

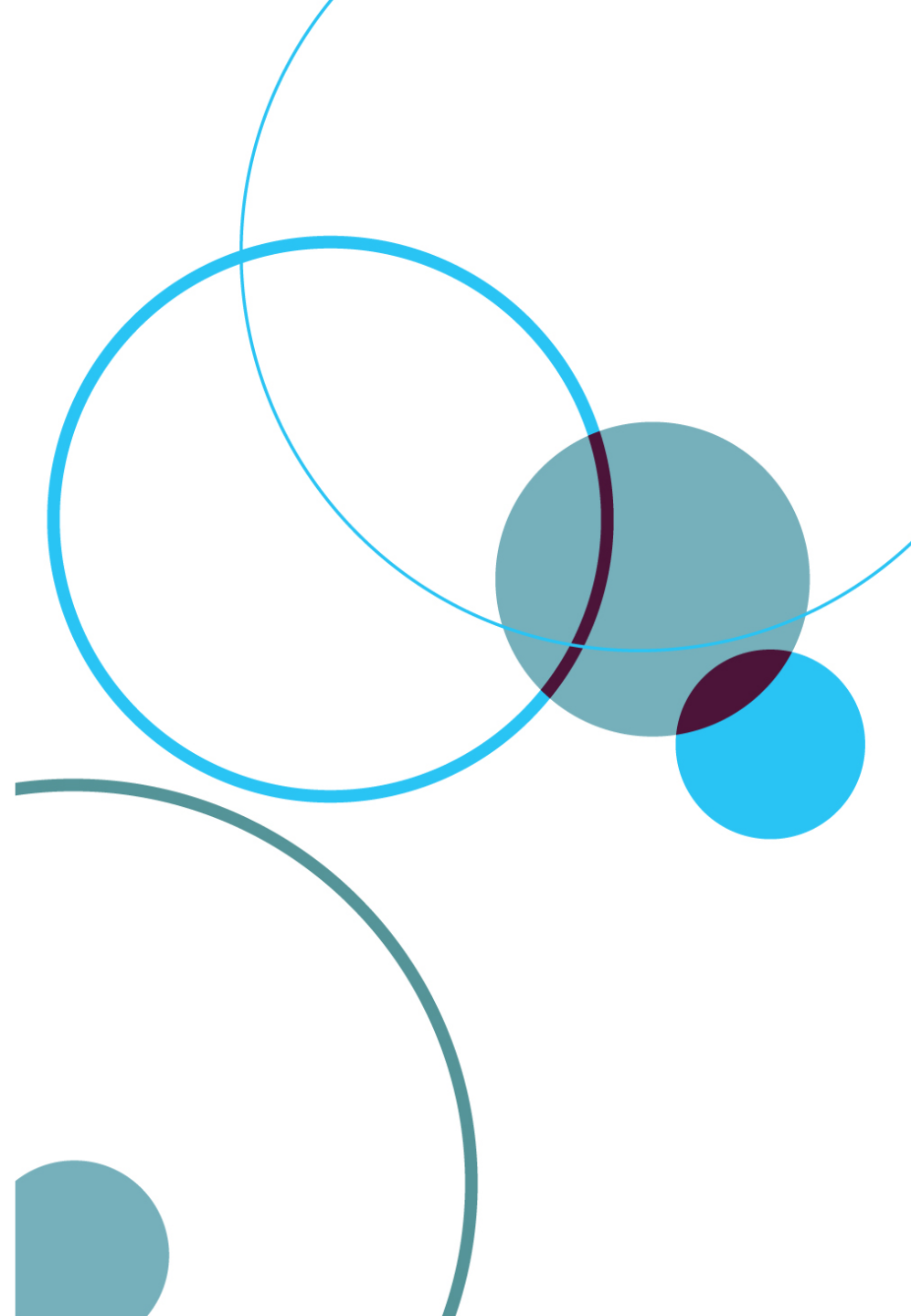
: vivideconomics

# The comparative advantage of international public money for adaptation

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**Report prepared for DFID**

4 November 2013



## Five key findings

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- 1. The best estimate of the cost of adaptation in developing countries is between \$60-\$100 billion a year by 2030, although this is subject to considerable uncertainty.**
2. Current flows of adaptation finance are significantly lower than future needs; there is a need to progressively scale up flows of adaptation investment from all sources (public, private, domestic and international) in the near term.
3. Uncertainty over climate impacts is not a reason for inaction on adaptation today; but does demand that adaptation decisions are made strategically.
4. There are complementary roles for the public and private sector in supporting adaptation activities; standard economic analysis can be used to help delineate the appropriate role for each.
5. Given limited resources for international climate finance for adaptation, resources may be optimally focussed in countries with high adaptation costs and where adaptation actors have limited access to finance. The limited evidence suggests that adaptation finance is not being prioritised in this way at present.

# The best estimates of the cost of adaptation in developing countries is between \$60-\$100 billion a year by 2030

## Although this is subject to considerable uncertainty

the best sources that provide a **comprehensive** assessment of the costs of adaptation are the World Bank Economics of Adaptation to Climate Change (EACC) and UNFCCC Investment and Financial Flows study

relatively consistent estimates of between \$60-\$100 billion a year

- significant elements relate to the costs of making infrastructure more climate resilient and greater coastal protection

but still significant number of issues to be resolved/addressed

- some sectors missing (tourism), focus on hard solutions, is adaptation optimised?

*Table 1. The UNFCCC and EACC studies provide broadly comparable adaptation cost estimates*

\$bn	UNFCCC	EACC-wet	EACC-dry
Infrastructure	2-41	27.5	13
Coastal zones	5	28.5	27.6
Water supply and flood protection	9	14.4	19.7
Agriculture	7	2.5	3.0
Human health	5	2	1.5
Extreme weather		6.7	6.4
Total	28-67	81.5	71.2

*Note: UNFCCC study billions by 2030; EACC annual average 2010-2050. Note, different aggregation approaches in the EACC study leads to different estimates*

# Bottom-up costing estimates play a useful role but, in isolation, are less helpful for making cross-country allocation decisions

## Bottom-up studies take different approaches to dealing with current adaptation deficits

EACC and UNFCCC are **top-down approaches**: developing frameworks or methodologies used for identifying costs in each sector; and applying these frameworks consistently across different countries or regions

- for example, EACC study examines expected expanded prevalence of diarrheal diseases and malaria and combines this with information about preventative costs

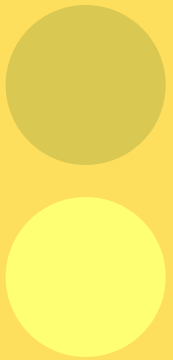
alternative approach is **bottom-up**: identify range of adaptation activities within a given geographic area and cost them, without replicating outside of the geographic area

bottom-up studies provide useful information of priority adaptation activities and the importance of sequencing in a particular context

- **but less useful, in isolation, for making global allocation decisions** due to diversity of assumptions and methodologies

in particular, different bottom-up studies will tend to take different approaches between responding to current climate variability and responding to future climate change

- links to the debate between adaptation and development
- UNEP AdaptCost study shows how this issue can double adaptation cost estimates



# Adaptation costs would be likely to increase substantially without mitigation effort

## **But the bulk of these additional costs would likely arise after 2050**

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most studies look at adaptation costs in the short-medium term implying moderate warming

— EACC study considers 2°C increase in global temperatures by 2050

Adaptation Integrated Assessment Models (AD-IAMs) are in principle able to look at the links between climate, economy, mitigation and adaptation over the longer term

— Africa 'Adaptation Gap' report uses this approach to estimate adaptation costs

these models suggest that global cumulative discounted adaptation costs to 2100 might increase by 66-100 per cent in a scenario in which there is no mitigation compared to a scenario in which emissions are stabilised at 550ppm (with some regions likely to see larger increases than others)

— but the bulk of these increases occur after 2050

however, AD-IAMs are very sensitive to modelling assumptions – especially on links between climate change and economic damage – that are very difficult to estimate

## Five key findings

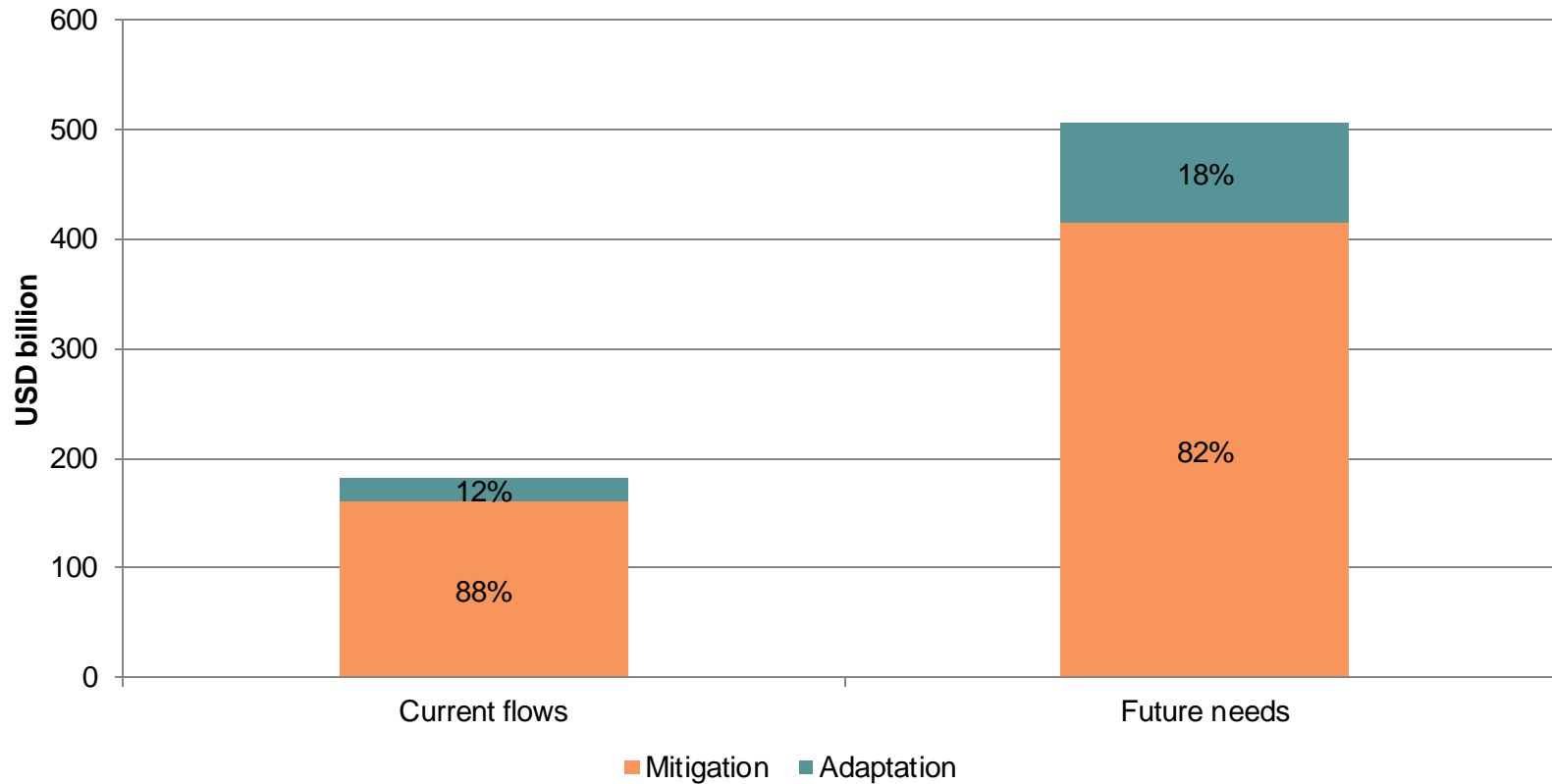
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# Adaptation flows in developing countries need to increase both in absolute and relative terms

**The design of the climate finance architecture may need to be adjusted to address this gap**

Figure 1. Investment flows relating to adaptation significantly lower than future expected costs



Note: For future adaptation finance needs, the EACC study estimates are reported. It is assumed that all of the adaptation flows reported in CPI (2013) flow to developing countries

Source: WB EACC (2010), various sources as listed in table 1, CPI (2013) Vivid Economics

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## Adaptation actions can be taken today to avoid lock-in, for activities with long-lead times and for ‘win-win’ options

**This represents a strategic response in the face of uncertainty over local/regional impacts**

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adaptation decision making is made challenging by deep uncertainty over localised climate impacts

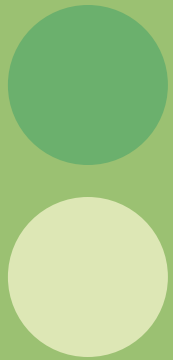
— significant risk of maladaptation

this should not be used as a reason for inaction but rather for strategic action

three principles can guide that action

1. activities which are **win-win** activities – that will be desirable regardless of the future climate scenario
2. activities which **avoid lock-in** of development or infrastructure path that would be costly to reverse in the future
3. activities which have a **long lead-time**

a number of activities across all key adaptation themes will meet some of these criteria in many countries



# There are priority adaptation interventions in all sectors

## Many relate to avoiding costly lock-in

Table 2. There are adaptation activities that can be prioritised in the short-term

Adaptation sector	Examples of priority activities
Agriculture	<ul style="list-style-type: none"> <li>— development of new strains of crops will have long lead-time</li> <li>— otherwise may be less activity needed except where practices are not desirable in the current climate (such as water management)</li> </ul>
Coastal	<ul style="list-style-type: none"> <li>— building standards for new buildings can avoid costly retrofitting</li> <li>— natural coastal defence measures may have long lead-times</li> <li>— other coastal defence measures only needed if communities currently exposed to coastal flooding</li> </ul>
Health	<ul style="list-style-type: none"> <li>— often core development goals so priority interventions in areas where there is an existing development need</li> </ul>
Infrastructure	<ul style="list-style-type: none"> <li>— revised technical standards for new infrastructure (safety-margins) and siting decisions</li> </ul>
Water	<ul style="list-style-type: none"> <li>— as for infrastructure</li> <li>— also water efficiency measures almost certainly a ‘win-win’ measure</li> </ul>
Extreme weather	<ul style="list-style-type: none"> <li>— few countries are well equipped to deal with extreme weather so measures such as better access to climate information, improved protection measures (storm shelters) and improved access to insurance can all represent priority win-win interventions</li> </ul>

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## To support adaptation the public sector should provide public goods, correct market barriers and protect the vulnerable

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much economic analysis is devoted to assessing when, where and how the public sector should intervene in markets

- this analysis applies as much to adaptation as it does to all other economic activities

three main reasons for intervention:

1. ensure the supply of **public goods** such as coastal defences, climate information and climate proofing existing public goods → often through public provision
2. respond to **market and policy/institutional failures** such as asymmetric information (limiting access to finance to, for example, farmers wishing to diversify crops), externalities (up-river water abstraction can have a negative impact on downriver communities), inappropriate existing interventions (water subsidies) → raise awareness and encourage action through taxes, subsidies and regulation (sometimes public provision)
3. **protect the vulnerable from climate events** e.g. extending immunisation programmes

the incidence of market barriers and vulnerable people will be particularly pronounced in LDCs

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## The allocation of international public resources for adaptation must be informed by both equity and efficiency considerations

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taking account of both equity and efficiency considerations in allocating international resources for adaptation would suggest two factors are particularly important:

- **expected adaptation costs:** countries that face greater damages from climate change and hence greater adaptation costs (expressed as a percentage of the relevant economic activity in that country) will have a greater need of – and ethical claim on – international adaptation resources
- **access to finance:** To maximise the efficiency of a limited amount of international public resources for adaptation, these resources may need to be directed to those ‘adaptation actors’ that have few or no alternative sources of finance (or can only access this finance at prohibitively high costs)

other factors (such as the quality of enabling environment) may also be important

# This framework suggests that across all adaptation sectors, Sub-Saharan Africa and South Asia are priority regions

**Similar analyses have been repeated for all individual adaptation sectors**

**Figure 2. Countries from SSA, as well as some SIDS and South Asian states, appear particularly vulnerable**

		Lowest adaptation costs					
<b>Best access to finance</b>		Algeria	Oman	Colombia	Angola	Gabon	
		Azerbaijan	Peru	Congo, Rep.	Panama	Kazakhstan	
		Botswana	Poland	Costa Rica	Uruguay	Marshall Islands	
		Russian Federation	Indonesia			Micronesia, Fed. Sts.	
		Slovak Republic	Latvia			Solomon Islands	
		Syrian Arab Republic	Malaysia			Tonga	
		Thailand	Paraguay				
		Turkmenistan	Philippines				
			Uzbekistan				
		Armenia	Hungary	Argentina	Namibia	Benin	Macedonia, FYR
		Belarus	Mauritius	Brazil	Nigeria	Bolivia	Mongolia
		Croatia	Romania	Ecuador	Tunisia	Chad	Rwanda
		Dominican Republic	South Africa	Georgia	Ukraine	Ethiopia	Tajikistan
			Turkey	Iraq		Guatemala	
			Tuvalu	Moldova			Comoros
							Djibouti
							Nepal
							Papua New Guinea
							Suriname
							Vanuatu
		Bosnia and Herzegovina	Albania	Morocco	Afghanistan	Niger	Bhutan
		Serbia	Cuba	Seychelles	Bangladesh	Tanzania	Guinea-Bissau
			El Salvador	Swaziland	Burkina Faso	Togo	Burundi
			Ghana	Zambia	Cambodia	Uganda	CAR
			India		Cameroon	Vietnam	Congo, Dem. Rep.
			Montenegro		Haiti		Madagascar
					Kyrgyz Rep.		Mali
							Nicaragua
							Senegal
<b>Worst access to finance</b>		Egypt, Arab Rep.	Jamaica		Dominica	St. Kitts and Nevis	Belize
		Jordan	Lesotho		Grenada	St. Vincent and the Grenadines	Liberia
	Lebanon	Libya		Kenya	Timor-Leste	Cape Verde	Malawi
	Samoa	Sri Lanka		Lao PDR	Yemen, Rep. and Principe	Cote d'Ivoire	Maldives
	Sudan	St. Lucia		Pakistan		Eritrea	Mauritania
		Venezuela, RB		Sao Tome and Principe		Gambia, The	Mozambique
						Guinea	Sierra Leone
						Guyana	

Source: Vivid Economics

Note: adaptation costs from NCAR (dry) EACC scenario

# But there are likely to be different geographic priorities for different adaptation sectors

## For coastal adaptation, SIDS become important

Figure 3. Many SIDS appear to be possible priorities for coastal adaptation

	Lowest adaptation costs				Highest adaptation costs			
Best access to finance	Azerbaijan		Algeria	Lithuania	Angola	Latvia	Comoros	
	Botswana		Bulgaria	Peru	Chile	Malaysia	Gabon	
	Kazakhstan		China	Poland	Costa Rica	Mexico	Marshall Islands	
	Paraguay		Colombia	Russian Federation	Indonesia	Philippines	Micronesia, Fed. Sts.	
	Turkmenistan		Congo, Rep.	Syrian Arab Republic		Uruguay	Panama	
	Uzbekistan		Iran, Islamic Rep.	Thailand			Solomon Islands	
							Tonga	
Worst access to finance	Armenia		Benin	Iraq	Argentina	Namibia	Djibouti	
	Belarus		Croatia	Mauritius	Brazil	Tunisia	Papua New Guinea	
	Bolivia		Dominican Republic	Nigeria	Ecuador	Ukraine	Suriname	
	Chad		Guatemala	Romania	Georgia	Vietnam	Vanuatu	
	Ethiopia		India	Turkey				
	Macedonia, FYR							
	Moldova							
	Mongolia							
	Nepal							
	Rwanda							
	Tajikistan							
	Afghanistan		Albania		Cambodia		Fiji	Honduras
	Bhutan		Bangladesh		Cameroon		Guinea-Bissau	Liberia
	Bosnia and Herzegovina		El Salvador		Congo, Dem. Rep.		Haiti	Madagascar
	Burkina Faso		Ghana		Cuba			Nicaragua
	Burundi		Togo		Montenegro			Senegal
	Central African Republic				Morocco			
	Zambia				Seychelles			
					Tanzania			
	Lao PDR		Egypt, Arab Rep.		Cote d'Ivoire	St. Kitts and Nevis	Belize	Mauritania
	Lesotho		Jordan		Jamaica		Cape Verde	Mozambique
	Malawi		Lebanon		Kenya	St. Lucia	Dominica	Sao Tome and Principe
			Pakistan		Libya	Venezuela, RB	Eritrea	
			Sudan		Sri Lanka	Yemen, Rep	Gambia, The	Sierra Leone
							Grenada	St. Vincent and the Grenadines
							Guinea	
							Guyana	
							Maldives	Timor-Leste

Source: Vivid Economics

Note: adaptation costs from NCAR (dry) EACC scenario



# Current flows of adaptation support do not appear to match suggested priorities

## **Although data constraints are significant**

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it is possible to compare the expected absolute adaptation costs for the countries in each cell in the matrix with current ODA flows related to adaptation

— see next slide for an example

this suggests a number of key points

- adaptation-related ODA does not tend to flow to the countries that this analysis suggest are most in need; indeed, if anything, the high-priority countries identified in this analysis receive smaller than proportionate amounts
  - rather adaptation flows appear to be flowing towards countries with moderate costs and moderate access to finance (the centre of the matrix)
- consistent with earlier analysis, current adaptation-related ODA flows are significantly lower than future expected costs
- all-sector adaptation costs for the countries which appear most vulnerable (are at the bottom right corner of the matrix) are about 20 per cent of total developing country adaptation costs

this suggests there may be a need to design international climate finance architecture to better support flows of adaptation to the most vulnerable countries

— allocation floors in relation to adaptation spending in some regions in the GCF?

# ODA-related adaptation does not appear to flow to the most vulnerable countries

Figure 4. ODA-related adaptation appears to flow more to countries with moderate costs and access to finance

		Lowest adaptation costs		Highest adaptation costs	
Best access to finance	Algeria Azerbaijan Botswana Bulgaria Cuba Cuba Ecuador Ghana Iran Lithuania Mexico	Oman Peru Poland Russian Republic Thailand Turkmenistan	Colombia Congo, Rep. Costa Rica Indonesia Lithuania Moldova Paraguay Peru Uzbekistan	Angola Palau Panama Uruguay	Gabon Kazakhstan Marshall Islands Micronesia, Fed. Sts. Solomon Islands Togo
	Armenia Belarus Cuba Dominican Republic	Hungary Mauritius	Argentina Brazil Ecuador Iran Moldova	Namibia Nigeria	Benin Bolivia Cuba Ecuador Guatemala
	Bosnia and Herzegovina Serbia	Albania Cuba	Morocco Seychelles	Afghanistan Bangladesh Cuba Cuba Cuba Honduras Kyrgyz Rep.	Macedonia, FYR Niger Tanzania
Worst access to finance	Egypt, Arab Rep. Jordan Lesotho Seychelles Sri Lanka	Jamaica Lesotho		Dominica Grenada Kenya Laos Lithuania Seychelles St. Kitts and Nevis and Principe Zimbabwe	Comoros Djibouti Niger Paraguay Senegal Vanuatu
					Bhutan Burundi Cape Verde Cuba Cuba Reunion Fiji Senegal Liberia Malawi Cuba Cuba Ecuador Ghana Cuba Guyana

Source: Vivid Economics

Notes: Countries in each cell are identical to those in slide 15. Percentages refer to the percentage of total costs/ODA associated with countries in that cell of the matrix



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