

# The Macro-Economic Effects of UK Aid Returning to 0.7% of GNI

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## Summary

The UK has recently reduced its foreign aid budget from 0.7% of gross national income (GNI) to 0.5%, with a view to going back to 0.7% when the fiscal context allows, estimated to be in 2024/5. The provision of aid is motivated by a wide range of factors that include moral, historical, strategic and security reasons. The primary aim of this paper is to complement the broad existing literature that focuses on the social and ethical aspects of aid by exploring aid flows from a macroeconomic perspective. The analysis reveals that the decision to cut UK aid will provide negligible direct savings for the UK, comes at a cost to the UK economy, and poses significant humanitarian and social costs in many poor countries. Aid delivers good value for money. Every £1 spent on aid delivers at least triple its value in the aid recipient regions. In addition, when we take international spillovers of aid into account, well-directed aid delivers a net positive return to the donor countries. Every £1 of ODA that is restored over the period 2021/22-2023/24, can be expected to provide recipient regions with the equivalent of £2.98-£5.31 in goods and services, and raise UK GDP by 1-13 pence. The estimates suggest that the decision to cut the UK ODA budget has cost in the range of £322 million to £423 million in lost UK exports, while up to 1.5 million more people in sub-Saharan Africa may suffer hunger as a result. <sup>1</sup>

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## 1. Introduction

UK development policy changed dramatically in 2021 by cutting official development assistance (ODA) from 0.7% of gross national income (GNI) to 0.5% of GNI. Whilst the Autumn Budget and Spending Review 2021 foresees aid returning to 0.7% of GNI in 2024/2025, this represents a sudden increase by £5.1 billion and is conditional on a set of fiscal tests being met. Many stakeholders would have preferred had aid not been cut. The Chancellor argued that the aid cut is required on fiscal grounds. This paper, however, argues that restoring the aid budget would not worsen the fiscal position in the UK significantly, and could actually support the UK exports whilst also supporting the livelihoods and food security of many poor people in many developing countries.

The provision of foreign aid is motivated by a variety of reasons. A 2021 survey by the British Foreign Policy Group<sup>2</sup> suggested that 20% of those who were supportive of aid spending argue it is a central part of the moral duty to help the world's poorest people as a leading global power; 15% believe that supporting local economies benefits the global economy; 13% think aid spending helps peace and security while making Britain safer; 10% think the UK has a special responsibility as a former colonial power; and 8% of Britons think the UK's status as a world-leading donor strengthens the UK's global reputation and international influence.

The primary aim of this paper is to complement the broad existing literature that focuses on the social and ethical aspects of aid by exploring aid flows from a macroeconomic perspective. A major contribution of this paper is to take into account the international spillover effects of the UK's recent aid cuts and discuss ways in which the UK economy may benefit from UK aid without tying aid to UK interest directly. The paper builds on a body of evidence such as Holland and te Velde (2012) and Mendez-Parra and te Velde (2017) that identifies four economic channels through which the economies of providers of aid are affected by aid outflows (apart from the financial resources it takes to fund aid) in addition to aid recipients. First, aid can lead to increased levels of exports and jobs directly. When aid increases growth and facilitates trade in recipients, recipient countries spend more resources on imports, which – depending on its export patterns – can affect aid providers. Massa and te Velde (2009) estimate partial equilibrium effects of bilateral aid loans and aid grants on exports and quantify the impact of additional aid flows (grants or loans) on exports, suggesting that a one million dollar increase in bilateral aid would lead to an increase of bilateral exports of a third of a million (France) and three quarters of a million in Germany and Japan. The percentage return to aid in the form of exports for Germany is 75%, Japan 76%, and France 31%. Drawing on an econometric analysis of the impact of EU development assistance on the EU economy and job creation, Mendez-Parra and te Velde (2017) estimate that UK direct bilateral development assistance generated an increase in UK exports of \$0.22 for every \$1 of aid spent, increasing trade revenues and providing an estimated 12,000 extra UK jobs in 2014. Secondly, aid can lead to cheaper and increased levels of imports in indirect ways. When aid increases productivity and reduces trade costs in aid recipients (e.g. through Aid for Trade (AFT)), this reduces the cost of imports from aid recipient countries, which affect aid providers depending on trade patterns. Using general equilibrium modelling, Holland and te Velde (2012) simulate the effects of €51 billion EU aid on sending and receiving countries over the period 2014-2020 and conclude that EU aid is an investment benefitting poor countries, the world generally, and the EU as a sender of aid. European and global GDP levels are estimated to have received a boost of almost 0.1 per cent and over 0.2 per cent, respectively, over this period. Using the same model, Fic et al (2014) find there are positive effects of Dutch aid for both the Dutch economy and recipient economies. This paper applies the same methodologies employed by Holland and te Velde (2012) and Fic et al (2014) to the UK economy.

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<sup>2</sup> <https://bfpfg.co.uk/2021/03/public-opinion-foreign-aid/>

Thirdly, aid can support foreign direct investment (FDI) and overseas profits of aid providing countries. Aid can pull or push FDI to developing countries, see te Velde (2007), which can lead to increased rates of returns for multinationals. Finally, aid can contribute to the provision of global public goods (te Velde et al., 2002) such as stable financial rules, a clean environment, a more secure world, or global knowledge – all of which can benefit aid providers and recipients.

Whilst a key interest in this paper is on the impact of the UK economy, the primary motivation of UK aid remains welfare, livelihoods and economic development in poor countries more generally. One particular focus of this paper is on the income effect and impact on hunger as measured by prevalence of undernourishment (PoU). According to FAO data, hunger had already been rising after 2014, due to conflict, adverse economic shocks, and climate change, with 688 million people hungry in 2019, compared to 624 million in 2014. Unfortunately, FAO (2021) estimates that due to Covid around 118 million more people were facing hunger in 2020 than in 2019, with around 768 million people in the world facing hunger in 2020. Similarly, the World Bank estimates that about 100 million additional people are currently living in extreme poverty as a result of the pandemic. All cuts in humanitarian funding, therefore, will be felt very acutely. Aid is now needed even more than before. The UK will pledge £1.5 billion over the next 8 years on tackling global malnutrition, as commitments to tackle malnutrition come directly to the fore.<sup>3</sup> There are also various ways in which different aid commitments and additional policies can tackle malnutrition and hunger.

There is a large literature on the impact of aid which we do not attempt to summarise here. However, it is important to emphasise that certain types of aid have bigger macro-economic impacts than other types, and that the context of aid matters. With appropriate complementary policies, aid or any international flow of finance such as FDI, has much larger positive impacts. Meanwhile, the institutional context affects the potential for misuse of aid and the absorptive capacity to spend aid. A survey of the literature on aid studies finds broad support for the positive relationship between development aid and economic growth (Arndt, Jones and Tarp, 2016), although weak institutions and poor governance in recipient countries may limit the potential returns from development assistance (Bräutigam and Knack, 2004). While acknowledging the importance of this context, for simplicity, in this study we do not distinguish the policy and institutional context of individual recipient countries, but focus on the average regional effects and absorptive capacity of aid flows. This approach is supported by the findings of Temple and Van de Sijpe (2017), who were unable to reject the hypothesis that aid is fully absorbed.

This paper examines the impact of restoring the UK ODA budget from 0.5% of GNI to 0.7% of GNI on both the recipient economies and the UK as aid provider, taking into account indirect spillover effects of aid as proposed in Holland and te Velde (2012). The structure of this paper is as follows. Section 2 outlines recent UK development policy with respect to the amount of aid and presents graphically the aid scenarios in broad terms. Section 3 provides model estimates around different aid scenarios, depending on key assumption on how aid is directed. Section 5 assesses the probability of meeting the fiscal tests to restore the 0.7% of GNI budget. Section 4 concludes. An Annex provides an overview of the macroeconomic model used to develop the scenarios.

## 2. Recent Changes in UK Foreign Aid and Broad Aid Scenarios

In the November 2020 Spending Review, the UK government announced that it would temporarily reduce the budget for ODA from 0.7% to 0.5% of gross national income (GNI) in 2021. This reduces the amount of aid available in 2021/22, relative to what had been previously planned, by approximately £4.1 billion. To put that into context, this represents about 0.4% of total managed public expenditure and 0.2% of GDP, but

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<sup>3</sup> <https://twitter.com/amandamilling/status/1488912194473545730>

represents nearly a third of the UK's ODA budget. This means it has necessarily entailed significant cuts in many programmes and support services overseas.

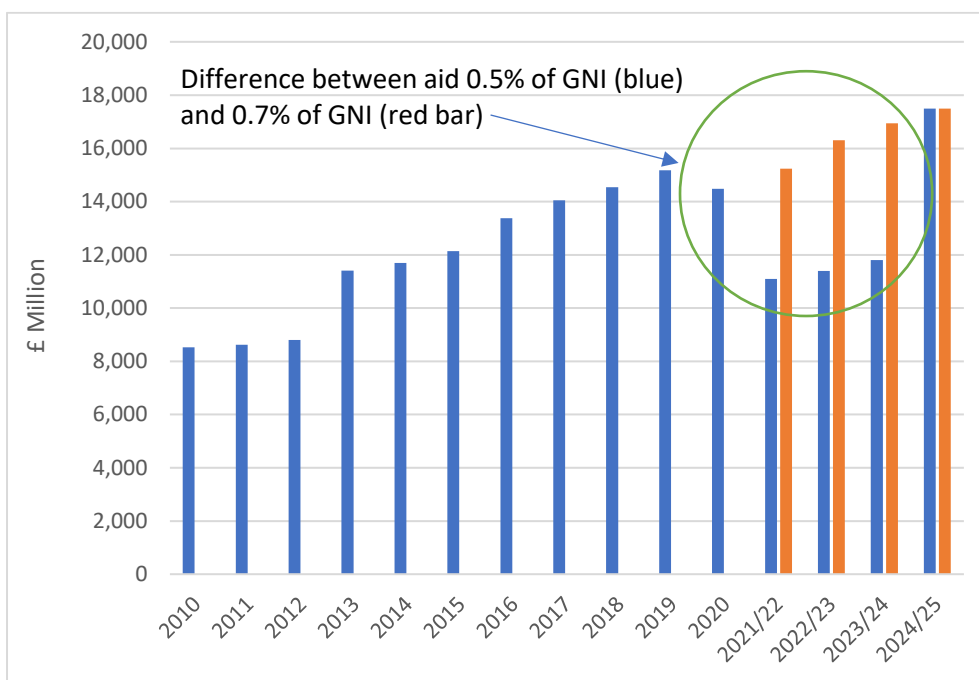
These cuts mean the UK has fallen short of meeting commitments set out in the 2015 International Development Act, when it pledged to maintain an ODA budget of at least 0.7% of gross national income. The 0.7% target originally stems from a UN resolution adopted in 1970, which established a target for all economically advanced countries to provide 0.7% of their gross national income in foreign aid. Back then, the plan was to achieve the target within 5-10 years in all economically advanced countries. A full 50 years later, this target remains elusive for the vast majority of wealthy countries. The UK was one of just six OECD countries that achieved this target in 2020, alongside Germany, Denmark, Luxembourg, Norway and Sweden. Without the UK, that leaves just 5 countries that are complying with the 1970 resolution.

The 2015 International Development Act does allow for deviations from the 0.7% target in a single calendar year under certain fiscal circumstances. The Covid crisis has certainly put a strain on public finances, and the Government is quite naturally seeking ways to help stabilize the fiscal position. The ODA cuts have been justified on the grounds of fiscal prudence, and the Chancellor has commented that at a time of emergency, sticking to 0.7% is not an appropriate prioritisation of resources. While the cuts in the UK aid budget represent a small direct saving to the exchequer, the decision to cut aid fails to account for the high returns of aid in recipient countries, where aid delivers good value for money, as well as the potential positive macroeconomic spillovers from outward ODA on the donor countries. In many cases, studies show that foreign aid delivers positive economic returns in the donor countries, and may ultimately pay for itself (Holland and te Velde, 2012).

The reduction in the UK foreign aid budget is intended to be temporary. In July 2021, the Government outlined a set of fiscal tests that would determine when spending levels would return to 0.7% of GNI. According to the Autumn Budget and Spending Review 2021, these fiscal tests are forecast to be met in 2024/25. Unallocated ODA spending for that year provisionally provides for aggregate spending levels that revert to 0.7% of GNI in 2024/25. This means that cuts in UK foreign aid are currently expected to be extended for at least a full 3 years, with accumulated cuts in ODA of an estimated £14.2.

Figure 1 presents the main aid scenarios in this paper. The baseline illustrated by the blue bar is aid as reported in the FCDO annual reports. ODA declined from £15.2 billion in 2019 to £14.5 billion in 2020. According to the Autumn Budget and Spending Review 2021, ODA is estimated to fall to £11.1 billion in 2021/22 (0.5% of GNI), rising to £11.4 billion in 2022-23, £11.8 billion in 2023-24 and £12.3 billion in 2024-25. An additional £5.2 billion has also been budgeted for in 2024-25, in order to revert the aid budget to 0.7% of GNI. The counterfactual or alternative scenario depicted by the red bar sees aid remaining at 0.7% of GNI over the full period. Over the three years, this allows spending on aid to increase by a cumulative £14.2 billion. In the next section, the scenarios developed compare the macroeconomic impacts of maintaining aid spending as depicted by the red bars to the current commitments depicted by the blue bars.

**Figure 1. UK ODA budget, current forecast (blue) and return-to-0.7 scenario (orange)**



Source : FCDO, Statistics for International Development, Sept 2021; UK Strategic Review October 2021, and simulated scenario

### 3. Modelling the Macroeconomic Impacts of the Decline in UK Aid

In this section, we report estimates of the macroeconomic impacts of the decision to reduce the UK ODA budget over the financial years 2021/22 to 2023/24. We then go on to assess the probability that the fiscal tests required to reinstate the 0.7% of GNI target for ODA will be met in each of the forthcoming fiscal years.

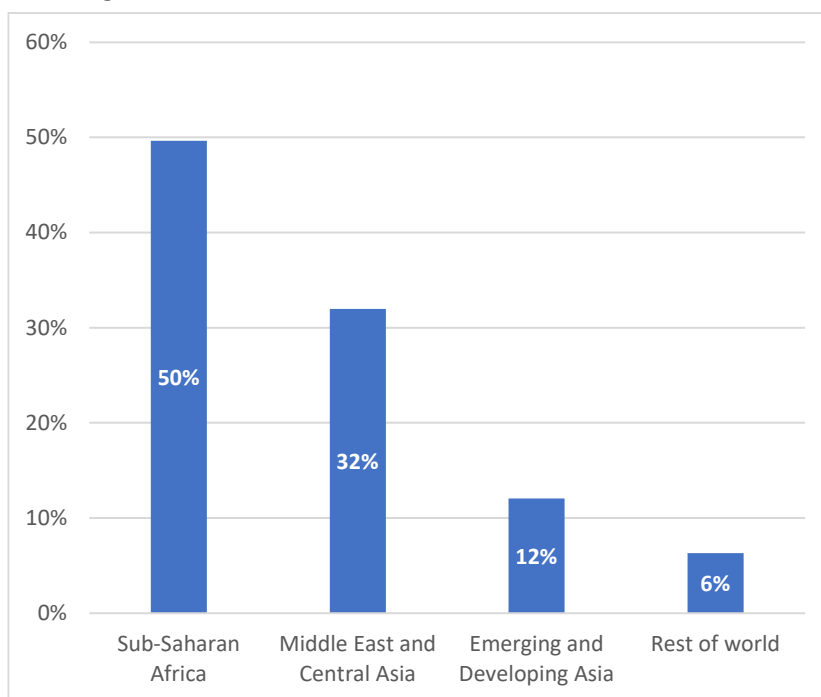
These estimates are based on a series of scenarios undertaken with the National Institute Global Econometric Model, NiGEM. NiGEM, which is developed and maintained by the National Institute of Economic and Social Research (NIESR), is a peer reviewed global econometric model that has been in the public domain for over 30 years. It is widely used by central banks, finance ministries and other public and private bodies around the world for forecasting, scenario analysis and stress testing and is well known to key UK government stakeholders. A brief overview of NiGEM is provided in the Annex.

#### 3.1. Macroeconomic Impacts of Aid Cuts

To estimate the macroeconomic impacts of the recent cuts in UK foreign aid, we develop a set of counterfactual scenarios in which the ODA budget is maintained at 0.7% of GNI over the period 2021/22 to 2023/24. This is compared to the baseline scenario, which incorporates the reduced ODA budget of 0.5% of GNI over this period (see figure 1 in Section 2 above). The difference between the two provides an estimate of how the trajectories for key macroeconomic variables in both the UK and the potential recipient countries have been affected by the decision to cut the aid budget.

In 2020/21, over 90% of bilateral ODA from the UK was directed towards countries in the NiGEM regional blocks<sup>4</sup> for sub-Saharan Africa, the Middle East and Central Asia and Emerging and Developing Asia (figure 2). For the purpose of simplicity, the scenarios presented in this section focus exclusively on these regions. Available information for 2021/22 indicates that approximately 46% of the cuts in UK ODA have fallen on sub-Saharan Africa; 41% have fallen on the Middle East and Central Asia; with the remainder hitting countries in Emerging and Developing Asia. The scenarios apply the shocks according to these proportions in all 3 years. The total shock amounts to approximately 0.21% of baseline GDP in sub-Saharan Africa, 0.08% of baseline GDP in Middle East and Central Asia and 0.04% of GDP in Emerging and Developing Asia. When interpreting the results, it is important to bear in mind that the shocks may be much bigger in individual recipient countries, which are small relative to the size of the regional block as a whole.

**Figure 2. Share of bilateral ODA from UK in 2020/21**



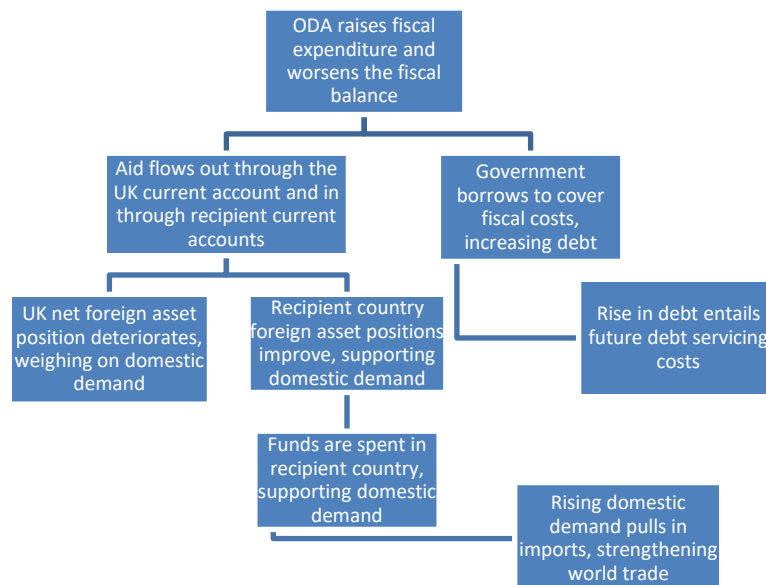
Source: FCDO Annual Report. Regional aggregations aligned with NiGEM blocks detailed in Table A1 of the Annex. Note that these aggregations exclude some of the larger emerging market economies that are modelled individually in NiGEM, including South Africa, China, India and Indonesia.

To understand the scenario estimates, let's first review the transmission channels of foreign aid flows. Figure 3 illustrates the "first round" effects of a rise in foreign aid on key channels. In a dynamic global model such as NiGEM, any first round effects – the direct impact from the change in policy – will be followed by second round effects as the private sector, trade position, prices and exchange rates adjust in response to the initial impacts.

<sup>4</sup> See Annex Table A1 for a description of regional aggregations. Note that these aggregations exclude some of the larger emerging market economies that are modelled individually in NiGEM, including South Africa, China, India and Indonesia.



**Figure 3. Transmission channels of ODA flows – first round effects**

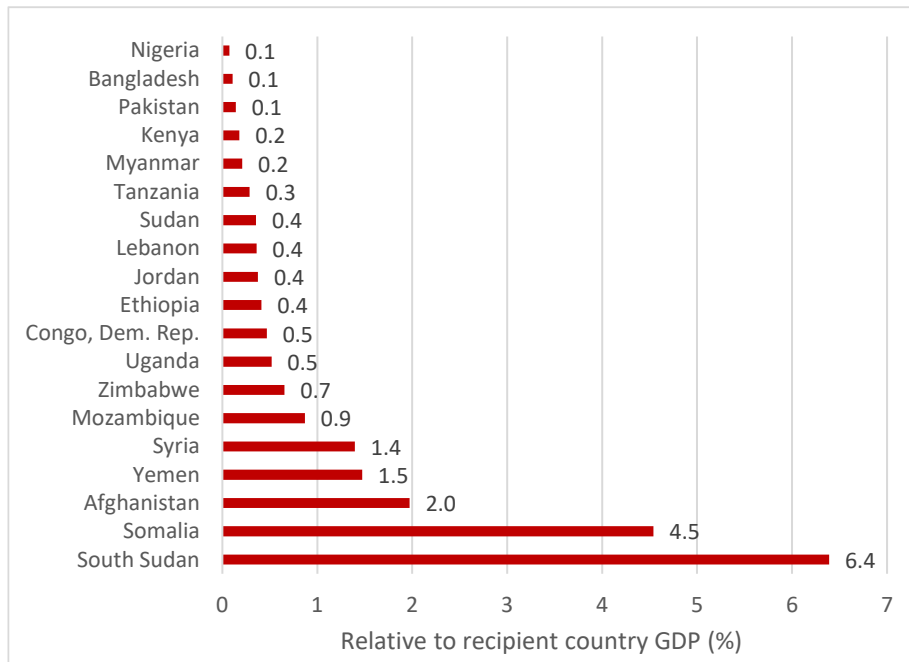


ODA forms part of the Government’s current expenditure. A rise in ODA increases government expenditure and initially worsens the fiscal balance – that is, the difference between the revenue raised by the government through taxation and other revenue streams and government expenditure on the provision of public goods and services. A deterioration of the fiscal balance is met through public borrowing, raising the level of government debt, which entails future debt servicing costs.<sup>5</sup>

Foreign aid flows between countries through the current accounts, with a negative effect on current account balances in the donor country and a positive effect on current account balances in the recipient countries. This has implications for the accumulation of foreign assets, as the size of the current account balance must equate to the change in the net stock of foreign assets in each country (after allowing for any revaluation effects). Aid recipients will see an improvement in their net foreign asset position, while the UK will initially see a deterioration. As foreign assets form part of the financial wealth stock of the economy, this would weigh on domestic demand in the UK, while supporting demand in the recipient countries (even before the inflow is spent). In US\$ terms, the direct net rise in recipient assets will roughly equal the direct net decline in UK net assets. However, in percentage terms, the gains in the recipient country may be high relative to the losses in a large country such as the UK. Figure 4 illustrates UK bilateral ODA by recipient country in 2019 as a share of domestic GDP. These flows constitute a crucial source of finance in several countries with limited access to international capital markets, and where extreme poverty rates tend to exceed 30 per cent (figure 5).

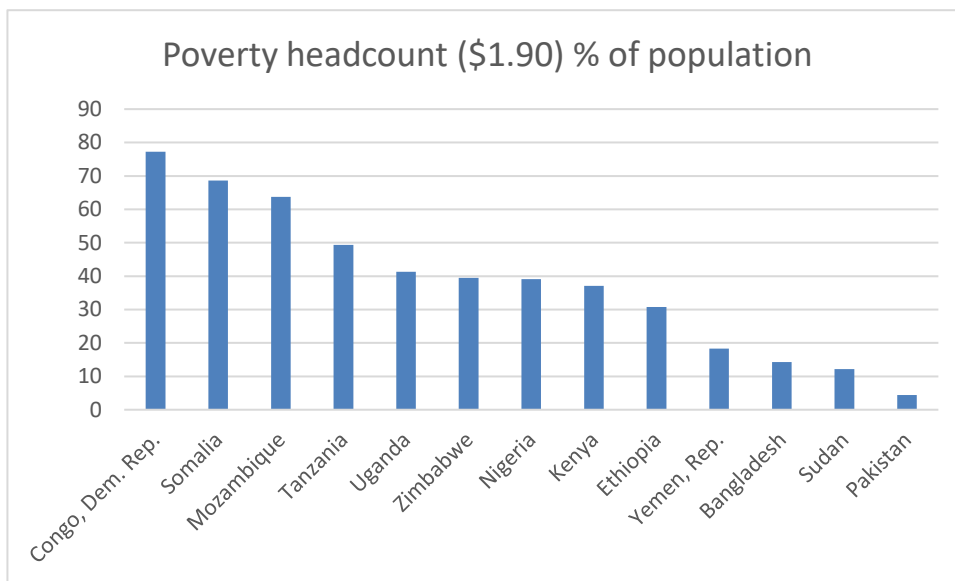
<sup>5</sup> NiGEM by default operates with a tax rule in place to ensure that governments remain solvent. Any rise in government debt will induce an endogenous response in the rate of income tax, to bring the fiscal position back in line with its target. In the scenarios that follow, this fiscal response is turned off for the UK, so that the long-run impacts on debt can be assessed.

**Figure 4. UK bilateral ODA by recipient country, 2019 , as % of GDP**



Source: Derived from Foreign, Commonwealth & Development Office, Statistics on International Development, September 2020; IMF World Economic Outlook Database, April 2021; United Nations National Accounts Main Aggregates Database, December 2020.

**Figure 5. Poverty headcount (\$1.90) % of population**



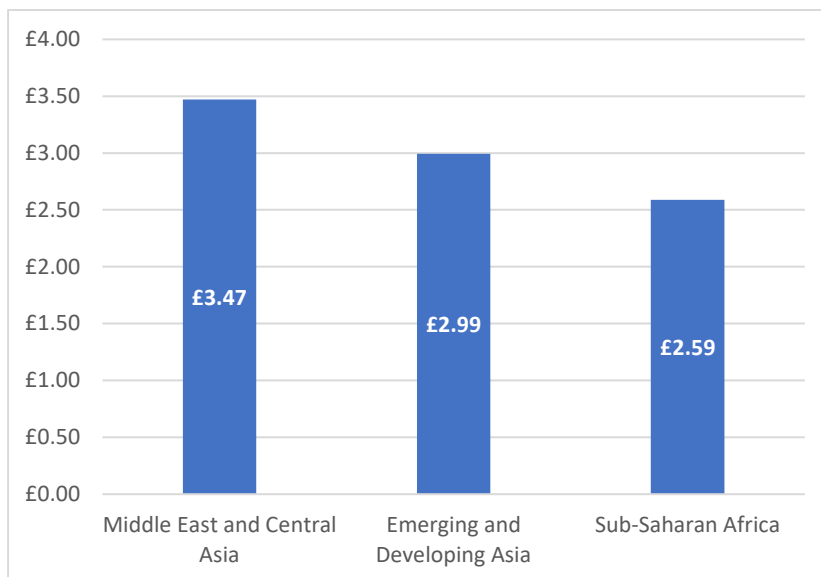
Source: WDI latest year available.

The aid received by the recipient countries is then spent on domestic goods and services. This raises domestic demand in the recipient countries which can help to alleviate hunger and food insecurity and improve livelihoods. Some of this additional demand will be met through imports, so it also raises world trade and export volumes in the rest of the world – including from the UK. The second round effects are largely driven by the rise in world trade that is expected to follow, offsetting the negative first-round impacts on the donor country outlined above.

An important caveat to bear in mind in all the scenarios is that the purchasing power of £1 in aid recipient countries tends to be significantly higher than it is in the UK. Figure 6 illustrates the average purchasing power in the primary recipient regions of UK ODA. In the ODA recipient countries of the Middle East and

Central Asia region, £1 is worth on average an equivalent of £3.47. In Emerging and Developing Asia, £1 can purchase the equivalent of roughly £2.99 in the UK. In sub-Saharan Africa, £1 is worth about £2.59. As a result, there are substantial gains to be made at the global level through transfers from the UK to developing and emerging economies, simply due to these purchasing power effects. Spending £1 in an ODA recipient country can purchase 2.5-3.5 times the quantity of goods that it would buy in the UK. In other words, spending on ODA represents good value for money to the UK taxpayer.

**Figure 6. Purchasing power of £1 in recipient regions in 2020**

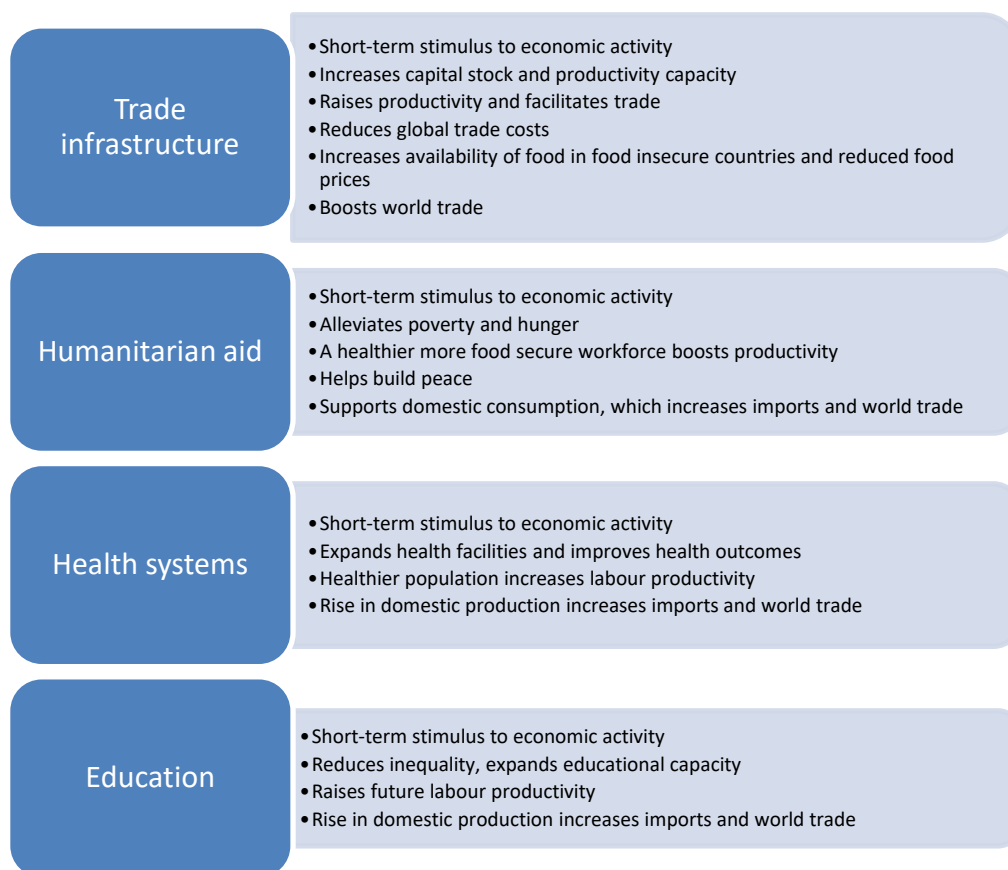


Source: Derived from weighted average of *Implied PPP conversion rates* from IMF World Economic Outlook database, October 2021. Country weights represent the share of UK aid cuts to the region in 2021/22. Regional aggregations aligned with NiGEM blocks detailed in Table A1 of the Annex.

Another important caveat to bear in mind is that recipient countries often have no or limited access to international capital markets. This means that in the absence of aid inflows the support measures would simply not be financed. As a result the multiplier attached to aid flows is expected to be relatively high, as the inflow of ODA is unlikely to squeeze out domestic spending.

The net impact of the aid on both the recipient countries and the UK ultimately depends on how the funds are spent. If aid is used to pay off existing debts of the recipient country, the impacts on the domestic economy are very limited (see Holland and te Velde, 2012). But aid that is directed towards humanitarian assistance, health systems, education, or trade facilitating infrastructure have important impacts in the recipient countries, and will also generate positive spillovers to the rest of the world in the form of higher trade and/or lower prices. Each category of expenditure has a slightly different impact on key economic and social indicators in the short-term and the longer-term. Figure 7 outlines the key impacts associated with each expenditure channel.

**Figure 7. Impacts of different types of development spending in recipient countries**



From a macroeconomic modelling perspective, the different channels outlined above lead us to ask 3 key questions when designing a scenario.

1. Is the aid directed towards current consumption or investment?
2. Are there spillovers to productivity growth in the recipient country, and if so what is the magnitude?
3. Are there spillovers to the costs of international trade in the recipient country and with the recipient country, and if so what is the magnitude?

Bearing in mind that the estimated impacts of ODA in both the sending and recipient countries will depend on the assumptions made around these questions, in section 3.3-3.6 a set of scenarios are explored to compare the estimated macroeconomic impacts under the differing assumptions. This determines an appropriate range of multipliers that can be applied to assess the macroeconomic effects of UK aid returning to 0.7% of GNI.

### **3.2. Estimating the Impacts on Food Security**

Each channel of impact outlined in figure 7 also links to food security through incomes and other factors. FAO (2021) estimate the prevalence of undernourishment (PoU, as % of population) at 9.9% for the World, 21% for Africa, 9% for Asia and 9.1% for Latin America). Globally, 768 million people were facing hunger in 2021, or 118 million more people than in 2020. In Africa, 281.6 million were estimated to face hunger and malnourishment. FAO (2019, 2021) argue that food insecurity as measured by the prevalence of hunger is caused by a number of factors including poverty and lack of incomes, local food shortages and food waste, poor infrastructure, volatile food markets and prices, climate change, war and conflict, nutritional quality and

discrimination. Focusing on the impact of poverty and incomes, FAO (2019) estimate that over the period 2011 to 2017, a 1% decline in the level of GDP was associated with a 0.15 percentage point rise in PoU. This is based on data and statistical analysis for 130 countries (See Annex 4, Table A4.2 of FAO, 2019). We use this benchmark elasticity of -0.15 in the discussions below, being fully aware that there are channels to hunger and food security beyond the link with income and that there are also substantial feedback loops from food security to incomes and growth.

An alternative methodology to estimate the potential impact on hunger and food security draws on the close correlation between measures of extreme poverty and measures of hunger. In 2017, there were 617 million people suffering from undernourishment (FAO, 2021) and 696 million people living in extreme poverty<sup>6</sup>. While there is not 1-for-1 overlap between the two groups, living in extreme poverty makes it much more likely that income constraints will lead to hunger. FAO estimates that around 118 million more people were facing hunger in 2020 than in 2019 as a result of the Covid-19 pandemic, while World Bank estimates suggest that extreme poverty rose by 88 million to 115 million in the same year.

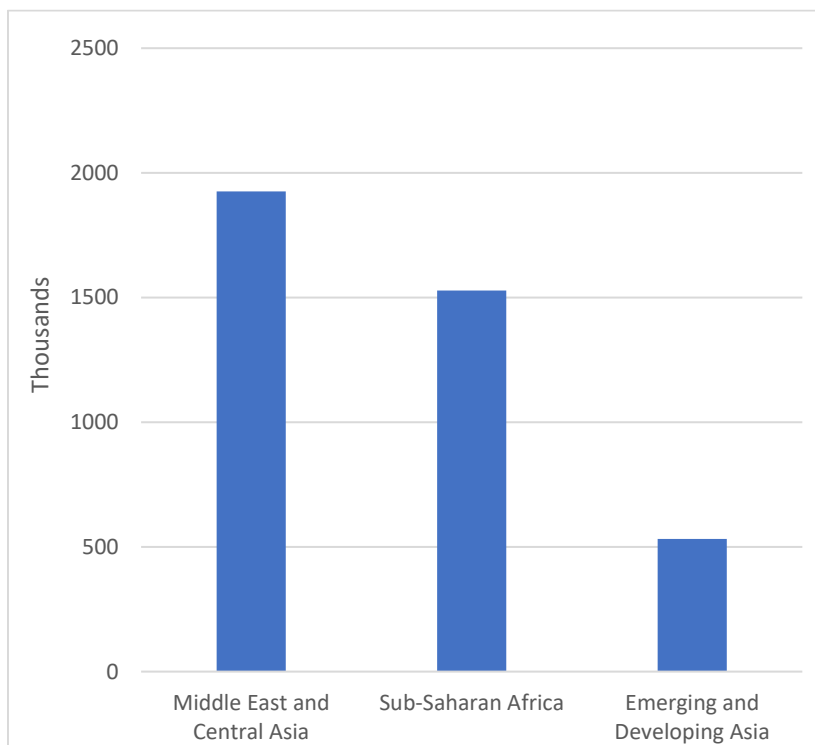
If transferring the equivalent of \$1.90 per day (at 2011 PPPs) – the international benchmark for extreme poverty<sup>7</sup> – to individuals suffering from extreme poverty can also alleviate hunger, we can easily calculate an estimated impact of aid flows that are directed towards humanitarian assistance of this kind on the number of people suffering from hunger. Figure 8 illustrates the number of people that could have been supported with \$1.90 per day had the UK ODA budget been maintained at 0.7% of GNI over the three-year period from 2021/22-2023/23. Across the three regions, nearly 4 million individuals could have been prevented from falling into malnourishment if these additional funds were directed entirely towards those at risk of extreme poverty.

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<sup>6</sup> <http://iresearch.worldbank.org/PovcalNet/povDuplicateWB.aspx>

<sup>7</sup> See <https://blogs.worldbank.org/developmenttalk/international-poverty-line-has-just-been-raised-190-day-global-poverty-basically-unchanged-how-even> for an overview of international poverty lines.

**Figure 8. Number of people that could have been supported with \$1.90/day if UK aid budget was maintained and fully directed towards those facing extreme poverty**



Source: Authors estimates, calibrated by converting to domestic purchasing power the estimated additional aid that each region would receive if the UK maintained the 0.7% of GNI target. This is divided by the annual equivalent of \$1.90/day. This simple calculation does not consider additional macroeconomic feedbacks.

### 3.3. ODA Directed Towards Current Consumption

Many types of aid flows, including humanitarian aid, are directed towards current consumption spending. Humanitarian aid can come in many forms, including the protection of civilians, the provision of food, water and sanitation, shelter, health services and other items of assistance. Fundamentally, humanitarian aid is directed towards saving lives and alleviating suffering, and often provides a vital lifeline in countries facing conflict, crises and natural disasters, to meet the immediate needs of those that are impacted. It is difficult to put a monetary value on many of these aims, reminding us why the primary motivation of ODA is generally not economic.

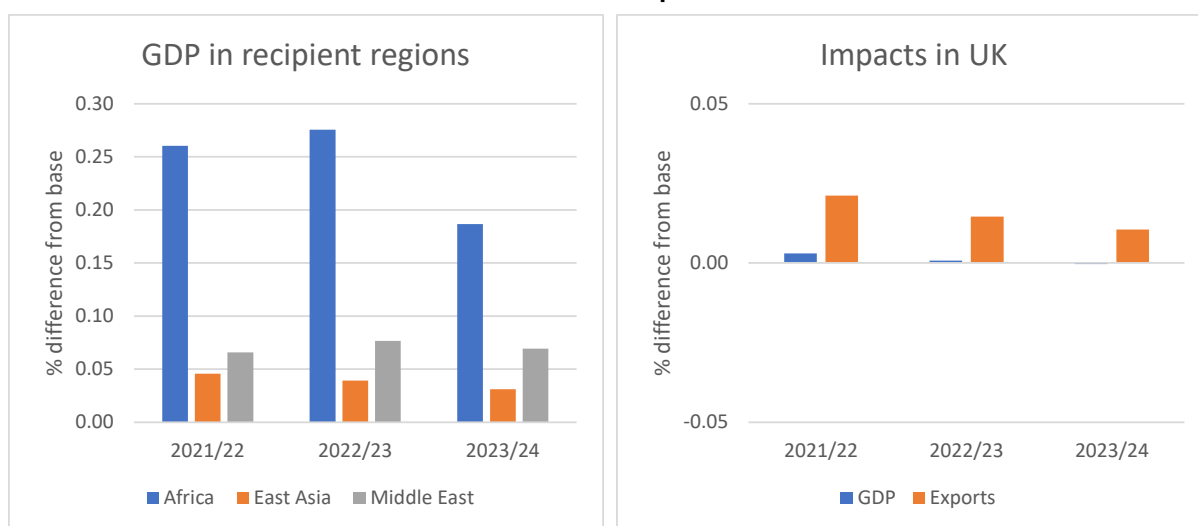
This first scenario is based on the most conservative assumption in terms of the expected macroeconomic returns from aid in both recipient countries and donor countries. We allow for no spillovers from the aid spending on productivity. Of course, under many circumstances aid directed towards current consumption spending may also deliver longer term economic benefits. For example, improving health conditions, or improving personal security situations that allows children to attend school and adults to seek employment can all raise productive capacity over the longer-term. The productivity channel is explored in subsequent scenarios, and the results from this scenario can be viewed as a lower benchmark.

Figure 9 illustrates the estimated impacts on GDP in the recipient regions of maintaining the 0.7% of GNI target for ODA in the UK, under the assumption that the additional spending is directed entirely towards current consumption. The results are presented relative to the baseline that includes the reduced level of spending on ODA of 0.5% of GNI throughout 2021/22-2023/24 (as in figure 1 above).

If the funds are spent on current consumption, there will be a short-term stimulus to demand in the recipient countries. The estimates suggest that GDP would have been temporarily about 0.25% higher in sub-Saharan Africa if the UK aid budget had not been cut, with smaller positive impacts in East Asia and the Middle East. Given the catastrophic impact of the COVID-19 pandemic on economies across the world, with global GDP estimated to have contracted by over 3% in 2020, even relatively small impacts on the level of GDP could have alleviated some of the deprivation faced by millions of households. The economic impacts of the additional aid flows would be expected to largely dissipate by 2024/25, by which time UK aid in the baseline scenario is also 0.7% of GNI.

The temporary stimulus in recipient regions would raise demand for imported goods, and so support exports from the rest of the world, including the UK. This offsets the negative first-round effects on the aid sending country outlined in figure 3. While the impacts in the UK are marginal, exports and GDP would have been slightly higher had the aid budget not been cut, and all additional aid been spent on current consumption in recipient countries. In other words, the decision to reduce the UK aid budget is likely to have reduced the level of UK exports and GDP over the period 2021/22-2023/24.

**Figure 9. Impacts of meeting 0.7% target, with additional spending directed towards current consumption**



Source: NiGEM Scenario 1. Note that figures illustrate the cumulative impacts on the level of GDP and exports in percentage terms.

Based on the FAO (2019) estimates discussed in Section 3.2, an increase in African GDP by 0.25% is expected to lead to a 0.04 percentage point change in PoU, or a decline in the number of malnourished people of about 450 thousand. Given that the aid in this scenario is directed entirely towards current consumption, the impacts on hunger could be even higher. For example, figure 8 shows that if the aid were directed exclusively towards those in extreme poverty, this could alleviate hunger for closer to 1.5 million people in Africa and 4 million people worldwide.

### 3.4. Scenario 2: ODA Directed Towards Investment

Scenario 2 represents a counterfactual scenario where all the additional aid is spent on investment in productive capital, rather than on current consumption as in scenario 1. Spending on investment will raise the available capital stock within the recipient countries, delivering a permanent rise in the level of potential output. Although the short-term effects of spending on current consumption and productive investment may not differ significantly, the long-term impacts are quite distinct. The long-term rise in productive capacity in the recipient countries in response to investment spending will be more likely to deliver a positive return in the donor countries, who gain from a longer-term rise in exports to the recipient countries.

Spending on investment goods can take many forms, such as investment in agricultural machinery, building schools and hospitals, constructing power plants, building roads, investing in ICT networks, etc. While many of these types of investment would be expected to raise productivity growth beyond the impact of rise in capital stock, in this scenario we do not allow for any additional productivity spillovers. These will be explored in the following scenarios.

In order to calibrate the impact of the rise in investment on the long-run productive capacity of the region, we need to understand the magnitude of its contribution to the capital stock. This requires an initial assumption on the level of existing capital in each region, the approximate labour share of income, and an estimate of the expected rate of depreciation of the investment. We apply the median global parameters for each of these variables, based on Penn World Tables 10.0 (Feenstra, Inklaar and Timmer, 2015). These suggest that on average the capital stock in each country is 4.15 times bigger than the level of GDP; the average labour share of income is about 50% (although fossil fuel exporters tend to have a lower labour share); and the average annual rate of capital depreciation is about 4%. The scenario results are based on these median set of assumptions.

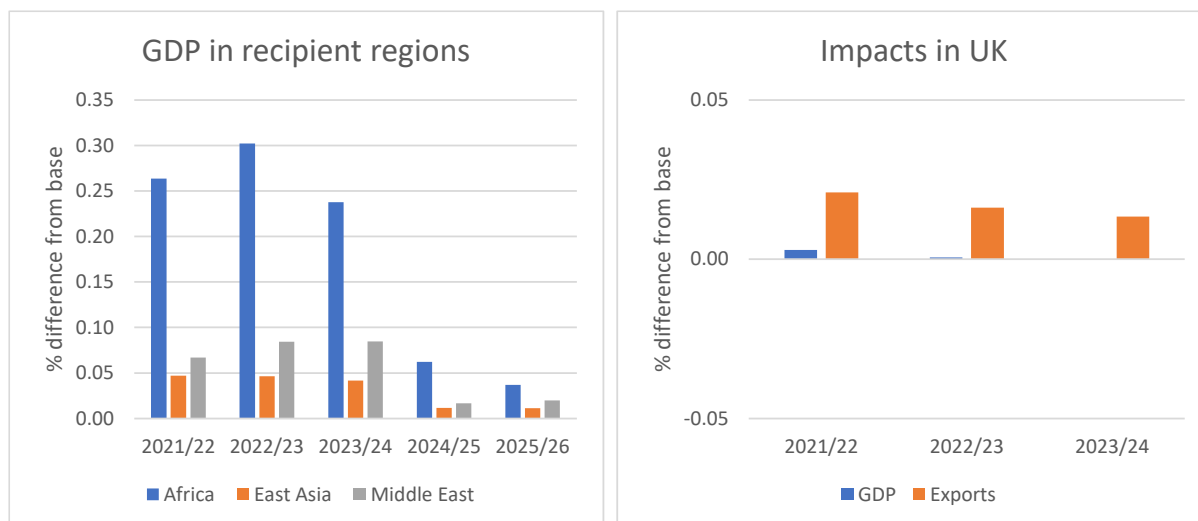
Figure 10 illustrates the estimated impacts on GDP in the recipient regions of maintaining the 0.7% of GNI target for ODA in the UK, under the assumption that the additional spending is directed entirely towards productive investment. The results are presented relative to the baseline that includes the reduced level of spending on ODA of 0.5% of GNI throughout 2021/22-2023/24.

If the funds are spent on investment, there will be a short-term stimulus to demand in the recipient countries. The estimates suggest that GDP would have been temporarily about 0.3% higher in sub-Saharan Africa if the UK aid budget had not been cut, with smaller positive impacts in East Asia and the Middle East. In contrast to scenario 1, the impacts do not fully dissipate after the period of increased aid, but the level of GDP would be expected to remain permanently higher in all regions. In other words, the temporary cut to UK ODA may mean that the economic wellbeing in ODA recipient countries is permanently worse off than it would have been had the ODA budget been maintained at 0.7% of GNI. Applying the FAO (2019) methodology, this could mean 140 thousand more people worldwide will permanently suffer from malnutrition as a result of the decision to temporarily cut UK ODA.

The stimulus in recipient regions would raise demand for imported goods, and so support exports from the rest of the world, including the UK. Again, the impacts in the UK are very small, but as in scenario 1 we seen that the decision to reduce the UK aid budget is likely to have reduced the level of UK exports and GDP over the period 2021/22-2023/24.



**Figure 10. Impacts of meeting 0.7% target, with additional spending directed towards investment**



Source: NiGEM Scenario 2. Note that figures illustrate the cumulative impacts on the level of GDP and exports in percentage terms.

### 3.5. Scenario 3: ODA Directed Towards Investment with Productivity Spillovers

In scenario 3, we build on the scenario discussed in the previous sections to allow for productivity spillovers from the aid spending. While there is the potential for productivity gains in response to spending on current consumption – for example if health conditions improve – in this scenario we consider ODA that is spent on productive investment that delivers productivity spillovers.

Some investment is more productive than others. Areas of investment spending that have been found to deliver high economic returns include, for example, infrastructure investment, investment in health and investment in education.

The economic returns of investment in healthcare, such as setting up clinics and training healthcare professionals, are well-documented. For example, Wang (2015) suggests that a 1 per cent of the GDP rise in health spending is expected to increase labour productivity growth by about 0.2 percentage points. A healthy workforce is more productive, which translates into higher levels of GDP, higher levels of government revenue, lower unemployment and higher real personal disposable incomes.

The returns to education have also been widely studied in academic literature. For example, Botev, Égert, Smidova and Turner (2019) suggest that a 1 per cent of the GDP rise in spending on education can increase in labour productivity growth by about 0.1 percentage points per annum.

Meanwhile, there are a number of channels through which infrastructure investment may raise productive capacity and potential growth. For example, better roads reduce transportation costs of goods and services; improve access for job opportunities; may help raise school attendance and further education; and may improve access to clean water and healthcare facilities. Improvements in the ease of doing business brought about by these changes may also attract higher levels of inward FDI to support private sector investment. The broad empirical research on this area includes studies such as Aschauer (1989), Briceño-Garmendia *et al* (2004), Fedderke and Bogetic (2009), Agénor (2011) and Pereira and Andraz (2013). Estimates point to at least a 20 per cent return to investment in key infrastructure, with average returns suggesting that a 1% of GDP rise in spending on infrastructure raises labour productivity growth by 0.15 percentage points per annum.

If the UK had maintained its ODA budget at 0.7% of GNI, and the additional spending had been directed entirely towards health systems in developing countries, labour productivity would have likely been about 0.75% higher in sub-Saharan Africa than currently anticipated (figure 13). Smaller, permanent rises would

have been expected in East Asia and the Middle East. This rise in productivity is indicative of improvements in the health and well-being of the population. Investment in health systems saves lives, extends healthy life expectancy, reduces infant mortality rates, and improves child welfare and education outcomes. The returns go far beyond the economic returns presented here, and even those are substantial.

Based on the range of potential productivity spillovers related to productive investment, for the purpose of this scenario we apply a relatively conservative estimate that allows productivity growth to rise by 0.1 percentage points per annum in response to investment spending equivalent to 1 per cent of regional GDP, bearing in mind that there is upside potential to this scenario.

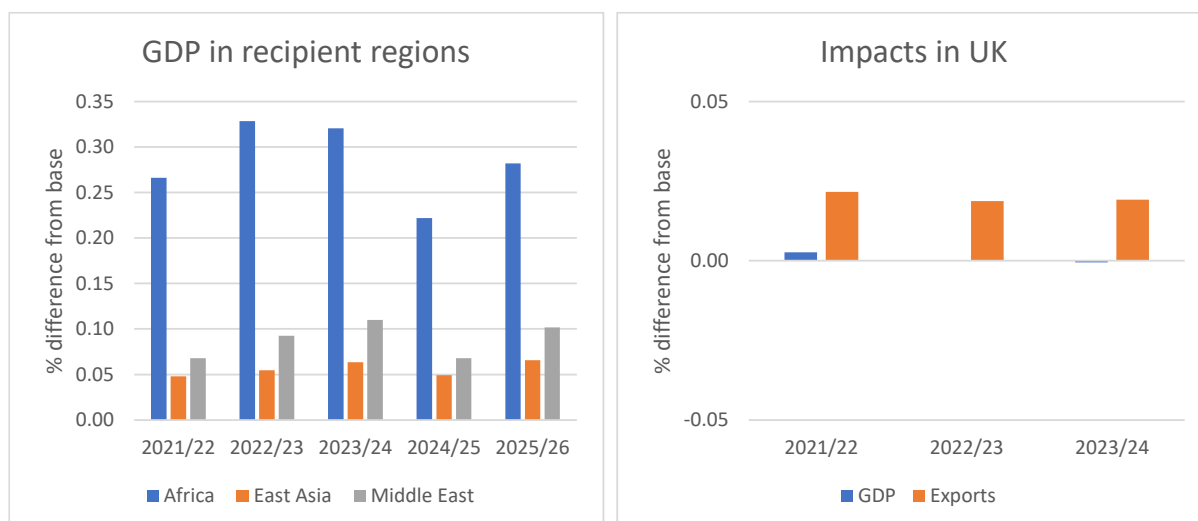
Figure 11 illustrates the estimated impacts on GDP in the recipient regions of maintaining the 0.7% of GNI target for ODA in the UK, under the assumption that the additional spending is directed entirely towards productive investment with productivity spillovers. The results are presented relative to the baseline that includes the reduced level of spending on ODA of 0.5% of GNI throughout 2021/22-2023/24.

As in the previous scenarios, the initial investment delivers a short-term stimulus to demand in the recipient countries. The estimates suggest that the level of GDP would have initially increased by over 0.3% in sub-Saharan Africa if the UK aid budget had not been cut, and about 0.1% in the Middle East ODA, with smaller positive impacts in East Asia. The positive impacts remain close to this level in subsequent years, as the rise in productivity growth delivers a permanent rise in the GDP growth rates in recipient regions.

As in scenario 2, this suggests that the temporary cut to UK ODA may mean that the economic wellbeing in ODA recipient countries is permanently worse off that it would have been had the ODA budget been maintained at 0.7% of GNI. Applying the FAO (2019) methodology, this could mean that by 2025, 675 thousand people worldwide continue to suffer from malnutrition as a result of the decision to temporarily cut UK ODA.

As in the previous scenarios, the impacts in the UK are estimated to be very small, but we continue to find that the decision to reduce the UK aid budget is likely to have reduced the level of UK exports and GDP over the period 2021/22-2023/24.

**Figure 11. Impacts of meeting 0.7% target, with additional spending directed towards investment with productivity spillovers**



Source: NiGEM Scenario 3. Note that figures illustrate the cumulative impacts on the level of GDP and exports in percentage terms.

### 3.6. Scenario 4: ODA Directed Towards Investment, with Spillovers to both Productivity and Trade Costs.

In the final scenario, we consider a counterfactual situation where the UK aid budget had been maintained at 0.7% of GNI, and all the additional spending is directed towards investment with spillovers to both productivity and trade costs.

Cali and te Velde (2009, 2011) demonstrate that investment directed towards trade facilitation (Aid for Trade) can significantly reduce the costs of trading with the recipient regions. They identify an elasticity of trade costs to aid supporting trade of -0.1. This raises the competitiveness and demand for recipient exports and also reduces import costs for the rest of the world. OECD/WTO (2019) cite a wide range of studies that confirm similar conclusions, supporting economic diversification and competitiveness in recipient countries.

Our estimates suggest that restoring the UK ODA budget, with the additional spending directed towards trade facilitating infrastructure in the recipient countries, would increase Aid for Trade flows to sub-Saharan Africa by about 17% over this period, and raise flows to the Middle East and Developing Asia by roughly 15% and 4.5% respectively. The shocks to export prices are calibrated with reference to these values and the elasticity of -0.1 identified by Cali and te Velde (2009).

Figure 12 illustrates the estimated impacts on world trade volumes and global trade costs if the UK aid budget had been preserved at 0.7% of GNI and the additional spending had been directed towards trade facilitating infrastructure in the recipient countries. The results are presented relative to the baseline, which includes the reduced level of spending of 0.5% of GNI (as in figure 1 above). If the UK's aid budget had been maintained, this could have reduced global trade prices by about 0.3% by 2025, and increased the volume of world trade slightly.

**Figure 12. Impacts of meeting 0.7% target, with additional spending directed towards investment with both productivity and trade cost spillovers**

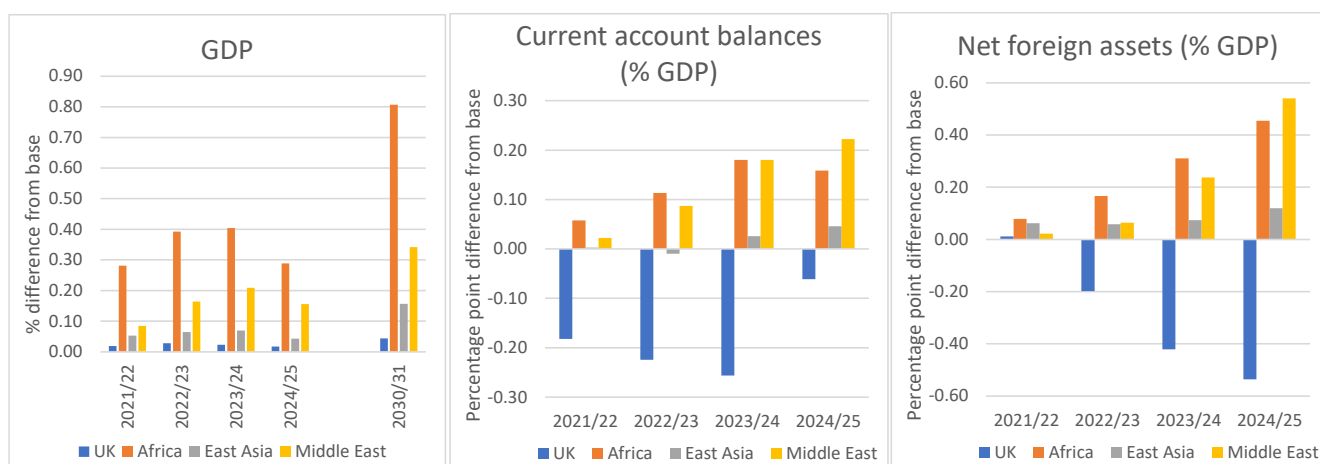


Source: NiGEM Scenario 4. Note that figures illustrate the cumulative impacts relative to the baseline in percentage terms.

Figure 13 illustrates the estimated impacts on key macroeconomic variables in the UK and in the recipient regions of maintaining the UK aid budget at 0.7% of GNI, had the additional spending been directed towards investment with both productivity and trade cost spillovers, such as trade facilitating infrastructure. The estimates indicate that the level of GDP in sub-Saharan Africa would have been about 0.4% higher than currently forecast by 2023/24, and 0.8% higher by 2030/31. Output in the other recipient regions would

also have been up to 0.3% higher. The strength of the impact in Africa reflects a combination of the facts that (1) approximately 46% of the cuts to UK ODA have fallen on sub-Saharan Africa, and (2) the loss of ODA in sub-Saharan Africa represents a larger share of the regions GDP – estimated at 0.21%.

**Figure 13. Impacts of meeting 0.7% target, with additional spending directed towards investment with both productivity and trade cost spillovers**



Source: NiGEM Scenario 4. Note that figures illustrate the cumulative impacts relative to the baseline values.

The boost to international trade would have supported stronger growth across the world, including in the UK. In this scenario, UK GDP would have been expected to be permanently higher by about 0.05% had the temporary cut to ODA not been introduced.

Applying the methodology of FAO (2019), the impacts suggest that more than 2 million people worldwide may suffer from malnutrition by 2030 as a result of the UK decision to temporarily reduce the ODA budget. Improvements in trade related infrastructure would also facilitate trade in agriculture goods and reduce food insecurity. This suggests that the impact on malnutrition may be even higher than 2 million.

### 3.7. Scenario Summaries

Table 1 summarises the key macroeconomic estimates from scenarios 1-4. A key takeaway from these scenarios is that spending on ODA represents good value for money. On average, each additional £1 spent on UK ODA during 2021/22-2023/24 would be expected to deliver the equivalent of £2.98-£5.31 of goods and services in the recipient regions. These high returns reflect a combination of the adjustment to purchasing power and the multiplier impacts, which depends on how the aid is spent. In general, multipliers tend to be high in aid recipient countries (close to or above 1), as they tend to have limited access to international capital markets and there is low risk that ODA will squeeze out domestic spending. In addition, with the global economy still suffering from the impacts of the Covid-19 pandemic, leaving high levels of spare capacity, multipliers in the short-term can be expected to be higher than usual (see, e.g., Auerbach and Gorodnichenko, 2012). The estimates reported in table 1, therefore, should be viewed as having upside potential.

**Table 1. Returns to meeting 0.7% target on GDP during 2021/22-2023/24**

	Scenario	Current consumption (1)	Investment (2)	Investment and productivity (3)	Investment, productivity and trade costs (4)
Average return to £1 in UK ODA	All recipients	£2.98	£3.34	£3.85	£5.31
	Africa	£2.97	£3.31	£3.78	£4.47
	East Asia	£2.95	£3.30	£3.79	£6.46
	Middle East	£2.83	£3.30	£4.08	£4.63
	UK	£0.01	£0.01	£0.01	£0.13
Cumulative rise in exports	UK	£322 mn	£354 mn	£420 mn	£423 mn

Source: NiGEM Scenarios 1-4. Impacts of the average return to £1 in UK ODA are assessed as the average return in the 3-year period from 2021/22-2023/24, so exclude long-run impacts. Impacts on UK exports are assessed as the cumulative rise in exports over the 3-year period.

In the UK, the expected economic returns from spending on ODA are expected to be small, but positive. For each additional £1 spent on ODA during 2021/22-2023/24, UK GDP would be expected to rise by 1-13p. Over the full 3-year period of reduced ODA, cumulative UK export losses are expected to be in the range of £322 million to £423 million.

Based on the elasticity between economic growth and undernourishment derived from FAO (2019), table 2 reports the estimated impact that maintaining the UK ODA budget of 0.7% of GNI would have had on malnourishment in Africa during 2021/22-2023/24.

**Table 2. Impact of meeting 0.7% target on food security during 2021/22-2023/24**

	Scenario	Current consumption (1)	Investment (2)	Investment and productivity (3)	Investment, productivity and trade costs (4)
Sub-Saharan Africa	% change in GDP	0.24	0.27	0.31	0.36
	PoU (percentage point decline)	0.036	0.040	0.046	0.054
	PoU (thousands decline)	387-1528	431	493	582
Middle East and Central Asia	% change in GDP	0.07	0.08	0.09	0.15
	PoU (percentage point decline)	0.011	0.012	0.014	0.023
	PoU (thousands decline)	85-1926	95	109	187
Emerging and Developing Asia	% change in GDP	0.04	0.05	0.06	0.06
	PoU (percentage point decline)	0.006	0.007	0.008	0.009
	PoU (thousands decline)	31-531	36	45	51
All recipients	% change in GDP	0.10	0.11	0.13	0.17
	PoU (thousands decline)	503-3987	563	647	819

Note: PoU is prevalence of undernourishment. Based on FAO (2019) a 1% rise in GDP is associated with a -0.15 percentage point decline in the prevalence of undernourishment. For scenario 1, the range reflects the potential closer correlation between humanitarian assistance, poverty and hunger.

The estimates show that the decision to temporarily cut UK ODA has allowed the number of people suffering from malnourishment to rise by somewhere between 500 thousand and 4 million during 2021/22-2023/24. Depending on how the aid would have been spent, the impact on global hunger may well persist beyond 2024.

## 4. Accessing the Probability of the Meeting the Government's Fiscal Tests

On 12<sup>th</sup> July 2021, the Chancellor published a written statement setting out the tests required to be met to restore the 0.7% target.<sup>8</sup> These are that the official forecasts from the Office for Budget Responsibility (OBR) show that on a **sustainable basis**:

1. The country is not borrowing for day-to-day spending. That is, the country is not running a current budget deficit.
2. The ratio of underlying debt to GDP is falling. Debt is taken as public debt excluding that held by the Bank of England.

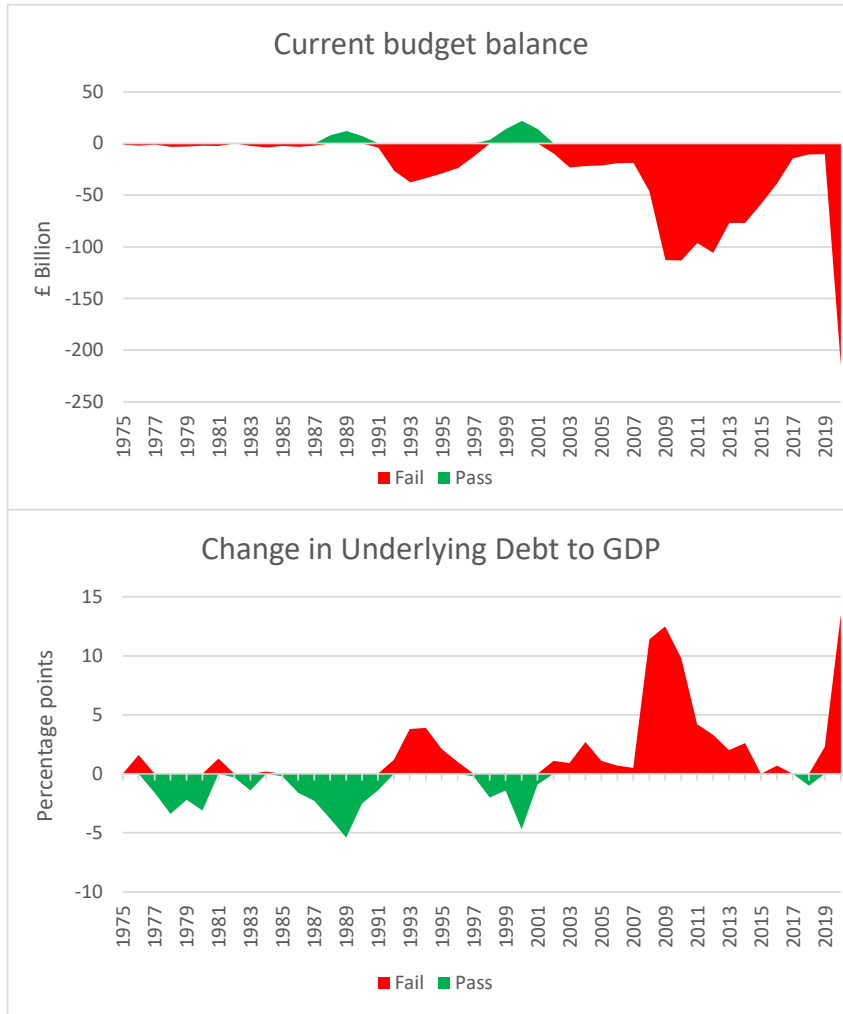
Importantly, there is no definition of what a sustainable basis is. This allows some room for political judgment, or manoeuvring, around the first point at which there is both a current budget surplus and falling debt to GDP ratio. Once aid had gone back to 0.7% in one year, it is expected to stay at that level and the tests would no longer apply. The commons voted to support these measures on 13<sup>th</sup> July 2021.

The fiscal tests established by the Government to determine when it will revert to the aid commitments set in the 2015 International Development Act deviate markedly from the standard principles governing HM Treasury's fiscal policy. The tests make spending on a specific category conditional on both attaining a current budget surplus and a decline in the aggregate stock of debt. The UK's fiscal policy has traditionally avoided hypothecation and direct earmarking. Historically the specific tests that will be applied have been met only rarely (figure 14). The last time that the two tests were met simultaneously was 20 years ago in 2001. Since 1975, the tests have jointly been met on only 8 occasions.

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<sup>8</sup> <https://hansard.parliament.uk/debates/GetDebateAsText/21071227000009>

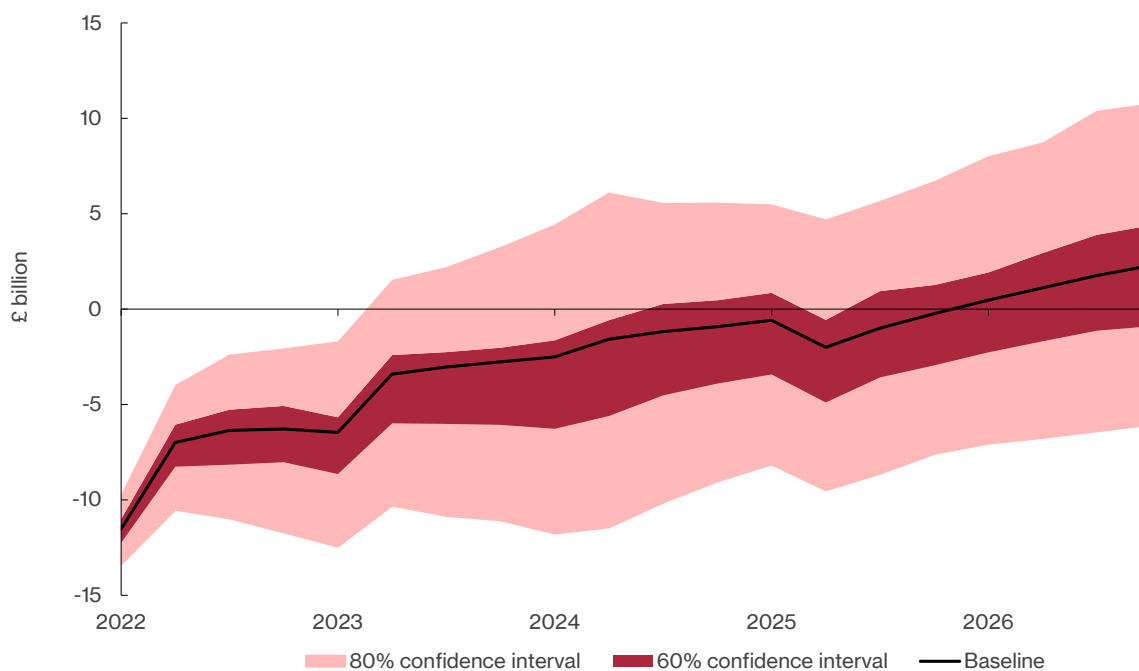
**Figure 14. Historical achievement of fiscal tests**



Source: Derived from ONS series ANLW and HF6W

In Autumn Budget and Spending Review 2021, the OBR’s forecasts show that both fiscal tests are currently forecast to be met in 2024/25, and the Government has provisionally set aside additional funding to take ODA to 0.7% of GNI in that year. NIESR’s October 2021 forecasts, on the other hand, suggest that the current budget balance will turn positive only in Q1 2026; while the target for the second test, net debt to GDP, is projected to be falling from Q2 2021. Both sets of forecasts are subject to a wide margin of error, which leaves open the timeframe for fulfilling the commitment to return to an aid budget of 0.7% of GNI. Figure 15 shows the confidence intervals around NIESR’s forecast for the current budget balance, based on a set of stochastic simulations with NiGEM that capture the historical patterns of error inherent in the model. These bands are wide even in the short-term, illustrating the inherent uncertainty in budget forecasts.

**Figure 15. NIESR forecast for current budget balance with confidence intervals**



Source: NiGEM v4.21.

Note: Shaded bands represent the 60% and 80% confidence intervals around the baseline forecast

Table 3 reports the probability of meeting each of the fiscal tests by the end of the fiscal years 2021/22 to 2026/27 based on this analysis. There is a high probability of meeting fiscal test 2 in the short term. By 2023/24, however, we see only a 50% chance that this target will be met in any given period. This reflects the volatility of factors that can impact the short-term borrowing requirement in any given period, so that in any given period debt is essentially just as likely to rise as it is to fall. The probability of meeting fiscal test 1, on the other hand, is much less likely in the near term, given the existing size of the current budget deficit. By the end of 2025/26, we see only a 50% chance that both tests will be met. This creates significant uncertainty around the future pathway for UK ODA.

**Table 3. Estimated probabilities of meeting the fiscal tests at end of fiscal year**

	2021/2	2022/3	2023/4	2024/5	2025/6	2026/7
Probability of meeting Fiscal Test 1	<1%	15%	35%	45%	50%	65%
Probability of meeting Fiscal Test 2	>99%	65%	50%	50%	50%	50%

Source: NiGEM v4.21.

## 5. Conclusions

The recent cuts in UK aid provide negligible direct savings for the UK, comes at a cost to the UK economy, and poses significant humanitarian and social costs in many poor countries. The fiscal tests provide no certainty on the future trajectory for UK foreign aid. The scenarios explored in this report suggest that UK GDP would have been higher, albeit by a small amount, if the ODA had been maintained at 0.7% of GNI.

The impact of the decision to cut UK aid on both recipient countries and the UK depends on how the funds would have been spent. If the funds are spent on current consumption, such as supporting social safety nets, there will be a short-term stimulus to demand in the recipient countries. This in turn will raise demand for imported goods within the recipient, and so support exports from the rest of the world, including the UK.



This offsets the negative impact of aid flowing out through the current account and reducing the accumulation of net foreign assets.

When funds are spent on investment, rather than current consumption, this not only supports economic activity in the recipient countries in the near term, but raises potential output over the longer term. The long-term rise in productive capacity in the recipient countries has a more lasting impact on exports from the donor countries, offsetting a greater share of the initial aid outlays.

Some types of investment can deliver additional productivity gains and/or a decline in trade costs. For example, when aid is spent on trade-facilitating infrastructure, this not only raises productive capacity and supports economic diversification, but also improves the competitiveness of recipient country exports, reduces the costs of trading with the recipient regions and boosts world trade. The returns to the donor country can be expected to rise with the return to the recipient countries.

In order to assess the macroeconomic effects of UK aid returning to 0.7% of GNI, this study develops a series of scenarios that build up from a very conservative estimate of the potential impacts, for example when aid is spent on current consumption with no longer-term productivity gains, to a higher return scenario that allows for a decline in trade barriers that stimulate productivity growth and facilitate a rise in world trade.

A key takeaway from the scenarios is that aid delivers good value for money. Every £1 of ODA that is restored over the period 2021/22-2023/24, can be expected to provide recipient regions with the equivalent of £2.98-£5.31 in goods and services and raise UK GDP by 1-13 pence. The estimates suggest that the decision to cut the UK ODA budget has cost in the range of £322 million to £423 million in lost UK exports.

UK aid cuts have fallen heavily on Sub-Saharan Africa, which also has particularly high rates of extreme poverty and hunger. Up to 1.5 million people in the region may remain malnourished as a result.

Immediately reversing the cuts in UK ODA could raise the level of GDP in sub-Saharan Africa by up to 0.4% by 2023/24. The estimates are broadly in line with studies such as Galiana et al (2017) and Arndt et al (2016). Galiana et al (2017) finds that a 1 percentage point increase in the aid to GNI ratio from the sample mean raises annual real per capita growth in gross domestic product by approximately 0.35 percentage points. A review study by Arndt, Jones and Tarp (2016) suggested that the weighted average result from a selection of studies indicates that a sustained inflow of foreign aid equivalent to 10 percent of GDP is expected to raise growth rates per capita by about one percentage point on average.

Despite high and increasing levels of aggregate debt and upward pressure on interest rates from the recent jump in inflation, UK debt interest payments as a per cent of total government spending remain historically low. By contrast, countries such as Lebanon, Somalia, Syria, Yemen and Zimbabwe are effectively shut out of capital markets, or face a borrowing premium in excess of 10 per cent.<sup>9</sup> At the same time, investment needs in the poorest countries are high. With support from sound institutions and leadership, this investment can yield high domestic and global returns when targeted well, for example towards trade facilitation, physical and social infrastructure, and human capital accumulation.

Most analyses on aid flows tend to focus only on the benefits of aid in the receiving country, but in practice the benefits extend beyond borders. When reconsidering the UK ODA budget, policy makers should remember to take into account the potential for important positive international spillovers from aid, including returns to the aid sending country.

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<sup>9</sup> [http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/ctryprem.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html)

## 6. Annex: Overview of NiGEM

NiGEM is a **Global** model that consists of individual country and regional models, which are linked together through trade in goods and services and integrated capital markets. So it can be used to look at policy developments in a single country, but also see how those policies interact with economic outcomes in the rest of the world. It represents a closed world, where outflows from one country or region are matched by inflows into other countries and regions. Individual country models are in place for almost all OECD<sup>10</sup> countries. There are also separate models of Argentina, Brazil, Bulgaria, China, Hong Kong, Indonesia, India, Romania, Russian Federation, South Africa, Singapore, Taiwan and Viet Nam. The rest of the world is modelled through regional blocks of Africa, Middle East, Latin America, Developing Europe, and East Asia, so that the model is fully global in scope. This ensures that there are no “black holes” in international transactions, as outflows from one country must be matched by inflows into other countries.

The compositions of the regional aggregations are mostly aligned with the IMF World Economic Outlook aggregates, excluding countries that are modelled individually. Most of the UK aid recipients are not modelled individually within NiGEM, so the scenarios for this study rely on the regional aggregations, which are defined in Table A1.

**Table A1. Composition of regional blocks in the scenarios**

Africa block	Based on the IMF's group <b>Sub-Saharan Africa</b> . From this the countries modelled individually in NiGEM are excluded (South Africa). This group includes: Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Republic of Congo, Côte d'Ivoire, Equatorial Guinea, Eritrea, Eswatini, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Seychelles, Sierra Leone, South Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe.
Developing Europe block	Based on the IMF's group <b>Emerging and Developing Europe</b> . From this the countries modelled individually in NiGEM are excluded (Bulgaria, Hungary, Poland, Romania, Russia and Turkey) and we add the advanced European economies that are not modelled separately on NiGEM (Iceland, Luxembourg, Malta and Cyprus). This group includes: Albania, Belarus, Bosnia and Herzegovina, Croatia, Cyprus, Kosovo, Iceland, Luxembourg, Malta, Moldova, Montenegro, North Macedonia, Serbia, Ukraine.
East Asia block	Based on the IMF's group <b>Emerging and Developing Asia</b> . From this the countries modelled individually in NiGEM are excluded (China, India, Indonesia, and Viet Nam). This group includes: Bangladesh, Bhutan, Brunei Darussalam, Cambodia, Fiji, Kiribati, Lao P.D.R., Malaysia, Maldives, Marshall Islands, Micronesia, Mongolia, Myanmar, Nauru, Nepal, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Sri Lanka, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu.
Latin America block	Based on the IMF's group <b>Latin America and the Caribbean</b> . From this the countries modelled individually in NiGEM are excluded (Argentina, Brazil, Chile, and Mexico). This group includes: Antigua and Barbuda, Aruba, The Bahamas, Barbados, Belize, Bolivia, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, St. Kitts and

<sup>10</sup> With the exceptions of Colombia, Iceland, Israel and Luxembourg.

	Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, and Venezuela.
Middle East block	Based on the IMF's group <b>Middle East and Central Asia</b> . To this the advanced Middle East economies that are not modelled separately on NiGEM are added (Israel). This group includes: Afghanistan, Algeria, Armenia, Azerbaijan, Bahrain, Djibouti, Egypt, Georgia, Iran, Iraq, Israel, Jordan, Kazakhstan, Kuwait, Kyrgyz Republic, Lebanon, Libya, Mauritania, Morocco, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tajikistan, Tunisia, Turkmenistan, United Arab Emirates, Uzbekistan, West Bank and Gaza, and Yemen.

NiGEM is an *Econometric* model, in that key behavioural equations are econometrically estimated using historical data. This ensures that the dynamics and key elasticities of the model fit the main characteristics of individual country data. From a theoretical perspective, NiGEM can be classed among global general equilibrium macroeconomic models. It therefore strikes a balance between theoretical underpinnings that guide economies towards long-run market clearing equilibria, and data-driven individual country characteristics that fit the main characteristics of real-world data outturns.

NiGEM is based on a broadly New Keynesian structure: prices and wages adjust gradually; interest rates affect investment and consumption decisions; shifts in domestic demand impact employment and production decisions in the short run; while over the longer term, economic activity is guided by the supply side, which refers to the quantity and quality of the workforce, investment goods and infrastructure, and the production technologies in use.

Individual country models are grounded in textbook macroeconomic foundations, with features such as sticky prices; rational or model-consistent expectations; endogenous fiscal policy; and endogenous monetary policy based on standard specifications such as a Taylor rule. Taylor rules are simple monetary policy rules that prescribe how a central bank should adjust its interest rates to maintain macroeconomic stability in response to developments in inflation and macroeconomic activity. The fiscal rule is introduced through the income tax rate, so that a rise in the deficit initiates a shift in the tax rate to pull the deficit and debt stock back towards targeted sustainable levels.<sup>11</sup> Country models are built around the national income identity, and contain the determinants of domestic demand, trade volumes, prices, current accounts, and asset holdings. Countries interact directly through trade, indirectly through the net accumulation of overseas assets, and through foreign exchange markets, which are driven by interest rate expectations in the individual country relative to those in the rest of the world.

The long run is anchored by supply inputs, which include labour, capital, and energy. NiGEM incorporates endogenous monetary and fiscal policy responses, which interact with price and wage adjustments to stabilize output and inflation and move towards equilibrium between demand and supply in the long run. For a full description of NiGEM, see [Hantzche, Lopresto and Young \(2018\)](#).

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<sup>11</sup> For the scenarios presented in this paper, the fiscal rule is turned off for the UK, in order to assess the potential impact of the policy on UK debt.

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