongst the leading provinces in 2015 (Inhambane and Manica) whereas four provinces fell back: (Nampula, Sofala, Cabo Delgado and Niassa). Beneath these trends is a mixed performance at the sectoral level, with widespread improvements in households' access to water, electricity and health facilities and a significant deterioration in access to transport and primary schools, especially in rural areas.

Second, it asks whether Mozambique's public investment program can help reduce the growing disparities in access? To answer this question, the report combines two waves of household survey data with detailed data on public investment expenditures to explore the association between public investment, access to public infrastructure and jobs, and whether the strength of this relationship varies between rural and urban areas. It also draws on an economy-wide model to understand the implications of different investment policy scenarios, comparing the outcomes of an urban-centric investment program with one that is more balanced between rural and urban areas, in terms of growth, structural change and welfare. As may be expected, the results point to the important role that public investments play in increasing the population's access to basic infrastructure. Notably, the analysis suggests that public investment budget has a more catalytic role in improving access levels in rural areas. It also suggests that rural investment is complimentary to growth and poverty reduction in urban areas, especially in small towns. Overall, this section points to the importance of avoiding excessive urban bias in public investment to achieve more balanced growth and for poverty reduction.

Lastly, and with this context in mind, the final part of the report asks if the large increases in public expenditure during Mozambique's investment boom years boosted funding to underserved areas: did it seek to address the growing disparities? The results point to a public investment program with significant misallocations and an insufficient focus on areas that are lagging in terms of access to basic infrastructure. Using a detailed database of on-budget spending, the results point to relatively lower investment levels in northern and central zones, especially Nampula, Zambezia and Cabo Delgado, which are amongst the most underserved areas. Capital investment in roads has been skewed towards urban areas, contributing to the declining rates of rural connectivity, whereas the

non-road capital budget was more balanced, potentially reflecting progress in rural water, electricity and health access. Moreover, investment levels have not been able to keep up with population growth, even during the investment boom years. The analysis also notes that a large proportion of the investment budget during the 2009-15 investment boom years was spent on recurrent and administrative expenditures, leaving just 42 percent for capital investment in basic infrastructure. But a look at the investment 'bust' years (from 2016 onwards) suggest an improvement in the composition of the capital budget as administrative expenditures dropped with fiscal consolidation.

The report concludes by providing recommendations to address the growing gaps in access to basic infrastructure as Mozambique prepares for a second investment boom. Revenues from gas production are expected to widen fiscal space significantly, providing considerable resources for Mozambique to invest in its infrastructure and in better opportunities for the population. In this favorable context, reforming the public investment program would place Mozambique in a position to ensure that the population benefits evenly from these resources. Some key recommendations include:

- **Setting specific targets to reach underserved areas in the *Plano Quinquenal do Governo* and the *Plano Economico e Social*.** The analysis presented in this report indicates insufficient progress in channeling resources to underserved areas and calls for a sharper policy focus. For instance, the Plano Quinquenal do Governo, the Government of Mozambique's five-year plan, and the Plano Economico e Social, the annual policy plan underlying the budget, would benefit from explicitly adopting targets that identify underserved areas and whether they are catching-up or falling behind.

- **Updating budget allocation formulas to take access gaps into account and ensuring that the formulas are applied in practice.** The type of analysis presented in the first part of this report, which maps the gaps and measures relative progress, would inform such reforms.

- **Reducing misallocations of investment resources to recurrent or administrative uses through a sound public investment management system.** A public investment management system, that screens proposed investments before funding them and that monitors them subsequently, including for SOEs, will help limit the tendency for administrative spending in Mozambique's investment budget and increase the quality of expenditure. Screening would also limit slippages from the recurrent budget to public investment program.

- **Strengthening municipal revenue mobilization to fund urban investment and free-up resources for rural areas.** Revenue mobilization by most municipalities is far below potential as these urban authorities continue to rely on central government transfers

to fund both their overheads and investments. Improving revenue mobilization by urban authorities would help finance the needed investments for smooth progress in urbanization and free-up much needed resources for investing in rural areas.

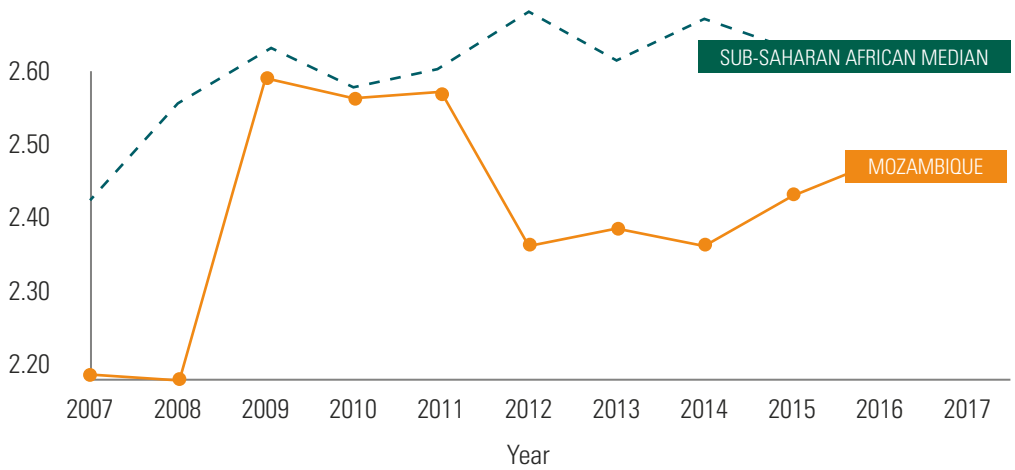
- **Rebuilding fiscal buffers to provide a more stable financing context for public investment.** Although the investment bust years between 2016-2017 came with the silver lining of lower misallocations in the capital budget, the cuts have been a source of major disruption to the rest of the capital budget, significantly lowering funding for ongoing and new infrastructure projects. Therefore, given the tendency of using the investment budget as the buffer in times of fiscal distress, rebuilding fiscal buffers would support a more stable financing context.

- **Lastly, adopting a national action plan for increasing access to basic infrastructure that is overseen at a high level would provide momentum and coordination to these efforts.** In particular, a clearly targeted action plan that is monitored at a high level would improve coordination, an element of particular importance given the sizable share of off-budget investments in infrastructure and the variety of players involved.

I
What is the State of Access to Basic Infrastructure?

Mozambique is a country with large infrastructure gaps. Years of conflict before peace was widely established in the early 90s left Mozambique with a low stock of physical capital and low rates of access to basic infrastructure and services across the country. As Mozambique set out to recover and to build its economy, its infrastructure and institutions, significant progress was made from a very low base. Yet, the infrastructure gap remains large and demands from a growing population and elevated exposure to natural disasters increase the magnitude of the challenge. Today, Mozambique ranks below regional peers on access and quality of infrastructure measures (Figure 1). Given this context, narrowing the infrastructure gap has been identified as a policy priority by the Government of Mozambique.[1]

Figure 1 Quality of infrastructure; 2017



Source: World Economic Forum Global Competitiveness Index

In this first section of the report, we discuss the extent of progress in increasing access to basic infrastructure for access to services between 2008 and 2015, based on the most recent data available. This is a period when Mozambique experienced a public investment acceleration, providing an important opportunity for progress. It is also a period when Mozambique achieved strong growth and a faster rate of poverty reduction as job opportunities grew, but during which inequality levels increased, especially between urban and rural areas. Poor households' lack of access to critical infrastructure and services is an important contributing factor to higher inequality and is a trend that limits the opportunities of the poor to improve their living standards.[2]

The evidence shows progress at an uneven pace, leading to reduced access in rural areas, especially in central and northern regions, and mixed progress at the sectoral level. Using

data from the *Inquérito sobre Orcamento Familiar (IOF)* household surveys, a physical infrastructure database[3] and other sources such as night-time lights data, this section of the report shows levels of access to basic infrastructure, namely water, electricity, roads, markets, primary schools and health facilities at provincial and district levels. The results show significant regional disparities in access and mark out the rural parts of Mozambique's central and northern regions as the areas with lowest levels of coverage. Notably, the results indicate that the two top leading provinces (Maputo and Gaza) improved their access levels further, thus maintaining their position. Two provinces that were lagging in terms of access in 2009 have caught up to be amongst the leading provinces in 2015 (Inhambane and Manica) whereas four provinces fell back: (Nampula, Sofala, Cabo Delgado and Niassa). Beneath these trends is a mixed performance at the sectoral level, with widespread improvements in households' access to water, electricity and health facilities, a significant deterioration in access to transport and a moderate deterioration in access to primary schools, especially in rural areas.

1.1 Access to basic infrastructure at the provincial level

We draw on data from Mozambique's IOF household surveys, to measure the levels of access to a set of basic infrastructures at the province level: water, electricity, transport,[4] markets, primary schools and health facilities. The survey provides the most recent nationally representative information about household access to basic infrastructure in rural and urban areas. Table 1 below shows how access to these basic infrastructures has evolved between 2009 and 2015.

Table 1 Access to Basic Infrastructure Indicators at the Household (HH) Level

Access Indicators (IOF)	2009	2015	Average Change	
Distance to transport				
(Average HH distance by foot in minutes)	24	71		
Rural	28	92	↑64 minutes	Deterioration
Urban	19	26	↑7 minutes	Deterioration
Distance to market				
(Average HH distance by foot in minutes)	24	67		
Rural	27	85	↑58 minutes	Deterioration
Urban	18	27	↑9 minutes	Deterioration
Distance to primary school				
(Average HH distance by foot in minutes)	22	36		
Rural	24	43	↑19 minutes	Deterioration
Urban	18	21	↑3 minutes	-

Access Indicators (IOF)	2009	2015	Average Change	
Distance to clinic				
(Average HH distance by foot in minutes)	35	32		
Rural	39	33	↑-6 minutes	Improvement
Urban	30	31	↓1 minute	-
Access to electricity				
(% of HH with access to electricity)	15	27		
Rural	1	7	↑6 percent	Improvement
Urban	47	72	↑25 percent	Improvement
Access to clean water				
(% of HH with water piped in-house, yard or water fountain)	20	26		
Rural	5	12	↑7 percent	Improvement
Urban	57	56	↓-1 percent	-

Source: Staff estimates based on IOF.

Leading and lagging areas.

Comparing progress at the provincial level reveals Maputo and Gaza as leading areas and Zambezia, Nampula and Tete as lagging and failing to catch-up. How do Mozambique's provinces fare in comparison with each other? A simple access to basic infrastructure index is constructed to provide a snapshot of progress by province across the various sectoral dimensions. The index is constructed using a ranking approach. It can be interpreted as showing the average rank of the province in access to basic infrastructure, across the multiple dimensions, relative to others, allowing comparison to identify leading and lagging areas in a given period (see Box 1 for more detail about the index). Figure 2 summarizes these results. There has been limited movement at the top and the bottom of the index. The two leading provinces in terms of access to basic infrastructure (Maputo and Gaza) maintained their position and further improved access levels compared to 2009. Similarly, the two most lagging provinces in 2009 (Tete and Zambezia) remained at the bottom in 2015. However, some areas caught up whilst others fell behind. Inhambane and Manica, which were lagging provinces in 2009 caught up to be amongst the leading in 2015, whereas four provinces dropped in the index: Nampula, Sofala, Cabo Delgado and Niassa. These four provinces, along with Zambezia (the most lagging province) have the highest percentages of the population below the poverty line in the country (Figure 3).

Leading and lagging sectors.

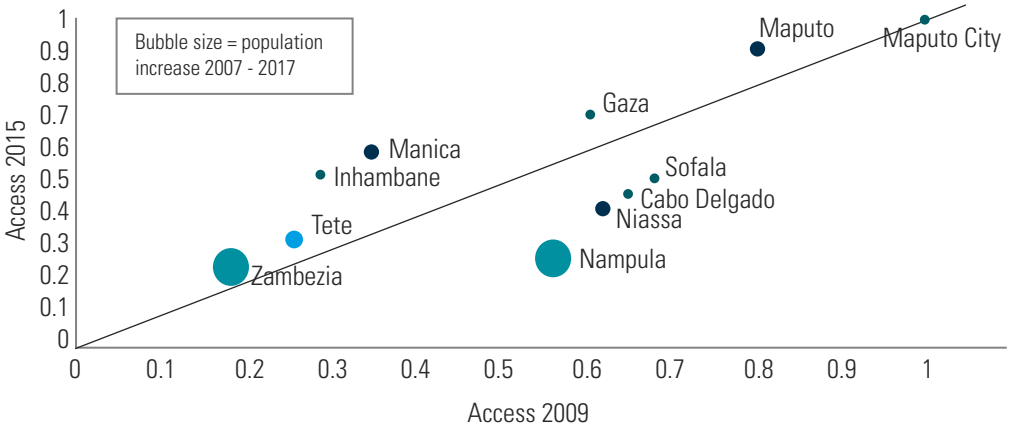
The data shows divergence in sectoral performance between 2009 and 2015, with widespread improvements in households' access to water, electricity and health facilities.

Access to electricity and water, which at 27 and 26 percent of households on average remains low, has increased in all provinces, including in rural areas. Similarly, access to health infrastructure, as measured by the distance of households to the nearest clinic, increased at the national level and is the only indicator to show faster progress at the rural level than in urban areas. In these three sectors, even though access levels remain low overall (especially electricity where only 27 percent of households had access), investment has helped to improve the supply of infrastructure in most areas.

In contrast, access to transport, markets and primary schools declined on average. The deterioration in access to transport between 2009 and 2015 is particularly notable. This indicator, which is a proxy for access to roads, shows the largest deterioration as distance transport tripled. This is largely a rural phenomenon. Average distance to transport in urban areas increased slightly from 19 to 26 minutes, whereas in rural areas, it increased from 28 to 92 minutes. Similar trends are observed for the access to market indicators.

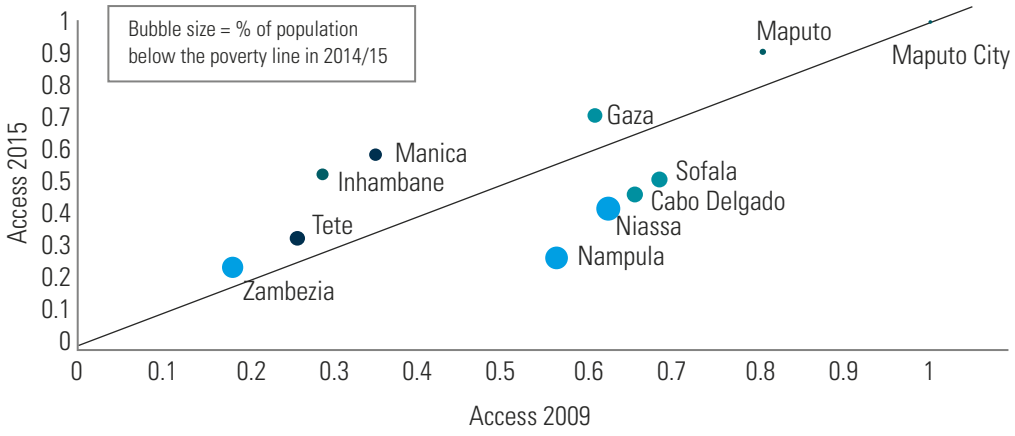
The indicators show a widening gap between rural and urban areas across all sectors with the exception of health and water. Disaggregating the indicators between rural and urban areas shows that most of the deterioration in access observed in the underperforming sectors (transport, markets and schools) occurred in the rural parts of Mozambique (Table 1). These trends suggest a significant deterioration in rural connectivity and rural access to markets since 2009. Distances to the nearest primary school also increased in rural areas from 24 to 43 minutes on average (the increase is highest in Nampula and Sofala), whilst urban access remained relatively stable (a 3 minute increase).[5] As for electricity, access in rural zones increased slightly (from 1 to 7 percent) but remains very low. In contrast, health and water have been able to narrow the gap, with health having almost eliminated it altogether: average distance to the nearest clinic is around 30 minutes in both rural and urban areas.

Figure 2 Access to basic infrastructure and population growth



Source: Staff estimates based on Census data.

Figure 3 Access to basic infrastructure and poverty reduction



Source: Staff estimates based on IOF.

Box 1 The access to basic infrastructure index

In order to portray progress in access to basic infrastructure across the various dimensions, an index is computed that aggregates information from the IOF sectoral indicators, based on equal weights.

Using the sectoral indicators, the provinces can be ranked in terms of their relative performance. Suppose $x(m,n)$ is sectoral indicator m for province n with a total of M indicators and N provinces.

A provincial ranking is established for each indicator: each indicator is ranked over the N provinces to provide:

$$r(m,n) = rank[x(m,n)]$$

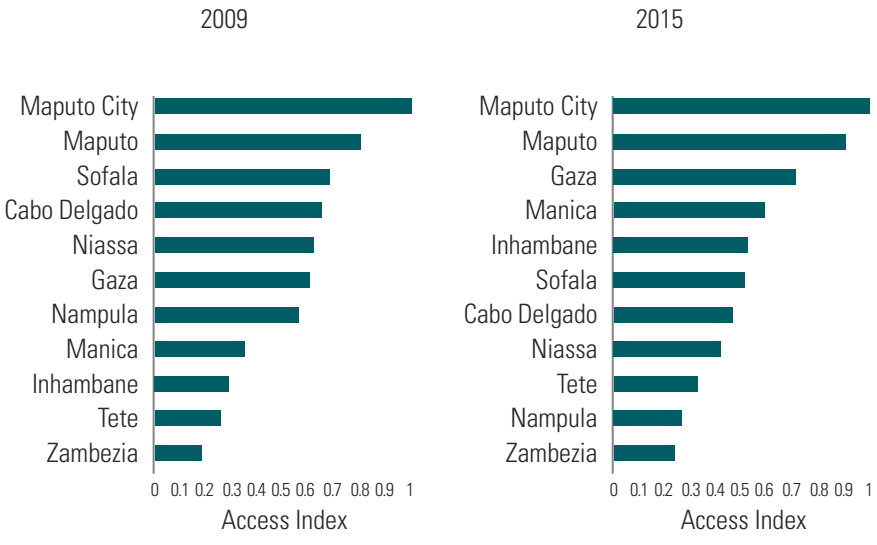
which takes the value 1 for the lowest performance and N for the highest performance. The sectoral rankings are averaged to establish an aggregate index. As such, the index for province n is defined as:

$$I(n) = (1/(NM)) \Sigma_m r(m,n).$$

With this ranking based approach, the index can be interpreted as showing the position of each province in relative terms in a given period. It shows the average rank of the province relative to others, with the maximum value (or the performance frontier) being the position of the best performing province. This approach allows us to compare Mozambique's provinces to identify

leading and lagging areas across multiple dimensions in a given period (year). It does not allow for the comparison of progress against a non-observed frontier, e.g. a minimum expected level of access above that which has been attained by the best performing province.

Figure 4 Access index 2009 and 2015



1.2 Access to basic infrastructure at the district level

What is the level of within-province variation in basic infrastructure coverage and where are the main district level gaps? The *IOF* survey data provided useful information about trends in access to basic infrastructure in rural vs. urban areas in aggregate terms and at the provincial level but offers less information about district level variation. To answer these questions, the analysis compiles district level indicators of basic infrastructure coverage using data on education and road infrastructure from the World Bank infrastructure database and information about electricity access from the night time lights database.[6] This information is combined to provide a measure of "investment intensity" at the district level, composed of the per capita value of education facilities, night-time light stock per capita and the value of road stock per area (km2). In order to permit comparisons between districts, the same index methodology described in Box 1 was applied. The results are presented in Figure 5 and Figure 6.

Figure 5 **Rural/ urban district access ranking by district (2015)**

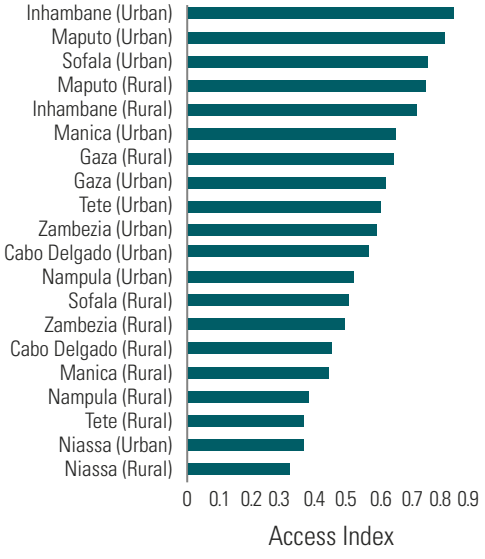
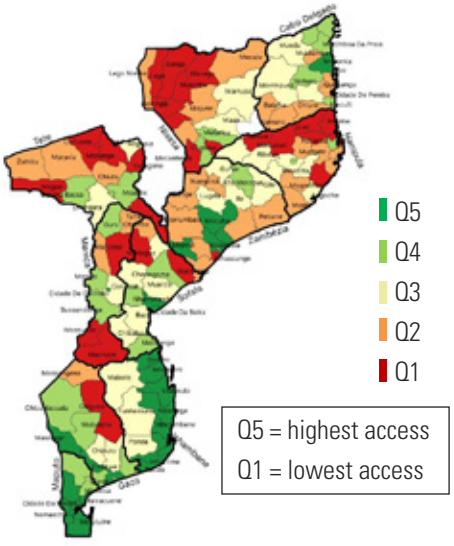


Figure 6 **Basic infrastructure access index by district (2015)**



Source: Staff estimates based on World Bank Infrastructure database.

The results are broadly comparable to the provincial level estimates generated using the *IOF* survey data, with higher levels of basic infrastructure coverage in southern provinces compared to northern and central zones. Interestingly, Figure 5 which shows the ranking when provinces are split by their rural and urban districts, shows how the rural parts of the leading provinces (Maputo, Gaza and Inhambane) have coverage levels above the urban zones of lagging districts such as Niassa, Nampula and Cabo Delgado. Figure 6 shows significant within province variation that makes this a useful approach to identify those with the largest investment gaps.

Measuring the extent of basic infrastructure coverage at the sub-national level in this way can improve the targeting and prioritization of public investment expenditures, including donor funds. Information about existing gaps in coverage and progress (or declines) in access to basic infrastructure is an essential part of a well-planned public investment program. For example, Table 2 below shows the 20 districts with the lowest levels of basic infrastructure coverage along with the respective population size. It is also necessary from an equity perspective, to ensure that some communities are not left behind with diminished opportunities, further deepening income inequalities. This analysis can provide a starting point and be supplemented with additional data and analytics to widen the coverage of the index and to disaggregate the information to provide sector level indicators given the heterogeneity in sectoral performance. See Annex one of this report for examples of sector specific spatial graphics that could support monitoring and investment policy.

Table 2 Twenty districts with the lowest basic infrastructure coverage; 2015 (ranked by population)

Province	District	Access Index	Population	Population Density
Tete	Mutarara	0.27	348,434	55.4
Nampula	Memba	0.21	329,876	52.7
Nampula	Erati	0.26	322,737	56.5
Niassa	Mecanhelas	0.08	313,154	63.1
Manica	Mossurize	0.22	301,575	59.7
Tete	Macanga	0.18	241,587	33.4
Niassa	Cidade De Lichinga	0.28	215,944	829.9
Nampula	Mecuburi	0.21	208,892	28.9
Tete	Chifunde	0.12	194,236	20.6
Sofala	Marromeu	0.28	184,797	32.2
Nampula	Nacaroa	0.23	142,263	52.2
Niassa	Lago	0.16	122,186	18.6
Niassa	Ngauma	0.27	115,901	38.3
Sofala	Maringue	0.25	101,543	16.4
Zambezia	Inhassunge	0.28	97,165	134.2
Manica	Macossa	0.26	52,287	5.5
Niassa	Muembe	0.26	43,203	7.4
Niassa	Nipepe	0.07	36,965	7.4
Niassa	Mavago	0.23	33,117	3.6
Gaza	Chigubo	0.16	32,372	2.1
			3,438,233	33.5*

Source: Staff estimates based on World Bank Infrastructure database.

** National average population density*

This section of the report has shown emerging dichotomies in access to basic infrastructure between leading and lagging regions. As Mozambique advanced in developing its infrastructure and ensuring the population's growing access to it, important disparities have emerged between southern Mozambique and the rest of the country, and in particular the rural zones. Given the extent of poverty in Mozambique's rural population especially in northern and central zones, low access to basic infrastructure contributes to Mozambique's growing levels of income disparity and the inequalities in opportunity faced by the poorest households.[7] A number of factors can affect the rate of progress in reducing access gaps such as the initial conditions in the area, the rate of population growth and exposure to damage from floods and severe storms. But the main instrument in hand for policy makers in tackling these issues is the public investment system and the levels of investment it provides to underserved areas. Can Mozambique's public investment program be an effective tool in reversing this trend? The following section of this report addresses this question.

II
Can Mozambique Address Disparities in Access to Basic Infrastructure Through its Public Investment Program?

The previous section of this report highlighted growing gaps in access to basic infrastructure for service delivery. It assessed how levels of access evolved across Mozambique in recent years and identified some pockets of progress, such as the increasing levels of access to health facilities. However, overall, it highlighted low levels of access to basic infrastructure and a growing divergence between rural and urban areas. It also noted a significant gap between the southern zone, and areas in the central and northern parts of the country.

With this context in mind, this section of the report assesses the potential of public investment as an instrument for raising access to services and jobs, and for rebalancing outcomes between rural and urban areas. First, we explore the extent of the association between public investment, access to public infrastructure and jobs, and whether the strength of this relationship varies between rural and urban areas. To do this, we match two waves of household survey data with detailed data on public investment expenditures to estimate a fixed effects model at the district level. We also estimate whether interactions between different investments (i.e. having access to more than one type of infrastructure) are associated with higher welfare outcomes. Second, we draw on the results of recent study by Dorosh et al (2016) prepared as a background report for the 2017 World Bank Mozambique Urbanization Review,[8] which presents findings from an economy-wide model to understand the implications of different investment policy scenarios. It compares the outcomes an urban-centric investment program with one that is more balanced between rural and urban areas, in terms of growth, structural change and welfare.

The results show how getting public investment to rural areas and maintaining a balanced rural/urban investment mix can help address the growing disparities. As may be expected, the results point to the important role that public investments play in increasing the population's access to basic infrastructure. Notably, the analysis suggests that the public investment budget has a more catalytic role in improving access levels in rural areas. It also suggests that rural investment is complimentary to growth and poverty reduction in urban areas, especially in small towns. Overall, this section points to the importance of the right rural/ urban investment mix in rebalancing outcomes in Mozambique and in influencing both the spatial pattern of growth and the pace of structural change.

2.1 Public investment and access to basic infrastructure and jobs[9]

The analysis in this section explores the relationship between public investment expenditure, access to basic infrastructure and jobs in rural and urban areas. We measure how within-district changes in investment expenditure affect within-district changes in access to basic infrastructure and jobs using a district level fixed effects model. This also allows for the differentiation of the results by rural and urban areas. The estimates are thus akin to a difference-in-differences estimate (Box 2 provides more detail). Two types of expenditures are considered: investment spending on basic infrastructure and spending on roads only,

given the importance of roads in Mozambique's investment budget and the extent of the deterioration in access to transport noted in the previous section.

The analysis draws on detailed public expenditure data and household level information from the *Inquérito sobre Orcamento Familiar* (IOF). Data on public investment from 2009 onwards is sourced from the Mozambique BOOST, a highly detailed database of on-budget expenditure.[10] Two expenditure categories are used in the analysis: (1) economic investments covering a range of multi-sector investments; and (2) road investments. The database contains detailed expenditure information but is only partially disaggregated at the sub-national level. To obtain district level estimates of investment expenditure on roads, we use data from the Roads Fund, a public agency executing major road investments to obtain information on the sub-national distribution of investment. Similarly, non-road investment is disaggregated to the provincial level using the size of the public administration (measured by the size of the civil service workforce) as a proxy for investment expenditure at the provincial, then further disaggregated at the district level based on population shares. In the absence of a more accurate measure of district level investment spending, this approach was adopted considering the expected close link between spending on schools, health facilities and other infrastructures and the number of civil servants (e.g. teachers and health workers) in a district. The data on outcomes such as consumption expenditure, poverty, and employment are obtained from the from 2008/09 and 2014/15 IOF surveys.[11] We also use the information the survey provides on distance to schools, clinics, water, transport,[12] and markets to measure access to these public basic infrastructures. The results are presented in annex two.

Box 2 District level fixed effects model specifications

To explore the association between public investment and access to public goods, the following regression is estimated:

$$Y_{hdt} = \gamma I_{dt} + \alpha_d + \lambda_t + \varepsilon_{hdt}$$

where Y_{hdt} stands for the average reported time to transportation, markets, water, schools and clinics in hours by household h in district d and in year t, γI_{dt} is the estimated spending on economic investments. α_d and λ_t are district and year fixed effects and ε_{hdt} the error term which is clustered by district. Importantly, the two time periods allow the inclusion district fixed effects and estimation of how within-district changes in road expenditure affect within-district changes in access to transport. The estimate is thus akin to a difference-in-differences estimate.[1] The same regression is estimated to explore the association between roads expenditure and access to transport.

To understand the relationship between public investment and job creation across regions and sectors (public, private, informal) the following specification for economic investments and roads are estimated separately:

$$Y^s_{dt} = \gamma I^s_{dt} + \alpha^s_d + \lambda^s_t + \varepsilon^s_{dt}$$

where Y^s_{dt} is the number of jobs in district d and in year t in sector s (public, private, informal); α_d is a district fixed effect; λ_d is a year fixed effect and ε_{hdt} is the error term which is clustered by district. γI_{dt} is public investment and captures the relationship of interest.

To explore how different types of infrastructure spending interact with each other in affecting consumption and poverty, the main specification is re-estimated by sequentially introducing dummies for other public goods into the last specification and allowing for interactions with access to transportation.

The results confirm that investment spending in general, and road construction in particular, are negatively associated with the time a household needs to access public services, especially in rural areas. The results suggest that a MZN 1 billion (around 32 million $US in 2014) increase in investment is associated with a 2 minute decrease in the time it takes an individual to access key infrastructures on average. The association is stronger in rural areas, where the increase is linked to a 7 minute drop in time needed to reach public services compared with less than 1 minutes in urban areas. Similarly, a MZN 1 billion increase in roads expenditure decreases the time to reach transportation by 9 minutes. Here again, when we look at urban and rural areas separately, we find no significant effect in urban areas, whereas in rural districts, an increase in public spending by 1 billion MZN decreases the time to transportation by as much as 25 minutes. These results point to "more bang for the buck" for investment in rural areas when it comes to increasing access. Mozambique's rural areas tend to have a lower density of infrastructure compared to urban areas, where distances to basic infrastructure tend to be less of a concern than the needs for density, maintenance and quality of infrastructure. In contrast, infrastructures such as roads and school buildings are missing or distant in many rural areas, making investment important for raising the levels of access (i.e. reducing distances) to these infrastructures.[13]

Public investment is also found to be associated with increased job creation, predominantly with the creation of private and informal jobs in rural areas. In particular, increasing public spending by 1 billion MZN (around 32 million $US in 2014) is associated with the creation of around 1500 jobs in the private sector across all areas.[14] The results suggest

that this relationship is larger in rural regions where around 2000 private jobs are created and additionally 14 thousand jobs are created in the informal sector. Wages remains unaffected across districts, which suggests a horizontal supply curve, driven by high unemployment. Some of the jobs created could be linked directly to the works associated with the investment itself, but the jobs are also likely to be created as infrastructure development supports growth local economic activity.

The analysis also shows complementarity effects, whereby access to more than one service is linked to even better outcomes. To explore how different types of infrastructure spending interact with each other in affecting consumption and poverty, we estimate the model allowing for interactions with access to transportation. The results suggest that access to electricity, water, a primary school, a market and a hospital all have complementary effects to transport access in increasing consumption (annex two). We find similar results on poverty reduction, except that there does seem to be a significant interaction between primary school and road infrastructure in this case. The results are consistent with significant complementarities from having access to a variety of public goods. This type of analysis could be expanded further to inform investment sequencing and clustering decisions.

2.2 The rural/ urban investment mix

Mozambique's urban areas have been a major source of economic growth, and recently, have seen a faster rate of population growth. 51 percent of Mozambique's growth over the past ten years has been generated in cities.[15] At the same time, the urban population growth rate has been rising, increasing from 3.3 between 1997-2007 to 3.9 between 2007-2017. These trends point to growing needs for investment in urban areas to keep up with the population's demands and to support their role as growth centers. The size of the rural population has been growing, but at the slower pace of 2.3 between 2007-2017, but given that two thirds of the population resides in rural areas, this is the area where the population increased most in absolute terms.

What is the appropriate investment scenario given the growth context and evolving population needs? To explore this question, we draw on a recent study by Dorosh et al.[16] that discusses the potential tradeoffs and outcomes of spatial investment scenarios using an economy-wide model (see Box 3). The model compares three investment and urbanization scenarios against a baseline representing the status-quo. The first scenario "faster urbanization" explores the implications of more rapid growth in the urban population (cities and towns), mainly through the migration of labor from rural to urban areas, with no change in urban-rural public investment shares. The second scenario "urban investment scenario" pairs faster urban population growth with increased investment in urban areas, financed by a reduction in rural investment levels. The third scenario, termed the "win-win scenario", shows the implications of faster urbanization but with both an

increase in urban and rural investment levels, financed by an increase in urban taxation. This third scenario leverages growth in urban areas and redistributes to rural areas (see Annex three for the results tables).

Box 3 The economy-wide model

The economy wide model discussed in this section of the report is a "computable general equilibrium" (CGE) model, which captures the workings of the economy and the linkages between households, producers, government and the rest of the world to estimate the potential impact of policy changes, investments or domestic and external events (Dorosh et al, 2016). It draws on a 2012 social accounting matrix (SAM) for Mozambique, a consistent framework that captures the flow of transactions that takes place in the economy, which has spatially disaggregated across cities, towns and rural areas (Thurlow and Seventer, 2016).

[1]Thurlow, J. and D.E. Van Seventer. 2016. A social Accounting Matrix for Mozambique: A Nexus Project SAM. Washington DC, USA: IFPRI.
[2]Dorosh, P. et al. 2016. Urbanization, Rural-Urban K=Linkages, and Economic Development in Mozambique. Background paper for the World Bank Mozambique Urbanization Review. Washington DC, USA: IFPRI.

In the first scenario, the model shows adverse effects from faster urbanization without higher urban investment levels. Faster urbanization accelerates structural transition from agriculture to trade and services. Manufacturing and construction jobs are also created in response to increased urban demand for goods and housing, but to a smaller extent. Urban growth also accelerates, but at the cost of rural growth. This is because reduced supply of labor in rural areas decreases rural growth rates and overrides increased demand for agricultural output from a growing urban population.[17] It also has a negative effect on agro-processing industries, which suffer from reduced agricultural growth. However, unless urban investment levels are raised, urban growth also fails to keep pace with urban population growth, causing welfare levels to drop in cities and towns.

The second scenario indicates that dealing with faster urbanization by redirecting public investment from rural areas, to maintain urban per capita investment levels penalizes welfare in rural areas and amongst the urban poor. Such a policy would raise urban GDP and welfare growth levels when compared to the faster urbanization scenario. It also yields faster growth in industry and services, thus accelerating structural change. But these effects come with an important trade off through slower growth in the rural economy and in rural welfare levels. This scenario also leads to worse outcomes for the urban poor. This

is because weaker agricultural growth leads to higher food prices and impacts the urban poor, for whom food purchases are the largest share in the consumption basket. Overall, the results of this scenario warn against an urban-centered investment program, even in the context of more rapid urbanization, given the potential for adverse effects on the rural economy and the urban poor.

The third scenario shows that leveraging urban growth to invest in rural areas can be advantageous to both rural and urban areas. Given the adverse effects of an urban-centric investment program on rural growth, the model evaluates the implications of a higher volume of investment overall, to allow for higher rural investment levels whilst also raising urban investment. The increase in public investment is financed by higher taxation in cities. This scenario leverages growth in urban areas to finance rural investment needs and support a more balanced investment portfolio. This approach results in the same increase in national GDP growth as the urban investment scenario, whilst also providing more rapid agricultural growth. In fact, it is the only scenario that offers faster agricultural growth relative to the status-quo. Agriculture's linkages to manufacturing (mainly agro-processing) and services promote structural change, and its spatial linkages promote faster growth in towns. Cities also grow faster than the baseline, albeit at a slower rate than the urban-centric investment scenario. In terms of welfare, whilst all groups (poor and non-poor in rural and urban areas) experience welfare growth, welfare growth of the rural population and the town-based poor exceeds the urban-centric scenario, whereas urban populations achieve slightly lower gains.

This analysis highlights the need for public investment to keep up with demographic shifts, but equally as important is avoiding investment in urban areas at the expense of rural. As Mozambique grows and begins to become more urbanized, getting public investment right will entail adapting to a changing landscape. An important insight from the economy wide model is that keeping up with the demands of growing urban centers should not come at the expense of rural areas if Mozambique is to provide better living conditions for the poor. Public investment could create a "win-win" scenario if urban growth could be leveraged through taxation to meet demand for urban infrastructure, thus freeing up resources ensuring healthy rural investment levels. Urban areas may also have more potential in deploying private investment to finance infrastructure through public-private partnerships. Another important insight from this exercise is that weak growth outcomes in rural areas can be adverse for the growth trajectory of towns and cities, particular the poor amongst those populations, given the important rural/urban linkages.

This section of the report draws on micro and macro-economic analyses to discuss the role of public investment in reversing the emerging gaps in access to basic infrastructure. Findings at the household level show that where there has been investment, access to basic infrastructure and jobs has increased, and that this was even more so in rural areas. To

compliment the micro analysis, findings from an economy wide model provide important insights as to the rural/urban investment mix. It points to the deficiencies of an urban-centric public investment program and demonstrates the positive implications of meeting urban investment needs whilst also maintaining rural investment levels, not only for raising welfare amongst the poorest parts of the population, but also for growth and welfare of the poor in small towns. Has Mozambique public investment program been cognizant of the growing disparities in access and its potential role in narrowing the gaps? Has it been urban-centric or balanced? The following section of the report considers these questions.

III
Has Mozambique's Public Investment Program Been Cognizant of the Growing Disparities in Access?

In this section, we ask if Mozambique has been implementing a public investment program that balances rural/ urban investment needs and that boosts funding to underserved areas. The first part of this report showed a widening gap in access to basic infrastructure, mainly between urban areas and the rural parts of Mozambique, especially in central and northern provinces. The second section presented evidence that points to the important role that public investment can play in rebalancing these emerging inequalities. With this context in mind, this final section of the report asks whether public investment policy has been fit for this purpose.

This part of the report unpacks Mozambique's public investment budget to provide a better understanding of how public investment resources were used, and whether increases in public expenditure boosted funding to underserved areas.[18] Although the contours of Mozambique's private investment boom are relatively well known, the contents and nature of the public investment program are less well understood. Limited data and analysis have hampered understanding of how these resources are allocated. Using BOOST, a detailed database of on-budget spending over this period, the analysis outlines how the resources were used, including effective sectoral priorities and the extent to which the investment budget is executed at the sub-national level. Additional data from state-owned enterprises' accounts was analyzed to provide a broad estimate of the share capital investment delivered off-budget. This section of the report also provides an overview of the 2016 and 2017 investment "bust" years, during which investment levels were halved as part of a fiscal consolidation program. It then discusses whether investment growth helped increase funding to areas with relatively low levels of access to basic infrastructure, and whether the underlying investment allocation systems work well, before concluding with key recommendations.

The results point to a public investment program with significant misallocations and insufficient focus on areas that are lagging in terms of access to basic infrastructure. In outlining the contents of the public investment program, the first part of this report notes that a large proportion of the investment budget during the 2009-15 investment boom years was spent on recurrent and administrative expenditures, leaving just 42 percent for capital investment in basic infrastructure. But a look at the investment 'bust' years (from 2016 onwards) suggest an improvement in the composition in the capital budget as administrative expenditures dropped with fiscal consolidation. The results also suggest insufficient progress in channeling resources to areas lagging in access to basic infrastructure. The results help explain some of the shifts observed in the access to basic infrastructure index discussed in the first part of this report: higher spending levels in the southern provinces which attained the highest access levels, especially Inhambane and Manica which caught-up, and lower allocations to lagging central and northern provinces. In terms of the rural/ urban mix, road investments had an urban-centric tendency, contributing to the decreased levels of rural connectivity, whereas non-road investment

was more likely to be higher in rural areas. Lastly the results suggest that investment levels do not tend to keep up with population growth, even during the investment boom years.

Box 4 The BOOST Public Expenditure Database

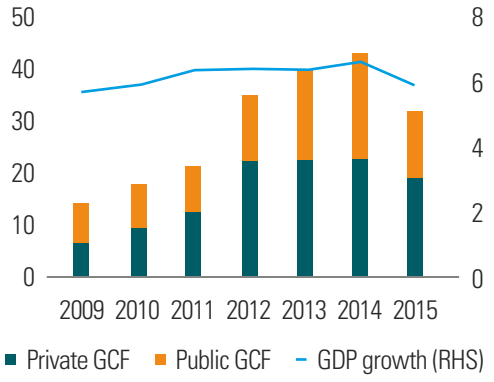
BOOST is a database tool with detailed information on public expenditure based on data from *e-Sistafe:* Mozambique's public finance information management system. The tool, now used by 40 countries, was launched by World Bank in 2010 with the aim of increasing transparency, accountability and capacity to assess expenditure efficiency.

The database contains detailed spending data of all the sectors, spending units, programs, types of spending and sources of funding recorded in *e-Sistafe* between 2009 and 2017. It provides granularity on the planned and executed public expenditure flows at the central government level but given that roll-out of *e-Sistafe* is incomplete at the sub-national level (and to parastatals) information on certain categories of expenditure such as district level spending and transfers is only provided at an aggregate level.

3.1 Public investment during the investment boom years: 2009–2015

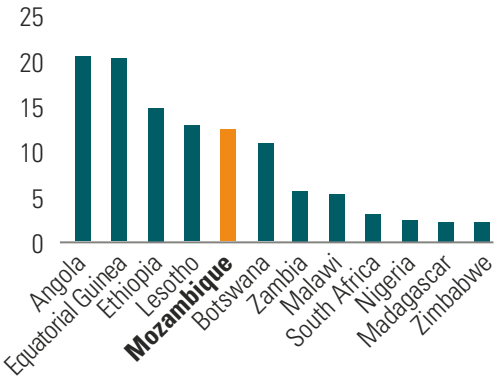
Mozambique experienced an investment acceleration between 2009 and 2015 driven by both private and public investment booms. Gross fixed capital formation averaged around 30 percent of GDP over this period, peaking between 2012 and 2014. This acceleration allowed Mozambique's investment rates to surpass the average for the region (21 percent of GDP) and for oil exporting African countries (22 percent of GDP) and supported the strong economic growth rates achieved at the time. Private investment accounted for approx. 59 percent of capital formation, with a concentration in two sectors, extractives and public infrastructure.[19] Public investment also boomed over this period, representing 41 percent of capital formation (Figure 7).

Figure 7 Gross fixed capital formation (private; public including SOEs) and GDP growth (black line)



Source: Authors' calculation base on BOOST

Figure 8 Mozambique's public investment in comparison (average 2009 – 2015; % GDP)

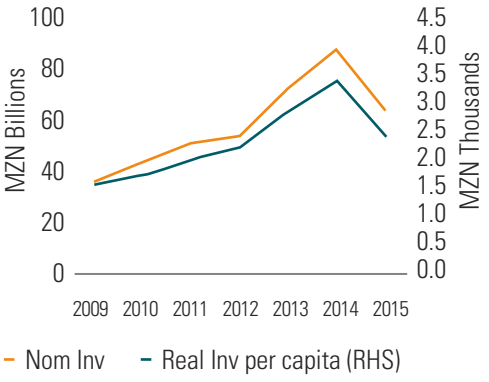


Source: IMF Fiscal Affairs Department: Investment and capital stock database

At 13 percent of GDP on average, Mozambique had one of the highest public investment levels in Africa between 2009 and 2015.[20]

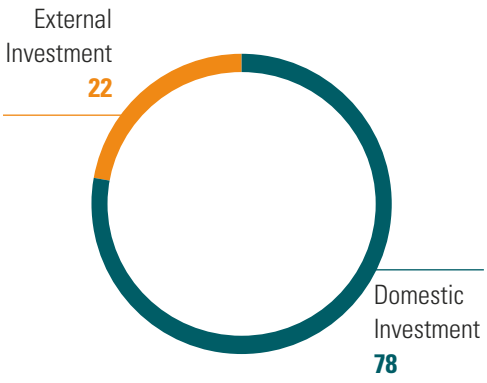
At an average of 13 percent of GDP, Mozambique sustained a high level of on-budget public investment relative to its peers between 2009 and 2015 (Figure 8). Investment picked up pace, rising steadily to peak at 16 percent of GDP in 2014 (42 percent of total expenditure), placing Mozambique as one of the African economies with the highest rates of public investment, before slowing from 2015 onwards (Figure 9).[21] An increase in both government and donor flows pushed investment up to this level. Although donor funded capital projects were significant (covering 51 percent of the investment budget between 2009 and 2015), the government's own resources (including budget support) were the main source of growth (explaining 78 percent of the investment growth), indicating a policy stance in favor of increased public investment (Figure 10). The composition of domestically and donor financed investments is similar in terms of sectoral allocation, but external funded component has tended to have a higher recurrent share (Figure 11 and Figure 12).

Figure 9 On-budget public investment per capita nominal & real



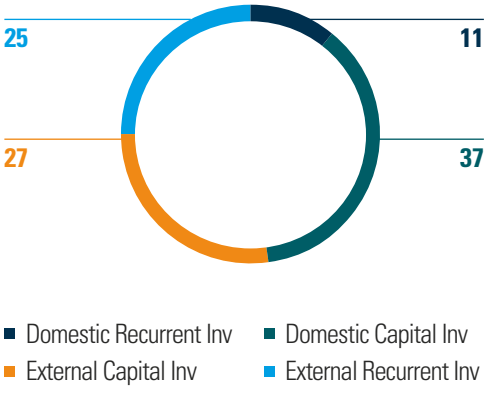
Source: Authors' calculation based on BOOST, INE

Figure 10 Drivers of public investment growth (contributions to growth in %; 2009 -2015)



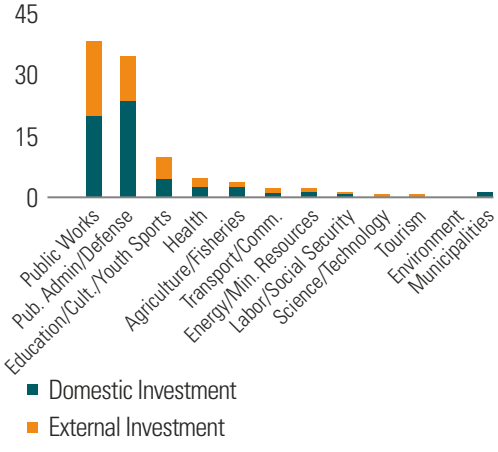
Source: Author's calculation based on BOOST

Figure 11 Composition of investment budget; 2009-15 by source of funding and recurrent/ capital split



Source: WB staff calculations based on BOOST

Figure 12 Composition of investment budget; 2009-15 by source of funding and sector

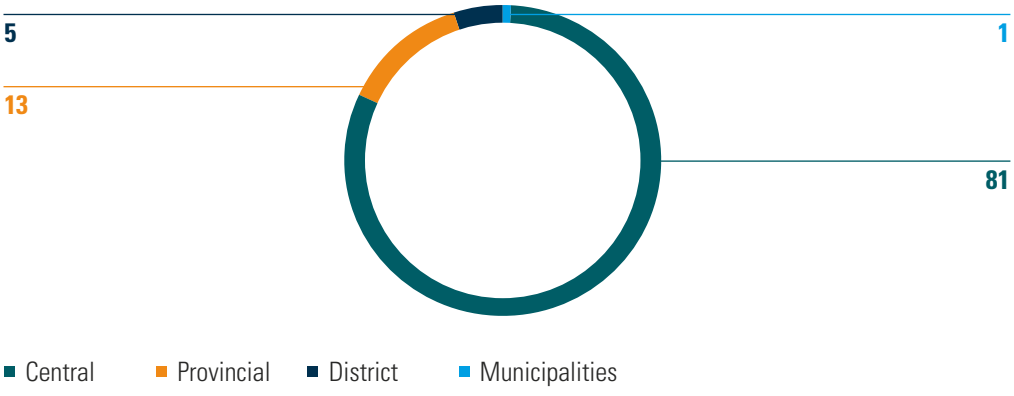


80 percent of on-budget investment is executed by central government.

Mozambique's investment budget is concentrated at the central level of government; local authorities executed only a fifth of the total capital budget. Approximately 81 percent of capital investment between 2009 and 2015 has been executed at the central level, 13 percent at the provincial level and 6 percent by districts and municipalities (Figure 13). The provincial budget share tends to be higher in areas with a higher urban population.

These sub-national investment programs focus on education (32 percent), small scale public works (10 percent), health (8 percent) and public administration (35 percent).

Figure 13 Investment expenditure by government level; 2009-15



Source: WB staff calculations based on BOOST

Only 42 percent of the investment budget went to capital expenditure on basic infrastructure for service delivery.

Approximately one third of the investment budget was used for recurrent spending between 2009 and 2015. This includes spending on personnel and non-durable goods and services (Figure 14). As such, only 64 percent of the investment budget may have contributed to gross capital formation (henceforth termed the capital expenditure). Although it is not unexpected for capital projects to contain some overhead costs, the significant volume of non-capital spending in the investment budget indicates weak budgeting and classification practices.

Public administration was the largest spending category in the capital budget between 2009 and 2015, taking up 35 percent of expenditure, followed by roads at 25 percent (Figure 15). The majority of capital spending under the "public administration" category was allocated to outlays that do not contribute to the accumulation of service delivery related infrastructure such as housing, office furnishings, vehicles and transfers to other public agencies for administrative expenses. Although these may be considered important costs for the upkeep of the public sector, their direct contribution to increasing access to basic services and raising the productive capacity of the economy is limited. Roads accounted for 25 percent of capital spending. Other key areas such as education, water, health and agriculture accounted for a smaller share of spending (10, 7, 5 and 4 percent respectively). Therefore, after deducting recurrent spending and administration expenses from the investment budget, just 42 percent of Mozambique's on-budget investment was allocated to capital formation in key economic and social sectors between 2009 and 2015.

Figure 14 Recurrent vs capital expenditure; 2009-15 (% of total investment budget)

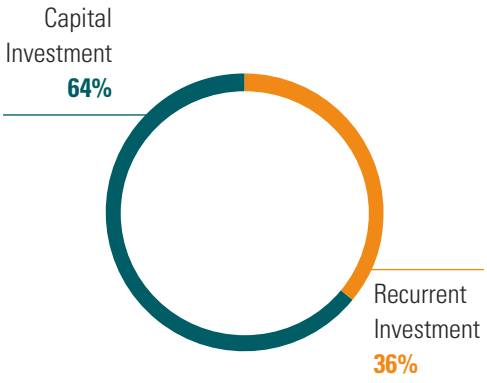
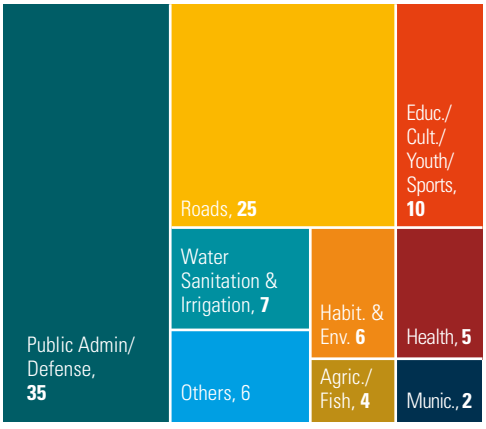


Figure 15 Composition of capital expenditure budget; 2009-15

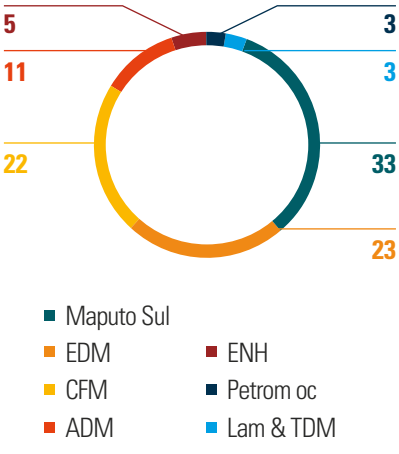


Source: WB staff calculations based on BOOST

Box 5 Investment through State Owned Enterprises (2014-15)

How large is off-budget investment by state-owned enterprises? An analysis of off budget capital investment executed by ten of the largest SOEs was carried to reach an estimate of their off-budget capital investments. The selection was based on the size, strategic importance and prominence of the company in terms of investment in the last years. The entities analyzed were: Telecommunications of Mozambique, Electricity of Mozambique, Railways of Mozambique, Airports of Mozambique, Petromoc, S.A. (fuel distribution), Mozambique Airlines, Maputo Sul Development Company (roads and bridges), and the National Hydrocarbon Company. The analysis focuses on 2014 and 2015 as the most recent years for which data was available for the full sample.

Figure 16 SOE investments (2014-15)



Source: WB staff estimates based on SOE accounts.

The results show that SOEs deliver a large share of the public sector's investment program, equivalent 6 percent of GDP on average, between 2014 and 2015. Transport infrastructure (roads, bridges, airports and railways) is the largest area of investment at 67 percent of the total, followed by electricity at 23 percent. Off budget investments in telecommunications, and air transport represented a relatively small share.

3.2 The Public Investment Bust: 2016 onwards

Public investment as a buffer in times of shock.

Sharp cuts to the investment budget were made as part of Mozambique's fiscal consolidation efforts from 2016 onwards, when an economic crisis necessitated deep fiscal and monetary adjustment programs. Mozambique began consolidating public finances between 2015 and 2018, reducing the primary deficit from 6.3 percent of GDP to an estimated 1.9 percent of GDP. Progress in terms of fiscal consolidation has relied, to a large extent, on cuts to the investment budget. Investment expenditure halved from 13 to 8 percent of GDP over this period, and cushioned a growing wage bill and higher debt service costs. This pattern, which is not unusual during periods of fiscal distress, reflects the rigidity of the recurrent budget and the absence of fiscal buffers to protect capital expenditures.

Cost cutting helped improve the composition of the capital budget.

With the cuts, the composition of the capital investment budget improved. Recurrent investment spending dropped slightly from 4 to 3 percent of GDP in 2017 whilst capital expenditure dropped at a faster pace, from 12 to only 4 percent of GDP, resulting in an investment budget with a larger share of recurrent spending (Figure 17). But, the composition of the capital component began to improve. The capital budget began shedding public administration spending, leaving a larger share for basic infrastructure spending (Figure 18). This helped sectors such as roads, health and education protect their shares and indicates an attempt to protect spending on basic infrastructure.

Figure 17 Capital vs recurrent spending after 2014 (% GDP)

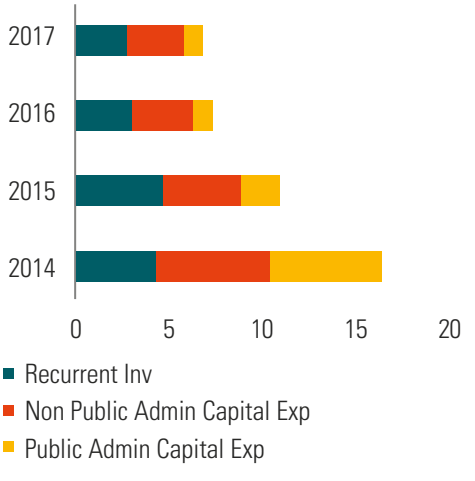
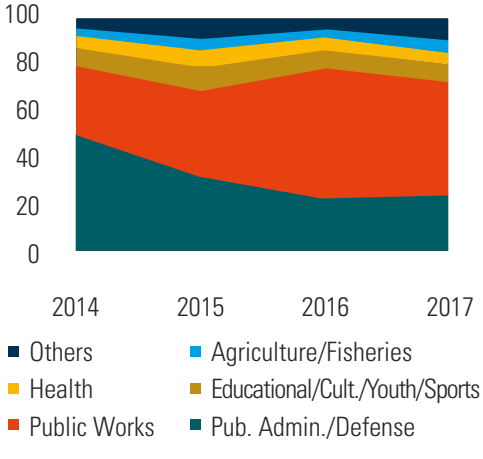


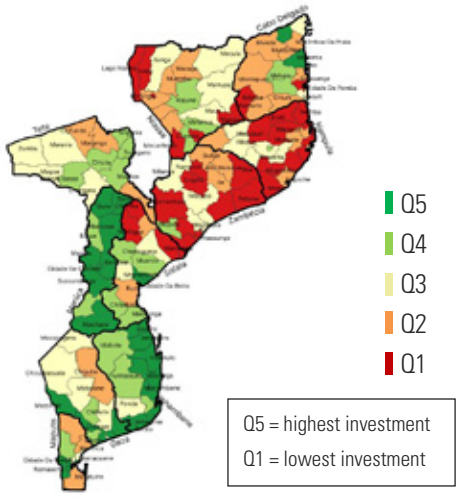
Figure 18 Sectoral composition of capital since 2014 (% of total investment capital spending)



Source: Authors calculation base on BOOST

3.3 Investment in areas with lowest access to basic infrastructure

Figure 19 Investment by district



Source: WB staff estimates using BOOST

Did the increases in public investment during Mozambique's boom years boost investment to underserved areas? Answering this question requires a disaggregation of investment expenditure to the subnational level (provinces and districts) and by rural and urban zones, a level of detail that is not currently offered by Mozambique's expenditure information. We address this by disaggregating roads and non-roads capital investment data using district level proxies. Information from the Roads Fund on provincial expenditure shares is used to split total road expenditure by province. The data is further disaggregated to the district level using the size of the road network in each district.[22] Non-roads capital expenditure, which relates mostly to health, education and other sectors that employ a large volume of civil servants, is split by province using the size of the local public administration as a proxy and is further disaggregated at the district level based on population shares. This approach provides the first available estimates of district level investment expenditures; the results are presented in Figure 19 below (see Annex 4 for roads and non-roads maps).

District level estimates suggest insufficient progress in channeling resources to underserved areas and in keeping-up with population growth.

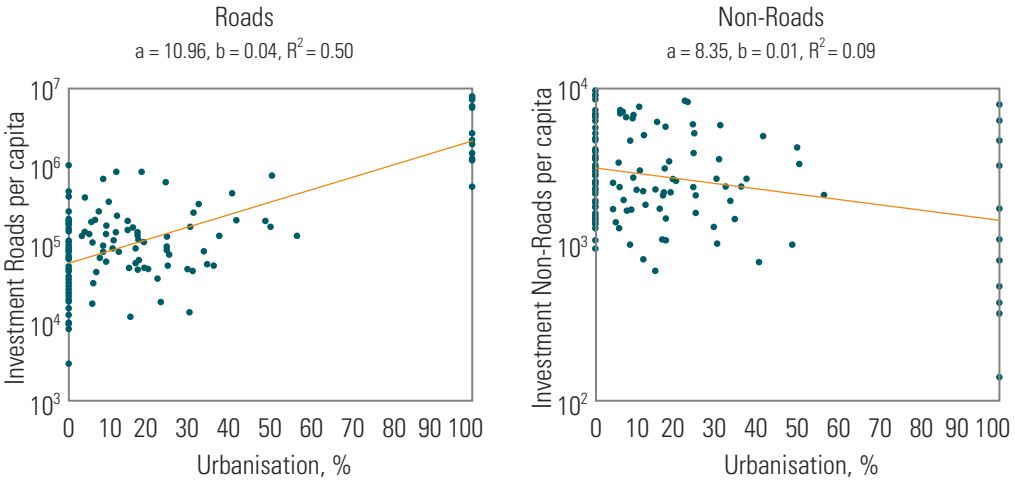
District level estimates show significant variation in expenditure levels both between and within provinces. In general, expenditure trends mirror the access indicators in pointing to lower investment levels in northern and central zones, especially Nampula, Zambezia and Cabo Delgado. This divide is most apparent in non-roads spending patterns.

The provinces with the lowest levels of access to basic infrastructure in 2009 were amongst the least well-funded in subsequent years. As discussed in the first part of this report, in 2009, rural areas had lower access to basic infrastructure than urban, with Zambezia, Tete, Inhambane and Manica having the lowest levels of access (less than half of the access levels of Maputo). Investment levels in Inhambane and Manica were amongst the highest in the country over this period, helping these two provinces catch-up and improve their position in the access to basic infrastructure index by 2015. Zambezia and Tete, the

two provinces with the lowest rates of access both in 2009 and 2015, were amongst the least well-funded areas, which further contributed to their limited progress. Nampula, the province that experienced the largest deterioration in access was also amongst the least well-funded. Other parts of the country such as Niassa and Cabo Delgado show a more mixed pattern.

Road expenditure tended to be higher in urban areas, thus contributing to the observed decline in rural connectivity, whereas non-road spending had the opposite tendency. Figure 20 plots district level road and non-road expenditure between 2009 and 2015 against district levels of urbanization.[23] The results indicate a higher road spend in more urban districts. This suggests that a larger share of the roads budget during the investment boom years focused on urban connectivity, echoing the significant increase in distance to transport reported by rural households and resulting in decreased levels of rural connectivity. In contrast, non-road expenditure tends to decrease with the level of urbanization, indicating larger rural per capita allocations in sectors such as health, education and water.

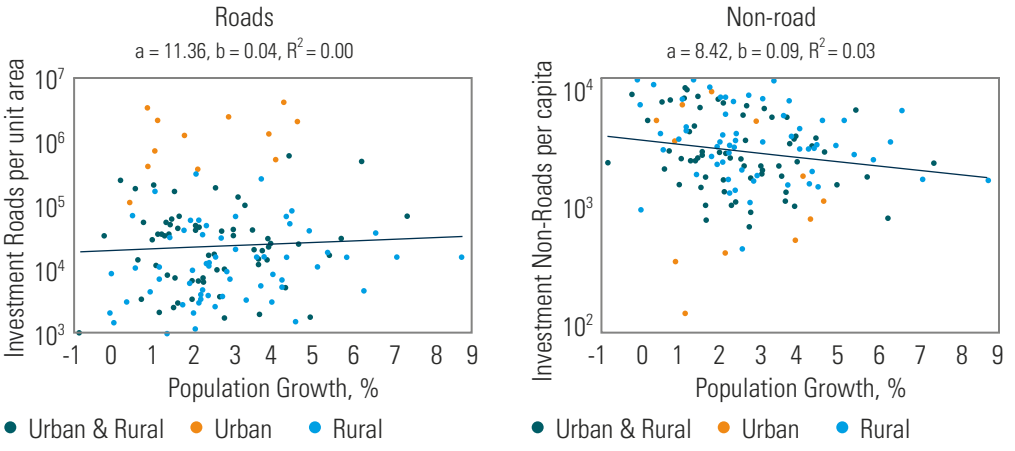
Figure 20 Investment and urbanization



Source: WB staff estimates using BOOST; INE.

Moreover, investment has been unable to keep up with population growth. Figure 21 indicates a limited link between roads expenditure and population growth, possibly as roads coverage is linked more closely to area size. The link between population growth and non-roads expenditure is more apparent. Here, per capita expenditure levels decline as population growth rates rise; investment in access to basic non-roads infrastructure is not keeping up with demographic needs, even during the investment boom years.

Figure 21 Investment and population growth



Source: WB staff estimates using BOOST; INE.

3.4 The investment allocation process and public investment management capacity

The territorial budget allocation process may exacerbate spatial inequality in access to basic infrastructure.[24]

The bulk of public expenditure is allocated on the basis of historical spending trends. The budget allocation process is largely incremental. It begins by allocating resources to ensure that previous year spending - principally in terms of salaries, goods and services - is covered to assure the continuous functioning of the public administration. Then, the remaining resources, if any, are distributed following two steps: (i) based on historical trends, the government splits between central government and provinces; (ii) once the total share of the provincial budget is determined, allocation follows a formula that assigns a weight of 70 percent to the subnational population and 30 percent to the multidimension poverty index.[25] Therefore, although the provincial allocation formula ponders territorial disparities, the distributional impact is limited as it applies to a small proportion of the total budget. A recent study by UNICEF (2017) shows that the proportion of resources subjected to the distributional formula averaged between 0.4 to 0.8 percent of the total annual spending and between and 3 to 4 percent of the annual domestic investment envelope, between 2012 and 2014. This small figure demonstrates the limited potential for the current allocation mechanism to tackle disparities that exist or emerge in population and poverty, creating a high level of path dependency in the budget.

Notwithstanding its limited scope, the provincial distributional formula is not fully applied in practice. There are significant discrepancies between the actual allocation of territorial spending and the estimated allocations using the formula. Moreover, evidence suggests

that when compared with estimations based on the formula allocation criteria, the budget law and the actual executed spending allocations are biased towards southern provinces, sub-allocating to the northern and center provinces that are the poorest (UNICEF; 2017).

Moreover, there is scope for sharpening the equity focus of subnational allocation formulas. Besides the provincial allocation process, the central government has other formula-based transfers to districts and municipalities to supplement local resources. The objectives of these transfers include local employment creation, food production and investment in local infrastructure and services. A recent World Bank review of sub-national allocations (2018) analyzed the different formula-based transfers and allocations to districts highlighted the limited consideration of equity in allocation formulas, e.g. by allocating equal amount for different subnational governments[26] and weak proxies for socioeconomic and access conditions at subnational levels, limiting accurate assessment of local needs (World Bank, 2018).[27]

…and public investment management capacity is low.

The most recent assessment of Mozambique's public investment management planning and appraisal systems found their quality to be low. Weak multi-year budgeting was found to reduce the predictability of the investment budget over the medium term, and when paired with less than credible costing, to contribute to weak financial planning for capital projects. Overall project appraisal and selection procedures, such as methodologies for socio-economic evaluation of projects, were found to be weak or non-existent, meaning that projects selection does not insure that projects are vetted and selected based on policy or efficiency criteria. Moreover, the investment program is being executed in the absence of strategic capital or infrastructure development plan, which leaves the capital budget anchored only in broad policy documents.

Figure 22 Summary of public investment management assessment (PIMA) results

Strength of Public Investment Management By Institution

Source: IMF (2015).

Project implementation and monitoring systems are also weak. For example, cash for project outlays is frequently released with delays, leading to significant deferrals in project implementation, public investment contracts are not always awarded based on competitive and transparent biddings and an integrated system for parallel monitoring of financial and physical progress of projects is missing.

IV
Conclusions and Recommendations

4.1 Summary of findings

This report asked three questions about public investment in basic infrastructure in Mozambique. First, it asks whether disparities in access to basic infrastructure between Mozambique's lagging and leading regions are growing or declining? The analysis finds that overall, disparities have been growing between rural and urban areas, especially in the rural parts of Mozambique's central and northern provinces. Divergence in sectoral performance is noted, with widespread improvements in households' access to water, electricity and health facilities and a significant deterioration in access to roads and schools in rural areas.

Second, it asks whether Mozambique's public investment program can help reduce the growing disparities in access? As may be expected, the results point to the important role that public investments play in increasing the population's access to basic infrastructure and services. Notably, the analysis suggests that the public investment budget has a more catalytic role in improving access levels in rural areas.

Lastly, and with this context in mind, the final part of the report asks if the large increases in public expenditure during Mozambique's investment boom years boosted funding to underserved areas: did it seek to address the growing disparities? The results point to relatively lower investment levels in northern and central zones, especially Nampula, Zambezia and Cabo Delgado, which are amongst the most underserved areas. Capital investment in roads has been skewed towards urban areas, contributing to the declining rates of rural connectivity, whereas the non-road capital budget was more balanced, potentially reflecting progress in rural water, electricity and health access. Moreover, investment levels have not been able to keep up with population growth. The analysis also notes that as much as 58 percent of on-budget investment went to non-capital outlays such as administrative and overhead costs, suggesting significant misallocations therein. The report concludes by recommending a reform of the resource allocation process and the adoption of project prioritization criteria that promote resource flows to areas with the largest investment gaps.

4.2 Recommendations

Looking ahead, Mozambique is on the cusp of a second investment boom in the coming decade, providing a tangible opportunity to address the growing gaps in access to basic infrastructure. Revenues from gas production are expected to widen fiscal space significantly, providing considerable resources for Mozambique to invest in its infrastructure and in better opportunities for the population. In this favorable context, reforming the public investment program would place Mozambique in a position to ensure that the population benefits evenly from these resources. Some key recommendations include:

Setting specific targets to reach underserved areas in the *Plano Quinquenal do Governo and the Plano Economico e Social.* First, taking spatial disparities into account when deciding where and how much to invest is essential if the public investment program is to succeed in reversing the growing gaps in access. The analysis presented in this report indicates insufficient progress in channeling resources to underserved areas and calls for a sharper policy focus. For instance, the *Plano Quinquenal do Governo,* the Government of Mozambique's five-year plan, and the *Plano Economico e Social,* the annual policy plan underlying the budget, would benefit from explicitly adopting targets that identify underserved areas and whether they are catching-up or falling behind.

Updating budget allocation formulas to account for access gaps. Second, tackling disparities would also entail restructuring budget allocation formulas to take access gaps into account, then ensuring that the formulas are applied in practice. The type of analysis presented in the first part of this report, which maps the gaps and measures relative progress, would inform such reforms. Further, a fiscal target for investment in basic infrastructure could be considered to help investment policy in reaching its goals.

Reducing misallocations of investment resources to recurrent or administrative uses through a sound public investment management system. Third, a growing investment budget should not come at the cost of higher inefficiencies and misallocations. Section three of this report estimated that only 42 percent of the investment budget during the 2009-15 boom years was used for funding economic and social infrastructure, given that recurrent and administrative spending consumed a big share of the resources, but that these misallocations lessened when the budget faced shortages from 2016 onwards. Putting systems in place that screen proposed investments before funding them will help limit this tendency in Mozambique's investment budget and increase the quality of expenditure. Screening would also limit slippages from the recurrent budget to public investment program. The Government of Mozambique is establishing such an investment management system that seeks to promote impact and efficiency through improved project appraisal and selection procedures. The system should be widened to include monitoring and to cover investments by SOEs considering that, as illustrated by the analysis, these entities undertake a sizeable share of the public investment portfolio.

Strengthening municipal revenue mobilization to fund urban investment and free-up resources for rural areas. Fourth, revenue mobilization by most municipalities is far below potential as these urban authorities continue to rely on central government transfers to fund both their overheads and investments. This is mainly due to limited technical and administrative capacity. For instance, most municipalities do not have updated databases of land and assets such as properties nor the technical capacity for property appraisal to facilitate the collection of property taxes. Similarly, there is significant room for improving municipal service delivery and the collection of service

related fees. Improving revenue mobilization of urban authorities would help finance the needed investments for smooth progress in urbanization and help free-up much needed resources for investing in rural areas.[28]

Building buffers to maintain fiscal stability. Fifth, although the investment bust years between 2016-2018 came with the silver lining of lower misallocations in the capital budget, the cuts have been a source of major disruption to the rest of the capital budget, significantly lowering funding for ongoing and new infrastructure projects. Therefore, given the tendency of using the investment budget as the buffer in times of fiscal distress, rebuilding fiscal buffers would support a more stable financing context.

Lastly, adopting a national action plan for increasing access to basic infrastructure that is overseen at a high level would provide momentum and coordination to these efforts. The risk that future investments will contribute to maintaining the status quo or even widen the gap further is significant. A clearly targeted action plan that is monitored at a high level would help to reverse this trend. Coordination is of particular importance given the sizable share of off-budget investments in infrastructure and the variety of players involved, especially in the current decentralization context. SOEs, municipalities, provinces, donor projects, non-governmental organizations and other private initiatives play an important role. By taking this into account, the action plan can influence in the dynamics of public investment and influence the distributional outcomes more fully.

4.3 Areas for future analysis

This report has provided evidence on spatial disparities in access to basic infrastructure and dynamics of on-budget investment flows. Yet, as always, there is room for further analysis to inform policy makers on how to improve investment outcomes. In particular, analysis of the efficiency and the quality of investment would inform policy makers on how to increase value for money and raise the impact of the investment program. Improved data collection and consolidation in a spatial access to infrastructure database would further support these efforts.

Notes

1. Estratégia Nacional de Desenvolvimento 2015 -2035; Programa Quinquenal do Governo 2015 -2019.

2. World Bank, (2018), 'Strong but not broadly shared growth. Mozambique Poverty Assessment', World Bank: Washington DC.

3. This database was developed by the World Bank disaster risk management group to measure exposure and impact of natural disasters.

4. The distance to transport indicator is considered to be a proxy for access to passable roads. The IOF survey did not directly measure household's distance to roads.

5. Mozambique has made significant progress in increasing lower primary school enrollment in recent years (97 percent net enrollment in 2016), whilst upper primary lags behind (23 percent net enrollment). The number of students estimated to be attending pre-primary programs is just 4 percent (World Bank, 2016). The increased distance to primary schools could reflect a longer commute to schools by enrolled students and/ or the slower progress in upper primary enrollment, especially in Nampula and Sofala – the two provinces with the most pronounced increase in distance to primary schools.

6. The database includes data about health facilities which was not used in the analysis due to its limited coverage. The database does not contain information about water or market infrastructure.

7. World Bank, (2018), 'Strong but not broadly shared growth. Mozambique Poverty Assessment', World Bank: Washington DC.

8. Dorosh et al. "Urbanization, Rural-Urban Linkages, and Economic Development in Mozambique"; IFPRI; 2016.

9. This section is based on a background paper prepared for this report titled "Public Investment, Access and Poverty in Mozambique". 2019.

10. See Box 4 in part III of this report for a description of the BOOST database.

11. Poverty rates are based on the World Bank methodology, where a poor household lives on less than $1.9 a day (2011 USD). The total number of jobs is estimated using the total number of people reporting being employed in each district and sector (public, private, and informal) and year and by grossing up the weights provided in the survey (see Blundell et al. (2004) for an example of grossing up weights). The number of informal jobs is measured by subtracting from total jobs the number of formal local jobs as per the 2014 firm census.

12. Distance to transport is considered a proxy for access to roads.

13. These results do not imply that investment in rural areas is more efficient than urban investments. Investments in urban areas could have higher economic returns given their higher population density and concentration of economic activity. Rather, the point here is to emphasize that investment spending in rural areas is linked to faster progress in increasing access levels given the paucity of basic infrastructure.

14. This refers to direct and indirect jobs.

15. World bank. Mozambique Urbanization Review. 2017.

16. This section is based on background report prepared for the 2017 World Bank Mozambique Urbanization Review titled "Urbanization, Rural-Urban Linkages, and Economic Development in Mozambique"; IFPRI; 2016.

17. Migration to urban areas under the faster urbanization scenario, without replacement

of labor by capital, reduces the supply of rural labor and slows rural growth in the absence of significant excess in labor supply, especially in peak agriculture seasons.

18. The analysis does not cover off-budget donor investment due to the absence of information/ updated database. Off-budget donor support is considerable in some sectors, notably health where off-budget donor financing was between one-third and one-half of the annual spend over the past decade. (UNICEF, 2017).

19. Around 59 percent of capital formation between 2009 and 2015 was private, with a concentration in extractives: on average, investment in extractives accounted for 17 percent of GDP between 2010 and 2015. There was also an increase in FDI to the transport sector linked with infrastructure to facilitate exports (e.g. Moatize - Nacala railway). The extractive sector represented an average of 64 percent of total foreign direct investment inflows between 2007 and 2015 and investment in infrastructure represented an average of 11 percent of GDP during the same period.

20. On-budget spending.

21. Public investment increased by an average of 12 percent in real terms between 2009 and 2015.

22. Source: World Bank infrastructure database.

23. Roads expenditure per km2 and non-roads per capita.

24. The findings of this subsection draw on two sources: UNICEF (2017) 'Analysis of the Budget Allocation Criteria by the Government of Mozambique'; and World Bank (2018) 'Horizontal Funds Distribution to Subnational Governments in Mozambique (Funding the Districts and Municipalities)'.

25. The Multidimensional poverty index combines measurement of household consumption with access to basic services. It is distributed as follows: household consumption (30 percent), access to clean water (15 percent), access to sanitation (15 percent), health (20 percent) and education (20 percent)

26. For example, the Road Funds allocates MZN 2 million per district irrespective of specific characteristics.

27. PERPU *(Programa de Redução da Pobreza Urbana)* and FDD *(Fundo de Desenvolvimento Distrital)*, for example, use aggregated poverty levels, which is a limited indicator of relative needs in terms of basic services and may not be so related to the objectives of the funds, in this case employment creation and food production. Closer proxies, such as food security to estimate support needed for food production could be explored.

28. See the World Bank "Mozambique Urbanization Review", 2017 for a more detailed discussion of reforms needed to improve municipal revenue mobilization.

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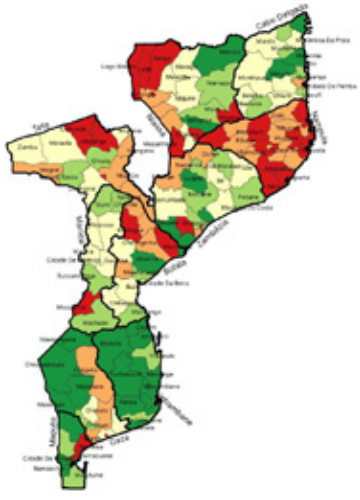
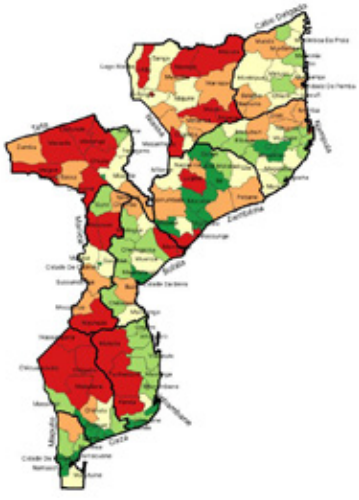
Annexes

Annex 1: Basic infrastructure coverage maps by sector and district and population density by district

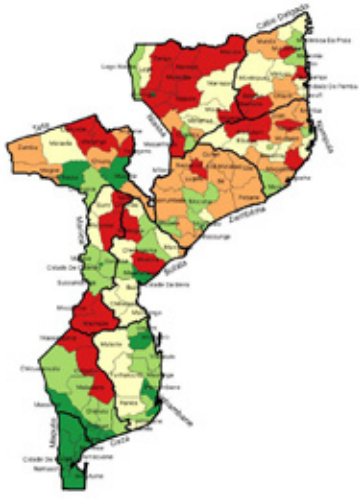
Education



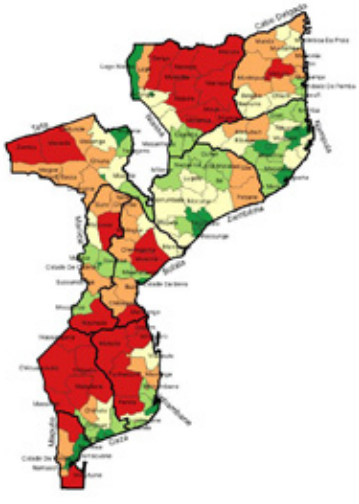
Roads



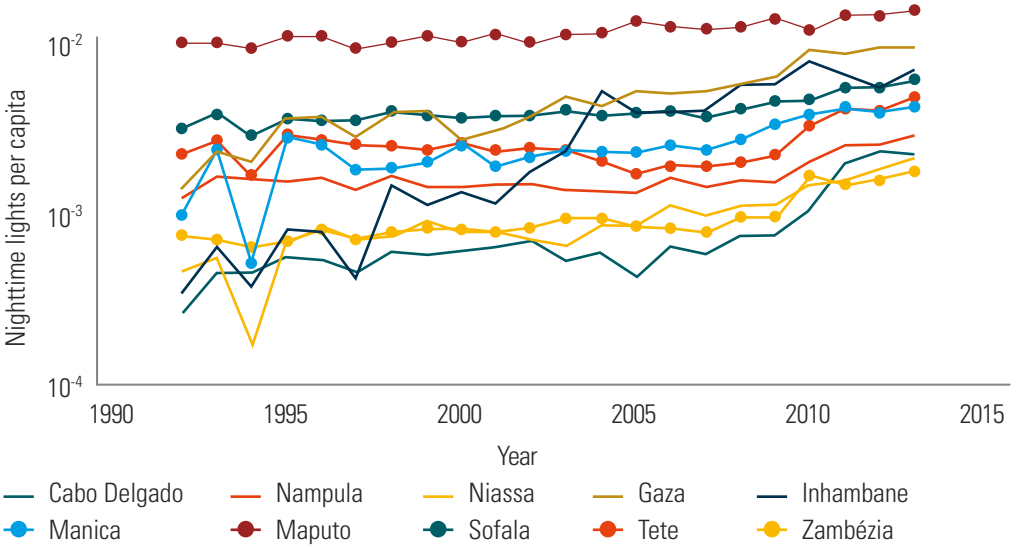
Electricity



Population density



Night-time lights per capita



Annex 2: Model output tables

Public investment and access to basic infrastructure

Average Distance			
	(1) All	(2) Urban	(3) Rural
Assuntos Economicos (bn. LCU)	-0.036***	-0.006**	-0.120*
	(0.009)	(0.003)	(0.065)
N	17369	10353	7016
R-sq	0.24	0.24	0.21

District and Year FE are included in all regressions. Standard errors are clustered by district.

Public investment and access to transport

Panel A: All Districts			
	(1) Hours to Transport	(2) Hours to Transport	(3) Hours to Transport
Assuntos Economicos (bn. LCU)	-0.084***		
	(0.018)		
Road Expenditure Boots (bn. LCU)		-0.147	
		(0.032)	
Road Expenditure (bn. LCU)			-0.141
			(0.030)
N	19262	19262	19262
R-sq	0.21	0.21	0.21

Panel B: Urban			
	(1) Hours to Transport	(2) Hours to Transport	(3) Hours to Transport
Assuntos Economicos (bn. LCU)	-0.007		
	(0.006)		
Road Expenditure Boots (bn. LCU)		-0.013	
		(0.010)	
Road Expenditure (bn. LCU)			-0.012
			(0.010)
N	10904	10904	10904
R-sq	0.15	0.15	0.15

Panel C: Rural			
	(1) Hours to Transport	(2) Hours to Transport	(3) Hours to Transport
Assuntos Economicos (bn. LCU)	-0.238*		
	(0.133)		
Road Expenditure Boots (bn. LCU)		-0.419*	
		(0.233)	
Road Expenditure (bn. LCU)			-0.402*
			(0.224)
N	8358	8358	8358
R-sq	0.21	0.21	0.21

District and Year FE are included in all regressions. Standard errors are clustered by district.

Public investment and jobs

Panel A: All Districts					
	(1) Worker	(2) Public	(3) Private	(4) Other	(5) ln (wage)
Assuntos Economicos (bn. LCU)	4.669*	0.388	1.474***	2.807	-0.000
	(2.554)	(0.355)	(0.222)	(2.444)	(0.000)
N	378	378	378	378	302
R-sq	0.92	0.93	0.99	0.89	0.73

Panel B: Urban					
	(1) Worker	(2) Public	(3) Private	(4) Other	(5) ln (wage)
Assuntos Economicos (bn. LCU)	3.413	0.373	1.409***	1.631	-0.000
	(2.302)	(0.409)	(0.292)	(2.149)	(0.000)
N	138	138	138	138	126
R-sq	0.98	0.95	1.00	0.96	0.82

Panel C: Rural					
	(1) Worker	(2) Public	(3) Private	(4) Other	(5) ln (wage)
Assuntos Economicos (bn. LCU)	15.845**	-0.145	2.157	13.833**	-0.000
	(6.688)	(0.299)	(0.648)	(6.672)	(0.000)
N	240	240	240	240	176
R-sq	0.84	0.48	0.74	0.85	0.69

District and Year FE are included in all regressions. Standard errors are clustered by district.

Access to basic infrastructure interactions

Panel C: Rural					
	(1) ln (Cons.pe)	(2) ln (Cons.pe)	(3) ln (Cons.pe)	(4) ln (Cons.pe)	(5) ln (Cons.pe)
Hours to Transport	-0.026***	-0.037***	-0.047***	-0.036***	-0.030***
	(0.009)	(0.009)	(0.011)	(0.010)	(0.010)
Electricity	0.776***				
	(0.042)				
Hours to Transport x Electricity	-0.331***				
	(0.093)				
Water < 5min		0.266***			
		(0.038)			
Hours to Transport x Water < 5min		-0.125***			
		(0.033)			
Primary < 10min			0.140***		
			(0.025)		
Hours to Transport x Primary < 10min			-0.027*		
			(0.016)		
Market < 20min				0.154***	
				(0.027)	
Hours to Transport x Primary < 20min				-0.084***	
				(0.024)	
Hospital < 30min					0.184***
					(0.026)
Hours to Transport x Primary < 30min					-0.082***
					(0.017)
N					19262
R-sq					0.34

Region and Year FE are included in all regressions. Standards in errors in parenthesis clustered by district.

Annex 3: Economy-wide model scenario results

Wage Differentials and Migration Flows, 2012-2032

	Baseline scenario	Urbanization scenarios		
		Faster migration	Urban investment	Win-Win
Average wage ratios, 2032				
Towns / Rural areas	1.27	1.07	1.08	1.15
Cities / Rural areas	3.20	2.67	2.69	2.87
Cities / Towns	2.53	2.50	2.49	2.49
Annual net migrant flows (1000s)				
Rural areas	-35.97	-90.49	-91.01	-96.41
Towns	16.59	31.44	31.27	35.00
Cities	19.38	59.05	59.74	61.41
Urban population share, 2032 (%)	33.56	39.75	39.80	40.32

Source: Mozambique CGE model results.

Economic Growth Results, 2012-2032

	Total GDP share, 2012 (%)	Baseline annual growth rate (%)	Urbanization scenarios (%-point deviation from baseline)		
			Faster migration	Urban investment	Win-Win
Annual GDP growth	100	6.84	0.40	0.46	0.46
Agriculture	28.0	4.57	-0.09	-0.33	0.17
Industry	19.3	8.17	0.78	0.97	0.36
Manufacturing	10.1	9.09	1.10	1.32	0.57
Agro-processing	4.6	7.49	-0.23	-0.50	0.05
Other manufacturing	5.5	10.13	1.69	2.08	0.82
Other industry	5.8	7.99	0.28	0.45	-0.02
Services	52.7	7.27	0.39	0.47	0.59
Rural areas	38.2	4.19	-0.45	-0.70	-0.21
Towns	10.4	7.15	0.66	0.72	0.94
Cities	51.4	8.17	0.64	0.79	0.60

Source: Mozambique CGE model results.

Economic Growth Results, 2012-2032

	Average per capita consumption, 2012 ($)	Share of national population, 2012 (%)	Baseline annual growth rate (%)	Urbanization scenarios (Annual growth rate, %)		
				Faster migration	Urban investment	Win-Win
National welfare	546	100	2.77	2.98	2.93	2.67
Poor	161	40.0	2.41	2.47	2.33	2.61
Non-poor	802	60.0	2.84	3.07	3.04	2.70
Rural welfare	336	69.6	2.34	2.65	2.51	2.83
Poor	146	32.1	2.60	2.75	2.57	2.93
Non-poor	499	37.5	2.35	2.89	2.76	3.08
Urban welfare	1,026	30.4	2.77	2.38	2.41	1.69
Poor	221	7.9	1.66	1.40	1.37	1.43
Non-poor	1,307	22.5	2.86	2.43	2.46	1.70
Town welfare	662	8.2	0.82	0.37	0.35	0.65
Poor	222	3.1	0.38	0.17	0.12	0.46
Non-poor	928	5.1	0.73	0.15	0.14	0.42
City welfare	1,160	22.2	3.48	3.11	3.14	2.21
Poor	220	4.8	2.58	2.26	2.24	2.12
Non-poor	1,418	17.4	3.52	3.15	3.19	2.23

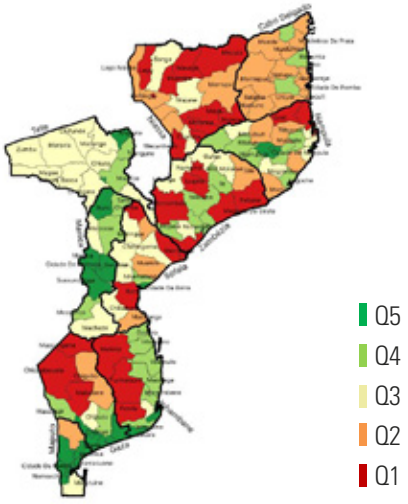
Source: Mozambique CGE model results.

Note: Welfare is measured using equivalent variation, which is a consumption-based measure that controls for price changes.

Annex 4: Investment by district: roads and non-roads

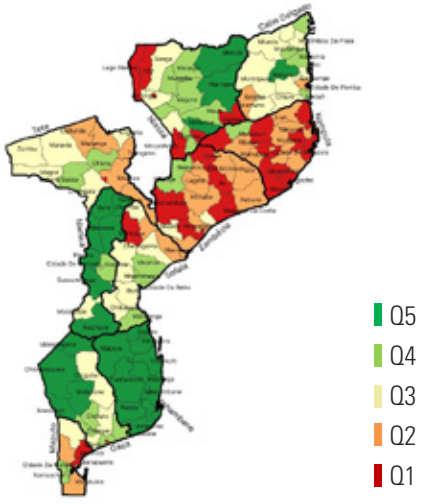
Roads investment

(roads expenditure per km²; 2009-2015)



Non-roads investment

(non-roads expenditure per capita; 2009-2015)



Source: WB staff estimates using BOOST

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