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DEMOCRATIC REPUBLIC OF TIMOR-LESTE

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September 2022

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DEMOCRATIC REPUBLIC OF TIMOR-LESTE

SELECTED ISSUES

July 28, 2022

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Asia and Pacific Department

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CONTENTS

BUILDING RESILIENCE TO NATURAL DISASTERS AND CLIMATE CHANGE: A MODEL APPLICATION TO TIMOR-LESTE

Timor-Leste is one of the most vulnerable countries to natural disasters and has limited fiscal space to deal with climate change shocks. Using a dynamic general equilibrium model, this annex shows that investing in climate-proof infrastructure, albeit costly, can make the Timorese economy resilient against natural disasters, limiting the post-disaster economic losses, recovery costs, and a rise in public debt. The analysis also shows how timely Public Financial Management reforms, including those that strengthen public investment management, boost the gains from such investment. Given Timor-Leste's limited fiscal space, this further stresses the importance of rationalizing public spending and undertaking revenue mobilization reforms to create more space for prioritizing resources towards building resilient infrastructure with significant dividends. The authorities should tap grant-based financing sources based in partnership with other development partners to help improve resilience to natural disasters. Clearly outlining a medium-term expenditure and finance roadmap for an adaptation plan in the budget planning is also crucial.

A. Vulnerability to Natural Disasters and Climate Change

1. Timor-Leste is a small mountainous island state exposed to various types of natural disasters. There have been 14 natural disasters since 2001 (see text table) of various types—this includes floods, landslides, tropical cyclones, droughts, earthquakes, and tsunamis. Floods are the most frequent disaster, which are caused by heavy rainfalls compounded with low soil permeability and rapid and excessive runoffs from steep mountain slopes to lower streams. The country experiences tropical cyclones at a pace of once every five years especially during April to May. Most recently, the heavy rainfalls resulting from Tropical Cyclone Seroja in April 2021 caused large-scale landslides and floods across the country, especially in the Capital Dili, leaving about 31,000 people without homes and in refugee centers.

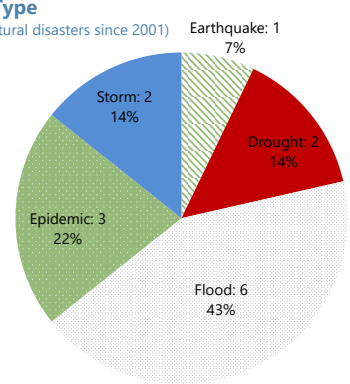
Natural Disasters in Timor-Leste

Year	Disaster Type	Total People Affected (% of population)		Total Deaths	Economic Losses (% of GDP)
2001	Flood	2508	(0.3%)	1	-
2003	Flood	600	(0.1%)	3	-
2003	Flood	450	(0.0%)	-	-
2005	Epidemic	336	(0.0%)	22	-
2006	Storm	8730	(0.9%)	-	-
2007	Flood	0	(0.0%)	-	-
2007	Flood	947	(0.1%)	1	-
2007	Drought	0	(0.0%)	-	-
2014	Epidemic	197	(0.0%)	2	-
2015	Earthquake	2003	(0.2%)	-	0.3%
2016	Drought	120000	(9.8%)	-	-
2020	Flood	9131	(0.7%)	3	1.3%
2021	Storm	143670	(10.7%)	41	-
2022	Epidemic	1353	(0.1%)	20	-

Sources: The International Disasters Database (EM-DAT); and IMF staff estimates.

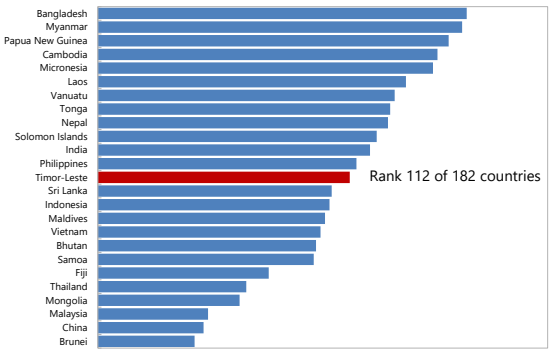
Disaster Type

(Out of 14 natural disasters since 2001)

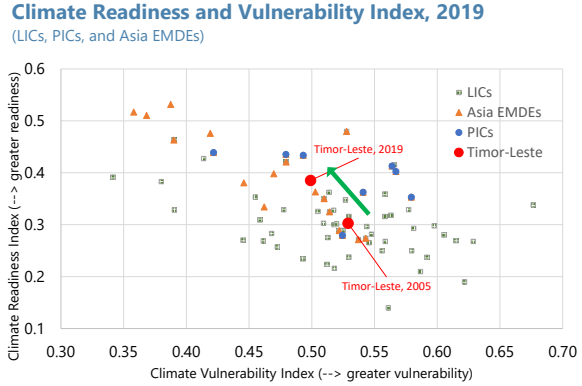


Source: EM-DAT.

2. Timor-Leste's vulnerability to climate change and natural disaster risk is amongst the highest across Asian economies, and is expected to worsen. Based on the Notre dame Global Adaptation Initiative (ND-GAIN) index, which summarizes a country's vulnerability to climate change, Timor-Leste ranked 112th out of 182 countries in 2019.[1] Vulnerabilities are exacerbated by limited and inadequate infrastructure and social welfare. While the authorities have made gradual progress in improving their climate readiness and vulnerability,[2] actual public expenditure on climate relevant programs and activities has been declining in recent years.[3] Climate change is expected to exacerbate natural disaster risk going forward, potentially resulting in heavier and more frequent rainfall, and harsher and longer drought conditions. Rapid urbanization and land degradation, particularly deforestation, will also likely contribute to increased disaster and climate vulnerability. Moreover, the frequency of extreme heat is expected to increase in Timor-Leste, posing a major threat to human health (see Asian Development Bank-World Bank Climate Risk Profile for Timor-Leste, November 2021).



Source: Notre Dame Global Adaptation Initiative (ND-GAIN Index).

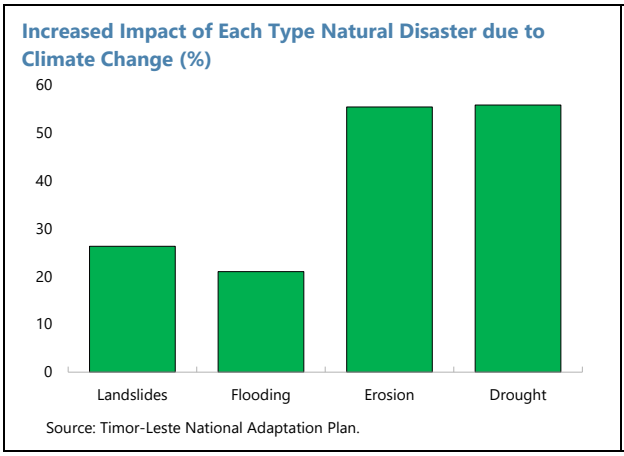


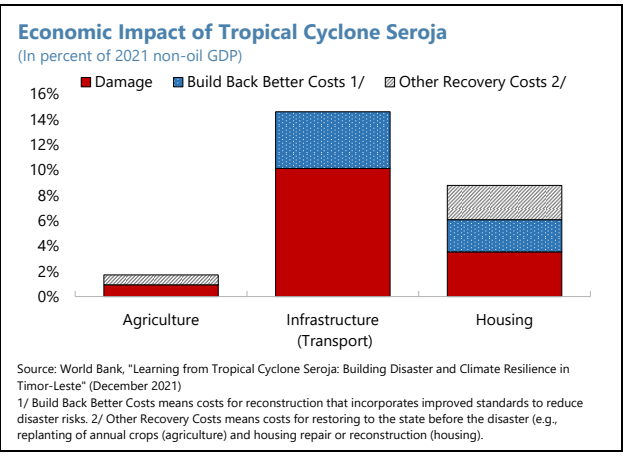
Source: Notre Dame Global Adaptation Initiative (ND-GAIN Index).

3. Worsening climate and disaster risk threatens the Government's development and infrastructure building agenda. In the recent worst episode of natural disasters—Tropical Cyclone Seroja in April 2021—landslides heavily damaged critical infrastructure (roads, bridges, water supply infrastructure, schools, and health facilities) and agricultural crops (rice fields and coffee plantation),and negatively impacted livelihoods and basic services (including access to electricity, water and the internet), employment, health, and education. Damages to agriculture, infrastructure and housing is estimated at US$245 million (14.5 percent of non-oil GDP) with total recovery costs

[1] The ND-GAIN Index ranks 181 countries using a score which calculates a country's vulnerability to climate change and other global challenges as well as their readiness to improve resilience. The more vulnerable a country is the lower their score, while the more ready a country is to improve its resilience, the higher it will be.
[2] Countries with a high ability to leverage investments and covert them to adaptation actions have a high climate readiness.
[3] See the UNDP Climate Public Expenditure and Institutional Review (CPEIR) report. In 2018, Timor-Leste spent 4.6 percent of non-oil GDP in highly climate relevant programs and projects, but it fell to 2.6 percent of non-oil GDP in 2020.

of US$422 million (25 percent of non-oil GDP).[4, 5] With potential increase in hazard occurrence, the economic losses due to climate change are estimated to increase by 20 to 50 percent. Moreover, this would considerably increase the cost of construction, operations, and maintenance of infrastructure.





4. This annex analyzes the macroeconomic impact of natural disasters and of investing in natural disaster resilient infrastructure. The increased likelihood of adverse climate-related shocks calls for building climate resilient infrastructure in Timor-Leste, which can be costly. Hence, a comprehensive analysis of the trade-offs between the costs versus the economic benefits of such investment, including how to fund them is essential. The analysis relies on a general equilibrium model to help quantify these tradeoffs and challenges. The annex is organized as following: Section B describes the features of the model and the design of illustrative simulations; Section C discusses the key findings; and Section D presents the policy implications.

B. Growth-Investment-Debt Tradeoff: A Model Application

5. The Debt-Investment-Growth (DIG) model was developed to study the macroeconomic impact of public investment in low-income and small open economies. It is a general equilibrium growth model which captures the macroeconomic impacts of scaling up public investment, as well as implications for debt. The DIG model is a real, dynamic, two-sector small open economy model with traded and non-traded goods sectors. The model puts together several channels that help capture the main mechanisms and policy concerns regarding debt dynamics, particularly those associated with the linkages between public investment, growth, and debt. These comprise (i) the investment-growth nexus, (ii) the fiscal adjustment, and (iii) the private sector response.

[4] See the World Bank report, "Learning from Tropical Cyclone Seroja: Building Disaster and Climate Resilience in Timor-Leste" (December 2021).
[5] This is consistent with a 2013 ADB study, which estimates the economic losses from climate change in Timor-Leste to reach 10 percent of its annual GDP by 2100. The negative impact on agriculture contributes the most to the total economic losses, more than 55 percent in 2100. See https://www.adb.org/news/timor-leste-economy-predicted-be-among-worst-hit-climate-change-adb

6. This annex uses the DIGNAD model that extends the DIG framework to study the macroeconomic challenges portrayed by Timor-Leste's high vulnerability to natural disasters. Marto, Papageorgiou, and Klyuev (2018) extended the DIG framework by introducing natural disasters and allowing the government to invest in both standard infrastructure (e.g., roads) and adaptation capital (e.g., seawalls or climate-proof roads). Investment in adaptation infrastructure is costlier than investment in standard infrastructure. However, adaptation infrastructure mitigates productivity losses during a natural disaster episode by allowing standard infrastructure to function better (for example, resilient roads allow users to access other infrastructure even in difficult conditions). It reduces the damages inflicted by a natural disaster and depreciates infrastructure at a lower rate. Previous applications of the model have shown how investing in adaptation infrastructure is useful as a complement to conventional infrastructure as it raises the marginal product of other capital by helping withstand the impact of natural disasters, and crowds in private investment.[6]

7. The model is calibrated to match the macroeconomic indicators and empirical estimates for Timor-Leste. The calibration of initial values and parameters is reported in Table 1 and is based on historical averages to capture Timor-Leste's steady state in the data. For example, the steady state of public standard investment infrastructure as a share of non-oil GDP is set at 16.8 percent, in accordance with the historical average from 2010-19, before the COVID-19 shock. Parameters that determine the impact of natural disasters are calibrated as follow: (i) the average return on standard infrastructure is set at 20 percent at the initial steady state versus that for adaptation infrastructure, which is 2.5 times as large, as the latter withstands longer even under adverse conditions; and (ii) adaptation capital depreciates at a lower rate than standard infrastructure implying that the former is more resilient. Timor-Leste only has access to external concessional debt with the real interest rate set at 1.3 percent, in line with the historical average. Efficiency of standard public investment is kept at 46 percent, based on the 2016 Public Investment Management Assessment. All other parameters are in line with Marto, Papageorgiou, and Klyuev (2018). While the simulation findings are influenced by the assumptions made under different scenarios, the model provides a framework for thinking through the macroeconomic effects of natural disasters under various scenarios.

C. Simulations and Findings

8. There are three simulation exercises. All simulations consider some form of scaling up of infrastructure spending for a five-year period (year -5 to 0). The government can invest in two types of infrastructure—cheaper standard/ conventional versus costlier natural disaster-resilient (adaptation) infrastructure. Investing in adaptation infrastructure can yield higher returns but is fiscally costly. Simulation 1 compares the outcomes of investing in standard infrastructure versus adaptation infrastructure. Simulation 2 looks at how Public Financial Management (PFM) reforms

[6] The model is designed to simulate the impacts of one-off disasters, however because it is not stochastic it does not capture how private firms or households would respond endogenously to a more permanent increase in the frequency or size of natural disasters due to climate change.

can affect the outcomes of public investment in adaptive infrastructure. Lastly, the effects of revenue mobilization efforts for financing adaptation investment are examined in Simulation 3.

Table 1. Timor-Leste: Model Calibration: Select Initial Values and Parameters

Variable/Parameter Definitions	Values	Source
Macroeconomic Aggregates		
Trend per capita growth rate	2.0%	Historical average
Imports to GDP ratio	34.8%	Historical average
Government		
Public domestic debt to GDP ratio	0.0%	No access
Public concessional debt to GDP ratio	11.3%	Historical average
Public external commercial debt to GDP ratio	0.0%	No access
Real Interest Rate on Concessional Debt	1.3%	Historical average
Grants to GDP ratio	9.5%	Historical average
Consumption tax rate (VAT)	2.5%	Historical average
Public infrastructure investment to GDP ratio	16.8%	Historical average
Public adaptation infrastructure investment to GDP ratio	0.0%	Historical average
Initial return on standard infrastructure investment	20.0%	Historical average
Initial return on adaptation infrastructure investment	50.0%	Bresh (2014)
Depreciation rate of public capital (standard infrastructure)	15.0%	Buffie et al. (2012)
Depreciation rate of public capital (adaptation infrastructure)	3.0%	Buffie et al. (2012)
Efficiency of public infrastructure investment	46.0%	PIMA (2016) report
Steady state efficiency of public infrastructure investment	46.0%	PIMA (2016) report
Oil revenue to GDP ratio	0.0%	Active oil fields are drying up
Other natural resource revenue to GDP ratio	0.0%	
Government savings to GDP ratio	0.0%	
Firms		
Capital's share in value added in the tradable-sector	40.0%	Marto, Papageorgiou, and Klyuev (2018)
Capital's share in value added in the non-tradable sector	55.0%	Marto, Papageorgiou, and Klyuev (2018)
Value added in non-tradable Sector	48.0%	Marto, Papageorgiou, and Klyuev (2018)
Households		
Private external debt to GDP ratio	9.1%	Historical average
Depreciation rate in tradable and non-tradable sector	5.0%	Historical average
Remittances to GDP ratio	5.6%	Historical average

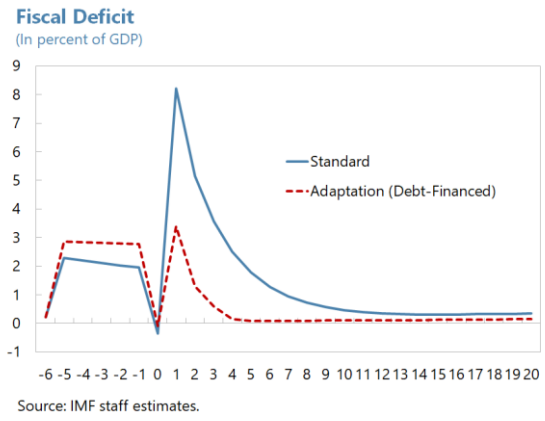
9. All simulations explicitly considered the impact of a natural disaster shock. It is assumed that the country is hit by a natural disaster after the five-year period of scaled-up infrastructure spending (year 0).[7] The natural disaster shock is assumed to inflict an average damage equivalent to 15 percent of non-oil GDP encompassing: (1) permanent damages to public infrastructure; (2) permanent damages to private capital; and (3) temporary losses of productivity. It is assumed the government aims to fully rebuild the damaged infrastructure in 4 to 8 years. Reconstruction after the disaster begins the year after the disaster hits (year 1) and is funded through an increase in external concessional debt.[8] The natural disaster also temporarily reduces the

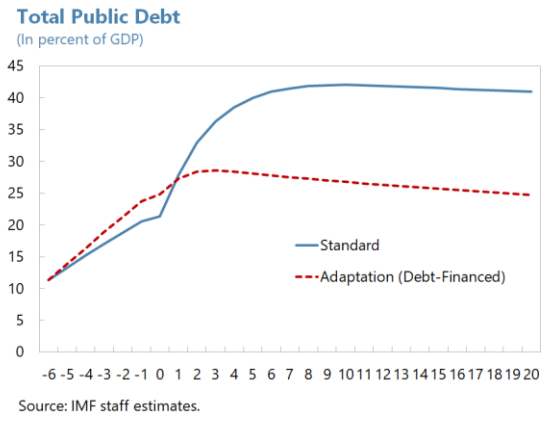
[7] This is because reaping benefits from disaster resilience would require substantial accumulation of adaptation investment.
[8] Timor-Leste does not have access to domestic and external market borrowing.

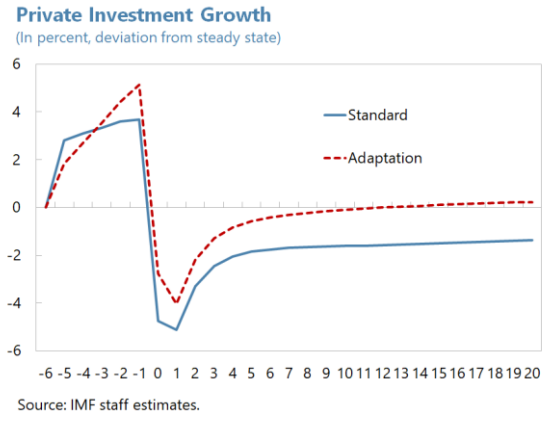
investment efficiency by 5 percent during the reconstruction process (e.g., due to capacity constraints, supply disruptions or coordination problems in rebuilding rapidly).[9]

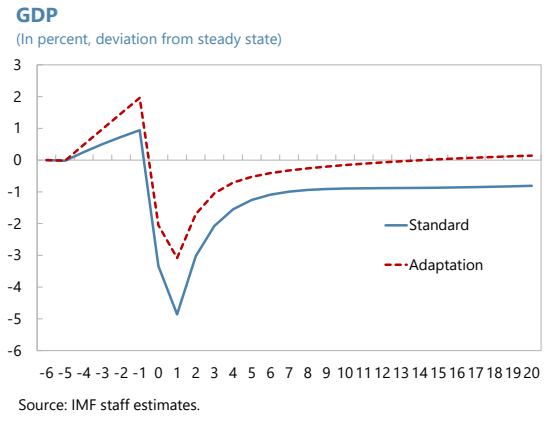
10. Simulation 1: Conventional vs. Adaptation Infrastructure. It considers a scaling-up of public infrastructure spending during a five-year period under two scenarios. In the first scenario, public spending is allocated towards building conventional infrastructure, with spending sustained at 2 percent of GDP above steady-state levels for five years. In the second scenario, the same magnitude of scaling-up with investment in natural disaster-resilient infrastructure instead. Disaster-resilient infrastructure is expected to be associated with a lower rate of capital depreciation, however, the costs of building it are likely to be higher and implementation more complex. Consequently, disaster-resilient infrastructure projects can be expected to require more time and resources than their conventional counterparts. It is assumed they are 30 percent more expensive than standard infrastructure.[10]

Figure 1. Adaptive versus Standard Infrastructure









[9] A field assessment in Vanuatu found that the impact of a natural disaster shock that causes damages equivalent to 61 percent of GDP, then leads to a 20 percent fall in investment efficiency for reconstruction. Given lack of data availability for Timor-Leste, we scale this to a shock of 15 percent of GDP which would be consistent with a 5 percent fall in reconstruction efficiency

[10] This estimate is based on our discussion with other development partners and consistent with some other estimates in the literature.

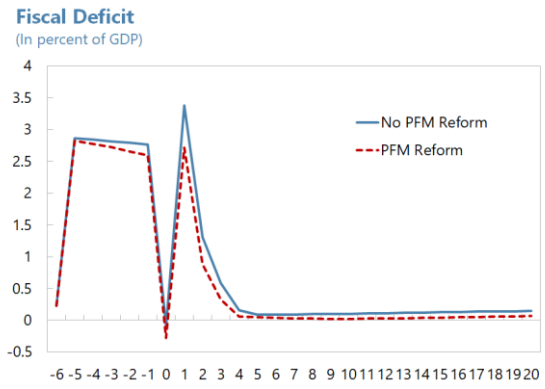
11. The benefits of natural disaster-resilient infrastructure are clear in the case of Timor-Leste. Although investing in adaptation infrastructure results initially in higher fiscal deficit and public debt, it improves the resilience of the economy limiting a post-disaster rise in public debt by reducing: (1) the adverse impact of natural disasters on output, (2) damages to physical assets, and (3) post-disaster fiscal costs for rebuilding and lifeline support. Figure 1 illustrates the growth-debt tradeoff under the two scenarios as follows:

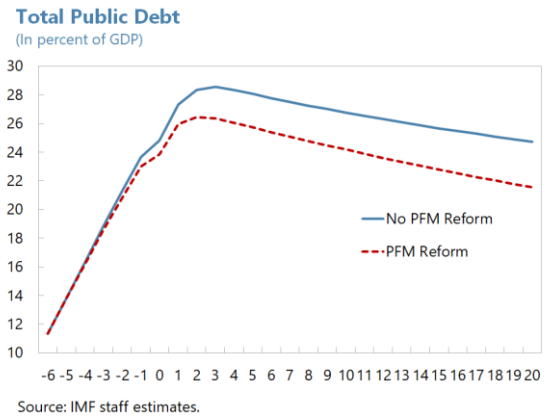
- *Fiscal deficit and public debt*. The increased cost of adaptation means that the fiscal deficit in the adaptation scenario is higher before the disaster strikes, and this leads to a larger accumulation of concessional debt before the disaster. Although an extreme natural disaster shock implies a spike in fiscal deficit due to reconstruction regardless of the type of infrastructure, adaptation infrastructure results in lower repair costs as damages are expected to be relatively limited, which in turns leads to a lower fiscal deficit and debt increases much less after the disaster strikes. Moreover, unlike the standard investment scenario, the debt level stabilizes more quickly over the medium- and long term due to smaller and less-persistent output losses and smaller reconstruction needs. While the actual increase in public debt may be lower—as grants from bilateral and multilateral development partners are likely to increase post-disaster—in relative terms, adaptation infrastructure is associated with lower public debt in the long term. The government could also use the resources in the Petroleum Fund instead of relying on debt – in which case adaptative investment would help strengthen the sustainability of Petroleum Fund – requiring less withdrawals cumulatively over time. Moreover, even in the absence of natural disasters, the lower average maintenance/repair costs of adaptation infrastructure due to its higher resilience are likely to be associated with a relatively lower fiscal burden over the long term, compared to conventional infrastructure.
- *Private investment*. Private investment is also more resilient under the adaptation investment scenario because adaptation infrastructure provides protection to private assets and mitigates productivity losses, raising returns to private investment and spurring output growth. In the first couple of years, the simulation results suggest that conventional infrastructure gives a higher boost to private investment compared to adaptation infrastructure. One interpretation of this result is that the complexity of adaptation capital projects means that it takes longer for these projects to become operational, and to contribute towards boosting economic productivity, compared to conventional infrastructure. On the other hand, by cushioning the economy from the natural disaster, adaptation infrastructure contributes towards raising the returns to households' and firms' long-term investment in the economy, which crowds-in higher private investment. This can help explain the bigger boost to private investment from adaptation infrastructure in the medium and long term, relative to conventional infrastructure.
- *Growth*. The results for broader economic performance largely echoes those for private investment. The investment scale-up pre-disaster increases output in both scenarios. This is larger for investment in adaptation, which depreciates slower and crowds in more private capital. The disaster hits in year 0 and reduces output substantially in the short term. Both the reduction in the short-run GDP and the long-run scarring effects are substantially lower with investment in adaptation infrastructure rather than standard infrastructure, with higher private investment providing a boost to growth over the medium and long run.

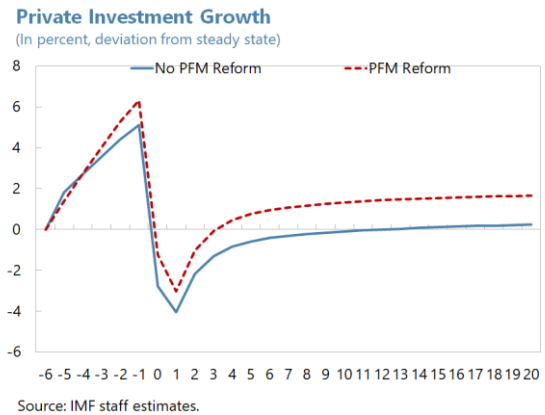
12. Simulation 2: Impact of Public Financial Management Reforms in the Adaptative Investment Scenario. It considers a scenario where the government implements PFM reforms before the disaster hits (starting in year -5) which increases Timor-Leste's public investment efficiency from 46 percent to 80 percent, consistent with other low-income countries in the region.[11] Meaningful PFM reform that strengthens public investment management can amplify the benefits gained from investing in adaptation infrastructure and lessen the growth-debt trade-off, illustrated in Figure 2 as follows:

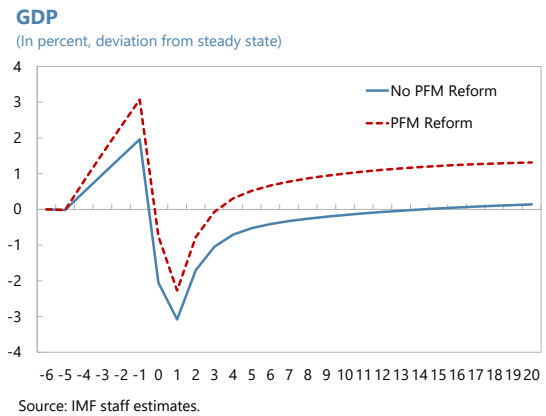
- *Growth and private investment*. GDP and private investment increases by more before the disaster thanks to a higher efficiency of investment. The higher efficiency of investment also allows a more rapid recovery from the disaster. Over the long run, PFM reform increases the level of steady-state output thanks to higher efficiency and crowding in of private investment.
- *Fiscal deficit and public debt.* Because of the higher efficiency of public investment, less spending is required to finance the recovery from the disaster, and hence the fiscal deficit increases by less. Correspondingly, public debt, while remaining unchanged in the short term, is lower in the long term, in line with a stronger fiscal position, and stronger growth.

Figure 2. Impact of Public Financial Management Reforms









[11] See Ghazanchyan and others (2017).

13. Simulation 3: Financing Adaptation Investment with Revenue Mobilization Reforms. It considers a scenario where the government starts strengthening revenue mobilization efforts before the disaster hits (in year -5) which improves tax collection efficiency (for any given tax rate). The reform takes 5 years to be fully implemented, with revenue collection improving by 2.5 percent each year. The improvement in the effectiveness of tax collection is permanent after the 5 years, and from there on government revenue is 12.5 percent higher than the baseline.[12] Figure 3 illustrates how such reforms can help alleviate the growth-debt trade-off.[13]

- *Fiscal deficit and public debt:* In the revenue mobilization scenario, the fiscal deficit shrinks gradually pre-disaster because of the gradual improvement in tax collection. The overall increase in the deficit is also lower post-disaster, and the fiscal deficit stabilizes at a lower level in the long run. Correspondingly, public debt increases by less and falls faster following the disaster.
- *Growth and private investment:* There is no effect on the path of GDP, given that reconstruction follows the same path in either case—the trade-off is between whether this reconstruction is funded by borrowing vs. more efficiently using tax revenues.[14]

14. The results are robust within a reasonable range of values for the relevant parameters. Although the exact magnitude of impact and tradeoff of investing in adaptation infrastructure is sensitive to the assumptions of the various parameters (paragraph 10 and Table 1), the qualitative results and policy implications remain unchanged. However, further analyzing the trade-off between the higher cost of adaptation infrastructure versus its post disaster fiscal savings indicates that if adaptation infrastructure is 2.5 to 3 times more expensive, it financially breaks even with respect to investing in standard infrastructure.[15] Beyond this, the net present discounted value of fiscal savings from investing in adaptation infrastructure versus standard infrastructure is negative.

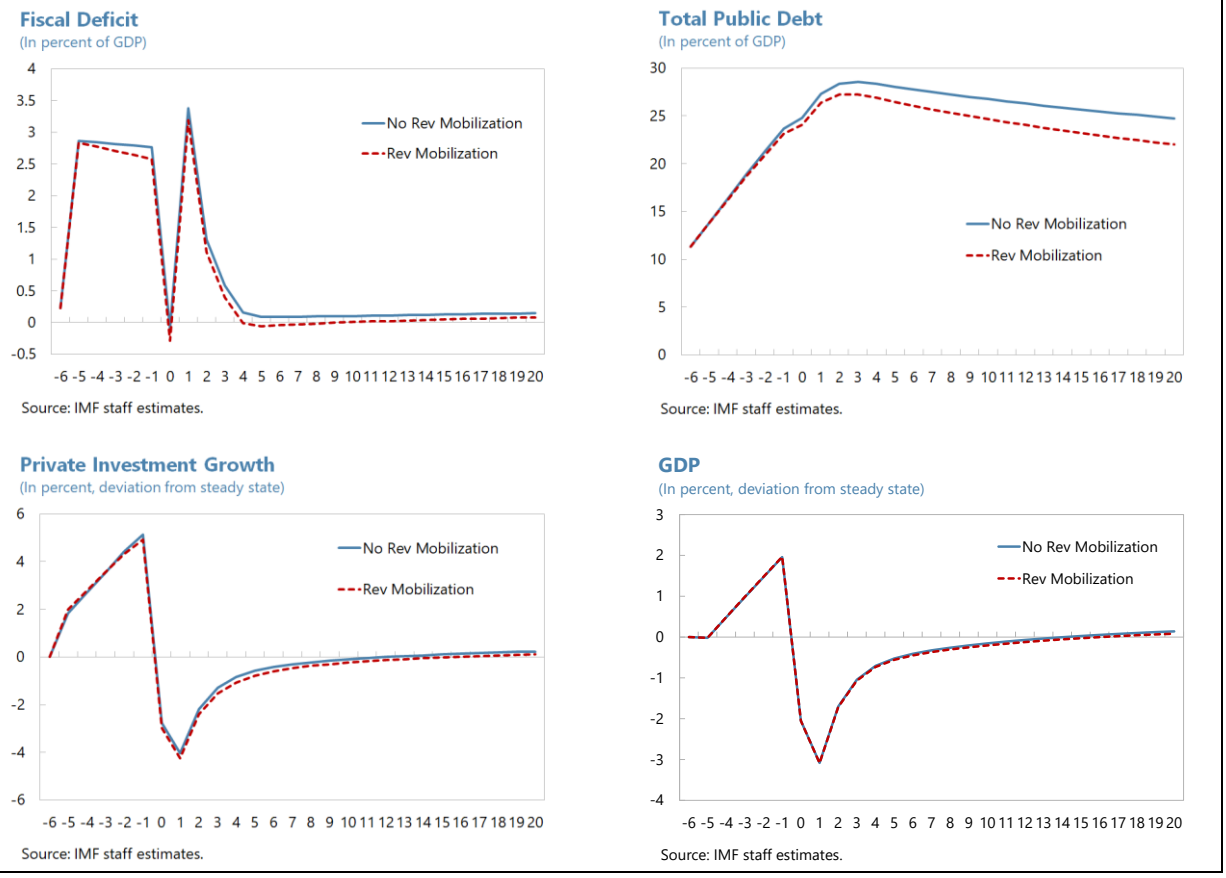
D. Policy Implications

15. The authorities should rationalize and reprioritize public spending towards natural disaster-resilient infrastructure. Government expenditure in Timor-Leste is exceptionally high averaging 86 percent of non-oil GDP between 2008-19, significantly higher than sustainable sources of revenue, thus threatening fiscal sustainability and gradually depleting its Petroleum Fund. In this context, the government budget should aim at rationalizing spending by cutting wasteful expenditure to create more space for allocating more resources towards resilient infrastructure building. Since 2011, close to one-fourth of public spending has been on building infrastructure assets, which is a top priority under Timor-Leste's Strategic Development Plan 2011–30. However,

[12] Note, this is a reform in which the government is not increasing the tax rate that consumers face, it is simply reducing inefficiencies in tax collection.
[13] While not included in the simulations, rationalizing government spending can also put public debt on a declining path.
[14] In the revenue mobilization scenario additional tax revenue gets rebated to households through transfers and lower taxes. Because households supply labor inelastically, this has very muted impact on the real economy, though the shift toward consumption and away from saving marginally dampens private investment. If the government used the additional tax revenue to further increase public investment, the model would predict much larger real impacts.
[15] This is based on discount rates ranging from 1 to 5 percent to calculate the net present discount value of the fiscal savings from investing in adaptation capital versus standard capital (see Melina and Santoro, 2021).

currently the design of infrastructure and construction standards in Timor-Leste are not climate resilient. The analysis shows that there is much greater dividend associated with building infrastructure using adaptation technologies instead. These include climate-proof roads and bridges, water supply and sanitation, and climate-resistant coastal systems. The initial cost of this type of infrastructure is usually elevated when compared to standard structures. However, when hit by a natural disaster shock, adaptation capital withstands adverse conditions reporting less damages, consequently cutting economic losses. It also limits the disruptive impact on agriculture and tourism, which are important economic sectors for the Timorese economy, as well as on health, education and food security. The resilience of adaption infrastructure also implies a healthier fiscal position in the long run as well as lower levels of indebtedness. Moreover, investing in disaster-resilient infrastructure can also instill greater confidence in the long-term prospects of the economy, which can go a long way towards crowding in private investment and potential growth.-

Figure 3. Impact of Revenue Mobilization Reforms



16. Revenue mobilization and PFM reforms will help tap the full potential of investing in adaptative infrastructure. Timor-Leste has limited fiscal space to deal with climate change risks. It is under moderate risk of debt distress but has limited space to absorb shocks. Moreover, along with very high public spending, it has very limited revenue mobilization—domestic revenues are low

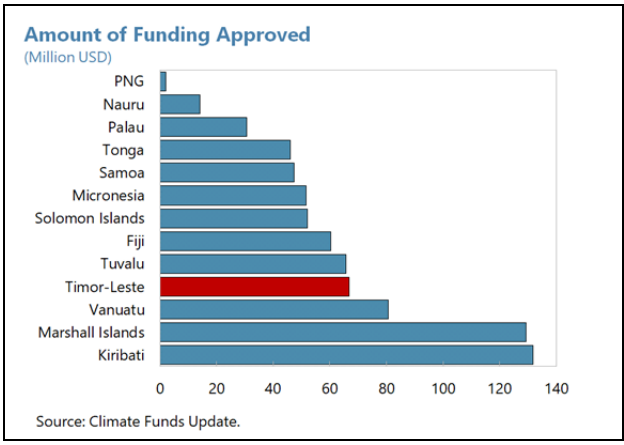
compared to other countries, averaging 11 percent of non-oil GDP during 2015–21. Revenue mobilization efforts are needed to help create space for allocating resources towards climate adaptation spending. According to the 2016 Public Investment Management Assessment, the average public investment efficiency gap in Timor-Leste is about 54 percent, much higher than the average of 24 percent for emerging market economies and 30 percent for emerging and developing Asia. Stronger PFM would help improve the quality and efficiency of public investment and raise the gains from adaptive infrastructure investment, as well as help sufficiently monitor and track the government's adaptation spending.

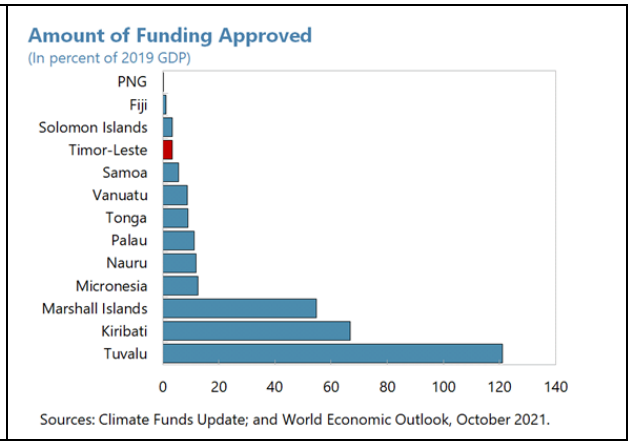
17. It will also be crucial to clearly articulate a medium-term expenditure and finance roadmap for an adaptation plan in the budget planning. IMF (2021) estimates that Timor-Leste would need to spend around 4.3 percent of non-oil GDP annually on public adaptation costs (mainly driven by spending on developing adaptive coastal protection infrastructure), which can be very costly.[16] Although adaptation priorities have been outlined in the Timor-Leste's National Adaptation Plan[17] —which identified agriculture, water resources, forestry, and public health to be the most vulnerable sectors to climate change— specific actions needed to achieve these have not yet been integrated into budgetary planning, and coordination amongst various public stakeholders and human capacity remain key challenges. While the 2022 budget includes considerable scaling up of public investment in the medium-term, it does not include any investment plans related to climate change infrastructure.

18. Timor-Leste should seek, to the extent possible, grants from development partners. Development partners have played an active role in helping Timor-Leste build its adaptive capacity so far. For instance, there are three ongoing projects with the Green Climate Fund (GCF) which include: (i) enhancing climate information capabilities and early warning systems; (ii) strengthening the capacity of institutions and building climate resilient rural infrastructure; and (iii) decreasing deforestation and forest degradation. International organizations, including the World Bank, ADB and UN agencies have also been providing support – for instance by making use of the latest technologies to climate proof their new infrastructure projects in the country and helping Timor-Leste access additional resources from global financing mechanisms for mitigation and adaptation.[18] However, more resources need to be mobilized to effectively cope with climate change risks. Timor-Leste's access to climate financing in terms of the amount of funding approved to GDP is one of the lowest while the absolute amount is the fourth largest in the region. Given capacity constraints, meeting the stringent requirement for financing from multilateral climate funds like GCF results in lengthy approval timelines and a considerable amount of approved funding is spent on hiring consultants/ technical experts. Building expertise and setting up a dedicated unit within the Ministry of Finance focused on tapping external grant-based financing to improve climate resilience could

[16] Approximately 66 percent of the population lives in coastal areas, and a key vulnerability to the coastal ecosystem is that the roads are often constructed too close to the coastline and are currently affected by severe coastal erosion due to floods and rise in sea levels.
[17] This was submitted to the United Nations Framework Convention on Climate Change (UNFCC) in March 2021.
[18] See Asian Development Bank. 2021. Climate Risk Country Profiles: Timor-Leste and World Bank Country Partnership Framework for the Democratic Republic of Timor-Leste for the period FY2020-24

help. Strengthening PFM capacity (paragraph 15) and outlining a medium-term financing roadmap for an adaptation plan (paragraph 16) are also important prerequisites.[19]





19. Concurrently, strengthening disaster risk management and preparedness, and raising awareness amongst the population, is equally important. There is an urgent need for a multi-pronged approach which should: (i) strengthen the institutional arrangement and prioritize the development of a national regulatory framework on comprehensive disaster risk management; (ii) update the National Disaster Risk Management Policy in line with lessons learnt from recent disasters; (iii) build and invest in multi-hazard early-warning systems; and (iv) explore financial preparedness strategies that increase the ability of the national and local government to respond more quickly to disasters. Moreover, strict land and building codes should be established to educate and prevent people from constructing precarious houses alongside riverbanks. Sustainable natural resource management is needed to decrease deforestation and forest degradation which has been causing more landslides. Also, educating the public about their role in adapting to climate change is essential.

[19] See Fouad et al. (2021)

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