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Financing the Child Centred Sustainable Development Goals (SDGs) in Ethiopia

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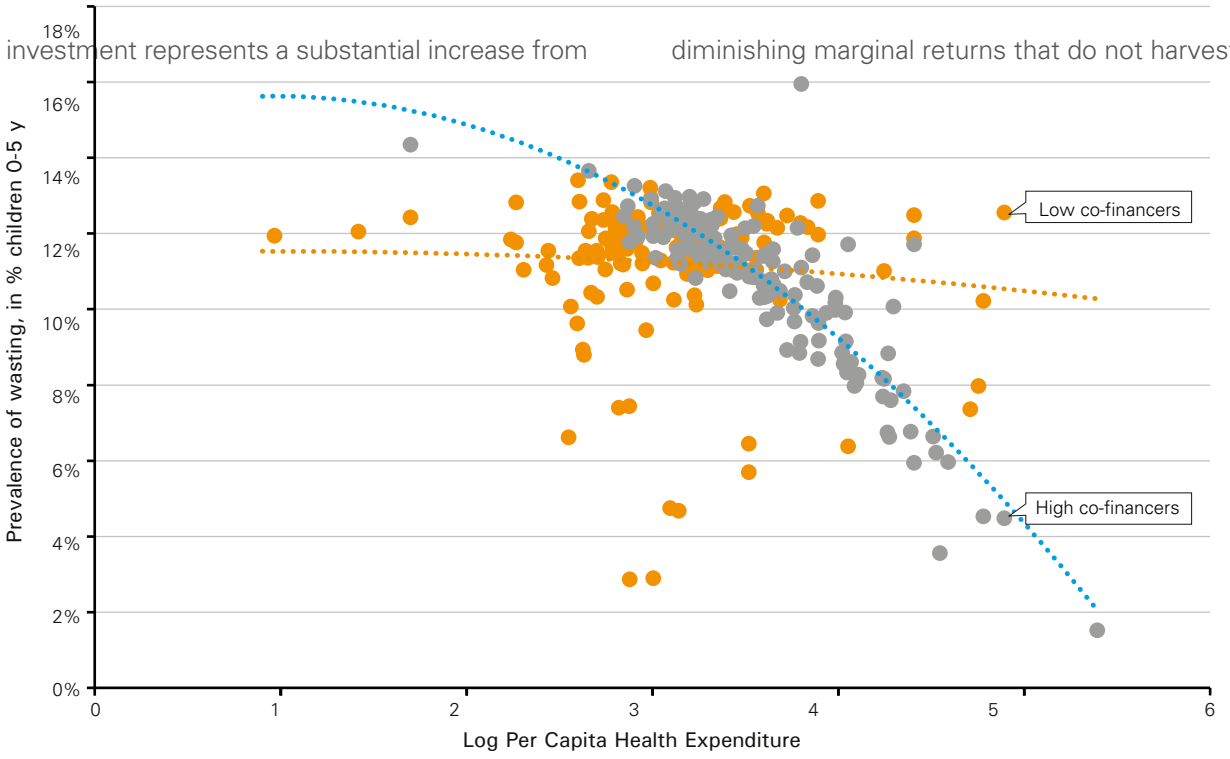
Executive Summary

Globally, the Sustainable Development Goals (SDGs) adopt a systems approach that depends on comprehensive and integrated economic and social policies. Ethiopia achieved almost all its Millennium Development Goals (MDGs) and the nation now faces the challenge of attaining the objectives aligned with the SDGs. Ethiopia has prepared a medium-term plan – the Second Growth and Transformation Plan (GTP II), covering the period from 2015 to 2020 – which forms an integral part of the country's post-2015 development agenda. Compared to where it was at the beginning of the MDG challenge in 2000, the country is well positioned today to achieve even greater progress in its development objectives, drawing from good-practices and lessons learned during the implementation of the MDGs. Ethiopia's ongoing process of fiscal decentralization provides an opportunity to identify linkages between policy spending and SDG indicator performance. This includes an analytic approach that captures intersectoral policy synergies, highlighting the role of systems to achieve the SDGs.

This study estimates the cost of achieving a selection of child-sensitive SDGs to be roughly US$230 per capita in 2030, compared to an estimated US$40 per capita actually invested in 2018. While the required investment represents a substantial increase from current spending, this costing study demonstrates that the price tag for child-sensitive development is affordable, particularly in light of Ethiopia's long-term growth trajectory. International experience demonstrates that countries that transition from low to middle-income status tend to substantially increase their government expenditure (measured as a percentage of gross domestic product). The size of this expansion typically exceeds the expenditure increase Ethiopia requires to fund the necessary investment.

This cost reflects fiscal synergies generated from cross-sectoral spending. Figure I below illustrates the example of health investments aimed at reducing the prevalence of wasting, where districts spending on both education and agriculture ("high co-financers") are more efficient and better able to reduce wasting in children with health expenditures compared to those districts who do not co-invest adequately in these complementary policy sectors ("low co-financers"). This evidence supports the recommendation of this report to adopt a systems approach to development – strengthening sectoral synergies and comprehensive programmes which have impacts beyond their own sector (e.g. health programmes which foster education outcomes). In contrast, silo approaches demonstrate rapidly diminishing marginal returns that do not harvest

Figure I. Health expenditure on prevalence of wasting, by high and low co-financing districts



Source: Author's empirical estimates

much more than the proverbial "low-hanging fruit." Practically, this means that attaining development is increasingly about moving away from within-ministry planning to integrated developmental planning. High-level political will fostering cooperation and coordination drive these vital opportunities to achieve inclusive social development and equitable economic growth.

Empirical Approach

This report consists of five chapters. The first chapter provides a **baseline analysis of Ethiopia's progress** achieving 20 SDG targets which are particularly important for childhood development. The chapter demonstrates that Ethiopia has made substantial achievements in reducing poverty rates, increasing school enrolment and providing contraceptive care. Yet the analysis further shows that greater investments are required to achieve the SDGs, particularly in access to basic services, child nutrition, reduced child mortality, abolishing child labour, and eliminating gender inequalities – all of which explain high rates of multidimensional poverty. Additionally, low rates of access to improved water and sanitation sources, electricity and health care impede efforts to achieve goals such as reducing wasting, stunting and child mortality. Significant spatial disparities between urban and rural areas and across regions highlight the need for SDG investments to better reach excluded and marginalized groups.

The second chapter develops and tests **an innovative costing methodology**, starting with a single-sector unit-cost model, and expanding this to a multisector Cobb-Douglass approach and then extending this to a synergy-measuring translog methodology – testing the significance of the relative contribution of each added layer of model complexity. The translog specification reflects an understanding that the achievement of the SDGs results from a public policy production process in which SDG indicators represent outputs and spending on critical policy sectors represent the inputs. The translog production function improves the costing approach in several ways. Foremost, it pre-empts two critical traps into which unit-cost approaches fall:

(i) Over-estimating costs by ignoring policy synergies;
(ii) Under-estimating costs by ignoring non-linear relationships, especially that of diminishing marginal returns.

The translog approach overcomes both these limitations and therefore can model not only total cost more accurately but also unlock the identification of synergy-producing input-outcome elasticities among sectors. Ethiopia's available district-level fiscal data merged with child outcomes summarized from household-level data enables the estimation of these elasticities. The data supports the analysis of nine sectors relevant for child-centred analysis: (1) Education, (2) Health, (3) Agriculture and Rural Development, (4) Culture and Sports, (5) Water Resources, (6) Trade and Industry, (7) Organs of State, (8) Justice and Security, and (9) General Services.

The third chapter of this study reports the results of a fiscal space analysis that supports the financing of child-centred development. The analysis shows that while development partner cooperation provides a vital and increasing contribution supporting inclusive social development, strengthening Ethiopia's equitable economic growth will continue to drive the financing of the nation's efforts to achieve the SDGs. Over the next decade, Official Development Assistance (ODA) as a share of Gross Domestic Product (GDP) is expected to fall substantially. Debt sustainability analyses show that Ethiopia is currently at a high risk of debt distress; the country's capacity to use borrowing to finance part of its future expenditure is dependent on instituting reforms to use and manage debt efficiently, to increase own-resource mobilization and to diversify exports to reduce exposure risk. Ethiopia's impressive economic growth will continue to drive increases in Government revenue, but these growth trends will not be sufficient to fully finance the required investment in the SDGs. Economic growth, however, will facilitate the strengthened Government capacity to mobilize improved domestic revenue streams, particularly from national taxation and sub-national income sources.

In the fourth chapter, the paper employs sub-national (district-level) expenditure data and develops a **macro model to forecast public expenditures until 2030 through three scenarios.** Scenario 1 models a fixed growth ("business-as-usual") approach, while Scenarios 2 and 3 adopt alternative dynamic optimization methodologies. The first scenario models existing expenditure patterns that grow in line with projected rates of economic growth. Scenario 2 reflects a "learning-by-doing" optimization approach, taking advantage of the diverse experiences across districts and

identifying a "best practice" combination of fiscal expenditures. Scenario 3 employs a "smart-search" optimization algorithm to fine tune fiscal synergies, improving progress intensively and extensively while improving efficiency. The analysis further tests these three scenarios with a rural-urban disaggregated model, factoring in residence-specific relationships.

The final chapter of the report further assesses the three scenarios, summarizes the main conclusions and offers policy recommendations to improve the achievement of the child-centred SDGs.

Main Findings

The second chapter of the paper offers four major findings. First, **conventional unit-cost models do not successfully predict SDG outcomes.** The regression estimates for most of the SDG indicators show that unit-cost approaches fail to explain the variability of district-level outcomes in Ethiopia. The unit-cost models also tend to display low overall significance and goodness-of-fit, rendering them unreliable for the purposes of a costing exercise. Out of 13 modelled indicators, 11 fail to significantly explain the data: only two of the F-tests for overall significance rejected the null hypothesis of no explanatory power.

Second, **formal hypothesis testing rejects the applicability of a unit-cost approach.** The conventional unit-cost approach requires the satisfaction of strong assumptions undergirding the adopted restricted linear model: total cost must equal the number of beneficiaries' times a constant cost-to-deliver. Technically, this requires a unit-cost function in log terms with a slope equal to one. The formal hypothesis testing in this paper rejects the power of the unit-cost approach in explaining district-level outcomes in Ethiopia. The F-tests significantly reject the null hypothesis of unit-slopes for all the modelled SDGs.

Third, **models that can measure the complex relationships between fiscal strategies and SDG outcomes (cross-sectoral translog models) provide substantially greater explanatory power and significance.** The cross-sectoral translog models go further than unit-cost approaches by adding cross-sectoral expenditure categories to the specification and by interacting spending across sectors to measure the impact of cross-sectoral synergies. These models demonstrate significantly greater explanatory power than the unit-cost models and are also more statistically significant and robust than the single-sector approach. Urban-rural disaggregated models for select indicators are also shown to be more robust than unit-cost models.

Fourth, **formal hypothesis testing documents the powerful impact of cross-sectoral synergies in explaining SDG outcomes at district level, with the interactions demonstrating complex pathways to achieving the SDGs.** F-tests for incremental contribution of the synergy terms in each model reject the null hypothesis that synergies should be excluded from the equations. For 12 out of 13 indicators, the hypothesis testing confirms that cross-sectoral synergy terms have a significant impact on the outcome indicator. The inclusion of these interaction terms better explains the variability in SDG outcomes and they are necessary to more accurately cost the achievement of SDGs in the long-term.

Overall, the translog production function best explains the achievement of SDG outcomes. Interestingly, most of the explanatory power results from components of the model reflecting policy synergies across sectors. For example, as discussed above in reference to Figure 1, districts that effectively integrate investments across sectors (health, education and agriculture in the example above) can more effectively achieve complex outcomes (improved nutrition in the above example). The study's findings support the hypothesis that comprehensive and integrated investments across key social sectors better enable a systems approach that has a greater likelihood of successfully achieving the SDGs.

The findings above from the sub-national (district-level) expenditure data analysis underpin the results from the analysis of the three scenarios identified above.

The macro model shows that **single-sector solutions are unlikely** to achieve adequate results with any feasible set of resource allocations. The complexity of SDG inter-relationships and the challenges of diminishing marginal returns to socioeconomic investments require cross-sectoral approaches at decentralized levels which the National Planning Commission (NPC) and the Ministry of Finance and Economic Cooperation (MoFEC), with support from relevant partners, are

best-placed to manage. The evidence demonstrates the powerful returns to comprehensive and integrated approaches.

Scenario 1, the baseline scenario, assumes a constant Government-spending-to-GDP ratio ("business-as-usual") for measurable and relevant social and economic expense categories, ranging from ETB 9 (current prices) per capita on culture and sports to ETB 147 per capita on education using 2011 as the base year. Assuming a constant growth rate, by 2030 these expenditures range from ETB 26 to ETB 384 per capita. This scenario leads to modest improvements in nearly all CC-SDG indicators, but does not come close to achieving SDG-defined targets. This is reflected in the low proportion of districts that achieve each target (of those successfully modelled in the first part of the paper), which, outside of a few significant leaps, shows improvements of between 1 and 7 percentage points. If child-centred investment only follows a business-as-usual path, there are some promising results. In particular, many districts show significant reductions in wasting and inequality as well as improvements in providing access to safe water and primary education.

In **Scenario 2**, the adoption of the best district fiscal model (decentralized learning-by-doing optimization) achieves dramatically better results. In this scenario, the best district is selected, and all other districts adopt its sectoral per capita expenditure mix. Under these conditions, all districts manage to achieve 10 out of the 13 targets. However, it does so at a significant increase in sub-national Government expenditure, increasing from 6.7 per cent to 23.9 per cent of GDP. This scenario thus shifts further toward SDG performance but away from fiscal affordability.

Scenario 3 uses a smart-search methodology to further optimize the learning-by-doing optimum. It adopts Scenario 2 as a starting point and adjusts fiscal expenditures sequentially following three criteria: (1) lower fiscal expenditure; (2) retaining all SDG outcomes achieved; and (3) achieving as many additional SDG outcomes as possible. The three criteria achieve a path-dependent solution that depends on the initial category of fiscal expenditure and the subsequent sequencing of fiscal expenditure adjustments. Assurance of a global optimum will likely require a grid-search, but the results demonstrate that the smart-search optimization procedure can both improve the achievement of SDG outcomes and lower the required costs, thus improving value-for-money. In total, this scenario enables the achievement of 11 of the 13 modelled SDG indicators (extensive progress) and improves the success of many of the indicators achieved in Scenario 2 (intensive progress), while lowering the total required Government expenditure necessary to achieve this progress (improved efficiency). These findings reveal that leveraging sectoral synergies at decentralized levels can enhance SDG performance at a lower cost compared to the second scenario – at 22.8 per cent of GDP, or US$230 per capita, per annum. This model only reflects the impact of increased Government expenditure and improved fiscal synergies. History demonstrates that improved technologies for social outcomes achievement also provide an important source of progress and will likely reduce the required costs. This model does not reflect such effects and, as a result, likely overestimates the total costs. In short, the evidence demonstrates the powerful returns to comprehensive and integrated approaches at a decentralized level, which generate developmental synergies, multiply impacts and improve value-for-money.

Policy Recommendations

The analysis of three forecasted scenarios lead to a set of four policy recommendations. First, achievement of the SDGs will **require Ethiopia to increase its fiscal commitments**. Although this commitment implies a costing that is three times the size of the Government's current commitment, this is affordable given the decade-plus time horizon. Namely, the strong growth trajectory of Ethiopia's economy will trigger a virtuous cycle which will strengthen Government capacity to commit and implement the SDGs. This positive elasticity between national income and size of Government is driven by an increased demand for public spending as the economy grows and increases in the supply of tax revenue.

Second, the findings highlight the **importance of multisectoral approaches and cross-sectoral synergies.** Evidence from a range of countries highlights the critical role that strong institutional and coordination frameworks have played in supporting the achievement of the Millennium Development Goals (MDGs). In most countries, ministries have separate budgets, communication channels and monitoring systems – a highly fragmented institutional reality. However, the developmental reality is that of deep interlinkages in sectoral overlapping targets and programme effects, as the SDGs illustrate. This reality requires strong interagency coordination, where the traditional "silo" approaches to development adopted by many countries in the past have been counterproductive and undermining the integrated planning approach necessary for achieving sustainable development. Institutional coordination will require political will to foster cross-sectoral synergies: coordinating across ministries, and ensuring that a country's existing development strategies, plans or roadmaps are fed into all line ministries' mandates. Connecting mandates to the SDGs provides a useful tool in this light to move from silos towards synergies.

Third, **budgeting practices and procedures need to be firmly rooted in Ethiopia's development strategy.** Countries that have taken such an integrated approach to development financing, often referred to as "whole-of-government" or "whole-of-finance" approaches, have performed better than countries that have allowed public investments to be politicized and fragmented. By untying development finance from political influence and by instead relying on principles such as "performance budgeting" – which ensure that performance, evaluation, and value for money are integral to the budget process – public agencies will be incentivized to work across portfolio boundaries, formally and informally, to achieve a shared goal and an integrated Government response to development targets.

Finally, the **complete eradication of extreme poverty (measured using the US$1.90 PPP poverty line) and child labour prove to be particularly challenging.** Increased expenditure and optimum cross-sectoral coordination may be insufficient for achieving these two goals. As a result, it will be important to continue to identify better policy approaches and more cost-effective interventions in addition to progressively increasing investments.

This report aims to foster a discussion of the importance of comprehensive planning for the financing of sustainable development, particularly those areas which deliver children's rights and simultaneously build the cognitive capital that drives Ethiopia's future prosperity. By integrating a "whole-of-finance" approach into Ethiopia's development strategies, costed sector plans which connect inputs to outcomes through a mix of evidence-based programmes and robust public financial management can translate sound policies into effective and developmental delivery.

At a national and woreda level, the important message to convey is: "Take risks; failure in the face of ambitious initiative is acceptable: the chance of failure is the price paid for the opportunity to achieve outstanding success. A nation of ambitious and innovative risk-takers that learns from each other will provide the world with the lessons of SDG success."

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List of Acronyms

ADF	African Development Fund
AfDB	African Development Bank
BCSCB	Bureau of Civil Service and Capacity Building
BoFED	Bureau of Finance and Economic Development
BoWCA	Bureau of Women's and Children's Affairs
CBHI	Community Based Health Insurance
CC-SDGs	Child-Centred Sustainable Development Goals
CGE	Computable General Equilibrium
DHS	Demographic and Health Survey
DPs	Development Partners
DRM	Domestic Resource Mobilisation
DRSLP	Drought Resilience & Sustainable Livelihood Programme
ERCA	Ethiopian Revenue and Customs Authority
ETB	Ethiopian Birr
EU	European Union
FDI	Foreign Direct Investment
FGT	Foster–Greer–Thorbecke method
GAVI	Global Alliance for Vaccines and Immunisation
GDP	Gross Domestic Product
GoE	Government of Ethiopia
GTP II	Government of Ethiopia's Second Growth and Transformation Plan 2015-2020
HCES	Household Consumption Expenditure Survey
HDI	Human Development Index
HIPC	Heavily Indebted Poor Country
HIV	Human Immunodeficiency Virus
HMIC	Higher Middle Income Country
IAMs	Integrated Assessment Models
IMF	International Monetary Fund
IN-SCT	Integrated Nutrition and Social Cash Transfer
LIC	Lower Income Country
LMIC	Lower Middle Income Country
LSMS	Living Standards Measurement Study
M&E	Monitoring and Evaluation
MAMS	Maquette for MDG Simulations
MDGs	Millennium Development Goals
MEFF	Macroeconomic Fiscal Framework
MoFEC	Ministry of Finance and Economic Cooperation
MTEFs	Medium-Term Expenditure Frameworks
NPC	National Planning Commission
NLFS	National Labour Force Survey
NREGA	National Rural Employment Guarantee Act
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PFM	Public Financial Management
PPP	Purchasing Power Parity
PSNP	Productive Safety Net Programme
SDGs	Sustainable Development Goals
SNNP	State of Southern Nations, Nationalities and Peoples'
TB	Tuberculosis
TGE	Total Government Expenditure
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNPD	United Nations Population Division
USD	US Dollar
WASH	Water, Sanitation, Hygiene
WHO	World Health Organization

1.

Baseline Assessment of the Child Centred Sustainable Development Goals in Ethiopia

1.1 Introduction

From 2000 to 2015, Ethiopia achieved top-ranking Millennium Development Goal (MDG) performance in the African region. The nation substantially reduced extreme poverty rates, raised primary school enrolments and reduced under-5 mortality rates – combining strong rates of equitable economic growth with exemplary improvements in inclusive social development. Several development-related investments which promoted inclusive growth and sectoral productivity – including the Productive Safety Net Program (PSNP) – contributed as drivers of poverty reduction in the country and supported achievement of the MDG targets.[1]

Ethiopia did not achieve all its MDGs, however, and the nation now faces the challenge of reaching the vital objectives aligned with the Sustainable Development Goals (SDGs). Compared to its initial point in 2000 at the beginning of the MDG challenge, Ethiopia today finds itself more advantageously positioned to achieve even greater progress. Drawing lessons from challenges faced during the implementation of the MDGs, Ethiopia has prepared a medium-term plan – the Second Growth and Transformation Plan (GTP II), covering the period from 2015 to 2020 – which forms an integral part of the country's post-2015 development agenda.

This report provides a baseline assessment of Ethiopia's current situation in the achievement of child-centred Sustainable Development Goals (CC-SDGs), analysing the areas of strength and progress as well as those opportunities that require greater attention and resources. In particular, 20 Sustainable Development Goals indicators[2] have been selected for this analysis focusing on both child-related outcomes as well as economic growth dimensions. This study identifies the spatial, social and economic disparities that create risks that might threaten or undermine SDG achievement. The report aims to contribute to the operational evidence base on delivery successes and gaps, supporting SDG performance that can strengthen Ethiopia's leadership role in Africa and around the world.

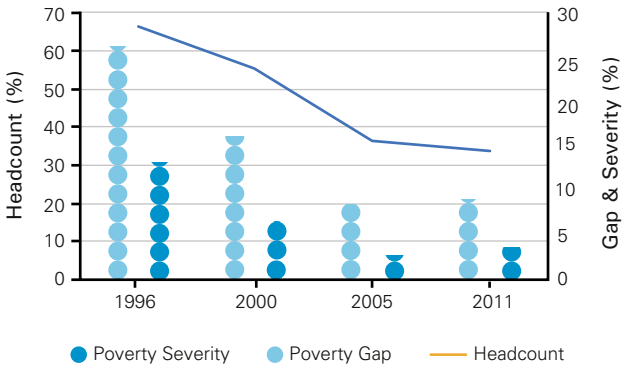
1.2 Progress in SDG Achievement

This section analyses Ethiopia's progress in the achievement of SDGs at both the national and sub-regional levels.

SDG 1.1.1: Proportion of the Population Living Below International Poverty Lines

SDG 1.1.1 aims to eradicate extreme poverty by 2030. Measured at the international US$1.90 poverty line (using 2011 PPP prices), the poverty headcount in Ethiopia stood at 33.5 per cent in 2011, according to the World Bank estimations based on the HCES survey,[3] down from 66.4 per cent in 1996 but marking an increase from 2005 (Figure 1). Estimates further show that the poverty gap stood at 9 per cent and poverty severity at 3.7 per cent in 2011, also representing an increase from 2005 when both the gap and severity poverty indicators registered their lowest values.

Figure 1: Poverty Indices at the $1.90 International Poverty Line



Source: World Bank PovcalNet, Author's Calculation

1 (UNECA, 2014)
2 Comprehensive table of indicators is presented in Appendix 1
3 PovcalNet Database

SDG 1.2.1: Proportion of the Population Living Below the National Poverty Line

SDG 1.2.1 aims to reduce poverty headcounts by 50 per cent, measured using national benchmarks. This study employs the HCES to disaggregate the poverty analysis reported in the 2014 World Bank Poverty Assessment Report,[4] which documented a national poverty rate of 29.6 per cent in 2011.[5] Adopting this figure as baseline implies that Ethiopia must reduce poverty to 14.8 per cent as measured using the national poverty line by 2030. The following graph shows that Ethiopia has reduced the poverty headcount by over 15 percentage points since 1996 and similar progress is apparent in terms of poverty gap reduction. The severity of poverty has, however, increased between 2005 and 2011, rising by nearly half a percentage point.

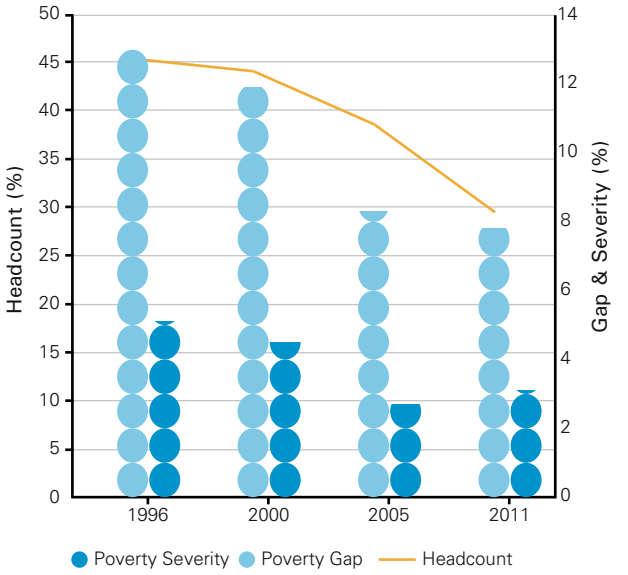
All poverty measures (rates, gaps, severity) are higher in rural areas than urban ones in 2011. Regionally, the Harari and Dire Dawa regions fare better than the rest of the country while poverty is highest among those living in Afar. The SNNP Region registers the highest poverty gap and severity in the country.

Table 1: Sustainable Development Goals (SDGs)

	Headcount	Gap	Severity
Place of Residence			
Urban	25.7%	6.5%	2.4%
Rural	30.3%	8.1%	3.3%
Region			
Tigray	31.7%	8.0%	2.9%
Afar	37.4%	10.6%	4.1%
Amhara	30.7%	7.7%	2.8%
Oromia	28.5%	7.6%	3.0%
Somali	32.6%	9.2%	3.5%
Benishangul	28.7%	8.4%	3.4%
SNNP	29.6%	8.5%	4.0%
Gambela	32.2%	8.2%	3.1%
Harari	12.4%	1.7%	0.4%
Addis Ababa	27.6%	7.5%	2.9%
Dire Dawa	27.9%	5.4%	1.7%
Total	29.6%	7.8%	3.1%

Source: World Bank Poverty Assessment 2014, Author's Calculation

Figure 2: Trends in Poverty Headcount, Gap and Severity Indices



Source: World Bank Poverty Assessment 2014, Author's Calculation

Education level and employment status play an important role in determining the likelihood of being poor.[6,7] Calculations from the 2011 HCES show that, at 31.6 per cent, poverty is highest amongst those with no education. The rate decreases with higher educational attainment, to 29.4 per cent for those who have completed primary education, 23.8 per cent to those with secondary education and only 10.8 per cent for those with higher than secondary education. Achieving progress in education access will likely contribute to poverty reduction, which in turn tends to sustain human capital development. While the employed population registers the lowest poverty rates at 28.2 per cent, those that are inactive and unemployed have similar rates of poverty at 30.6 per cent and 30.8 per cent respectively.

Overall, children are more severely affected by poverty (32.4 per cent) and extreme poverty (5.2 per cent) than adults (29.6 per cent and 4.5 per cent, respectively).[8]

4 (World Bank, 2015)
5 The Methodology used to replicate poverty figures is described in Appendix 2
6 (Hanjra, Ferede, & Gutta, 2009)
7 (Dercon, Hoddinott, & Woldehanna, 2011)
8 CSA, UNICEF and OPM.2015 Child Well-Being in Ethiopia. Analysis of Child Poverty Using the HCE/ WMS 2011 Datasets. Addis Ababa, Ethiopia

SDG 1.2.2: Proportion of Men and Women Living in Poverty in All its Dimensions

Multidimensional poverty far surpasses income-measured poverty in Ethiopia. Assessed using the OPHI methodology,[9] the multidimensional poverty headcount stands at 83.7 per cent in 2016 after a near 3-percentage point decrease from 2011. The objective of SDG 1.2.2 is to halve this headcount by 2025, i.e. reducing the proportion of the population in multidimensional poverty to 41.9 per cent. The figures below indicate that while the multidimensional poverty headcount is near that target in urban regions, rural regions are however far from the objective with only 8.3 per cent not multidimensionally deprived. The Addis Ababa (18.2 per cent), Dire Dawa (57.8 per cent) and Harari (56 per cent) regions (which are largely urban) fare better than the rest of the country's regions. Household wealth is clearly inversely correlated with the incidence of poverty as is educational attainment. Less than a third of those who completed higher education were poor in 2016, compared to 90.8 per cent of those who never attended school.

Table 2: Multi-dimensional Poverty Headcount by Year

	2005	2011	2016
Sex			
Male	89.9%	87.3%	84.4%
Female	89.2%	85.9%	83.1%
Place of Residence			
Urban	33.5%	44.7%	40.7%
Rural	97.3%	95.9%	91.7%
Educational Attainment			
None	95.5%	93.6%	90.8%
Incomplete Primary	89.0%	85.9%	84.1%
Complete Primary	72.9%	62.3%	67.2%
Incomplete Secondary	53.0%	52.0%	55.8%
Complete Secondary	18.3%	22.3%	24.5%
Higher Education	16.7%	25.7%	31.8%
Wealth Index			
Poorest	99.2%	99.5%	96.8%
Poorer	98.4%	98.8%	95.9%
Middle	97.7%	97.2%	92.3%
Richer	96.8%	93.2%	86.3%
Richest	56.1%	44.8%	47.8%
Total	89.6%	86.6%	83.7%

Source: Author's Calculation using DHS 2005, 2011, 2016

9 Described in Appendix 3

SDG 1.4.1: Proportion of Population Living in Households with Access to Basic Services

The objective of SDG 1.4.1 is to ensure that the entire population, especially the poor and vulnerable, have equal rights to economic and natural resources, access to basic services, technology and financial services. Using the LSMS and DHS, three indicators are used to determine households' access to basic services: access to electricity, access to education and access to credit.

Figures show that most households in Ethiopia are not connected to the electric grid although there has been a vast improvement since 2005. Nationally, only 31.8 per cent of households had access to electricity in 2016, more than twice as much as in 2005. Disparities are significant spatially as urban areas, and especially the capital city, are much more likely to be connected than rural areas. Increasing access to electricity can have important effects on the well-being of households by providing a source of lighting, heating (thus reducing time spent gathering firewood, a household chore that often burdens girls disproportionately), enabling the use of appliances and modern cooking facilities, all of which help reduce the time spent on household tasks (usually with important gender equality impacts).

Access to schooling further supports the achievement of SDG 1.4.1, as well as other SDGs. Estimates based on the LSMS surveys show that both in rural areas and large towns, over 8.5 per cent of the population were not able to pursue an education because they lived far from a school. Reducing this gap is likely to have a positive effect on increasing net primary and secondary enrolment rates in the country.

The ability to access credit to sustain or launch the household enterprise often helps to improve household well-being and increase income. The share of households with a bank account is used as a proxy for financial inclusion. Estimations from DHS surveys (Table 22 in Annex 1) show that less than a third of households had a bank account in 2016, but there was a near five-fold increase in the proportion of households with a registered account since 2005. Households in urban areas are better connected to credit markets as nearly 70 per cent reported having an account in 2016 compared to less than 1 in 5 rural ones.

SDG 2.2.1: Prevalence of Stunting Among Children Under 5 Years of Age

SDG 2.2.1 commits Ethiopia to reducing the prevalence of stunting (low height-for-age) by 40 per cent by 2025. Stunting rates are currently high in Ethiopia with over 1 in 3 children below the age of 5 suffering from impaired growth in 2016. Evidence demonstrates progress in tackling this challenge, as rates have dropped by 8.1 percentage points since 2005. The prevalence of stunting is low among children whose mothers have higher educational attainment, in part because these are most likely to be food secure, have better access to health care and more informed about good feeding practices. Comprehensive and integrated interventions in rural areas, where the prevalence of stunting is often more than 15 percentage points higher than urban ones, offer the most promising path to lower stunting to 23 per cent nationally by 2025.

Table 3: Prevalence of Stunting by Year

	2005	2011	2014	2016
Mother's Education				
None	49.1%	46.7%	43.0%	41.8%
Primary	39.8%	41.7%	37.3%	35.1%
Secondary	27.0%	20.0%	21.7%	21.9%
More than Secondary	21.3%	18.9%	7.7%	17.5%
Region				
Tigray	41.0%	51.4%	45.7%	39.3%
Afar	40.8%	50.2%	46.1%	41.1%
Amhara	56.6%	52.0%	42.2%	46.3%
Oromia	41.0%	41.4%	38.2%	36.5%
Somali	45.2%	33.0%	36.5%	27.4%
Benishangul	39.7%	48.6%	40.3%	42.7%
SNNP	51.6%	44.1%	44.1%	38.6%
Gambela	29.3%	27.3%	22.4%	23.5%
Harari	38.7%	29.8%	27.6%	32.0%
Addis Ababa	18.4%	22.0%	22.9%	14.6%
Dire Dawa	30.8%	36.3%	27.1%	40.2%
Place of Residence				
Urban	29.8%	31.5%	26.5%	25.4%
Rural	47.9%	46.2%	42.4%	39.9%
Wealth Index				
Lowest	47.9%	49.2%	46.5%	42.2%
Second	54.0%	47.7%	45.3%	43.3%
Middle	45.0%	45.6%	39.6%	38.3%
Fourth	46.4%	45.0%	38.3%	36.5%
Highest	34.9%	29.7%	27.7%	26.9%
Sex				
Male	47.2%	46.2%	41.0%	41.3%
Female	45.8%	42.5%	39.7%	35.3%
Total	**46.5%**	**44.4%**	**40.4%**	**38.4%**

Source: DHS 2005, 2011, 2014, 2016

SDG 2.2.2: Prevalence of Malnutrition among Children Under 5

The prevalence of malnutrition is assessed through weight-for-height measures. Children under 5 years of age whose z-scores are two standard deviations below the mean are considered "wasted" whereas those whose z-scores are two standard deviations above it are "overweight." By committing to SDG 2.2.2, Ethiopia aims to reduce malnutrition by 40 per cent by 2025. In terms of wasting, this would be equivalent to a national rate of 5.9 per cent while the overweight target would be 1.7 per cent. Although Ethiopia has made some progress in reducing wasting rates between 2005 and 2016, the prevalence of overweight is stagnant during the same period after gains witnessed up to 2011 were erased in subsequent years. Both wasting and overweight are slightly more common among boys. Whereas wasting decreases with higher wealth, the relationship is less evident in terms of the overweight in 2016.

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Table 4: Prevalence of Malnutrition by Type and Year

	Prevalence of Wasting			Prevalence of Overweight		
Sex	**2005**	**2011**	**2016**	**2005**	**2011**	**2016**
Male	11.4%	11.1%	10.2%	3.1%	1.5%	2.9%
Female	9.6%	8.2%	9.6%	2.5%	1.9%	2.7%
Region						
Tigray	11.6%	10.3%	11.1%	0.8%	1.0%	1.3%
Afar	9.9%	19.5%	17.7%	8.1%	2.1%	0.5%
Amhara	14.2%	9.9%	9.8%	2.0%	1.6%	1.3%
Oromia	9.6%	9.7%	10.6%	3.3%	1.4%	3.8%
Somali	23.7%	22.2%	22.7%	4.7%	1.2%	1.5%
Benishangul	16.0%	9.9%	11.5%	0.0%	1.2%	1.5%
SNNP	6.5%	7.6%	6.0%	2.8%	2.3%	2.7%
Gambela	6.8%	12.5%	14.1%	6.4%	0.7%	1.6%
Harari	9.1%	9.1%	10.7%	3.1%	1.8%	2.2%
Addis Ababa	1.7%	4.6%	3.5%	1.7%	5.7%	7.0%
Dire Dawa	11.4%	12.3%	9.7%	1.8%	2.0%	1.5%
Place of Residence						
Urban	6.3%	5.7%	8.7%	3.3%	3.3%	3.1%
Rural	10.9%	10.2%	10.1%	2.8%	1.5%	2.8%
Wealth Index						
Lowest	13.0%	12.1%	14.1%	2.8%	1.7%	3.8%
Second	13.4%	12.3%	10.1%	1.9%	1.8%	1.7%
Middle	10.7%	9.4%	9.4%	2.9%	0.8%	2.4%
Fourth	7.6%	7.7%	6.5%	3.1%	1.5%	3.2%
Highest	6.2%	5.1%	8.2%	3.6%	2.8%	2.9%
Total	**10.5%**	**9.7%**	**9.9%**	**2.8%**	**1.7%**	**2.8%**

Source: DHS 2005, 2011, 2016

SDG 3.1.2: Percentage of Births Attended by Skilled Personnel

Ensuring that women have access to skilled attendants to support birth delivery provides a critical step in achieving progress towards development goals aiming to reduce neonatal and maternal mortality. DHS estimates (Table 23 in Annex 1) are used to document both Ethiopia's progress and remaining gaps in ensuring that women giving birth have access to skilled attendants. In 2016, only 27.7 per cent of women had their births delivered by doctors, nurses or midwives, but this rate represents a near five-fold increase in access since 2005.[10] Rates of births attended by skilled personnel vary substantially based on the urban/rural divide, by region, by education level of the household head, and by the welfare quintile. The percentage of births attended by skilled personnel at birth was nearly four times higher in urban regions than rural ones in 2016; Addis Ababa leads the rest of the country with 96.8 per cent of births delivered by professionals followed by Tigray which is 37.5 percentage points behind. In 2016, 93.2 per cent of births among women having more than a secondary education were attended by skilled attendants, more than three times the national average.

10 Note: Health Extension Workers are only counted as skilled birth attendants in the 2016 wave of the EDHS. Previous waves exclude health extension workers in their definition.

SDG 3.2.1: Under-Five Mortality Rate

SDG 3.2.1 sets the target for the under-5 mortality[11] rate to 25 deaths per 1,000 live births by 2030. The benchmarks calculated for 2011 indicate that this target requires a reduction of the existing rate by over 75 per cent between 2011 and 2030. The table below indicates that the under-5 mortality rate fell from 132 to 79 deaths per thousand live births from 2005 to 2016, but with substantial regional variations. Although children in rural regions suffer considerably higher mortality rates than those in urban ones, the disparities have diminished from 2005 to 2016. Greater levels of mother's educational attainment and higher wealth both correlate with lower under-5 child mortality rates.

Table 5: Under-Five Mortality Rate[12]

	2005	2011	2014
Mother's Education			
None	49.1%	46.7%	43.0%
Primary	39.8%	41.7%	37.3%
Secondary	27.0%	20.0%	21.7%
More than Secondary	21.3%	18.9%	7.7%
Region			
Tigray	41.0%	51.4%	45.7%
Afar	40.8%	50.2%	46.1%
Amhara	56.6%	52.0%	42.2%
Oromia	41.0%	41.4%	38.2%
Somali	45.2%	33.0%	36.5%
Benishangul	39.7%	48.6%	40.3%
SNNP	51.6%	44.1%	44.1%
Gambela	29.3%	27.3%	22.4%
Harari	38.7%	29.8%	27.6%
Addis Ababa	18.4%	22.0%	22.9%
Dire Dawa	30.8%	36.3%	27.1%
Place of Residence			
Urban	29.8%	31.5%	26.5%
Rural	47.9%	46.2%	42.4%
Wealth Index			
Lowest	47.9%	49.2%	46.5%
Second	54.0%	47.7%	45.3%
Middle	45.0%	45.6%	39.6%
Fourth	46.4%	45.0%	38.3%
Highest	34.9%	29.7%	27.7%
Sex			
Male	47.2%	46.2%	41.0%
Female	45.8%	42.5%	39.7%
Total	**46.5%**	**44.4%**	**40.4%**

Source: DHS 2005, 2011

SDG 3.7.1: Need for Family Planning Satisfied by Modern Methods

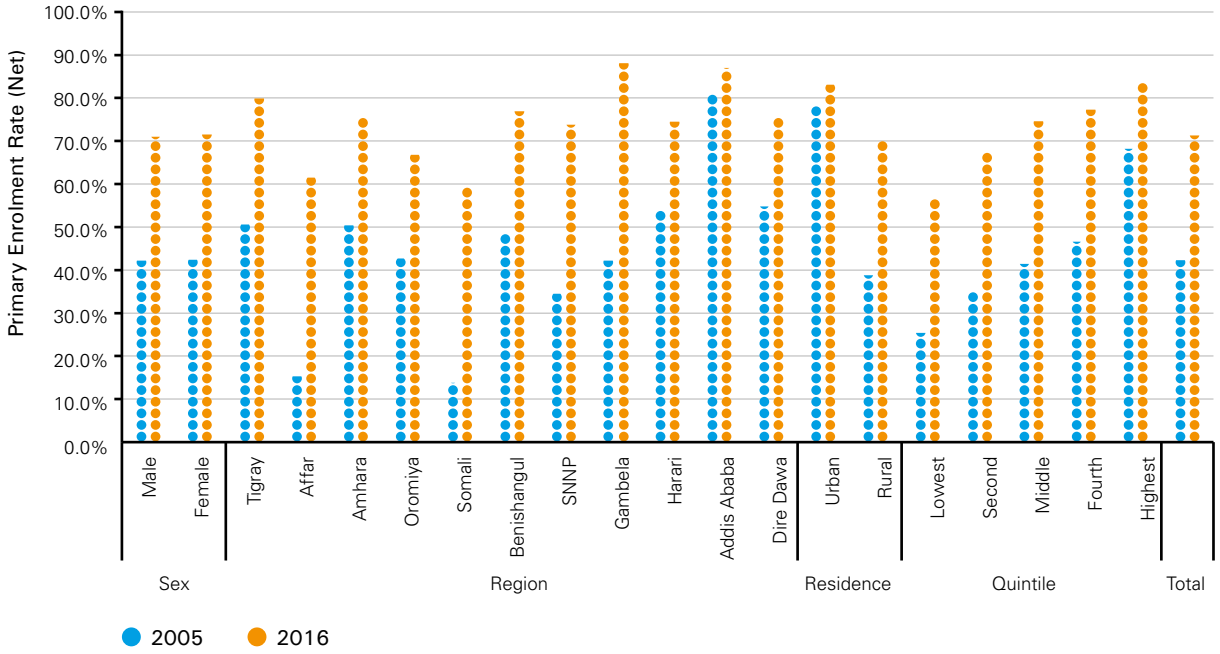
SDG 3.7.1 aims to ensure universal access to planning/reproductive services to all women of reproductive age (between age 15-49 years). Achieving this goal allows women to delay pregnancies and prevent ill-timed ones which can increase both infant and maternal mortality. It can also reduce the transmission of sexually-transmitted diseases such as HIV. Ethiopia's progress in that respect is gauged by measuring the percentage of women whose need for family planning is satisfied by modern contraceptive methods. DHS estimates (Annex 1- Table 24) show that Ethiopia has made considerable strides in achieving this objective by more than quadrupling access to modern contraceptive methods between 2005 and 2016. Although the gap between rural and urban regions has shrunk during the same period, it still stands at 21.9 per cent in 2016. Women with higher educational attainment and from wealthier households are more likely to have their planning needs met by modern methods. There are also considerable differences between regions in the attainment of this SDG, especially in the Somali region where less than 10 per cent of women are using modern methods.

SDG 4/MDG 2: Primary and Secondary Net Enrolment Rates

The stated aim of SDG 4 is ensuring equitable and inclusive quality education for all. The indicators used to gauge this goal mainly focus on the quality of schools' infrastructure, including their access to electricity, the internet, improved water and sanitation facilities, and other vital services. Due to a lack of relevant information in the datasets employed for this study, this section adopts a proxy indicator based on MDG 2 (achieve universal primary education) to measure the progress achieved in providing education for all. The specific indicators include the net primary and secondary enrolment rates reported in the table below.

11 The probability of dying between birth and the fifth birthday
12 Calculated for the 10-year period preceding each survey

Figure 3: Net Primary Enrolment Rate

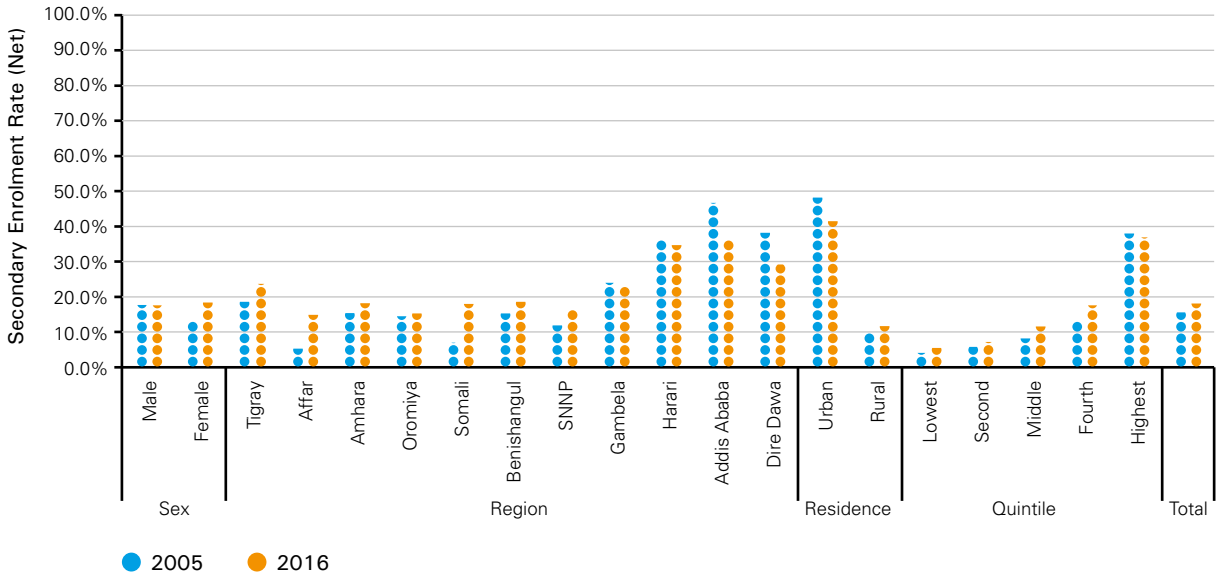


Source: DHS 2005, 2016

As part of its Education and Training Policy (1994) and through Education Sector Development Programs (1997), Ethiopia started offering free primary education and it also more than doubled its education spending between 2000 and 2011.[13] These investments are yielding significant results as estimates, displayed in the figure below, show the country has made large strides in increasing enrolment at the primary level. It registered a 29-percentage-point increase in the number of children aged 7-11 enrolled in primary school between 2005 and 2016.

Secondary school enrolment registered a modest increase of 2.5 percentage points during the same period (Figure 4). At both levels, enrolment was higher for girls in 2016, marking a change from a decade earlier (2005), when primary enrolment rates were nearly equal for primary school children and higher for boys in secondary school. Children in

Figure 4: Secondary Net Enrolment Rate



Source: DHS 2005, 2016

13 (UNESCO, 2015)

urban regions are also more likely to be attending school than those in rural ones, especially at the secondary level for which enrolment is nearly 30 percentage points higher in urban areas in 2016. Household wealth appears to be an important factor in determining whether a child attends school; secondary enrolment rates for those in the top quintile, for instance, are twice as high as the national average.

SDG 4.c.1: Proportion of Teachers Receiving the Minimum Organized Teacher Training

SDG 4.c.1 aims to substantially increase the supply of teachers at all school levels through training and international cooperation on pedagogical preparation. The Ethiopian Ministry of Education considers primary-level teachers to be qualified if they possess at least a diploma certification, while secondary school teachers should have a degree-level qualification. Overall, the supply of qualified teachers is the lowest for grades 1-4 of primary schools with only 72.3 per cent of teachers considered qualified. The proportion of qualified teachers increases to 93.4 per cent for primary grades 5-8 and decreases slightly to 92.7 per cent for grades 9-12. Some disparities exist across regions with Addis Ababa registering the highest proportion of qualified teachers in the country at all school levels, alternatively Afar registers the lowest percentage of qualified tutors for grades 1-4 and 9-12 (Figure 29 in Annex 1).

SDG 5.3.1: Proportion of Women Aged 20-24 Married Before Age 15 and Age 18

SDG 5, which focuses on achieving gender equality and empowering women, includes a target for the "elimination of all types of forced and early marriage." Early marriage is prevalent in Ethiopia, even though the federal legal age of marriage is set at 18 years. The figures below, however, show that the rates of early marriage are decreasing for women aged 20-24. Between 2005 and 2011, there was a 7.5 percentage point decrease in the rate of women married by age 15 and an 8.1 percentage point decrease for those married by age 18. Between 2011 and 2016, early marriage rates decreased by a further 2.3 and 0.9 percentage points respectively. Rates of early marriage are more than three times as high in rural areas than urban ones. The rates of early marriage decrease significantly with higher educational attainment of women, and prevalence is considerably higher for those in bottom wealth quintiles.

Table 6: Prevalence of Early Marriage

	Percentage of women aged 20-24 married by age 15			Percentage of women aged 20-24 married by age 18		
Place of Residence	2005	2011	2016	2005	2011	2016
Urban	11.2%	9.2%	2.8%	27.2%	21.7%	15.7%
Rural	27.3%	19.3%	17.7%	55.2%	49.0%	48.0%
Educational attainment						
No Education	31.2%	28.3%	29.7%	62.3%	62.9%	67.8%
Incomplete Primary	19.3%	12.8%	12.8%	41.9%	38.7%	44.2%
Complete Primary	3.0%	8.2%	9.1%	22.5%	29.0%	35.2%
Incomplete Secondary	7.9%	3.8%	3.1%	21.3%	13.5%	12.8%
Complete Secondary	4.1%	0.4%	0.1%	5.4%	7.0%	12.4%
Higher	7.6%	2.7%	0.2%	9.0%	7.0%	5.8%
Wealth Index						
Lowest	30.3%	22.5%	21.1%	61.4%	59.2%	58.0%
Second	28.2%	20.9%	21.5%	59.5%	56.4%	53.2%
Middle	28.8%	18.6%	20.2%	55.6%	46.8%	49.6%
Fourth	27.1%	19.9%	9.4%	52.2%	42.2%	35.1%
Highest	12.4%	8.3%	4.4%	29.9%	22.0%	18.7%
Total	23.9%	16.4%	14.1%	49.3%	41.2%	40.3%

Source: DHS 2005, 2011, 2016

SDG 6.1.1: Proportion of Population Using Safely Managed Drinking Water Services

The sixth SDG addresses households' access to sustainable water and sanitation services. The first target of this SDG focuses specifically on access to safely managed drinking water and aims for universal access by 2030. The figure below indicates that Ethiopia has made good progress over the last decade in providing households with an improved source of drinking water, most notably in rural regions. Between 2005 and 2016, the share of rural households with an improved drinking water source increased by nearly 30 percentage points. Significant disparities exist at the sub-regional level, with the Somali region lagging behind the rest of the country in offering improved access to safe drinking water. Universal access appears to be within reach in the capital Addis Ababa.

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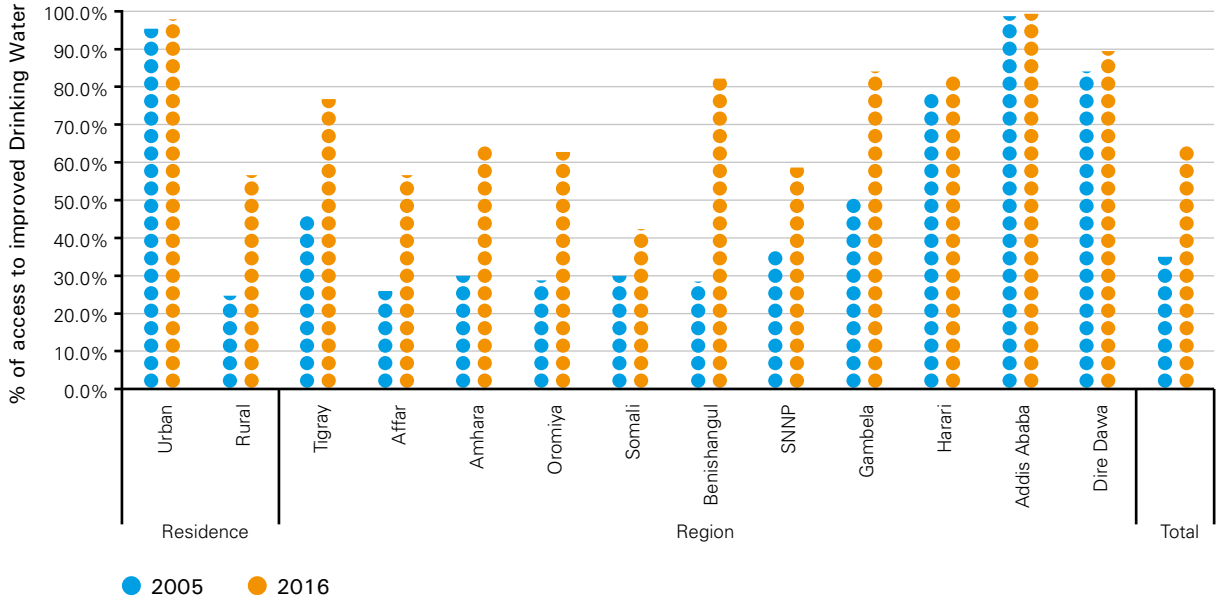
Figure 5: Share of Access to Improved Source of Drinking Water



Source: Author's Calculation based on DHS2005, DHS2016

SDG 6.2.1: Share of Population Using Safely Managed Sanitation Services

The second target of SDG 6 aims to achieve universal access to safe sanitation services by 2025. As shown in the Figure 6 below, access to improved sanitation is low in Ethiopia with only 6.4 per cent of the population connected to safe systems. Estimates show that access had dropped nationally between 2005 and 2014, before recovering again in 2016. As is the case with access to safe water sources, significant disparities exist at the regional level as evidenced by the 22.7-percentage point gap between the lowest and best-performing region.

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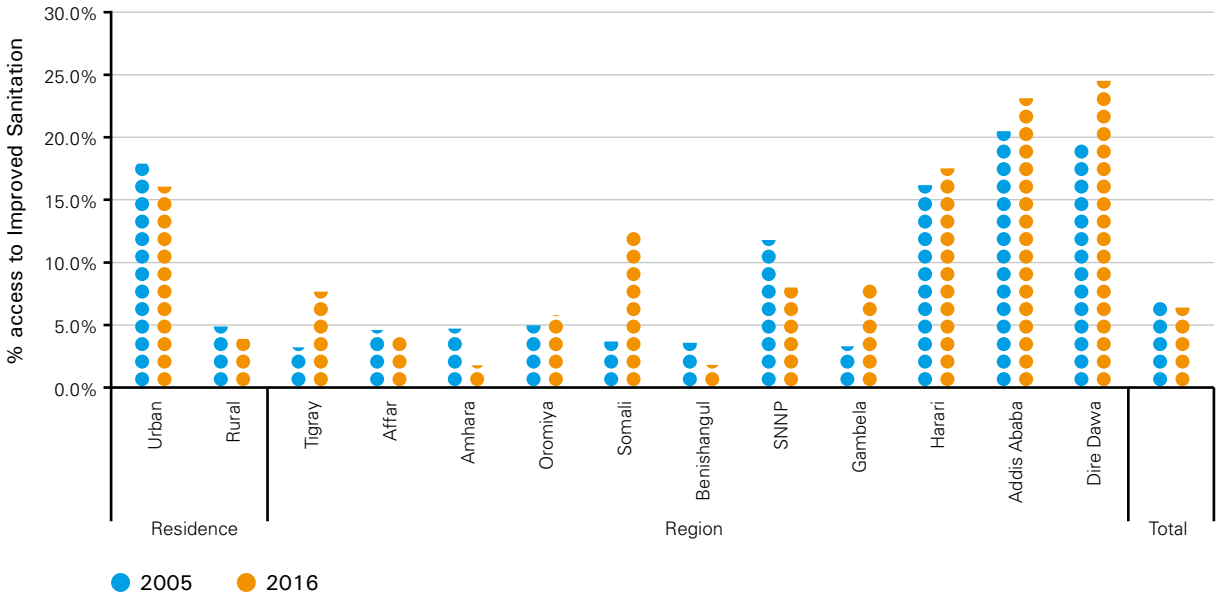
Figure 6: Share of Access to Improved Sanitation Source

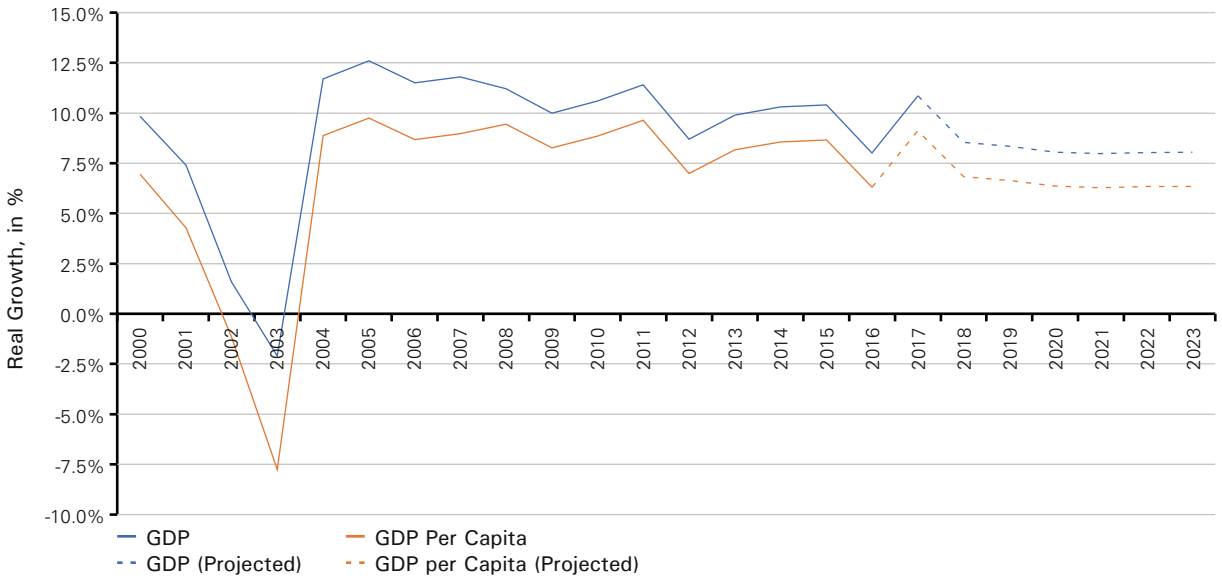


Source: Author's Calculation based on DHS2005, DHS 2016

SDG 8.1.1: Annual Growth Rate of GDP per Capita

Generating high real GDP per capita growth is imperative to spur and sustain progress in development goals. The target for SDG 8.1.1 is to sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries. In the GTP II, the target set for Real Gross Domestic Product growth is at least 11 per cent throughout 2015/16 to 2018/19 and 10.8 per cent for 2019/20. The figure below indicates that GDP growth picked up after 2012 and kept its momentum in the subsequent years above the 10 per cent mark before dropping to 8 per cent in 2016. These rates are below the GTP II target, but growth is still considered rapid compared to the average for East African countries and to the whole of Africa. Real GDP per capita growth rates follow the same trend as GDP rates but lag behind the latter (since the population growth rate is positive). Between 2010 and 2016, real per capita income grew at an average rate of 8.2 per cent. Short-term projections indicate that after reaching a six-year peak in 2017, GDP growth will decrease and stabilize at a rate near 8.2 per cent per annum until 2023.

Figure 7: Real GDP and GDP per Capita Growth



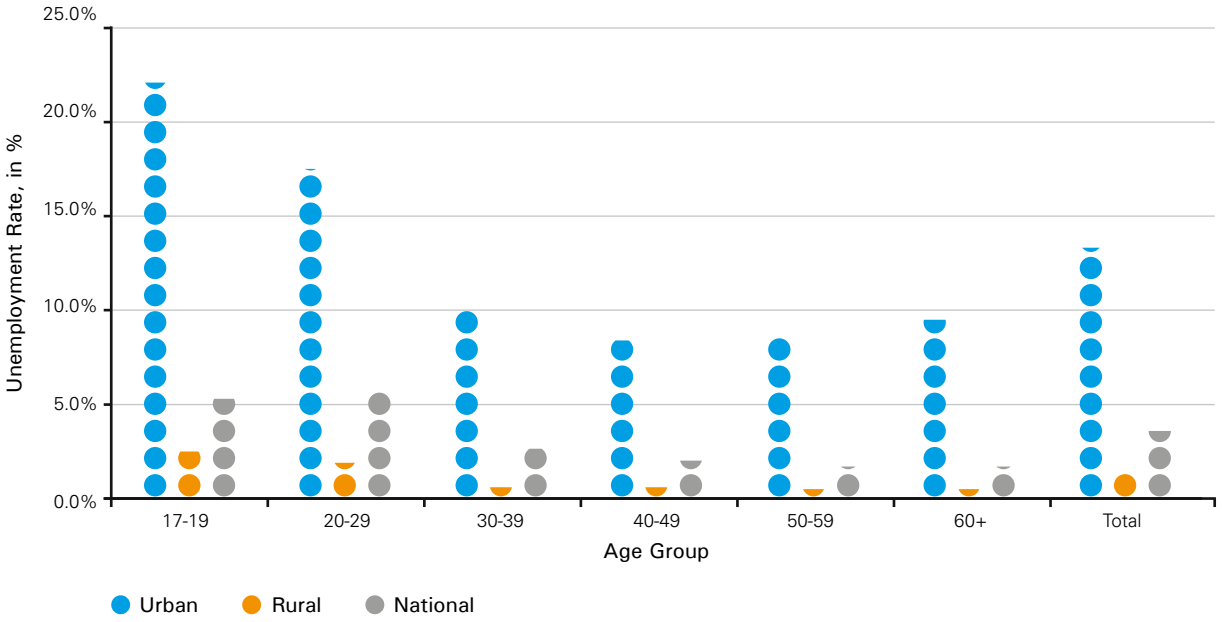
Source: IMF World Economic Outlook Database, April 2018

SDG 8.5.2: Unemployment Rate by Sex, Age, Persons with Disabilities

The 2030 target for SDG 8.5.2 is to achieve full and productive employment for all men and women, including young people and persons with disabilities. The unemployment rates displayed in Figure 8 are estimated using the 2013 National Labor Force Survey. The national unemployment rate stands at 3.6 per cent, but significant spatial disparities exist in the distribution of the unemployed. In urban regions, over 13.3 per cent of the active population is unemployed, over ten times higher than in rural regions. Unemployment is substantially higher for youth residing in urban areas. For those aged 17-19 for instance, unemployment stands at 22.1 per cent in urban regions compared to just 2.5 per cent in rural ones.

Unemployment appears to decrease in the higher age groups, but it is not higher for persons with disabilities. Unemployment rates for men and women differ, particularly in urban areas. Although

Figure 8: Unemployment Rate by Age Group



Source: Author's Calculation based on the 2013 National Labour Force Survey

unemployment among women is only 1 per cent higher than among men in rural regions, this gap jumps to 11.2 per cent in urban ones. Achieving SDG 8.5.2 and reaching full productive employment will require a narrowing of the gap in unemployment rates between urban and rural areas, improving youths' integration into labour markets and greater gender equality.

SDG 10.1.1: Growth Rates of Household Expenditure Per Capita among the Bottom 40 per cent of the Population and the Total Population

The 2011/12, 2013/14 and 2015/16 waves of the LSMS are used to calculate the growth of expenditure per capita in the country. All expenditure per capita numbers were adjusted to 2010 prices and further deflated using the HCE spatial price indices to obtain real consumption growth per decile, as displayed in the figure below.

Real per capita consumption grew rapidly between 2011 and 2013 for the entire population except those at the top decile. Between 2013 and 2015 however, growth was negative at all levels although households in the upper decile registered a lesser drop in real consumption. Overall, the average real per capita consumption dropped by 0.6 per cent between 2011 and 2013 but it grew by 11.6 per cent for the households in the bottom 40 per cent.

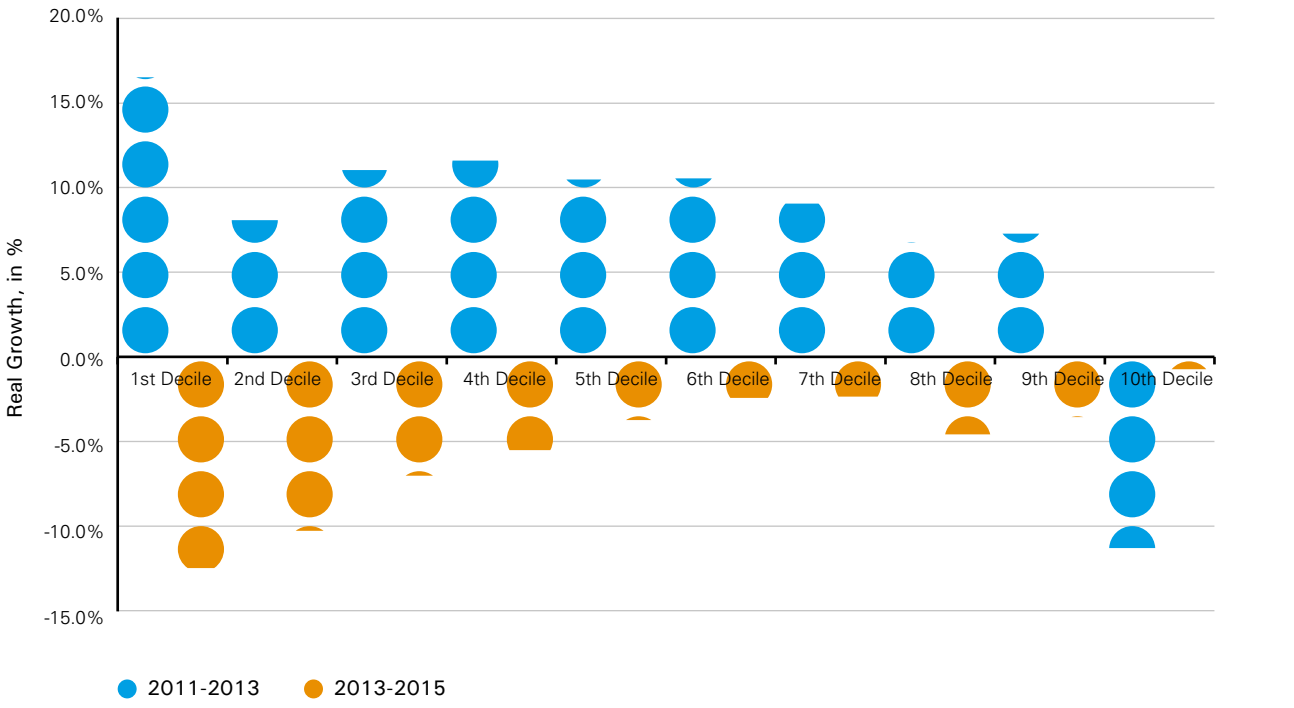
During the period from 2013 to 2015, per capita consumption of both the whole population and that of the bottom 40 per cent fell, by 8.3 per cent and 3.9 per cent respectively.

SDG 10.2.1: Proportion of People living Below 50 per cent of Median Income

Promoting economic and social inclusion involves improving the livelihoods of bottom-earners and ensuring low disparities of income in the population. Consumption per capita is used instead of income to analyse the percentage of the population earning below 50 per cent of the median.

The figures from the LSMS data indicate a slight increase in the percentage of people consuming below 50 per cent of the median per capita consumption, from 10.8 per cent in 2011 to 12.1 per cent in 2015. Although there are no apparent disparities between men and women nor between persons with or without disabilities, it is evident that those living in rural areas are nearly four times more likely to be low earners than those in urban ones.

Figure 9: Expenditure Growth Incidence by Decile



Source: LSMS 2011, 2013, 2015

SDG 8.7.1: Proportion and Number of Children Aged 5-17 Years Engaged in Child Labour

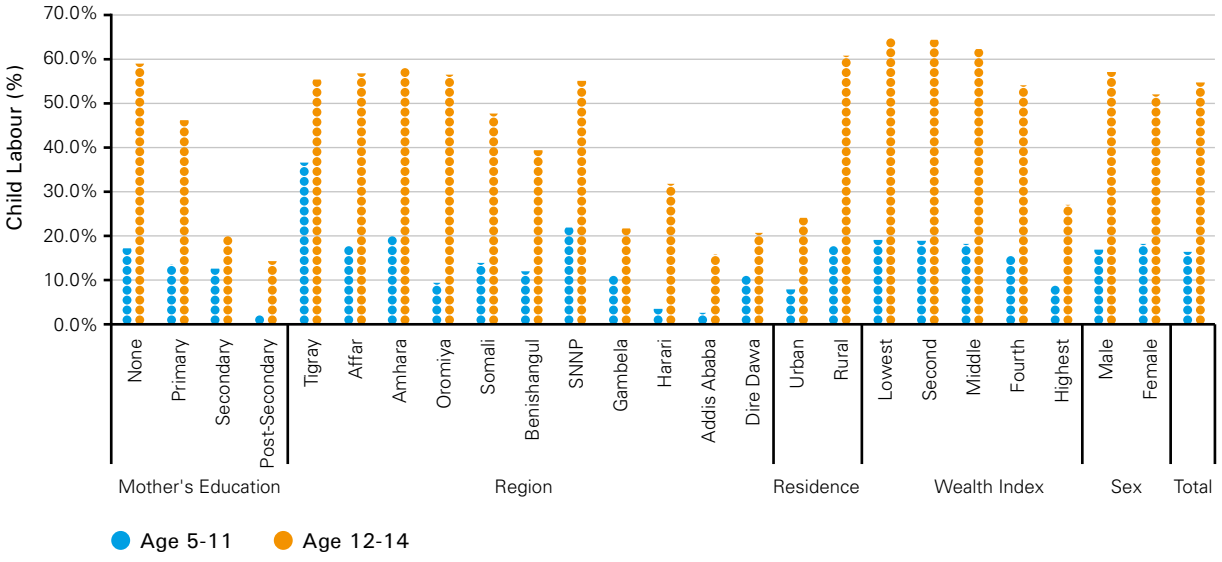
SDG 8.7.1 aims to eradicate child labour by 2025. Indicators for child labour, adapted to the definition of the UN Convention on the rights of the child, are derived using the DHS 2011.[14] The figure below shows that 27.4 per cent of children ages 5-14 are engaged in child labour and that is more prevalent among boys than girls for those ages 12-14 while the opposite is true for those ages 5-11. Child labour appears to be more of an urban phenomenon and it decreases considerably for mothers with higher educational attainment. Over half of children ages 12-14 had an economic activity or participated in household chores for at least 28 hours, suggesting that children drop out of school at the secondary level to contribute to household income.

The DHS only captures information for children ages 5-14 while the SDG target covers the youth below age 17. For this purpose, the 2013 National Labor Force Survey is used to further analyse the types of employment that children engage in. While the NLFS does not allow obtaining indicators based on the same definition of child labour as in the DHS, it does however allow for the determining of the economic status of children. Overall, the figures show that of all children ages 5-17, 71.2 per cent are engaged in some type of work. Over 38.2 per cent of children are engaged in a productive economic activity and 15.3 per cent are engaged in both work and in household chores. Children of higher age groups are the most likely to be employed either by the household or an employer. An estimated 47.5 per cent of those ages 15-17 work. The data from these two surveys indicate that child labour is persistently high in Ethiopia, and the country is currently not on track to completely eradicate child labour by 2025.

SDG 16.2.3: Proportion of Young Women and Men aged 18-29 Experiencing Sexual Violence by Age 18

The objective of SDG 16.2.3 is to end abuse, exploitation, trafficking and all forms of violence against and torture of children. Because of a lack of detailed data on both men and women and on the specified age groups relevant to this SDG, a proxy indicator is used based on the preliminary figures from of the 2016 DHS. Instead of analysing the proportion of women and men victims of sexual violence by age 18, the proportion of ever-married women is used (Table 27 in Annex 1). In 2016, 11.1 per cent of all ever-married women aged 15-49 reported having experienced sexual violence committed by their partners or husbands. Women with higher educational attainment are less likely to have suffered any violence as are those residing in urban regions. There is a 7.5 percentage point gap between women residing in the bottom and the

Figure 10: Child Labour by Age in 2011



Source: DHS 2011

14 Child labour includes (a) children 5-11 years who in the 7 days preceding the survey, worked for someone who is not a member of the household, with or without pay, or engaged in any other family work or did household chores for 28 or more hours, and (b) children 12-14 years who in the 7 days preceding the survey, worked for someone who is not a member of the household, with or without pay, or engaged in any other family work for 14 or more hours or did household chores for 28 or more hours.

highest wealth quintiles, suggesting that those with higher household wealth are less likely to be victims of violence.

1.3 Conclusion

Ethiopia's baseline status at the beginning of the post-2015 development horizon varies across the different SDG targets. The country demonstrates substantial achievements and positive trends towards achieving several of the goals by continuing its current trajectory, positioning Ethiopia favourably for the 2030 Agenda.

The analysis of recent progress significantly highlights reductions in extreme poverty, increases in primary enrolment (and narrowing of the enrolment gap between boys and girls), and improvements in the access to modern contraception methods. Both real GDP and GDP per capita growth rates are high and appear to benefit lower deciles, which might lead to further reductions in poverty and better employment opportunities, especially for unemployed youth.

However, substantially greater resources and commitments are required to achieve the SDGs related to access to basic services, child nutrition, child labour (which impedes progress in secondary school enrolment) and gender equality. Low rates of access to improved water and sanitation sources, electricity, health care (especially skilled personnel at birth) hinder efforts to achieve goals related to wasting, stunting and under-5 mortality.

Highly variable spatial disparities, both across regions and between urban and rural areas, document the importance of ensuring that SDG investments reach the most vulnerable and marginalised parts of the country.

2.

A Comprehensive Cross-Sectoral Approach for Costing the Achievement of the Child Centred Sustainable Development Goals in Ethiopia

2.1 Introduction

One of the important milestones in many policy advocacy processes is marked by the finance minister's question: **"What will this policy cost?"** The query signifies the success of the initial advocacy efforts – the active interest of one of the most important policy stakeholders. A robust and credible answer can propel the advocacy process towards success. But costing policy intervention prior to its comprehensive design represents a perilous exercise. Under-costing may lead to under-resourcing, and the resulting backlogs and bottlenecks may ultimately imperil policy success. Over-costing, on the other hand, can generate sticker shock and paralyse the political will required to move the policy forward.

This chapter develops and tests an innovative methodology that aims to improve costing approaches with an econometric model that explicitly measures synergies that result from interactions between different policy sectors. The model – based on a public policy production function that specifically models "joint production"– embeds one of the most common empirical costing models used for assessing the resource requirements for development objectives, the "unit-cost approach." This more general econometric approach allows the relaxation and testing of the unit-cost approach's restrictive assumptions, enabling a rigorous testing of this standard approach compared to the newly developed multisectoral model.

The unit-cost approach is sometimes referred to as the "input-outcome elasticities approach." The most common application simply divides the relevant amount of Government spending by an appropriately quantified outcome indicator. An early study calculated the unit-cost of primary school education by dividing existing spending by the enrolled population. The study then used the resulting unit-cost to project the cost of reaching the target population, simply multiplying the unit-cost by the number of children in the target population.[15] A water and sanitation study adopted a similar approach but included capital and recurrent components of expenditure.[16] Two studies of biodiversity adopted a simple unit-cost approach, calculating the average cost to protect existing areas (per square kilometre), and then multiplying this constant by the targeted number of square kilometres to be protected.[17] Similarly, the World Bank employed the unit-cost approach in estimating resource requirements for energy, telecommunications, transportation, water and sanitation investments.[18]

The simplicity and prevalence of the unit-cost approach offers an attractive option for assessing resource requirements for the Sustainable Development Goals (SDGs). However, Schmidt-Traub (2015) offers a critique of this approach.[19] Simply projecting current expenditure requirements into the future does not account for required changes in the composition of investment (due to technological change) or the higher costs associated with hard-to-reach populations. Most unit-cost methodologies lack sufficient detail to support practical policy decisions, and they cannot estimate the impact of cross-sectoral synergies or other economy-wide impacts. As a result, they do not adequately inform vital policy trade-offs and complementarities.

Schmidt-Traub (2015) also provides a critique (both advantages and disadvantages) of other development goal assessment methodologies. Incremental-capital-output-ratio models suffer similar challenges to the unit-cost approach, providing too aggregate a policy result and failing to address required structural changes and innovations. While intervention-based needs assessment tools can provide a structured and transparent methodology for quantifying resource requirements at a practical and policy-relevant level of disaggregation, they generally are unable to assess dynamic cross-sectoral trade-offs and synergies.

Computable General Equilibrium (CGE) models provide economy-wide assessments that can explicitly incorporate development goal production functions (such as that by Agénor discussed below). The World Bank's **Maquette for MDG Simulations (MAMS)**[20] supports economy-wide assessments, assessing cross-sectoral interactions and macroeconomic forces. CGE models like MAMS

15 (Delamonica et al., 2011)
16 (Hutton & Varughese, 2016)
17 CBD 2012a, 2012b
18 (World Bank, 2013)
19 (Schmidt-Traub, 2015)
20 (Bourguignon, Diaz-Bonilla, & Lofgren, 2008) (Lofgren & Diaz-Bonilla, 2010) (Lofgren, Cicowiez, & Diaz-Bonilla, 2013)

usually use restrictive Cobb-Douglas production functions to predict development goal outcomes, limiting policy technologies to constant returns to scale and similarly restricting opportunities for cross-sectoral synergies. More sophisticated tools include **Integrated Assessment Models** (IAMs), which provide a flexible approach for assessing cross-sectoral dynamic interactions over long horizons. However, they generally do not support goal-based budgeting with concrete estimates of required investment resources. Both CGEs and IAMs involve complex methodologies and require considerable expertise.

This paper's cross-sectional estimation approach follows the lead of Agénor et al. (2005), which developed an integrated macroeconomic model to assess Millennium Development Goals (MDGs) progress in Sub-Saharan Africa.[21] This analysis estimated cross-sectional regressions including core MDG social indicators: (a) malnutrition, (b) infant mortality, (c) life expectancy, and (d) access to safe water. The adopted methodology employed cross-sectional estimation "in order to focus on long-run relationships. Given that all the MDG indicators considered […] tend to change slowly over time, this appears to be a more sensible strategy than using, say, dynamic panel techniques" (p. 17). In addition, the cross-sectional estimation methodology follows the most typical practice for estimating translog production functions.

This paper's methodology is rooted in the conclusions of Schmidt-Traub (2015) and Bourguignon et al. (2008), reflecting that the diverse advantages and disadvantages of the various tools available imply the need for multiple complementary models and approaches. The approach developed in this paper does not aim to replace the diverse set of tools but offers important innovations that extend the toolkit. In particular, by adopting a "policy production function," this paper enables modelling of variable own- and cross-elasticities. Unit-costs can vary, for example, reflecting the increasing costs associated with hard-to-reach populations. The model reflects cross-sectoral synergies that can improve the value-for-money of SDG investments. The model is also simple to estimate, employing readily available fiscal data and development outcomes derived from existing household surveys, and an Ordinary Least Squares (OLS) estimation approach. The model can also

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be readily incorporated into more complex macro models, such as that of Agénor et al. (2005) or CGE models like MAMS.

This chapter estimates the cost of the set of child-centred SDGs analysed in Chapter 1. The chapter presents the results on both the highly restrictive simple log model as well as the cross-sectoral variable elasticity model. The first enables the testing of the conventional unit-cost approach which assumes that there exists a constant linearly homogenous relationship between SDG outcomes and each outcome's specific sectoral spending. Specifically, the unit-cost approach assumes that each individual or household benefitting from the second model assesses the importance of cross-sectoral synergies and other complex non-linearities in the production of public policy outcomes. This chapter compares both types of models, estimated at the district-level, for an identified set of child-centred SDG indicators. Formal hypothesis tests assess whether the data supports the unit-cost model and whether or not the cross-sectoral model significantly improves explanatory power.

2.2 Methodology

The Ethiopia CC-SDG model helps demonstrate the benefits of integration across child-sensitive sectors. These sectors interact with one another dynamically through a network of feedback loops. Investments in health can increase the

21 (Agénor, Bayraktar, Moreira, & El Aynaoui, 2005)

effectiveness of education spending,[22,23] and education outcomes reinforce nutritional impacts and strengthen livelihoods.[24] The following sections present the results of two models, for which Yi represents a SDG indicator and x1, x2, and x3 represent fiscal spending sectors (for example, health, education and agriculture) and ui is the error term.

The first regression (equation 1) shows the own-sector spending effect of an intervention on the selected SDG indicator. This regression effectively represents a highly-restricted production function, the unit-cost regression in the model allows a more general test, which encompasses both the established approach and single-sector alternatives.

(1) Equation 1: lnYi = ß0 + ß1lnxi + ui

Regression 2 goes a few steps further, adding more spending categories to the specification to test direct cross-sectoral impacts, and further interacts spending across sectors, measuring the impact of cross-sectoral synergy. The cross-terms measure the extent to which one sector's spending influences the effectiveness of another sector's spending—that is, to create synergy. An F-test for incremental contribution is employed to measure whether the contribution of cross-sectoral synergy to impact is significant.

To measure these cross-sectional synergies and non-linear relationships among multiple policy inputs and multiple CC-SDGs outcomes, the Ethiopia CC-SDGs model has employed a joint-production estimation model. The joint production model estimates results that have informed the core parameters and relationships across the CC-SDGs sectors. The production function model specification takes the following form:

(2) Equation 2: lnYi = ß0 + ß1lnx1i + ß2lnx2i + ß3lnx3i + …

+ ß11lnx1ilnx1i + ß12lnx1ilnx2i + ß13lnx1ilnx3i + …

+ ß22lnx2ilnx2i + ß23lnx2ilnx3i + … vi - ui

where:

lnYi = Selected SDG targets (in log form) by woreda – for example, the proportion of the population covered by a specific public service reflecting an SDG indicator

lnx1i = Spending per capita on sector 1 input – (e.g., health sector investment) by woreda (in log form)

lnx2i = Spending per capita on sector 2 input - (e.g., education sector investment) by woreda (in log form)

lnx3i = Spending per capita on sector 3, etc.

vi, ui = Error terms

The estimation focuses on several relevant expenditure sectors for which data are consistently available: (1) education, (2) health; (3) agriculture, (4) water, (5) trade and industry, (6) culture and sport; (7) general services; (8) organs of State and (9) women's bureau (as a specific subset of the organs of State expenditure). Each SDG indicator model includes the most relevant expenditure categories, including recurrent and capital expenditures, and the appropriate interaction terms representing synergy among sectors.

The model constructs SDG outcome variables from national household survey data, whereas the fiscal input variables are constructed from the BOOST dataset. The production function model reflects an understanding that the achievement of the SDGs results from a public policy production process in which SDG indicators represent outputs and spending on critical policy sectors represent the inputs. The model is estimated using sub-national (woreda-level) data mapped from the BOOST database. Each relevant SDG indicator has been mapped to an "own-sector" basket of spending sectors at woreda levels for the 2010/2011 fiscal year.

Outcome indicators have been estimated using household survey datasets and national demographic and health survey (DHS) data for the year 2011. National household surveys are usually representative at best at the regional level, however woreda-level aggregations support

22 (Vogl, 2012)
23 (Bijwaard & Van Kippersluis, 2016)
24 (International Labour Organization (ILO), 2010)

inferences on production function relationships without necessarily identifying robust woreda-level indicators. The BOOST data provides robust fiscal indicators by woreda. The study estimates the SDG outcome indicators at woreda level from household survey data and these are not precisely representative of the associated woredas. However, they represent observations on these woredas with statistical properties that support the econometric estimation of the production function employed in this analysis. The high variance associated with the statistical properties of the outcome indicators reduces the goodness-of-fit of the estimated models but does not preclude the estimation of statistically significant relationships between the BOOST fiscal indicators and the SDG outcomes.

The estimated elasticity of an indicator with respect to its own-sector spending represents the direct relationship between investment in a particular sector and the respective returns. The estimates of elasticities of an indicator with respect to the other sectors' spending (cross-elasticities) represent the synergies. The joint production model understands that spending on any sector can generate an impact on any SDG indicator, and the estimation approach reflects this.

For each of the selected indicators, a model is estimated using a subset of the available expenditure categories, specifically those that yield significant explanatory power in explaining variations in the outcome, given that they are statistically significant. Although most of the models use the total spending on a relevant sector, some of the models make use of a sub-set of the expenditure categories, namely capital or recurrent expenditure. These sub-sets are often more successful in explaining the variation of the outcome as they incorporate spending on specific programmes or investments that are directly related to the respective SDG indicator.

2.3 Data Description

The BOOST database is used to match SDG outcomes at the woreda-level with their respective sectoral expenditures. The sub-national spending in this dataset consists of nine expenditure categories: Organs of State, Justice and Security, Health, General Services, Agriculture and Rural, Education, Trade and Industry, Culture and Sport and Water Resources. The regression models make use of all these main expenditure categories to estimate a costing equation but also uses subsets of expenditure such as the Bureau of Women's and Children's Affairs or the Bureau Education's expenditure for which programme spending is more relevant to specific SDGs. Table 28 in Annex 2.1 summarizes the sectors used to estimate the spending for each development goal, detailing the spending category included in the model.

Woredas in the BOOST dataset exhibit a high level of variation, allowing for robust cross-sectional modelling. The summary statistics on the sectoral spending (Table 29 in Annex 2.1) show that these expenditures all display significant standard deviations from their means signifying that the data apparently captures fiscal inequalities across different regions of the country, and it should allow for large enough statistical variance and more accurate standard errors.

2.4 Results

The following section presents the results of the unit-cost model regressions compared against the production function model incorporating cross-sectoral synergies. The fiscal variables in these regressions are all expressed in log per capita terms.[25] The analysis also calculates F-tests to support or refute the statistical significance of each model. The tables in Annex 2.4 present the results of the test verifying whether the unit-cost model is rejected (i.e. the slope is equal to one and the intercept term is equal to zero), and it also shows the result of the F-test for incremental contribution of synergy terms. Each model was estimated twice for each indicator: first using a sample of all woredas in the country (Annex 2.2), and second by disaggregating the data into urban and rural sub-samples and running the estimations on each. (Annex 2.3).[26]

25 All regressors represent total per capita expenditure on a sector, unless recurrent or capital expenditure is specified

26 Only presented are the indicators for which urban and rural models could be robustly estimated. The disaggregated urban and rural models highlighted important challenges. The urban/rural distinction is not consistent across surveys and the national census. For example, the methodology for the census classifies some districts as urban while that for the Demographic Health Survey (DHS) classified them as rural. In the surveys, the urban sub-sample is much smaller than the rural sub-sample, making it difficult to satisfy the requirements of the data-hungry translog

SDG 1.1.1: Proportion of the Population Living Below the $1.90 PPP Poverty Line

The first indicator to be analysed using the two respective models is the poverty headcount measured at international poverty lines. While the cross-sectoral (synergy) model is statistically significant, the unit-cost model is not statistically significant at any level. The formal statistical test for the unit-cost approach requires the constant term to be not statistically significant from zero, while the coefficient on the own-sector spending should not be statistically significant from one. The statistical tests reported in Annex 2.4 reject these null hypotheses, robustly rejecting the appropriateness of the unit-cost methodology. The high degree of multicollinearity among the explanatory variables renders individual t-tests ineffective in assessing individual significance for the cross-sectoral (synergy) model, but joint tests demonstrate the importance of combinations of variables. The cross-sectoral model's F-statistic for overall significance is statistically significant at the 1 per cent level.

SDG 1.2.1: Proportion of the Population Living Below the National Poverty Line

The same expenditure sectors are used to model poverty at national poverty lines. The unit-cost model is not statistically significant at any level. The formal statistical test for the unit-cost approach finds the coefficient on the own-sector spending is statistically significantly different from one – and in this case, not statistically significantly different from zero. The statistical tests reported in Table 48 (Annex 2.4) reject the null hypothesis, robustly rejecting the appropriateness of the unit-cost methodology.

The cross-sectoral (synergy) model is statistically significant at the 1 per cent level (based on the F-test). The high degree of multicollinearity among the explanatory variables weakens the effectiveness of individual t-tests ineffective in assessing individual significance for the cross-sectoral (synergy) model, but joint tests demonstrate the importance of combinations of variables. Both education spending and trade and industry investments yield significant and powerful impacts reducing national poverty – both directly and indirectly through interaction effects. Investment in the agricultural-rural sector also appears to be significantly associated with lower poverty through interactions with general services and capital investment in water resources. The F-test for incremental contribution confirms that the terms reflecting non-linearities and cross-sectoral synergies statistically improve the explanatory power of the model.

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SDG 1.2.2: Proportion of Men and Women Living in Poverty in All its Dimensions

Like the income-measured poverty models, the unit-cost approach to modelling multidimensional poverty is not statistically significant at any level. The formal statistical tests reject the appropriateness of the unit-cost model. The coefficient on the own-sector spending is statistically significantly different from one – and in this case, statistically significantly less than zero.

The cross-sectoral (synergy) model is statistically significant at the 1 per cent level (based on the F-test). Again, while high multicollinearity creates analytical challenges, the F-test for incremental contribution demonstrates the importance of the model's non-linearities and cross-sectoral synergies. Investments in water, health and agriculture are particularly important, both linearly, non-linearly and in their interactions with other policy sectors. Evidence suggests strong linkages between the agriculture and education sector as agriculture investments that address food security directly contribute to human capital accumulation.[27] The

estimation methodology.

health sector is also shown to be synergetic with agriculture spending as health spending can increase yield and output.[28]

The cross-sectoral "synergy" model (regression) counter-intuitively shows that investment in the agriculture sector is directly positively correlated with multidimensional poverty. Both the linear and quadratic agricultural expenditure terms have positive coefficients, meaning that the relationship between outcome and spending on this sector takes the shape of a convex function – with positive spending on agriculture, higher spending is directly and positively correlated with higher multidimensional poverty. A decrease in multidimensional poverty due to agriculture only becomes apparent in the synergetic effect of agriculture with other sectors. Notably, the model demonstrates that the interaction terms between agriculture and both health and education generate strong, statistically significant reductions in multidimensional poverty. These effects are so powerful that they ensure that the comprehensive impact of agricultural investment reduces multidimensional poverty.

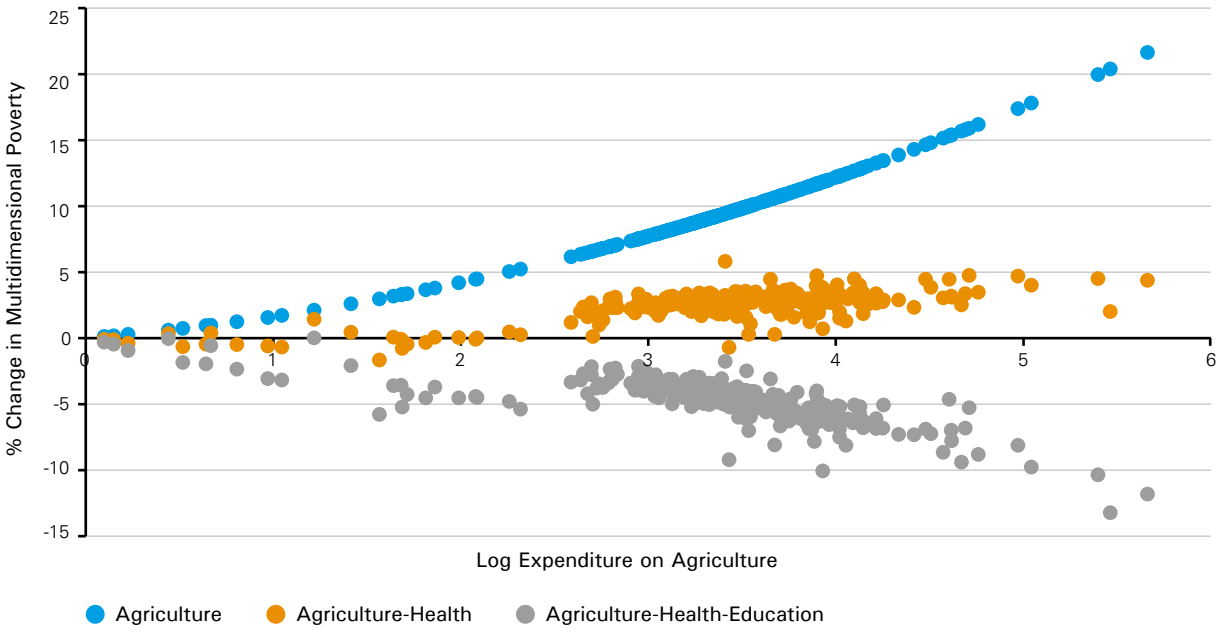
Figure 11 visualizes the above-described synergy effects, where adding an interaction term between agriculture and health to the equation both shifts the curve down and decreases its slope. Additionally, a second interaction term is added between agriculture and education, which further reduces the slope and shifts the curve down. These findings rigorously document the impact of increased investment in agriculture and synergies with education and health spending accelerating multidimensional poverty reduction.

SDG 2.2.2: Prevalence of Malnutrition among Children Under Five

In contrast to the previous results, the unit-cost approach for wasting rates is statistically significant at the 1 per cent level. However, the model explains less than 2 per cent of the variability in the SDG indicator. While the unit-cost model is statistically significant, formal tests reject the null hypothesis: the slope is significantly greater than the negative one. The formal statistical tests reject the appropriateness of the unit-cost approach, but the results still demonstrate the explanatory power of the basic model. The cross-sectoral (synergy) model, however, more than quadruples the explanatory power. The results demonstrate the importance of interactions among investments in health, agriculture and the women's bureau.

The cross-sectoral (synergy) model (regression) estimates a concave relationship between investments in recurrent health expenditure and changes in the wasting outcome, with districts both in the increasing and decreasing ranges of

Figure 11: Agricultural Cross-Sectoral Effects on Multi-dimensional Poverty



Source: Author's calculation based on BOOST and DHS 2011 data

27 (Lipton, 2012)

the curve, as illustrated in the figure below. A large number of districts are in a range of recurrent health expenditure where the direct estimated impact of increased health expenditure is an increase in wasting, although this relationship is non-linear, and the impact increases at a decreasing rate.

As with multidimensional poverty in the section above, the analysis of inter-sectoral synergy terms substantially improves the explained relationship between investments in recurrent health expenditure and wasting. The health expenditure interacts significantly with investments in the women's bureau, as illustrated in Figure 3 below. The combined impact generates a strong relationship with additional health investments reducing wasting. The synergy effect suggests that women's empowerment greatly strengthens the impact of health investment in reducing wasting. Evidence suggests strong synergies exist between these sectors, for example programmes focusing on gender issues are shown to increase agricultural productivity and promote household nutritional status, especially when women gain greater control over household resources.[29] Such is the case of Nepal where women landowners are significantly less likely to have underweight children.[30]

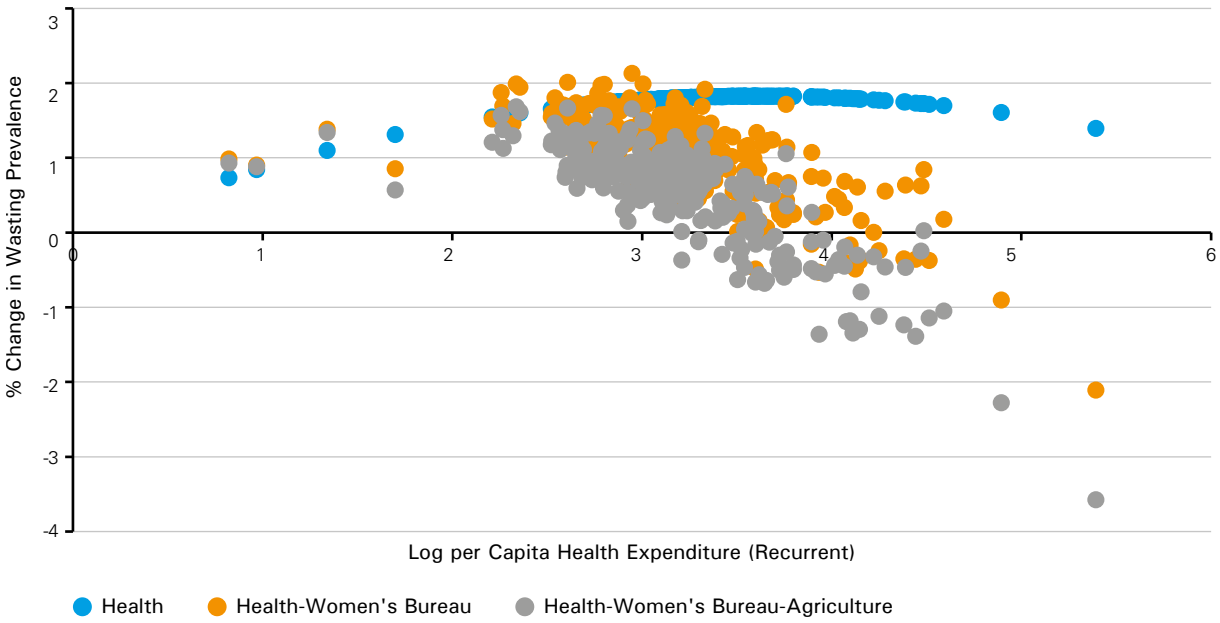
A similar interaction of public investments in health and agriculture reinforces this synergy.

Figure 12 illustrates the net effect of the combined interactions of health, the women's bureau and agriculture, generating strong, statistically significant reductions in wasting. These effects are so significant that they ensure that the comprehensive impact of health investment reduces wasting, even in spending ranges where the direct effect does not.

SDG 3.1.2: Percentage of Births Attended by Skilled Personnel

The formal statistical test for the unit-cost approach finds the coefficient on the own-sector spending is not statistically significantly different from zero, robustly rejecting the appropriateness of the unit-cost methodology in explaining variation in births attended by skilled personnel. The cross-sectoral (synergy) model is statistically significant at the 1 per cent level. While high multicollinearity creates analytical challenges, the F-test for incremental contribution confirms that the terms reflecting non-linearities and synergies statistically improve the explanatory power of the model. The model particularly highlights the role of non-linearities and interactions involving investments in health, justice and security, agriculture and the women's bureau. The model is one of the best in the study in terms of overall explanatory power.

Figure 12: Health Expenditure Cross-Sectoral Effects on Wasting Prevalence



Source: Author's calculation based on BOOST and DHS 2011 data

28 (Bloom et al., 2001)
29 (IFPRI, 2003)

SDG 3.2.1: Under-5 Mortality Rate

In contrast to the results for most of the unit-cost models, the regression for this indicator is statistically significant at the 1 per cent level. However, the model describes a positive relationship between health expenditure and the under-5 mortality rate, inconsistent with theory. Further, formal tests reject the null hypothesis: the slope is significantly less than one. While these formal statistical tests refute the applicability of the unit-cost approach, the results still demonstrate small but statistically significant explanatory power. The cross-sectoral (synergy) model, however, explains seven times more of the variability in the under-5 mortality rate. The regression model quantifies the power of the interactions between investments in health, justice and security, general services, and the organs of state, particularly the women's bureau.

SDG 3.7.1: Need for Family Planning Satisfied by Modern Methods

The unit-cost model is statistically significant in the case of this indicator, but formal tests reject the null hypothesis: the slope is significantly less than one. While these formal statistical tests refute the applicability of the unit-cost approach, the results still demonstrate very small but statistically significant explanatory power. The cross-sectoral (synergy) model, however, explains substantially more variability in the outcome indicators. The regression model quantifies the importance of the women's bureau and the relevance of interactions with investments in health. The model is well based in the literature as evidence shows that cross-sectoral investments in gender and health programmes directly allow women to space out and delay their pregnancies.[31]

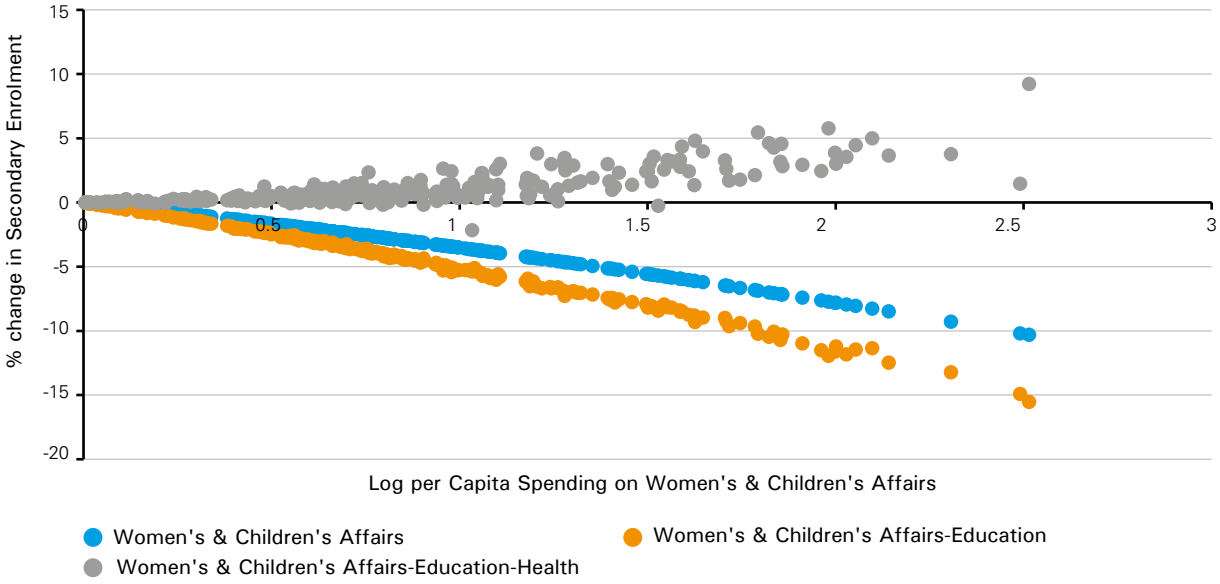
SDG 4/MDG 2: Primary and Secondary Net Enrolment Rates

The regression for the unit-cost approach is not significant at any level in explaining either primary or secondary enrolment and formal statistical testing rejects the hypothesis of unit-slope in both cases. The F-test for the synergetic approach shows that these models are significant at the 1 per cent level, and that they explain considerably more variability in the outcome indicator than the unit-cost approach. Although high multicollinearity creates analytical challenges, the F-test for incremental contribution demonstrates the importance of the model's non-linearities and cross-sectoral synergies. It particularly illustrates that in the case of primary enrolment, education and agriculture expenditure as well as investment in culture, sports and general services enables the achievement of this goal by 2030. The urban-rural disaggregated model, displayed in Annex 2.3, further supports the hypothesis that these synergies are effective in increasing enrolment rates. The secondary enrolment model shows that investment in culture and sports is associated with higher secondary enrolment as is the synergy between the health sector and women's and children's affairs.

The cross-sectoral synergy model (regression) for education, as measured by secondary school enrolments, illustrates a particularly complex relationship. The direct effect of investments in the women's bureau on the indicator maps out a convex quadratic, with both the linear and quadratic terms negative. The direct contribution of any positive investment in this sector has a negative impact on the secondary school enrolment rate. The education interaction intensifies this negative relationship, as illustrated in the figure below. The third interaction term, public investments in health, clarifies a substantially more significant relationship between investments in, for example, the women's bureau and secondary school enrolments. The health expenditure interacts significantly with these other sector investments to generate a strong relationship with additional spending increasing secondary school enrolment. It should be noted that the individual sector impact estimates do not imply that the education spending actually reduces enrolment. The analysis simply demonstrates that single-sector estimates may provide misleading results by ignoring the complexity of the true relationship. Non-linearities and cross-sectoral synergies build and map out complex pathways to developmental impact. Evidence suggests that synergies between infrastructure investment, partly captured through the general services sector, and education are strong and can significantly affect years of schooling.[32]

30 (van den Bold, 2013)
31 (United Nations Economic and Social Council, 2016)

Figure 13: Women's & Children's Affair Cross-Sectoral Effects on Secondary Enrolment



Source: Author's calculation based on BOOST and DHS 2011 data

SDGs 6.1.1 and 6.2.1: Proportion of Population Using Safely Managed Drinking Water Services and Sanitation Services

The unit-cost model is not significant at any level and exhibits less than 0.1 per cent explanatory power in explaining the variation in access to safe drinking water and to sanitation services. The formal F-test also rejects the null hypothesis of unit-slope. The synergy models display a high overall significance for both indicators. The F-test for incremental contribution of the interaction terms rejects the null hypothesis that the coefficients on these synergy variables are equal to zero. Because of multicollinearity, the models show mixed effects in terms of correlation with SDG achievement. Although agricultural investment and strengthening of organs of state appear to be significantly negatively correlated with access to water, it appears that spending on education improves outcomes. Separating the water access model and re-estimating regressions for urban and rural regions (Annex 2.3) also yields models with high overall significance and better explanatory power.

The cross-sectoral model counterintuitively shows that investment in agriculture and rural services is negatively correlated with improved access to water. The first curve in the figure below is a function of the linear and quadratic agriculture terms from the model. It suggests that the direct impact of an incremental investment in agriculture reduces access. The model however shows that agricultural spending has strong synergies with other sectors.

After adding the interaction term between general services and agriculture, the curve shifts upwards and becomes relatively flat. Although this reduces the negative impact of the investing solely in agriculture, the curve still shows that incremental spending leads to reduced outcomes. Adding the synergy term between education and agriculture changes the shape of the curve. It is now convex and increasing and above zero for all levels of incremental spending. The model therefore shows that the combined effect of own-sector spending on agriculture and of synergies with other sectors leads to higher access to improved drinking water and that additional spending on agriculture helps attain the target faster.

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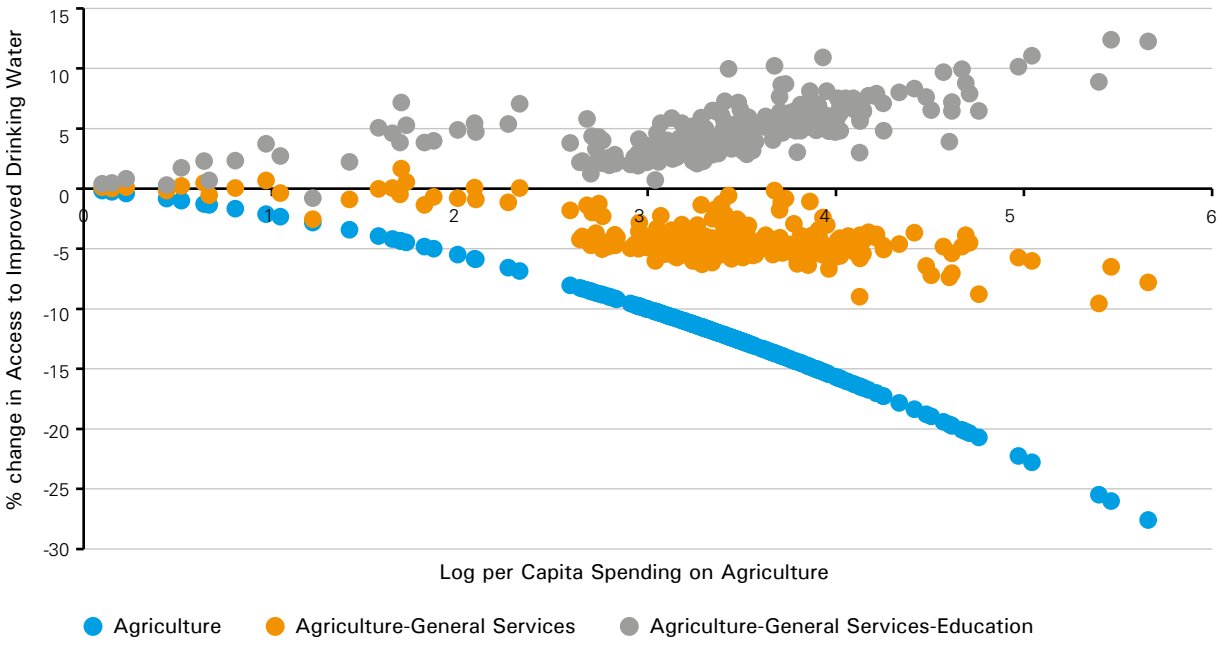
Figure 14: Agriculture Cross-Sectoral Effects on Water Access



Source: Author's calculation based on BOOST and DHS 2011 Data

SDG 10.2.1: Proportion of people living below 50 per cent of median income

The models use consumption per capita from the LSMS survey instead of income to analyse the percentage of the population earning below 50 per cent of the median. The unit-cost model consists of a regression of the SDG indicator on the sum of per capita expenditure of the education, general services, agricultural-rural and health sectors, all of which are included in the synergy model. The unit-cost model is not statistically significant at any level and displays very low explanatory power. The formal F-test also rejects the null hypothesis of unit slope. The cross-sectoral synergy model has a higher overall significance and is statistically significant at the 1 per cent level, it also explains substantially more variability in the outcome indicator. Although multicollinearity makes it difficult to estimate specific sectoral effects, the model shows that all of education, general services and agricultural spending appear to be correlated with lower shares of the population below 50 per cent of median expenditure.

SDG 8.7.1: Proportion and number of children ages 5-17 years engaged in child labour

Child labour is calculated using DHS data for children ages 5-14 years. The unit-cost model is not significant at any level and the regression has zero explanatory power. The formal statistical test for the unit-cost approach finds the coefficient on the own-sector spending is statistically significantly different from one. The statistical tests reported in Table 48 (Annex 2.4) reject these null hypotheses, robustly rejecting the appropriateness of the unit-cost methodology.

The F-test for incremental contribution, presented in Annex 2.4, further supports the presence of synergies as it rejects the null hypothesis that the sectoral interactions terms are equal to zero. The model shows that synergies between the education and health sector are negatively correlated with child labour, as are ones between education and women's and children's affairs spending, and between agriculture and culture and sport. Disaggregating the model between urban and rural regions (Annex 2.3), further supports the necessity of including cross-sectoral synergy terms as the latter greatly improve the statistical significance of the model as well as its ability to measure variability in the SDG outcome.

2.5 Conclusion

This chapter employs a woreda-level dataset, matching SDG outcome indicators from various household surveys with fiscal expenditure indicators from the BOOST database. The analysis models SDG achievement using a public policy production function, developing and testing an econometric specification that explicitly measures synergies resulting from interactions among different policy sectors. The chapter demonstrates four major findings:

- **Conventional unit-cost models do not successfully predict SDG outcomes.** The regression estimates for most of the SDG indicators show that unit-cost approaches fail to explain the variability of woreda-level outcomes in Ethiopia. The unit-cost models also tend to display low overall significance and goodness-of-fit, rendering them unreliable for the purposes of a costing exercise. Out of 13 modelled indicators, 11 fail to explain the data: only two of the F-tests for overall significance rejected the null hypothesis of no explanatory power.

- **Formal hypothesis testing rejects the applicability of a unit-cost approach.** The applicability of the conventional unit-cost approach requires a set of stringent modelling assumptions undergirding the adopted restricted linear model: total cost must equal the number of beneficiaries times a fixed constant cost-to-deliver. Statistically, this requires a unit-cost function in log terms with a slope equal to one. The formal hypothesis testing in this chapter rejects the power of the unit-cost approach in explaining woreda-level outcomes in Ethiopia. The F-tests and t-test statistically significantly reject the null hypothesis of unit-slopes for each of the 13 modelled SDG indicators. In no case is the unit-cost model appropriate for Ethiopia's woreda-level data.

- **Models that can measure the complex relationships between fiscal strategies and SDG outcomes (cross-sectoral translog models) provide substantially greater explanatory power.** The cross-sectoral models developed in this chapter go further than unit-cost approaches by adding cross-sectoral expenditure categories to the specification and by interacting spending across sectors, to measure the impact of cross-sectoral synergy. These models demonstrate significantly greater explanatory power than the unit-cost models and are also more statistically significant and robust than the single-sector approach. Urban-rural disaggregated models for select indicators are also shown to be more robust than unit-cost models. For all the SDGs modelled, the results of the regressions overwhelmingly support the hypothesis that a cross-sectoral synergy approach provides a better costing of the child-centred SDGs.

- **Formal hypothesis testing documents the powerful impact of cross-sectoral synergies in explaining SDG outcomes at the woreda level, with the interactions demonstrating complex pathways to achieving the SDGs.** F-tests for the incremental contribution of the synergy terms in each model reject the null hypothesis that synergies should be excluded from the equations. For 12 out of 13 indicators, the hypothesis testing confirms that cross-sectoral synergy terms have a significant impact on the outcome indicator. The inclusion of these interaction terms better explains the variability in SDG outcomes and they are necessary to more accurately cost the achievement of SDGs in the long-term. Formal significance tests in both types of models demonstrate that cross-sectoral approaches have a higher statistical significance and goodness-of-fit, and they overall perform better in capturing the variability in SDG outcomes.

These four findings provide the basis for the subsequent fiscal modelling in the remainder of the report. The innovative methodology improves costing approaches in several ways:

- It pre-empts traps into which unit-cost approaches can fall: (i) over-estimating the cost of SDG achievement by ignoring cross-sectoral synergies that increase efficiency and improve value-for-money, and (ii) under-estimating the cost by ignoring non-linear relationships that reflect the higher costs of incremental achievements once initial initiatives harvest the proverbial "low-hanging fruit."

- The innovative public policy production function estimates the joint production of SDG outcomes taking into account comprehensive

cross-sectoral synergies. The estimated models provide a system that can forecast alternative fiscal scenarios as well as identify the contribution of fiscal synergies to SDG achievements.

Future modelling exercises can be even more successful in modelling outcomes conditional on the availability of richer datasets. For example, the current analysis is cross-sectional in nature as detailed fiscal data is not yet available for the years in which the major health and socio-economic surveys are conducted. The robustness of results and overall costing model fit can be further validated with the addition of different waves of matching outcome indicator fiscal datasets. This could allow for a deeper analysis of fiscal trends by woreda and the availability panel expenditures can help control for past spending for those woredas with high achievement in SDGs.

3.

Fiscal Space Analysis for the Child Centred Sustainable Development Goals in Ethiopia

3.1 Introduction

This chapter provides an analysis of Ethiopia's revenue trends and possibilities for creating fiscal space to achieve the 2030 SDG goals, particularly those focused on children.[33] This analysis adopts the fiscal space approach used by the United Nations, as it centres the term around a human development perspective in line with the current report: "Fiscal space is the financing that is available to Government as a result of concrete policy actions for enhancing resource mobilization, and the reforms necessary to secure the enabling governance, institutional and economic environment for these policy actions to be effective, for a specified set of development objectives."[34]

In practice, it is common to create fiscal space by suggesting the elimination of "bad" programmes for "good" programmes. Alternatively, other approaches suggest the reallocation of discretionary spending, which in theory has scope for renegotiation. Although approaches such as these can create available resources in the short-term, they are also highly politically sensitive and risk backlash that undermines prospects for success. Coming from this experience, fiscal economists have proposed that fiscal space is better considered on a forward-looking basis, primarily because sustainability not affordability often proves to be the most critical issue.[35] Following this more pragmatic approach,[36] this chapter identifies three forward-looking avenues for fiscal space:[37]

1. Fiscal space generated by Ethiopia's high and enduring economic growth rates
2. Fiscal space generated by Official Development Assistance (ODA)
3. Fiscal space generated by domestic tax revenue mobilization

These three avenues align with the Government of Ethiopia's (GoE) budget revenues:

- Domestic revenues such as tax on income and business profits, value-added taxes, export duties and different service fees and charges.
- External assistance from donor countries primarily the United States, the United Kingdom, EU Institutions, the African Development Fund, Global Fund, Canada, Japan, Germany and United Nations agencies such as the UNDP and UNICEF.
- Loans, such as those from the World Bank, the African Development Bank or domestic sources.

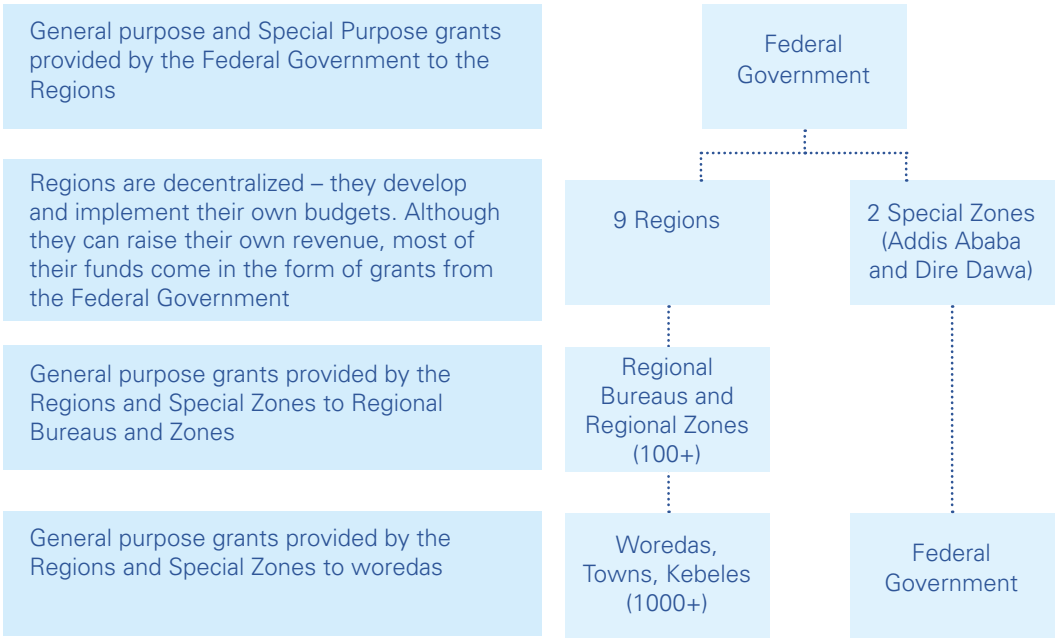
Government devolution over past decades means that Ethiopia is fiscally highly decentralized. As such, a fourth avenue of fiscal space can be considered by streamlining the budgeting process from central to sub-national government levels, as a substantial number of programmes, specifically child-related services and policies, are funded and implemented at woreda and city administration levels. This fourth avenue is considered in the first part of this chapter after which the other three are analysed. The central question for each avenue is: Is this a feasible future revenue stream to draw upon for the financing of the child-centred SDGs? Finally, this chapter takes stock of the most promising avenues.

3.2 Fiscal decentralization

Ethiopia has undergone two phases of decentralisation in the past three decades. Woredas are well-positioned to identify and prioritize local needs and deliver public services.[38] The country follows a federal system where government authority is divided between central Government and nine regional states of governments, as well as two special administrative cities. These regions are further divided into zones, woredas/urban administrations and kebeles (villages areas, with an average population of 5,000; see Figure 15). Public functions, expenditures and revenues are highly layered. More than 80 per cent of the budget sources in most regions come from federal Government subsidies.[39] The remaining 5-20 per cent of the budget originates from the regions' own revenue. Local revenues are mobilized through regional and woreda inland revenue offices and are primarily drawn from income tax, agricultural and urban land taxes, urban land lease fees and service fees and charges.

32 (Calderon & Serven, 2004)
33 (MoFEC, PWC and UNICEF, 2018)
34 (Roy, Heuty, & Letouze, 2007)
35 (Pick, 2017)
36 (Duflo, The Economist as Plumber (March 2017), 2017)
37 (Heller, 2005)
38 (Garcia & Rajkumar, 2008)

Figure 15: Ethiopia's Budget Structure



However, woreda administrations vary greatly in institutional and fiscal capacity, ranging from those with substantial own-revenue bases (mostly in peri-urban areas such as Hawassa Zuria) to ones without much of a fiscal base and very low capacity (such as Boricha, a woreda in a rural area that is highly food-insecure).[40] Moreover, a vertical imbalance exists where woredas are responsible for their revenue mobilization whereas their expenditures are largely centrally administered.[41] This lack of autonomy is vulnerable to inefficiencies, with many woredas receiving "block grants" to compensate for their deficits.

One significant topic of legislation is the eligibility criterion for the block grant, which for many woredas is a necessary revenue stream to keep their balance solvent year-to-year. Woredas with small revenues receive block grant transfers as compensation, whereas more self-sufficient woredas receive smaller grants, subsequently offsetting their domestic gains. As such, if a woreda takes a step to improve its own revenue mobilization, block grant transfers are reduced for future years, creating as a powerful disincentive to invest in local revenue mobilization.[42] By addressing the legislative framework around the country's decentralized structure, resolving issues such as these can unlock fresh revenue streams and provide an incentive to build up local institutional and administrative capacities.

3.3 Revenues from Economic Growth

As shown in Table 7 below, real GDP growth has ranged between 8 to 12 per cent over the past decade with economic growth concentrated in services and agriculture – mainly driven by productivity gains and capital accumulation from substantial expansion of public infrastructure investment led by the country's state growth model.[43]

Ethiopia's strong economic growth has remained steady over the past decade and is slated to continue in the same path for several reasons. A state-led economic model that has put emphasis on infrastructure development coupled with weak global prices on Ethiopia's key import (oil) and prudent budget execution have helped the country maintain strong economic performance and lower-than-projected fiscal deficits.[44] The International Monetary Fund (IMF) recently projected that Ethiopia will grow at an annual rate of 9.0 per cent in 2016 and 8.5 per cent in 2017, despite lingering drought risks.[45]

39 MoFED Laypersons Guide to the Public Budget Process at Regional and Woreda Level
40 (Garcia & Rajkumar, 2008)
41 (Assefa, 2015)
42 (Garcia & Rajkumar, 2008)
43 World Development Indicators, AfDB, Statistics Department- African Economic Outlook- Ethiopia 2017
44 World Bank- Ethiopia's Public Expenditure Review- April 2016

Ethiopia's Second Growth and Transformation Plan (GTP II) has integrated – within the first five years of the plan – the SDG goals which span 15 years (2016-2030). It aims to turn the country into a lower-middle income country (LMIC) by 2025. It intends to do so by setting medium-term economic and social policy priorities by creating conducive conditions for macroeconomic stability, ensuring fast and sustained economic development, infrastructural development, human capital and technological capacity building, ensuring good governance and democratic systems building.[46] As such, the Ministry of Finance and Economic Cooperation (MoFEC) has prioritized the provision of basic services and infrastructure to boost the living standards of children, women and disadvantaged populations.[47]

But will growth endure? Ethiopia's medium-term expenditure framework shows that GDP growth is expected to decrease somewhat and stabilize at around 8.0 per cent annual growth until 2021, which is still high (see Table 7). Under the projections resulting from the baseline (constant growth) scenario, overall Government expenditure would average 20.7 per cent of GDP over the years 2016/17–2021/22. Total child-focused expenditure would average 12 per cent of GDP. Revenues from tax and non-tax sources and external grants over the same medium-term period average 17.6 per cent of GDP – producing an average financing "gap" of 2.4 per cent of GDP. This gap creates a need for policymakers to find ways to enhance their funding sources, improve investment efficiency, or reduce non-priority expenditure.

3.4 Revenues from Official Development Assistance (ODA)

Ethiopia receives funding from over 60 development partners and governments. These development partners play an important role in providing funding towards achieving child-friendly policy goals set by the Ethiopian Government. In terms of official development assistance (ODA), the latest figures of the Organization for Economic Co-operation and Development (OECD) show that the largest contributors in Ethiopia were the World Bank (on average, US$824 million a year), the United States (on average, US$711 million a year) and the United Kingdom (on average, US$470 million a year). Figure 16, Panel A displays the 10 largest Development Partners (DPs) in Ethiopia in terms of ODA. Between 2009 and 2015, Ethiopia received a total of US$3.5 billion a year, on average. The United Kingdom contributes almost all its development assistance to child-centred sectors such as education, health, and water and sanitation sectors.

Table 7: Selected macroeconomic indicators, projection 2016/17 - 2021/22

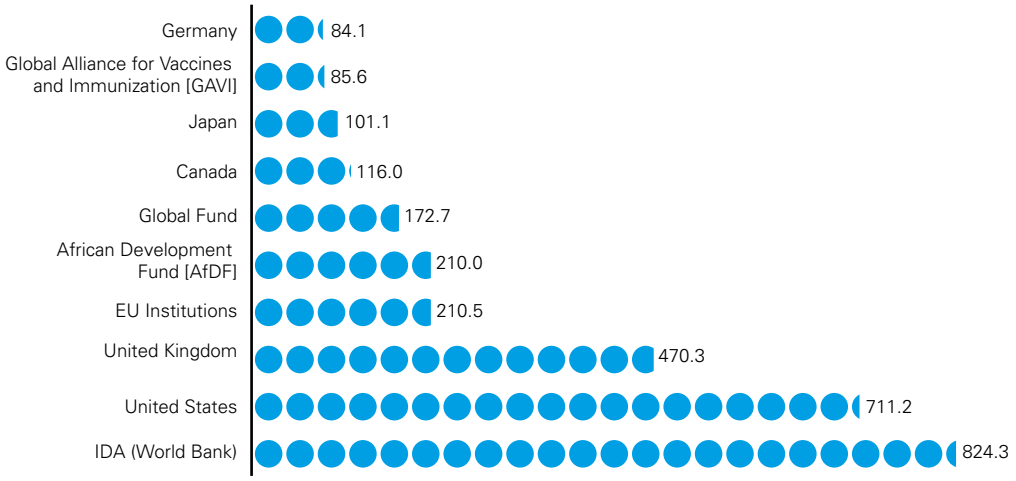
	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
GDP at constant prices (%)	9.0	8.5	8.3	8.1	8.0	8.0
Total revenue and grants	17.3	17.1	17.1	17.6	18.1	18.5
Revenue	16.3	16.1	16.2	16.8	17.5	17.9
Tax revenue	13.5	13.9	14.5	15.1	15.7	16.2
Nontax revenue	2.8	2	1.7	1.7	1.7	1.7
Grants	1.0	0.9	0.9	0.8	0.7	0.6
Expenditure and net lending	20.2	20.3	20	20.7	21.2	21.5
Recurrent Expenditure	10.8	9.6	8.6	8.4	8.3	8.3
Capital Expenditure	9.5	10.6	11.6	12.3	13.0	13.2
Child-focused expenditure[48]	12.6	12.3	11.9	11.9	11.8	11.7
Fiscal balance, excluding grants (cash basis)	-4.1	-3.3	-3.2	-2.9	-2.7	-2.6
Fiscal balance, including grants (cash basis)	-3.4	-2.5	-2.5	-2.3	-22	-2.1
Primary fiscal balance, including grants	-2.4	-2.6	-2.4	-2.5	-2.5	-2.4

Sources: Ethiopian authorities and IMF staff estimates and projections

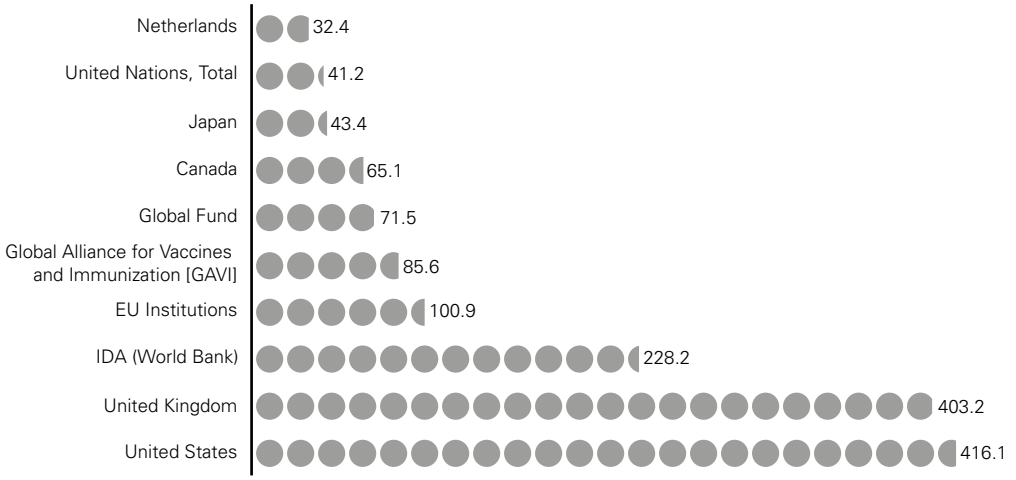
45 IMF- Ethiopia http://www.imf.org/en/Countries/ETH
46 Ethiopian National Plan Commission - The 2017 Voluntary National Reviews on SDGs of Ethiopia: Government Commitments, National Ownership and Performance Trends
47 MoFED Government Budget for Sustainable and Inclusive Growth Budget Brief- May 2017

Figure 16: Top ten development partners for Ethiopia, Y2009-Y2015 average (USD million, current prices)

A. All sectors



B. Child-centred sectors



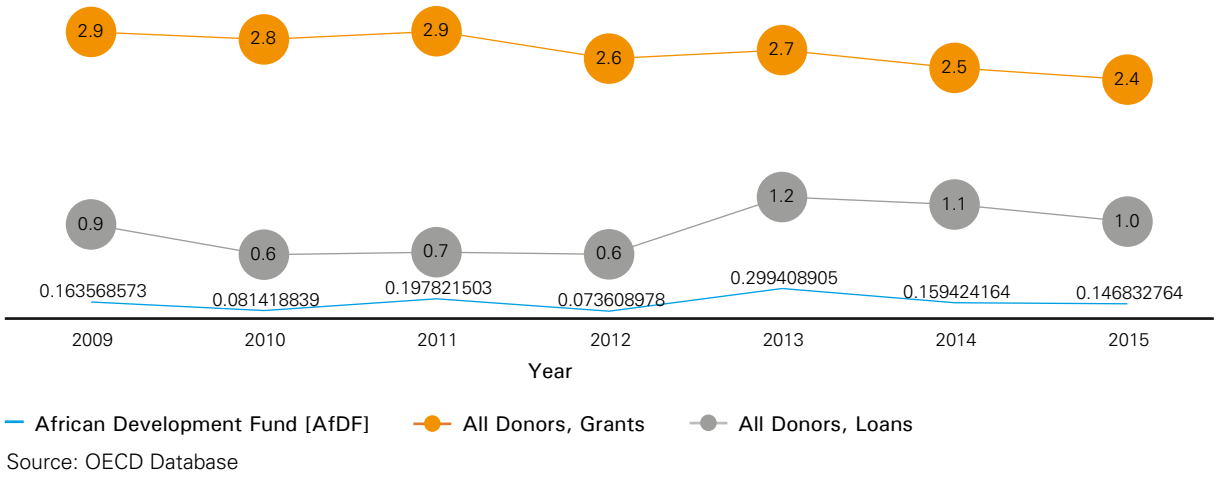
Source: OECD Database

In the education and health sectors, the United Kingdom is the largest contributor in Ethiopia, followed by the World Bank and the United States in the education sector, Global Alliance for Vaccines and Immunisation (GAVI) and Global Fund in the health sector. In the water and sanitation sector contributions from the World Bank, the United Kingdom and African Development Fund (ADF) make up about 70 per cent of all ODA to the sector. Official development assistance for humanitarian aid including contributions for emergency responses, disaster prevention and preparedness programmes, and food aid comes from primarily from the United States, the United Kingdom, and EU institutions. Figure 32 (Annex 3.2) shows the 10 largest DPs in education, health, water and sanitation, and humanitarian and food aid sectors.

The OECD statistics show little change in Ethiopia's development aid trend during the period from 2009 to 2015. The ODA trend is consistent across development partners. Most of the aid is provided bilaterally: on average, around US$2.66 billion per year annually in bilateral grants and US$884 million per year in bilateral loans. It should be noted that development assistance is slowly shifting towards bilateral loans and there is a gradual reducing trend in bilateral grants (see Figure 17). With the current political conditions reducing development aid from donor countries, this trend is expected to continue in the foreseeable future. Countering the decline in external grants are increasing trends in loans (Figure 17), mainly below-market-rate loans from China.[49] Some of these loans were used together with IDA funding in the water and sanitation sector and in

48 Child-centred spending is defined to include poverty-reducing expenditures (total spending on health, education, agriculture, roads, and food security)

Figure 17: Trends in bilateral grants and loans by DPS in Ethiopia, Y2009-Y2015 average (USD billion, current prices)



Source: OECD Database

the rehabilitation of power infrastructure and anti-poverty sectors.

The OECD statistics noted that on average (2009-2015) most ODA was allocated towards the child-centred sectors, with more than half of the funding spent on health and population, education, water and sanitation, and humanitarian aid (Annex 3.3, Figure 33). Much of the flow of aid dollars over the past five years has gone towards social, health, agricultural and humanitarian programs. The majority of the ODA is channelled through the public sector. Ethiopia's steady influx of aid, paired with its Government spending priorities, have allowed the country to invest handsomely in education, health and infrastructure. However, as aid's share of GDP declines, the GoE will need to replace those resources by improving tax administration and domestic revenue collection in order to maintain or even accelerate investment in these key child-focused sectors.

But will ODA endure? According to a projection by Fredrick S. Pardee Center's International Futures (IFs) modelling systems,[50] official development aid to Ethiopia is expected to decline from 9 per cent of GDP in 2016 to 6.6 in 2030 (see Figure 18). Although IFs forecasts that aid to Ethiopia will nearly double from US$4.4 billion to US$8.5 billion between 2016 and 2030, GDP will nearly triple over the same period – resulting in GDP growth outstripping aid growth by an average of nearly 2.5 percentage points per year out to 2030.[51]

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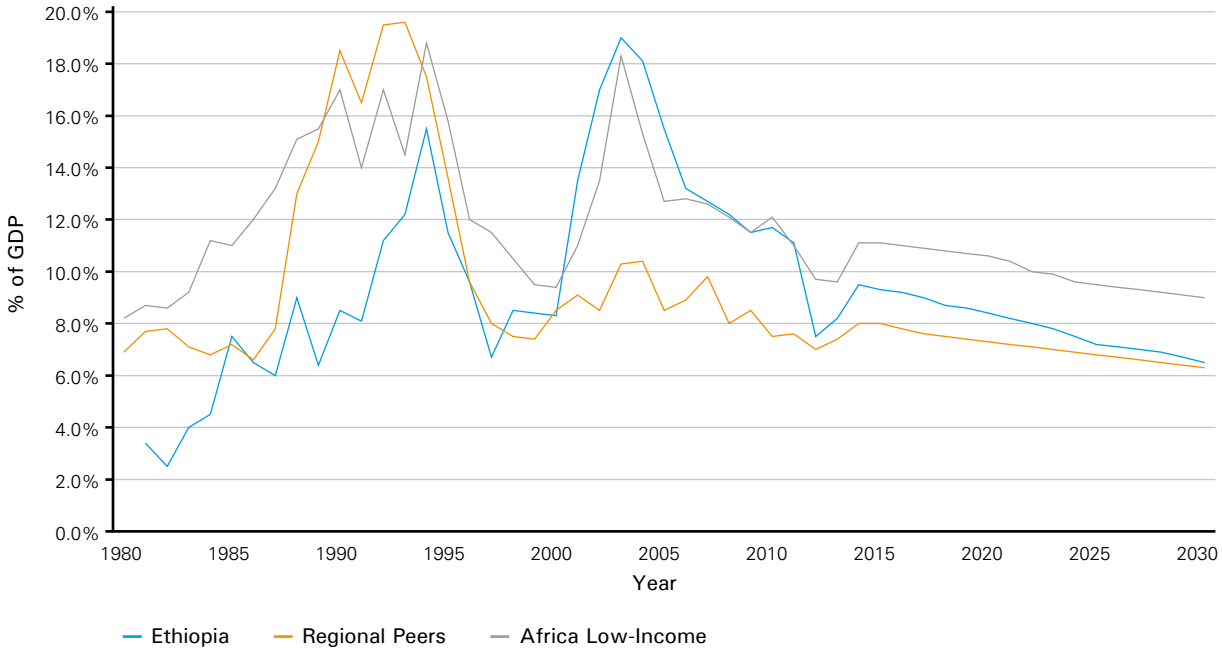
3.5 Domestic resource mobilization

Domestic resource mobilization (DRM) is a dependable and long-term source of development financing. In contrast, international sources of funding such as ODA, remittances, exports and other inflows in practice prove much more volatile. Domestic resource mobilization is not only important as a source of funding by itself but is also pivotal to fuel the economy and ensure the long-term sustainability of growth. Unlike foreign aid and foreign direct investments (FDI), domestic finances

49 IMF, Staff Report for the 2017 Article IV Consultation, 1 January 2018, http://www.imf.org/en/Publications/CR/Issues/2018/01/24/The-Federal-Democratic-Republic-of-Ethiopia-2017-Article-IV-Consultation-Press-Release-Staff-45576.

50 The International Futures (IFs) to explore Ethiopia's current development trajectory simulates ambitious, but realistic, 5-year interventions (2017-2021) across different development sectors and explores the effects of these interventions on development outcomes to 2030.

Figure 18: Aid as percentage of GDP, Ethiopia, African low-income economies, and regional peers, 1980-2030



Source: Adapted from International Futures (Model v1.27)

are more predictable and can be directed to desired sectors. Other countries' experiences indicate that relying on domestic resources is essential to solidify ownership over development strategies and strengthen the relationship of accountability between Government and its citizens.

Ethiopia has substantially enhanced its domestic resource mobilization through increases in tax collection over recent years. Factors contributing to these increases come from institutional reforms, improvement in tax administration and trade facilitation. And as discussed earlier in this chapter, revenues from ODA are gradually making up a smaller size of GDP. Further expanding domestic tax revenues therefore seems a critical step in financing Ethiopia's development goals.

3.5.1 Analysis of tax buoyancy

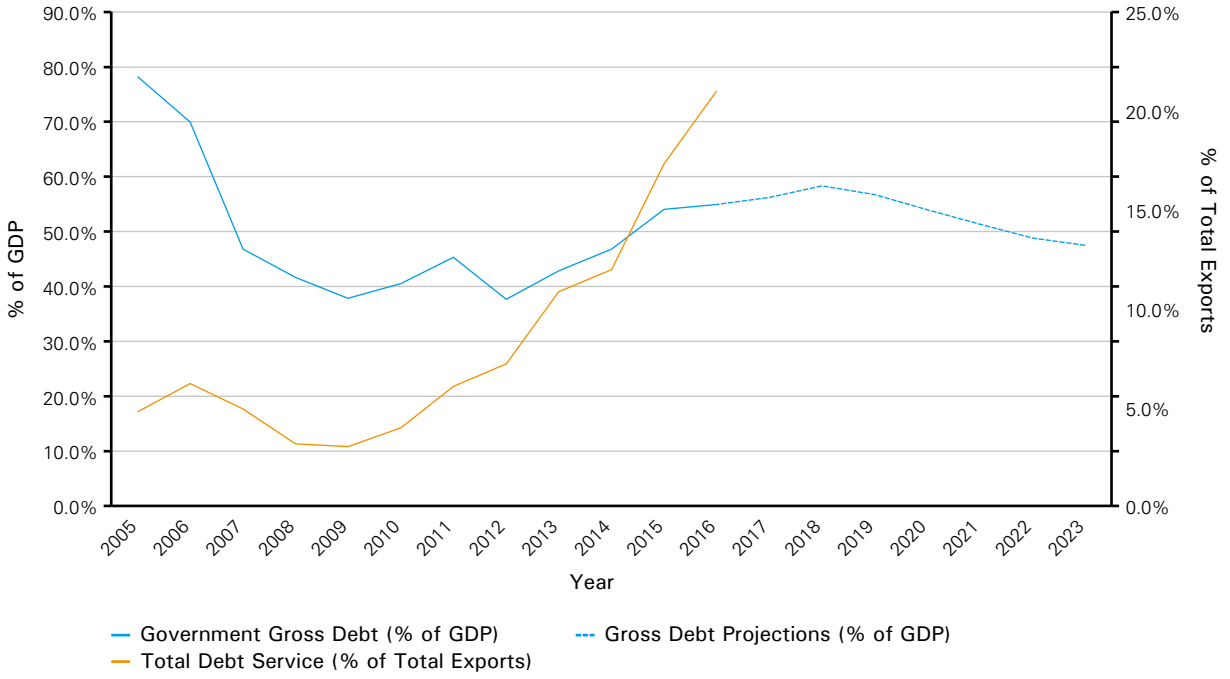
As the economy grows, a country's tax revenue typically follows along. This relationship is captured in the concept of tax buoyancy, which expresses the elasticity between growth in GDP and tax revenue. With Ethiopia's high growth rates, an expanding tax revenue base is expected. However, a recent study found that Ethiopia's direct and domestic indirect tax revenues were non-buoyant both in the short and long-run.[52] Overall, the study found that tax revenue grows at a slightly lower rate than GDP growth. However, foreign trade taxes did show buoyancy in the long run. The analysis further found that tax buoyancy in Ethiopia is strongly driven by the size of the service sector boosts tax revenue, as well as the size of import from foreign trade and past Government budget deficits. In contrast, economic growth coming from ODA revenues affected tax revenue negatively, most likely as it weakens Government incentives to invest in its tax system. These findings highlight that Ethiopia cannot solely rely on its growth to carry over to institutional development.

3.5.2 Debt Sustainability Analysis

Faced with the pressing need to increase its fiscal space to implement the 2030 SDG Agenda, Ethiopia can potentially resort to borrowing either on commercial terms, concessional terms or with grant financing. Recent trends indicate that Ethiopia, in similar to fashion to ex-HIPC economies, has increased its debt exposure by actively borrowing in global capital markets in the past decade. But any policy to further increase the country's public debt must be sustainable in the long-run especially at a time when emerging economies are facing increased risks of debt crises that jeopardize their development objectives.

51 Ethiopia Performance Monitoring and Evaluation Services (EPMES) for USAID: Ethiopia Development Trends Assessment, https://issafrica.

Figure 19: Gross Government Debt and Debt Service Trends



Source: IMF WOE Database (April 2018), World Bank World Development Indicators

The latest debt sustainability analysis from the International Monetary Fund indicates that Ethiopia is at high risk of debt distress since public and publicly guaranteed external debt and debt servicing ratios have surpassed standard cross-country thresholds.[53] Figure 19 shows that Gross Debt has steadily increased from 37.7 per cent to 55 per cent of GDP between 2013 and 2016 and is expected to have continued rising until 2018, after which projections indicates a decline. The cost of debt servicing increased at an even steeper rate, jumping from 3 per cent to over 21 per cent of the total value of exports in just seven years because of export supply delays. The recent decline in international commodity prices, which affect a large part of Ethiopia's export sector, is one of the main factors leading to unstable export revenues, which in turn widen current account deficits and worsen the debt situation. The main risks associated with this increased level of public debt include a compression of imports, a decrease in FDI and other private financing, and a weakening of Ethiopia's growth trajectory. With the country's low foreign exchange reserves, external shocks (especially from natural disasters) can exacerbate the debt servicing situation and seriously hamper Ethiopia's growth momentum.[54] In response to these developments, the Ethiopian Government resorted to devaluing its currency by 15 per cent to boost exports as well as instituting intensified reforms through the GTP II to improve competitiveness and increase private sector participation.[55]

The likelihood of Ethiopia financing its development objectives by exclusively borrowing on commercial terms appears to be unsustainable. Evidence based on UNCTAD financing projections show that low-income and middle-income countries cannot expect to finance their additional costs to attain the 2030 SDG objectives[56] by relying on commercial lending.[57] This strategy also appears untenable for Ethiopia given its current debt risk profile and high exposure to external shocks. The country can, however, opt to borrow if the incurred debt is not used solely to fund Government expenditure but rather to strengthen the productive capacities of economic sectors and spur structural transformation to generate long-term benefits and increase fiscal space (which can in turn offset debt service obligations). Doing so entails instituting reforms aimed at increasing public resource

s3.amazonaws.com/site/uploads/ethiopia-assessment.pdf
52 (Bayu, 2015)
53 (IMF, 2018)
54 (IMF, 2018)
55 Ibid.

mobilization, better allocating public resources in the budget and setting a transparent and efficient debt management framework to ensure that debt is used productively. Debt monitoring and debt management mechanisms are key to gauge the success of investment programmes, to ensure that financial investments are reaching their intended objectives and that debt-financed projects are implemented in a timely manner. If developmental projects and public-sector investments are soundly implemented using these frameworks, the potential for an increase in fiscal space strengthens as the returns to investment exceed the financing costs.[58]

The ability to attract financing (on commercial or concessional terms) for development objectives will depend both on the ability of Ethiopia to increase its debt management capacities at the national and regional levels, and on creditors' willingness to offer technical assistance to unlock these capacities and to set clear terms and conditions on debt instruments to make the latter easier to track.

3.5.3 Growing to Middle-Income Status Can Unlock Tax Capacities

The Government of Ethiopia (GoE) has made strong efforts in the past two decades to improve its domestic tax revenues, mainly through a significant institutional reform in 2006 with the inception of the Ethiopian Revenue and Customs Authority (ERCA). These efforts have started to pay off in recent years, as tax revenues have reached 83 per cent of total domestic resources in 2015.[59] Recognizing the necessity of expanding tax revenues, the Government has set a target to increase the tax-to-GDP rate from 13.4 per cent in 2014 to 17 per cent by 2020 which marks the end of the Second Growth and Transformation Plan.

Because growth registered in the economy has not resulted in commensurate taxation, the GoE has recently implemented a new set of tax and administrative reforms. These reforms are aimed at improving tax collection, broadening the tax base and setting up a more efficient tax system overall, taking into account its decentralized nature as described at the start of this chapter. A newly formed Tax Policy Directorate under the Ministry of Finance and Economic Cooperation is coordinating the reform.

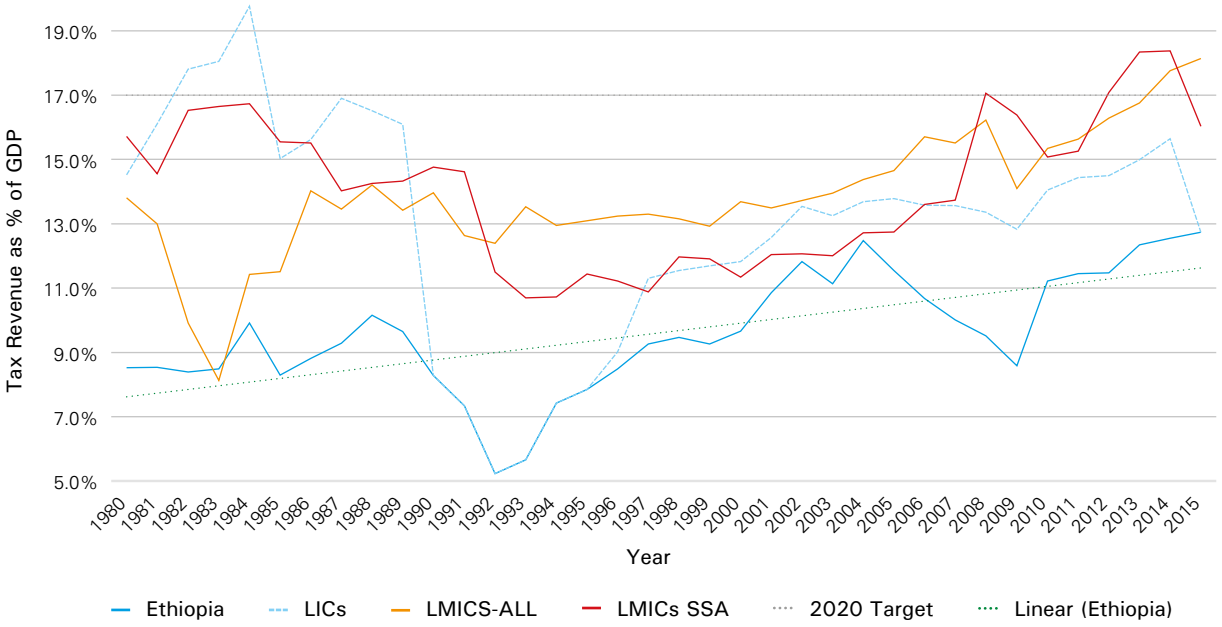
Ethiopia has shown a positive linear trend in increasing tax revenue over the past four decades. Another observation from Figure 20 is that Ethiopia has historically underperformed in its tax revenue mobilization as compared to its low income (LIC) peers. This means that "tax effort" is below potential.[60] This difference between potential and actual tax revenue broadly defines the aggregate tax gap. Unlocking tax administration constraints can significantly increase the tax revenue stream. For example, the recent IMFs Article IV review mentioned administrative bottlenecks and weak tax compliance to be the primary obstacles to revenue administration.[61]

A study conducted by the IMF found that once the tax-to-GDP ratio reaches 12¾ per cent, real GDP per capita increases sharply.[62] An older study found this threshold to be around 15 per cent of GDP.[63] Theory explains that below a minimum tax-to-GDP threshold, governments face challenges to finance their basic functioning and services.[64] Ethiopia has recently passed this milestone, potentially predicting acceleration in tax revenue growth.

Typically, countries achieving lower-middle income status (LMIC) improve their institutional capacities, resulting in, among other things, a larger tax-to-GDP ratio. A simple GNI growth projection carried out for this chapter estimates that Ethiopia will graduate from its current lower-income to lower-middle income status between 2023 and 2026. This means that the low middle-income benchmark (Figure 37, Annex 3.4) will show the tax revenue potential for Ethiopia, showing significant gains to 18 per cent of GDP.

56 The analysis focuses specifically on SDG 1-4
57 (UNCTAD, 2017)
58 (UN-IATF, 2018)
59 (UNDP, 2016)
60 (Mascagni & Moore, 2014)
61 (IMF, 2018)
62 (Lagarde, 2016)
63 (IMF, 2005)
64 (Mascagni & Moore, 2014)

Figure 20: Tax-to-GDP ratio comparison



Source: Calculations based on ITC/UNU-WIDER Government Revenue Dataset

3.6 Conclusion

This chapter reports the findings of a forward-looking fiscal space analysis. It considers four avenues where Government revenue streams can be increased to finance the child-centred SDGs. A first finding is that ODA will not be sufficient to finance Ethiopia's development agenda. Although the country receives a significant amount from donor grants which is expected to increase in the years to come, it is fully offset by the country's higher economic growth. As such, the relative contribution of ODA to GDP is expected to shrink substantially.

Ethiopia's impressive economic growth, however, is itself a substantial driver of Government revenue. Yet, current growth trends will not be enough to finance the SDGs in full. Rather, growth will likely align with a continued strengthening of Government capacity to mobilize fresh domestic revenue streams, particularly from (1) national tax and (2) sub-national sources of income.

1. Regarding the first source of fiscal space, Ethiopia has recently passed an important milestone in its tax ratio, which is associated with a strengthening of Government functioning, giving it more capacity to facilitate its development. As such, investments in the tax system and fiscal policy reforms can be important levers to unlock increased domestic revenues. With Ethiopia approaching lower-middle income country status between 2023 and 2026, this will mark another step for revenue potential in its tax system.

2. Regarding the second source of fiscal space, Ethiopia's decentralized government structure means that institutional capacity needs to be built at all levels. It requires an appropriate legislative framework that incentivizes and facilitates efficient revenue streams from woredas to regions to the central Government. This framework should enable woredas and city administrations to receive sufficient autonomy to prioritize and offer public services in a cost-efficient way and mobilize revenues from which they will see benefits themselves.

4.

Resourcing the Child Centred Sustainable Development Goals for Ethiopia

4.1 Introduction

The results from Chapters 1, 2, and 3 enable a more comprehensive analysis of the fiscal and policy reforms required for achieving the child-centred Sustainable Development Goals (CC-SDGs). Using sub-national (woreda-level) expenditure data, a macro model is developed to forecast public expenditures until 2030 via three scenarios. Scenario 1 models a business-as-usual situation, while Scenarios 2 and 3 adopt different optimization methods.

The simulated 2030 sectoral expenditures provide the input for analysing the financial resources required to achieve CC-SDGs in Ethiopia. The specification of Chapter 2 reflects an understanding that the achievement of the SDGs results from a public policy production process in which SDG indicators represent outputs and spending on critical policy sectors represent inputs. The three scenarios are repeated using a second model with rural-urban disaggregation, factoring in residence-specific relationships.

The model results provide particularly important evidence for the National Planning Commission (NPC) and the Ministry of Finance and Economic Cooperation (MoFEC), as well as well as for donors and development partners. The results demonstrate that single-sector solutions are unlikely to achieve adequate results with any feasible set of resource allocations. The complexity of SDG inter-relationships and the challenges of diminishing marginal returns to socioeconomic investments require cross-sectoral approaches which the NPC and MoFEC, with support from relevant partners, are best-placed to manage. The evidence demonstrates the powerful returns to a comprehensive and integrated developmental policy approach.

4.2 Model Assumptions

Any model's quality of results depends in part on the validity of the underlying assumptions. The macro model that is constructed for this exercise is based on household survey outcomes data that is matched with Government expenditure data, specifically sectoral expenditures for woredas, cities and zonal administrative bureaus (administrative level 4 in the BOOST dataset). This creates the set of CC-SDG production functions estimated in Chapter 2. The expenditure inputs are projected to 2030 under alternative sets of assumptions, drawing on population and GDP estimates and forecasts from official sources. As GDP forecasts are not available beyond general medium-term expenditure frameworks (MTEFs), economic growth trends are linearly extended for the remaining years. For demographic growth, long-term trends are available. Due to data constraints in matching expenditure data with household outcomes, the most complete and feasible dataset feasible

Table 8: Overview of available Child-Centred SDG indicators

SDG #	Indicator	SDG target
1.1.1	International poverty	Eradicate extreme poverty (towards 3% headcount)
1.2.1	National poverty	50% reduction (towards 14.80% headcount)
1.2.2	Multidimensional poverty	50% reduction (towards 41.90% headcount)
2.2.2	Wasting	40% reduction by 2025 (towards 5.90% headcount)
3.1.2	Skilled birth attendance	(universal birth attendance)
3.2.1.	Under-5 mortality (per 1,000)	25 deaths per 1,000 live births
3.7.1	Contraception	Universal access to planning/reproductive services
4.1.1	Primary enrolment	Universal enrolment
4.1.1	Secondary enrolment	Universal enrolment
6.1.1	Water	Universal access
6.2.1	Sanitation	Universal access
8.7.1	Child labour	Eradication of child labour by 2025 (towards 1% headcount)
10.2.1	Below-median income	Income growth of bottom 40% higher than national average

Source: UN, 2015

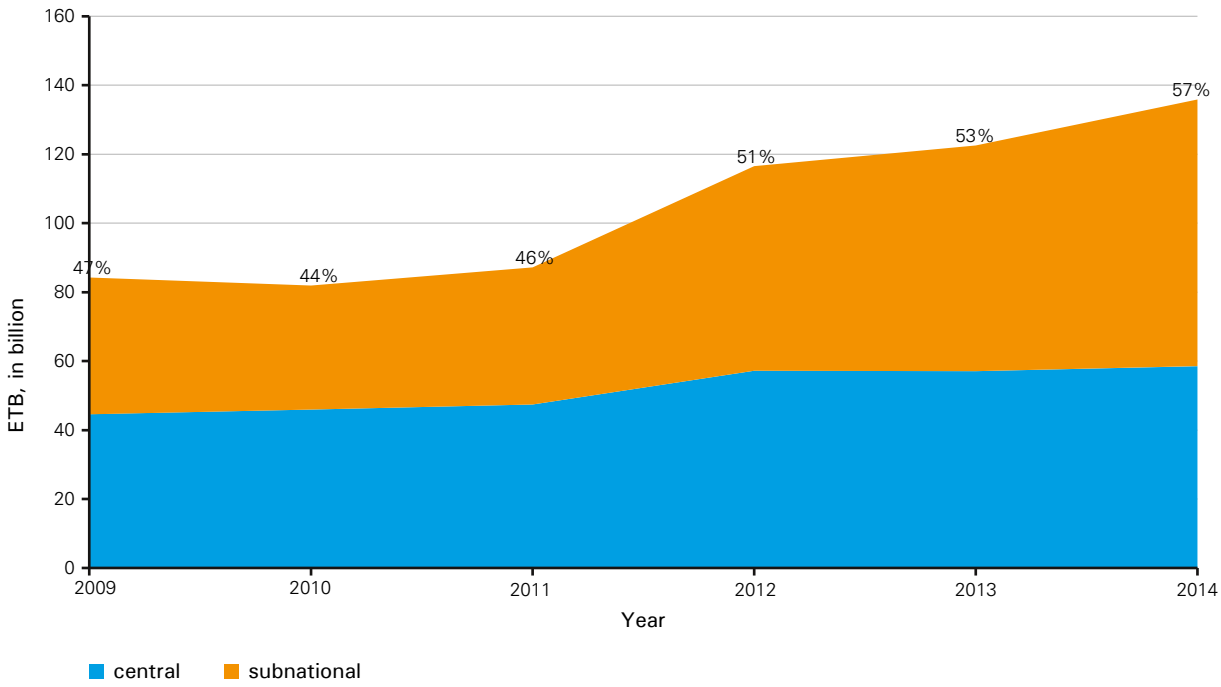
provides data for 2011: the analysis employs this as the base year.[65] The SDG outcomes created by each production function are benchmarked against internationally and in some cases nationally defined SDG targets for 2030 (see Table 8).

The expenditure inputs used are per capita, serving as a proxy for per person resources available to support each policy sector, such as health, education and agriculture. Because the BOOST data comes in aggregate expenditures only, these amounts were divided by an estimated population size in 2011.[66] These 2011 per capita expenditures, per sector, were grown to 2030 using projected growth rates, as mentioned above. Total government expenditure is assumed to be the sum of modelled (endogenous) and non-modelled (exogenous) expenditure components, which can have differing yearly growth rates. The modelled share of expenditure grows endogenously based on the scenario specifications, while non-modelled expenditure is held constant in real purchasing terms until 2030. An alternative method employs the average growth rate between a series of expenditure data. However, because the Government of Ethiopia (GoE) was implementing a series of devolution reforms during this time-period, government expenditure growth at the sub-national level was significantly larger than economic growth. This renders infeasible the application of this approach at the regional level (see Figure 21).

According to the International Monetary Fund's (IMF) Medium-Term Expenditure Framework 2017-2022, GDP growth is forecasted to drop from 11 per cent in 2011 to 7.5 per cent in 2021 – which the IMF forecasts to remain consistent until 2022.[67] The forecasted gradual stabilization of economic growth is for this analysis projected to remain constant until 2030. The United Nations Population Division (UNPD) provides population growth forecasts until 2030 in 5-year intervals, showing a slight but significant decrease from 3 per cent in 2011 to 2.03 per cent by 2030. Per capita growth rates can be derived from the following the equation:

*GDP growth index = GDP p.c.growth index *Population growth index (Equation 1)*

Figure 21: Total Government expenditure by level of Government, nominal prices

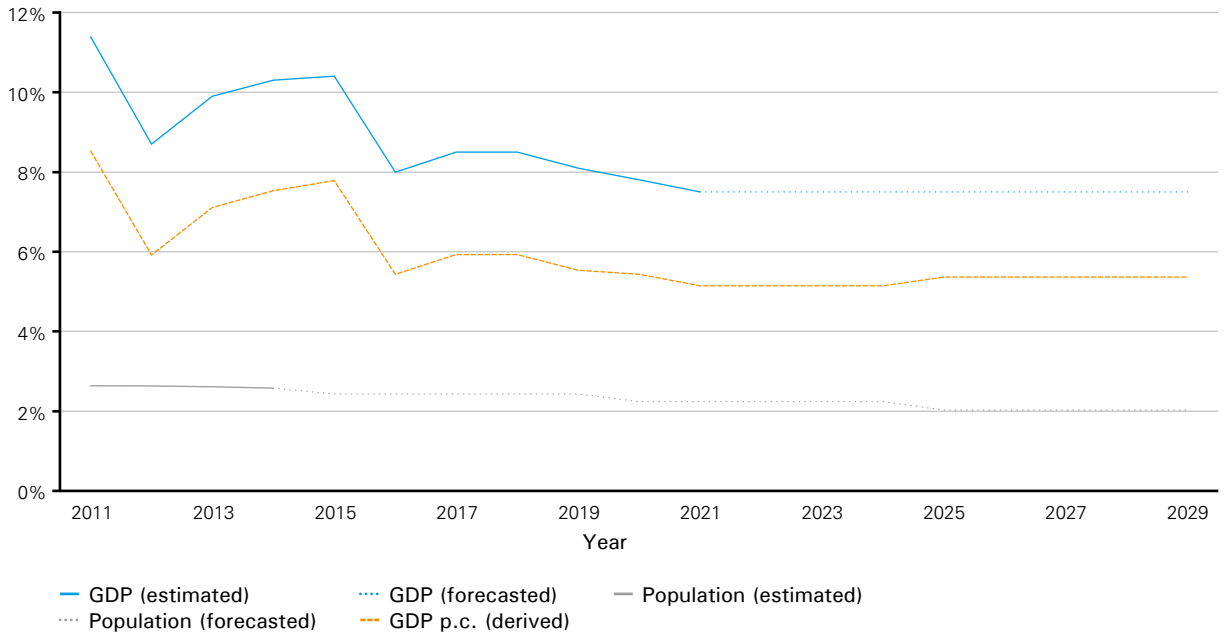


Note: Percentages express the size of sub-national spending as proportion of total spending. The blue striped line expresses the point at which sub-national overtook central spending.

Source: Boost 2008/09-2013/14

65 These models are the same as those presented in chapter 2.
66 This was based on the 2012 population projection of the 2007 national Census and the World Bank's growth rate – reduced to 2011 estimates.
67 (IMF, 2017)

Figure 22: Model assumptions, growth rates for GDP, population size, and GDP per capita



Source: Author's calculation using World Bank, IMF, UNPD, 2012 Census

Using the above set of forecasts until 2030 gives an average growth rate of 8.4 per cent annually, together with an average population growth rate of 2.3 per cent. This results in an average annual GDP per capita growth rate of 5.9 per cent (see Figure 22).[68]

Ethiopia's sub-national governance structure maps a hierarchy from regional to zonal level and then to woreda and town administrations (see Chapter 3). To calculate total sub-national spending for the model, zonal and regional expenditure data are included. In absence of census population estimates for these areas, the resulting missing values were imputed using their known total sectoral spending levels and divided by the average per capita expenditures calculated at the woreda and city, for which data was available.

The model assumes that the absorptive capacity (physical and human capital) constraints can be substantially relaxed over the medium term through systematic investments in human resources, administrative capacity, and/or infrastructure. Therefore, the long "ramp-up time" of the CC-SDGs expenditure adopted in the model assumes no – or a negligible degree of – capacity constraints. A 2003 Development Committee report for the annual meetings of the World Bank and IMF examined Ethiopia's capacity to absorb significantly higher aid flows in pursuit of the MDGs. It concluded that a significant increase in aid (60 per cent to a 100 per cent) could be effectively absorbed.[69]

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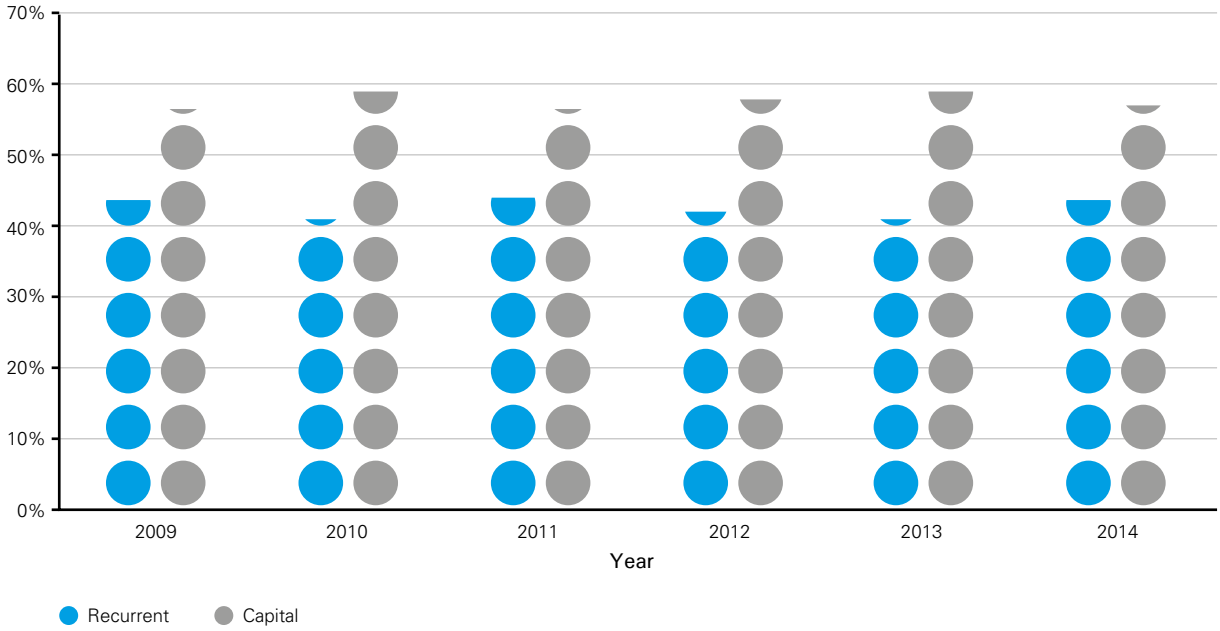
68 Taking these figures as growth indices, one can calculate the unobserved variable: 1.084 / 1.023 = 1.059. A growth index of 1.084 implies a growth rate of 8.4 per cent.

69 Development Committee (2003), Supporting Sound Policies with Adequate and Appropriate Financing. Report prepared for the 2003 Annual Meetings of the World Bank and the IMF in Dubai, DC 2003-0016, 22 September 2003, Washington D.C

Figure 23: Total Government expenditure, by recurrent and capital expenditures



Source: Boost 2008/09-2013/14

In addition, the model assumes a static timeframe compatible with the cross-sectional data. Future research will explore the potential of panel data to support dynamic estimation.

4.3 Model Results

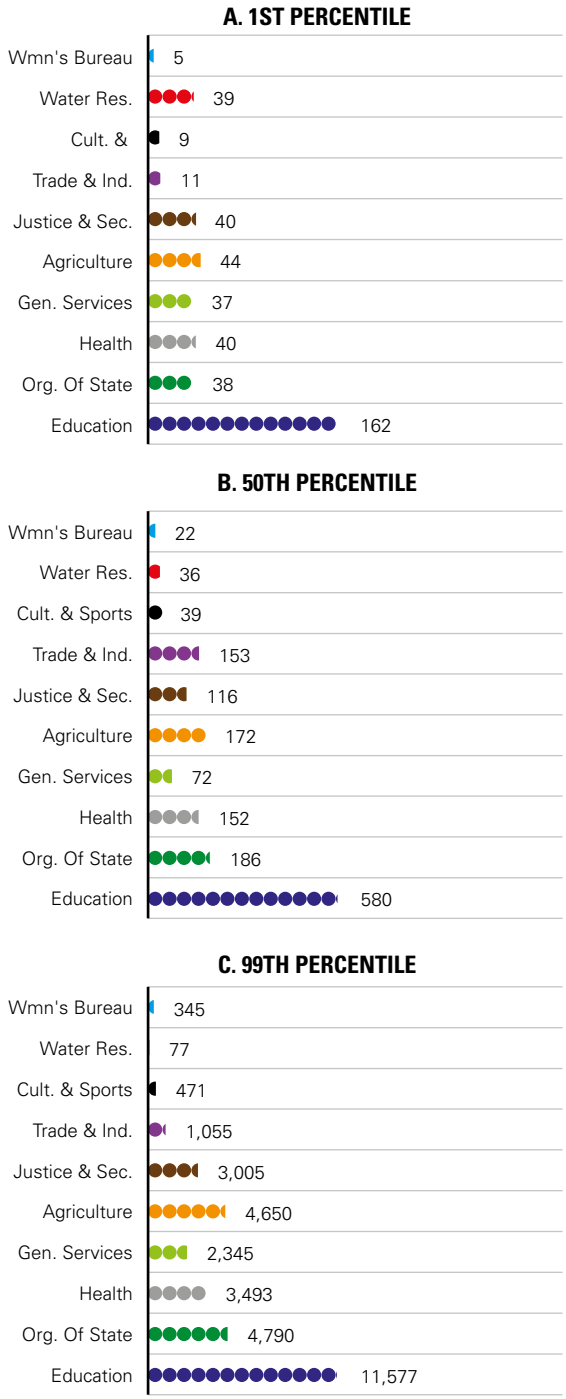
To assess the Child-Centred SDGs performance by 2030, three scenarios were created which consider affordability, performance and cost-efficiency in varying degrees. Scenario 1 models a business-as-usual case where expenditure growth reflects changes in size of the economy and the population as described above. Scenario 2 uses an empirical optimization of Government spending where the top-performing district, in terms of largest CC-SDG targets attainment and lowest per capita expenditure, is identified and selected as best-practice that all districts adopt over time. The third scenario employs a path-dependent algorithm to improve efficiency and value-for-money. Adopting a step-wise process, the algorithm searches for improvements in SDGs achievement and reductions in cost, without compromising the achievement of any of the CC-SDGs achieved by 2030 in Scenario 2.

4.3.1 Scenario 1: Business-As-Usual (Constant Growth)

The first scenario presents CC-SDGs achievements by 2030 resulting from a business-as-usual case. Specifically, (1) Government expenditure grows proportional to real GDP growth. (2) Total Government expenditure (TGE) as a per cent of GDP remains constant over time. And, (3) each district is assumed to keep their original expenditure mix, prioritizing certain sectors over others in the same manner as the baseline, in relative terms. The third component is visualized below in Figure 24, which outlines the size and mix by the per capita total expenditure percentile of all districts. It reveals high intra- and inter-variances between sectors and between districts, yet also certain sectors which are prioritized across the board – most notably education.

Based on these spending allocations, the question is: **how much of the SDGs will be achieved if the country continues its current trajectory?** Table 9 presents the average district achievements by the year 2030, and the change in percentage points (p.p.) compared to the base year 2011. Of the 13 indicators, all but one show improvement. Under-5 mortality does not change with increases in expenditure over time. On the other side of the spectrum, primary school enrolment and skilled birth attendance behave as the low-hanging fruits of development and are very sensitive to expenditure growth. Access to sanitation and improved water sources also improve significantly.

Figure 23: Total Government expenditure, by recurrent and capital expenditures



Note: Lowest percentile includes district between 0 and 1 per cent in the total expenditure ranking, median percentile includes between 44.5 and 55.5 per cent, and highest percentile includes 99 to 100 per cent. Each percentile covers ten districts from the average spending per sector is calculated.

Source: Author's calculation

Some of the eradication targets seem to be similarly responsive to economic growth. A trend here is that indicators with higher initial prevalence decrease faster than those with already low rates, consistent with the economic principle of diminishing marginal returns. This is especially the case for multi-dimensional poverty, which is a particularly prevalent challenge in Ethiopia today – reducing by 8 percentage points until 2030. However, while seemingly large, this change translates to a half-a-percentage point reduction per year, which is low considering that other low income countries (LICs) such as Tanzania and Rwanda managed to reduce their multi-dimensional poverty by 2.3 and 3.4 percentage points per year between 2005 and 2010, respectively.[70]

If Ethiopia maintains its current pace of economic performance – with the relative size of Government spending to GDP held constant and the current

Table 9: CC-SDG average performance across districts, 2011 and 2030 business-usual

SCENARIO 1	2011	2030 Scenario 1	Difference in p.p.
eradication			
Multidimensional poverty	69.4%	61.7%	-7.7%
International poverty	31.5%	25.8%	-5.7%
National poverty	27.1%	22.0%	-5.1%
Child labour	21.6%	16.5%	-5.1%
Wasting	10.8%	6.7%	-4.2%
Below median-income	14.6%	11.3%	-3.3%
Under-5 mortality (per 1,000)	93	100	6
universality			
Primary school enrolment	69.4%	86.3%	16.9%
Skilled birth attendance	22.5%	37.3%	14.8%
Water	48.1%	56.8%	8.7%
Sanitation	12.4%	20.4%	8.0%
Contraception	46.3%	50.4%	4.1%
Secondary school enrolment	20.0%	21.2%	1.2%

Source: Author's calculation

70 (Alkire & Housseini, 2014)

mix of public spending held constant at district level – the country will make important progress on some CC-SDGs indicators but will nonetheless only achieve one of the indicators (wasting) in more than half the districts (see Figure 21), and only marginally: 50.3 per cent of the districts will have reduced wasting to the nationally defined SDGs target of 5.9 per cent prevalence by 2030. These findings illustrate that a "business-as-usual approach" will lead to imbalanced and inadequate progress towards CC-SDG achievement.

However, averages do not convey the complete story. On many indicators, at least one district achieved the target already in 2011 (see Figure 21). This is the case for all six targets of universal service provision. The simple fact that in 2011 already some districts managed to achieve some of the SDGs targets demonstrates that there is capacity within the country to tackle these developmental challenges. In contrast, the country's best performing districts will only achieve four of the seven eradication targets by 2030, up from two. As such, this scenario illustrates that for several SDGs, increased resources are part of the solution. The scenario further highlights the importance of learning from high performing districts and adopting them to other districts with care for the uniqueness of context.

The three SDG eradication targets that show lack of progress provide another lesson. For these issues, even the best performing district fails to reach the defined targets by 2030. As such, there is no locality that manages to "solve the puzzle." This is the case for child labour and extreme poverty.[72] These developmental issues prove particularly stubborn problems for Ethiopia, and increasing expenditure alone, nor learning from high performing districts, will not be sufficient to ban them out. New approaches are needed.

In conclusion, Scenario 1 shows that increasing expenditure alone will not achieve sustainable development for children. When looking at the

Table 10: Proportion of districts achieving each CC-SDG target and prevalence of best-performing district per indicator, 2011 and 2030 business-as-usual

SCENARIO 1	2011		2030 Scenario 1	
	% districts achieving target	Best-district prevalence	2018/19	2019/20
eradication				
Below median income	11.1%	0.1%	48.8%	ERADICATION
Wasting	5.4%	ERADICATION	50.3%	ERADICATION
Child labour	0.0%	0.8%	0.0%	0.1%
National poverty	14.7%	0.1%	21.7%	ERADICATION
International poverty	0.0%	1.2%	36.2%	0.1%
Multidimensional poverty	2.7%	3.7%	7.8%	2.2%
Under-5 mortality	5.4%	ERADICATION	8.8%	ERADICATION
universality				
Primary school enrolment	3.6%	UNIVERSALITY	21.5%	UNIVERSALITY
Skilled birth attendance	1.9%	UNIVERSALITY	8.1%	UNIVERSALITY
Water	14.7%	UNIVERSALITY	25.6%	UNIVERSALITY
Sanitation	0.4%	UNIVERSALITY	1.2%	UNIVERSALITY
Contraception	3.3%	UNIVERSALITY	6.1%	UNIVERSALITY
Secondary school enrolment	0.9%	UNIVERSALITY	1.5%	UNIVERSALITY

Source: Author's calculation

71 The indicators reflect unweighted averages, counting each district as one observation.

72 An observer might point out that the same is true for multidimensional poverty (it doesn't reach eradication). However, as the defined target here is not "absolute" eradication but rather a 50 per cent reduction – creating a target headcount of 41.9 per cent – then the best performing district by 2030 in fact over-achieves the target.

relationship between total per capita expenditure of each district and the number of SDGs each district achieves, expenditure fails to explain SDG progress. More technically, this correlation is low and not statistically different from zero correlation, at any acceptable threshold.[73] This is an important and innovative finding, as simple costing studies often indicate increased spending to be the primary driver of development. This analysis, however, shows that more spending is but one part of the development story. The analysis shows that value-for-money lies in identifying the right expenditure mix. Successful achievement of the CC-SDGs requires investing in specific sectors, especially those where synergies across sectors generate the highest joint returns. The next two scenarios explore this question.

4.3.2 Scenario 2: "Best-practice" Learning-By-Doing Optimization

Learning-by-doing approaches increasingly improve developmental planning processes and provide valuable opportunities for improved public financial management (PFM). The second scenario adopts a "best-practice" empirical optimization of Government spending. Specifically, the analysis identifies the best-performing district in terms of SDGs achievements in Scenario 1, the one that achieves the largest number of targets at the lowest total expenditure. As such, this scenario adopts the mix of the best-performing district and improves fiscal equity by increasing under-resourced districts more rapidly while growing more generously resourced districts more gradually. Table 11 reports the five top-performing districts in Ethiopia based on SDG achievement criteria. Both Woreda A and Woreda B achieve 10 out of 13 SDG targets by 2030, yet the former does so at a significantly lower per capita total expenditure. This identifies Woreda A as the best-practice district, and this district's expenditure size and mix are adopted across the other districts.[74]

Four out of the five "best-practice" districts are located in a region in northwestern Ethiopia that has a strong agricultural sector due to a combination of fertile land, heavy rainfall, and abundance of water sources. However, some of the districts also have a sizable proportion of the population active in non-agricultural employment.[75] Several districts have benefited from investments by development partners (DPs) and local government in areas of food security[76] as well as water, sanitation, and hygiene (WASH), which, for example, have allowed women and children to reduce their time spent on collecting water for more productive activities and created general health improvements of households and their livestock.[77] Furthermore, several districts have invested in health facilities and yielded health coverage above the national average. Examples include the early prevention of tuberculosis (TB) through early detection screening and an integrated health management information system at health facility level.[78] Coverage and uptake of the country's Community-Based Health Insurance (CBHI) is largest in this region.[79] In terms of infrastructure, several districts have all-weather road density and electricity coverage above the national average.[80]

Table 11: "Best-practice" districts of scenario 1

SCENARIO 1	2030 Scenario 1	Difference in p.p.
Woreda A	10/13	5,652
Woreda B	10/13	28,910
Woreda C	9/13	3,899
Woreda D	9/13	7,307
Woreda E	8/13	14,925

Source: Author's calculation

Adopting Woreda A's public spending approach across the country, all districts achieve 10 out of the 13 targets by 2030 (see Table 12). All the universal targets are achieved bar secondary school enrolment, which nonetheless rises from a district average of 21 per cent enrolment in 2011 to 66 per cent by 2030. Similarly, all districts show progress reducing national, international and multidimensional poverty. However, international poverty – measured as the proportion of the population living below $1.90 a-day – still fails to achieve its target, reducing the poverty headcount to only 12 per cent. Districts also fail to achieve the child labour target, although the average prevalence falls substantially — from 22 to 7 per cent.

73 R = 0.223; p = .254
74 District (woreda) names have been anonymized since representativeness is not guaranteed at this level.
75 (World Bank, 2018); (World Bank, 2004)
76 (Japan International Cooperation Agency, 2011)
77 (Kibret & Tulu, 2014)
78 (Gebreegziabher, Yimer, & Bjune, 2016)
79 (Yilmaa, et al., 2014)
80 This overview is by no means complete and exhaustive, it merely functions as a brief and selective description of some of the visible commonalities among the identified "best-practice" districts.

Table 12: Scenario 2 outcomes

SCENARIO 2	2030 Scenario 1	2030 Scenario 2	Difference in p.p.	Target	Achieved?
eradication					
Multidimensional poverty	61.7%	23.4%	-38.3%	42%	YES
International poverty	25.8%	11.8%	-14.1%	3%	NO
National poverty	22.0%	10.1%	-14.0%	15%	YES
Child labour	16.5%	7.0%	-9.5%	1%	NO
Below median income	11.3%	1.8%	-9.5%	15%	YES
Under-5 mortality (per 1,000)	100	24	-76	25	YES
Wasting	6.7%	1.3%	-5.4%	6%	YES
universality					
Sanitation	20.4%	100.0%	79.6%	100%	YES
Skilled birth attendance	37.3%	100.0%	62.7%	100%	YES
Contraception	50.4%	100.0%	49.6%	100%	YES
Secondary school enrolment	21.2%	66.3%	45.2%	100%	NO
Water	56.8%	100.0%	43.2%	100%	YES
Primary school enrolment	86.3%	100.0%	13.7%	100%	YES

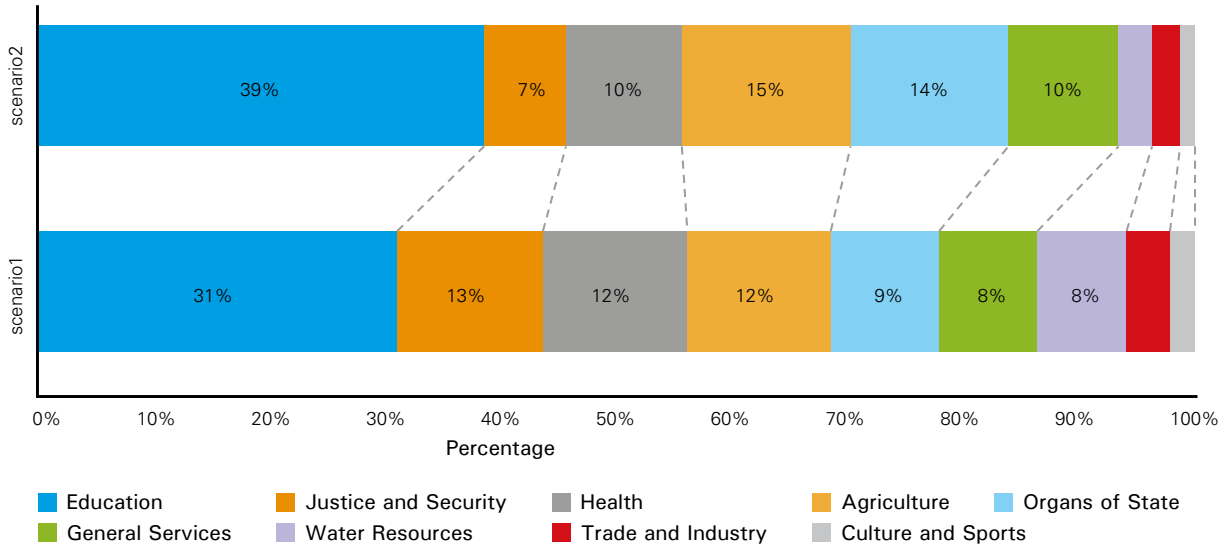
Source: Author's calculation

The increased performance of Scenario 2 comes with a significant increase in cost – between tripling and quadrupling compared to Scenario 1 (see Table 14). The best performing district spends considerably more than the average district. However, this district also exploits significant innovations in the expenditure mix. The production function on which the input-output elasticities in this analysis are based allow sectoral expenditures to interact with each other, creating multiplicative effects which can be referred to as "synergetic effects" or simply "synergies." For example, the best-practice adoption leads to a sizable increase in education investments. Global evidence corroborates the importance of education in this respect – education expenditure goes beyond achieving educational outcomes and reduces poverty and can improve children's health.[81] In turn, education makes health spending more productive, while nutritional programmes make education more effective (e.g. school feeding) – they all interact. All these spending inputs are simultaneously achieving joint outputs on health, education, nutrition, livelihoods, and overall child well-being.

Besides education, the best-practice district prioritizes agriculture, organs of state and general services. While education and agriculture are clearly important drivers of sustainable development,[82] the role of organs of state and general services are less commonly explored in social policy models. The category "organs of state" primarily includes administrative councils and executive offices, and in case of Ethiopia also the Bureau of Women's and Children's Affairs (BoWCA), an agency collaborating with organizations working on women, children and youth empowerment. The bureau performs capacity-building activities to ensure equal participation and benefit for women in political, economic and social spheres.[83] "General services" encapsulates the Bureau of Finance and Economic Development (BoFED) and the Bureau of Civil Service and Capacity Building (BCSCB). Expansion of both can yield improved sustainable development through channels of financial management, economic policy and increased human capital among civil servants.

81 DSD, SASSA, UNICEF (2012)
82 (Mincer, 1974); (Ghatak & Ingersent, 1984)
83 (Ministry of Women and Children Affairs, 2017)

Figure 25: Sectoral per capita expenditure mix in 2030, scenario 1-2



Source: Author's calculation

In sum, this best-practice scenario clearly outperforms the business-as-usual scenario. This is due to (1) a significant increase in expenditure and (2) a reprioritization of sectoral investments. Considering the first, this scenario requires a growth rate in Government spending that is greater than the economic growth rate. As economies grow, government expenditure as a percentage of GDP typically increases. Scenario 2 demonstrates that it is important to identify, learn, and adopt from districts where child-sensitive development outcomes are achieved. This scenario also shows that certain developmental milestones remain out of reach even with the learning-by-doing best-practice approach: secondary school enrolment, extreme poverty, and child labour (see Table 12). This raises the question whether it is possible to go beyond the learning-by-doing optimization and further improve performance by analytically optimizing the expenditure mix. This is investigated in the third scenario.

4.3.3 Scenario 3: Analytic "Smart-Search" Optimization

The third scenario adopts an optimization strategy to achieve near-universal CC-SDGs achievement against the best possible efficiency in expenditure size and sectoral prioritization. Typically, an analytic optimization algorithm is used for such a job. However, due to the high number of expenditure functions included in the present simulation, this exercise is too computationally intensive given the available computer resources.[84] Moreover, because the algorithm seeks to find an optimum on a multidimensional surface with a specific set of indicator thresholds, the optimization is discontinuous and therefore non-differentiable, ruling out most analytical approaches.[85] For example, the synergy effects of the functions create both reinforcing as well as offsetting effects simultaneously. Therefore, an incremental approach is adopted where the fiscal mix and expenditure levels of best-practice scenario provide the initial point of departure.

A "smart-search" methodology is applied to optimize performance. Adopting Scenario 2 as a starting point, the approach adjusts fiscal expenditures sequentially – increasing fiscal expenditure to achieve additional goals, or reducing expenditure to improve efficiency, as long as the achievement of any SDG is not compromised. These criteria achieve a path-dependent solution

84 A typical numerical optimization algorithm employs a grid search of the feasible set of inputs to the optimization problem, with a system of nested loops for each independent variable in the system of equations. With 10,000 increments tested for each of 13 independent inputs, the numerical analysis must evaluate the full system of SDGs outcome equations (each test involving hundreds of variable permutations) for approximately 10^51 combinations of fiscal expenditure. A finer grid search (to exclude the possibility of local optima) will require exponentially greater computational resources.

85 Since the objective function is the sum of the indicators that achieve the threshold value, the effective optimization surface essentially "falls off a cliff" once the threshold is achieved. Our optimization process assumes that once we achieve a particular SDG, all further resources should be allocated to achieving other SDGs rather than "over-achieving" any SDG. This specific assumption creates the discontinuities, and effectively requires a kind of numerical analysis optimization approach (as opposed to an analytical approach).

conditional on the initial category of fiscal expenditure adjusted and the subsequent sequencing of fiscal expenditure adjustments. Assurance of a global optimum will likely require a grid-search, but the results demonstrate that the smart-search optimization procedure can both improve the achievement of SDGs outcomes and lower the fiscal expenditure required, improving value-for-money.

The scenario manages to improve SDG performance (adds universal secondary enrolment to the mix of achieved targets) and, remarkably, does so at a lower cost, reducing expenditure to 19.9 per cent of GDP, down from 20.9 per cent in scenario two (see Table 14). Moreover, most indicators show further improvement. These findings reveal that leveraging sectoral synergies can enhance SDGs performance at a lower cost compared to the second scenario.

4.3.4 Taking Stock: Scenario Cost and Sectoral Prioritization

The third scenario is the most cost-efficient compared to the other scenarios. While both optimization methods increase CC-SDG achievement by 2030, they also triple government expenditure. In Scenario 2, expenditure grows to 23.9 per cent of GDP. In Scenario 3, this can be reduced to 22.8 per cent of GDP while achieving an additional SDG targets. Table 14 depicts the price tag for each scenario, expressed in various units. Scenario 3 costs approximately US$229 per person, or ETB 7,200. To cover the entire population, this amounts to roughly US$30 billion, or ETB 1.2 trillion. Proportionally, this is 22.8 per cent of GDP, or 123.7 percent of total government expenditure. The model holds exogenous components of government expenditure constant in real purchasing power terms, and grows the endogenous components based on the scenario projections.

This model only reflects the impact of increased government expenditure and improved fiscal synergy. History demonstrates that improved technologies for social outcomes achievement also provide an important source of progress and will likely reduce the cost required to achieve the SDGs. This model does not reflect that likely impact and as a result likely overstates the required cost.

Figure 26 shows the iterative change in sectoral prioritization from business-as-usual to adopting best-practice to optimizing synergies. These sectoral expenditures indicate the rough sectoral prioritization needed to achieve the developmental outcomes in terms of intra-government allocation. Following this path, education, health, organs of state, agriculture, and health are the biggest drivers of child-sensitive sustainable development.

Table 13: Scenario 3 outcomes

SCENARIO 2	2030 Scenario 1	2030 Scenario 2	Difference in p.p.	Target	Achieved?
eradication					
Multidimensional poverty	23.4%	21.0%	-2.4%	42%	YES
Wasting	1.3%	0.8%	-0.4%	6%	YES
Under-5 mortality (per 1,000)	24	23	-1	25	YES
Child labour	7.0%	7.0%	-0.0%	1%	NO
Below median income	1.8%	2.4%	0.6%	15%	YES
International poverty	11.8%	15.4%	3.6%	3%	NO
National poverty	10.1%	12.9%	4.9%	15%	YES
universality					
Secondary school enrolment	66.3%	100%	33.7%	100%	YES
Skilled birth attendance	100.0%	100%	0.0%	100%	YES
Water	100.0%	100%	0.0%	100%	YES
Sanitation	100.0%	100%	0.0%	100%	YES
Contraception	100.0%	100%	0.0%	100%	YES
Primary school enrolment	100.0%	100%	0.0%	100%	YES

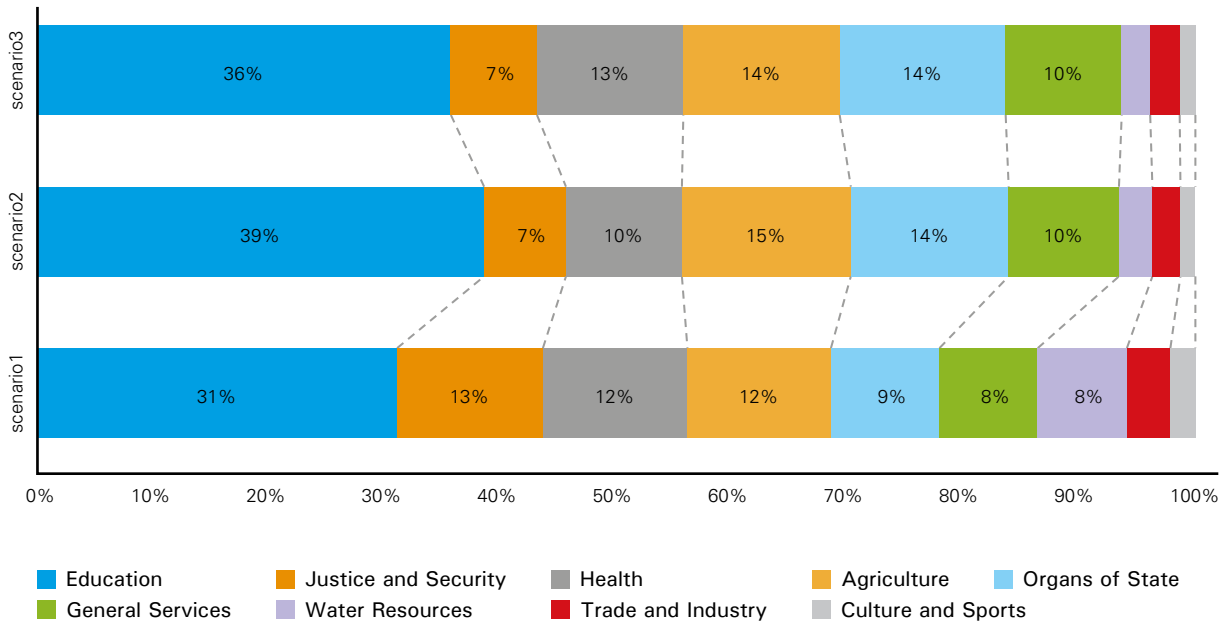
Source: Author's calculation

Table 14: Scenario cost comparison, by type of expenditure

	Scenario 1	Scenario 2	Scenario 3
Per cent of Gross Domestic Product (GDP), at projected growth rate	6.7%	23.9%	22.8%
Per cent of Total Government Expenditure (TGE), 2017 constant	36.2%	130.1%	123.7%
Annual total growth, 2011-2030 (in %), scenario-required growth rate	8.4%	15.9%	15.6%
Annual total growth, 2011-2030 per capita (in %), scenario-required growth rate	5.9%	13.3%	13.0%
Total Expenditure (in USD current)	8.56 billion	30.71 billion	29.20 billion
per capita (in USD current)	67	241	229
Total Expenditure (in ETB current)	327.4 billion	1.175 trillion	1,117 trillion
per capita (in ETB current)	2,109	7,572	7,199

Source: Author's calculation

Figure 26: Sectoral expenditure mix in 2030, scenario 1-3



Source: Author's calculation

4.4 Disaggregating Urban and Rural districts

It is expected that urban and rural districts have unique policy challenges surrounding child-centred sustainable development. Rural areas have supply-side challenges, with significant infrastructural gaps that cause a lack of access to improved sanitation and safe water sources.[87] Schools and health clinics are more difficult to access for those in more remote areas. Yet, rural does just mean deficits in industrialization and infrastructure. Social norms in rural areas are often more conservative.[88] As such, rural areas often lag behind in access to modern contraception. Urban areas do not perform better in all areas, child labour in cities can be pervasive and of an especially devastating nature when factory work is carried out by young hands. In the city, numerous policy issues result from externalities of industrialization, among which is income inequality.[89]

86 With an exchange rate of 0.03653, December 2017
87 (Singh, 2016) (Naica & Ferreira, 2016)
88 (OECD, 2010)
89 (Adhikari, 2016)

The above gives sufficient reason to consider urban and rural differences in child-centred sustainable development. The various districts in the model were classified into urban and rural districts based on the prevailing areas of residence.[90] This led to a sample of 745 rural districts and 260 urban districts. A significant data issue was the small urban sample size on which to run OLS regressions (see Chapter 2). For five CC-SDGs indicators, unique urban and rural complex regressions were modelled (improved water source, skilled birth attendance, under-5 mortality, primary enrolment, and child labour). For the other seven indicators, the aggregated equations were used as no statistically significant and robust models could be identified with disaggregated data.

The two optimization scenarios increase the number of achieved SDG targets from 8 to 11, out of 13 for rural areas, and from 5 to 6 for urban areas (see Table 63). This is a considerable gain given that it comes at 2.6 percentage points increase in government expenditure as a percentage of GDP, from 16.4 per cent in Scenario 2 to 19.0 per cent in Scenario 3. Compared to the aggregated model, these costs fall roughly in the same area of government spending, showing that both the aggregated model and disaggregated model presented in this section lead to similar results.

4.5 Conclusion

This chapter employed a macro model to simulate child-sensitive developmental outcomes by 2030, drawing from three scenarios. Each scenario informed one or several policy lessons, which are summarized below.

Insights from Scenario 1 (business-as-usual):

> Economic growth manages to improve a wide range of child-sensitive development outcomes, but mostly for those involving universal provision of goods and services. The eradication targets are less responsive to growth.
>
> Increasing fiscal commitments is necessary but not sufficient for attaining the SDGs. Universal provision can be "purchased" more easily than the eradication of well-being deficits.

Insights from Scenario 2 (best-practice, learning-by-doing):

> The careful adoption of best-practices substantially boosts child-sensitive development and should be an indispensable part of the Government's public financial management (PFM).

Insights from Scenario 3 (optimizing synergies):

> The maximizing of synergy benefits offers particularly important but still largely untapped potential to achieve exceptional progress in achieving the CC-SDGs. This requires a comprehensive, multisector coordinated approach.

Important "last mile" problems persist:

> No scenario fully eradicates extreme poverty or child labour, regardless of fiscal commitment, best-practice adoption, and synergies leveraged. New approaches, innovative technologies, and policies informed by "behavioural insights" are required to achieve this progress.[91]

The analysis carried out in this chapter demonstrates that budget allocations supporting cross-sectoral synergies provide an essential contribution alongside increased fiscal expenditure in enabling the Government of Ethiopia (GoE) to achieve the Child-Centred Sustainable Development Goals. These results corroborate recent work assessing the overlaps and synchronicities that characterize SDG strategies.[92] The chapter offers insights into how fiscal policies can strengthen intervention points that can lead to rapid and positive change. Particularly important for child well-being in Ethiopia are investments in education, which have been recognized as a vital driver of capability development.[93] The analysis also demonstrates the high child-centred returns of investing in health, agriculture, women's empowerment, and governance. For some targets, spending means the scaling up of best-practices. A number of districts have already made important strides and even achieved universal provision of public services in safe drinking water and access to modern contraception. Learning from their practices and adapting these in other contexts may prove an effective way to apply more practical evidence.

90 Where the majority of the population in the district live.
91 (OECD, 2013); (Banerjee & Duflo, Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty, 2011)
92 (Schultz, 2016)
93 (Hoffman, 2006)

5.

Towards Integrated Developmental Planning in Ethiopia

5.1 Taking stock: What are the Lessons Learned?

The analysis of this study employs an innovative approach to answer the question: "How can complex socioeconomic objectives such as the Sustainable Development Goals be costed?" The findings offer fresh insights into how fiscal allocations can strengthen comprehensive and integrated interventions that can lead to rapid and positive change. The analysis demonstrates a particularly important role for education supporting child well-being in Ethiopia, which provides a vital driver of capability development.[94] Other sectors that offer particularly high returns for child well-being include health, agriculture, women's empowerment, and governance. More important than individual investments, however, strengthening cross-sectoral synergies provides the greatest impact and the highest returns.

Silo approaches to investments in these sectors are likely to yield rapidly diminishing marginal returns. The importance of cross-sectoral synergies implies that simply calculating unit-costs for one or more sectors can seriously overestimate the costs of SDG achievement. While the study demonstrates that increased fiscal commitments are necessary, integrated multisectoral approaches provide value-for-money and achieve the SDGs at a more affordable price. Building the necessary cross-sectoral and cross-ministerial coordination requires political will at all levels of government, including the top leadership.[95] Many countries have faced challenges in elevating the policy process above narrow sectoral approaches.

A comprehensive approach to developmental planning requires appropriate fiscal commitments. Substantially greater Government spending will be required for Ethiopia to achieve the Child-Centred SDGs. Encouraging evidence from cross-country empirical analysis demonstrates that greater spending feeds back into the strengthening of Government capacity.[96] Positive feedback loops between economic development and Government capacity will enable increased Government spending and a virtuous economic growth circle. Today's most successful economies are spending half of their national income or even more on delivering the key social goods and services that make countries happy, healthy and prosperous.[97]

Developmental planning, especially the allocation and distribution of fiscal resources, needs to be informed by a robust evaluation framework that specifically assesses programme selection and integration, including the identification, adoption, and scaling up of good (and best) practices. Scenario 2 of Chapter 4 shows that relatively low hanging fruits lie in learning from districts that are allocating optimal fiscal investments. Several districts have already made great strides in reaching important milestones. In 2011, 1 in 6 districts (14.7 per cent) already achieved near universal provision of safe drinking water. With hundreds of districts all tackling similar challenges with devolved responsibility, local lessons of experience offer important insights into how best to achieve Ethiopia's most important challenges. At a national and woreda level, the important message to convey is: "Take risks, failure in the face of ambitious initiatives is acceptable: the chance of failure is the price paid for the opportunity to achieve outstanding success. A nation of ambitious and innovative risk-takers that learns from each other will provide the world with the lessons of SDG success." An acceptance of the consequences of ambitious risk-taking enables innovative experimentation which in turn nurtures the development and identification of good (and best) practices. Fertile opportunities for this kind of innovation include the elimination of child labour and the eradication of extreme poverty, which will require policy breakthroughs. Innovative policy approaches such as M&E-guided micro-interventions offer promise in enabling the achievement of these goals.

5.2 Policy Recommendations

These lessons inform a set of practical policy recommendations:

1. Substantial increases in Ethiopia's fiscal investments are required if the nation is to achieve the Child-Centred Sustainable Development Goals.

94 (Hoffman, 2006)
95 (UNDP, 2017)
95 (Hillman A. L., 2009)
97 (OECD, 2018)

2. Similarly, strengthened inter-sectoral coordination and cross-ministerial cooperation will build synergies and create value-for-money in achieving sustainable development.

3. SDG budgets require optimization through sound public financial management (PFM).

4. New policy approaches are required to eradicate poverty and child labour, for both of which fiscal bottlenecks or lack of local best-practices are not the main constraints. In addition, policy innovations will likely improve the technology for achieving other SDGs as well – which are achievable with current approaches.

The following sections discuss each of these four recommendations.

Figure 27 depicts how the four recommendations depict a policy road map, consisting of inputs, process, and outcomes:

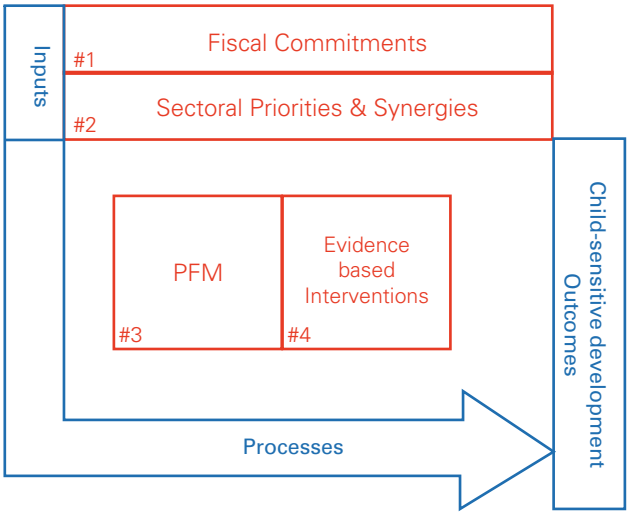
- **Inputs** refer to the resources used by Government in their production function, as well as the way in which they are mixed.

- **Processes** refer to the public management practices and procedures undertaken by governments to implements policies. They address the means used by public administrations to fulfil their duties and obtains their goals.

- **Outcomes** refer to the effects of public programmes and services on citizens, in terms of welfare gains, health gains, educational/ learning gains, and so on.[98]

The macro model created for this study explicitly linked inputs and outcomes by analysing an integrated set of fiscal expenditure and household living standards data. The econometric approach measures the otherwise hidden processes that drive the technology of the policy production process – that of programme implementation and delivery.

Figure 27: Policy roadmap for child-centred SDGs in Ethiopia



Recommendation #1: Increasing Fiscal Commitments to the SDGs

Achievement of the SDGs will require Ethiopia to increase its fiscal commitments. Both Scenarios 2 and 3, which generate substantial improvements in SDG achievements, require substantially greater fiscal expenditure. Although Ethiopia's required fiscal commitment implies an investment that is three times the size of the Government's current commitment, this is affordable within the decade-plus time horizon. Ethiopia's strong economic growth trajectory enables a virtuous cycle between national income and the strength and size of the public sector, which will enable Government capacity to commit and implement the SDGs.

The economic theory known as Wagner's Law, also known as the law of increasing state spending, states that the size of government as measured by public spending increases as national income grows, and has become a stylized fact in public finance.[99] This positive elasticity is driven by an increased demand for public spending as the economy grows.

- Demand for public goods increases the size of government when growth of the middle class transforms previous private goods into public goods, such as access to health care and receiving an education. As the middle class grows, services that are initially mostly

98 (OECD, 2018)
99 (Wagner, 1958)

taken up by the rich as privately supplied goods (e.g. private schools) become public goods collectively sought by the middle class through public finance. This empirical observation supports another economic theory knows as Director's Law, which states that public spending on public goods principally benefits the middle class.

- As incomes increase, public awareness tends to increase surrounding negative externalities. Public health concerns increasingly come to the fore and demand higher living standards. Households also start seeking protection from the externalities of crime and personal harassment.

- The entitlements of social protection increase public spending. The appetite for universal transfers and insurance increases as income and wealth of the middle class grows.[101]

- Demand for government regulation and consumer protection increases. As incomes grow and education advances, individuals become more conscious of fraud and product safety and demand protection against corruption and abuse.

…as well as increases in the supply of tax revenue.

- Tax revenue grows when opportunities for taxation expand. Economic growth raises households' discretionary income, better enabling taxation that can be returned in the form of public goods and social benefits.[102]

- The entry of women into the formal labour market expands revenue opportunities for governments through the taxable incomes they earn.

- Greater gender equality in labour markets improve demand for early childhood development services.[103]

- Economic growth stimulates a transition towards formal employment. The growth of the private sector reduces self-employment and increases the proportion of paid workers, who in turn are taxed on their wages.[104]

These structural factors depict a general trend between development and the role and size of the state, yet significant individual variation between countries exists. Table 15 illustrates a "national income-public expenditure elasticity" above one, revealing that higher income country groups also have a higher total government expenditure (TGE). At its current growth trend, Ethiopia will graduate to a lower-middle income status by between 2023 and 2026 (see Chapter 3). The group of lower-middle income countries demonstrates on average an increased capacity for government spending that is 5.7 percentage points higher than an average low-income country.

Table 15: Country income class comparison

	GNI per capita, Atlas method (2016 USD)	Total gov't expenditure (% of GDP)	GDP Growth Rate (in %)
Low income	< $1,005	26.3%	4.1%
Lower middle income	$1,006 - $3,955	32.0%	5.1%
Upper middle income	$3,956 - $12,235	34.7%	3.5%
High Income	> $12,235	41.8%	1.7%

Source: WB, 2017; IMF, 2017

With a total Government expenditure of 18.4 per cent of GDP in 2016, Ethiopia is spending around 8 percentage points less than the average for low-income countries (the average low income country spends 26.3 per cent of GDP; see Table 16). Over the past decade, Ethiopia has reallocated spending from recurrent to capital expenditures and to investments increasing service coverage at local levels. At the same time, there has been a reorientation of expenditure towards financing of the two Growth and Transformation Plans (GTPs). While the total expenditure as a per cent of GDP declined somewhat over the past decade, expenditure on roads and poverty sectors increased relative to GDP. Moreover, contraction mainly occurred in the period from 2000 to 2010 but has increased relative to GDP since, revealing an elasticity above one in recent years.

100 (Hillman A. I., 2013)
101 (Freeland, 2018)
102 (Hillman A. I., 2013)
103 (Ferrant & Kolev, 2016)
104 (ILO, 2013)

Table 16: Ethiopia and a selection of comparators, by income class

	Income class	GNI per capita, Atlas method (2016 US$)	Population size (in million)	Total gov't expenditure (% of GDP)	GDP Growth Rate (in %)
Uganda	Low	$630	40.1	20.6	4.7
Ethiopia	Low	$660	99.9	18.4	10.4
Ghana	Lower Middle	$1,380	27.6	23.6	3.9
South Africa	Upper Middle	$5,490	55.0	32.1	1.3
Italy	High	$31,730	60.7	49.9	1.0

Source: WB, 2017; IMF, 2017

Economic growth often triggers foreign direct investment (FDI) inflows, which support further increases in national income. In 2015, the country was the eighth largest investment destination in Africa.[107] This virtuous cycle between growth and FDI can be strengthened by investing in child-sensitive sectors – the "software of the country" – together with a healthy mix of infrastructure investment – the "hardware of the country."[108] Especially investments in health centres, schools, farmer training centres, water supply lines, and similar such initiatives offer substantial potential to reinforce the foundations of future prosperity.

Innovative ways to finance the Child-Centred SDGs offer potential to expand resource opportunities. For example, comprehensive approaches can unite Government actors, donors, impact investors, and other private sector agents. Due to the decade-plus time horizon of the SDGs, this report focuses primarily on the long-term fiscal space that will be created following the country's development trajectory and the leading role the Government will play. However, in the short-term, innovative financing methods will have to be developed and adopted. For example, community-based health insurance schemes (CBHIs) can combine premium payments into a community-level fund with a co-financing of a consortium of external contributors – for example a government fund, cross-subsidy from other public insurance premiums, NGOs, and private organisations. This mechanism has been successfully adopted in Rwanda.[109] Moreover, a pilot evaluation of a CBHI scheme in Ethiopia interacted positively with the Productive Safety Net Program, significantly improving coverage by leveraging the PSNP as an effective platform to spread information and awareness.[110] Another example is social impact investment. Increasingly, private companies and funds are interested in social outcomes and demonstrating social returns and value-for-money can be a powerful tool to attract investments.[111]

Recommendation #2: Fostering Cross-Sectoral Synergies

The findings from this research highlight the importance of multi-sectoral approaches and intersectoral synergies. The conventional unit-cost approach indicates that the cost of some SDGs is unaffordable, and others unattainable. The comprehensive costing model demonstrates that cross-sectoral synergies generate efficiencies and improve value-for-money, predicting a substantial but affordable cost for achieving nearly all the child-centred SDGs. Identifying and strengthening cross-sectoral synergies constitutes a vital strategy for Ethiopia's achievement of the SDGs.

105 (World Bank, 2016)
106 (World Bank, 2016)
107 (Hailu, 2017)
108 There are different "schools of thought" on how to trigger this virtuous cycle. One school argues that infrastructure is part of a country's physical stock of capital and therefore a factor production which directly induces economic growth (Aschauer, 1993). Other schools argue that infrastructure complements other factors of production (Barro, 1990) or that infrastructure indirectly induces growth through education and health development, for example by facilitating facilities and roads to access those facilities (Fedderke & Garlick, 2008). Empirical findings over the years show a convergence to the latter schools, which relegate infrastructure at best to one production factor within a mix of factors, and at worst to an "enabler" of more important factors, such as human and cognitive capital – making child-sensitive investments imperative for development.
109 (AfDB, 2016)
110 (NWO, 2015)
111 (UNDP, 2017)

Horizontal collaboration among sectors requires institutional change in budgeting structures and implementation modalities.[112] Due to Ethiopia's decentralized governance structure, horizontal coordination will involve vertical linkages among Federal, Regional and Woreda levels. Most implementation is local. Practically, this means that ministries, as well as sectoral administration offices (such as health and education) at the woreda-level, will be collaborating both horizontally and vertically. A recent report by the United Nations Development Programme (UNDP) could serve as a good starting point in fostering synergies:[113]

- Experience from a range of countries highlights the critical role that strong institutional and coordination frameworks have played in supporting the achievement of the Millennium Development Goals (MDGs). This includes the horizontal coherence across ministries and vertical coherence across government levels (national, sub-national and local). In most countries, ministries have separate budgets, communication channels and monitoring systems: a set of **highly fragmented institutional arrangements**. A key challenge is that the SDGs are interlinked. Evidence demonstrates that complex challenges require approaches that build deep interlinkages among programmes that aim to achieve multisectoral targets, including those associated with the SDGs. This reality requires strong interagency coordination. The traditional "silo" policy approaches employed by many countries in the past worked as well as possible when information constraints stymied comprehensive development, but today, improved information and evidence-building technologies enable better integrated planning approaches necessary for achieving sustainable development. Institutional coordination will require political will to foster cross-sectoral synergies: coordinating across ministries and ensuring that a country's existing development strategies, plans and road maps inform all line ministries' mandates. Connecting mandates to the SDGs provides a useful to transition from silos towards synergies.

- An institutional tool that can foster a synergy-building approach is the **use of an overarching coordinating body that serves as the ambassador of the country's National Development Strategy,** such as a National Planning Commission. Some countries have created National Councils on Sustainable Development (NCSD) for this purpose. In other instances, it has been a certain line ministry that has taken the lead. Fundamentally, this body engages stakeholders in the creation, implementation and monitoring of national strategies and fosters consensus and ownership of the plans across the Government. The location of such a body within the administrative structure of Government is a strong indication of the political clout of the body, to influence decisions and actions on policy issues. Membership within such councils should cut across all sectors: broad representation increases the council's effectiveness.

- Monitoring progress through cross-sectoral indicators and composite indicators such as the Human Development Index (HDI) function as incentive systems to facilitate **shared accountability**. This requires nationally integrated data systems where each ministry can feed its budgeting and performance data into. This can aid in transitioning a mentality from goals of economic growth to broad-range human development.

- Synergies should go beyond intra-government cooperation and should include the **engagement of civil society, business, philanthropy, and academia.** Although inter-ministerial commissions with only Government members would have significant authority and legitimacy to support their work, the inclusion of non-state stakeholders may facilitate the development of a practical and shared strategy.

- Many lessons can be learned from good practices illustrated by the cross-sectoral approaches employed by various countries to address climate change as well as gender inequality – two policy areas for which policy synergies demonstrate powerful successes.

- The framework, however, intrinsically relies on data that maps the input-outcome elasticities and cross-sectoral synergies. By updating the data regularly – the current model is based on

112 (UNDP, 2017)
113 (UNDP, 2017)

2011 data – and improving the quality – the current model exclusively analyses sub-national patterns – the adequacy of this framework can increase significantly. The most effective way to leverage the use of such a framework is by aligning ongoing data collection processes to support these kinds of models. For example, by ensuring that inputs, processes, outcomes, and population sizes are analysed with sufficient disaggregation (e.g. woreda and city level) and can be merged into an integrated data framework.

Recommendation #3: Maximizing the Impact of SDG Budgets

Budgeting practices and procedures need to be firmly rooted in Ethiopia's development strategy. Countries that have taken such an integrated approach to development financing, often referred to as "whole-of-government" or "whole-of-finance" approaches, have performed better than countries with more narrow and fragmented budgetary frameworks. Planning documents are often aspirational and not fully costed, and therefore do not provide an adequate basis on which to choose effective investments. While earmarking can help guarantee a minimum expenditure threshold in a "single input-impact mindset," this report demonstrates that lasting impacts are achieved through synergies. Therefore, project appraisal and costed sector plans better identify projects that deliver value-for-money. Appropriate incentives for policy makers within ministries can foster working across portfolio boundaries – formally and informally – to achieve shared goals by providing an integrated government response to development targets.

Linking development finance to principles such as "performance budgeting" ensures that performance, evaluation, and value-for-money are integral to budget planning. Central to performance-based public financial management (PFM) is "policy evaluation" to guide budget allocation.[114] Government programmes all aim at fostering particular development outcomes, yet there is great variation in their costs as well as their effectiveness. Policy evaluation answers the questions: "Does this programme or policy work? Why or why not? How can it work better?" Using such questions to guide which programmes to improve, which to expand and transpose to other regions, and which to terminate, can help to build a highly cost-effective package of programmes. For pilot programmes this can require a rigorous evaluation, combining robust quantitative evaluations with key informant interviews and focus group discussions. However, even proven interventions can benefit from a continuous learning-by-doing approach. Over time, a knowledge-base is built where key evaluation questions are answered and evidence supports budget planning process. In practice, gaps in budget execution can severely hamper the capacity to allocate resources. These gaps can be partially explained by a limited capacity to absorb the budget into programmes and investments, and other inefficiencies. The effective translation from the approved budget to actual expenditures depends on three pillars: (1) budget transparency, (2) public participation, and (3) formal oversight.[115] Ethiopia has achieved successful reform in its budgetary management and strengthening of revenue mobilization over the past decade. Further improvements in areas of transparency and accountability can reinforce these gains.[116] Improvements in each of the pillars can result from the adoption of budget management systems which map out the flow of funds, for example, by instituting Public Expenditure Tracking Surveys.[117] These surveys track how the funds flow from beginning to end, revealing leakages and wastages and supporting timely and reliable disbursements.

Fund flows reach the end of the budget pipeline at programme implementation, but weak administrative structures prove costly in many developing countries around the world.[118] It is important to have a lean administrative structure and streamlined organization of tasks in safeguarding against malfeasance. However, such reforms can elicit resistance and require a long time to achieve. Recent innovations have shown that high returns can be employed by simply "shortening the pipeline." By (re)designing programme delivery, programme costs can be curbed significantly. For example, India's National Rural Employment Guarantee Act (NREGA), a large public works programme, reduced costs by 25 per cent (roughly US$1.5 billion) with a delivery reform – moving from a traditional cash flow practice involving seven

114 (Duflo & Banerjee, Handbook of Field Experiments, Volume 1 [1st Edition], 2017)
115 (UNICEF & IBP, 2018)
116 (World Bank, 2017)
117 (UNICEF, 2017)
118 (Finan, Olken, & Pande, 2017)

steps between fund request and fund release to one using an electronic platform involving only three steps.[119] Other examples of such innovations in "e-governance" include "smart cards" and "mobile money".

Recommendation #4: Better Interventions for the Eradication of Poverty and Child Labour

The complete eradication of extreme poverty (measured using the US$1.90 PPP poverty line) and child labour prove to be particularly challenging issues in Ethiopia. Increased expenditure and optimum cross-sectoral coordination may prove insufficient for achieving these two targets, which is a worrying finding of the analysis. Simply put, better policy interventions are needed to tackle these challenges.[120] For example, child labour is strongly linked with poverty and forms a response of households coping with poverty and vulnerability.[121] A recent UNICEF Ethiopia report on the access of the poor and vulnerable to basic social services identified several promising interventions that have been introduced since 2011 and as such weren't included in the policy production function of this analysis. Interventions and approaches such as these – and new interventions going forward – can create additional leaps in eradicating poverty and child labour:

- By increasing the understanding of the nature of poverty in Ethiopia, more appropriate interventions can be designed. An example is the recent investment in rural livelihood programmes, such as the Ethiopia Drought Resilience and Sustainable Livelihood Programme, rolled out in 2013 with aid of the African Development Bank (AfDB). Agricultural livelihoods account for 70.5 per cent of total employment in 2017 and poverty is clustered in rural areas.[122]

- Promoting more child-sensitive interventions under the existing social protection programmes – particularly the Integrated Nutrition and Social Cash Transfer (IN-SCT), including standardized birth registration (over 90 per cent of children remain unregistered) and community messaging discouraging child labour.[123]

- Ethiopia anticipates the expansion of the role of social workers and the grassroots community in its social protection interventions. In countries such as South Africa, the support of social workers to households helps to strengthen and increase the impact of its child protection measures.

- Improved monitoring and evaluation (M&E) frameworks can help programmes to develop over time, learning to deepen their impact by improving design and delivery. For example, prior to 2015, Ethiopia's social protection flagship programme, the Productive Safety Net Program (PSNP) had no nutrition objectives and did therefore not routinely monitor nutrition outcomes. There was a general assumption that the PSNP contributed to improved nutrition. An impact evaluation in 2014 demonstrated that there was no significant impact on nutrition outcomes and that children of enrolled households were even more likely to be stunted (47 per cent) than non-PSNP children (42 per cent).[124]

5.3 Towards an Integrated Developmental Planning Framework

This report aims to foster a discussion of the importance of comprehensive planning for the financing of sustainable development, particularly those areas which deliver children's rights and simultaneously build the cognitive capital that drives Ethiopia's future prosperity. By integrating a "whole-of-finance" approach into Ethiopia's development strategies, costed sector plans which connect inputs to outcomes through a mix of evidence-based programmes and robust public financial management can translate sound policies into effective and developmental delivery.

Integral to this approach is the understanding that single targets (particularly those that reflect complex outcomes) often cannot be achieved through single-sector approaches. The diminishing marginal

119 (Banerjee, Duflo, Imbert, Mathew, & Pande, 2017)
120 (OECD, 2013); (Banerjee & Duflo, Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty, 2011)
121 (ILO, 2017)
122 (AFDB, 2017)
123 (UNICEF, 2016)
124 (UNICEF, 2016)

returns are simply too high. Rapid health gains can be achieved by investing in health infrastructure and health programmes, and these can bring significant and promising results, yet they are not enough to eradicate diseases completely[125] or achieve universal access to health care.[126] Ethiopia's most important policy objectives require integrated and inter-sectoral responses. For example, tackling nutrition challenges require food security, maternal care practices that ensure infants benefit from exclusive breastfeeding, complete vaccinations at easy-to-reach clinics with trained and motivated personnel, proper shelter, supportive families with sustaining livelihoods, educated caregivers, low-stress environments and other factors that foster not only a happy childhood but also an environment in which children can grow successfully into adults who contribute completely to the social and economic life of their communities and nation.

Figure 28 illustrates the results of Scenario 3 of the macro model that informs this costing study, incorporated into a developmental planning matrix. The figure shows the size and mix of inputs and the outcomes they produce. The framework demonstrates that outcomes are not driven by a series of programmes or even a set of sectors but rather an entire national fiscal framework. Comprehensive and integrated development plans enable fiscal commitment linked with cooperation and collaboration across sectors to deliver unified Government responses to development priorities – the Sustainable Development Goals.

Figure 28: Developmental Planning Framework, scenario 3

Sectoral Investment, in % of GDP (INPUTS)										Development and Planning Matrix 2030		
Organs of state	Womens bureau	Health	Education	Agriculture	Water resources	General Services	Justice and Security	Trade and Industry	Culture and Sports			
3.3%	0.6%	2.9%	8.1%	3.1%	0.6%	2.3%	1.7%	0.6%	0.3%			
T	X	R	-	X	-	-	-	-	-	0.8%	Wasting	Policy Objectives (OUTCOMES)
-	-	X	T	X	-	-	X	-	T	7%	Child labour	
-	-	X	T	T	X	T	-	-	-	2.4%	Below and median income	
X	-		X				X		X	21%	Multidimentional poverty	
X	T	X	T	X	X	-	X	T	-	13%	National poverty	
X	T	X	T	X	X	-	X	T	-	15%	International poverty	
-	T	R	-		-	T	X	-	X	23%	Under 5-mortality	
-	X	-	T		-	T	-	-	X	100%	Sanitation	
T	-	-	-	T	-	X	-	-	-	100%	Water	
-	T	X	-	T	-	-	T	-	X	100%	Skilled birth attendance	
X	T	-	-		-	T	-	-	-	100%	Contraception	
-	-	X	T	X	C	T	-	-	T	100%	Primary enrolment	
-	T	T	-		X	-	-	-	T	100%	Secondary enrolment	

Note: T refers to sectoral total expenditure have a direct relationship with the outcome, R refers to a direct relationship of recurrent spending, C refers to a direct relationship of capital spending, X refers sectors that only have interactive relationships through other sectors, and – signifies sectors which are not included in the model in any form.

Source: Author's calculation

125 (Tanner, et al., 2015); (Gish, 1992)
126 (Chalasani & Wickramasinghe, 2013)

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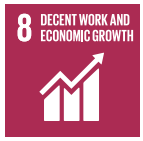
Appendix

Appendix 1

Table 17: List of SDG Indicators Selected for this Study

Goal		Target	Indicator	Indicator Description
1		1.1	1.1.1	Proportion of population below the international poverty line, by sex, age, employment status and geographical location (urban/rural). (Including analysis of relevant FGT-P1 poverty gap measures.)
		1.2	1.2.1	Proportion of population living below the national poverty line, by sex and age. (Including analysis of relevant FGT-P1 poverty gap measures.)
		1.2	1.2.2	Proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions. (Including analysis of relevant FGT-P1 poverty gap measures.)
		1.4	1.4.1	Proportion of population living in households with access to basic services. (Including analysis of relevant FGT-P1 poverty gap measures.)
2		2.2	2.2.1	Prevalence of stunting (height for age <-2 standard deviations from the median of the World Health Organisation (WHO) Child Growth Standards) among children under 5 years of age
		2.2	2.2.2.	Prevalence of malnutrition (weight for height >+2 or <-2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight)
3		3.1	3.1.2	Proportion of births attended by skilled health personnel
		3.2	3.2.1	Under-5 mortality rate
		3.7	3.7.1	Proportion of women of reproductive age (aged 15-49 years) who have their need for family planning satisfied with modern methods.
4		MDG	MDG	Gross /Net Enrolment Rates for Primary and Secondary Education by Age, Gender
		4.c	4.c.1	Proportion of teachers in: (a) pre-primary; (b) primary; (c) lower secondary; and (d) upper secondary education who have received at least the minimum organized teacher training required for teaching at the relevant level.
5		5.3	5.3.1	Proportion of women aged 20-24 years who were married or in a union before age 15 and before age 18
6		6.1	6.1.1	Proportion of population using safely managed drinking water services
		6.2	6.2.1	Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water
8		8.1	8.1.1	Annual growth rate of real GDP per capita
		8.5	8.5.2	Unemployment rate, by sex, age and persons with disabilities
		8.7	8.7.1	Proportion and number of children aged 5 17 years engaged in child labour, by sex and age
10		10.1	10.1.1	Growth rates of household expenditure or income per capita among the bottom 40 per cent of the population and the total population
		10.2	10.2.1	Proportion of people living below 50 per cent of median income, by age, sex and persons with disabilities
16		16.2	16.2.3	Proportion of young women and men aged 18 29 years who experienced sexual violence by age 18

Appendix 2

To replicate the international and national poverty headcount figures reported in the World Bank/MoFED 2014 Poverty Assessment Report, this study adopts the same measurement methodology. To calculate poverty rates, a household consumption figure, obtained by aggregating household food and non-food expenditure, is divided by the number of household adult equivalents and measured against the relevant poverty line. Before aggregating food and non-food expenditure, consumption in each of these two categories is deflated using a MoFED-defined spatial price index at the sub-regional level.[127] The adult equivalency is the same used in the report, which is in turn obtained from Dercon & Krishnan (1998).[128] Table 20 below reports the adult equivalency scale.

Table 18: Adult Equivalency Scale

Years of Age	Male	Female
0-1	0.33	0.33
1-2	0.46	0.46
2-3	0.54	0.54
3-5	0.62	0.62
5-7	0.74	0.7
7-10	0.84	0.72
10-12	0.88	0.78
12-14	0.96	0.84
14-16	1.06	0.86
16-18	1.14	0.86
18-30	1.04	0.8
30-60	1	0.82
60+	0.84	0.74

Source: Dercon & Krishnan, 1998

The methodology outlined above, applied to the datasets employed in the study, yields estimates of the poverty headcount figures that vary from those published by MoFED. In order to align these results to national estimates of poverty headcounts in the face of undocumented differences in methodologies, poverty lines were re-calibrated at the national and sub-regional levels. The following table lists the Birr per adult equivalent annual poverty lines used in each region to reproduce a national poverty headcount of 29.5 per cent (the reported headcount is 29.6 per cent) as well as the reported poverty gap and poverty severity indices.

Table 19: Calibrated Poverty Lines by Region

Region	Poverty Line (Birr/Adult Equivalent per Year)
Tigray	4,021
Afar	4,220
Amhara	3,925
Oromia	3,972
Somali	3,960
Benishangul	4,126
SNNP	3,826
Gambela	4,148
Harari	3,992
Addis Ababa	4,235
Dire Dawa	4,213

The international poverty line of US$1.25 2011 PPP used to obtain the poverty figures in this report is the same as the World Bank's PovcalNet, it stands at ETB 2,171.95 per capita per year while the US$1.90 line is set at ETB 3,301.38 per capita.[129]

127 The detailed index is available in the Appendix of the (MoFED, 2013) report
128 (Dercon & Krishnan, Changes in Poverty in Rural Ethiopia 1989-1995: Measurement, Robustness Tests and Decomposition, 1998)
129 The computation uses a PPP conversion factor of 5.44

Appendix 3

The methodology followed to compute the multidimensional poverty index in this report is the same as the one derived by the Oxford Poverty and Human Development Initiative and outlined by Alkire & Santos[130] (2010). Using two of DHS surveys for 2005 and 2011, three main characteristics of households determine their levels of multidimensional poverty. These main dimensions are health, education and standard of living and the table below displays them with their components and weights:

Dimension	Indicator	Weight
Health	Nutrition	1/6
	Child Mortality	1/6
Education	Years of Schooling	1/6
	School Attendance	1/6
Living Standard	Cooking Fuel	1/18
	Sanitation	1/18
	Water	1/18
	Electricity	1/18
	Floor	1/18
		1/18

Undernourishment of a woman or child in the household is an indication of deprivation in nutrition. The cut off for undernourishment is that the BMI of the adult is below 18.5 and the child's z-score for weight for age is more than two standard deviations below the population. Child mortality indicates that a child has died in the family, years of schooling indicates whether any adult has attended school for less than 5 years. If any child in the household is not attending school for grades 1-8, the household is considered deprived of education. In the living standards dimension, household deprivation is also true if their cooking fuel is dung, firewood or charcoal, if they do not have access to improved water or sanitation facilities and if they do not have electricity. Furthermore, poor flooring materials (dirt, sand or dung) and not owning more than one of: radio, TV, telephone, bike, motorbike or refrigerator, and not owning a car or truck is an indicator of deprivation.

The index is composed of two parts: the incidence or headcount ratio (H) and the intensity of deprivation (A). A household and its constituents count as multidimensionally poor if their deprivation is true for 33 per cent or more of the weighted indicators mentioned above. As for the intensity of deprivation, it refers to average proportion of the indicators in which these households are deprived. The index is therefore the result of the headcount ratio times the intensity of deprivation (H x A).

130 Alkire, S. and Santos, M.E. (2010). "Acute Multi-dimensional Poverty: A New Index for Developing Countries." OPHI Working Papers 38, University of Oxford

Annex 1

Table 20: Percentage of Households with Electricity Access

	2005	2011	2016
Place of Residence			
Urban	85.7%	85.2%	90.9%
Rural	1.9%	4.8%	9.6%
Region			
Tigray	19.2%	26.1%	29.7%
Afar	17.4%	32.5%	18.1%
Amhara	8.5%	20.5%	16.7%
Oromia	11.8%	17.9%	18.4%
Somali	10.5%	19.7%	11.1%
Benishangul	5.8%	15.4%	18.1%
SNNP	7%	15.3%	15.0%
Gambela	15.6%	28.1%	25.6%
Harari	70.2%	81.1%	79.4%
Addis Ababa	95.9%	98.6%	99.4%
Dire Dawa	68%	68.9%	69.3%
Total	14%	23%	31.8%

Source: Author's calculation based on DHS 2005, 2011, 2016

Table 21: Percentage Never Attending School because of Distance

	2011	2013	2015
Place of Residence			
Small Town	4.9%	6.7%	4.8%
Rural	6.2%	9.1%	8.8%
Large Town		8.7%	8.6%
Region			
Tigray	17.4%	21.6%	22.5%
Afar	12.1%	20.2%	15.1%
Amhara	6.9%	10.4%	9.4%
Oromia	4.7%	6.7%	6.2%
Somali	20.3%	15.0%	21.0%
Benishangul	12.5%	11.6%	13.4%
SNNP	2.0%	5.8%	4.7%
Gambela	3.0%	9.2%	14.6%
Harari	6.4%	10.1%	10.1%
Addis Ababa	-	11.2%	10.5%
Dire Dawa	18.0%	17.7%	26.8%
Total	6.2%	9.0%	8.6%

Source: Author's Calculation using LSMS 2011, 2013 , 2015

Table 22: Percentage of Households with a Bank Account

	2005	2011	2016
Place of Residence			
Urban	18.5%	27.1%	69.6%
Rural	2.9%	5.6%	19.4%
Region			
Tigray	3.7%	10%	40.1%
Afar	2.5%	4.5%	18%
Amhara	6.8%	13.7%	38.6%
Oromia	3.5%	7%	20.2%
Somali	1.5%	3.3%	7.1%
Benishangul	2.9%	5.9%	23%
SNNP	2.2%	6.4%	23.5%
Gambela	2.1%	13.8%	34%
Harari	11.4%	20.3%	40.7%
Addis Ababa	30.2%	40.1%	81.4%
Dire Dawa	12.8%	23.4%	43.2%
Total	5.1%	10.5%	29.6%

Source: Author's Calculation based on DHS 2005, 2011, 2016

Table 23: Births Attended by Skilled Personnel

Education	2005	2011	2014	2016
None	2.3%	4.6%	7.5%	17.3%
Primary	8.5%	15.4%	21.0%	38.6%
Secondary	55.2%	72.4%	69.4%	78.4%
More than Secondary	61.0%	74.1%	90.7%	93.2%
Region				
Tigray	6.0%	11.6%	26.2%	59.3%
Afar	4.5%	7.2%	10.0%	16.4%
Amhara	3.7%	10.1%	11.7%	27.8%
Oromia	4.8%	8.1%	13.1%	19.7%
Somali	5.2%	8.4%	15.3%	20.0%
Benishangul	5.1%	8.9%	16.3%	28.6%
SNNP	4.2%	6.1%	11.7%	28.6%
Gambela	15.3%	27.4%	29.1%	46.9%
Harari	31.4%	32.5%	45.5%	51.2%
Addis Ababa	78.8%	83.9%	86.1%	96.8%
Dire Dawa	26.7%	40.3%	59.2%	56.7%
Place of Residence				
Urban	44.6%	50.8%	58.4%	80.1%
Rural	2.6%	4.0%	9.1%	21.2%
Wealth Index				
Lowest	0.7%	1.7%	4.5%	11.0%
Second	1.3%	2.9%	5.5%	20.8%
Middle	1.9%	3.2%	9.1%	24.2%
Fourth	4.5%	7.4%	14.5%	28.5%
Highest	26.6%	45.6%	55.6%	70.3%
Total	5.7%	10.0%	15.5%	27.7%

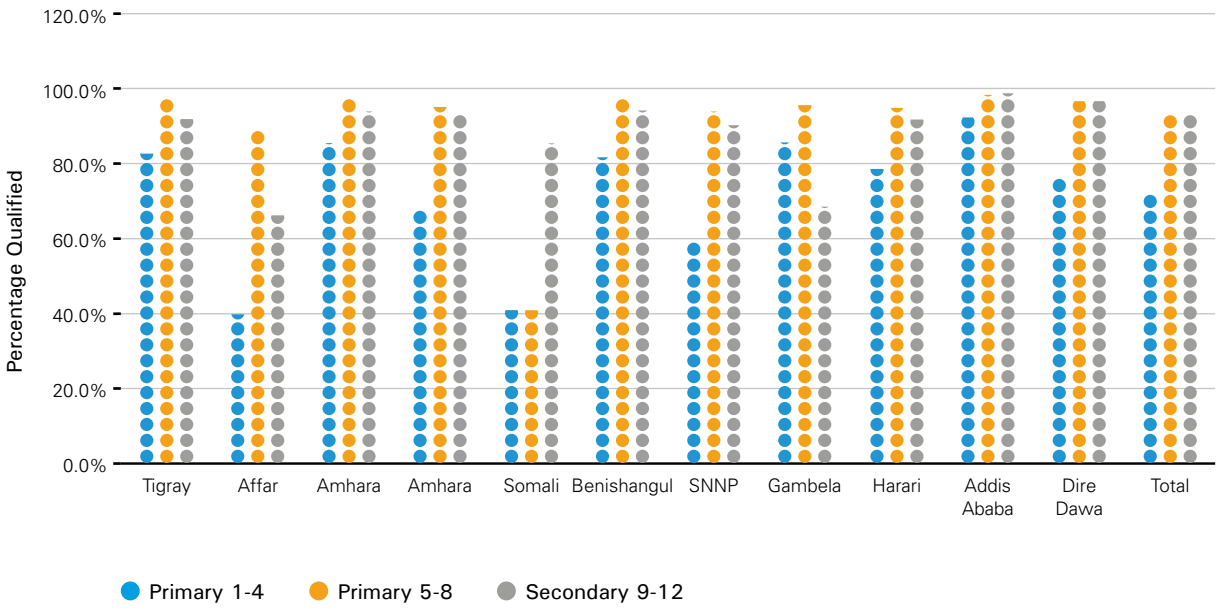
Source: DHS 2005, 2011, 2014, 2016

Table 24: Percentage of Women (15-49) whose Planning Need is Satisfied by Modern Methods

Education	2005	2011	2016
None	9.8%	45.0%	55.5%
Primary	21.9%	54.1%	63.9%
Secondary	46.5%	76.1%	77.3%
More than Secondary	42.6%	76.5%	77.1%
Region			
Tigray	16.2%	48.0%	64.8%
Afar	6.0%	35.5%	40.3%
Amhara	15.7%	58.9%	72.5%
Oromia	12.9%	44.4%	48.9%
Somali	2.7%	13.5%	9.6%
Benishangul	10.4%	51.1%	57.2%
SNNP	11.4%	48.6%	65.3%
Gambela	15.8%	63.1%	60.3%
Harari	29.1%	53.5%	57.7%
Addis Ababa	45.2%	77.1%	75.4%
Dire Dawa	31.5%	57.4%	58.6%
Place of Residence			
Urban	42.2%	73.3%	78.6%
Rural	10.6%	44.2%	56.7%
Wealth Index			
Lowest	4.0%	29.6%	47.1%
Second	6.5%	44.2%	51.3%
Middle	11.6%	45.8%	61.0%
Fourth	15.2%	51.7%	65.4%
Highest	33.7%	72.5%	73.3%
Total	13.9%	50.7%	60.6%

Source: DHS 2005,2011, 2016

Figure 29: Percentage of Qualified Teacher by School Cycle in 2015



Source: Ministry of Education, 2016

Table 25: Unemployment Rates by Region in 2013

	Urban	Rural	National
Age Group			
17-19	22.1%	2.5%	5.3%
20-29	17.5%	1.9%	5.7%
30-39	10.2%	0.6%	2.7%
40-49	8.4%	0.6%	2.0%
50-59	8.5%	0.5%	1.7%
60+	9.5%	0.5%	1.7%
Region			
Tigray	9.9%	0.9%	3.0%
Afar	8.8%	4.2%	5.1%
Amhara	11.1%	0.8%	2.4%
Oromia	10.6%	0.9%	2.4%
Somali	12.8%	2.5%	4.0%
Benishangul	6.8%	0.7%	1.8%
SNNP	10.5%	1.8%	3.1%
Gambela	4.0%	3.0%	3.3%
Harari	13.7%	0.3%	8.3%
Addis Ababa	21.4%	-	21.4%
Dire Dawa	19.8%	2.0%	14.1%
Any Disability			
Yes	13.1%	1.2%	3.1%
No	13.3%	1.2%	3.6%

	Urban	Rural	National
Sex			
Male	8.0%	0.7%	2.2%
Female	19.2%	1.7%	5.3%
Total	13.3%	1.2%	3.6%

Source: NLFS 2013

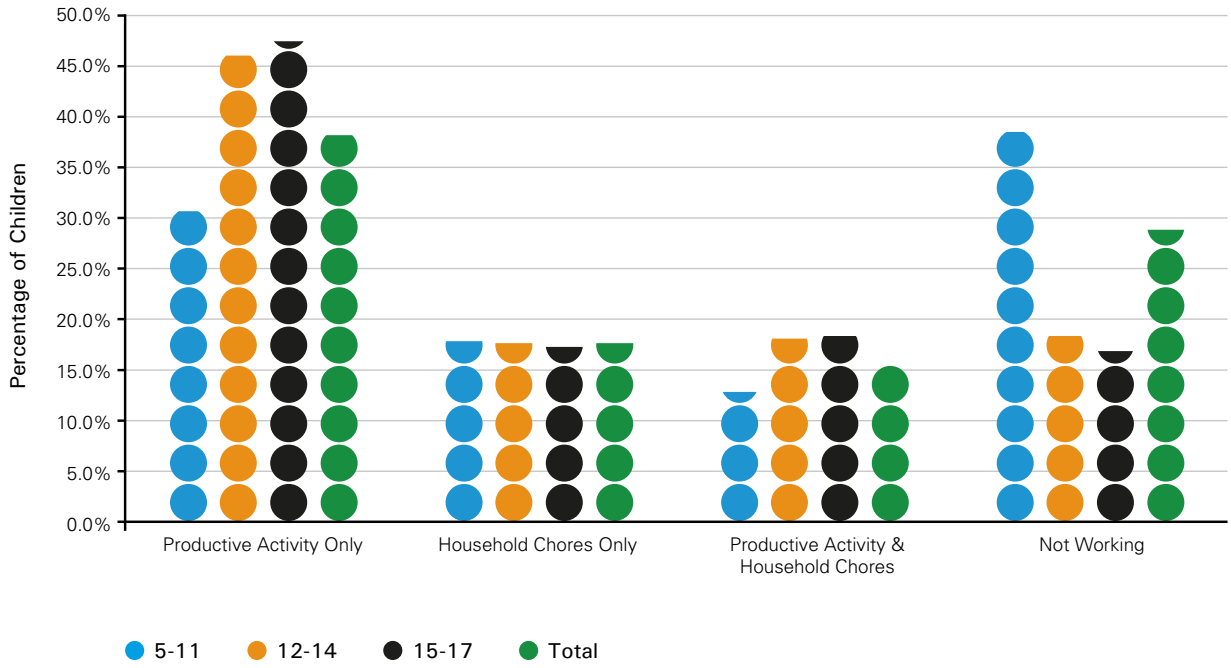
Table 26: Percentage of Population Living Below 50% of Median Consumption

	2011	2013	2015
Place of Residence			
Rural	11.1%	11.7%	13.9%
Small Town	4.9%	8.8%	8.3%
Large Town	-	3.0%	3.6%
Region			
Tigray	6.4%	5.6%	9.4%
Afar	3.5%	6.4%	5.5%
Amhara	13.0%	10.3%	11.5%
Oromia	3.6%	7.1%	9.5%
Somali	5.2%	16.4%	7.8%
Benishangul	22.9%	14.2%	26.7%
SNNP	19.8%	18.6%	20.6%
Gambela	7.9%	22.3%	14.8%
Harari	0.0%	0.6%	9.6%
Addis Ababa	-	3.1%	2.7%
Dire Dawa	1.7%	4.0%	2.9%
Sex			
Male	10.6%	10.2%	12.3%
Female	11.0%	10.7%	12.5%
Any Disability			
Yes	10.8%	9.8%	12.8%
No	10.8%	10.6%	12.9%

	2011	2013	2015
Age Group			
17-19	8.3%	6.8%	11.4%
20-29	9.2%	6.8%	9.1%
30-39	12.0%	12.2%	12.3%
40-49	10.1%	9.7%	12.9%
50-59	8.4%	7.4%	9.2%
60+	8.3%	9.2%	10.9%
Total	**10.8%**	**10.4%**	**12.1%**

Source: Author's Calculation using LSMS 2011, 2013, 2015

Figure 30: Children by Economic Status, 2013



Source: Author's Calculation using NLFS 2013

Table 27: Ever-Married Women Aged 15-49 Experiencing Sexual Violence

Education	2005
None	12.9%
Primary	9.4%
Secondary	6.0%
More than Secondary	4.5%
Region	
Tigray	13.0%
Afar	3.0%
Amhara	11.4%
Oromia	14.4%
Somali	0.4%
Benishangul	7.6%
SNNP	6.8%
Gambella	8.6%
Harari	5.2%
Addis Ababa	7.0%
Dire Dawa	8.6%
Place of Residence	
Urban	7.2%
Rural	12.0%
Wealth Index	
Lowest	14.1%
Second	11.2%
Middle	13.3%
Fourth	10.9%
Highest	6.6%
Total	11.1%

Source: DHS 2016 Preliminary Report

Annex 2.1 – Data Description

Table 28: Summary of Sectors used in Translog Estimations[131]

	Organs of State	Women's Bureau	Health	Education	Agriculture	Water Resources	General Services	Justice & Security	Trade & Industry	Culture & Sport	Education Bureau
Wasting	Total	X	Recurrent	-	X	-	-	-	-	-	-
Child labour	-	-	X	Total	X	-	-	X	-	Total	-
Below median income	-	-	X	Total	Total	X	Total	-	-	-	-
MD poverty	X	-	Total	X	Total	Total	-	X	-	X	-
National poverty	X	Total	X	Total	X	X	-	X	Total	-	-
International poverty	X	Total	X	Total	X	X	-	X	Total	-	-
Under-5 mortality	-	Total	Recurrent	-	-	-	Total	X	-	X	-
Sanitation	-	X	-	Total	-	-	Total	-	-	X	X
Water	Total	-	-	-	Total	-	X	-	-	-	X
Skilled birth attendance	-	Total	X	-	Total	-	-	Total	-	X	-
Contraception	X	Total	-	-	-	-	Total	-	-	-	-
Primary enrolment	-	-	X	Total	X	Capital	Total	-	-	Total	-
Secondary enrolment	-	Total	Total	-	-	X	-	-	-	Total	-

131 Note: "X" refers to sectors included only as interaction variables with main sectors. "-" signifies the sector is not included in the model in any form

Figure 31: Constituents of BOOST Expenditure Categories

Organs of State	Justice and Security	Health
• Administrative Councils • Executive Offices • Bureau of Women's and Children's Affairs	• Bureau of Justice • Sub-national Courts • Police Office • Ethics and Anti-Corruption Commission	• Bureau of Health • HIV/AIDS Prevention and Control • Health and Health Related Services Office
General Services	**Agricultural-Rural**	**Education**
• Bureau of Finance and Economic Development • Bureau of Civil Service and Capacity Building • Bureau Revenue • Regional Management Training Institute • Mass Media Agency	• Agri & Rural Development Bureau • Agri Research Institute • Agricultural Marketing • Land and Environmental Protection bureau • Livestock Development Agency	• Bureau of Education • Bureau of Technical and Vocational Training • Information and Communication Technology Development Office
Trade and Industry	**Water Resources**	**Culture & Sport**
• Trade Industry and Urban Development • Office of Small Scale and Microentreprise • Ethiopian Investment Agency • Office of Transportation	• Water Resources Development Bureau • Irrigation Development Authority • Water & Sewage Management Bureau (Addis Ababa)	• Bureau of Culture and Tourism • Youth and Sports' Affairs Bureau

Table 29: BOOST 2011 Per Capita Actual Expenditure- Summary

	Mean	SD	Minimum	Maximum
Organs of state	47.40	155.52	0	4352
Health	42.64	100.82	0	2476
Health (Recurrent)	33.78	83.21	0	2451
Education	127.27	375.62	0	11232
Education (Recurrent)	113.30	366.30	0	11232
Education (Capital)	13.94	53.38	0	1376
Education Bureau	118.61	375.32	0	11232
Women and Children's Affairs	5.62	12.53	0	285
Agriculture-Rural	37.58	133.96	0	2891
Agriculture-Rural (Recurrent)	29.69	97.02	0	2859
Water Resources	6.96	13.01	0	197
Water Resources (Capital)	3.09	7.49	0	88
General Services	38.11	65.21	0	1523
Justice-Security	36.94	84.06	4	2156
Trade-Industry	17.03	48.04	0	1066
Trade-Industry (Recurrent)	13.17	30.66	0	594
Culture-Sport	9.25	20.91	0	379
Culture-Sport (Recurrent)	7.80	17.97	0	379
Total	**414.41**	**990.12**	**41**	**28284**

Source: BOOST 2010/2011 Data

Annex 2.2 – Combined Models

Table 30: Poverty at International Line Translog Model[132,133]

VARIABLES	Synergy	Unit-Cost
Total Own-Sectoral Spending		-0.0918
		(0.1)
Education	-4.585	
	(4.681)	
Education Squared	0.216	
	(1.210)	
Women's Bureau	-2.667*	
	(1.552)	
Women's Bureau Squared	-1.163***	
	(0.324)	
Trade & Industry	-0.124*	
	(0.0703)	
Trade & Industry Squared	1.316**	
	(0.568)	
Water Resources_Education	-1.525*	
	(0.779)	
Water Resources_Health	-0.429	
	(0.286)	
Trade & Industry_Education	1.276**	
	(0.591)	
Education_Women's Bureau	1.063**	
	(0.519)	
Justice & Security_Trade & Industry	5.194	
	(3.297)	
Water Resources(cap)_ Agriculture	1.036*	
	(0.583)	
Agriculture_Education	-1.243	
	(1.582)	
General Services_Agriculture	-0.347	
	(0.266)	
Organs of State_Agriculture	-0.197	
	(0.205)	
General Services_Education	0.445	
	(0.276)	
Organs of State_Trade & Industry	0.829	
	(0.800)	
Constant	8.191	-0.769
	(9.538)	(0.545)
Observations	150	245
Adjusted R-squared	0.056	-0.001
F test	1.512	0.838

Source: Author's calculation based on BOOST and HCES 2011 Data

Table 31: Poverty at National Lines Translog Model

VARIABLES	Synergy	Unit-Cost
Total Own-Sectoral Spending		0.0735
		(0.109)
Education	-0.422	
	(6.108)	
Education Squared	-1.220	
	(1.597)	
Women's Bureau	5.275	
	(3.399)	
Women's Bureau Squared	0.872	
	(0.598)	
Trade & Industry	-3.056*	
	(1.730)	
Trade & Industry Squared	-0.402	
	(0.277)	
Water Resources_Education	-0.334	
	(0.211)	
Water Resources_Health	0.622**	
	(0.286)	
Trade & Industry_Education	1.557*	
	(0.869)	
Education_Women's Bureau	-2.593	
	(1.599)	
Justice & Security_Trade & Industry	-1.549***	
	(0.336)	
Water Resources(cap)_ Agriculture	-0.151**	
	(0.0717)	

132 Standard errors in parentheses
133 *** p<0.01, ** p<0.05, * p<0.1

VARIABLES	Synergy	Unit-Cost
Agriculture_Education	1.973***	
	(0.614)	
General Services_Agriculture	-2.103**	
	(0.847)	
Organs of State_Agriculture	-0.710**	
	(0.294)	
General Services_Education	1.817***	
	(0.643)	
Organs of State_Trade & Industry	1.576***	
	(0.531)	
Constant	-0.410	-1.762***
	(12.79)	(0.595)
Observations	145	238
Adjusted R-squared	0.106	-0.002
F test	2.002	0.453

Source: Author's calculation based on BOOST and HCES 2011 Data

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Table 32: Multi-dimensional Poverty Translog Model

VARIABLES	Synergy	Unit-Cost
Total Own-Sectoral Spending		0.029
		(0.0702)
Water Resources	-0.648**	
	(0.255)	
Water Resources Squared	-0.469***	
	(0.162)	
Agriculture	1.173	
	(0.910)	
Agriculture Squared	0.936***	
	(0.316)	
Justice & Security_Water Resources	0.537**	
	(0.220)	
Agriculture_Culture & Sport	-0.0695	
	(0.0485)	
Agriculture_Health	-1.247***	
	(0.377)	
Education_Health	1.166**	
	(0.575)	
Agriculture_Education Bureau	-0.937*	
	(0.506)	
Organs of State_Water Resources	0.316	
	(0.194)	
Health	-0.981	
	(1.342)	
General Services_Women's Bureau	-0.300***	
	(0.0944)	
Constant	-1.057	-0.330***
	(0.835)	(0.0925)
Observations	228	294
Adjusted R-squared	0.068	-0.003
F test	2.383	0.17

Source: Author's calculation based on BOOST and DHS 2011 Data

Table 33: Prevalence of Wasting Translog Model

VARIABLES	Synergy	Unit-Cost
Health(rec)	1.008	-0.213**
	(0.769)	(0.0924)
Health(rec) Squared	-0.278	
	(0.287)	
Organs of State	0.709	
	(0.731)	
Organs of State Squared	-0.203	
	(0.230)	
Health(rec)_Women's Bureau	-0.517	
	(0.419)	
Agriculture_Women's Bureau	0.465	
	(0.398)	
Health(rec)_Agriculture	-0.0994	
	(0.136)	
Constant	-4.567***	-1.555***
	(0.827)	(0.301)
Observations	219	224
Adjusted R-squared	0.085	0.019
F test	3.907	5.291

Source: Author's calculation based on BOOST and DHS 2011 Data

Table 34: Births Attended by Skilled Personnel Translog Model

VARIABLES	Synergy	Unit-Cost
Women's Bureau	-0.184	-0.158
	(0.538)	(0.182)
Women's Bureau Squared	1.977***	
	(0.678)	
Agriculture	1.033	
	(0.789)	
Agriculture Squared	-1.336***	
	(0.383)	
Agriculture_Health	1.558**	
	(0.696)	
Agriculture_Culture & Sport	0.217*	
	(0.115)	
Organs of State_Water Resources	-1.043**	
	(0.460)	
Justice & Security_Health	-1.605**	
	(0.679)	
Justice & Security_Water Resources	1.014**	
	(0.478)	
Justice & Security	1.500	
	(1.088)	
Justice & Security Squared	-0.334	
	(0.894)	
Constant	-3.666*	-1.827***
	(2.020)	(0.176)
Observations	144	195
Adjusted R-squared	0.173	-0.001
F test	3.986	0.752

Source: Author's calculation based on BOOST and DHS 2011 Data

Table 35: Under-Five Mortality Rate Translog Model

VARIABLES	Synergy	Unit-Cost
Health(rec)	-0.102	0.154**
	(0.572)	(0.0749)
Health(rec) Squared	-0.135	
	(0.205)	
Women's Bureau	-0.903*	
	(0.500)	
Women's Bureau Squared	-0.883**	
	(0.362)	
Health(rec)_Justice & Security	0.335***	
	(0.0731)	
Health(rec)_Organs of State	-0.0571	
	(0.0563)	
Culture & Sport(rec)_ Women's Bureau	-0.167	
	(0.153)	
General Services	-0.493**	
	(0.206)	
General Services_Women's Bureau	1.006**	
	(0.455)	
Constant	5.651***	4.167***
	(0.842)	(0.246)
Observations	202	239
Adjusted R-squared	0.092	0.013
F test	3.250	4.229

Source: Author's calculation based on BOOST and DHS 2011 data

Table 36: Use of Modern Contraception Methods Translog Model

VARIABLES	Synergy	Unit-Cost
Women's Bureau	0.568	0.101
	(0.724)	(0.0698)
Women's Bureau Squared	0.628	
	(0.392)	
General Services	-0.419	
	(0.733)	
General Services Squared	0.768**	
	(0.322)	
General Services_Women's Bureau	-1.827***	
	(0.687)	
General Services_Health	-0.537***	
	(0.162)	
Health_Women's Bureau	1.187**	
	(0.468)	
Organs of State_General Services	-0.0817	
	(0.0613)	
Constant	-0.116	-0.934***
	(0.900)	(0.0679)
Observations	250	250
Adjusted R-squared	0.052	0.004
F test	2.701	2.083

Source: Author's calculation based on BOOST and DHS 2011 Data

Table 37: Net Primary Enrolment Translog Model

VARIABLES	Synergy	Unit-Cost
Education	-4.425*	0.00204
	(2.290)	(0.0444)
Education Squared	1.481**	
	(0.688)	
Water Resources Squared (cap)	0.0289	
	(0.0376)	
Agriculture_Health	-0.0965	
	(0.0771)	
Culture & Sport	0.528*	
	(0.304)	
Agriculture(rec)_ Education(rec)	0.174*	
	(0.0924)	
General Services	1.642	
	(1.254)	
General Services Squared	0.986***	
	(0.372)	
General Services_Agriculture	-0.266*	
	(0.142)	
General Services_Education	-1.616**	
	(0.699)	
General Services_Culture & Sport	-0.366*	
	(0.195)	
Constant	6.623*	-0.423**
	(3.770)	(0.206)
Observations	162	292
Adjusted R-squared	0.053	-0.003
F test	1.816	0.00212

Source: Author's calculation based on BOOST and DHS 2011 Data

Table 38: Secondary Enrolment Translog Model

VARIABLES	Synergy	Unit-Cost
Women's Bureau	-3.142	0.0363
	(2.439)	(0.126)
Women's Bureau Squared	-0.764	
	(1.024)	
Health_Women's Bureau	3.655**	
	(1.699)	
Education_Women's Bureau	-0.698	
	(0.650)	
Culture & Sport	1.296***	
	(0.449)	
Culture & Sport Squared	0.209	
	(0.268)	
Water Resources_Culture & Sport	0.279	
	(0.219)	
Organs of State_Culture & Sport	-1.040***	
	(0.344)	
Health	2.937	
	(1.966)	
Health Squared	-1.412*	
	(0.784)	
Constant	-4.662*	-1.844***
	(2.500)	(0.125)
Observations	128	167
Adjusted R-squared	0.113	-0.006
F test	2.623	0.0825

Source: Author's calculation based on BOOST and DHS 2011 Data

Table 39: Access to Improved Drinking Water Translog Model

VARIABLES	Synergy	Unit-Cost
Agriculture	-1.617**	-0.0680
	(0.692)	(0.0633)
Agriculture Squared	-1.150***	
	(0.362)	
Organs of State	1.149	
	(0.778)	
Organs of State Squared	-0.382	
	(0.243)	
General Services_Education Bureau	-1.035***	
	(0.343)	
General Services_Agriculture	1.583***	
	(0.487)	
Agriculture_Education Bureau	1.162***	
	(0.350)	
Constant	-0.173	-0.510**
	(0.990)	(0.216)
Observations	201	260
Adjusted R-squared	0.033	0.001
F test	1.961	1.153

Source: Author's calculation based on BOOST and DHS 2011 data

Table 40: Improved Sanitation Translog Model

VARIABLES	Synergy	Unit-Cost
General Services	0.203	-0.116
	(1.063)	(0.113)
General Services Squared	-0.538	
	(0.705)	
Agriculture	-1.354	
	(0.850)	
Agriculture Squared	-1.057**	
	(0.456)	
General Services_Education Bureau	-0.951	
	(0.745)	
General Services_Agriculture	2.081***	
	(0.793)	
Organs of State_Water Resources	-0.688**	
	(0.273)	
Agriculture_Education Bureau	0.634	
	(0.680)	
Agriculture_Culture & Sport	0.0679	
	(0.0862)	
Water Resources_Education Bureau	0.335*	
	(0.186)	
General Services_Women's Bureau	0.669***	
	(0.165)	
Constant	0.904	-2.018***
	(1.142)	(0.344)
Observations	149	201
Adjusted R-squared	0.117	0.000
F test	2.785	1.047

Source: Author's calculation based on BOOST and DHS 2011 Data

Table 41: Percentage of Population below 50 per cent Median Consumption Translog

VARIABLES	Synergy	Unit-Cost
Total Own-Sectoral Spending		0.0591
		(0.134)
Education	4.472	
	(4.000)	
Education Squared	-0.460	
	(1.049)	
General Services	2.104	
	(2.152)	
General Services Squared	-1.109**	
	(0.436)	
Agriculture	-3.131***	
	(1.118)	
Agriculture Squared	-0.340	
	(0.338)	
General Services_Education	-1.903	
	(1.270)	
General Services_Agriculture	3.034***	
	(0.940)	
Agriculture_Water Resources	-0.0962	
	(0.0658)	
General Services_Health	0.204	
	(0.139)	
Constant	-9.460	-2.371***
	(8.016)	(0.693)
Observations	132	137
Adjusted R-squared	0.101	-0.006
F test	2.479	0.195

Source: Author's calculation based on BOOST and LSMS 2011 data

Table 42: Child Labour Translog Model

VARIABLES	Synergy	Unit-Cost
Culture & Sport	0.820***	0.0587
	(0.223)	(0.0593)
Culture & Sport Squared	-0.334**	
	(0.137)	
Education	0.0154	
	(0.787)	
Education Squared	0.157	
	(0.182)	
Education_Health	-0.278**	
	(0.115)	
Justice & Security_Health	0.205**	
	(0.0893)	
Organs of State_Agriculture	0.216***	
	(0.0649)	
Education_Women's Bureau	-0.368***	
	(0.100)	
Agriculture_Culture & Sport	-0.446***	
	(0.123)	
Culture & Sport_Women's Bureau	0.527*	
	(0.269)	
Constant	-2.714	-1.586***
	(1.715)	(0.0852)
Observations	239	245
Adjusted R-squared	0.092	-0.000
F test	3.398	0.982

Source: Author's calculation based on BOOST and DHS 2011 Data

Annex 2.3 – Disaggregated Models

Table 43: Births Attended by Skilled Personnel, Urban-Rural Model

VARIABLES	Urban	Rural
Women's Bureau	-2.876	-3.226
	(3.680)	(3.025)
Women's Bureau Squared	-0.542	1.294
	(1.376)	(1.940)
Agriculture	1.456*	1.902
	(0.789)	(1.432)
Agriculture Squared	-1.076***	-0.711
	(0.299)	(0.533)
Agriculture_Health	0.622	
	(0.485)	
Agriculture_Culture & Sport	0.0335	
	(0.115)	
Health	3.648	
	(4.094)	
Health Squared	-2.054	
	(1.518)	
Health_Women's Bureau	2.112	
	(2.742)	
General Services_Health	0.476**	
	(0.234)	
Water Resources_Women's Bureau		-2.769**
		(1.293)
Agriculture_Women's Bureau		3.004
		(2.137)
Agriculture_Water Resources		-0.962
		(0.878)
Water Resources		1.756
		(1.359)
Water Resources Squared		0.423
		(0.326)
Constant	-6.384	-5.910**
	(5.628)	(2.511)
Observations	71	101
Adjusted R-squared	0.261	0.090
F test	3.471	2.094

Source: Author's calculation based on BOOST and DHS 2011 Data

Table 44: Access to Improved Water, Urban-Rural Model

VARIABLES	Urban	Rural
Education Bureau	4.512**	-1.381
	(1.909)	(1.091)
Education Bureau Squared	-1.451**	0.495*
	(0.596)	(0.259)
Agriculture	1.028	
	(0.662)	
Agriculture Squared	-0.191	
	(0.132)	
Health	-3.166***	
	(1.125)	
Health Squared	0.907**	
	(0.410)	
Agriculture_Education Bureau	0.406	-0.0367
	(0.344)	(0.0339)
Organs of State_Education Bureau	0.615***	
	(0.192)	
Organs of State_Agriculture	-0.873***	
	(0.265)	
Health_Education Bureau	0.117	-0.0965
	(0.721)	(0.0859)
Organs of State		1.162
		(0.738)
Organs of State Squared		-0.361*
		(0.213)
Constant	-6.265**	-0.683
	(2.840)	(2.355)
Observations	79	179
Adjusted R-squared	0.196	0.039
F test	2.898	2.192

Source: Author's calculation based on BOOST and DHS 2011 Data

Table 45: Under-Five Mortality Urban-Rural Translog Model

VARIABLES	Urban	Rural
Women's Bureau	-0.175	-1.204
	(0.548)	(1.058)
Women's Bureau Squared	-0.470	-1.129**
	(0.581)	(0.520)
General Services	1.185	-0.0904
	(1.659)	(1.240)
General Services Squared	-0.358	-0.199
	(0.559)	(0.501)
Health(rec)		-0.231
		(0.618)
Health(rec) Squared		-0.0288
		(0.227)
Health(rec)_Justice & Security		0.282***
		(0.0856)
Health(rec)_Organs of State		-0.0665
		(0.0643)
Culture & Sport(rec)_ Women's Bureau		-0.160
		(0.169)
General Services_Women's Bureau		1.394
		(0.911)
Health	-0.390	
	(1.591)	
Health Squared	-0.442	
	(0.448)	
Justice & Security_Health	0.705***	
	(0.198)	
Organs of State_Health	-0.00614	
	(0.162)	
Culture & Sport_Women's Bureau	-0.316	
	(0.367)	
Constant	3.450	5.385***
	(2.660)	(1.652)
Observations	36	165
Adjusted R-squared	0.255	0.071
F test	2.329	2.258

Source: Author's calculation based on BOOST and DHS 2011 Data

Table 46: Primary Enrolment Urban-Rural Translog Model

VARIABLES	Urban	Rural
Education	-0.847	-0.861*
	(0.992)	(0.510)
Education Squared	0.295	0.492**
	(0.284)	(0.243)
Culture & Sport	-0.419**	0.354
	(0.171)	(0.305)
Culture & Sport Squared	-0.155**	0.0725
	(0.0689)	(0.177)
Agriculture_Education	-0.0723	-0.364
	(0.0860)	(0.240)
General Services_Agriculture	0.116	0.332
	(0.129)	(0.339)
General Services_Education	-0.388	-0.144
	(0.333)	(0.266)
General Services_Culture & Sport	0.365**	-0.356
	(0.141)	(0.288)
General Services	1.494**	
	(0.583)	
General Services Squared	-0.283	
	(0.239)	
Agriculture_Health	-0.0164	
	(0.0431)	
Water Resources		-0.0496
		(0.164)
Water Resources Squared		0.0154
		(0.0924)
Constant	0.113	0.658
	(1.619)	(1.041)
Observations	71	161
Adjusted R-squared	0.225	0.053
F test	2.850	1.895

Source: Author's calculation based on BOOST and DHS 2011 Data

Table 47: Child Labour Urban-Rural Translog Model

VARIABLES	Urban	Rural
Culture & Sport	0.956**	0.316*
	(0.432)	(0.181)
Culture & Sport Squared	0.0249	-0.350**
	(0.191)	(0.153)
Education	-1.318	1.798*
	(2.338)	(1.005)
Education Squared	0.503	-0.538*
	(0.522)	(0.305)
Trade & Industry		-1.677
		(1.079)
Trade & Industry Squared		-0.227*
		(0.129)
Education_Women's Bureau	-0.532***	-0.249***
	(0.141)	(0.0927)
Trade & Industry_Education		0.868
		(0.531)
Agriculture_Culture & Sport	-0.729***	-0.0322
	(0.263)	(0.0500)
Culture & Sport_Women's Bureau		0.749***
		(0.262)
Education_Health	-0.385	
	(0.269)	
Justice & Security_Health	0.427*	
	(0.225)	
Organs of State_Agriculture	0.363**	
	(0.149)	
Constant	-1.296	-4.000**
	(4.926)	(1.660)
Observations	61	173
Adjusted R-squared	0.287	0.043
F test	3.678	1.775

Source: Author's calculation based on BOOST and DHS 2011 Data

Annex 2.4 – Statistical Tests

Table 48: Unit-cost Model F-test

Model	Df1	Df2	F-stat	p-value
Poverty National Lines	1	236	30.61	0.00
Poverty International Lines	1	243	17.47	0.00
Multi-dimensional Poverty	1	266	626.67	0.00
Wasting	1	222	172.94	0.00
Births Attended by Skilled Personnel	1	193	694.76	0.00
Under-5 Mortality Rate	1	237	370.46	0.00
Need for Family Planning Satisfied by Modern Methods	1	248	1666.06	0.00
Primary Enrolment Rate	1	290	77.49	0.00
Secondary Enrolment Rate	1	165	1211.87	0.00
Access to Improved Drinking Water	1	258	102.81	0.00
Access to Improved Sanitation	1	199	179.25	0.00
Percentage below 50% Median Income	1	135	35.00	0.00
Child Labour	1	243	2735.65	0.00

Source: Author's calculation

Table 49: F-Test for Incremental Contribution

Model	Df1	Df2	F-stat	p-value
Poverty National Lines	11	127	2.87	0.00
Poverty International Lines	11	132	1.92	0.04
Multidimensional Poverty	8	215	3.04	0.00
Wasting	3	211	1.43	0.24
Births Attended by Skilled Personnel	6	133	2.07	0.06
Under-5 Mortality Rate	5	192	4.61	0.00
Need for Family Planning Satisfied by Modern Methods	4	241	4.55	0.00
Primary Enrolment Rate	5	150	3.23	0.01
Secondary Enrolment Rate	4	117	4.20	0.00
Access to Improved Drinking Water	3	193	4.37	0.01
Access to Improved Sanitation	7	137	3.73	0.00
Percentage below 50 per cent Median Income	4	121	3.88	0.01
Child Labour	6	228	4.56	0.00

Source: Author's calculation

Annex 3.1 – Budget Process

Budget Process at the Federal Level

The Federal Government uses a block grant (subsidy delivered as one amount that is untied or that is unconditional) formula to address the imbalance created by the lack of capacity of regions to fulfil their expenditure responsibilities.

The ultimate purpose of the block grant formula is to ascertain every citizen's access to basic services, such as health, education, clean water, agricultural development and accessible roads. It aims to equalize the revenue capacity of regions, based on per capita calculation of the revenue raising capacity and expenditure needs. The formula is based on the following variables:

- Population size of the region
- An expenditure assessment, which estimates resources needed to provide all people of the region with the above-mentioned services.
- A revenue assessment (an estimate of the revenue potential in the region, based on previous years' performance and divided per capita.)

This block grant is not earmarked for sectors and allows regions to prioritize the sectors that align with the national policy and priorities.

This federal grant covers a significant portion of regional spending; however, figures differ from region to region. For example, during the fiscal year 2007-2008 the federal subsidy covered 84 per cent of Oromia's spending. For Afar the figure is considerably higher; the subsidy covere 95.2 per cent of the spending.[134]

Additionally, the Federal Government also disburses special purpose grants such as Safety Nets Fund and Rural Roads Fund which are paid to Woreda Offices of Finance and Economic Development (WoFEDs).

Budget Process at the Regional Level

The regions' budget planning processes begins by estimating the budget sources. The planning stage considers the expected federal subsidy, the federal revenue and foreign loans and aid it will get. Some Regional Bureaus of Finance and Economic Development (BOFEDs) prepare multi-year projections of expenditures using Macroeconomic Fiscal Framework (MEFF) Plans and Public Investment Programs (PIP).

After receiving tentative pre-ceilings on the expected federal Government subsidies from MOFED in early or mid-February, Regional BOFEDs determine allocations to regional public bodies or sector bureaus (such as health, education, water, rural development, etc.) for the following budget year.

BoFED experts use estimates to give notice about pre-ceilings to representatives at both at regional and *woreda* levels. Each region allocates about two-thirds of their budgets to woredas and urban administrations. Regional and woreda inland revenue offices are primarily responsible for collecting the regions' revenue, mainly, in the form of taxes. These taxes are collected at regional, *woreda* and *kebele* levels. The previous year's tax collection serves as a basis for BOFEDs to forecast own revenue.

The annual budget process at regional levels must go through the following six basic stages for the cycle to be complete:

1. **Budget Preparation:** BOFED estimates physical resources available: federal subsidy, own revenue, foreign loans and aid. Regional bureaus, zonal offices, woredas and urban administrations submit draft budget plans to BOFED, with careful distinctions made between recurrent and capital budgets.

2. **Review:** BOFED reviews the draft budget and then passes to the regional cabinet for endorsement.

3. **Approval:** The regional cabinet discusses and endorses the budget and transfer formula. The endorsed budget is then presented to the regional council (elected representatives of citizens from woredas and urban administrations) for appropriation and allocations to sector bureaus, zonal offices, woredas and urban administrations.

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4. **Appropriation:** After approved budgets have been determined and adjusted, allocations are made. BOFED notifies each sector office of its respective budget.

5. **Expenditure:** Budget implementation by different bureaus, offices, woredas and urban administrations takes place and detailed records are kept.

6. **Auditing:** Regional BOFED auditors reconcile expenditures with approved budgets and make sure that there have been no financial irregularities.

Regions also use the principles of the Block Grant Formula when transferring funds to woredas. While some regions like Oromia use a formula based on a unit-cost approach (expenditure needs are estimated by sectoral allocations, including education, health, agriculture, water, roads and administrative costs); others such as SNNP prefer the transfer formula which is similar to the Federal Block Grant Formula which takes into account parameters such as demography per square foot, while the Afar regions uses a combination of the block grant and unit-cost approaches.

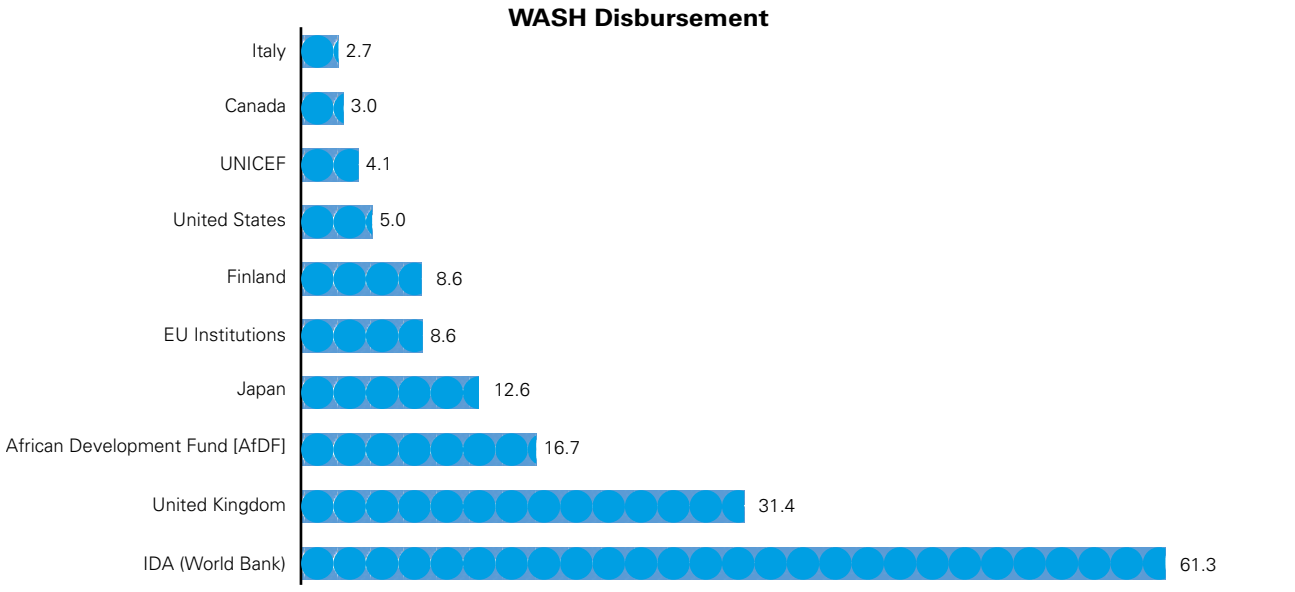
When determining the amount of fund to be transferred to woredas, an infrastructure deficit index is used implying a favourable funding outcome for woredas that are considered as having poor infrastructures in terms of schools, health centres, roads and other infrastructures.

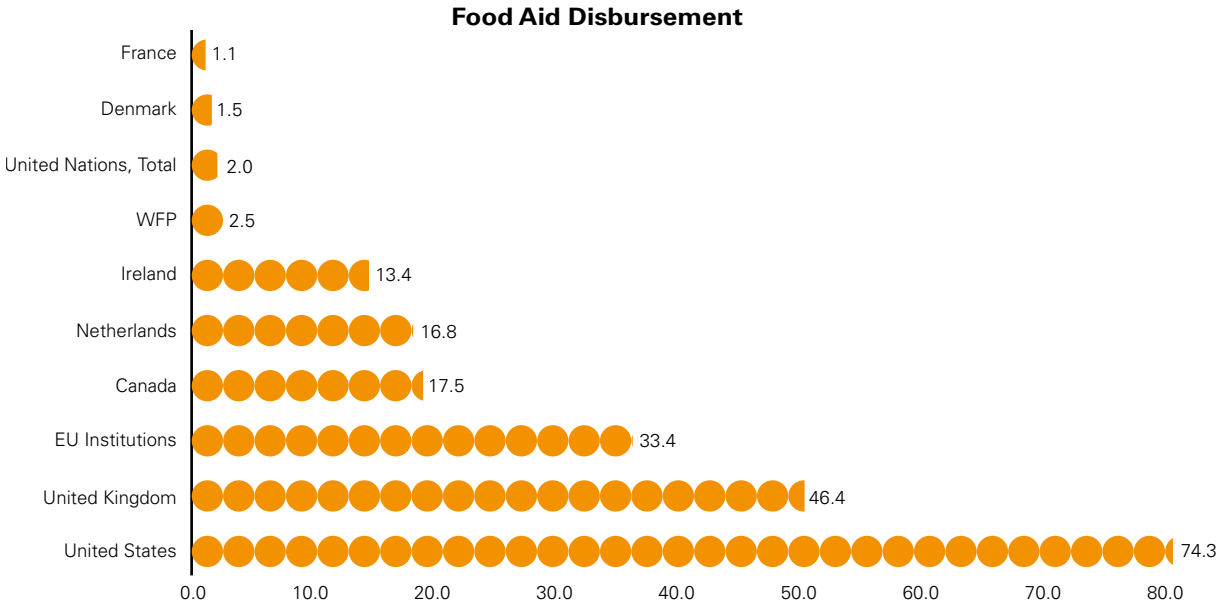
Budget Process at the Woreda Level

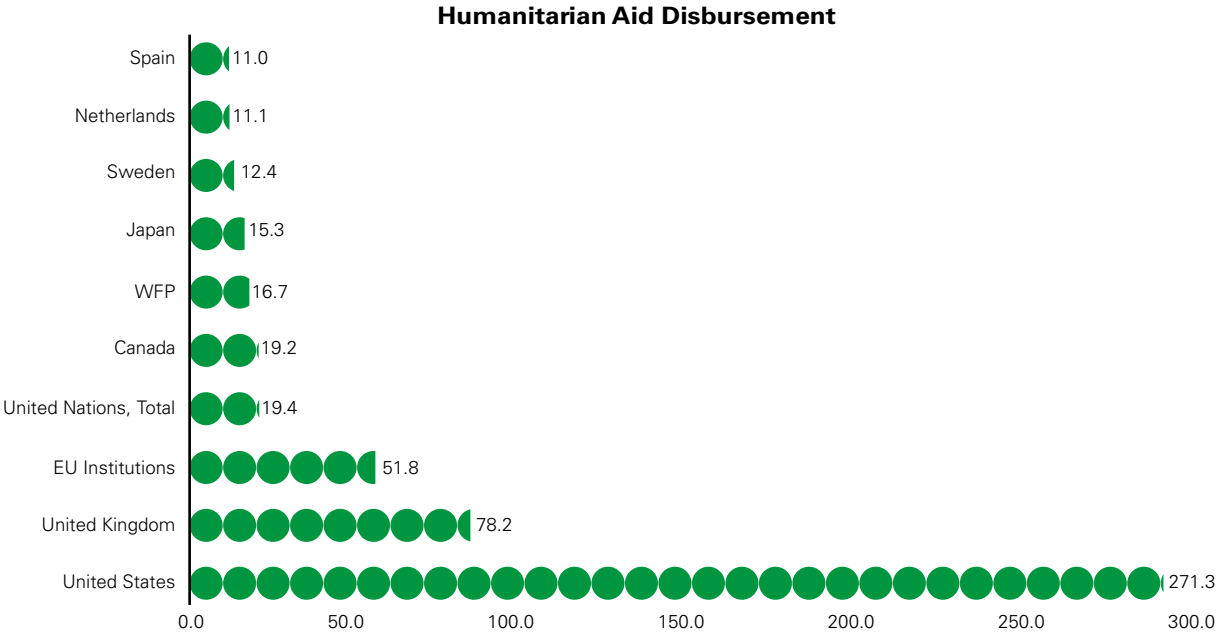
Woredas are the primary entities that execute spending, along with other urban administration entities who are responsible of providing the most basic services. While regions have a monitoring and oversight capacity (through performance agreements) on how woredas spend the budget transferred from regions through federal subsidies, woredas maintain the power to decide the allocation of the spending of their budget.

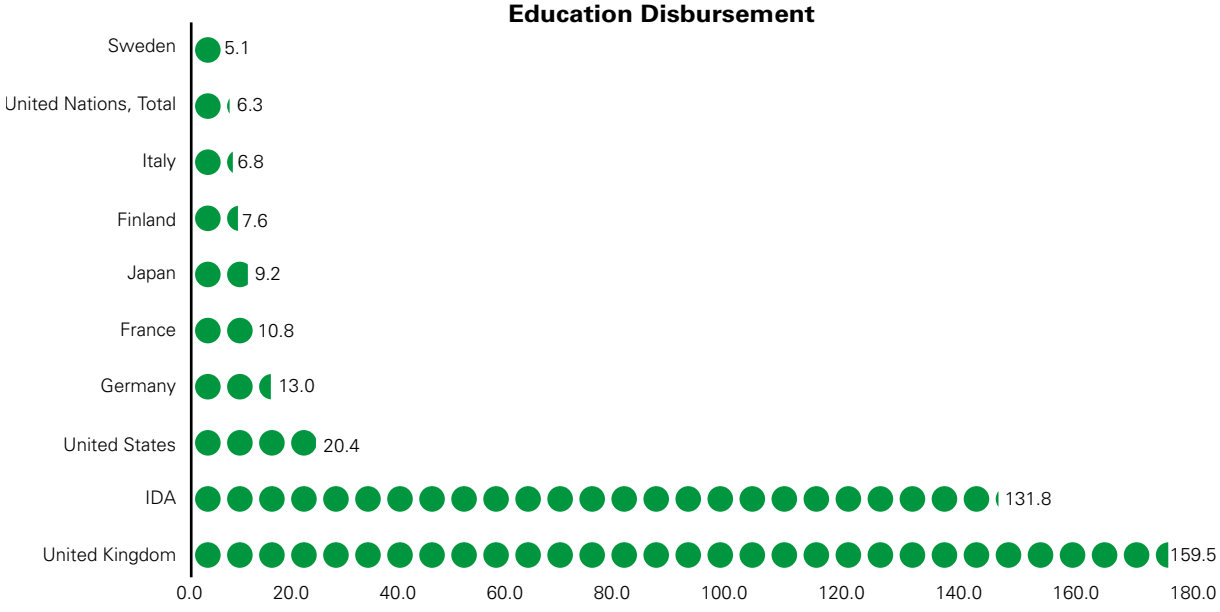
Annex 3.2 – Top 10 Development Partners by Child-Focused Sectors

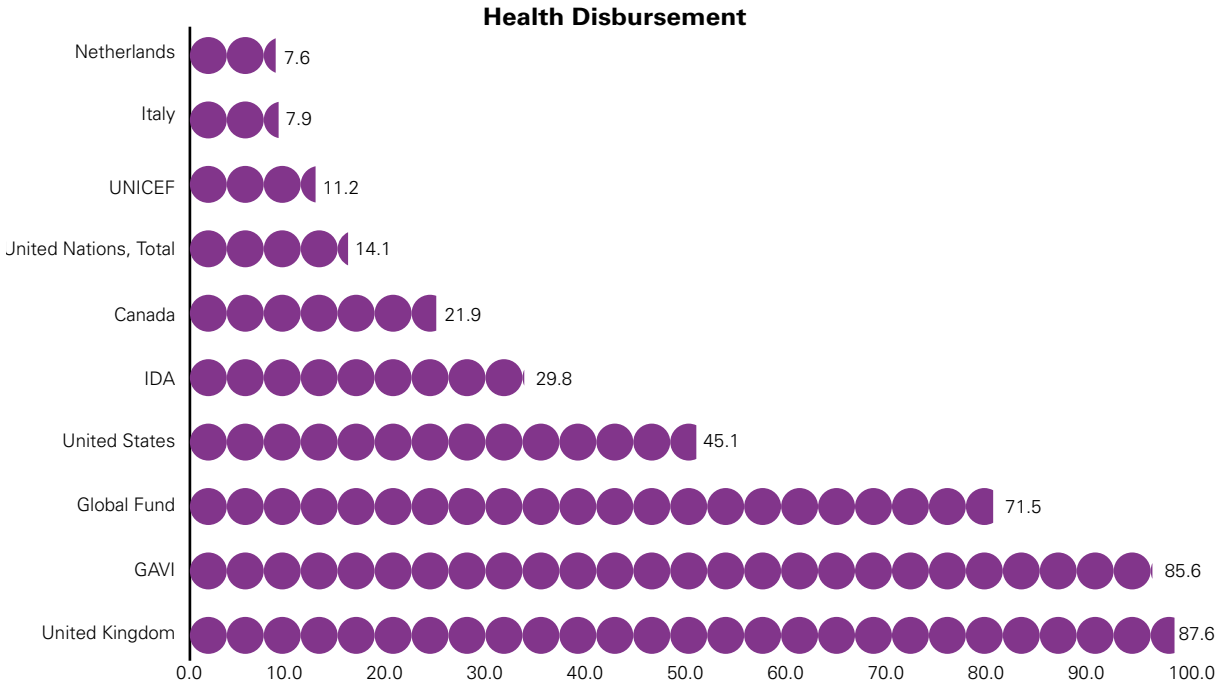
Figure 32: Top 10 DPs of gross disbursement for Ethiopia in education, health, humanitarian aid, food aid, and WASH sectors Y2009-Y2015 (average, US$ million, current prices)




Food Aid Disbursement
France
1.1
Denmark
1.5
United Nations, Total
2.0
WFP
2.5
Ireland
13.4
Netherlands
16.8
Canada
17.5
EU Institutions
33.4
United Kingdom
46.4
United States
74.3
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0

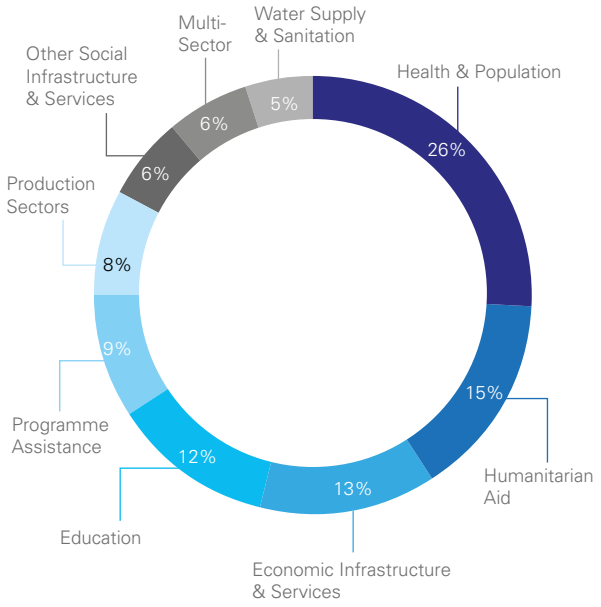

Humanitarian Aid Disbursement
Spain
11.0
Netherlands
11.1
Sweden
12.4
Japan
15.3
WFP
16.7
Canada
19.2
United Nations, Total
19.4
EU Institutions
51.8
United Kingdom
78.2
United States
271.3
0.0
50.0
100.0
150.0
200.0
250.0
300.0


Education Disbursement
Sweden
5.1
United Nations, Total
6.3
Italy
6.8
Finland
7.6
Japan
9.2
France
10.8
Germany
13.0
United States
20.4
IDA
131.8
United Kingdom
159.5
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
180.0



Annex 3.3 – Official Development Assistance by Sectors

Figure 33: Official development assistance (ODA) per sector for Ethiopia, Y2009-Y2015 average



Source: OECD Statistics, Creditor Reporting System (CRS) Database

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Table 50: Development partners of gross disbursements for Ethiopia - Y2009-2015, in US$ current prices

Donor	2009	2010	2011	2012	2013	2014	2015	Average 2009-2015	Total 2009-2015
All Donors, Total	3794.7	3419.0	3523.8	3233.8	3900.1	3638.0	3351.6	3551.6	24860.94
DAC Countries, Total	1801.8	1854.0	1939.8	1821.1	1946.6	1950.1	1881.3	1885.0	13194.68
Multilaterals, Total	1992.0	1549.2	1572.9	1398.6	1947.7	1678.9	1457.5	1656.7	11596.77
IDA	1041.4	668.7	719.7	769.5	967.6	893.3	710.1	824.3	5770.42
United States	726.0	803.9	659.5	695.9	678.8	666.6	747.6	711.2	4978.29
United Kingdom	343.2	407.1	552.3	421.7	515.7	533.9	518.2	470.3	3292.06
Other Multilateral, Total	186.1	293.4	306.8	208.6	406.8	234.5	310.3	278.1	1946.44
EU Institutions	202.5	237.6	212.1	239.1	134.1	281.5	166.8	210.5	1473.54
African Development Fund [AfDF]	307.8	150.2	234.3	99.3	349.5	176.7	151.9	210.0	1469.81
Global Fund	130.5	256.7	194.6	93.9	276.1	103.9	153.2	172.7	1208.79
Canada	86.8	140.4	118.3	123.4	131.8	108.2	103.2	116.0	812.09
Japan	97.8	93.9	120.6	108.7	150.1	82.8	54.2	101.1	707.99
United Nations, Total	83.4	71.5	95.6	78.7	88.3	92.8	118.0	89.8	628.40
Global Alliance for Vaccines and Immunisation [GAVI]	37.8	19.9	90.7	94.1	108.0	114.5	134.6	85.6	599.49
Germany	79.8	96.5	101.2	116.8	86.0	59.6	49.1	84.1	588.99
Netherlands	85.9	54.2	67.9	79.3	76.7	90.0	80.5	76.4	534.47
Ireland	52.2	48.8	49.3	42.1	46.6	47.9	38.8	46.5	325.76
Norway	37.8	32.6	29.1	39.8	62.3	60.1	48.7	44.3	310.28
UNICEF	41.4	43.4	40.8	29.9	43.9	40.6	41.6	40.2	281.54
Sweden	44.6	39.4	40.7	27.6	30.2	35.3	35.1	36.1	252.83
France	38.7	13.7	13.6	21.1	47.0	61.1	21.8	31.0	217.06
Spain	84.1	39.5	38.8	14.7	8.2	8.0	6.8	28.6	200.12
Italy	54.0	18.3	35.0	15.8	11.0	30.1	34.9	28.4	199.12
Finland	23.5	25.6	23.7	31.1	20.6	40.9	24.7	27.2	190.18
Korea	4.2	10.2	11.6	20.4	27.3	42.9	46.0	23.2	162.68
WFP	16.6	3.7	28.1	23.4	18.9	26.5	24.0	20.2	141.14
UNDP	17.3	17.7	16.0	15.5	13.9	15.2	11.3	15.3	106.97
Denmark	10.4	7.5	21.9	8.4	12.3	16.9	6.1	11.9	83.56
Australia	4.2	2.3	18.8	27.9	13.6	9.9	3.9	11.5	80.66
Switzerland	5.4	4.1	11.3	9.6	10.0	14.3	19.8	10.6	74.53
Austria	12.7	9.7	12.1	8.4	10.6	9.7	8.1	10.2	71.26
Kuwait (KFAED)		15.5	10.2	14.0	5.7	6.6	9.3	10.2	61.36
Poland					0.3	23.5	27.3	17.0	51.03
OPEC Fund for International Development [OFID]	8.0	8.5	4.4	8.3	6.8	3.6	9.6	7.0	49.16
Global Environment Facility [GEF]	5.7	5.5	7.2	7.7	6.3	6.9	6.9	6.6	46.29
UNFPA	6.1	5.0	6.1	5.7	5.7	6.5	7.1	6.0	42.25

Donor	2009	2010	2011	2012	2013	2014	2015	Average 2009-2015	Total 2009-2015
Belgium	6.3	4.2	8.5	3.3	2.5	3.4	1.8	4.3	29.89
Arab Bank for Economic Development in Africa [BADEA]			7.1	4.6	7.2	3.9	5.7	5.7	28.62
IFAD							28.4	28.4	28.38
African Development Bank [AfDB]	5.8	5.5	4.3	3.4	1.4		0.4	3.5	20.83
Czech Republic			2.9	3.1	3.6	3.6	3.2	3.3	16.47
World Health Organisation [WHO]			2.9	1.9	3.4	2.4	3.7	2.8	14.24
UNAIDS	2.0	1.6	1.8	1.8	1.8	1.3	0.9	1.6	11.01
United Arab Emirates	0.9	0.2	0.9	0.1	0.0	2.4	2.2	1.0	6.89
Luxembourg	1.6	0.7	1.4	0.8	0.8	0.9	0.6	1.0	6.79
Greece	2.2	1.4	1.1	0.8	0.1	0.1	0.1	0.8	5.81
Global Green Growth Institute [GGGI]					2.4	1.8		2.1	4.16
International Labour Organisation [ILO]				0.6	0.5	0.3	0.4	0.5	1.83
Iceland			0.2	0.2	0.2	0.4	0.4	0.3	1.40
New Zealand	0.4			0.0	0.0	0.2	0.2	0.2	0.91
Turkey							0.7	0.7	0.71
International Atomic Energy Agency [IAEA]							0.7	0.7	0.67
Portugal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.22
Climate Investment Funds [CIF]							0.2	0.2	0.20
Russia							0.2	0.2	0.18
Estonia					0.0	0.0	0.1	0.0	0.13
Israel							0.1	0.1	0.13
Hungary						0.0	0.1	0.0	0.09
Slovak Republic					0.0	0.0	0.0	0.0	0.05
Malta							0.0	0.0	0.04
Thailand							0.0	0.0	0.03
Lithuania							0.0	0.0	0.01
Romania						0.0	0.0	0.0	0.01

Table 51: Historical expenditure on child-sensitive SDG sectors (2008/09 - 2013/14)

Fiscal year (FY)	2001 EC (2008/09 GC)			2002 EC (2009/10 GC)			2003 EC (2010/11 GC)			2004 EC (2011/12 GC)			2005 EC (2012/13 GC)			2006 EC (2013/14 GC)		
	Capital	Recurrent	Total	Capital	Recurrent	Total	Capital	Recurrent	Total	Capital	Recurrent	Total	Capital	Recurrent	Total	Capital	Recurrent	Total
Child-Sensitive Total expenditure	2.34	2.75	5.10	3.38	2.93	6.31	3.39	3.12	6.51	3.45	2.91	6.36	3.24	3.10	6.34	3.85	3.67	7.52
Total education expenditure	1.03	2.16	3.19	1.47	2.27	3.74	1.72	2.40	4.12	1.68	2.20	3.88	1.60	2.32	3.92	1.50	2.65	4.15
Federal Government	0.87	0.54	1.41	1.19	0.61	1.80	1.46	0.67	2.13	1.38	0.66	2.03	1.21	0.72	1.93	1.10	0.74	1.84
Regional governments	0.16	1.62	1.78	0.28	1.66	1.94	0.26	1.73	1.99	0.30	1.55	1.85	0.39	1.60	1.99	0.40	1.91	2.31
Total health expenditure	0.71	0.49	1.20	1.10	0.50	1.59	0.90	0.56	1.46	0.81	0.55	1.36	0.37	0.60	0.96	0.93	0.76	1.69
Federal Government	0.50	0.03	0.53	0.86	0.02	0.89	0.73	0.03	0.76	0.60	0.03	0.63	0.07	0.03	0.10	0.60	0.03	0.63
Regional governments	0.22	0.45	0.67	0.23	0.48	0.71	0.17	0.53	0.70	0.22	0.51	0.73	0.29	0.57	0.86	0.33	0.73	1.06
Total social-protection expenditure	0.00	0.04	0.04	0.02	0.03	0.05	0.01	0.04	0.05	0.02	0.05	0.06	0.03	0.06	0.08	0.04	0.06	0.10
Federal Government	-	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	-	0.01	0.01	0.00	0.01	0.01
Regional governments	0.00	0.03	0.03	0.02	0.03	0.04	0.01	0.03	0.04	0.01	0.04	0.05	0.03	0.05	0.08	0.03	0.05	0.08
Total water resource expenditure	0.60	0.07	0.67	0.80	0.12	0.92	0.76	0.12	0.88	0.94	0.12	1.06	1.24	0.13	1.37	1.38	0.20	1.58
Federal Government	0.35	0.01	0.36	0.43	0.01	0.44	0.44	0.01	0.45	0.55	0.02	0.56	0.74	0.02	0.76	0.57	0.02	0.58
Regional governments	0.25	0.06	0.31	0.37	0.11	0.48	0.32	0.11	0.43	0.39	0.11	0.50	0.50	0.11	0.62	0.81	0.18	1.00

Figure 34: Ethiopia: Selected macroeconomic indicators, FY2008/09 - FY2015/16

Fiscal Year	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Gross Domestic Product (US$ Billion)	27.07	32.437	29.934	31.953	43.311	47.648	55.61	64.46
Growth Rate (%)	10.79	8.8	12.55	11.18	8.65	10.58	10.26	10.39
Per Capita								
Gross Domestic Product (US$)	325.38	379.76	341.31	354.85	468.51	502.15	571.16	645.46
Growth Rate (annual %)	7.88	5.96	9.62	8.28	5.83	7.74	7.45	7.62
Per cent of GDP								
Gross fixed capital formation (%)				32.11	37.1	34.08	37.99	40.67
Fiscal Balance (%	-2.9	-1	-1.3	-1.6	-1.2	-2	-2.6	-2.4
Trade Balance (%)	-40%	-34%	-30%	-26%	-34%	-22%	-19%	-20%
Tax Revenue (%)	8.6	11.3	11.5	11.5	12.3	12.5	12.7	12.5
Nontax Revenue (%)	3.3	2.8	2.0	2.3	2.0	1.2	1.7	2.8
Growth Rate								
Inflation, Consumer Prices (annual median %)	44.39	8.47	8.14	33.22	22.77	8.08	7.39	10.13
Exchange Rate (annual average %	7.07	22.69	22.35	17.28	4.77	5.21	5.15	5.06
Population (%)	2.66	2.65	2.64	2.64	2.63	2.61	2.58	2.54
Population under fifteen (%)	45.34	44.92	44.45	43.91	43.36	42.79	42.21	41.61

Table 52: Education sector: Expenditure and its fiscal space (per child expenditure) FY2008/09 - 2014/14 ETB

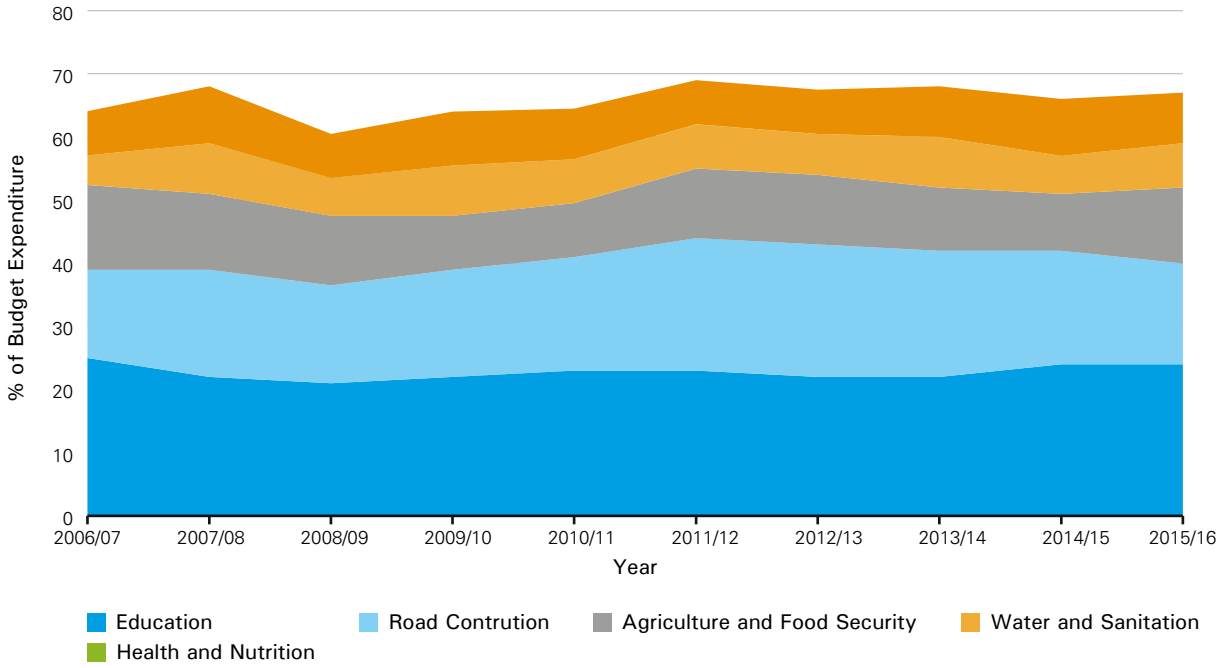
Fiscal year (FY)	2001 EC (2008/09)	2002 EC (2009/10)	2003 EC (2010/11)	2004 EC (2011/12)	2005 EC (2012/13)	2006 EC (2013/14)
Child-centred total expenditure:	**436.45**	**605.66**	**773.50**	**1,055.85**	**1,181.25**	**1,667.74**
Total education expenditure	273.08	359.32	489.52	643.39	730.08	920.29
Federal Government	121.04	172.61	252.79	337.07	359.69	407.09
Regional governments	152.04	186.71	236.73	306.32	370.39	513.20
01 Tigray Region	208.60	239.87	308.03	425.24	524.50	543.17
02 Afar Region	125.68	153.80	206.95	248.16	356.21	343.94
03 Amhara Region	171.62	195.76	247.07	342.56	431.65	453.01
04 Oromia Region	142.68	165.04	212.28	258.75	305.31	681.56
05 Somali Region	46.82	121.80	165.25	177.16	198.43	1.96
06 Benishangul Region	235.28	271.27	366.11	496.54	542.38	576.72
07 SNNP Region	118.87	162.83	197.98	268.76	309.90	323.73
08 Gambella Region	437.97	581.96	643.33	766.60	454.26	303.26
09 Harari Region	426.16	473.19	570.48	812.48	1175.95	1074.37
10 Addis Ababa Administrative Area	425.89	576.31	734.40	898.63	1252.89	1339.80
11 Dire Dawa Administrative Area	461.59	460.40	560.70	839.60	966.01	1087.04

Figure 35: Child-centred expenditure and its fiscal space (per cent of GDP), FY2008/2009 - FY2013/2014, ETB

Fiscal year (FY)	2001 EC (2008/09)	2002 EC (2009/10)	2003 EC (2010/11)	2004 EC (2011/12)	2005 EC (2012/13)	2006 EC (2013/14)
Per cent (%) of DGP						
Child-centred Total expenditure	5.10	6.31	6.51	6.36	6.34	7.52
Total education expenditure	3.19	3.74	4.12	3.88	3.92	4.15
Federal Government	1.41	1.80	2.13	2.03	1.93	1.84
Regional governments	1.78	1.94	1.99	1.85	1.99	2.31
Total health expenditure	1.20	1.59	1.46	1.36	0.96	1.69
Federal Government	0.53	0.89	0.76	0.63	0.10	0.63
Regional governments	0.67	0.71	0.70	0.73	0.86	1.06
Total social-protection expenditure	0.04	0.05	0.05	0.06	0.08	0.10
Federal Government	0.01	0.01	0.01	0.01	0.01	0.01
Regional governments	0.03	0.04	0.04	0.05	0.08	0.08
Total water resource expenditure	0.67	0.92	0.88	1.06	1.37	1.58
Federal Government	0.36	0.44	0.45	0.56	0.76	0.58
Regional governments	0.31	0.48	0.43	0.50	0.62	1.00
Overall Fiscal Space						
Revenue (excl. external grants) (% of GDP) *	15.87	16.18	17.16	16.62	15.48	15.82
Net Official Development Assistance (% of GNI)	12.24	11.80	11.58	10.95	7.46	8.17
External debt service**	3.14	3	3.95	6.05	7.19	10.85
Per-child expenditure						
Child-centred Total expenditure (Per-child***)	436.45	605.66	773.50	1,055.85	1,181.25	1,667.74
Total education expenditure	273.08	359.32	489.52	643.39	730.08	920.29
Total health expenditure	102.48	153.11	173.28	225.42	179.55	375.32
Total social-protection expenditure	3.46	4.87	5.97	10.56	15.79	21.33
Total water resource expenditure	57.44	88.37	104.72	176.47	255.83	350.81

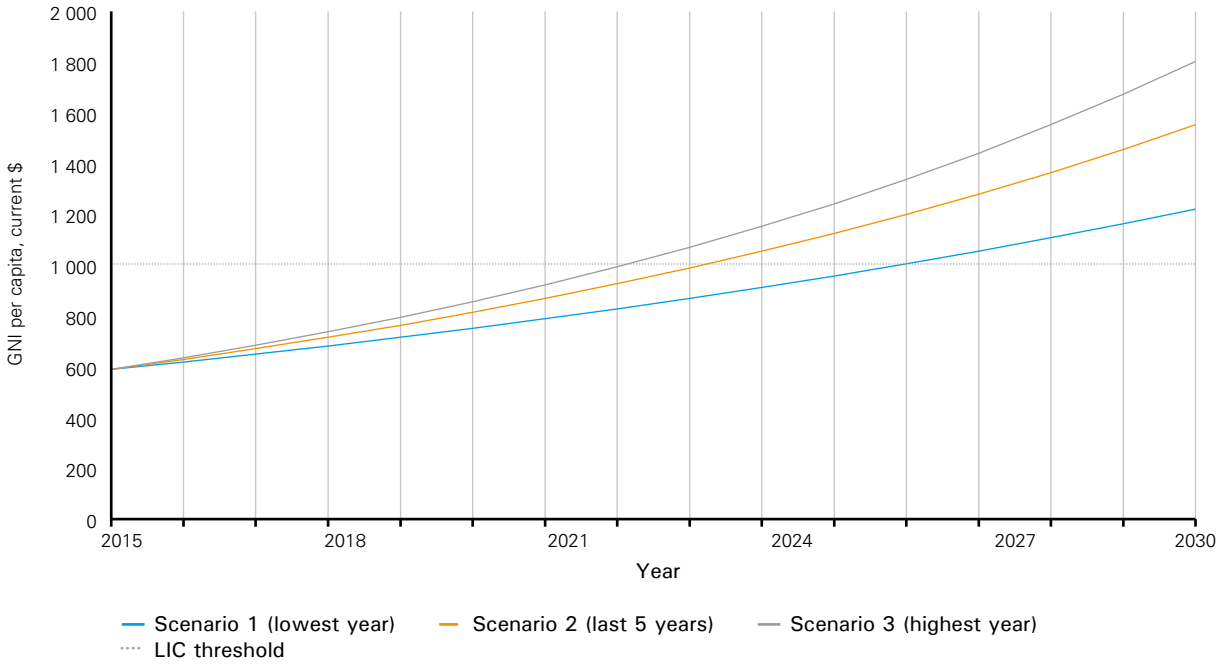
Source: *IMF Cross Country Macroeconomic Statistics, accessed October 9, 2017 - ** World Bank, International Debt Statistics - ***United Nations, Department of Economic and Social Affairs, Population Division (2017).

Figure 36: Ethiopia's key priority sectors



Source: Author's calculation based on MoFED Data

Figure 37: GNI growth projection



Source: Author's calculation based on WB & IMF, 2018

Table 53. Education Sector: Expenditure and its fiscal space (% of GDP) (Total expenditure in ETB) FY2008/09-FY2014/14

Fiscal year (FY)	2009		2010		2011		2012		2013		2014	
	Total	% GDP	Total	% GDP	Total	% GDP	Total	% GDP	Total	% GDP	Total	% GDP
Child-Sensitive Total expenditure:	**19,067,425,163**	**5.10**	**26,904,920,106**	**6.31**	**34,929,698,750**	**6.51**	**48,456,371,976**	**6.36**	**55,948,972,802**	**6.34**	**81,444,548,097**	**7.52**
Total education expenditure	11,930,074,328	3.19	15,961,762,488	3.74	22,105,824,455	4.12	29,527,445,076	3.88	34,579,794,904	3.92	44,942,598,837	4.15
Federal Government	5,287,864,190	1.41	7,667,768,786	1.80	11,415,373,046	2.13	15,469,305,256	2.03	17,036,606,496	1.93	19,880,361,850	1.84
Regional governments	6,642,210,138	1.78	8,293,993,702	1.94	10,690,451,409	1.99	14,058,139,819	1.85	17,543,188,408	1.99	25,062,236,988	2.31
01 Tigray Region	517,235,073	0.14	604,778,032	0.14	789,492,393	0.15	1,107,646,985	0.15	1,409,986,157	0.16	1,505,530,895	0.14
02 Afar Region	104,867,328	0.03	130,488,554	0.03	178,491,991	0.03	217,520,693	0.03	322,232,068	0.04	320,798,211	0.03
03 Amhara Region	1,676,747,333	0.45	1,944,807,919	0.46	2,495,262,386	0.46	3,515,937,940	0.46	4,572,282,190	0.52	4,947,629,531	0.46
04 Oromia Region	2,389,992,189	0.64	2,811,165,289	0.66	3,675,526,233	0.68	4,553,138,948	0.60	5,544,729,897	0.63	12,762,099,695	1.18
05 Somali Region	124,831,137	0.03	330,184,307	0.08	455,410,742	0.08	496,185,541	0.07	573,546,747	0.06	5,835,551	0.00
06 Benishangul Region	109,392,656	0.03	128,247,439	0.03	175,952,164	0.03	242,522,598	0.03	273,399,911	0.03	299,736,631	0.03
07 SNNP Region	1,105,352,559	0.30	1,539,580,798	0.36	1,902,965,937	0.35	2,625,390,250	0.34	3,124,252,173	0.35	3,365,108,289	0.31
08 Gambella Region	75,267,458	0.02	101,697,426	0.02	114,283,537	0.02	138,399,156	0.02	84,638,048	0.01	58,258,903	0.01
09 Harari Region	39,740,972	0.01	44,869,333	0.01	54,991,150	0.01	79,593,082	0.01	118,892,671	0.01	111,995,742	0.01
10 Addis Ababa Administration	420,983,939	0.11	579,268,882	0.14	750,388,503	0.14	933,145,671	0.12	1,342,705,707	0.15	1,480,436,749	0.14
11 Dire Dawa Administration	77,799,494	0.02	78,905,724	0.02	97,686,374	0.02	148,658,955	0.02	176,522,840	0.02	204,806,789	0.02
15 Federal Government	5,287,864,190	1.41	7,667,768,786	1.80	11,415,373,046	2.13	15,469,305,256	2.03	17,036,606,496	1.93	19,880,361,850	1.84

Table 54: Health Sector: Expenditure and its fiscal space (per child expenditure) FY2008/09-FY2014/14, ETB nominal prices, per child

Fiscal year (FY)	2009	2010	2011	2012	2013	2014
Child-Centred Total expenditure:	436.45	605.66	773.50	1,055.85	1,181.25	1,667.74
Total health expenditure	102.48	153.11	173.28	225.42	179.55	375.32
Federal Government	45.27	85.23	90.22	104.49	18.89	140.17
Regional governments	57.20	67.88	83.06	120.93	160.66	235.15
01 Tigray Region	73.56	81.74	95.33	133.24	164.75	192.72
02 Afar Region	84.96	86.64	135.86	175.43	228.38	203.19
03 Amhara Region	45.53	49.46	61.97	85.93	141.00	170.16
04 Oromia Region	56.71	64.66	71.47	108.91	136.14	316.83
05 Somali Region	46.56	83.51	110.07	118.25	115.93	2.30
06 Benishangul Region	82.45	111.31	160.68	217.69	295.45	423.14
07 SNNP Region	49.57	54.04	71.65	114.72	150.04	146.18
08 Gambella Region	125.38	173.25	237.78	526.33	150.68	166.22
09 Harari Region	275.45	280.63	259.26	396.07	674.40	429.75
10 Addis Ababa Administrative Area	157.28	252.62	336.49	461.80	721.21	911.53
11 Dire Dawa Administrative Area	147.50	247.09	262.30	448.00	701.15	735.77

Table 53: Education Sector: Expenditure and its fiscal space (% of GDP) (Total expenditure in ETB) FY2008/09-FY2014/14

Fiscal year (FY)	2009		2010		2011		2012		2013		2014	
	Total	% GDP	Total	% GDP	Total	% GDP	Total	% GDP	Total	% GDP	Total	% GDP
Child-Sensitive Total expenditure:	19,067,425,163	5.10	26,904,920,106	6.31	34,929,698,750	6.51	48,456,371,976	6.36	55,948,972,802	6.34	81,444,548,097	7.52
Total health expenditure	4,476,968,318	1.20	6,801,426,300	1.59	7,825,032,995	1.46	10,345,477,213	1.36	8,504,118,764	0.96	18,328,716,669	1.69
National Government	1,977,920,466	0.53	3,786,096,503	0.89	4,074,200,374	0.76	4,795,507,519	0.63	894,619,532	0.10	6,845,181,915	0.63
Other government	2,499,047,852	0.67	3,015,329,797	0.71	3,750,832,621	0.70	5,549,969,694	0.73	7,609,499,231	0.86	11,483,534,753	1.06
01 Tigray Region	182,385,063	0.05	206,089,037	0.05	244,325,451	0.05	347,071,052	0.05	442,899,970	0.05	534,164,016	0.05
02 Afar Region	70,891,544	0.02	73,507,006	0.02	117,177,784	0.02	153,769,431	0.02	206,601,061	0.02	189,516,711	0.02
03 Amhara Region	444,798,769	0.12	491,375,628	0.12	625,806,727	0.12	881,942,467	0.12	1,493,527,795	0.17	1,858,374,616	0.17
04 Oromia Region	949,976,142	0.25	1,101,263,567	0.26	1,237,526,207	0.23	1,916,379,147	0.25	2,472,479,656	0.28	5,932,603,920	0.55
05 Somali Region	124,128,366	0.03	226,385,702	0.05	303,326,067	0.06	331,176,804	0.04	335,078,076	0.04	6,861,889	0.00
06 Benishangul Region	38,333,830	0.01	52,622,667	0.01	77,222,145	0.01	106,325,289	0.01	148,928,116	0.02	219,919,436	0.02
07 SNNP Region	460,972,505	0.12	510,939,147	0.12	688,706,727	0.13	1,120,621,862	0.15	1,512,686,560	0.17	1,519,523,284	0.14
08 Gambella Region	21,546,681	0.01	30,275,005	0.01	42,239,292	0.01	95,020,793	0.01	28,075,738	0.00	31,931,708	0.00
09 Harari Region	25,686,941	0.01	26,610,599	0.01	24,991,103	0.00	38,800,025	0.01	68,184,303	0.01	44,798,384	0.00
10 Addis Ababa Administrative Area	155,467,485	0.04	253,914,353	0.06	343,812,128	0.06	479,539,978	0.06	772,915,069	0.09	1,007,215,661	0.09
11 Dire Dawa Administrative Area	24,860,526	0.01	42,347,086	0.01	45,698,989	0.01	79,322,844	0.01	128,122,888	0.01	138,625,127	0.01
15 Federal Government	1,977,920,466	0.53	3,786,096,503	0.89	4,074,200,374	0.76	4,795,507,519	0.63	894,619,532	0.10	6,845,181,915	0.63

Table 56: Social Protection: Expenditure and its fiscal space (per child expenditure) FY2008/09-FY2014/14, ETB nominal prices, per child

Fiscal year (FY)	2009	2010	2011	2012	2013	2014
Child-centred Total expenditure:	436.45	605.66	773.50	1,055.85	1,181.25	1,667.74
Total social-protection expenditure	3.46	4.87	5.97	10.56	15.79	21.33
Federal Government	0.61	0.62	1.08	2.23	1.50	2.84
Regional governments	2.85	4.25	4.89	8.33	14.29	18.49
01 Tigray Region	4.17	3.36	2.97	9.54	11.93	14.26
02 Afar Region	3.63	3.79	8.34	29.04	34.58	33.80
03 Amhara Region	0.88	0.92	1.19	4.89	4.11	5.88
04 Oromia Region	0.82	1.18	2.03	2.51	2.82	6.32
05 Somali Region	2.46	8.44	11.75	14.94	10.22	0.38
06 Benishangul Region	0.00	0.00	0.75	2.03	3.12	4.29
07 SNNP Region	0.23	0.99	0.37	0.43	12.71	15.42
08 Gambella Region	4.49	4.77	11.18	34.48	0.16	0.00
09 Harari Region	83.49	94.60	80.05	206.33	492.42	436.00
10 Addis Ababa Administrative Area	68.96	99.93	103.34	147.70	278.34	376.00
11 Dire Dawa Administrative Area	20.52	30.80	41.09	60.42	62.97	130.20

Table 57: Social Protection: Expenditure and its fiscal space (% of GDP) (Total Expenditure in ETB) FY2008/09-FY2014/14

Fiscal year (FY)	2009		2010		2011		2012		2013		2014	
	Total	% GDP	Total	% GDP	Total	% GDP	Total	% GDP	Total	% GDP	Total	% GDP
Child-Sensitive Total expenditure:	**19,067,425,163**	**5.10**	**26,904,920,106**	**6.31**	**34,929,698,750**	**6.51**	**48,456,371,976**	**6.36**	**55,948,972,802**	**6.34**	**81,444,548,097**	**7.52**
National Government	151,122,398	0.04	216,282,903	0.05	269,704,761	0.05	484,728,565	0.06	747,803,770	0.08	1,041,581,778	0.10
Other government	26,484,698	0.01	27,547,022	0.01	48,989,093	0.01	102,481,865	0.01	70,884,495	0.01	138,782,329	0.01
01 Tigray Region	124,637,700	0.03	188,735,881	0.04	220,715,669	0.04	382,246,699	0.05	676,919,275	0.08	902,799,449	0.08
02 Afar Region	10,349,843	0.00	8,467,567	0.00	7,602,753	0.00	24,848,355	0.00	32,077,877	0.00	39,517,866	0.00
03 Amhara Region	3,027,718	0.00	3,216,163	0.00	7,195,878	0.00	25,456,615	0.00	31,279,973	0.00	31,523,191	0.00
04 Oromia Region	8,576,792	0.00	9,138,720	0.00	12,068,400	0.00	50,215,881	0.01	43,514,387	0.00	64,188,666	0.01
05 Somali Region	13,815,407	0.00	20,154,284	0.00	35,134,450	0.01	44,222,365	0.01	51,167,296	0.01	118,431,796	0.01
06 Benishangul Region	6,559,470	0.00	22,890,114	0.01	32,374,728	0.01	41,839,989	0.01	29,530,525	0.00	1,125,589	0.00
07 SNNP Region	-	-	-	-	361,284	0.00	990,360	0.00	1,571,737	0.00	2,228,168	0.00
08 Gambella Region	2,123,868	0.00	9,342,044	0.00	3,526,606	0.00	4,158,996	0.00	128,156,035	0.01	160,336,924	0.01
09 Harari Region	772,208	0.00	832,728	0.00	1,986,024	0.00	6,225,318	0.00	29,395	0.00	-	-
10 Addis Ababa	7,785,538	0.00	8,970,304	0.00	7,716,169	0.00	20,213,085	0.00	49,785,602	0.01	45,449,785	0.00
11 Dire Dawa	68,168,876	0.02	100,444,490	0.02	105,590,472	0.02	153,377,874	0.02	298,299,095	0.03	415,467,247	0.04
15 Federal Government	3,457,980	0.00	5,279,467	0.00	7,158,905	0.00	10,697,860	0.00	11,507,353	0.00	24,530,216	0.00
15 Federal Government	26,484,698	0.01	27,547,022	0.01	48,989,093	0.01	102,481,865	0.01	70,884,495	0.01	138,782,329	0.01

Table 58: Water Resources: Expenditure and its fiscal space (per child expenditure) FY2008/09- FY2014/14 (ETB)

Fiscal year (FY)	2009	2010	2011	2012	2013	2014
Child-centred Total expenditure:	436.45	605.66	773.50	1,055.85	1,181.25	1,667.74
Total social-protection expenditure	57.44	88.37	104.72	176.47	255.83	350.81
Federal Government	30.95	42.10	53.46	93.49	141.23	129.26
Regional governments	26.49	46.27	51.27	82.98	114.60	221.55
01 Tigray Region	22.06	54.20	77.96	236.78	315.06	337.89
02 Afar Region	53.89	107.73	108.97	147.50	150.91	143.53
03 Amhara Region	10.11	19.75	41.08	57.52	85.67	206.23
04 Oromia Region	28.49	36.76	35.51	45.15	70.97	201.49
05 Somali Region	17.07	110.59	61.25	60.71	62.11	0.00
06 Benishangul Region	13.25	22.15	71.29	167.71	217.06	85.42
07 SNNP Region	10.02	17.90	14.52	46.90	48.35	70.00
08 Gambella Region	27.87	56.70	108.56	294.50	210.21	526.00
09 Harari Region	0.00	124.08	190.58	145.12	191.07	786.95
10 Addis Ababa Administrative Area	329.62	489.66	590.38	810.88	1273.77	2479.13
11 Dire Dawa Administrative Area	36.17	68.15	45.82	327.06	263.45	154.67

Table 59: Water Resources: Expenditure and its fiscal space (% of GDP) (Total Expenditure in ETB) FY2008/09-FY2014/14

Fiscal year (FY)	2009		2010		2011		2012		2013		2014	
	Total	% GDP	Total	% GDP	Total	% GDP	Total	% GDP	Total	% GDP	Total	% GDP
Child-Sensitive Total expenditure:	19,067,425,163	5.10	26,904,920,106	6.31	34,929,698,750	6.51	48,456,371,976	6.36	55,948,972,802	6.34	81,444,548,097	7.52
Total water resource expenditure	2,509,260,120	0.67	3,925,448,415	0.92	4,729,136,538	0.88	8,098,721,123	1.06	12,117,255,365	1.37	17,131,650,813	1.58
Federal Government	1,352,033,609	0.36	1,869,986,024	0.44	2,414,098,655	0.45	4,290,429,666	0.56	6,689,323,899	0.76	6,312,464,321	0.58
Regional governments	1,157,226,510	0.31	2,055,462,391	0.48	2,315,037,883	0.43	3,808,291,458	0.50	5,427,931,466	0.62	10,819,186,492	1.00
01 Tigray	54,689,340	0.01	136,664,314	0.03	199,825,703	0.04	616,750,829	0.08	846,954,807	0.10	936,528,233	0.09
02 Afar	44,966,868	0.01	91,400,616	0.02	93,989,022	0.02	129,284,200	0.02	136,512,330	0.02	133,873,784	0.01
03 Amhara	98,808,489	0.03	196,162,377	0.05	414,830,480	0.08	590,328,960	0.08	907,446,291	0.10	2,252,323,285	0.21
04 Oromia	477,193,728	0.13	626,156,089	0.15	614,876,289	0.11	794,477,724	0.10	1,288,911,787	0.15	3,772,824,049	0.35
05 Somali	45,499,285	0.01	299,792,798	0.07	168,805,817	0.03	170,032,995	0.02	179,532,740	0.02	-	-
06 Benishangul	6,160,919	0.00	10,470,868	0.00	34,262,279	0.01	81,914,926	0.01	109,416,614	0.01	44,394,183	0.00
07 SNNP	93,195,794	0.02	169,288,713	0.04	139,577,304	0.03	458,185,034	0.06	487,440,517	0.06	727,646,305	0.07
08 Gambella	4,790,075	0.00	9,907,830	0.00	19,285,726	0.00	53,168,325	0.01	39,165,828	0.00	101,048,692	0.01
09 Harari	-	-	11,765,513	0.00	18,370,457	0.00	14,216,936	0.00	19,317,664	0.00	82,034,186	0.01
10 Addis Ababa	325,826,388	0.09	492,172,752	0.12	603,231,571	0.11	842,022,288	0.11	1,365,092,061	0.15	2,739,373,469	0.25
11 Dire Dawa	6,095,624	0.00	11,680,521	0.00	7,983,234	0.00	57,909,240	0.01	48,140,826	0.01	29,140,306	0.00

Annex 4

Table 60: Proportion of districts that achieve SDG indicators by 2030, and total expenditure, aggregated model

	2011		2030 Scenario 1 business-as-usual		2030 Scenario 2 empirical optimization		2030 Scenario 3 analytic optimization	
	# of districts	% of all districts	# of districts	% of all districts	# of districts	% of all districts	# of districts	% of all districts
Wasting	54	5%	376	38%	1005	100%	1005	100%
Sanitation	4	0%	12	1%	1005	100%	1005	100%
Skilled birth attendance	19	2%	81	8%	1005	100%	1005	100%
Contraception	33	3%	61	6%	1005	100%	1005	100%
Child labour	0	0%	0	0%	0	0%	0	0%
Multi-dimensional poverty	27	3%	78	8%	1005	100%	1005	100%
National poverty	147	15%	217	22%	1005	100%	1005	100%
International poverty	0	0%	366	37%	0	0%	0	0%
Primary enrolment	36	4%	215	21%	1005	100%	1005	100%
Secondary enrolment	9	1%	15	1%	0	0%	1005	100%
Water	147	15%	256	26%	1005	100%	1005	100%
Under-5 mortality (per 1,000)	54	5%	88	9%	1005	100%	1005	100%
Below median income	111	11%	488	49%	1005	100%	1005	100%
Annual. p.c. growth (2011-2030)	-		5.9%	10.7%		10.4%		
Annual growth (2011-2030)	-		8.4%	15.9%		15.6%		
% of GDP	5.8%		5.8%	20.9%		19.9%		

Table 61: Average district performance, aggregated model

	2011	2030.1	2030.2	2030.3
Wasting	10.82%	6.65%	1.26%	0.8%
Child labour	21.62%	16.49%	6.97%	7.0%
Below median income	14.60%	11.33%	1.80%	2.4%
Multi-dimensional poverty	69.38%	61.72%	23.42%	21.0%
National poverty	27.06%	21.98%	7.94%	12.9%
International poverty	31.50%	25.83%	11.77%	15.4%
Under-5 mortality	93.92	100.23	24.02	23
Sanitation	12.38%	20.36%	100.00%	100%
Water	48.05%	56.75%	100.00%	100%
Skilled birth attendance	22.51%	37.35%	100.00%	100%
Contraception	46.34%	50.41%	100.00%	100%
Primary enrolment	69.45%	86.34%	100.00%	100%
Secondary enrolment	19.97%	21.17%	66.33%	100%

Source: Author's calculation

Table 62: Top performing districts, by area of residence[135]

Districts	# of SDGs targets achieved by 2030	Total per capita expenditure (in 2011 ETB)	Districts	# of SDGs targets achieved by 2030	Total per capita expenditure (in 2011 ETB)
Woreda F	10/13	12,767	City A	5/13	252
Woreda A	8/13	2,496	City B	5/13	1,095
Woreda G	8/13	3,226	City C	4/13	647
Woreda H	7/13	1,722	City D	4/13	933
Woreda I	5/13	1,307	City E	4/13	1,038

Source: Author's calculation

135 District and city names have been anonymised.

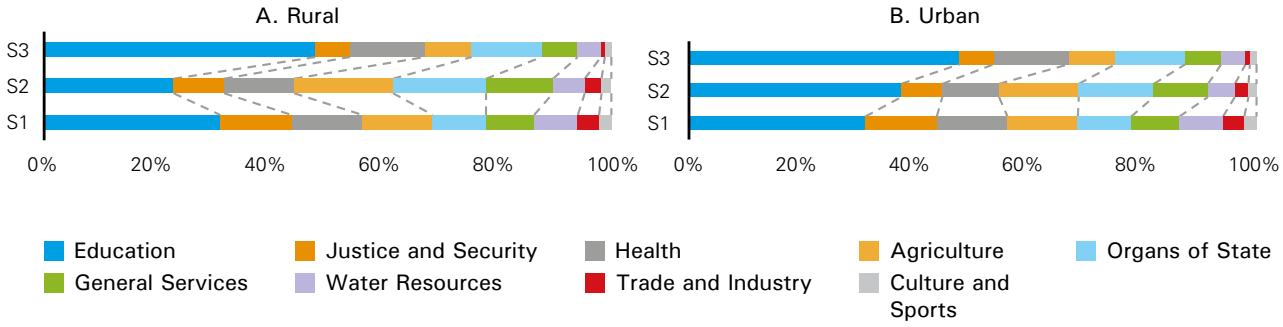
Table 63: Proportion of districts that achieve SDG indicators by 2030, and total expenditure, disaggregated model

	2001 EC (2008/09 GC)			2002 EC (2009/10 GC)			2003 EC (2010/11 GC)			2004 EC (2011/12 GC)		
	rural	urban	combined	rural	urban	combined	rural	urban	combined	rural	urban	combined
Wasting	3.9%	9.6%	5.4%	34.5%	95.0%	50.3%	100.0%	0.0%	74.1%	100.0%	0.0%	74.1%
Sanitation	0.5%	0.0%	0.4%	1.6%	0.0%	1.2%	100.0%	0.0%	74.1%	100.0%	0.0%	74.1%
Skilled birth attendance	1.5%	13.1%	4.5%	6.0%	20.0%	9.7%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Contraception	1.7%	7.7%	3.3%	3.8%	12.7%	6.1%	100.0%	0.0%	74.1%	100.0%	0.0%	74.1%
Child labour	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Multi-Dim poverty	3.5%	0.4%	2.7%	10.1%	1.2%	7.8%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
National poverty	0.4%	5.4%	1.7%	28.3%	2.3%	21.7%	100.0%	0.0%	74.1%	100.0%	100.0%	100.0%
International poverty	0.1%	0.0%	0.1%	1.5%	0.0%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Primary enrolment	0.5%	0.4%	0.5%	7.1%	0.4%	5.4%	0.0%	100.0%	25.9%	100.0%	100.0%	100.0%
Secondary enrolment	1.2%	0.0%	0.9%	1.9%	0.4%	1.5%	0.0%	100.0%	25.9%	100.0%	100.0%	100.0%
Water	0.4%	5.4%	1.7%	3.4%	5.8%	4.0%	0.0%	0.0%	0.0%	100.0%	0.0%	74.1%
Under-5 mortality	0.4%	53.8%	14.3%	1.1%	74.2%	20.1%	100.0%	0.0%	74.1%	100.0%	0.0%	74.1%
Below median income	14.1%	2.3%	11.1%	64.2%	3.8%	48.8%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Annual. p.c. growth (2011-2030)	-			5.9%			9.0%			10.1%		
Annual growth (2011-2030)	-			8.4%			14.4%			15.3%		
% of GDP	5.8%			5.8%			16.4%			19.0%		

Table 64: Average district performance, disaggregated model

	2011			2030 Scenario 1			2030 Scenario 2			2030 Scenario 3		
	rural	urban	combined	rural	urban	combined	rural	urban	combined	rural	urban	combined
Wasting	7.7%	11.2%	10.8%	3.2%	11.2%	6.7%	10.5%	1.3%	3.6%	6.6%	0.4%	2.0%
Child labour	12.4%	27.7%	26.0%	10.5%	27.7%	24.8%	13.3%	65.9%	52.3%	2.5%	3.9%	3.5%
Below median income	12.5%	14.7%	14.6%	9.6%	14.7%	11.3%	4.6%	1.8%	2.5%	6.4%	0.3%	1.9%
Multi-Dim poverty	72.9%	69.3%	69.4%	65.0%	61.6%	61.7%	8.4%	23.4%	19.5%	5.6%	27.6%	21.9%
National poverty	34.5%	26.9%	27.1%	28.6%	21.8%	22.0%	96.7%	7.9%	30.9%	14.5%	0.0%	3.8%
International poverty	29.6%	31.7%	31.5%	30.4%	25.7%	25.8%	100.0%	11.8%	34.6%	8.4%	27.6%	22.6%
Under-5 mortality	41	104	89	13	118	93	135	25	53	118	13	40
Sanitation	10.6%	12.4%	12.4%	17.5%	20.4%	20.4%	7.1%	100.0%	76.0%	35.7%	100.0%	83.4%
Water	61.9%	36.1%	38.8%	46.6%	56.3%	55.3%	8.1%	56.6%	44.1%	17.5%	100.0%	78.7%
Skilled birth attendance	67.4%	10.9%	16.9%	75.4%	20.5%	26.4%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Contraception	54.0%	43.8%	46.3%	57.5%	48.1%	50.4%	48.2%	100.0%	86.6%	44.4%	100.0%	58.8%
Primary enrolment	73.4%	61.5%	62.8%	54.9%	71.4%	69.5%	100.0%	83.6%	87.8%	100.0%	100.0%	100.0%
Secondary enrolment	26.7%	19.8%	20.0%	33.5%	20.9%	21.2%	100.0%	66.3%	75.0%	100.0%	100.0%	100.0%

Figure 38: Sectoral expenditure mix in 2030, by area of residence



Source: Author's calculation

Table 65: Scenario cost comparison, disaggregated model

	Scenario 1	Scenario 2	Scenario 3
% of GDP	4.4%	16.4%	19.0%
Annual total growth	8.4%	14.4%	15.3%
Annual per capita growth	5.9%	9.0%	10.1%