WORLD BANK GROUP

ETHIOPIA
RURAL INCOME DIAGNOSTICS STUDY

Leveraging the transformation in the agri-food system and global trade to expand rural incomes

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Currency Equivalents

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Br 51.45 = US$1.00
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Acronyms and Abbreviations

ACRONYMS	DEFINITION
AFE	Adult Female Equivalent
AFS	Agri-food Systems
AGP	Agriculture Growth Project
ATI	Agricultural Transformation Institute
ATT	Average Treatment Effect on the Treated
CEM	Country Economic Memorandum
CHIRPS	Climate Hazards Group InfraRed Precipitations with Stations
COMTRADE	Common Format for Transient Data Exchange
CSA	Central Statistics Agency
CSES	Cambodia Socio-economic Survey
ECHO	European Civil Protection and Humanitarian Aid Operations
EIAR	Ethiopia Institute of Agriculture Trade
ESS	Ethiopian Socioeconomic Survey
ETB	Ethiopian Birr
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FEWS NET	Famine Early Warning Systems Network
GAEZ	Global Agro-Ecological Zoning
GAVCs	Global Agricultural Value Chains
GDP	Gross Domestic Product
GPWv4	Gridded Population of World Version 4
GTAP	Global Trade Analysis Project
GVCs	Global Value Chains
HBS	Household Budget Survey
HFPS	High-Frequency Phone Survey
IPC	Integrated Food Security Phase Classification
KIHBS	Kenya Integrated Household Budget Survey
LFS	Labor Force Survey
LMMIS	Large- and Medium-sized Manufacturing Industries Survey
LSMS-ISA	Living Standards Measurement Study - Integrated Surveys on Agriculture

MAT	Multiple Agriculture Technologies
MPSE	Mobile Populations Survey for Ethiopia
MSME	Micro, Small, and Medium Enterprise
NPS	National Panel Survey - Tanzania
OCHA	Office for the Coordination of Humanitarian Affairs
OECD	Organization for Economic Co-operation and Development
PPP	Purchasing Power Parity
PSI	Policy Studies Institute
RID	Rural Income Diagnostics
RuLIS	Rural Livelihoods Information System
SME	Small and Micro Enterprise
SNNP	Southern Nations, Nationalities, and People's
SOE	State Owned Enterprise
TLU	Total Livestock Unit
UNCTAD	United Nations Conference on Trade and Development
UNCTAD-TRAINS	United Nations Conference on Trade and Development – Trade Analysis Information System
UNICEF	United Nations International Children's Emergency Fund, now officially United Nations Children's Fund
UNPS	Uganda National Panel Survey
VHLSS	Vietnam Household Living Standards Survey
WDI	World Development Indicators
WDP	WorldPop Spatial Distribution of Population
WFP	World Food Programme
WITS	World Integrated Trade Solution

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Executive Summary

Rural households experienced weaker growth at the onset of the decade and now multiple shocks at the end of the decade threaten to undo their marginal gains.

Ethiopia began the decade on a great run, with high economic growth and significant gains in poverty reduction nationally. But the gains were unevenly shared. Earlier studies show that growth in per capita consumption midway through the past decade was five times faster in urban areas than in rural areas, where households' consumption growth per capita grew by only 6 percent in total during 2011–16, while the GDP per capita grew cumulatively by 39 percent in the same period. The poorest 20 percent of rural households, at best, did not experience any growth. Continued growth in the second half of the decade, averaging 5.3 percent per year during 2016–21, should have seen greater poverty reduction, but instead poverty reduction is expected to have followed the same uneven pattern, given that the economic growth model remained unchanged.

Multiple shocks at the beginning of the new decade threaten to discontinue progress and possibly undo most of the gains made in the recent past. Since 2020, households in Ethiopia have had to contend with the COVID-19 pandemic, climate change-induced droughts, pests and diseases, and conflict within the country and, more recently, the fallout from the Russia-Ukraine war. The combination of these 3Cs—COVID-19, climate change, and conflict—have left no part of the country untouched. As conflict exploded in the northern parts of Ethiopia, driving 5.5 million people into hunger as of June 2021, prolonged droughts were wreaking havoc in lowland areas, affecting 7 million people, and a locust invasion caused cereal losses of more than 3.5 million quintals, affecting more than 806,000 farming households. Meanwhile, the effects of the COVID-19 pandemic were felt everywhere, including rural areas where poverty is projected to have increased by more than 9 percentage points in 2020 compared with 2019. Inflation has also been high, averaging 34 percent year-on-year between March 2021 and March 2022. While some net producers benefited, there are more households, especially the poor, who are net consumers with limited options for substitution between food items. The increase in maize and sorghum prices reduced welfare by as much as 10 percent among rural households.

Being primarily subsistence agriculture-based, rural households have not been connected to the rest of the economy

Being primarily subsistence-oriented, with low education and disconnected from markets, rural households have not been fully integrated into the modern, faster-growing segments of the economy. Despite some encouraging signs, the transition in the rural economy has been slow compared with Ethiopia's regional peers, Kenya, Uganda, and Tanzania, and when compared with international comparators such as Vietnam and Cambodia, whose economies were once predominantly agricultural, but have since undergone significant transformation in the past two decades. The rural population in Ethiopia remains predominantly dependent on subsistence agriculture, which made up three-quarters of rural incomes in 2019 and employed 77.5 percent of the rural workers in 2021. In contrast, agriculture contributed less than 40 percent of rural incomes in Cambodia in 2019 and Vietnam in 2018, and around 59 percent in Uganda in 2019. Consequently, rural households in Ethiopia have less diversified and more subsistence-oriented livelihoods. The low education levels among rural workers—with four out of five rural adults in 2021 either having never been to school or having dropped out of primary education at best—has lowered both productivity in agriculture and access to off-farm opportunities, which were already limited by low market access due to poor connectivity and low population density.

But structural transformation in the agri-food system and the broader economy along with changes in global trade present opportunities for expanding both on- and off-farm rural incomes.

Despite these vulnerabilities, other economic developments point to greater opportunities for expanding rural incomes. The study identified four key drivers of rural income growth opportunities, rooted in the transformation path that the country is set upon and changes in global trade. The structural transformation in the agri-food system, driven by: (i) *technology adoption in agriculture production;* and (ii) *growing urban populations and incomes, and the resultant dietary transformation,* presents direct opportunities for expanding agricultural incomes, while at the same time creating income-generating opportunities in the non-farm segments of the food system. The changing patterns in global trade, specifically (iii) *growth in global agri-food trade;* and the broader (iv) *spatial and economic transformation in Ethiopia* as it integrates into global value chains through expansion of urban based export-oriented industries, will create additional opportunities for rural households, both on the farm and off the farm.

Technological transformation in agriculture

Advances have been made on the adoption of advanced inputs in Ethiopia, signifying the start of technological transformation in agricultural production that has improved yields. The share of households applying inorganic fertilizers increased from 49 percent in 2012 to 63 percent in 2019, for example, and that of households using improved seeds increased from 20 to 33 percent. However, other technologies, such as mechanization and irrigation, remain inaccessible and little used, with 9 percent and less than 2 percent of rural households irrigating and mechanizing their plots, respectively. Mechanization has, however, taken off among wheat farmers in the southwest regions of Ethiopia, with the use of combine harvesters. The adoption of fertilizers and improved seeds has improved productivity by at least 13 percentage points since 2012, placing Ethiopia's cereals yields above its regional peers but still lower than international comparators. Gains from mechanization are evident in the wheat-producing areas.

> ***The share of households applying inorganic fertilizers increased from***
>
> ***49%*** *IN 2012 TO* ***63%*** *IN 2019*

There is considerable scope for increasing technology adoption to further improve yields and create jobs in agriculture services. Despite the noted improvements and better performance than regional peers, yields have not reached their potential levels because the adoption of technology remains low. The recent improvements in technology adoption started from such a low base that improved seeds and inorganic fertilizers covered only 13 percent of cultivated land in 2019. In addition, agriculture technologies have been adopted in isolation instead of being applied together on the same plots to maximize complementarities. On only 6 percent of the plots were improved seeds, inorganic fertilizer, and soil and water conservation technologies applied together, even though evidence suggests that their joint application would double land productivity relative to the use of inorganic fertilizer alone, or increase land productivity by 45 percent more than using improved seeds alone. Further productivity gains can be achieved through increasing irrigation coverage and farm mechanization. Increased technology adoption, including mechanization and irrigation, would also create jobs in input production and distribution, as well as agriculture services, such as extension services and equipment sharing, renting and repairs. Restrictions in input markets (e.g., control of the fertilizer supply chain and profit margins for improved seed varieties) have reduced private sector participation, resulting in suboptimal input supply. This has constrained technology adoption, together with low access to credit, small and fragmented farm sizes, poor connectivity to markets, and the disincentive effects that climate shocks have on the adoption of risky technologies.

The rise in the urban population and dietary transitions

Increased food demand and dietary transformation driven by urbanization and rising incomes will be an important driver of rural income growth. The urban population grew by nearly 60 percent from 2010 to nearly 23 million in 2021 and is expected to rise to 31 million by 2025. Moreover, urban households have experienced faster income growth, resulting in high growth in food consumption. Combined with urban population growth, total urban food consumption would have doubled in those five years. These factors have contributed to a dietary transition as urban households in Ethiopia spend a higher share of their budget on teff, vegetables and meat & fish, and processed foods, and significantly less on other cereals, especially maize. Their consumption is heavily skewed toward commodities with high income elasticities, suggesting greater potential for growth in demand for some commodities but less so for others. The annual demand for teff, wheat, pulses and nuts, vegetables, meat and dairy products is expected to increase by more than US$1.6 billion, mostly due to rising teff, wheat and diary demand, while demand for maize is expected to decline.

Rising urban food demand, being more reliant on markets and with higher shares of processed or packaged foods, has triggered a transition that is creating jobs in the non-farm segments of the food system. Beyond jobs created in bringing and marketing produce to urban consumers, opportunities will also expand in food processing, packaging, marketing, and food preparation and retail. Initially, most of these activities will be in the small-scale segments of the non-food system, with long and fragmented value chains that can present opportunities for rural Micro, Small and Medium Scale Enterprises (MSMEs). Recent trends suggest the rise in urban food demand has begun to expand job opportunities beyond primary agricultural production. For example, since 2013, total employment in food manufacturing, food preparation, and marketing and transport has more than doubled. More of these jobs will be created as the share of downstream segments in the food system GDP rises to close to 30 percent by 2040. Similar trends are expected regionally. However, realizing more of these gains in Ethiopia could be constrained by a challenging business environment, due to regulations that increase barriers to entry (especially the trading sector which can catalyze value chain development but is currently closed to foreign ownership) and the cost of doing business, inadequate infrastructure, and low access to finance.

Growth in global agri-food trade

Global agri-food trade has been on the rise and rural households in Ethiopia are primed to benefit. Global agriculture trade is estimated to have doubled in nominal terms between 2004 and 2014, which continued to expand until the COVID-19 pandemic struck. Rural households in Ethiopia are primed to benefit, being more integrated into global agriculture value chains with high growth potential or shifting into premium production. Coffee, the country's top export, already supports the livelihoods of close to 20 million people. Its export revenues have stagnated, and its market share has been declining in recent years. But with the right market incentives, farmers could still gain from increasing yields and switching to wet processing, which commands a premium but only accounts for one-third of exports, unlike in Kenya where it accounts for 89 percent of coffee exports. The second export crop, sesame oilseed, is produced by 1 million households, and has the potential to expand if yields are improved. Ethiopia is also catching up in high growth global agriculture exports commodities, such as meat and beans, which are produced by smallholder farmers too, and have further room to expand as current exports are only a small fraction of production (e.g., only 2 percent of production for meat). Maize farmers could have benefited from growth in trade but have missed out due to export controls. The shift from livestock to meat exports also shows the potential of value addition, which could create jobs in the packaging and processing segments, provided the right infrastructure (e.g., cold chains) and food safety standards are put in place. Value addition in the services segments of the agriculture value chain will both create jobs and increase farmers' returns too.

Spatial and economic transformation

The expansion of urban based export industries has generated jobs mostly filled by rural-urban migrants. Export-oriented firms, whose number has been rising, have created more jobs per firm on average, which are mostly filled by migrants, as surveys at industrial parks across the country show. About 70 percent of workers in Bole-Lemi Industrial Park and 52 percent of workers in Hawassa Industrial Park, for example, are migrants. With rural areas a source of labor for urban based industries, migration becomes an important pathway for access to employment and connecting rural areas to the broader economy. Close to 2 million people, representing one-third of all recent migrants, moved from rural to urban areas during 2016–21. Rural-urban migrants tend to be younger, with an average age of 27 years, and have better education. Close to half have at least completed primary school, with 18 percent having completed secondary or post-secondary education. Most adult rural-urban migrants—about 54 percent (and two-thirds among females)—migrated for economic

reasons, with reasonable success in finding jobs in their destination areas. The rural-urban migrants are as equally likely to be economically active, employed and in non-agricultural work as urban residents, but more likely to be in wage employment, though a disproportionate share (17 percent) is engaged in domestic wage work.

With a rising rural population, rural-urban migration, and urban development, are essential for facilitating rural economic transformation. The rural population expanded by more than 20 million people since 2004. It will keep expanding given the high fertility rate in rural areas, which will increase the pressure on land. The average land size per household has already declined from 1.25ha in 2006 to 0.89ha in 2020 for example. Migration eases the land pressure and catalyzes rural transformation through two primary channels. First, it improves labor productivity in origin communities and helps remaining household members feed off their land. In Ethiopia for example, rural-urban migration during 2012–15 has increased the intensity of family labor use and output per worker in migrant origin households compared with non-migrant households by 28.6 and 18.3 percent, respectively. This implies that migration reduces disguised unemployment in rural areas. Second, migration increased the share of land rented out by 6.6 percent among migrant households relative to non-migrant households. Thus, it increases the efficiency of the rental markets too. In addition, migration is a coping mechanism for drought-related shocks and helps to improve households' resilience. Impoverishment rates—the likelihood of falling into poverty—were 7 percentage points lower among households with a migrant during 2011–16 compared with similar households without a migrant.

Increased smallholder farmers' market orientation, diversification into non-farm segments of the food system and rural-urban migration, leverages these opportunities to expand rural incomes.

Three pathways are identified for expanding rural incomes by leveraging opportunities presented in the transformation of the agri-food system and greater involvement in the global value chains (GVCs). First, rural households in Ethiopia could expand agricultural incomes by becoming more market-oriented in their production, taking advantage of rising urban food demand and the global agri-food trade. Second, rural households could diversify their livelihoods by taking advantage of opportunities created during the transition in the food system and beyond. Third, expanding incomes through increased rural-urban mobility to take advantage of the job opportunities as Ethiopia integrates more into GVCs.

Increasing market orientation of smallholder farmers

Increasing the market orientation of smallholder farmers improves welfare but is hampered by the inherent need to attain self-sufficiency, low productivity, and high exposure to shocks. A percentage increase in the share of output sold increases rural households' per capita consumption by 11 percent, on average, and by more among the poor. Nutrition outcomes improve with market participation too. However, factors that incentivize smallholder farmers to be food self-sufficient—market isolation and high food prices—have suppressed households' market participation in Ethiopia. Households in remote areas, facing high transaction costs and frequent climate -related shocks inducing higher price volatility, are more inclined to produce for own consumption instead of engaging in market-oriented production. Land use choices are therefore geared toward the production of staples commonly consumed in rural areas. Government interventions, especially agriculture extension services, have been biased toward increasing cereals production too, given the country's history of food insecurity. Most smallholder farmers also do not generate enough of a surplus to sell due to low productivity and the impact of climate shocks, which discourages households from selling their surplus and encourages them to hold larger buffer stocks instead. Fostering market integration, improving land productivity, strengthening household resilience to shocks and risk mitigation are therefore foundational pillars for increasing market orientation of smallholder farms.

Promoting livelihood diversification through development of the agri-food system

Livelihood diversification is low in Ethiopia due to a combination of low rural non-farm job creation and households' lack of education, gender biases and the prioritization of meeting subsistence needs. Rural off-farm opportunities are mostly created in the services sector, which requires higher populations to thrive. The sparse population in rural areas in Ethiopia, combined with low non-food market spending, result in limited local demand and constrained job creation. Job prospects are found to continuously improve with increasing rural population density. Low skills and gender biases compound the low availability of non-farm opportunities. The off-farm job prospects of people with secondary education are more than double the prospects of primary educated people, for example. Prospects of secondary educated men and women are similar, but primary educated men face better prospects than women with a similar background. Low market integration encourages households to focus on agricultural production. For example, net food consumers of both maize and teff tend to engage less in non-agriculture activities the higher the staple food prices in local markets relative to the price in Addis Ababa. With low density a key limiting factor, the development of the agri-food system holds potential for generating off-farm jobs in rural Ethiopia. It taps into external demand from urbanization and the global food trade, the supply chains of which are long and fragmented during the transition stage and hence dominated by MSMEs. The more than 500,000 jobs and nearly 300,000 jobs created under the marketing and agriculture support components of the AGP project, respectively, is evidence of this potential.

Rural-urban migration

With low economic density limiting access to local economic opportunities, rural-urban migration is an alternative pathway for improving access to better income-generating opportunities. In Ethiopia, remittances from urban migrants were equivalent to one-third of receiving households' consumption per capita in 2016, and more than double that among the poorest quintiles. Rural urban migration is, however, constrained by non-wage factors making integration in destination areas more difficult for migrants. The high cost of migration is a barrier to migration. Migrants find the job search process more difficult, which increases the job search costs, and they face administrative barriers to obtain kebele IDs, inhibiting their access to government services. Many typically find the transition to urban life difficult, and females face additional challenges. Connecting migrants to jobs and services would facilitate the labor shift into off-farm jobs in urban areas and increase the flow of remittances to rural households. More fundamentally, urban development to enhance the urban pull factor and adapt urban areas to rising populations, is essential for both the integration of migrants and relieving the impacts of urban population growth on infrastructure and services.

Priorities for realizing opportunities should focus on five critical areas with the greatest impact on the poor and high implementation feasibility

To expand opportunities for rural households and increase their incomes, policy interventions should promote a shift toward market orientation among smallholder farmers, create opportunities for livelihood diversification and reduce barriers for rural labor mobility. Interventions to achieve these should focus on reducing constraints in the following five key areas:

i. Changing incentives for households to produce for the market

Increasing the market orientation of smallholder farmers is centered on shifting their land use choices away from self-sufficiency-driven production decisions to market demand-driven production choices. The key factors affecting the incentives faced by households that are identified in our analysis are: (i) market isolation, which requires improving rural connectivity; (ii) risks to shocks from climate change and price volatility, which can be addressed through the adoption of climate smart agriculture technologies in combination with better connectivity; (ii) depressed returns due to state intervention in output markets, making the elimination of export controls particularly critical; (iii) high transaction costs, which can be reduced by improving market linkages to minimize aggregation costs and improve information flow; and (iv) a bias in extension services provision toward cereals production, thus calling for revamping extension services provision to facilitate private sector extension services provision and orient public extension services toward providing market-oriented advice.

ii. Increasing agriculture surplus generation and availability

Farmers, especially cereal producers, need to have surplus output to sell if they are to participate profitability in markets. Surpluses, especially for cereals, need to be generated by increasing land productivity and preserved by minimizing losses. The key constraints to surplus generation and availability are low adoption of multiple agriculture technologies, exposure to climate-induced shocks and hoarding of surpluses to cope with climate shocks. The critical interventions are those that promote the adoption of multiple agriculture technologies, such as extension services provision, promoting access and use of climate smart agriculture technologies, including expanding irrigation and conservation agriculture, improving access to credit and liberalizing input markets to increase supply.

iii. Overcoming the disadvantage of low economic density in remote, sparsely populated areas

A major reason behind the lack of non-farm opportunities in rural areas is the lack of demand due to a small internal market, compounded by the under development of agriculture value chains partly due to restrictions in investment in the trading sector, leading to fewer and smaller rural enterprises, and hence fewer jobs created. Rural enterprises in these circumstances can only thrive by serving external markets. This requires addressing the challenges of: (i) low market access, which calls for increasing rural connectivity; (ii) low linkages with prospective customers, which requires investments in improving digital connectivity, logistical services for supply and delivery to customers and suppliers, and the construction of markets and other supporting infrastructure, such as warehouses and cold storage, through private sector participation; (iii) high entry barriers in the trading sector, which calls for removal of restrictions of foreign ownership in the trading sector, to attract investment by firms with knowledge and the incentive to reorganize agriculture value chains.

iv. Promoting rural enterprise development in the non-food segments of the food system

The development of rural enterprises is important for off-farm rural job creation. For rural areas, fulfilling rising demand for food and agriculture commodities in urban areas and globally is the source of external demand that can drive growth. Participation in the non-farm segments of these agriculture value chain presents opportunities for

MSMEs in rural areas. Taking advantage of these opportunities requires addressing challenges with the business environment, namely: (i) the lack of access to finance, which could be addressed through de-risking lending to the rural economy, and the provision of startup capital through matching grants and lines of credit, coupled with technical assistance to lenders to improve credit risk assessment; (ii) barriers to entry and state intervention across key nodes of the value chains, which require market deregulation in agriculture input licensing, input pricing and maize price controls, and private participation in services provision, such as infrastructure and market development; and (iii) limited skills, which in the short term can be addressed through supporting vocational training for the rural youth and capacity building for cooperatives and developing an ecosystem of business development services. In the longer term, investments facilitating transition to secondary education are required.

v. Reducing costs for rural urban migration and reinforcing the urban pull factors for migration

Easing the process of integration of migrants in urban areas and expanding urban development is important for reducing the cost of migration and promoting mobility. Migration has both social and economic costs that can be a deterrent to prospective migrants. These costs are driven by: (i) frictions in the job-matching process, which can make the job search costly and unaffordable for those without savings to tap into; and (ii) barriers to access to services. The first constraint can be addressed through measures that reduce job search costs by improving systems that facilitate matching of jobseekers to job vacancies, such as setting up an employment agency and strengthening public employment services; and helping jobseekers signal their skills, for example by expanding youth apprenticeship programs. The second constraint can be addressed by streamlining administrative procedures, the most important ones being minimizing the burden of the requirement to obtain kebele IDs by reducing the minimum length of stay and removing the requirement for a release letter; and streamlining ID reforms and household registration. More importantly urban development through investments in urban infrastructure, housing, social services, and urban based industries, can spur labor mobility by improving both access to opportunities and social services.

Interventions to increase rural incomes should focus on addressing constraints to achieve these five outcomes. In the context of ongoing government reforms targeting many of the constraints to achieving these outcomes, a set of priority areas for interventions are proposed. These have been selected by considering the impact of the constraints on the five outcomes and gender gaps, as well as feasibility of solutions in terms of how difficult they are to implement, government buy-in on the reforms and asymmetry of benefits. The identified top priority areas are:

1. Addressing infrastructure gaps focused on connectivity, irrigation, land structures and supporting infrastructure.

2. Private sector participation in the delivery of supporting infrastructure.

3. Agriculture input deregulation to shift from government direct delivery of inputs to regulation, stopping pricing interference for inputs supplied by the public research system and reduce preferential treatment of cooperatives for agriculture technology multiplication.

4. Output market deregulation, including the elimination of grain export bans.

5. Market making by creating market linkages, such as market information and liberalizing the trading sector.

6. Re-orienting extension services provision toward the delivery of more sophisticated, market-oriented messages and permitting a plurality of advisory service provision.

7. Financial sector reforms to reduce credit controls, preferential treatment, and

overreliance on government financing for farmer inputs.

8. Forex reforms to align the exchange rate and remove foreign currency controls.

9. Improving natural resource governance and land administration, including eliminating restrictions on land transactions and the transfer of user rights to facilitate land consolidation.

10. Relaxing constraints on the movement of labor by streamlining the administrative process required for migrants to integrate into urban areas and by improving services that connect people to jobs.

11. Expanding urban investments in infrastructure, housing, and social services to adapt urban areas to increasing population and reinforce the urban pull through expanding investments in urban-based industries.

12. Addressing gender gaps in education and training and access to land, as well as norms around women's occupations and roles within households.

On these proposed areas, the diagnostics provides an impetus for pushing ahead with reforms and consider other actions as well. It provides evidence reinforcing the importance of rural infrastructure investments for agriculture commercialization and food system transformation, and how new approaches like the agriculture commercialization clusters being piloted in the country, provide a promising model for addressing multiple constraints faced by small holder farmers. It also elevates some reform areas, to signal importance of moving fast. Such areas include (i) speeding up market deregulation of agriculture input markets to attract private investment into agriculture technology research and improve input supply to foster productivity and job creation, and (ii) increasing private sector participation in delivery of infrastructure and post-production nodes of agriculture value chains. The diagnostics also offers empirical arguments to support the need for reforms in areas where either consensus might be lacking or there is policy hesitation, such as elimination of grain export restrictions and foreign exchange rate alignment to improve price incentives for agriculture producers, opening up the trading sector for foreign investment to bring in investors with the knowledge and scale in the retail and wholesale sector that can catalyze agriculture value chain reorganization and development, and that encouraging rural-urban migration facilitates agriculture transformation.

A summary of the priority constraints and interventions, along with their prioritization ranking are presented in the following two tables. The first table shows priorities for immediate implementation and the second table shows medium to long term priority areas.

Short-term priority intervention areas for increasing rural incomes

Constraint	Pathway	Priority Level	Interventions
Investment gaps			
Low rural connectivity	• Market-oriented production • Increasing economic density	High	• Rural roads investments
Limited access to irrigation	• Agriculture surplus generation	Medium	• Irrigation investments
Low access to climate-smart agriculture technologies	• Agriculture surplus generation	High	• Investment in R&D for climate-smart agriculture technologies • Incentives for on-farm private investments
Lack of logistical infrastructure	• Rural enterprise development • Market-oriented production	High	• Investments in modernized physical markets, cold chains, warehouses and storage facilities
Depleting natural resources	• Agriculture surplus generation	High	• Land structures for protecting or rehabilitating eroding landscapes
Market related constraints			
Input shortages and unavailability	• Agriculture surplus generation • Rural enterprise development	High	• Liberalization of input markets
Weak price incentives due to market distortions	• Market-oriented production • Rural enterprise development	High	• Streamlining marketing restrictions • Revising the incentive structure to promote premium coffee production
Low market linkages	• Market-oriented production	Medium	• Contract farming • Market information systems • Direct support to farmer groups and SMEs
Risk management financial instruments	• Agriculture surplus generation	Low	• Vegetation index-based insurance • Livestock based insurance
High job search costs	• Reducing barriers to migration • Market-oriented production	Medium	• Employment intermediation services • Youth apprenticeships • Expand investments in urban based industries
Capacity constraints			
Limited access to complex, market-focused, advisory services	• Agriculture surplus generation • Market-orientated production • Rural enterprise development	High	• Plurality of extension services • ICT based advisory service delivery mechanisms • Retraining of extension services providers
Low education and skills	• Reducing barriers to migration • Market-oriented production	High	• Gender-focused vocational training
Gender biases in intra-household labor allocation	• Rural enterprise development • Market orientation	High	• Gender representation in decision making structure & enterprise group formation
Policies and regulations			
Lack of access to credit	• Agriculture surplus generation • Rural enterprise development • Reducing barriers to migration	Medium	• Input voucher system • Elimination of credit controls and preferential treatment
Land fragmentation limits technological adoption	• Agriculture surplus generation	High	• Cluster approach • Develop equipment rental markets suitable for small farm sizes
Gender bias in land access	• Market-orientated production	Medium	• Enforcing land co-titling

Medium-term priority intervention areas for increasing rural incomes

Constraint	Pathway	Priority Level	Interventions
Investment gaps			
Low digital connectivity	• Market-oriented production • Increasing economic density	High	• ICT infrastructure development
Limited access to irrigation	• Agriculture surplus generation	Medium	• Rationalizing institutional arrangements • Review regulations and legal provisions for water user charges to increase
Distorted incentives for natural resource management	• Agriculture surplus generation	High	• Improve natural resource governance and land management systems
Poor access to urban services deterring migration	• Reducing barriers to migration	High	• Urban infrastructure investments
Market related constraints			
Weak price incentives due to market distortions	• Market-oriented production	High	• Elimination of export bans
Limited knowledge and private sector investment in value chain development	• Rural enterprise development	High	• Open trading sector to foreign ownership
Capacity constraints			
Low education and skills	• Reducing barriers to migration • Market-oriented production	High	• Fostering school progression, especially among girls
Policies and regulations			
Lack of access to credit for rural enterprises	• Rural enterprise development	High	• Strengthening financial institutions capacity for credit assessment
Exchange rate misalignment	• Rural enterprise development • Market oriented production	Medium	• Exchange rate unification • Remove foreign exchange controls
Burdensome administrative procedures for IDs	• Reducing barriers to migration	Medium	• Reducing minimum stay requirements for obtaining Kebele IDs • Removing release letter requirement • Digital IDs
Limited access to public services and housing for migrants	• Reducing barriers to migration	Medium	• Expand public investment in urban infrastructure, housing and services
Land fragmentation limitations to mechanization	• Agriculture surplus generation	Medium	• Remove restrictions on land transactions and transfer of user rights
Barriers to trade	• Agriculture surplus generation • Rural enterprise development	Medium	• Free trade agreements • Strengthening capacity and enforcement of SPS

INTRODUCTION

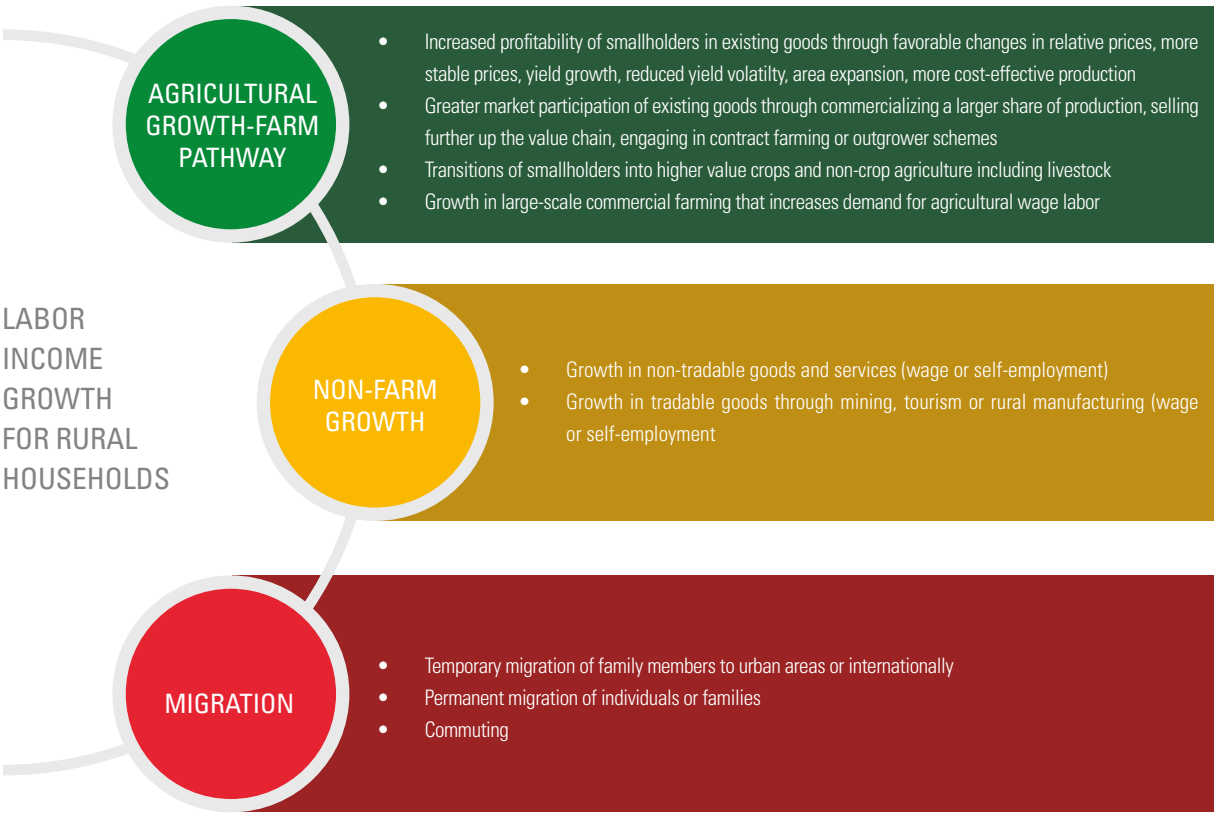
Background

Identifying opportunities and constraints to increasing rural household income through three complementary pathways

Ethiopia has experienced rapid economic growth over the past decade, but rural households have benefited less from this growth than their urban peers. Per capita GDP cumulatively increased by 39 percent during 2011–16, but average consumption per capita in rural areas grew by only 6 percent, or only one-fifth of per capita consumption growth in urban areas. The bottom 20 percent in rural areas failed to experience any consumption growth at all (World Bank, 2020b). Consequently, poverty has become more concentrated in rural areas, which today account for 87 percent of the poor in Ethiopia.

This Rural Income Diagnostics (RID) study therefore seeks to inform how to promote growth in rural incomes to accelerate poverty reduction. This is in support of the ongoing reforms in agricultural and rural development policy, along with macroeconomic and structural reforms proposed under the Homegrown Economic Reform Agenda (HGERA), the overall goal of which is promoting job creation, inclusive growth, poverty reduction and creating a path to prosperity. The RID achieves this by characterizing livelihood strategies of rural households, and identifying opportunities and challenges to increasing their incomes through three complementary pathways, namely: (i) *agricultural income growth* – increased profitability of smallholder farmers, greater market participation, transition to high value production and large-scale farming; (ii) *growth in off-farm incomes* – wage and self-employment in the rural non-farm economy; and (iii) *migration* – both permanent and temporary migration, and remittances (Figure 1).

Figure 1. Poverty pathways and income growth for rural households



Source: RID Framework.

The objective of the RID is to examine how those who currently reside in rural areas can have higher incomes in the future, which could entail one or more members moving to urban areas. The focus is on income growth that results in higher incomes on average, but also income that is less volatile because of due consideration to effective risk reduction and management, and to ensuring that growth is sustainable. While the RID focuses only on income that is earned by rural households, it is much more detailed in its identification of the constraints because of this narrower focus. The diagnostic provides evidence to validate constraints and key areas of focus in ongoing agriculture and rural policy reforms and other relevant reforms under the HGERA, elevate the importance of some reforms where immediate action is required, and provide empirical arguments to support important policy interventions where consensus might be lacking or there is policy hesitation. The RID's quantification of impacts of identified constraints on rural incomes provides a basis for prioritizing and sequencing the reforms. While it identifies inadequacies in human capital where relevant and presents macroeconomic factors to provide context, the RID does not go into detailed analysis of the constraints or identify policy priorities to address these issues, many of which are tackled in the recent Country Economic Memorandum (World Bank, 2022a).

Approach in the Rural Income Diagnostics

The diagnostic takes four steps to the identification and prioritization of constraints within and across the three types of income growth—farm incomes, non-farm incomes and migration:

STEP 1: Context and key dimensions of heterogeneity – How do households currently allocate time and assets across activities to maximize income and reduce variability?

STEP 2: Identifying the opportunities for income growth – What are the opportunities for agricultural growth and rural non-farm growth, and the nature of migration?

STEP 3: Prioritizing constraints to achieving growth – What are the most important constraints preventing poor households from taking advantage of these opportunities?

STEP 4: Identification of feasible policy solutions – What are the feasible policy actions that would help poor households overcome these constraints and take advantage of the opportunities for income growth that are present?

Complementing the wealth of existing literature with distributional focused analysis

This RID study builds on a wealth of existing evidence on the main issues of focus in Ethiopia. The Poverty Assessment 2020 provides a comprehensive description of the spatial distribution of the poor in Ethiopia. The evolution of rural livelihoods in Ethiopia has been documented, showing the low non-farm income contribution in rural incomes (Bachewe, Berhane, Minten, and Taffesse, 2016), a wide gender gap in non-farm employment (F. N. Bachewe et al., 2016), and low market participation in agricultural output (Minten, Dereje, Bachewe, and Tamru, 2018) and input markets (Bachewe, Berhane, Minten, and Taffesse, 2018). On agriculture, there are recent empirical studies on agricultural yields for some key crops, for example, maize (van Dijk et al., 2020) and wheat (Silva et al., 2021), farm mechanization (Daum and Birner, 2020; Diao, Takeshima, and Zhang, 2020), opportunities that urban population growth offers for increasing agricultural incomes (Vandercasteelen, Beyene, Minten and Swinnen, 2018), and agriculture production linkages and agriculture trade patterns (Eshetu and Mehare, 2020; World Bank, 2016). The benefits and constraints to migration have also been analyzed in various studies, including a new Rural-Urban Migration Study by the World Bank (World Bank, 2022b).

Despite this wealth of evidence, there are knowledge gaps that the RID helps to fill with new analysis. These include more detailed analysis to better understand patterns observed in the literature, such as: (i) the determinants of low market surpluses and market participation; (ii) the influence of intra-household dynamics on gender differences in economic participation; (iii) how the land ownership structure influences households' land use choices, labor allocation between farm and non-farm activities, and overall incomes; and (iv) how migration affects factor allocation in agricultural production.

New analysis was also conducted to provide a distribution lens and/or new perspective on topics where the existing literature has only paid limited attention to the distributional dimension of those issues. The growing literature on urban growth and expenditure linkages has not taken a distributional angle to ask: (i) who produces the food items with high demand in urban areas and the elasticities of demand for food products produced by the poor versus non-poor, or in lagging areas versus better off areas; or (ii) to assess the agriculture supply response to price changes and factors influencing/constraining this supply response to quantify the extent to which rural households can benefit from rising urban demand.

Other areas where new analysis was conducted are those with limited evidence available in Ethiopia. These include assessing the rural demand potential for consumer goods and services that can be met locally by looking at non-food expenditure patterns. As part of this, the RID digs deeper into geography and rural non-farm economic potential to better understand the relationship between access to off-farm opportunities, population density, connectivity, and access to markets more broadly.

The analysis is a combination of descriptive and multivariate econometric analysis depending on the question of focus. The goal is to provide a sharper distributional lens on topics where this has been lacking, conduct in-depth analysis to better understand the drivers of trends/phenomena identified in the literature, and break ground on some areas that have so far received minimum attention. Pulling together existing evidence and the new analysis provides an empirical basis for prioritizing interventions for boosting rural incomes. The prioritization is at a more granular level to provide actionable policy options in Ethiopia's context.

Benchmarking

Throughout the analysis, Ethiopia is benchmarked against country comparators. These are a combination of regional peers (Uganda, Kenya and Tanzania) and comparator countries at the next stage of development (Cambodia and Vietnam). Cambodia and Vietnam are selected as comparators, having undergone transformation, with rapid growth in the non-agriculture sector initially driven by the garment industry, while also increasing their exports of key agriculture commodities such as coffee, rice, and pepper. Vietnam also had similar starting conditions as Ethiopia. It had a closed economy and limited private sector participation, which was not allowed until 1997 and kicked off with a state-led development model. Benchmarking exercises against these countries are used to explore areas with the potential for growth or the potential for improvement by reducing binding constraints.

Incorporating new and innovative data sources

The Ethiopia Socioeconomic Survey (ESS) is used as the main source of data for micro analysis. This survey has both a panel component, with three rounds between 2011/12 and 2015/16, and a new round conducted in 2018/19, which is one of the most recent surveys available in the country. The ESS has been designed as part of the Living Standards Measurement Survey–Integrated Survey of Agriculture (LSMS-ISA) surveys, with a rural focus and particular aim to improve the measurement of agriculture output and incomes. It involves more precise measurement of agriculture land size, soil quality, and ownership structure (at plot and individual levels), labor inputs (at plot and individual levels), and input application and utilization of agriculture services. Non-farm incomes are also captured in a separate household enterprise module and wage labor modules. The

survey is thus ideal for analyzing how households allocate income-producing assets and labor as they do, and what limits a household's ability to earn higher, less volatile returns.

Table 1. Description of data sources for rural income diagnostics analysis

Data Source	Data Type and Characteristics
Ethiopia Socioeconomic Survey (ESS) – 2011/12, 2014, 2015/16, 2018/19	• Nationally representative panel data with three waves, and a refreshed sample for 2018/19 • The data provides variables on: Household and individual characteristics; Land and agriculture production at plot level; Geographic characteristics such as population density, connectivity, access to services; and Prices based on an EA level market prices survey
Ethiopia National Labor Force Survey (LFS) – 2013, 2021	• Nationally representative, cross sectional survey data. Due to conflict the 2021 survey excluded the Tigray region (which constitutes about 6 percent of the population)
Ethiopia Transport Network Layer 2020	• Distance matrix dataset of travel time from one woreda to another • Dataset also combined with population data to generate various market indices with destination population areas weighted by travel time
Gridded Population V4 (GPWv4), LandScan Global (LSG), WorldPop (WDP)	• Global gridded geospatial dataset • GPWv4 - population counts years 2000, 2005, 2010, 2015, 2020, calibrated to census; Resolution about 1 km • LandScan: Resolution about 1 km These data provide Population distribution indicators - land cover, roads, slope, urban areas, and village locations
The Climate Hazards Group InfraRed Precipitations with Stations (CHIRPS)	• High frequency 30 years quasi-global rainfall at 6-hourly, daily, monthly, bi-monthly, quarterly and annually • Based on triangulation of Earth based rainfall gauge data and satellite imagery at 0.050 resolution
FAO GAEZ Data	• Geospatial data, at 9.3 x 9.3 km pixel size (resolution). The data are extracted at the EA Level Provides information on Agriculture land production potential – crop suitability, yield potential, production gaps which is combined with the ESS survey data in analysis of productivity, land use and market participation
FEWSNET Central Statistics Agency (CSA) price survey	• Panel Data – Monthly prices from 2019 to 2021 for various crops, livestock and non-food items
WFP Food Prices data	• Dataset spans the years 2000 to 2021 for maize, sorghum, teff and wheat
Galor & Ozak (2016)	• Geospatial data – at 9.3 x 9.3 km resolution measuring Caloric Suitability Index which measures potential variation in crop yields across space in calories per hectare per year
COMTRADE	• Timeseries – Trade flows data at H6 level
FAOSTAT	• Timeseries – Agriculture production, export, import data

Source: Authors' compilation.

The ESS data were complemented with data from other sources as necessary. Several geospatial datasets are used in combination with the ESS data in the analysis. High-frequency quasi-global rainfall data from the Climate Hazards Group InfraRed Precipitations with Stations (CHIRPS) are incorporated to measure the impact of climate shocks. Travel time and market accessibility indicators are computed from the Ethiopia Transport Network Layer 2020 and global gridded population datasets derived from probabilistic estimation from satellite imagery (Gridded Population V4, LandScan Global and WorldPop). The enumeration of area-level proxies for suitability and the productive potential of land are computed from the FAO GAEZ spatial data and Galor and Zak (2016) caloric suitability index, both based on the application of machine learning to satellite imagery. High frequency price data from FEWS NET and the World Food Programme (WFP) are also incorporated in the analysis. Some specific questions are analyzed entirely using complementary datasets, such as the Labor Force Survey (LFS) 2013 and 2021 for labor market outcomes and COMTRADE, FAOSTAT and GTAB datasets for agriculture trade-related analysis.

Given the multiple shocks that Ethiopia has experienced since 2020, additional evidence from recent but more limited surveys is brought in to capture recent developments and update trends. The COVID-19 High-Frequency Phone Surveys (HFPS) collected after every four weeks between April 2020 and 2021 in Ethiopia by the World Bank are used to capture changes or impacts of the COVID-19 pandemic on rural outcomes. To highlight the impacts and household responses to droughts in affected areas, the RID brings new data from a Mobile Population Survey conducted between December 2021 and February 2022 among pastoral and agropastoral communities that are at the epicenter of the current drought.

> ***Additional evidence from recent but more limited surveys has been brought in to capture recent developments and update trends***

Report outline

The RID comprises five chapters including this introductory chapter. A short overview of each of the next four chapters is provided below.

Chapter 2: A Snapshot of Rural Livelihoods – Rural Incomes and Welfare.

This chapter sets the stage for the RID by characterizing rural livelihoods and poverty, which is the first step of the diagnostic, answering questions on how households currently allocate time and assets across activities. The chapter then discusses the evolution of rural household income sources, whether there is growth in non-farm income in absolute and relative terms, and growth in income from market-based activities, as well as whether households have adequate human and physical assets that they can leverage to expand household incomes. These issues are presented with a distributional lens in terms of variation across welfare quintiles, spatially and by gender. Most of the analysis presented will be descriptive, relying on the most recently available data.

This chapter shows how the unfolding crises have impacted rural households and upended previous trends. Ethiopia has experienced multiple, severe shocks from 2020 onwards, after key data used in the analysis were collected. This chapter reflects on this. It delves into how the COVID-19 pandemic, conflict and climate change-driven events, have impacted rural households and their responses to them by bringing alternative data sources to analyze these issues. By laying out how rural households currently earn their incomes, their natural and human endowments and present challenges, the chapter sets the stage for identifying opportunities and pathways for rural households to expand their incomes going forward.

Chapter 3: Big Picture: Key opportunities for enhancing rural incomes through development of the food system.

This chapter presents the key opportunities for expanding rural incomes in Ethiopia centered around four trends that will drive access to opportunities in the country. The four key drivers are: (i) the technology transformation in agriculture; (ii) the urbanization and dietary transformation; (iii) the rise in global agri-food trade; and (iv) the spatial and economic transformation. The chapter presents how each one of these trends will help directly increase agricultural incomes and create off-farm opportunities for households to diversify their livelihoods. The analysis for this chapter is a mix of descriptive and sophisticated statistical analysis.

- *Technological transformation in agriculture* – This starts with a descriptive discussion of trends in the adoption of agriculture technologies and the improvement in yields in Ethiopia. Evidence from multivariate analyses of the determinants of land productivity and its impact on crop incomes based on statistical models accounting for the joint determination of the two outcomes is presented. This is discussed together with estimates from literature and our own analysis on yields and their decomposition into various factors to assess the potential impact of technological adoption on productivity. Descriptive analyses are then presented to show job creation potential for technological adoption in the agriculture sector.

- *Urbanization and dietary transformation* – Descriptive analysis on the urban population, income growth and evidence of dietary transformation is presented first. Then the results from more sophisticated analysis to identify the food items with potential for growth in demand from estimation of elasticities from a household demand system are discussed. This is used to identify who is likely to benefit from the rising urban demand. Additional descriptive analysis of changes in jobs in the food system is presented at the end to show the off-farm job opportunities created during the transition of the food system.

- *Rise in global agri-food trade* – Trends in agriculture trade performance at the global level and for Ethiopia are presented, benchmarking the country's agriculture trade performance, and identifying untapped markets. This is followed by a discussion of how rural households might benefit more from engaging in the global agri-food trade, incorporating evidence from value chain analysis. The analysis on this third driver is mostly descriptive based on secondary data sources from COMTRADE, FAOSTAT and GTAP.

- *Spatial and economic transformation* – The discussion of this driver starts with a descriptive presentation of rural-urban migration trends, job creation potential among urban based export-oriented firms, and how migrants are a major source of labor for these firms. Findings from the econometric analysis of the spillover effects of rural-urban migration on rural households and communities, such as labor productivity, renting of land, are then presented.

Chapter 4: Leveraging opportunities: Three pathways for increasing rural incomes.

This chapter identifies and discusses three pathways for expanding rural incomes by leveraging the opportunities presented in Chapter 3. The three pathways are: (i) increasing market orientation of farmers to take advantage of rising urban food demand and global agri-food trade; (ii) livelihoods diversification through off-farm job creation in the agri-food system; and (iii) rural-urban labor mobility. Similar to Chapter 3, a mix of results from descriptive analysis and complex statistical models is presented.

- *Increasing market orientation of farmers* – Given the trade-off between self-sufficiency and market orientation that households must weigh in their production decision-making process, this section starts by showing the impacts of

market participation on household welfare to make a case that market orientation enhances smallholder farmers' welfare. It then presents an analysis of the constraints or factors that disincentivize households to produce for, or participate more in, the markets. These factors are drawn from multivariate analysis of determinants of households' land use choices and determinants of market participation, which is done jointly with the estimation of the impact of market participation on household welfare.

- *Livelihood diversification through off-farm job creation in the agri-food system* – This sub-section starts with a presentation of evidence of the contribution of livelihood diversification into non-farm incomes to rural households' incomes and poverty reduction. Descriptive analysis of factors affecting the presence of non-farm job opportunities—low rural demand and a challenging business environment for rural development—are then presented. This is followed by a discussion of the main findings from an econometric analysis of how location factors, such as connectivity and population density on the one hand, and labor supply factors such as the household farming system, endowments and gender norms on the other hand, influence the creation and access to non-farm opportunities in rural areas and participation in non-farm work.
- *Rural-urban migration* – This starts with a presentation of evidence on the impact of migration on household outcomes. This is followed by quantitative analysis of the determinants of migration, combined with results from qualitative studies on challenges faced by rural urban migrants.

Chapter 5: Translating pathways into action: Priorities for increasing rural incomes.

This chapter presents priority areas for intervention for growing rural households' incomes in Ethiopia, distilling from the diagnostics in Chapter 3 and Chapter 4 on key opportunities and pathways for increasing rural incomes. Emphasizing the heterogeneity among rural households, and the poor in particular, the chapter identifies the different groups of the poor and discusses the most important constraints and impacts of different policy interventions for these groups. Prioritization of these interventions is then placed in the context of the Government's sectoral reforms by first presenting the key reforms undertaken to address constraints identified in the diagnostics and identifying areas where progress is being made and others where progress is stalled. A set of policy priorities are then presented, considering: (i) the impacts of constraints on increasing incomes across the three pathways identified in the study; and (ii) implementation feasibility in the context of ongoing policy reforms.

SNAPSHOT OF RURAL LIVELIHOODS: RURAL HOUSEHOLD INCOME AND WELFARE

To inform how to promote growth in rural incomes and accelerate poverty, the RID starts by presenting evidence on a series of questions to provide context about rural household welfare. These includes questions on who and where are Ethiopia's rural poor, and how has poverty in rural areas been changing? How do rural Ethiopians earn their incomes, and what shocks affect livelihoods? What are the main factors shaping heterogeneity in rural incomes? How do key household endowments translate into rural income gains? This section thus characterizes the current state of rural poverty and incomes in Ethiopia, shows trends, and identifies key dimensions of rural income heterogeneity, for example across welfare groups, geographical regions, and gender. The section also investigates the effects of recent and contemporary shocks on vulnerability and welfare, and the potential implications on poverty reduction efforts in Ethiopia. It therefore provides evidence to inform the analysis and policy recommendations presented later in the report.

The section starts with a quick summary of poverty trends over the period 2011–16, the most recent period for which official poverty statistics are available. It then discusses the key aspects of poverty that likely remained the same and what could have changed using some of the descriptive analyses from the year 2021. The section also marshals evidence of the recent development challenges that Ethiopia has been grappling with and that are expected to reverse the hard-won gains of the past two decades. In relation to this, the section highlights the likely welfare effects of the COVID-19 pandemic, inflation, internal conflict, drought, and the Russia-Ukraine crisis. The section also highlights the welfare implications of food price shocks for rural households.

Poverty and distribution of the poor

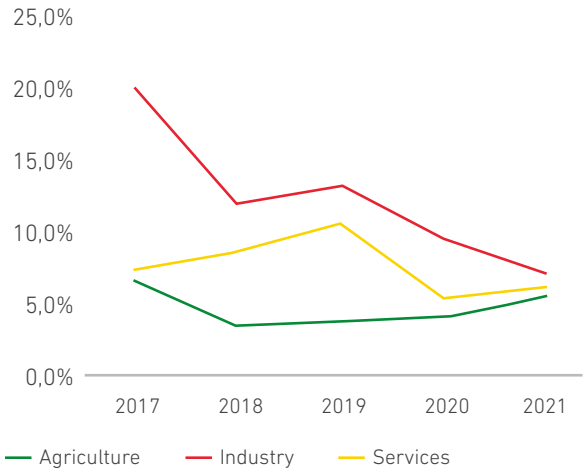
Strong poverty reduction but with increased spatial disparities

There have been significant improvements in rural well-being, but the gap between rural and urban areas has increased. In urban areas, poverty decreased strongly from 25.7 percent in 2011 to 14.8 percent in 2016, while in rural areas it decreased from 30.4 to 25.6 percent during the same period. Consumption growth has been especially weak among poor rural households. Growth for the bottom 15 percent was not statistically different from zero, in contrast to the top of the distribution where growth rates reached a maximum of close to 6 percent per year between 2011 and 2016 (World Bank, 2020b). The absence of gains for the poorest segment of the population owed to generally lower growth in rural areas. The bottom 20 percent in rural areas did not experience any increase in consumption between 2011 and 2016, while annual growth rates in consumption did not exceed 3 percent, even for the richest percentile. In contrast, mean consumption growth in urban areas was 5.9 percent per year and was always above 3 percent, even for the poorest. Poverty in Ethiopia is therefore disproportionately concentrated in rural areas, which accounted for 90 percent of the poor in 2016 compared with a rural population share of 80 percent, reflecting the stronger poverty reduction in urban as opposed to rural areas.

The growth elasticity of poverty was low, as rural households participated less in the growth process. This is because growth in the agriculture sector, where rural labor is concentrated, has been lower than any other sector. While GDP grew by 10.6 percent on average during 2010-15, agriculture

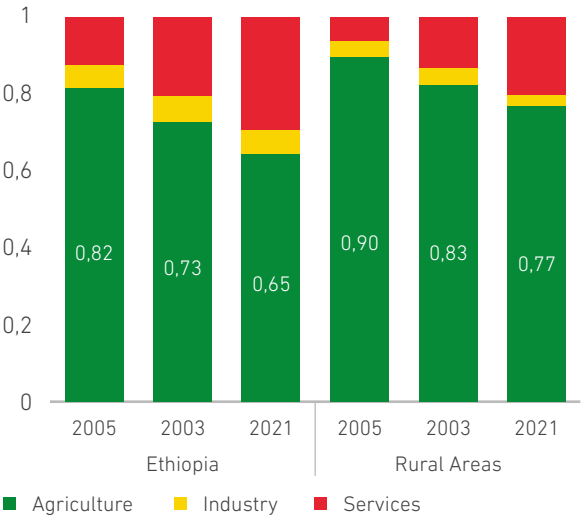
GDP grew by 6.5 percent. The shift of labor from agriculture to non-agriculture sectors has also been slow, despite the fast decline in agriculture's share of GDP. This pattern continued during the second half of the past decade. Agriculture growth was still lower than other sectors, though growth rates were converging to a lower rate (Figure 2), while employment data from the Labor Force Survey suggest the share of rural workers employed in the agriculture sector declined by 6 percentage points during 2013–21, similar to the decline observed during 2005–13 (Figure 3).

Figure 2. Sectoral GDP growth rates, 2016–21



Source: Authors' estimates from WDI.

Figure 3. Sectoral employment composition, 2005–21

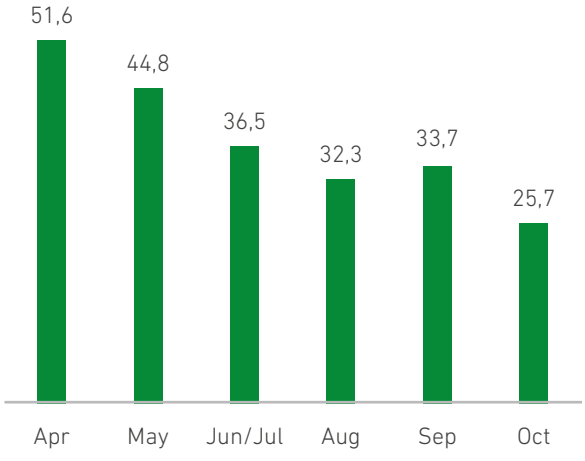


Source: Authors' estimates from LFS 2021.

Households have faced multiple shocks that increased vulnerability

Multiple shocks at the beginning of the new decade threaten to undo the gains made in the past. Since 2020, households in Ethiopia have had to contend with the COVID-19 pandemic, climate change-induced droughts, pests and diseases, conflict within the country, and now the fallout from the Russia-Ukraine war. The combination of these 3Cs—COVID-19, climate change, and conflict—have left no single part of the country untouched. As conflict exploded in the northern parts of the country, prolonged droughts were wreaking havoc in lowland areas, while the effects of the COVID-19 pandemic were felt everywhere, especially in urban areas that previously were the driver of poverty reduction in the country. High-Frequency Phone Surveys (HFPS) implemented by the World Bank after the onset of the COVID-19 pandemic showed that rural incomes declined over the course of 2020. More than half of rural households reported that their household incomes in April 2020 were lower than the previous month. Though declining, a high share of rural households continued to be reporting income losses throughout 2020 (Figure 4).

Figure 4. Share of rural households reporting loss in incomes (%), April-October 2020



Source: World Bank Staff's estimates based on HFPS Rounds 1 - 6.

Notes: For comparability, estimates from LFS 2013 were computed excluding data from Tigray, which was not covered in the LFS 2021.

The COVID-19 pandemic

The COVID-19 pandemic is likely to reverse the hard-won poverty reduction gains achieved in the past years. According to the World Bank's Poverty and Shared Prosperity Report 2020, the pandemic could have pushed some 100 million people into extreme poverty in 2020 alone, leading to an increase in global poverty for the first time since 1998 (World Bank, 2020c). Ethiopia has not escaped the impacts. Besides its direct effect on health, the most explicit impact of the COVID-19 crisis on the welfare of households and individuals in Ethiopia was through the loss of income due to disruptions of employment and transfers (Harris et al., 2021; Yimer, Alemayehu, and Taffesse, 2020). A World Bank study using the COVID-19 HFPS shows that the share of people below the 23.5th percentile line (a poverty line that coincides with the recent poverty headcount rate in Ethiopia) increased by 11.2 percent between 2019 (pre-pandemic) and November 2020 (Wieser, Takamatsu, Yoshida, Zhang, and Aron, 2020). While the share of people in urban areas below the 23.5th percentile increased by 33.2 percent, the share in rural areas increased by 9.4 percent. The much larger relative increase in poverty in urban areas reflects the more severe impact of the COVID-19 pandemic on employment and income in urban areas. Despite the smaller poverty increase in rural areas, the sheer size of the rural population, combined with higher poverty rates in rural Ethiopia, means that the increase in the absolute number of poor was higher in rural areas.

The pandemic affected the agriculture sector, mainly through indirect channels. Although no direct restrictions and lockdown measures were imposed on the agriculture sector (and broader agri-food systems, AFS), the sector faced a 4.7 and 10.6 percent loss in output and value-added in the agri-food system, respectively (Aragie, Taffesse and Thurlow, 2020). The partial or full lockdowns across the country also limited agricultural operations. Within the AFS, food services experienced the largest percentage decline in GDP (at 83 percent), followed by agro-processing (Aragie et al., 2020). The horticulture segment was also highly affected by the pandemic and the restrictive measures taken to contain the spread of the virus (Wieser, Ambel, Bundervoet and Haile, 2020). However, the effect of the pandemic on the rural economy was modest, as only a small share of farmers experienced challenges in their farming activities due to mobility restrictions at the onset of the pandemic in April 2020 (Wieser, Sosa, Ambel, Tsegay, and Pimhidzai, 2021). Rural households, however, faced challenges during the planting cycle mainly through their inability to purchase fertilizers and seeds. The pandemic also affected the livelihood strategies of agricultural households by altering them (e.g., agricultural intensification, livelihood diversification, and migration) and the disruption of agricultural input supply chains (Asegie, Adisalem and Eshetu, 2021). But the main channel through which rural households are negatively affected by the pandemic and its associated restrictions of movement and assembly is via reduced income.

The Climate Shocks

Increased occurrences of pests and diseases linked to climate change have affected rural livelihoods. Ethiopia experienced two invasions of desert locusts in 2020. The first invasion, which spread from Yemen to East Africa (including Ethiopia, Kenya, Somalia, Uganda, Sudan, and Tanzania) between January and May, is reported to have invaded 180–240 *woredas*[1] primarily in eastern and southern Ethiopia. The second invasion of locusts, which started in late September and peaked in October–November, was more severe than the first invasion (Ilukor and Gourlay, 2021). A

[1] Districts of Ethiopia are also called woredas and are the third level of the administrative division of Ethiopia, after zones and the regional states.

recent study using the HFPS shows that over half of all rural households in their *kebele*[2] and nearly 30 percent on their farms experienced locusts during the first locust invasion. At the peak of the second invasion, 37 and 20 percent of the rural households observed locusts in their kebele and on their farms, respectively. The Afar, Somali, and Harar regions had the highest incidence of reported locusts (Ilukor and Gourlay, 2021). The desert locust invasions caused an estimated cereal loss of more than 3.5 million quintals, affecting more than 806,000 farming households, almost 200,000 hectares (ha) of cropland, and 1.35 million ha of pasture and browse land (about 50 percent) in the areas around Somali and Eastern Oromia that have suffered continuous attacks (Ministry of Agriculture et al., 2020). Overall, the locust outbreak affected the food security of millions of people, compounding the already bleak food security and poverty situation in rural Ethiopia. While agriculture activities seemed to be impacted less by the COVID-19 pandemic, results from the HFPS show that one in four rural households still reported a reduction in income from farming activities in October 2020, much of which was attributable to the locust invasions (Wieser et al., 2021).

Prolonged drought is pushing families in the lowland areas in Ethiopia to the brink. A severe drought following three consecutive failed rain seasons (from late 2020 into 2021) has affected nearly 7 million people in Oromia, the SNNP, the South West, and the Somali regions (OCHA, 2022). The drought dried up water wells, killed livestock and crops, and pushed hundreds of thousands of children and their families to the brink. In the traditionally arid Somali region, for instance, the drought has caused severe water shortage and desiccated the landscape, making the grasses, shrubs, and browsing trees that camels and other animals typically feed on scarce. The greatest impact is on livestock deaths due to a lack of pasture and water. Households lost income due to animal deaths or as prices went down. The drought conditions have also led to a 20 percent increase in severe acute malnutrition among children (UNICEF, 2022). As a result of the severe drought that led to livestock losses, many families have been forced to leave home without any job opportunities. Overall, the drought conditions heightened the need for emergency food assistance in the affected regions.

Conflict

The conflict in the northern part of the country has also destroyed livelihoods. The conflict between the federal authorities and the Tigray regional government has devastated Ethiopia's north. The conflict erupted in November 2020 at the peak of the main agricultural season (*meher*) harvest period, when many households had not yet harvested their crops. It is estimated that over 90 percent of the crop harvest and 15 percent of the Tigray region's 17 million livestock were lost. Throughout 2021, the conflict expanded beyond Tigray into the neighboring regions of Amhara and Afar, causing high levels of food insecurity mainly through widespread crop and livelihood losses, and the destruction of the local economy. The resulting limitations on movement also impaired livelihood activities, market functioning, access to basic services, and humanitarian assistance (WFP, 2022b). This has caused the deaths of tens of thousands, created large-scale displacements, and vast humanitarian needs in northern Ethiopia (ECHO, 2022). As of June 2021, about 5.5 million people in Tigray and neighboring Afar and Amhara (nearly 93 percent of the population in northern Ethiopia) were in high acute food insecurity. The most recent global food crisis report that covers nearly half of the country's 115 million population cited Ethiopia as being among the four countries with the highest number of people that faced

[2] A *kebele* is the smallest administrative unit of Ethiopia, and similar to a ward, a neighborhood or a localized and delimited group of people.

Catastrophe (IPC Phase 5) in 2021, primarily due to conflict or insecurity (WFP, 2022b).

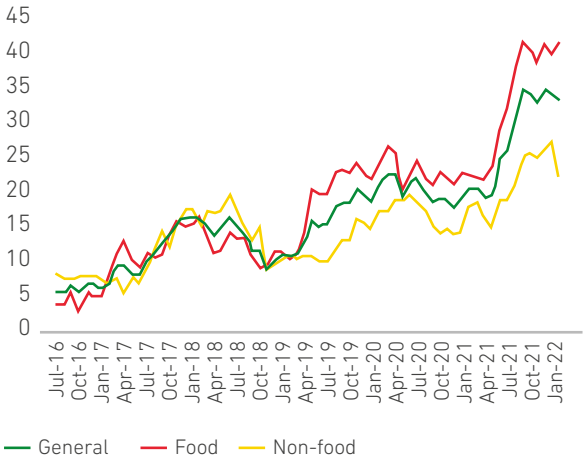
Market Shocks

Inflation has been rising in Ethiopia more recently. After hovering at around 20 percent in 2020 and the first half of 2021, inflation rose to very high levels in mid-2021, remaining above 30 percent in early 2022 (World Bank, 2022c). As of February 2022, food inflation was estimated to be about 42 percent—the highest rate recorded during the past nine years—while non-food inflation stood at 22.9 percent. The primary contributors to the high inflation in the country since June 2021 were food prices (Figure 5 and Figure 6), where *bread and cereals* and *oils and fat* have contributed to about 60 percent of food inflation. In more recent months, vegetables and non-alcoholic beverages, and coffee have increased their contributions to food inflation. Non-food inflation was mainly driven by: (i) housing, water, electricity, gas, and other fuels; (ii) furnishings, household equipment, and routine maintenance; and (iii) clothing and footwear, which contributed to about 60 percent of non-food inflation between June 2021 and February 2022. The contribution of alcoholic beverages and tobacco has increased in recent months.

Production shocks from droughts, pests and diseases, and the escalation and spread of the armed confrontation since June 2021 have contributed to high inflation. A decline in oilseed production and a deceleration in cereal production had already been observed during the main harvest season of the FY2020/21 (World Bank, 2022a). This supply shock was magnified in FY2021/22 by the subsequent conflict. According to regional authorities in Amhara, about 41 million quintals of agricultural production (or about 10 percent of the production of the previous year) were lost due to the conflict in the fall of 2021 when the armed clashes escalated (World Bank, 2022c). The conflict also affected some non-food prices. For example, the closure of the Messobo Cement Factory (with a market share of over 20 percent) due to the armed conflict in Tigray was likely among the factors contributing to an increase in the prices of building materials (furnishings, household equipment, and routine maintenance).

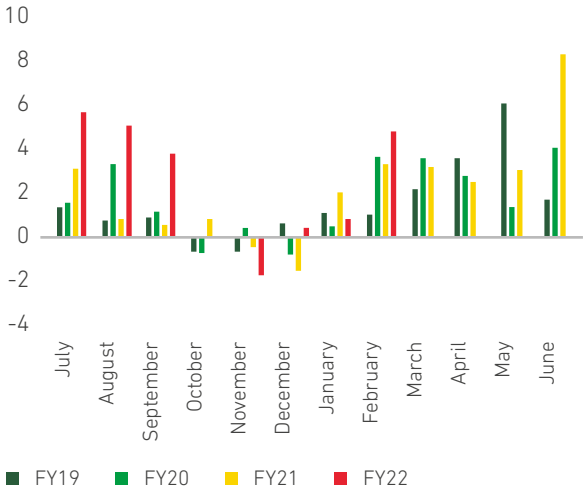
The Russia-Ukraine crisis is likely to aggravate the already high inflation in Ethiopia and exacerbate food insecurity through the availability and pricing of commodities. Within just a few weeks of the outbreak of the Russia-Ukraine war in February 2022, the global prices of wheat, corn, fertilizer, and oil all soared. This will likely aggravate the already high inflation and exacerbate food insecurity in Ethiopia, through the reduced availability and higher pricing of commodities (e.g., wheat, energy, oil, and fertilizer) (WFP, 2022b). Ethiopia is likely to

Figure 5. Inflation rate, year-on-year (%), 2016-22



Source: World Bank (2022c).

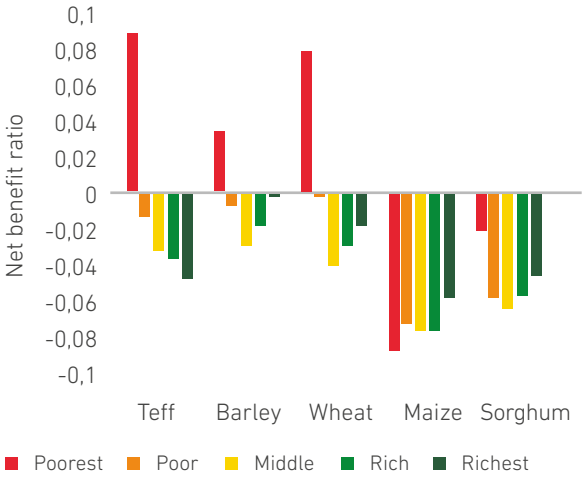
Figure 6. Monthly food inflation, (percent change), 2019-22



be more severely affected by the ongoing conflict in Ukraine, as the country imports 2.3 percent of its total imports (mainly wheat and oil) from Russia and Ukraine. A shortage of fertilizers due to protracted fertilizer deliveries will also lead to rising fertilizer costs and food prices, with knock-on effects for agricultural production and food security in Ethiopia. The impact will be more severe among resource-poor and credit-constrained agricultural households by constraining their ability to respond to rising prices. Besides the direct effects of the conflict, the imposition of export tariffs or trade restrictions by Ukraine and Russia (e.g., export bans on wheat to support domestic food needs should the crisis prove to be prolonged) could slow trade in food and fertilizers, worsening global food crises and further fueling inflation (WFP, 2022a).

Though food price increases have heterogenous consumption effects by income groups and market position, the impacts on rural household welfare in Ethiopia are generally negative. High commodity prices, particularly for food, could have adverse effects on consumption and poverty for net food buyers but are beneficial for net seller households. A new analysis based on the net buyer ratio (NBR), which expresses the household food production and consumption gap relative to a household's expenditure, shows that price shocks (increases) for teff and wheat have a low impact on rural households, but increases in maize and sorghum prices have a severe impact, especially on the rural poor as their buyer positions are worse (Figure 7) because net buyers of maize and sorghum out number net sellers. However, the poor will benefit from price increases in teff and wheat as there are more net sellers than net buyers of these crops (Table 2).

Figure 7. Net buyer ratio (NBR) by food commodities and welfare quintiles



Source: Authors' estimates based on ESS 2018/19.
Notes: The net benefit ratio (NBR) of a food item is calculated as net production (production-consumption) divided by total household consumption. It expresses the household food production and consumption gap relative to a household's expenditure.

Table 2: Household distribution by crop market position and welfare quintile, 2019

	Teff			Barley			Wheat			Maize			Sorghum		
	Net seller	Net buyer	Self-sufficient	Net seller	Net buyer	Self-sufficient	Net seller	Net buyer	Self-sufficient	Net seller	Net buyer	Self-sufficient	Net seller	Net buyer	Self-sufficient
Poorest	17.6	11.1	71.3	8.1	9.2	82.7	8.2	6.3	85.5	9.7	44.9	45.4	11.0	17.5	71.6
Poor	13.2	19.0	67.8	9.9	11.5	78.6	11.1	14.4	74.5	7.0	37.5	55.5	5.4	21.2	73.4
Middle	14.7	22.3	63.0	5.5	9.9	84.6	9.5	20.2	70.3	5.8	35.1	59.1	3.1	19.6	77.3
Rich	11.2	19.8	69.0	5.0	8.7	86.3	6.4	14.4	79.2	3.8	44.5	51.7	2.7	18.2	79.1
Richest	9.7	24.4	65.9	4.3	2.9	92.8	6.1	14.6	79.3	2.9	28.0	69.1	1.8	15.2	83.0

Source: Authors' estimates from ESS 2018/19.
Notes: Household are classified based on their NBR as follows: Net Buyers (NBR < -0.05); Net Sellers (NBR>0.05) and Self-sufficient (-0.05 <= NBR <= 0.05)

Households are fully exposed to the price increases of maize, barley and sorghum, as their consumption is less responsive to price changes of these crops. Analysis using price elasticity estimates from the Exact Affine Stone Index (EASI) demand system function (Box 1) shows that the price elasticity of demand for maize, barley, and sorghum is close to zero (Table 3). In addition, the poor tend to substitute teff with wheat. However, cross-price effects appear to be rather weak for most commodity pairs. This suggests limited possibilities in consumption for substitution and/or complementarity in Ethiopia. Diversity in the bio-physical and socio-economic landscape is likely to constrain these possibilities. Rural households that produce teff and wheat (commodities with high urban demand) are however likely to benefit from price increases.

Table 3: Price elasticities of demand of major cereals, 2019

						Relative income group	
	Rural					Bottom 40 percent	Top 60 percent
	Teff	Wheat	Maize	Sorghum	Barley		
Teff	-0.105***	-0.037**	-0.079***	-0.001	-0.047***	-0.146***	-0.081*
Wheat		-0.199***	-0.073***	0.074***	0.003	-0.194***	-0.198***
Maize			-0.053**	0.031***	-0.046***	0.016	0.065***
Sorghum				-0.029*	-0.013	-0.01	0.008
Barley					-0.003	-0.100*	-0.033

Source: Authors' estimates from ESS 2018/19.
Notes: Estimates based on the Exact Affine Stone Index (EASI) demand system. * p < 0.10, ** p < 0.05, *** p < 0.01.

Box 1: Estimation of own- and cross-price elasticities

The Exact Affine Stone Index (EASI) demand system is used to estimate price elasticities of demand for the commodities in Table 3. The EASI models, while maintaining the simplicity of the AIDS model, accommodate high rank Engel curves and unobserved preference heterogeneity. Observable sources of preference heterogeneity are also controlled, and these are the gender of the head, size of household in adult equivalence and being a PSNP beneficiary.

Relative income groups: To capture different inflationary pressures (short-term effects of price shocks) by relative income group and net market position, we construct price elasticities for the bottom 40 percent and top 60 percent, and for net seller and net buyer households.

Market position: The definition of the net-seller/net-buyer status of households is based on three components: (i) sale of production for income (income source); (ii) purchase of food on market (expenditure); and (iii) own-production (stocks for consumption, seed, or storage). A net-seller household is a household whose combined production and stocks of the commodity is more than what it consumed during the year of the study. Similarly, a net-buyer household is a household whose combined production and stocks of the commodity is less than what it consumed during the year under consideration.

Household livelihoods

The lack of consumption gains for the poor makes the progress uneven and many rural people are still exposed to substantial risks. Having examined rural poverty trends and key factors influencing rural-urban disparities in poverty reduction, this section focuses on characterizing rural income patterns and dynamics. It also identifies the main factors that shape heterogeneity in the composition of rural incomes, providing important evidence for setting policy priorities. There are three factors behind heterogeneity in rural incomes that need to be emphasized to promote inclusive rural income growth. First, incomes within agriculture are still largely centered around crop production, mainly staple crop production. Second, there are pervasive gender gaps in rural Ethiopia where women are largely employed in agriculture and unpaid work primarily because of low education or skills. Third, geographic location and transfers largely determine heterogeneities in income diversification across different regions and agro-ecological zones.

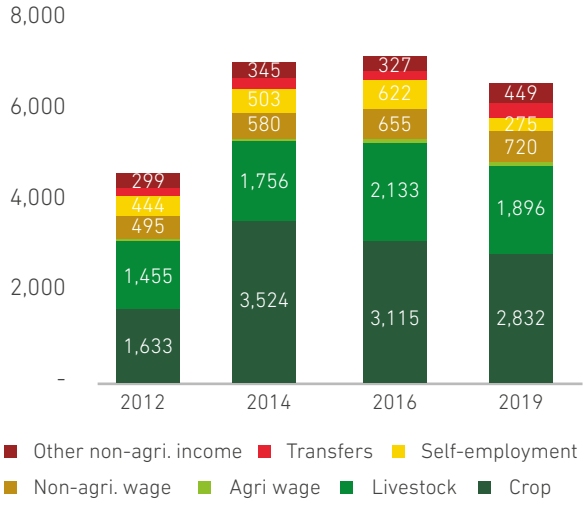
Rural livelihoods – Household incomes are increasing over time but stagnated for the poor

Rural incomes have significantly increased over time although they have stagnated for the poor in the last half of the past decade. The average rural income grew (in nominal terms, in Ethiopian birr) from about Br 1,925 in 2012 to Br 6,137 in 2019. Real incomes (in December 2019 prices) on average grew between 2012 and 2016 and declined between 2016 and 2019 (Figure 8), suggesting that there were high inflationary pressures during this period. The increase in total rural incomes is significant for the richest. Incomes of the richest quintile are more than double those of the poorest quintile, who have lower incomes across almost all sources. For instance, non-agricultural wage income is about six times higher for the richest quintile. Moreover, income growth for the bottom 40 percent stagnated between 2014 and 2019 (Figure 9).

Rural livelihoods are predominantly agricultural

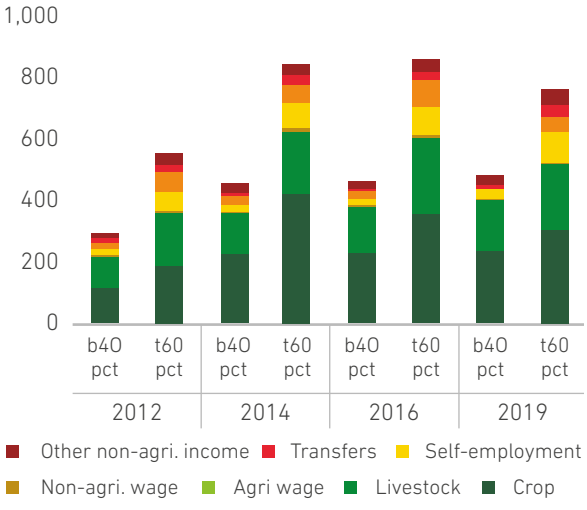
Agriculture, mainly on-farm production, remains the main source of livelihoods and income in rural

Figure 8. Trends in rural incomes by income source, 2012–19 (Ethiopian birr, 2019 prices)



Source: Authors' estimates based on ESS 2011/12, 2013/14, 2015/16, 2018/19.

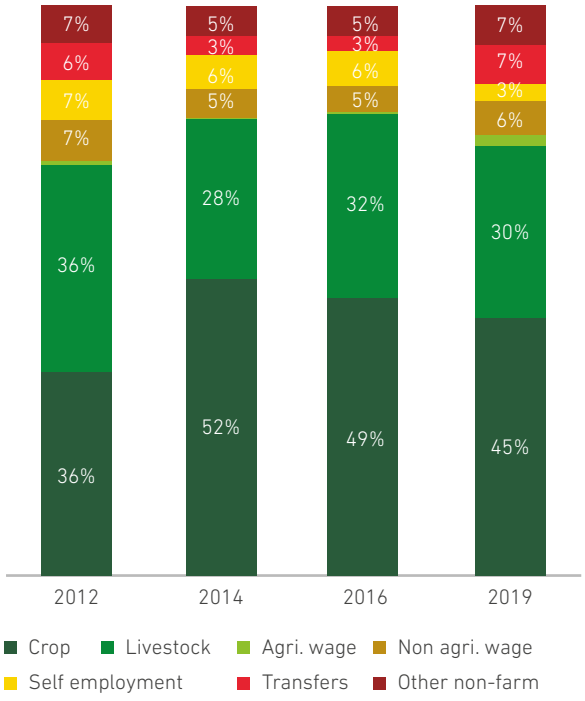
Figure 9. Trends in rural incomes by income source and welfare status, 2012–19 (Ethiopian birr, 2019 prices)



Source: Authors' estimates based on ESS 2011/12, 2013/14, 2015/16, 2018/19.

Ethiopia. More than 90 percent of rural households participated in agriculture (crop production, livestock raising, or agricultural wage employment) in 2019, highlighting that agriculture continues to play a fundamental role in rural households' economic portfolios. Rural households have higher shares of agricultural income or farm income (Figure 10), though the share of income from agriculture declined between 2016 (81 percent) and 2019 (77 percent). Within agriculture, crop production contributes a large share of agricultural and rural incomes. Although agricultural wage employment is a common off-farm activity that could help the poor supplement their on-farm income between cropping seasons, it appears to be a much less important source of income than other off-farm activities, contributing only 2 percent of the total incomes in 2019 (Figure 10). This could reflect limited opportunities for wage employment in agriculture (FAO, 2017; Lanjouw, Quizon and Sparrow, 2001) because private and state farmers are not common (they produce about 6 percent of the food crops and 2 percent of the coffee) and family labor is the most important contributor to agricultural work with hired labor contributing about 7 percent of agriculture labor (Bachewe, Berhane, Minten, and Taffesse, 2016).

Figure 10. Share of total income by source, 2012–19



Source: Authors' estimates based on ESS 2011/12, 2013/14, 2015/16, 2018/19.

Off-farm labor income sources—wage and self-employment—contribute less to rural incomes. In the absence of a significant market for agricultural wage labor, the main source of alternative incomes is non-agricultural wage employment and self-employment in a wide range of extremely varied activities, including agro-processing, manufacturing, mining, commerce, transportation, utilities, tourism, and other services (Haggblade et al., 2007). Reflecting the higher level of the rural labor market supply and lower-level rural non-farm enterprise development in Ethiopia, non-agricultural wage employment has relatively higher contributions to rural income (6 percent of income in 2019) than self-employment (3 percent), though both sources' contributions to rural incomes are still low (Figure 10).

The lower share of non-agricultural wage employment income is primarily because such employment is a limited option in rural Ethiopia, mostly found in regions with unique endowments of resources, infrastructure, and services. In Sub-Saharan Africa (SSA), especially in rural areas, wage employment in productive sectors (e.g., manufacturing) is scarce, and most non-agricultural wage labor consists of jobs in the services sector. The most lucrative opportunities are usually available to households that are already well-off, with ample human and social capital. Self-employment is believed to be the most common source of off-farm income in developing countries and the main diversification option for the poorest households. However, the incidence of self-employment and its contribution to rural incomes are extremely low in rural Ethiopia. In 2019, only 15 percent of the households participated in self-employment, while participation was higher in other countries such as Nigeria (53 percent), Malawi (34 percent), and Uganda (27 percent) during the same period. The contribution of self-employment to rural income was 3 percent in Ethiopia but higher in other SSA countries, including Malawi (8 percent), Uganda (14 percent), and Nigeria (26 percent).

The share of non-agricultural income has increased in recent years, driven mainly by

income from transfers and other non-labor income sources. Non-labor income from transfers (remittances and safety nets) and other income (such as land and property rentals, income from inheritance, or sale of assets) have contributed to an increase in non-agricultural income. Transfer incomes are generally greater than income from local non-farm activities (such as wage employment or self-employment). Among the main components of transfers are social protection programs that seek to promote the more efficient use of resources and allow poor rural households to invest in riskier but more remunerative livelihood activities, mainly by reducing liquidity constraints and supporting labor mobility (Slater and Mccord, 2009). Other non-labor income sources, such as rents from land and other property, contributed about 7 percent to rural incomes in 2019 (and increased between 2016 and 2019 by 2 percentage points).

Rural households are subsistence-oriented and less diversified

Most rural households specialize in farm activities, deriving most of their income from farming. The share of rural households that generates more than 75 percent of their income from farming alone increased between 2012 and 2016, before it declined in 2019 (Table 4). This indicates that specialization in on-farm activities continues to be the norm among rural households in Ethiopia, as in most African countries including Kenya. Specializing in off-farm employment is, however, a rare phenomenon. A small share of rural households specializes in off-farm employment—wage employment, self-employment, or transfers/migration/other non-labor activities. The degree of dependance on transfers is however consistent with other African countries that have more than 5 percent of households specializing in transfer income (Kenya, with 9 percent). The share of households that do not derive more than 75 percent from a single income source —be it farming, labor, transfers, or other non-agricultural sources—but instead have a diversified income source decreased between 2012 and 2016, and then increased in 2019. The increases in diversified income in 2019 were driven partly by engaging more in off-farm income alternatives mainly wage employment and transfers. Overall, diversification was relatively low at the household level.

Table 4: A typology of rural households by type of livelihoods

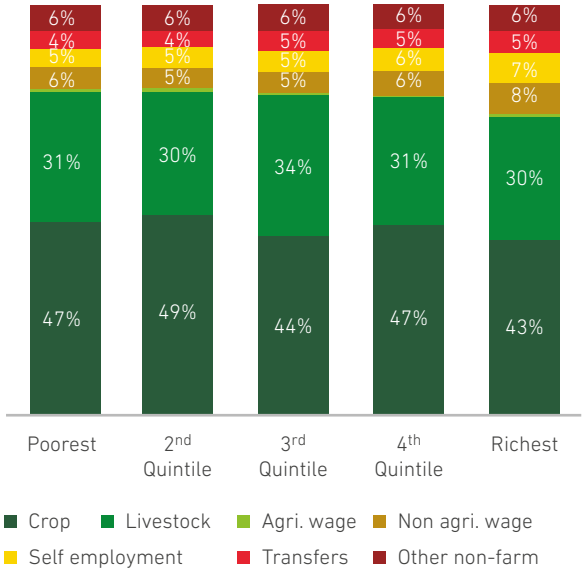
Typology	Definition	2012	2014	2016	2019
Specialized in farm activities	More than 75 percent of total income from farm production (crop/livestock)	61	72	75	68
Specialized in wage employment	More than 75 percent of total income from agricultural/ non-agricultural wage employment	5	3	2	4
Specialized in self-employment	More than 75 percent of total income from nonfarm self-employment	4	2	3	2
Specialized in transfers/other nonlabor	More than 75 percent of total income from transfers/ other nonlabor sources	5	3	3	6
Diversified	Neither farming, labor, nor migration income source contributes more than 75 percent of total income.	25	20	17	20

Source: Authors' estimates from ESS 2011/12, 2013/14, 2015/16, 2018/19.
Notes: Carletto et al. (2007) and Davis et al. (2017) for the methodology.

The rural poor depend most on agriculture

Agricultural income typically accounts for a larger share of income for the poorest households. The importance of on-farm sources of income (crop and livestock production) gradually decreases with income, as they are replaced by non-agricultural or off-farm income, mainly non-agricultural wage income and transfers (Figure 11). The relative importance of off-farm (non-agricultural) income is greater among wealthier households. Within non-agricultural income sources, transfer income tends to be relatively higher among the relatively few better-off households (FAO, 2017). This could imply that the poorest rural households either engage in short-term migration to reduce the food security gap or consumption smoothing, or that household members do not have the means to migrate. The share of income from non-farm employment is similar across the first four quintiles, though average non-farm incomes are higher among the better off quintiles. This might reflect a pattern of *neutral diversification*, in which the poorest and most marginalized households engage in minor self-employment activities with very low returns as coping or survival strategies (Losch, Fréguin-Gresh and White, 2012).[3]

Figure 11. Income shares by quintiles, 2019



Source: Authors' estimates based on ESS 2011/12, 2013/14, 2015/16, 2018/19.

The difference in the level of engagement in off-farm activities between the poor and the rich could be due to differences in resource endowments, such as capital, education, and infrastructure. The wealthier households are the ones that often seize remunerative or higher-return rural non-farm opportunities (e.g., Barrett et al., 2001; Bezu et al., 2012) and they are the ones that can accumulate capital, increase adult labor or increase access to credit and savings (Bezu and Barrett, 2012). The poor often face entry barriers that render them unable to make investments in key assets (Reardon, Taylor, Stamoulis, Lanjouw and Balisacan, 2000). As a result, they engage in low productivity activities such as subsistence agriculture and seasonal agricultural wage labor (Davis et al., 2017).

Land ownership dictates income diversification

The share of non-agricultural income decreases with the size of landholdings. Market labor income is important where population pressures on limited land resources are high or where seasonal income from farming is insufficient for survival in the off-season, possibly because of weather-related shocks, price risks, or diseases (World Bank, 2007). In Ethiopia, the share of agricultural (farm) income increases with the size of landholdings driven mainly by crop production (Table 5). The rural landless tend to depend on non-agricultural income sources, including wage employment, self-employment, and non-labor income sources. They are likely to depend on the non-farm income for their survival because they have limited options, unlike agricultural households that mostly count on non-farm earnings to diversity risk, moderate seasonal income swings, and finance agricultural input purchases (Haggblade, Hazell and Reardon, 2010; Kosec, Ghebru, Holtemeyer, Mueller and Schmidt, 2017; Winters et al., 2009).

[3] This is in contrast to a positive diversification (generally a full-time activity), in which self-employment contributes significantly to household income. Moreover, positive diversification is accessible mostly to better-off households—those with more or better assets and the ability to make an initial investment (for example, a grinder, a sewing machine, or welding equipment).

Differences in diversification among agro-ecological zones are primarily driven by transfers

Agricultural income share is higher in high agriculture potential areas than in less potential areas. In areas where the agro-climate is favorable, i.e., moisture reliable areas that include parts of Amhara, Oromia, SNNP, and Benishangul-Gumuz regions (World Bank, 2017a), households tend to earn more from farming with crop production, which tends to be the most important means of livelihood, contributing about half of the total household income (Table 6). Most regions (Amhara, Afar, Dire Dawa, Harari, Gambela, and Tigray) have agricultural income shares of between 60 and 80 percent. Livestock income is an important source of income in drought-prone, lowland, pastoralist areas, and more so than elsewhere. The Somali region appears to be an exception, with a small share of income from agriculture (mainly livestock). In the Afar region as well, agriculture (livestock production) makes the largest contribution to income.

Table 5: Income diversification patterns by landholding classes, 2019

	No farmland	0 - 1 ha	1 - 2 ha	2 - 4 ha	> 4 Ha	Rural
Agricultural income	36%	80%	85%	91%	95%	77%
Crop	0%	52%	53%	55%	57%	45%
Livestock	34%	27%	32%	36%	37%	30%
Agriculture-wage	1%	1%	0%	0%	0%	2%
Non-agriculture (labor) income	29%	10%	5%	3%	2%	9%
Non-agriculture. wage	20%	7%	3%	2%	1%	6%
Self-employment	9%	3%	2%	1%	1%	3%
Non-labor income	35%	11%	9%	6%	4%	14%
Transfers	22%	5%	3%	1%	1%	7%
Other non-agriculture sources	13%	6%	6%	5%	3%	7%

Source: Authors' estimates from ESS 2018/19.

Table 6: Income diversification patterns by agro-ecological zone

	Drought-prone, highland	Drought-prone, lowland, Pastoralist	Humid moisture reliable, lowland	Moisture reliable, highland-Cereal	Moisture reliable, highland-Enset
Agricultural income	75%	57%	64%	82%	80%
Crop	48%	18%	33%	50%	51%
Livestock	27%	39%	30%	31%	27%
Agriculture-wage	0%	1%	1%	1%	1%
Non-agriculture (labor) income	14%	16%	12%	8%	8%
Non-agriculture. wage	12%	13%	5%	4%	5%
Self-employment	2%	3%	7%	4%	3%
Non-labor income	11%	27%	24%	11%	12%
Transfers	7%	19%	7%	3%	6%
Other non-agriculture sources	4%	8%	17%	8%	6%

Source: Authors' estimates from ESS 2018/19.

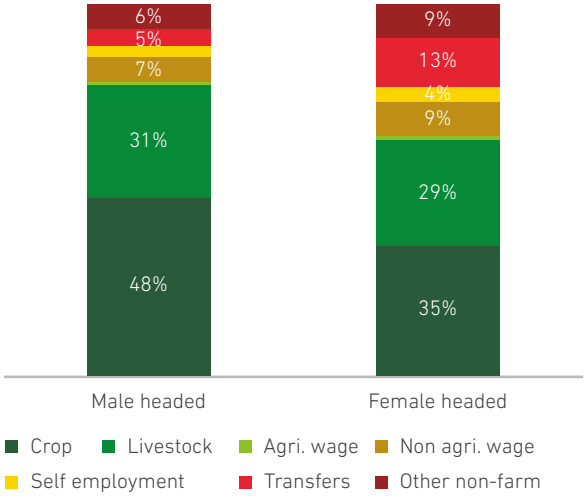
Non-agricultural incomes are more important in the lowlands due to transfers. Non-agricultural income makes up between 18 and 20 percent of the total rural household incomes in high potential agricultural areas, much of that coming from non-labor income sources (Table 6). In less agriculture potential areas that include arid regions (Tigray, Afar, and Gambela), the non-farm sector is larger, contributing between 25 and 43 percent of the total income. The most important non-farm income sources in these areas are transfers and non-agricultural wage employment, contributing 19 and 13 percent of the total incomes, respectively. The contribution of wage employment and self-employment is also relatively higher in these areas than those in agriculture potential areas. The results hint at push factors for diversification, with households in less-favorable agroclimatic zones (less fertile or drier regions) tending to diversify their livelihoods beyond agriculture and engage in non-farm activities to manage crop income risk or to cope with the risks (Schmidt and Woldeyes, 2016; World Bank, 2007).

Non-agricultural incomes are more important for households with female heads

The income diversification pattern differs considerably across gender. Although women have traditionally been heavily engaged in farming and contribute a large share of the agricultural workforce, the share of income from agriculture is less among female-headed households than for male-headed households (Figure 12). This is primarily driven by differences in transfer incomes, which make up 13 percent of incomes of female-headed rural households compared with 5 percent among male-headed households. Private transfers, including remittances, make up about 56 percent of the transfer income among female-headed households. The difference in the contribution of labor income (non-agricultural wage and self-employment) is not as big, though female headed household also have a higher share of income from these sources than male headed households. Thus, differences in income composition by gender of the household head are driven largely by transfers than labor income. The higher share of income from non-agriculture sources for female-headed households could reflect that female household heads are pushed into off-farm employment because they have less access to land and other factors of production than men (World Bank, 2019b).

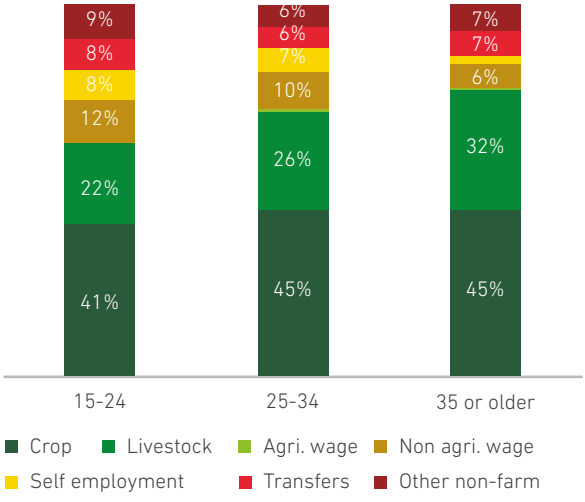
Compared with adults, younger farmers are more likely to engage in non-agricultural or off-farm activities. The share of agricultural or farm income increases with age, accompanied by a decrease in the share of non-agricultural or off-farm income with age (Figure 13). Households that have younger heads (15 to 24 years of age) earn relatively a

Figure 12. Rural income composition by gender of household head, 2019



Source: Authors' estimates based on ESS 2018/19.

Figure 13. Rural income composition by age of household head, 2019



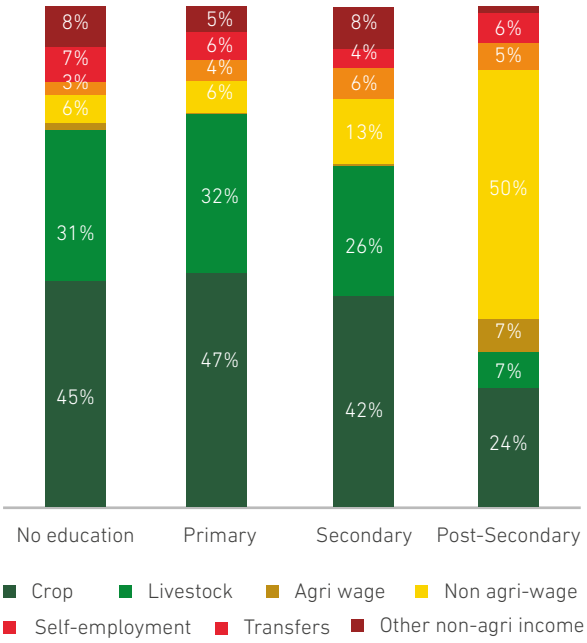
Source: Authors' estimates based on ESS 2018/19.

lower share of their income from farming (crop or livestock production) compared with those with older heads. The results also show that households that have younger heads (15 to 24 years of age) earn a relatively higher share of income from non-agricultural wage employment and self-employment than households that have mature or older heads. The findings highlight the importance of rural non-agricultural or off-farm jobs to rural youth and female-headed households.

Income diversification is positively correlated with education

Education increases prospects of non-agricultural employment and has high returns in rural Ethiopia. The income shares from farm sources (crop and livestock production) decrease with the level of education, while those of non-agricultural sources (mainly wage-employment) increase with education (Figure 14). Households with heads that have no formal education or less education earn a larger share of their income from agriculture compared with those households with heads that have higher levels of formal education. Both the level and share of income from off-farm or non-agricultural sources increase with education. The share of off-farm income for households with a head that has no formal education and those with post-secondary education is 24 and 69 percent, respectively. Households that have heads with post-secondary education earn about half of their income from wage employment. Self employment's contribution to total incomes is among households with more educated heads as well. The findings point to a high return to education in terms of expanding access to opportunities.

Figure 14. Income composition by education status, 2019



Source: Authors' estimates based on ESS 2018/19.

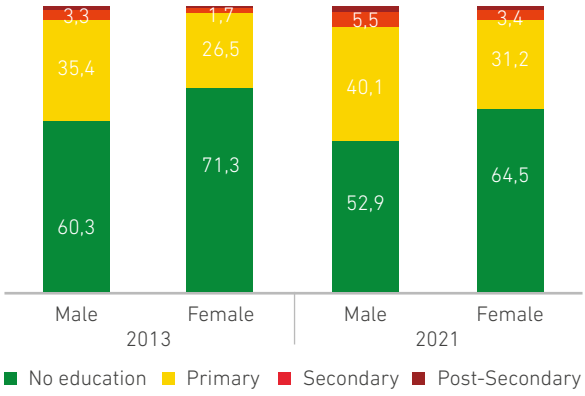
Household endowments

The amount and quality of household endowments—human capital, land, productive resources, and infrastructure—affect rural households' earning capabilities and incomes. Education and land are the key household assets that have been shown to influence earnings in rural areas. Also important, are productive services and infrastructure (e.g., roads, electricity, markets, credit and insurance markets) and financial institutions, which are crucial to both agriculture and rural non-farm activities. Rural electrification is, for instance, a critical element of rural development and diversification. Better infrastructure increases investments and incomes and improves the supply response by providing greater access to output and input markets and allowing lower production and transaction costs. This sub-section analyzes the key household endowments to paint a clearer picture of how people in rural Ethiopia earn their incomes.

Human capital is low

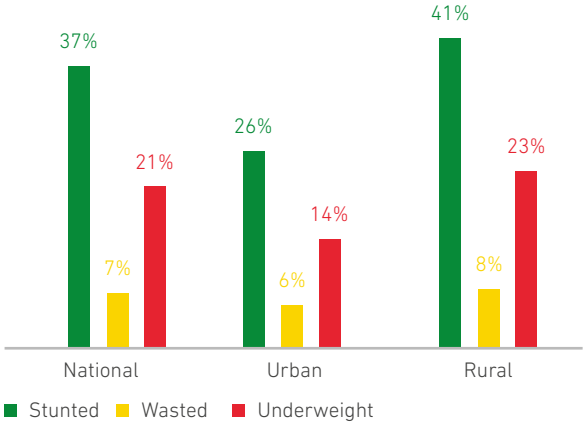
Education attainment is low, especially among women. Education is a key asset in determining people's capacity to earn higher incomes. However, the rural population remained poorly educated in 2021, although there was an improvement from 2013. Women remain less educated than men. In 2021, about 71 percent of women had no formal education, compared with 60 percent of men. In addition, women are less likely to pursue higher levels of education. Only 2 percent of women in rural areas have completed secondary school or above, compared with 4 percent of men (Figure 15). A low level of literacy in rural Ethiopia (particularly among women) implies low skills and knowledge (of technologies, opportunities, etc.) that would constrain rural income growth.

Figure 15. Population distribution by education attainment (%), 2021



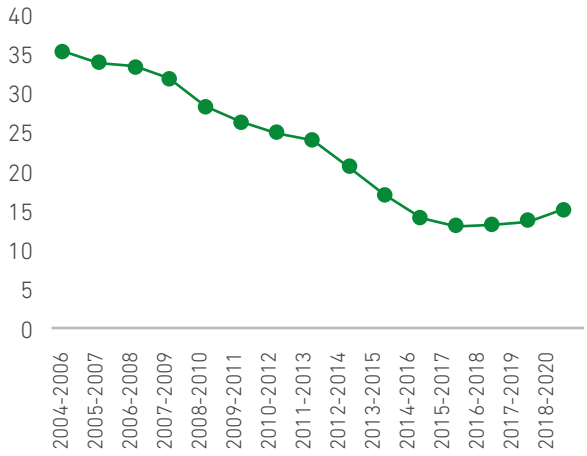
Source: Authors' estimates based on LFS 2013 and 2021.
Notes: (a) Estimates for 2013 exclude the Tigray region which was not covered in the 2021 survey; (b) **Primary** – has some primary education; **Secondary** – has some post primary education up to complete secondary education; **Post-secondary** – has some post-secondary education.

Figure 16. Nutrition outcomes of under five years old rural children (%), 2019



Source: Ethiopia Mini DHS 2019.

Figure 17. Prevalence of undernourishment (modeled value, %)



Source: FAOSTAT.

Nutrition outcomes are also poor, with child stunting very high in Ethiopia. Data from the 2019 Ethiopia Mini Demographic and Health Survey (EMDHS) show that about 37, 7 and 21 percent of children under five years of age are stunted, wasted, and underweight, respectively (Figure 16). Overall, children in rural areas are more likely to be stunted, wasted, and underweight than those in urban areas. The prevalence of undernourishment decreased between 2004 and 2017, but then slightly increased over the past five years (Figure 17). A recent report shows that about 5.2 million children under five years of age (7.2 percent) were wasted in 2021 (WFP, 2022b). Nutrition outcomes are expected to further deteriorate following the conflict in northern Ethiopia and the drought in regions in the south and southeast of Ethiopia. Low nutrition outcomes have negative implications for future productivity and earnings.

The poorest own less land on average

The average landholdings are small on average, and the poor own less land than the rich. The national average landholding is 1.02 hectares (ha) per household, and about 0.90 ha among the poorest quintile (Figure 18). The difference in landholdings between the rich and the poor is greater when adjusted for household size, a measure of the mouths that need to be fed, and labor that needs to work on the farms or adjusted for the productive potential of the land. The per capita landholding among the poor is 0.10 ha, while households in the richest quintile own about 0.18 ha of land per capita (Figure 19). The average per adult equivalent caloric production potential of land owned by rural households (land suitability) is found to be 885, on average, but only 708 among the poor, with the richest quintile owning nearly twice as much land as the poorest quintile (Figure 19).

Figure 18. Average landholdings (ha) by quintile, 2019

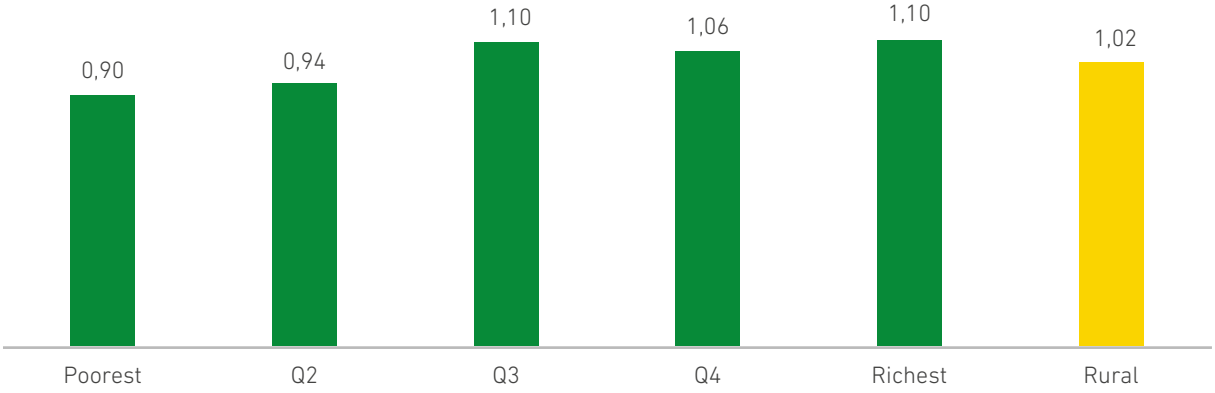
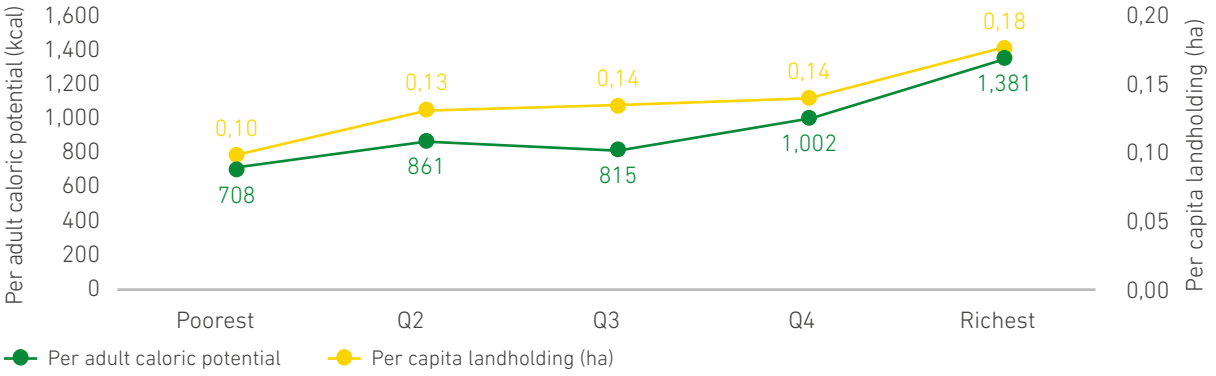


Figure 19. Average landholding (ha) and caloric production potential (kcal) by welfare quintile, 2019



Source: Authors' estimates based on ESS 2018/19.
Notes: The household caloric production potential is calculated as the product of the Caloric Suitability Index (CSI) and total landholding. The CSI gives the average caloric yields per hectare of land.

There are significant gender gaps in land ownership, with women owning less land than men. The results indicate much larger gender gaps or inequalities in land ownership when we consider landownership solely by men or women (Table 7). The share of land owned only by men and women were 17 and 28 percent, respectively. Moreover, the share of land with titles owned by women is 20 percent, while 36 percent is owned by men. The gender differences in land ownership could explain existing gender gaps in productivity and constrain women's opportunities to engage in the production of high-value crops through diversification. Closing the gender gap in agricultural productivity would need inclusive land-titling programs.

Table 7: Land ownership by gender, 2019

	Share (%)
Total land ownership	*100*
Land owned by women	17
Land owned by men	28
Land jointly owned	55
Titled land ownership	*100*
Land female owned by women with title	20
Land owned by men with title	36
Land jointly owned with title	44

Source: Authors' esitmates from ESS, 2018/19.

Livestock ownership in pastoral areas is also unequal

The poor in pastoral areas own less livestock than the rich, on average, but ownership differs by livestock species. Livestock is important in Ethiopia's agricultural economy, as almost all farmers own some livestock. Livestock rearing is more common in the pastoral and agro-pastoral areas of Ethiopia, mainly in Afar and Somali regional states, and in the Southern Oromia and SNNP regions. According to a recent survey, the total livestock population in these four regions is about 19.4 million total livestock units (TLUs). The Somali and Afar regional states make up nearly 80 percent of the total livestock population (Figure 20). In terms of the composition of the livestock portfolio, cattle, followed by small ruminants, are the dominant livestock species owned in the Oromiya and the SNNP regions. The Afar and Somali regional states have more diversified livestock portfolios composed of cattle, small ruminants, and camels. A recent study demonstrates that the share of cattle in total livestock output is declining, and that small ruminants are on the rise, especially in pastoralist areas (Bachewe, Minten, Tadesse and Taffesse, 2018). The poorest in these regions own less livestock on average than the rich (Figure 21). In terms of livestock species, the poorest in the SNNP region and Somali own more cattle than the richest. However, it is the richest who own more cattle in Afar and Oromiya. In the Somali region, the richest own more camels on average than the poor.

Figure 20. Livestock population distribution by regions (in TLUs), 2022

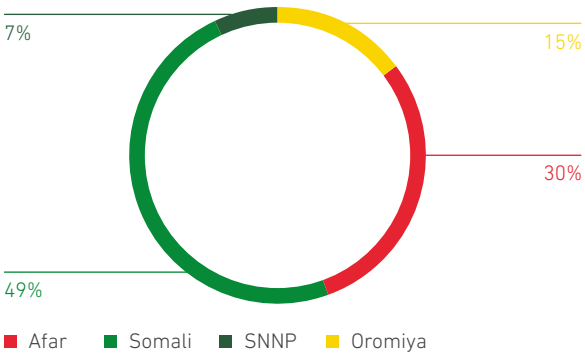
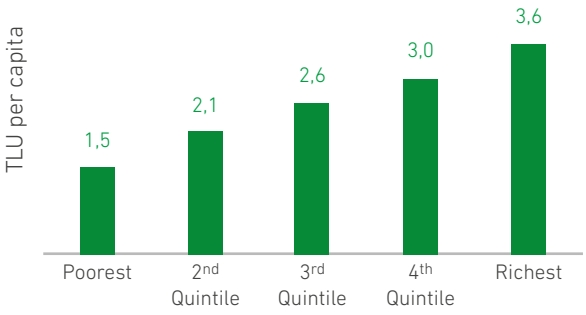


Figure 21. Average livestock holdings by welfare quintile (TLU), 2022



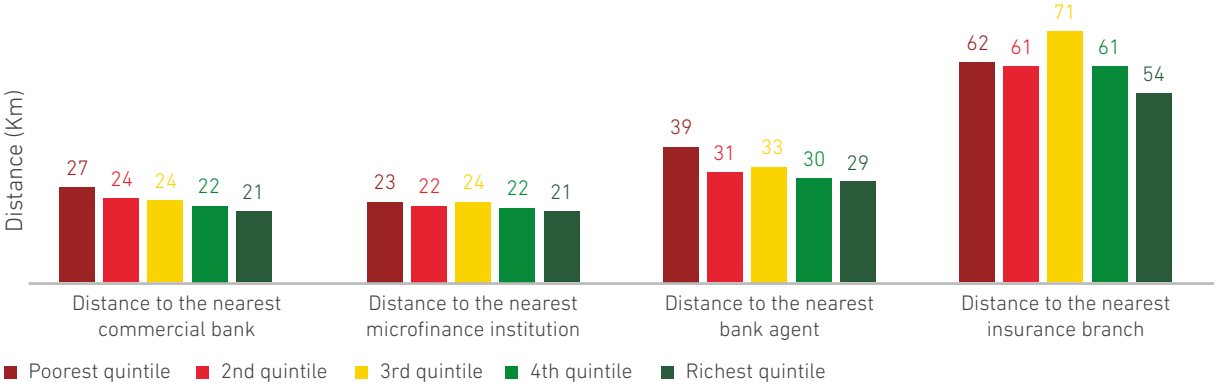
Source: Authors' estimates based on Mobile Population Socio-Economic Survey (MPSE) 2022.
Notes: The total estimated livestock population is 19,399,481 (in Total Livestock Units - TLUs).

Livestock output has grown in the past decade, but productivity has remained stagnant. The average gross livestock revenue per capita is Br 6,505, the highest being for the SNNP region (Br 7,565) and the lowest for Oromiya (Br 5,150). Existing evidence shows that livestock output (e.g., milk and egg production) grew at about 6 percent per year between 2005 and 2015 (Bachewe, Minten et al., 2018). Nonetheless, productivity (output per animal) stagnated during the same period, implying that rapid output growth resulted from an increase in the number of livestock. Although the adoption of improved breeds and improved feeding practices has increased rapidly over the past decade, linked to improved access to extension and markets, this contributed little to growth in the livestock sector. This growth path contrasts with the crop sector, where modern input adoption has played an important role in recent growth (Bachewe, Berhane, Minten and Taffesse, 2018). There has also been an increase in veterinary services provision, leading to a decline in livestock death rates. However, the number of livestock lost is still more than twice the number sold for meat consumption. Frequent droughts in pastoral areas of the country that are associated with water and pasture shortages and low livestock prices contribute to low production. Improving access to livestock extension, proximity to markets and urban centers, and better education will stimulate the adoption of modern livestock production inputs (Bachewe, Minten et al., 2018), which would contribute toward increased output and productivity.

Access to productive services and infrastructure is also low

Financial institutions are few in rural Ethiopia and the poor have limited access to finance. The shares of households that live in communities where there are Savings and Credit Cooperative Organizations (SACCOs) and Microfinance Institutions (MFIs) were 35 and 24 percent, respectively. Only about 1 percent of rural households lived in communities where there is a commercial bank in 2019. The share of rural households that live in communities where there are insurance offices and cooperatives is less than 10 percent. The rural poor live further from financial institutions than richer households (Figure 22). The use of formal financial services such as credit was 20 percent in 2019. Among the key determinants of access to credit among agricultural households are political and social networks, risks, resource endowments and wealth, and agro-ecological zone (Ali and Deininger, 2014). Overall, Ethiopia lags behind its neighboring countries (e.g., Kenya) and other SSA countries in financial inclusion and access to and usage of digital financial services. The presence of few financial institutions has a negative effect on financial inclusion and the use of formal financial services. As later analysis demonstrates, this limits non-farm economic development (mainly non-agricultural business development) and investment in remunerative activities, including technological innovations in agriculture. Insurance markets are largely underdeveloped in the country. Limited agricultural insurance or formal insurance markets mean that rural households rely on their resources or adverse risk-coping mechanisms in the face of income shocks.

Figure 22. Distance to the nearest financial institution by institution type and welfare quintile (km), 2019

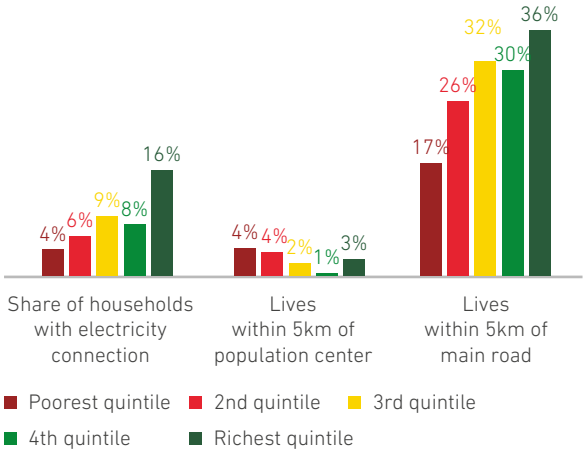


Source: Authors' estimates based on ESS 2018/19.

The rural poor are also poorly connected to other services. Access to electricity in rural areas is particularly limited. The share of rural households with access to electricity ranges from less than 5 percent among the poorest rural households to about 17 percent among the richest households (Figure 23). The Government of Ethiopia (GoE) embarked on constructing rural roads to make public and social services more accessible to the rural communities. Between 2010 and 2016, the government developed rural roads under the Universal Rural Road Access Program (URRAP) in about 4,000 communities, reaching nearly 20,000 km in total, mainly in Oromiya region. An additional 6 percent of rural Ethiopians were connected to rural roads, the rural accessibility index (RAI) increased from 46 to 52 percent, and the average travel time to the nearest town decreased by about 30 minutes (Nakamura, Bundervoet, and Nuru, 2020). Moreover, according to data from the Ministry of Finance (MoF), the amount of government expenditure on roads was Br 18,549 million (19.7 percent of total expenditure) in 2010 and increased to Br 54,043 million (11.1 percent of total expenditure) in 2019/20. Despite this concerted effort, rural accessibility or connectivity is still low, particularly among the rural poor. The share of the rural poor population that lives within 5 km of the main road is about 17 percent, compared with 36 percent for the rural rich (Figure 23). The average distance to roads, markets, population centers, or urban centers is, on average, higher among the rural poor than for the rural rich (Figure 24).

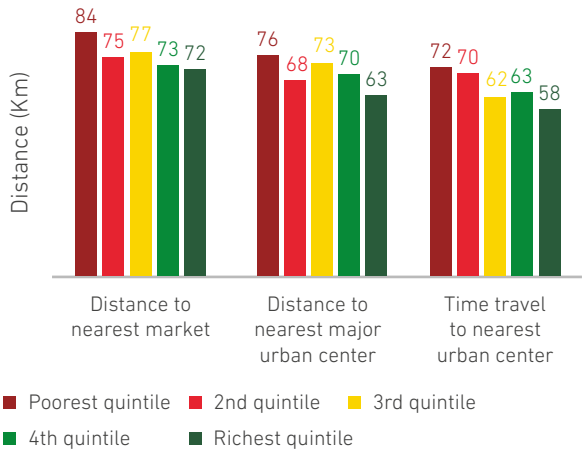
Mobile phone ownership is still low in rural Ethiopia, with a gap between the poor and the rich. The use of mobile phones is an effective means to complement or replace direct and face-to-face services, and to shorten the distance between isolated smallholders and other actors involved in agri-value chains (Annan, Conway and Dryden, 2016). As third generation (3G) broadband coverage extends to the countryside, rural people are moving increasingly from basic mobile phones, with voice and text-message capabilities, to feature phones, which support media formats such

Figure 23. Access to electricity, roads and urban centers (%), 2019



Source: Authors' estimates based on ESS 2018/19.

Figure 24. Distance to markets by quintile (km), 2019



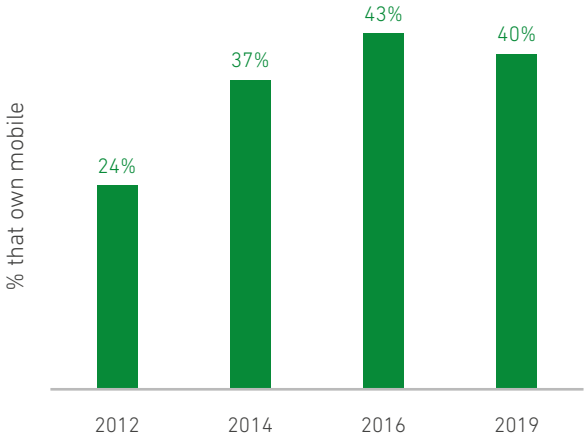
Source: Authors' estimates based on ESS 2018/19.

as images and videos, and can connect to the internet (FAO, 2017). There has been a dramatic improvement in the past two decades in mobile phone coverage and adoption, although infrastructure investments remain low in many developing countries. The share of rural households that own a mobile phone increased between 2012 and 2019 (Figure 25). There is a large gap in mobile phone ownership between the rural poor and the rural rich (Figure 26). This could contribute to gaps in access to market information, technologies, and business development. Improving access to the internet (and internet literacy) for the poor would help leverage the potential of ICT in improving rural incomes.

In summary, Ethiopia has experienced high economic growth and significant gains in poverty reduction over the past two decades, but this growth has been less inclusive. The pace of poverty reduction has been slower in rural areas. Overall, poverty is disproportionately concentrated in rural areas, as labor has been slow to shift out of agriculture, which has grown at a slower rate than other sectors of the economy. The rural population in Ethiopia remains less connected to the rest of the economy, has poor access to public services, and remains predominantly dependent on subsistence agriculture and has less diversified livelihoods. Income diversification in rural Ethiopia has been driven by push factors in the form of a lack of land or the receipt of social transfers in drought-prone areas. Since 2020, households in Ethiopia have had to contend with the COVID-19 pandemic, climate change-induced droughts, pests and diseases, and conflict within the country, together with the fallout from the Russia-Ukraine war that together threaten to undo the gains made in the past decades by exacerbating the already high inflation in the country that aggravates poverty and food insecurity.

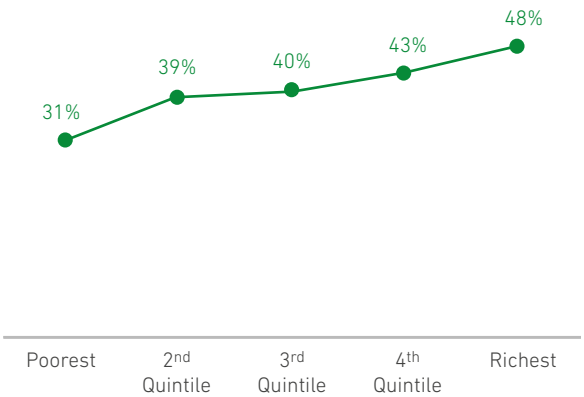
Growth in rural households' incomes has—and continues to be—hamstrung by the same factors as before, exacerbated by multiple recent shocks. Livelihoods remain predominantly subsistence-based agriculture, but agriculture sector growth has been lower than other sectors. This means that boosting growth in agricultural incomes—through raising productivity, given small land sizes, and shifting from a subsistence to commercial orientation—will remain the primary driver of rural income growth. However, the limited level of diversification suggests expanding off-farm income-generating opportunities accessible by households with low human capital could also help rural households raise their incomes. Transfers are also a major income source for livelihood diversification. Meanwhile, the impact of recent shocks highlights the need to strengthen households' resilience to future shocks. The key opportunities for increasing households' income in agriculture and through diversification and transfer incomes are discussed in the next section.

Figure 25. Mobile phone ownership in rural Ethiopia, 2012–19



Source: Authors' estimates based on ESS 2011/12, 2013/14, 2015/16, 2018/19.

Figure 26. Mobile phone ownership by rural quintiles, 2019



Source: Authors' estimates based on ESS 2011/12, 2013/14, 2015/16, 2018/19.

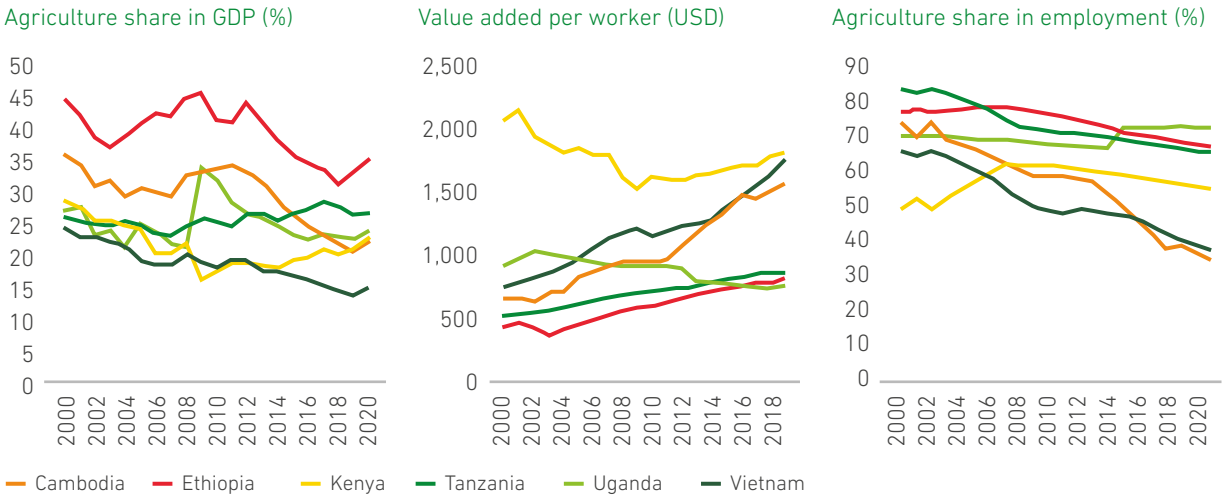
THE BIG PICTURE: KEY DRIVERS OF OPPORTUNITIES FOR ENHANCING RURAL INCOMES

The transformation of the food system and global agri-food trade will be the main drivers of opportunities for rural households

Being primarily agricultural, most opportunities for expanding rural incomes will emerge from the transformation of the food system. This transformation is driven by technology adoption and urbanization at the domestic level, which will be accompanied by increases in agricultural productivity and dietary transformation. This in turn will create opportunities for smallholder farmers to increase productivity and sell their outputs, while also creating non-farm income-generating opportunities for rural enterprises both upstream and downstream of agriculture value chains.

This can be viewed in the context of Ethiopia making a transition from the "beginning" stage to the "agriculture surplus" stage, and then the "early integration" stage of agriculture development. Timmer (1988) outlines four phases of agriculture transformation. In the beginning stage, low agriculture labor productivity starts to rise, continuing to a point where productivity increases sufficiently to generate enough agriculture surplus to facilitate a shift of factors of production out of agriculture, which is the second phase of agriculture development. The agriculture surplus phase enables growth of non-agriculture sectors as the linkages between rural and urban areas are strengthened through more efficient markets—a process that accelerates the shift of labor and capital to more productive sectors, which is the integration phase—the third phase. Agriculture will be progressively linked to the rest of the economy until the role of agriculture is little different from any other part of the economy, at which point the economy is fully industrialized—the fourth phase. With value added per worker of US$804 and an agriculture output share of 33.5 percent in 2019 and an employment share of 65 percent in 2021, Ethiopia is at the beginning phase of the agriculture transformation process, similar to where Vietnam and Cambodia were two decades ago (Figure 27).

Figure 27. Agriculture value added and contribution to employment and GDP, 2000–20



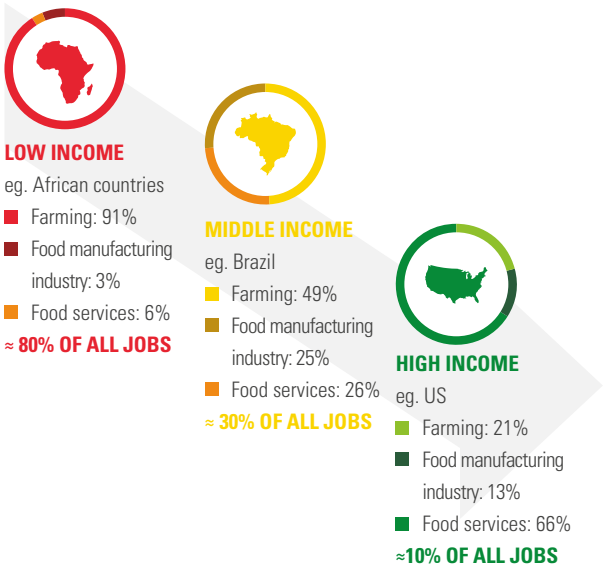
Source: WDI.
Notes: Employment shares are based on ILO modelled estimates.

As global experience shows, both the composition of agriculture output and jobs in the food system change during the transition process, generating new opportunities along the way. First, the composition of agriculture changes from cereals to more nutrient-dense, high value crops. In the early 1970s, cereals, roots and tubers made up 47 percent of agriculture output in developing Asian countries and this declined to 27 percent by 2010. Second, jobs in the food system shift from being primarily farming-based toward more food manufacturing and food services-based (World Bank, 2017b; Figure 28). This suggests that growth opportunities in Ethiopia will be linked to a shift toward high value crops production and off-farm jobs in the non-food segments of the food system.

At the global level, opportunities are created from the transformation in global value chains. The first and most important factor for increasing rural household incomes is that agriculture and related agribusiness activities are increasingly being organized into global value chains (GVCs), with organized supply chains displacing traditional arrangements (Briones and Felipe, 2013). Vertically integrated plantations give way to smallholder farm systems, creating an opportunity for rural households to join these supply chains and increase their incomes. The second factor is Ethiopia's efforts to industrialize, which have seen its increased engagement in GVCs beyond agriculture commodities, which in turn has employment and other spillovers in rural areas.

On this basis, this Rural Income Diagnostics (RID) study identifies and focuses on four main drivers of opportunities for expanding rural incomes in Ethiopia. These are: (i) technological transformation in the agriculture sector; (ii) the rise of urbanization and dietary transformation; (iii) growth in global agri-food trade; and (iv) spatial and economic transformation. Each of these drivers is discussed in detail in this section, demonstrating how they directly contribute to rising agricultural incomes and non-agricultural incomes. The analysis presents the opportunities at the household level, and hence mostly focuses on the implications for smallholder farmers, micro, small and medium rural enterprises, and at the individual level. Based on the identified opportunities, the next section discusses pathways for expanding rural incomes leveraging on the identified opportunities.

Figure 28. Evolution of jobs in the agri-food system



Source: World Bank (2017b).

The technological transformation in agriculture production

With land a limiting factor for expanding production, technological transformation in agriculture is crucial for increasing productivity through sustainable intensification. Technological transformation in agriculture production is characterized by: (i) the increased use of advanced physical inputs, such as high-yielding varieties and improved combinations of fertilizers; (ii) the adoption of resource-conserving practices, such as mixed cropping and zero tillage; (iii) the effective mobilization of water resources and more efficient irrigation to reduce rain dependance of agriculture; and (iv) the mechanization of the production process, which enhances the productivity of labor. The latter is essential for labor to exit from agriculture and for labor reallocation to the non-farm sector.

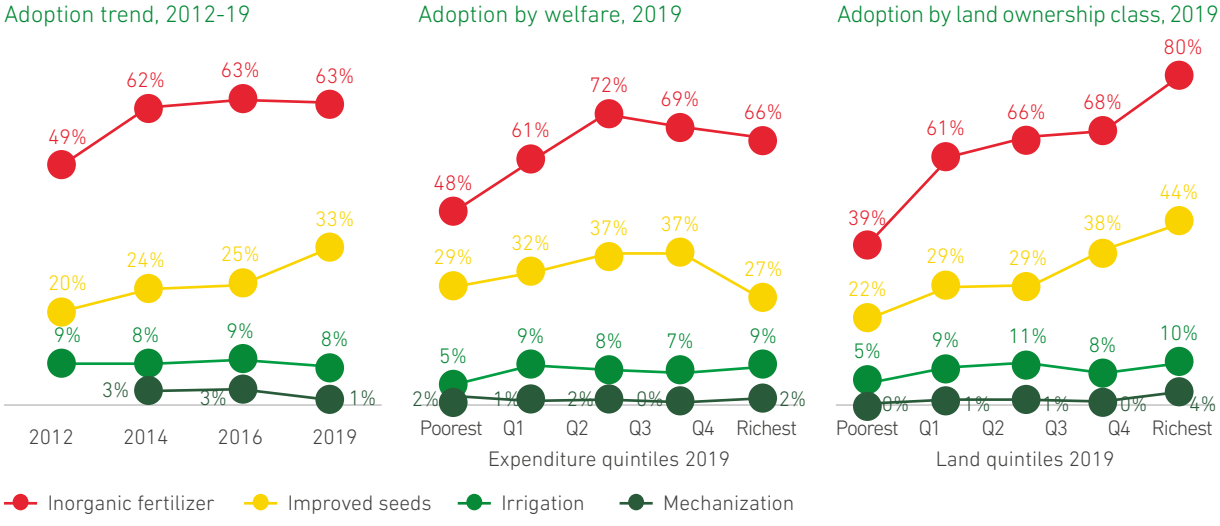
Technological adoption is also crucial for strengthening resilience and adaptation to climate change. The effects of climate change on Ethiopia are seen through the increased frequency of droughts, pests and diseases. Technologies such as drought-resilient crop varieties, irrigation and conservation agriculture, help farmers deal with frequently occurring weather-related shocks and sustain production (Teklewold, Gebrehiwot, & Bezabih, 2019; Tesfaye, Blalock, & Tirivayi, 2020). This helps to reduce the impact of weather-related shocks on rural households, especially in a country like Ethiopia, where food insecurity has been a major concern.

Progress is being made on the adoption of improved seed varieties and fertilizers but has been limited on mechanization and irrigation

In Ethiopia, advances have been made on the adoption of advanced inputs, signifying the start of technological transformation in agriculture production. Households are increasingly using marketed inputs such as fertilizers and improved seeds (Figure 29). For example, the share of households applying inorganic fertilizers increased from 49 percent in 2012 to 63 percent in 2019. The adoption of improved seeds is also rising, with one-third of households in 2019 using improved seeds on their plots, compared with 20 percent of households in 2012. The adoption of fertilizer and improved seeds is higher among farmers with larger landholdings and generally lowest among the poorest households.

Mechanization is, however, taking off in some areas and is expected to be reinforced by the transformation of the rural economy. Recently, imports of combine harvesters and tractors have

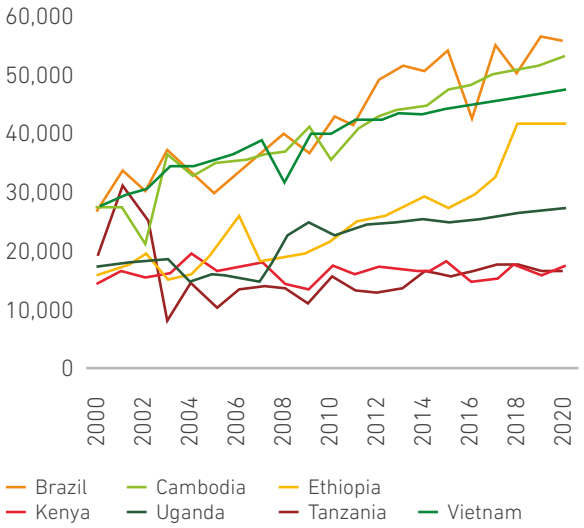
Figure 29. Marketed input utilization (% of farmers) over time and welfare status and land size, 2019



Source: Authors' estimates based on ESS 2011/12, 2013/14, 2015/16, 2018/19.
Notes: There is no data on agricultural mechanization for 2011/12.

increased. One-quarter of the area in Ethiopia that is planted with wheat is now harvested by combine harvesters. These have been widely used in the major wheat-growing zones in the southeast of the country. Studies in Ethiopia show that rising rural wages and the cost of draft animals are positively correlated with mechanization (Berhane, Dereje, Minten, and Tamru, 2017), and that factors such as rural-urban migration and growth of the non-farm segments of the rural economy increase rural wages, making mechanization more attractive. Small farm sizes and fragmented plots with their consequent limits in scale, combined with lack of access to credit, render the use of some agriculture equipment unfeasible or unaffordable for smallholder farmers (FAO, 2021), while scarcity of foreign currency reduces their supply. The experience from Asia, where farm sizes are even smaller and more fragmented, suggests that mechanization can be increased with improved design of farm machinery and equipment adapted to the specific needs of smallholder farmers (e.g., smaller farm machinery, such as hand tillers or hand tractors), coupled with well-developed rental markets for machinery or the shared use of equipment through farmer cooperatives (FAO, 2017).

Figure 30. Maize yields (kg/ha), 2000-20



Source: FAOSTAT.

Access to irrigation is expected to expand with increased government investments in this area. During 2016–21, the Government financed the construction of small-scale irrigation infrastructure, doubling the irrigated land coverage to about 7 percent of total land area by 2021. In the next five years, with projects such as the Food System Resilience Project (FSRP), the Government will finance small-scale irrigation infrastructure to increase the land covered by irrigation by 48,000 ha. The planned investments in irrigation in Ethiopia are therefore a major opportunity to raise agricultural productivity and smallholder farmers' incomes.

Technological adoption has reaped productivity gains for smallholder farmers, but more can be done

Technological adoption has improved agricultural productivity and incomes. Empirical analysis shows that the adoption of input use has contributed to yields and agricultural growth in Ethiopia. Some estimate that 20 percent of agricultural growth between 2005 and 2014 can be attributed to improved seeds and chemical fertilizers (World Bank, 2020a). A rigorous study by Muleta and Girmay (2021) finds that households utilizing irrigation from small-scale irrigation schemes in central Ethiopia doubled their gross agricultural incomes relative to the comparable non-irrigator households. On wheat farms in southwest Ethiopia, the adoption of combine harvesters (but not tractors) is closely associated with higher yields, seemingly due to lower post-harvest losses (Berhane et al., 2017).

While agricultural productivity in Ethiopia has increased, especially for cereals, it remains below potential, and has been stagnant in non-cereal crops and livestock. Maize yields in Ethiopia have increased in the past decades to levels above comparator countries in Eastern Africa (Figure 30). The average yields in cereals production overall have more than doubled since 2020. However, the

yields are significantly lower than aspirational countries such as Brazil, and countries in Asia such as Vietnam, where input application rates have been higher. Analysis of the productivity potential of crops shows that maize yields are 30 percent of their potential (van Dijk et al., 2020) and wheat is 20 percent of potential (Silva et al., 2021). New analysis conducted for this report (see Box 2) shows that non-cereal crops such as beans and sesame seeds are 60 and 42 percent of their potential, respectively. The yields for coffee, for example, have been stagnant in Ethiopia, unlike in Brazil, which had the same coffee yield levels as Ethiopia in 2000, but has since managed to double them (Figure 31).

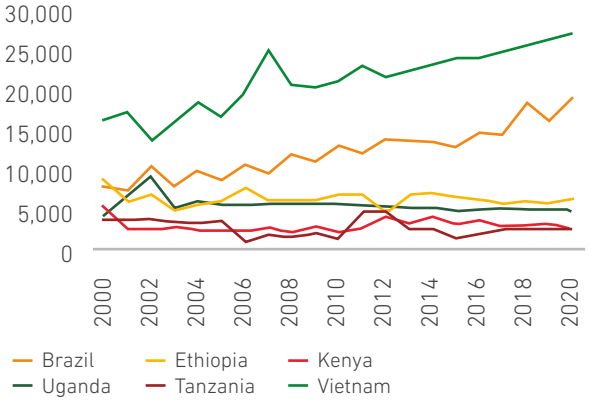
There is significant potential to increase productivity further through the intensification of the use of inputs, since Ethiopia is starting from a low base. Stochastic frontier analysis (SFA) shows that the yield gap is mostly explained by low technology adaptation. This is because the increase in the use of fertilizer and improved varieties is starting from such a low base. For example, only 13 percent of land under cereal crop cultivation is covered by improved seeds as coverage of crops other than maize is very low, ranging between 2 percent for sorghum and 18 percent for teff. For other crops such as coffee, uptake of improved varieties remains very low (Table 8).

Table 8: Use of improved varieties by crop (%), 2021

Crop	Share of Land covered (%)
Teff	6.74
Wheat	18.07
Maize	56.88
Barley	5.72
Sorghum	1.99
Sesame	0.3
Coffee	0.68

Source: Authors' estimates based on AAGS 2021.

Figure 31. Coffee yields (kg/ha), 2000-20



Source: FAOSTAT.

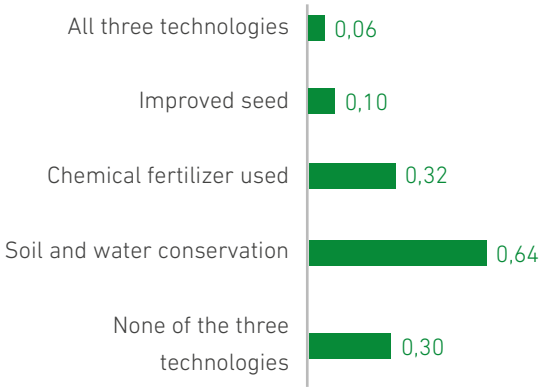
Box 2: Estimation of yields potential in Ethiopia using the stochastic frontier technique

The Stochastic Frontier Analysis (SFA) is used to measure the plot crop production efficiency, which is subject to different control variables such as household level, plot characteristics, rainfall, temperature, and crop suitability indicators. The SFA is used for its ability to distinguish inefficiency from deviations that are caused by factors beyond the control of the plot manager and from the frontier. The model introduces the disturbance term representing noise, measurement error, and exogenous shocks that are beyond the control of the production unit, and a component that captures deviations from the frontier due to inefficiency.

The analysis was conducted using the ESS 2018/19 data. The technical efficiency (TE) of each plot was estimated and the impacts of MATs on TE of plots were investigated using the Multinomial Endogenous Switching Regression (MESR) model after controlling for endogeneity. The analysis was also done at the individual crop level to investigate the TE and yield gaps of the major crops (maize, teff, wheat, legumes, coffee and oil seeds) among the smallholder farmers in Ethiopia.

The adoption of multiple agriculture technologies on the same plots is especially beneficial to farmers compared with the use of the technologies in isolation, as currently practiced by most farmers in Ethiopia. While more than 70 percent of plots cultivated by households in 2018/19 were covered by at least one of the improved seed varieties, chemical fertilizers, or soil water conservation technologies, only 6 percent of the plots used all three technologies applied in combination (Figure 32). However, an analysis of the impact of multiple agriculture technology (MAT) adoption on land productivity finds that the use of all three technologies in combination increased land productivity by three times more than the impact of adopting soil and water conservation alone, two times more relative to the incremental impacts of fertilizer use alone, and 45 percent more relative to the use of improved seed varieties. Similar magnitudes of impact are observed on net crop incomes (Table 9). These impacts were estimated controlling for the possibility of co-determination of technological adoption and land productivity, and hence provide a rigorous quantification of the impact of MAT adoption on land productivity (see Box 3). Studies in other countries also find complementarities between natural resource management technologies and the adoption of improved seeds and fertilizers (Wainaina, Tongruksawattana, and Qaim, 2016).

Figure 32. Multiple agriculture technology (MAT) adoption (% of plots), 2019



Source: Authors' estimates based on ESS 2018/19.

Use of improved seed varieties, chemical fertilizers and soil water conservation technologies together increases land productivity by two times more than fertilizer use alone, and 45% more than using improved seed varieties alone

Table 9: Impact of MAT adoption on land productivity and net crop income, 2019

	Multiple Agriculture Technology (MAT) Adoption			Average Treatment Effects (Ethiopian Birr)	
MATs Regime	Improved Seed Variety	Water Conservation	Chemical Fertilizer	Land Productivity	Net Crop Income
V1S0F0	✓	✗	✗	11,529	11,520
V0S1F0	✗	✓	✗	5,317	5,326
V0S0F1	✗	✗	✓	8,095	7,706
V1S1F0	✓	✓	✗	14,374	14,352
V0S1F1	✗	✓	✓	7,310	6,763
V1S0F1	✓	✗	✓	15,964	15,358
V1S1F1	✓	✓	✓	16,735	16,021

Source: Authors' estimates based on ESS 2018/19.
Notes: Estimates based on the multinomial endogenous switching regressions on multiple agriculture technology adoption (at the crop level) on land productivity and crop incomes.

Box 3: Estimation of the impact of MAT on land productivity and crop incomes in Ethiopia

The multinomial endogenous switching regression model (MESR model) is used to estimate the adoption and impacts of Multiple Agriculture Technologies (MATs) after controlling for observed and unobserved heterogeneities. The analysis focuses on the adoption and impact of three combinations of MATs, namely improved seed varieties, soil and water conservation, and chemical fertiliser. The outcomes of interest are land productivity (value-added per land) and net crop incomes (using an inverse hyperbolic sine transformation to deal with negative net incomes).

These are estimated using plot-level data from the 2018/19 ESS data. Detailed information is used on plot characteristics, household demographics, socio-economic status, climatic conditions and crop suitability indicators to condition adoption and impacts of MATs. The regression models also control for farm type, using the crops growth on each plot.

Even without exclusion restrictions, the impacts of MATs on the outcome variables of interest are expected to be consistent because they are estimated separately for the MATs adopters and non-adopters in the MESR model. However, it is advised to include an exclusion restriction, as the inverse mills ratio might not sufficiently overturn endogeneity. Following the literature, the selection instruments used in the analysis are distance to input markets, lagged total rainfall, lagged rainfall shock, and access to extension services. A simple falsification test shows that the selection instruments indeed jointly and significantly affect the MATs adoption model, but not the land productivity outcomes, confirming the validity of the instruments we used.

Technological adoption among rural households is primarily influenced by access to input markets, climate and knowledge. Evidence from the analysis of determinants of MAT adoption shows a negative correlation between distance to market and the adoption of any technological packages, including market-based inputs (improved varieties and inorganic fertilizers). Thus, adoption rates decline the further the household is from a road or a market, implying access to input markets could be a constraint to adoption. The analysis also shows that farmers with access to public extension services are more likely to adopt agriculture technologies packages including fertilizer applicatoin. Those accessing private advisory services are more likely to adopt multiple technologies instead of single agriculture technologies. This suggests that extension services have an important influence on the adoption of agriculture technologies. Climate factors have a significant influence on farmers' adoption of technologies too, evidenced by lower adoption of agriculture technologies when annual temperatures are high. Other studies (Kebede, 2022) also show that climate shocks disincentivize risk-averse households from adopting high-risk, high-return technologies.

Technological adoption in agriculture generates job opportunities in input markets and agriculture services

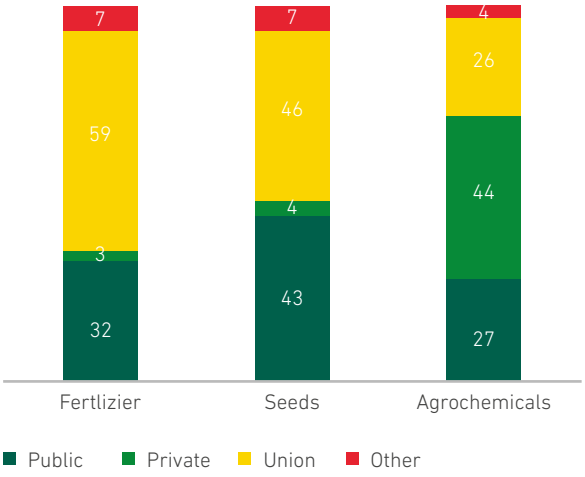
Agriculture technological adoption generates off-farm jobs when market conditions favor private sector participation. The production and distribution of inputs is one source of job creation, with increased demand and utilization of farm inputs. Jobs can be created in the production of inputs, such as improved seed varieties and inorganic fertilizers, and the distribution of these inputs in the transportation and retail sectors. Under the AGP II, support to farmer groups to produce and distribute improved seeds helped create jobs (World Bank, 2022d). Other opportunities are created in the provision of agriculture services linked to mechanization, irrigation and extension services to rural farmers.

Such jobs include the provision of other services, such as renting, distribution and the repair of agricultural equipment, pest control, etc.

The opening up of inputs markets in the Ethiopia could facilitate the realization of job creation potential in the production and distribution of agriculture inputs. Job creation in input markets in Ethiopia had been largely stifled by state interventions. State-owned enterprises (SOEs) and unions are the main suppliers of fertilizers and seeds, with private sector companies supplying no more than 4 percent of farming households in 2019 (Figure 33). No fertilizer was being produced in the country and its supply chain—from importation to the farmgate—had long been state managed. An SOE had the sole mandate to import, and cooperatives are involved in distribution at a price set by the Government. This not only resulted in limited availability and quality of fertilizers, but limited job creation in the supply chain too.

Under the economic reforms, the Government has opened the inputs sector and licensed private firms to import fertilizers, which could expand job opportunities. The reforms have generated investor interest in fertilizer production. The recent success of international investors such as Pioneer in increasing the market share of the improved inputs market in collaboration with cooperatives for seed multiplication shows the potential of opening the inputs market, not just for improving the variety and quality of inputs, but also for private sector generation of jobs.

Figure 33. Supply source of modern inputs in Ethiopia (% of households), 2019



Source: Authors' estimates based on ESS 2018/19.

The experience in Ethiopia's primary wheat-producing zones demonstrates that a takeoff in mechanization creates an ecosystem of support services that generates off-farm jobs. In major wheat-growing zones in the southeast of the country, where combine harvesters are widely used, private mechanization service providers have rapidly emerged for agricultural machinery rental services for plowing or harvesting. Equipment service centers are also set up for the repair of tractors and combine harvesters. Similarly, irrigation development will have substantial job-creating potential as well, through the establishment of shallow groundwater drilling enterprises, retailers and distributors, and pumps and pipes and pump repair services.

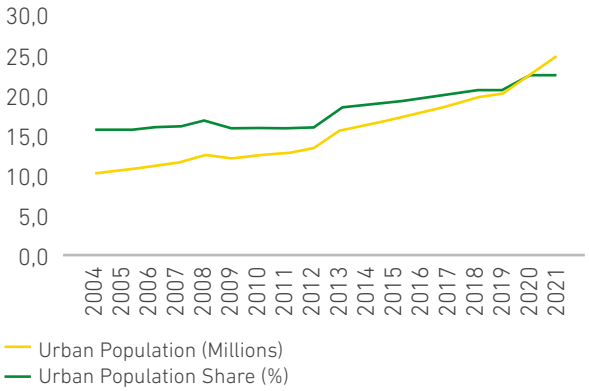
In sum, rural households in Ethiopia stand to benefit from rising agriculture technological adoption. These benefits extend beyond the increases in agricultural productivity to off-farm employment opportunities in inputs supply chains and agriculture services. This potential can be maximized through further input intensification, given the low base of input application that Ethiopia is starting from, the adoption of MATs to maximize complementarities, and increased private sector participation to realize job creation potential in inputs supply chains, the development of equipment rental and sharing markets, and the supply of agriculture equipment tailored to the needs of smallholder farmers.

The rise of urban consumption and the dietary transformation

The second key driver of opportunities for rural income growth is increased food demand and dietary transformation driven by urbanization and rising incomes. The urban population has grown by nearly 60 percent, or 5 percent annually, since 2010, rising to about 25 million in 2021 (Figure 34). It is expected to rise to 31 million by 2025 and 52 million by 2035 (World Bank, 2020). Moreover, urban households have experienced faster income growth, resulting in high growth in food consumption. According to adjusted estimates from the ESS, 2018/19, the average consumption expenditure in urban areas grew at about 10 percent per year between 2014 and 2019. Combined with urban population growth, total urban food consumption would have doubled in those five years.

Urbanization and rising incomes are associated with dietary changes that are already evident in Ethiopia. With an increase in income and urbanization, people shift their consumption from a low-quality diet (e.g., staples) to a high-quality and nutritious diet, including fruits, vegetables, and animal-origin items (Bennett, 1941; Gouel and Guimbard, 2019). Consumption also shifts away from unprocessed to processed food items, including food away from home (Berkum, Achterbosch and Linderhof, 2017). The dietary transformation toward high value food items is already evident in Ethiopia, especially in urban areas (Table 10). During the 2014–19 period, the

Figure 34. Trends in urban population growth, 2004-21



Source: National Bank of Ethiopia Annual Reports (2021).

Table 10: Changes in food consumption spending patterns (food budget share), 2014–19

Food item	Rural Areas			Urban Areas		
	2014	2016	2019	2014	2016	2019
Teff	0.13	0.11	0.08	0.25	0.18	0.15
Wheat	0.03	0.08	0.06	0.06	0.04	0.03
Maize	0.01	0.09	0.11	0.04	0.03	0.05
All other cereals	0.06	0.12	0.12	0.05	0.03	0.05
Pulses & nuts	0.05	0.11	0.09	0.12	0.10	0.09
Oil seeds	-	0.00	0.00	0.00	0.00	0.00
Tubers & stem	0.10	0.06	0.10	0.04	0.03	0.05
Vegetables	0.05	0.11	0.11	0.08	0.15	0.15
Fruits	-	0.01	0.01	0.03	0.02	0.03
Dairy	0.06	0.04	0.03	0.04	0.03	0.02
Meat, fish, and Eggs	0.05	0.04	0.02	0.11	0.10	0.08
Fats & oils	-	0.06	0.06	-	0.08	0.07
Beverages & stimulants	0.10	0.12	0.15	0.10	0.10	0.11
Condiments	0.05	0.03	0.03	0.07	0.04	0.04
Other foods	-	0.01	0.02	-	0.06	0.08

Source: Authors' estimates based on ESS 2013/14, 2015/16 and 2018/19.
Notes: The consumption module was revised in the 2019, and therefore the data are not strictly comparable.

expenditure share of cereals declined from 40 to 27 percent, while the expenditure share of vegetables increased by 8 percentage points, fats and oils by 7 percentage points, and other foods by 8 percentage points. These changes have significant implications for farm returns and on- and off-farm employment generation.

Rising urban food demand creates direct opportunities to increase agricultural incomes

Higher food consumption and changing dietary preferences in urban centers will increase urban demand for rural agricultural products. The changes in demand will increase for some products more than others (Table 11). In Ethiopia, maize demand is expected to decline, while teff and wheat—which are more consumed in urban areas—have the strongest prospects for increased production demand (of up to a US$500 million annually for teff) and income growth. A larger portion of teff's increased consumption demand will benefit the smallest landholding class (< 1 ha), while increased wheat demand will benefit the middle land class (2 to 5 ha) more. Respectively, annual demand for pulses and vegetables will increase by nearly US$200 million and US$100 million, respectively, which are significant increases from current demand. These projections highlight that the cereal crops segment will continue to be important, though growth rates in non-staple crop segments are likely to be larger. Animal-origin products—mostly meat and dairy—will also see a substantial increase in their annual consumption demand by about US$350 million. In total, the annual demand for food is expected to increase by about US$1.6 billion. Earlier studies (Vandercasteelen, Beyene, Minten and Swinnen, 2018b) show similar results. The changes in labor demand are expected to mirror the changes in production demand.

Additional analysis identifies those commodities with higher growth potential as urban incomes rise, by considering each commodity's income elasticity of demand. The demand for items with a positive income elasticity increases as household incomes increase, with an income elasticity of 1 implying a one-to-one relation between changes in household incomes and consumption of the product. An income elasticity greater than 1 thus suggests a more-than-proportionate increase in the product's consumption as household incomes rise. Income elasticities were estimated for various food products and food groups in Ethiopia using a household demand system, accounting for the

Table 11: Forecast change in demand at the farm level (US$ '000)

	Total	Total landholding size class				
		< 1 ha	1-2 ha	2-5 ha	5-10 ha	> 10 ha
Teff	565,852	195,228	164,827	179,438	21,901	4,458
Wheat	222,837	35,356	75,421	87,080	21,143	3,837
Maize	-15,967	-4,925	-3,374	-7,348	-245	-75
All other cereals	95,631	23,971	35,679	28,512	7,087	382
Pulses and nuts	193,079	31,703	49,073	96,835	13,511	1,956
Tubers and stems	91,700	56,558	24,664	9,163	1,065	250
Oil seeds and spices	32,430	2,860	4,850	22,267	2,101	351
Vegetables	101,845	68,920	14,969	17,314	269	373
Fruits	30,676	25,807	1,743	2,883	241	2
Dairy	244,467	-	-	-	-	-
Poultry & eggs	16,683	-	-	-	-	-
Meat	94,457	-	-	-	-	-

Source: Tesfaye and Dolislager (2019) in World Bank (2020) based on ESS 2016 and Authors' estimates for Diary, poultry & eggs and meat.
Notes: Projections are based on an assumption of 4.5 percent annual income growth during 2010-25.

fact that some goods are substitutes, and hence consumed in place of the other goods, while others are complements that are consumed together, such that price and demand for different foods are interrelated. A complete demand function model for household consumption, called the Almost Ideal Demand Function (AIDS), commonly used for this purpose in the literature, was thus estimated using the ESS 2019 data for urban households (see Box 4). The estimated elasticities are presented in Table 12.

Estimates show that consumption of urban households is skewed toward those commodities with high income elasticities, suggesting greater potential for future urban demand growth. The cereals most consumed in urban areas (teff and wheat) have a unitary or greater income elasticity of demand. In contrast, maize, which has a lower budget share in urban areas than in rural areas, is inelastic, and hence its consumption demand in urban areas is not expected to grow. Other nutrient-dense, high value foods constituting the largest portion of the urban consumption basket (meat & fish, fruits, pulses & nuts, and beverages) have an income elasticity of greater than 1. Their consumption in urban areas will increase faster than urban income growth.

Table 12: Urban households income elasticity of demand

Food Items	Expenditure Share	Income Elasticity
Teff	0.15	1.148
Wheat	0.03	0.993
Maize	0.05	0.02
All other cereals	0.05	0.904
Pulses & nuts	0.09	1.203
Oil seeds	0.00	1.321
Tubers & stem	0.05	0.653
Vegetables	0.15	0.949
Fruits	0.03	1.519
Dairy	0.02	0.877
Poultry & eggs	0.08	1.559
Meat & fish	0.07	1.786
Fats & oils	0.11	1.152
Beverages & Stimulants	0.04	1.145
Condiments	0.08	0.813

Source: Authors' estimates using ESS 2018/19.
Notes: Estimates based on Almost Ideal Demand System, imposing the homogeneity and symmetry restrictions.

Box 4: Estimation of income elasticities of demand

The almost-ideal demand system (AIDS) model of Deaton & Muellbauer (1980) is utilized to estimate income elasticities of demand for main agricultural and food commodities. The model considers a consumer's demand for a set of k food items or broad categories (e.g., teff, wheat, maize, other cereals, meat, etc.) for which the consumer has budgeted m (household income proxied by total household expenditure) units of Birr. The AIDS model gives the expenditure share equation in a k good system as:

$$\omega_i = \alpha_i + \sum_{i=1}^{k} \gamma_{ij} \ln p_j + \beta_i \ln \left\{ \frac{m}{p} \right\}, i = 1, \ldots, k$$

where q_i denotes the quantity of good i consumed by a household and define the expenditure share for good i as $\omega_i = p_i q_i / m$. α_i is the constant coefficient in the i^{th} share equation. The price index is denoted by p, its transcendental logarithmic function (the price deflator of the logarithm of income is) can be estimated as follows

$$\ln p = \alpha_0 + \sum_{i=1}^{k} \alpha_i \ln p_i + \frac{1}{2} \sum_{i=1}^{k} \sum_{j=1}^{k} \gamma_{ij} \ln p_i \ln p_j$$

Deaton & Muellbauer (1980) suggest replacing that price index with the approximation $\ln p \approx \sum_j \omega_j \ln p_j$, resulting in a set of equations that can be fit by linear estimation techniques. The following are the resulting conditions imposed during the estimation of the constrained model (the restrictions on the demand functions are deduced from the cost function, using Shephard's duality lemma): adding up, homogeneity, and Slutsky symmetry:

$$\sum_{i=1}^{k} \alpha_i = 1, \sum_{i=1}^{k} \beta_i = 0, \sum_{i=1}^{k} \gamma_{ij} = 0, \text{ and } \gamma_{ij} = \gamma_{ji}$$

The AIDS model has the advantage that the homogeneity and symmetry restrictions are easily imposed and tested. The expenditure share equation can be interpreted as a Marshallian or uncompensated demand function in budget shares. The price elasticities of good i with respect to good j can be derived from the Marshallian price elasticities using the Slutsky equation in elasticities as follows

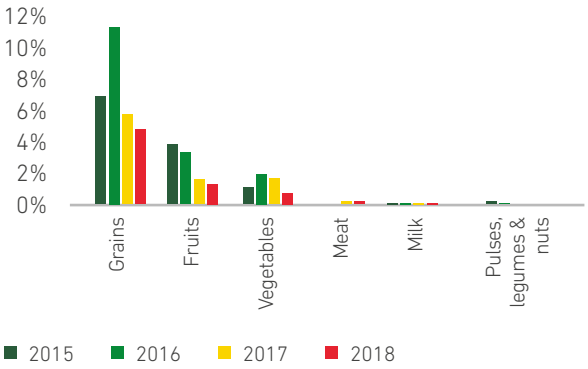
$$\epsilon_{ij} = -\delta_{ij} + \frac{1}{\omega_i} \left(\gamma_{ij} - \beta_i \left(\alpha_i + \sum_{j=1}^{k} \gamma_{ij} \ln p_i \right) \right)$$

where δ_{ij} is the Kronecker delta, defined as: $\delta_{ij} = 1$ if $i = j$ and 0 otherwise. The expenditure (income) elasticity for good i is computed as

$$\mu_{ij} = 1 + \frac{\beta_i}{\omega_i}$$

Most of the increase in urban demand can be met locally. Ethiopia still imports grains and oils for its food security. Its total food imports were US$1.5 billion in 2020. The main imported food products include grains (mostly wheat), vegetables oil, fruits, vegetables, meat and milk. However, the share of imports of the food items with stable or increasing budget shares in urban areas in Ethiopia is not significant (Figure 35) and is mostly met by local production. Compared with the total volume consumed in the country in 2018, less than 2 percent of fruits, about 1.5 percent of vegetables, and negligible amounts of meat, milk, pulses, legumes and pulses, were imported. Only for wheat, which accounted for one-quarter of food imports in 2018, does Ethiopia rely more on a higher share of imports for its consumption.

Figure 35. Share of imports in total food supply (%), 2015-18



Source: FAOSTAT.

Due to differences in ecologies, the expected demand surge will be different across the country, depending on the agro-ecology and households' ability to respond to urban demand. Households in Amhara and Oromia are the main suppliers of food items consumed in urban areas. While more than 6.8 million smallholders planted teff in the 2020/21 cropping season, producers in Amhara and Oromia accounted for 87 percent of the total production in 2020/21, with the East and West Gojjam of Amhara, and the East and West Shoa of Oromia being the major teff producing areas in the country. A smaller proportion of teff is also produced in the SNNP and the Tigray regions. Amhara and Oromia together also produce 81 percent of pulse crops, while the SNPP region accounts for 12 percent. Vegetables and fruits are however, mostly produced in the SNPP region. Lastly, coffee is mostly produced in the Yirgachefe, Sidamo, Kaffa, Harrar, Dimmah and Limu zones in Oromiya and in the SNPP region. Households in Somali and Afar contribute mostly with livestock and animal products.

A supply response is needed for more rural households to benefit from growing urban demand. Only a smaller share of output of the most consumed foods in urban areas is marketed in Ethiopia, exemplified by only 18 percent of teff production being marketed (Table 13). One contributing factor

Table 13: Households' participation in production and marketing of food with high urban demand, 2019

Agriculture commodity	Share producing	Share selling	Share of output sold	Share of land among producers	Share of land in areas crop is the most suitable
Maize	0.547	0.02	0.237	0.434	0.471
Wheat	0.253	0.04	0.106	0.422	0.449
Teff	0.392	0.09	0.183	0.467	N/A
Other cereals	0.594	0.05	0.260	0.513	0.642
Root crops	0.136	0.09	0.040	0.296	0.138
Fruits	0.114	0.32	0.026	0.233	0.082
Vegetables	0.042	0.16	0.003	0.071	0.016
Oil seeds	0.056	0.27	0.017	0.295	0.202
Coffee	0.259	0.36	0.127	0.489	0.463
Other cash crops	0.271	0.55	0.128	0.475	0.466
Livestock products (Eggs & milk)	0.733	0.12			

Source: Authors' estimates from ESS 2018/19.

is that a smaller proportion of producers market their produce. For example, only about 9 percent of teff farmers sold teff during 2018/19. Vegetables and fruits were sold by only 32 and 11 percent of farmers, while pulses and coffee were sold by about 8 and 9 percent of households producing these crops, respectively. Market participation is also low among livestock producers, with only 4 percent of them selling milk produce and about 25 percent reporting selling eggs. A second issue is that farmers devote a small share of land to these crops, even in areas where high value crops are among the top three most suitable crops. Vegetables account for less than 2 percent of cultivated land in areas most suitable for vegetable production, unlike cereals to which farmers devote between 44 percent (for wheat) and 64 percent (sorghum and millet) in areas most suitable for their production.

Urbanization and unfolding diet transformation will create downstream job opportunities in the agri-food system

Urbanization and changing consumption patterns will shift employment within the food system, as urban households increasingly rely on markets to meet their food needs. The food system is defined as the whole set of activities required to get food onto people's plates. It extends beyond agricultural production and includes the supply of agricultural inputs and services, all the post-farm activities that result in the retailing of food to consumers, such as food storage, processing, distribution, transportation, retailing, preparation, restaurants, and many other services (World Bank, 2017b). The non-farm segments in the food system can make a significant contribution to job creation during the transition of the food system that Ethiopia has entered. In addition to bringing and marketing produce to urban consumers, demand for processed, store-convenient foods and the consumption of food away from home will also expand non-farm activities, such as food processing, packaging, marketing, and food preparation and retail. Initially, most of these activities will be in the small-scale segments of the non-food system (Allen, Heinrigs, and Heo, 2018), with long and fragmented value chains that can present opportunities for micro, small and medium rural enterprises.

Indeed, dietary change is expected to drive structural changes in labor demand and employment in the food system and beyond over the next decade in Africa. Tschirley, Snyder et al. (2015) empirically quantify the employment implications of diet transformation in East and Southern Africa within the broader food system and non-food system. They find that the transformation of the food system would add more jobs than any other sector of the economy by 2025 (Table 14). Food services—marketing,

Table 14: Evolution of job structure in East and Southern Africa, 2010–25

Category	Jobs in 2010		Jobs in 2025		Contribution to total job growth (%)
	Number ('000)	Share (%)	Number ('000)	Share (%)	
Agri-food systems	81,183	83	106,532	72	51.6
Farming, own wage labor	73,396	75	89,941	61	33.7
Food manufacturing	2,237	2	4,871	3	5.4
Marketing, transport, and other services	4,704	5	9,688	7	10.1
Food preparation away from home	846	1	2,032	1	2.4
Non-agri food system	17,090	17	40,879	28	48.4
Total	98,273		147,411		

Source: Tschirley et al. (2015).
Notes: Projections are based on an assumption of 4.5 percent annual income growth during 2010-25".

transportation and other services—will contribute 10 percent of total jobs growth between 2010 and 2025, assuming income growth rates of 4.5 percent per year, with food manufacturing contributing about 5 percent of new jobs in that time.

In Ethiopia a large share of the labor force is still employed in the primary agriculture production segment of the food system. Primary agriculture made up 63 percent of employment in the country and 66 percent of employment in the food system in 2021. In rural areas, it made up 77.5 percent of total employment and 79 percent of employment in the food system (Table 15). Employment in the non-farm segments of the food system in Ethiopia is low. The agro-processing industry contributes 2.4 percent of the total national employment and only 1.4 percent in the rural sector. As yet, there is no employment related to farm inputs manufacturing in rural areas.

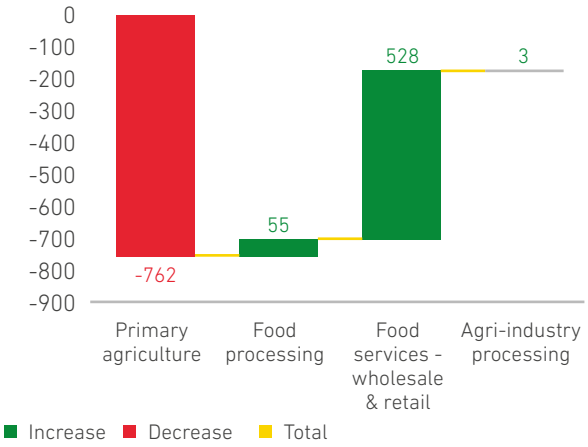
But the rise in urban food demand has begun expanding job-opportunities beyond primary agricultural production in Ethiopia. For example, total employment in food manufacturing, food preparation, and marketing and transport has more than doubled since 2013 (Figure 36). Employment in the non-food segments of the food system will continue to increase as the share of downstream segments in the food system GDP rises to about 25 percent in 2025 and close to 30 percent by 2040, while agriculture's share in GDP declines to less than 20 percent (Figure 37). Thus, trends driven by urbanization will spur growth and employment in the non-farm economy.

Table 15: Jobs in the agri-food system, 2021

	National		Rural	
	Number	Share	Number	Share
Primary agriculture	22,211,655	63.3	21,249,693	77.5
Food processing	364,487	1.0	195,195	0.7
Other agro-processing	258,239	0.7	96,313	0.4
Food services	1,955,610	5.6	811,533	3.0
Farm inputs	585	0.0	0	0.0
Total Food System	**24,790,576**	**70.6**	**22,352,734**	**81.6**

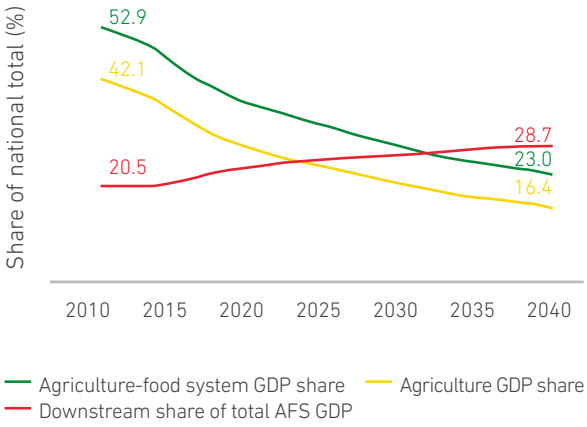
Source: Authors' estimates from LFS 2021.
Notes: For comparability, estimates from LFS 2013 were computed excluding data from Tigray, which was not covered in the LFS 2021.

Figure 36. Changes in jobs in the agri-food system in rural areas ('000), 2013–21



Source: Authors' estimates from LFS 2013; 2021.

Figure 37. Share of agri-food system in GDP, 2010-40



Source: Dorosh and Minten, ED. (2020).

Notes: For comparability, estimates from LFS 2013 were computed excluding data from Tigray, which was not covered in the LFS 2021.

In short, the trends driven by urbanization will not only improve the lives of millions of farmers but will also spur growth and employment in the rural non-farm economy, creating jobs for the rural youth. For improving farm incomes, a supply response is required to get more households to produce and market products in demand in urban areas, but the benefits will be uneven depending on agro-ecological zones and households' ability to change their land use in response to rising demand. For non-farm jobs, an emergence of small-scale enterprises along the value chain will create more off-farm jobs, which will be crucial in the transition phase of agriculture development.

Growth in global agri–food trade

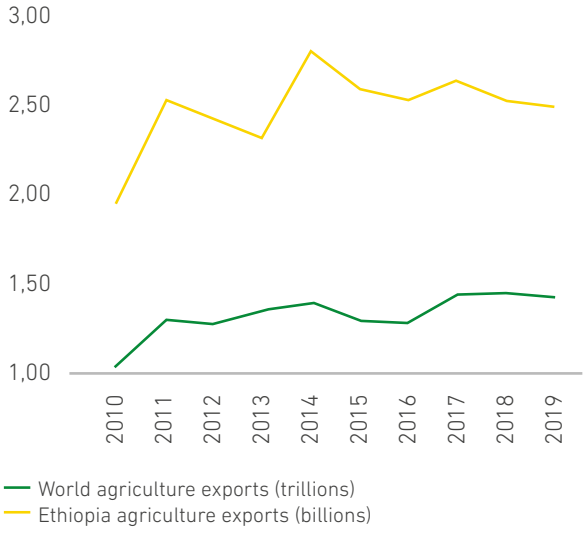
The evolution of global agriculture value chains has provided an initial boost in the agri-food trade, which Ethiopia has benefited from. An OECD 2020 study estimates that "agri-food value added used to generate foreign exports increased by 123 percent in nominal terms" in the 10-year period between 2004 and 2014 (OECD, 2020). Further growth since then has, however, been limited by declining commodities prices. Ethiopia's own agri-food exports have moved in tandem with growth in global trade in food and agriculture commodities. Its agriculture exports had risen to more than US$1.5 billion by 2019 (Figure 38). This has been a boon to Ethiopia's economy, the exports of which are heavily concentrated in agriculture products. Agriculture exports still made up about two-thirds of the country's exports in 2019, despite the rising contribution of garments and textile exports in the past decade.

Rural smallholder farmers in Ethiopia are primed to benefit from the rise of global agri-food trade. First, Ethiopia's exports are concentrated in agriculture products that have seen high export growth globally. Animal and related products, coffee, oilseeds, and legumes have all seen global trade expansion of over 40 percent since 2010, while the trade in cut flowers rose by 20 percent (Figure 39). Second, Ethiopia's agriculture exports are concentrated in commodities with greater participation of smallholder farmers (Figure 40). Coffee is the country's major export commodity, accounting for 69 percent of agriculture exports and nearly one-quarter of total exports in 2019. It is cultivated by over 4 million households, supporting the livelihoods of about 20 million people in Ethiopia. The country's second most important export is sesame oilseed, accounting for 15 percent of agriculture exports and produced by more than 1 million households. New growing areas of exports, such as meat, are primarily produced by smallholder farmers too. Third, Ethiopia is fast catching up on some rapidly growing agriculture exports such as meat and beans. The country's exports of these products have risen 2.5 and 3.5 times faster, respectively, than the already high global trade growth in these products. The rise of global agri-food trade has therefore presented great opportunities for smallholder farmers in Ethiopia to expand their incomes.

Smallholder farmers will benefit more from global agri-food trade through expanding production, reducing trade barriers, focusing on quality and entry into new markets

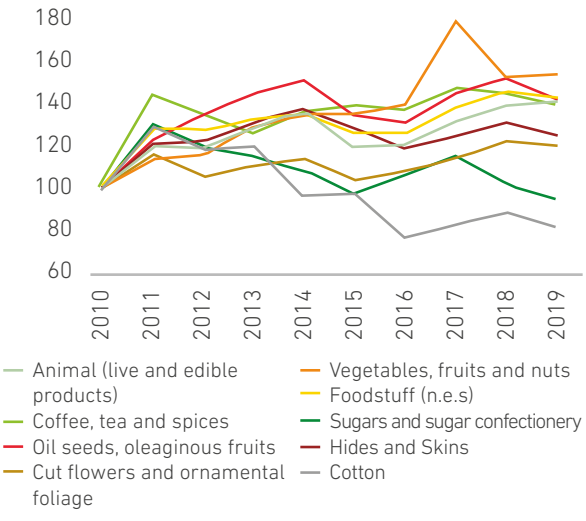
A slowdown in production of some commodities has constrained export growth. While the production of many other crops has been increasing, both the production of sesame and

Figure 38. Trends in global agriculture (US$), 2010-19



Source: Authors' estimates from COMTRADE.

Figure 39. Global food trade – key commodities (US$ million), 2010-19

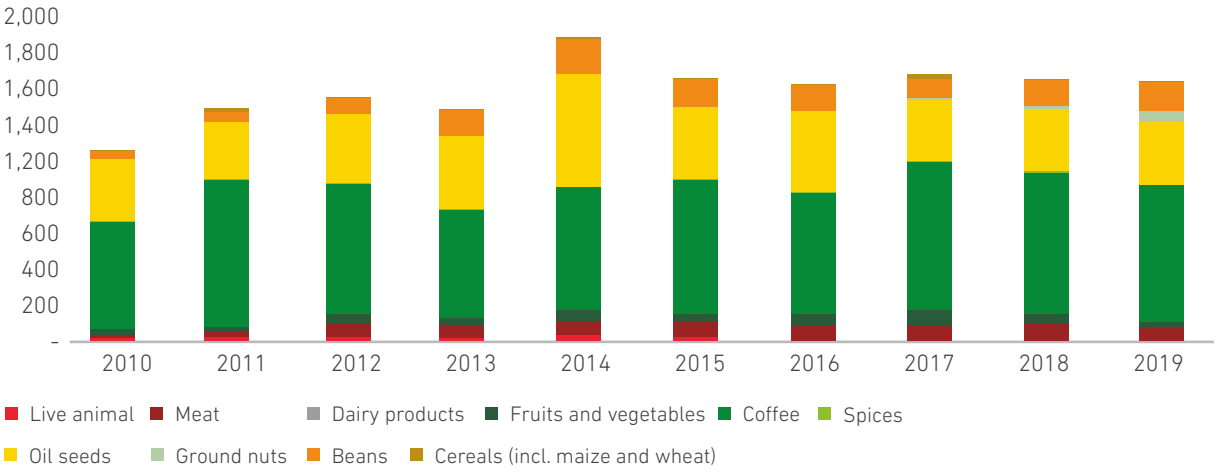


Source: Authors' estimates from COMTRADE.

beans—the second- and third-highest agriculture exports for Ethiopia—declined by 15 and 40 percent, respectively, compared with their peak production in 2015 (Figure 41). Their exports declined too. The value of sesame oil seed exports from Ethiopia declined by more than the decline in global exports of sesame oil seed. This was driven more by the 25 percent reduction in the quantity of sesame oil seed exported than the decline in prices. The decline in production thus constrained exports. Similarly, the quantity of beans exports declined (by close to 27,000 tons), though the export value declined by less, as prices remained high. Therefore, reduced production represented a missed opportunity for smallholder farmers, as the share of production exported declined significantly (Figure 42).

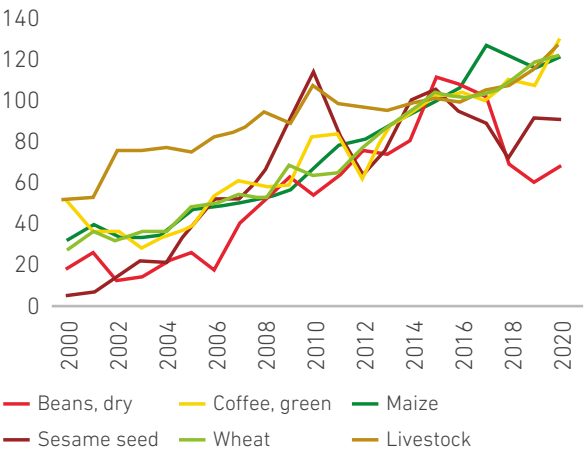
Export controls prevented any maize exports, even though maize production has been increasing. This has disadvantaged maize producers in two respects. First, global maize exports growth has been very high during the past decade, and Ethiopia's smallholder farmers completely missed out on this trade boom (Figure 42). Second, the domestic price of maize has remained depressed, at levels below international prices. This means that maize producers faced lower prices than they could have otherwise obtained, which is an implicit tax on net producers and a subsidy for consumers. Elimination of these controls will provide a boost to farmers, as domestic demand for maize is projected to decline given its low-income elasticity in domestic urban markets.

Figure 40. Ethiopia's food trade – key commodities (US$ million), 2010-19



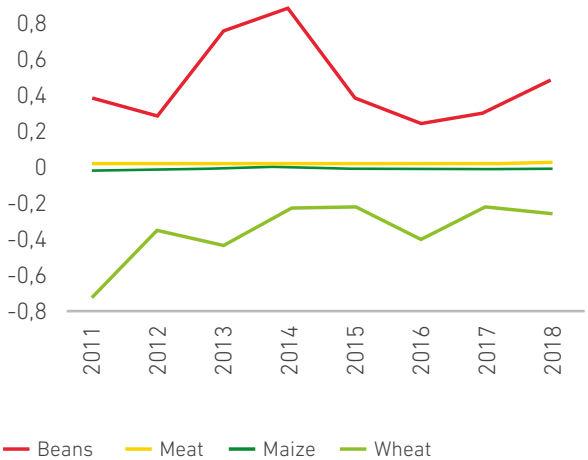
Source: Authors' estimates from COMTRADE.

Figure 41. Production index trends (base year = 2015), 2000-20



Source: Authors' estimates from FAOSTAT.

Figure 42. Share of net exports relative to production for selected crops, 2011-18

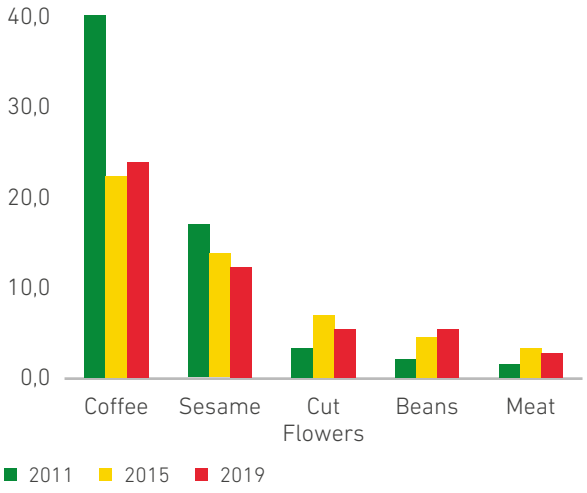


Source: Authors' estimates from GTAP database.

Ethiopia's top agriculture exports have been losing market share in world trade, pointing to additional room for agriculture export growth. Ethiopia's share of exports to the top 10 importers of coffee declined from 40 percent in 2011 to 24 percent in 2019 (Figure 43). The market share for sesame in that product's top 10 import markets also declined, from 17 to 12.5 percent during the same period. These declines are a result of stagnation in the quantity of exports for coffee and declining production for sesame, pointing to missed market opportunities. Only for beans and meat has Ethiopia gained market share.

Nonetheless, there is great potential to increase both export values and farmers' incomes in the coffee trade by introducing market incentives and infrastructure for premium coffee production. Due to the absence of quality-based payment by the Ethiopia Commodity Exchange (ECX) and limited access to wet stations, wet processed coffee only accounts for about 30 percent of coffee exports, despite carrying a 20 percent price premium in export markets. In comparison, wet processed coffee accounts for 89 percent of Kenya's coffee exports (Figure 44). Coffee producers in Ethiopia therefore earn a lower margin in the value chain, receiving about 60 percent of the export price compared with Vietnam (95 percent), for example (EIAR et al., 2018).

Figure 43. Ethiopia market share in the top 10 markets (%), 2011-19



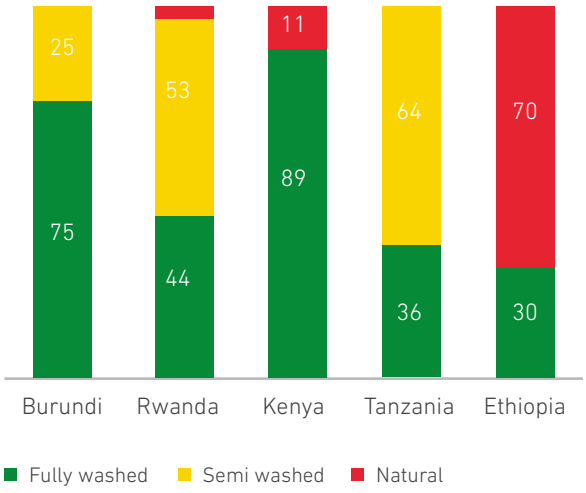
Source: Authors' estimates from COMTRADE.

This difference is attributed to the low quality of the coffee supply and limited value addition, but also by traders offering lower prices to make up for the high cost of doing business to comply with stringent marketing rules by the ECX. The reform of the pricing mechanism and marketing rules of the ECX, along with adoption of improved varieties, could open further opportunities for expanding smallholder farmers' incomes from coffee production.

Further off-farm opportunities are created in the post-primary production phases of agriculture export value chains

With linkages to a variety of sectors, agriculture export value chains create jobs beyond primary production and final product retail. Agriculture exports generate jobs upstream (logistics and marketing) and downstream (e.g., use of fertilizer, machinery and extension services) of the primary production stages of the value chain. An analysis by the OECD finds that agriculture only accounted for 42 percent of final price paid by consumers for foods and fiber in developing countries. Services and food processing each accounted for close to one-quarter of the final price in 2014 (OECD, 2020). The study also finds that primary agriculture production made up 73 percent of the gross value of agriculture exports, with services making up 14 percent.

Figure 44. Arabica coffee processing method among African exporters (%), 2017



Source: EIAR et al., 2018.

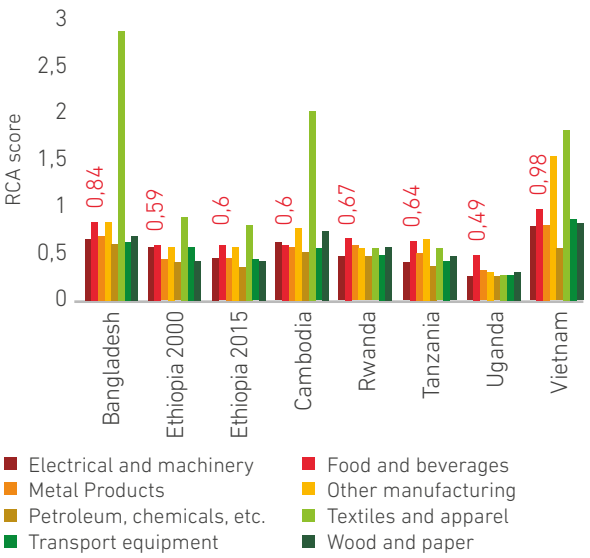
Downstream processing along other value chains helps create jobs if adequate infrastructure and regulatory measures are in place. Though not as pronounced as its comparators, Ethiopia has revealed comparative advantage in the food and beverage, and textile and apparel sectors (Figure 45)—two sectors linked to agriculture. This points to the potential to create jobs in the processing segment of agriculture raw materials, from food processing and other inputs such as leather for the apparel sector. However, Ethiopia currently has the lowest level of backward linkages in textiles and apparel of any of the countries among the major textile and apparel exporters by a wide margin. Some agri-food subsectors are showing promise, though. For an example, livestock products exports from Ethiopia have shifted from live animals to meat exports, which are a packaged product. In 2010, US$14 million out of the US$41 million that Ethiopia generated from exports of live animals and livestock products came from live animals' exports. By 2019, meat exports accounted for US$87.5 million, while live animals' exports dropped to just US$780,000. Improvements in supportive infrastructure, such as cold chains and food safety standards, will significantly boost the potential for job creation along this value chain, given that meat exports are a growth product for which only a small portion of local production is currently being exported. Coffee, diary, and leather processing also have similar potential.

The increasing use of services along value chains can drive domestic value-added growth for primary agriculture exports and create jobs. In general, Ethiopia has a low services content in its exports compared with comparators (Figure 46), which suggests that there is an unexploited potential to increase domestic value addition and the sophistication of its exports. Ethiopia's services content in exports is around 14 percent, which is on a par with the services export content in the agro-food trade. However, the domestic services content of its export is very low, at around 5 percent. Embedding more domestic services in agro-food exports, such as quality control, extension services, marketing, and financing, could also help increase aggregate returns for producers through gains from improvements in quality, even though they may capture a lower share of the price. That services are consumed domestically suggests the potential for job creation in the services sector supporting primary exports.

Ethiopia's services content exports is around

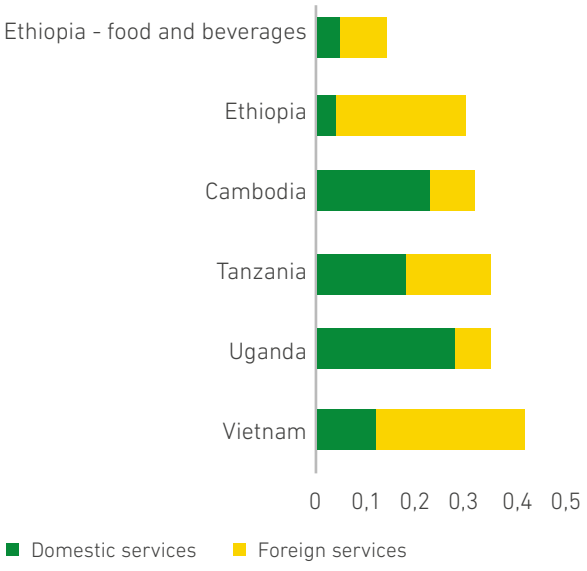
14%

Figure 45. Revealed comparative trade in goods, 2015



Source: World Bank 2022a, based on WITS, UNCTAD-TRAINS data.

Figure 46. Share of services value in exports, 2015



Source: World Bank 2022a, based on WITS, UNCTAD-TRAINS data.

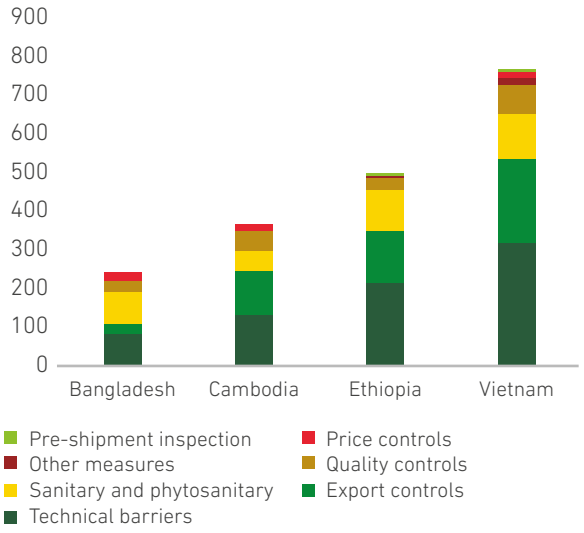
Addressing barriers to trade is key for integration into global agriculture value chains

Improvements in food safety and traceability will be key to integration into global agriculture value chains. Non-tariff measures, mostly related to sanitary and phytosanitary (SPS) measures and technical measures (TBTs) such as standards, tend to be higher for agriculture and food products. These provide assurances of quality to consumers. Producers that can meet these requirements are therefore able to access high-value markets. Recent changes in China's export standards and requirements for coffee, which caught several exporters in Ethiopia unawares, demonstrate the importance of meeting high standards for tapping into export markets. An ability to demonstrate that producers can meet the standards through strong food safety measures, improved certification and traceability will open access to new high-value markets. For other opportunities, such as specialty coffee, traceability and certification are pre-requisites for recognition and generating a premium for the products. Ethiopia has more SPS and TBTs than most of its comparators other than Vietnam (Figure 47). However, it is important to ensure these are aligned with major export markets, to reduce the costs and build capacity for efficiently enforcing them, otherwise they will merely become impediments to trade.

Ethiopia, however, has many export controls and high food and beverage tariffs, and hence stands to gain from boosting agri-food trade through further trade liberalization. Non-tariff barriers to trade in Ethiopia are raised by export controls. There are about 139 export control measures in place, higher than Cambodia or Bangladesh, though lower than Vietnam (Figure 47). As the case of maize shows, export controls can have a discouraging effect on trade, preventing rural households from gaining from growth in global agri-food trade. Furthermore, high tariffs on imports (Figure 48) could inhibit the country's own exports if matched by trade partners, and also slow down the development of local industries by increasing the costs of inputs. The country and, consequently, rural households stand to benefit from trade reforms, as simulations of alternative reform scenarios suggest (World Bank, 2022a).

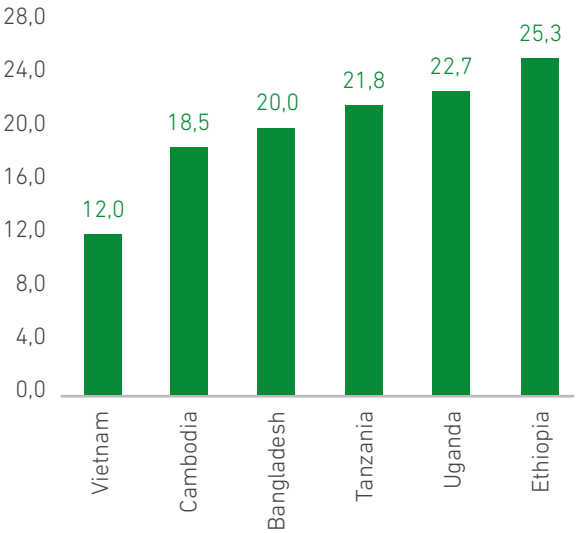
In sum, the rise in global agri-food trade is creating opportunities for rural households in Ethiopia to increase their incomes directly in agriculture, and by creating non-farm jobs. Further gains will be made through the elimination of harmful export controls, such as the maize export ban, and increasing domestic production of key products to recover lost market share by implementing productivity enhancing interventions, for example, those promoting the adoption of improved varieties to increase yields, to stem the stagnating production of key export products. Reforming the incentive structure and investing in the necessary

Figure 47. Number of non-tariff measures, 2017



Source: World Bank 2022a, based on WITS, UNCTAD-TRAINS data.

Figure 48. Food and beverage tariffs (%)



Source: World Bank 2022a, based on WITS, UNCTAD-TRAINS data.

infrastructure to encourage quality production and processing will both help increase farmer returns, while also creating off-farm job opportunities. Though Ethiopia has a revealed comparative advantage in the food and beverage, and textile and apparel sectors, there is an unexploited potential to increase domestic value addition and the sophistication of exports and, consequently, returns to producers.

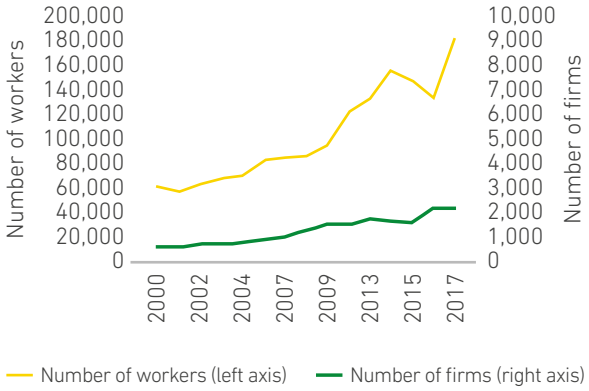
Spatial and economic transformation

Rural areas supplied labor to fill jobs created during Ethiopia's expansion of urban based export industries

The Government's thrust to boost export-oriented manufacturing through investment in urban-based industrial parks has contributed to employment generation. The number of manufacturing firms quadrupled in two decades to just over 2,000 firms in 2017, with sharp increases in the number of firms observed around 2007 and 2016. The number of permanent workers in the sector tripled in this period (Figure 49). A cross-country analysis by Pahl, Timmer, Gouma, & Woltjer (2019) finds evidence of major job creation due to Ethiopia's participation in GVCs between 2000 and 2014. The country's job growth was strongest among the four African countries in the study, and nearly as much as in Vietnam and Bangladesh. However, the backward linkages have so far been limited, and hence indirect job creation has been modest (Ndiaye et al., 2021).

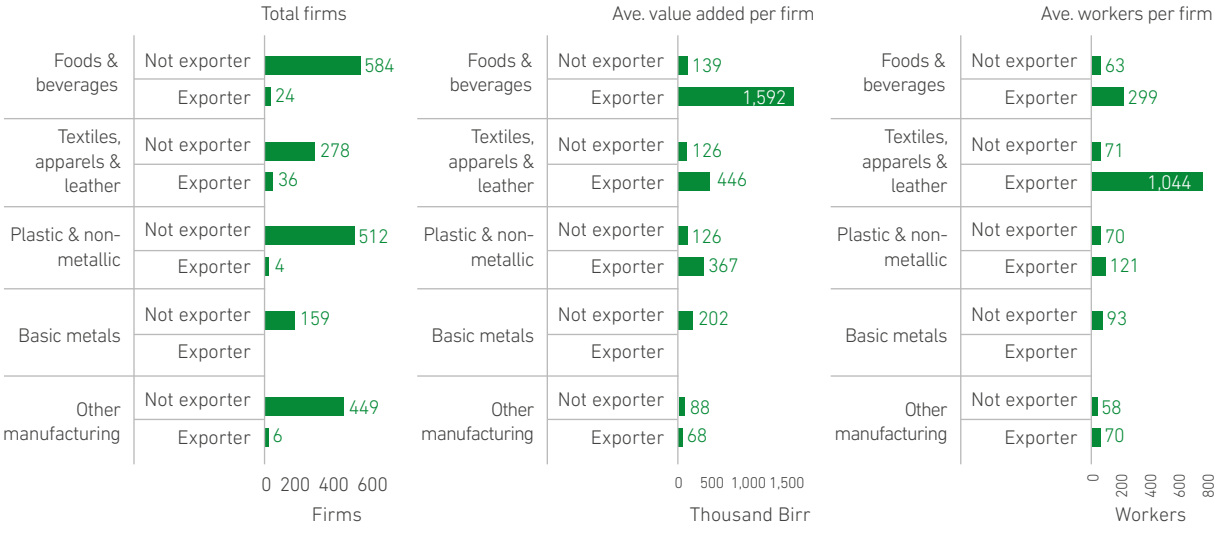
Export-oriented firms create more jobs on average. In the garment sector, exporters employed more than 1,000 workers per firm in 2017 compared with about 71 workers per firm among non-exporting firms (Figure 50). Exporting firms in the food and beverages sector on average employed four times more workers per firm than non-exporting firms in the sector. While fewer in number than non-exporting firms, in some sectors exporting firms employ more workers.

Figure 49. Number of workers and firms in the manufacturing sector in Ethiopia: 2000–17



Source: Ndiaye et al. (2021).

Figure 50. Comparison of Ethiopian firms' metrics by export status, 2017



Source: World Bank 2021, based on the Large and Medium Manufacturing Enterprises Survey (LMMS, 2017).

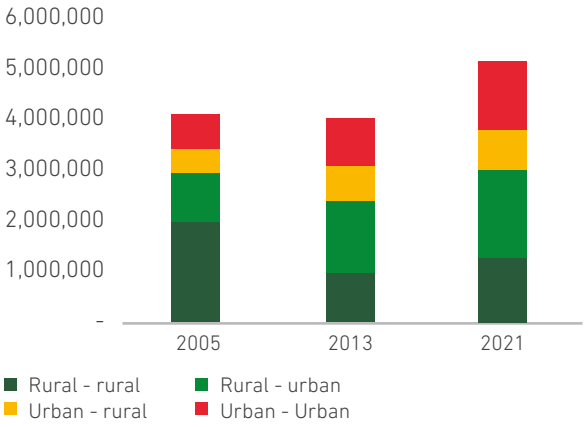
Export firms established in urban areas mostly employ migrants, as surveys at industrial parks across the country confirm. About 70 percent of workers in the Bole-Lemi Industrial Park were recent migrants to Addis Ababa (Abebe, Buehren, and Goldstein, 2020) and 52 percent of workers in the Hawassa Industrial Park were born outside the Hawassa zone (Meyer, Hardy, Witte, Kagy, and Demeke, 2021). Thus, rural areas are a major source of labor for urban-based firms participating in GVCs. Evidence also suggests that these jobs present first time opportunities for people without prior formal work experience. Oya and Schaefer (2020), for example, find that 46 percent of workers in industrial parks in their study did not have any previous formal work experience and the job was a first factory job for 58 percent of the workers. Increased participation in GVCs by urban-based firms generates high job demand that has so far been largely filled by rural migrants.

Rural-urban migration is a pathway to employment for better educated rural youth

A substantial number of people are migrating from rural to urban areas. More than half of the urban population in 2021 - about 10 million people - were born outside their zone, according to estimates from the LFS 2021. Rural-urban migrants account for a large share of migrant flows in Ethiopia, even though a considerable share of urban migrants also moved from other urban areas (Figure 51). More than one-third of recent migrants, defined as those who migrated to their destination areas during the most recent five-year period, relocated from rural to urban areas. Thus, close to 2 million people moved from rural to urban areas within the five years prior to 2021. This number has been increasing over time.

Migrants from rural areas tend to be younger and better educated than non-migrants, especially those migrating to urban areas. With an average age of 27 years, the typical rural-urban migrant is nearly 10 years younger than the typical non-migrants they leave behind, most of whom are illiterate. More than half of the rural non-migrant adult population has never been to school, one-third dropped out of primary school and just 2 percent have at least secondary education. In contrast, close to half of rural-urban migrants have at least completed primary school, with 18 percent having completed secondary or post-secondary education (Figure 52). This suggests that rural-urban migration is an outlet for the more literate

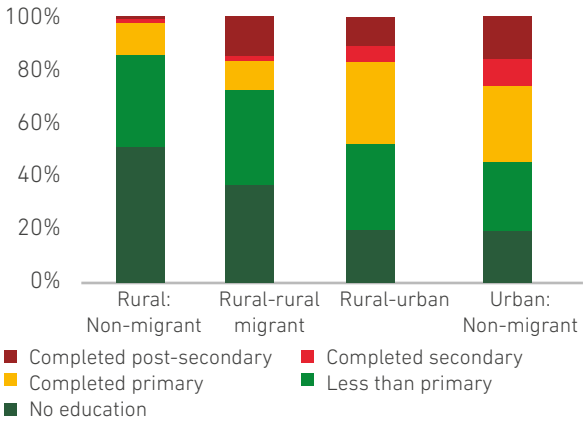
Figure 51. Migration flows: the number of recent migrants, 2005–21



Source: Authors' estimates from the LFS 2021.

Notes: Estimates for 2021 exclude Tigray, which was not covered by the survey due to conflict.

Figure 52. Education status of recent migrants, 2021



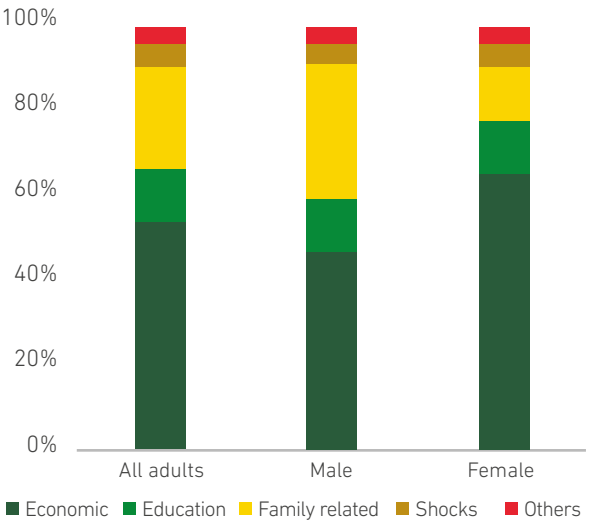
Source: Authors' estimates from the LFS 2021.

Notes: Estimates for 2021 exclude Tigray, which was not covered by the survey due to conflict.

youth in rural areas, especially women, who made up 60 percent of the rural-urban migrants.

Most rural-urban migrants moved in search of better economic opportunities, especially women. Close to 54 percent of all adults and 65 percent of adult women who migrated five years prior to 2021, moved for economic reasons (Figure 53), either in search of a job or due to limited access to land. Rural-urban migrants are equally as likely to be economically active, employed and in non-agriculture work as urban residents, but are more likely to be in wage employment (Table 16). However, a disproportionate share is in engaged in domestic wage work (17 percent compared with 5 percent among non-migrant urban residents). Thus, migration offers a pathway to employment for rural residents, mostly the youth with better education, facing limited opportunities in rural areas.

Figure 53. Reason for migration among rural-urban migrants, 2021



Source: Authors' estimates from the LFS 2021.
Notes: Estimates for 2021 exclude Tigray, which was not covered by the survey due to conflict.

Table 16: Labor market outcomes of migrants, 2021

Labor Market indicator	Rural: Non-migrant	Urban: Non-migrant	Rural-urban migrant
Active	74%	71%	74%
Unemployed	6%	18%	20%
Sector of employment			
Agriculture	79%	13%	13%
Industry	3%	17%	20%
Services	18%	70%	68%
Employment type			
Wage employee	4%	45%	53%
Self-employed	58%	42%	35%
Unpaid family	37%	11%	10%
Employer	0%	1%	0%
Others	1%	1%	1%

Source: Authors' estimates from the LFS 2021.
Notes: Estimates for 2021 exclude Tigray, which was not covered by the survey due to conflict.

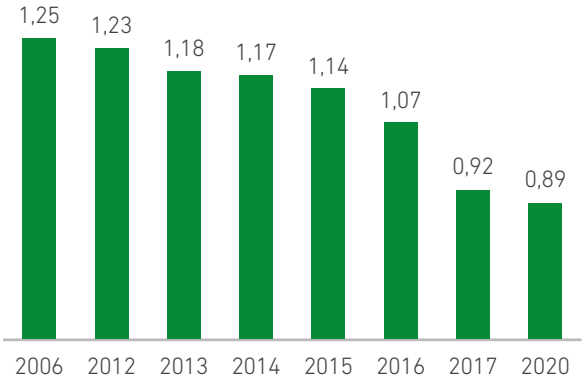
Rural-urban migration brings essential, positive effects on rural transformation

Rural-urban migration also has positive benefits to originating households and communities. Migrants send remittances, which are an important source of livelihoods among recipient households. The average amount of remittances received by households in 2016 was equivalent to 31 percent of recipient household consumption expenditure nationally and 70 percent among the bottom quintile (World Bank, 2020b). Other research suggests that recipient households also improve investment, both in human capital and physical capital, and encourage greater risk-taking behavior.

With a rising rural population, rural-urban migration, and urban development, are essential for facilitating rural economic transformation. The rural population expanded by more than 20 million people since 2004, and by 11 million in the past decade alone. With a total fertility rate of around 5.2 in 2016, the rural population will keep expanding, increasing pressure on land. The average land size per household has declined from 1.25 ha in 2006 to 0.89 ha in 2020 (Figure 54). The challenges of small land sizes on agricultural productivity can be mitigated by land consolidation interventions such as the agriculture commercialization cluster approach championed by the Government, but that has its limits. The movement of people from rural to urban areas will be essential to relieve the land pressure and transform the agriculture sector.

Migration is linked to favorable changes to rural land and labor markets that facilitate rather than inhibit the transformation of the agriculture sector and the rural economy. Estimates based on statistical matching techniques (see Box 5) find a positive impact of migration on both intensity of labor use, agriculture output per capita and land rental markets (Table 17). Migration increases family labor days worked and output per capita in migrant-origin households compared with non-migrant households by 28.6 and 18.3 percent, respectively. This implies that migration reduces disguised unemployment in rural areas. It raises the subsistence wage in the rural economy, a process necessary for the commercialization of a backward agriculture-based rural economy in convergence with the modern sector, according to the Lewis development model. The rising output per worker suggests migration enables the remaining

Figure 54. Trends in household land ownership (ha), 2006–20



Source: Authors' estimates from AAGS 2006, 2012–20.

Table 17: Impact of migration on factor markets in origin communities

Statistics	Cultivated land (ha per capita)	Land rented out	Family labor supply (days per capita)	Value of crop harvest (Ethiopian birr per capita)
Average Treatment Effect on the Treated	0.065**	0.012**	120**	938.5**
Standard Errors	0.001	0.017	21.302	369.5
97.5% Confidence Interval	(0.045; 0.083)	(-0.024; 0.042)	(79.958; 161.455)	(235.67; 1678.94)

Source: Authors' estimates based on ESS 2011/12; 2013/14; 2015/16.

Notes: (a) Cultivated land per capita is the area per hectare that the household utilized for crop production. (b) Land rented out is the share of households renting/sharing out agriculture land. (c). Value crop harvest is the Ethiopia birr value of the total production. ** result statistically significant at the 5 percent level

household members in migrant-origin households to adequately feed off their land. Second, migration increased the share of households that rented out land by 1.2 percentage points, translating into a 6.6 percent increase in the amount of land rented-out. It has increased the rent-in rates among non-migrant households by 1 percentage point. Thus, migration improves the efficiency of the land markets too.

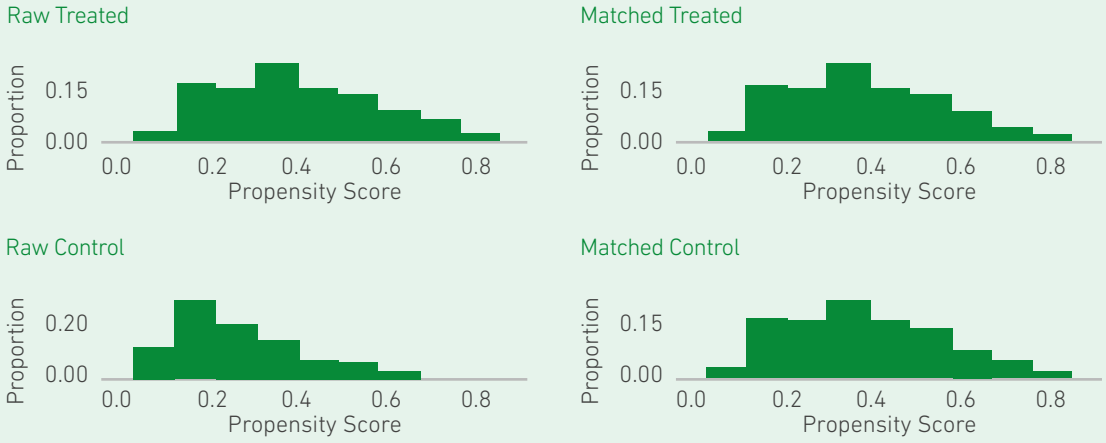
To summarize, rural-urban migration and urban development are both a pathway to gainful employment for the rural youth facing limited opportunities and a catalyst for rural transformation. Opportunities for migrants are expanding with jobs created in urban based export industries, as Ethiopia integrates into GVCs. This also generates positive spillovers in the rural agriculture sector, where land pressure has risen due to an expanding population. Rural-urban migration helps to relieve this pressure by improving the efficiency of land markets as land rent-outs increase among migrant households, and reducing disguised unemployment, resulting in increased output per worker and labor productivity in rural areas. In other words, by absorbing rural labor, the development of urban-based export industries has significant development impacts for the rural economy by providing opportunities for the inexperienced rural youth, while at the same time aiding the transformation of the agriculture sector instead of holding it back.

Box 5: Estimation of the impacts of migration on factor markets

Analysis of impacts of migration on factor markets uses a balanced panel dataset based on the ESS for 2011/12 (wave 1), 2013/14 (wave 2) and 2015/16 (wave 3). The study considers migration experience at the household level. The study tracked households and their member from wave 1 to wave 3 and identified members who moved out to other places during the household visits in wave 2 and wave 3. Households with at least one household member aged 10 years or above who moved, are defined as a household with migrants. Using this definition of a migrant household, the impacts of migration on land and labor utilization, as well as output per capita, in migrant households is estimated using a propensity score matching technique to correct for imbalances in baseline covariates between households with and without migrants. This is used to construct a counterfactual group statistically similar to the with migrant households from the pool of without-migrant households' data. The matching strategy involved a 'Nearest Neighbor' matching estimator with replacement among propensity scores within a preferred caliper of 0.05 and radius of 2.

This analysis includes covariates that can affect the probability of migration and outcomes to eliminate biases due to variable selection. The model includes household demographics, human and social capital, liquidity constraints, and financial capital of the households. Drought shocks and distance to local administration are controlled at village level. Standardized Precipitation Evapotranspiration Index (SPEI) is applied to estimate the level of drought shock at village level. The main purpose of matching was to break the link between migration and the premigration covariates. The original households without migrants are not comparable with households with migrants. The preprocessing produces statistically similar propensity scores distribution for the households with and without migrants (see chart). Households with and without migrants need to be similar in every value, except having sent out a household member to other locations. The standardized bias was computed to test whether balance improved for each covariate. The preprocessing assures that balance improved for all household covariates.

Propensity score distribution in the original and matched groups and overlap condition



Source: Authors' estimates based on ESS 2012.

LEVERAGING OPPORTUNITIES: THREE PATHWAYS FOR INCREASING RURAL INCOMES

Increasing the market orientation of rural agricultural households

Linking rural households to input and output agricultural markets and their participation in markets contributes toward improving the livelihoods of rural populations. Agricultural commercialization is viewed as pathway toward economic growth and development for many agrarian economies (Timmer, 1997). It entails physical access to markets and actual market participation (the sale of agricultural produce and the purchase of agricultural inputs). Commercial transformation will link rural households to input and output agricultural markets, and thus help contribute toward improving the livelihoods of the rural population (World Bank, 2012). Previous research on Ethiopia suggests that there is huge potential to boost rural households' incomes through the diversification of production into high value crops and increased participation in agricultural (input and output) markets (International Livestock Research Institute [ILRI], 2020; Wakeyo, Kuma, Mekonnen, and Ageba, 2017). Therefore, higher market participation is translated into higher farm incomes and household welfare.

This section of the report showcases how increasing the market orientation of rural households can contribute toward improved livelihoods and welfare of the rural poor in Ethiopia. Evidence based on rigorous empirical models is presented to show that the participation of rural households in both input and output markets increases real consumption per capita, demonstrating that markets have the potential to boost rural household incomes, enabling households to break out of poverty traps. The key constraints to smallholder market participation are identified based on econometric analysis of the determinants of households' land use choices and the determinants of market participation. The latter is jointly estimated with the impact of market participation on household consumption, as market participation consumption decisions are often jointly made within a farm household's production framework.

Though it involves trade-offs, market participation enhances household welfare of rural agricultural households in Ethiopia.

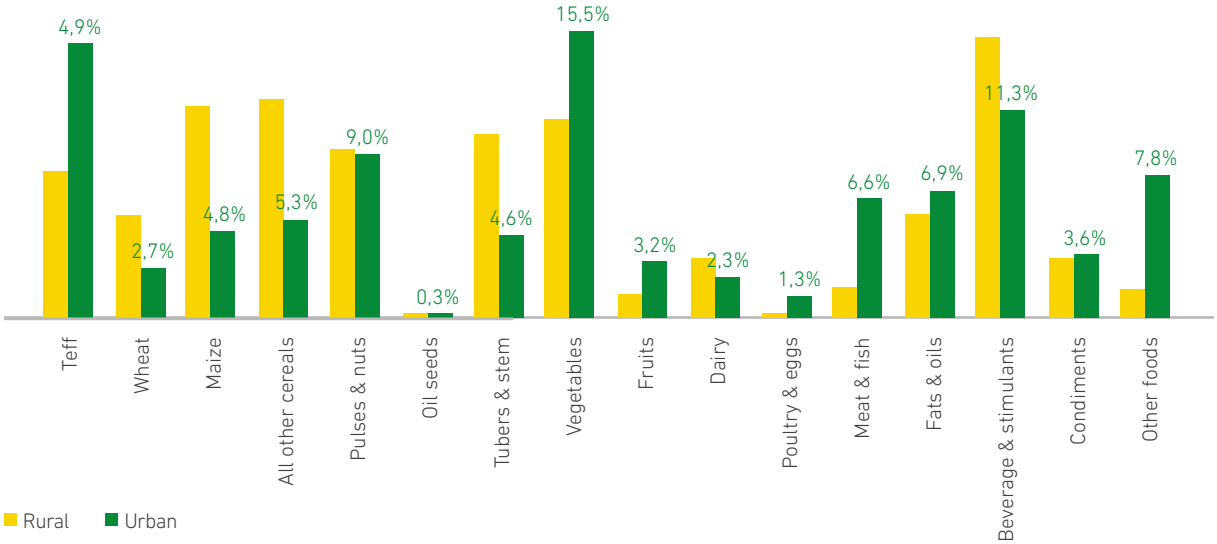
Farmers' market-orientation decisions can be best understood in the context of balancing the trade-off between food self-sufficiency and specialization for market production in the face of incomplete markets. Studies have used the agriculture household model (AHM) to conceptualize rural households' decision-making in both perfect and incomplete markets. In the model, the agricultural household is both a producer that chooses the allocation of labor and other inputs to farm production, and a consumer that chooses the allocation of income from profit and labor sales to the consumption of goods and services (Singh, Squire, and Strauss, 1986; Taylor and Adelman, 2003). The household maximizes utility through the consumption of all available commodities (i.e., home-produced goods, market-purchased goods, and leisure), subject to households' budget constraints determined by net revenues from agriculture and wage labor, which are a function of agriculture production levels and input prices, including wages, farmgate prices, and market prices for food and other commodities. At the core of the AHM is whether households' production, consumption and labor supply decisions are simultaneously determined, or whether these decisions are taken independently of each other. If rural households have access to input and output markets, then prices are exogenous, resulting in an independent decision-making process (Roe and Graham-Tomasi, 1985). As such, production decisions (input use, the adoption of farm technology and output choice) affect consumption exclusively via income levels, and production decisions are entirely independent of consumption. But with rural households in Sub-Sahara Africa, Ethiopia included, confronted with serious challenges related to market access and participation due to lack of roads and

transportation infrastructure (Årethun and Bhatta, 2012; Jacoby, 2000; Wudad, Naser, and Lameso, 2021) and supply chain and price information (Anderson, 2003; Hamill, 2017), production and consumption decisions tend to be made jointly.

For rural farmers in Ethiopia, a joint decision on production and consumption introduces a trade-off between producing for own consumption and producing for the market. Consumption patterns between rural areas and urban areas, which are a major target market, are different (Figure 55). Rural households primarily consume maize, and other cereals such as sorghum and millet, tubers and stems, which urban households spend a smaller proportion of their food budgets on, in addition to having a low income elasticity of demand, hence limited demand potential. Thus, farmers have to weigh the trade-off between being more market-oriented—maximizing income by producing the most profitable products for their land, then acquiring food in the market—or being self-sufficient instead, producing food for their own consumption irrespective of whether such food items are the most profitable for their farms. Their choice is determined by their perceived net welfare gains from the two options, given the risks, costs and expected returns from market participation.

Empirical evidence suggests that the benefits of market orientation outweigh the trade-offs for self-sufficiency. For the purposes of analyzing whether market orientation brings net benefits to households, an empirical investigation of the impact of market participation on household consumption in Ethiopia was undertaken for this RID. The analysis uses statistical techniques that account for the possible factors that influence the decision of households to participate in the market, for example, how much surplus they produce or their level of education. These factors may directly influence households' income-generating capacity and, hence, their consumption, irrespective of their market-participation decision (see Box 6).

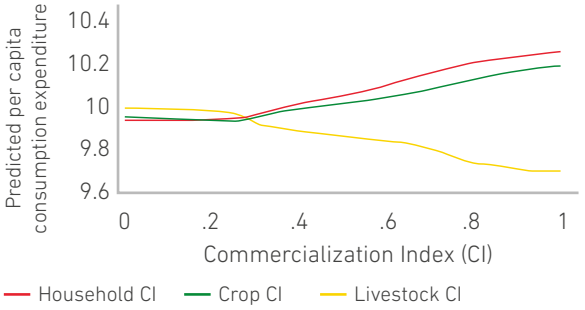
Figure 55. Food item share in household consumption (%), 2019



Source: Authors' estimates from ESS 2018/19.

The results show a positive benefit (close to 50 percent) from market participation on 20 percent or above of rural incomes, especially for the poorest households. A percentage increase in the commercialization index (CI) of rural farmers in Ethiopia increases per capita consumption by 11 percent (Figure 56), but only among crop producers. The increase in per capita consumption is greatest among the poor. The share of caloric intake from non-staples increases with market participation. More commercially-oriented rural households are observed to have a higher protein, iron and vitamin intake too (Table 18). The positive impact of market participation on both consumption and nutrition outcomes shows a favorable trade-off between self-sufficiency and market orientation.

Figure 56. Impacts of commercialization on consumption per capita, 2019



Source: Authors' estimates from ESS 2018/19.

Notes: The inverse hyperbolic sine (IHS) transformed per capita consumption is plotted against the Commercialization Index (CI) based on predicted estimates from Recursive Bivariate Regression models of market participation and household consumption per capita using ESS 2018/19. A positive relationship is also found in estimates using Endogenous Switching and Instrumental Quintile Regression Models.

Table 18: Relationship between crop commercialization and nutritional outcome of households

	Commercialization Index (CI) level	N	Mean Rank	Kruskal-Wallis H	Asymp. Sig
Energy intake from non-staples calorie/ day/Adult female equivalent (AFE)	No sale	1505	1240	8.89	0.010
	Below mean CI	595	1252		
	At least equal to mean CI	424	1358		
Protein intake gm per AFE per day	No sale	1505	1197	30.59	0.000
	Below mean CI	595	1352		
	At least equal to mean CI	424	1370		
VA intake per AFE per day	No sale	1505	1157	104.7	0.000
	Below mean CI	595	1317		
	At least equal to mean CI	424	1559		

Source: Authors' calculations from ESS 2018/19.

Box 6: Estimation of determinants of market participation and its impacts on household welfare

The empirical analysis in recent studies explores market access and participation by using three sets of models: Endogenous Switching Regressions (ESR), Recursive Bivariate Regression, and Smoothed Instrumental Variable Quantile Regression models. These models look at variables related to how the road network and accessibility influence marketing and transaction costs that then determine households' market access and participation. Accordingly, this report applies the ESR model to capture the presence of unobserved variables that influence both the decision of rural households on market participation and their welfare. The use of the ESR model in this study is justified for two main reasons. First, causal inference methods, such as propensity score matching and inverse probability weighted regression adjustment (IPWRA), which control for only observed heterogeneities (observable

household characteristics), result in biased treatment effect estimates due to unobserved heterogeneity. Second, the ESR model is an appropriate specification to construct accurate counterfactuals for households in the two groups to identify the causal relationship between market participation and the outcome variables of interest. Unlike the instrumental variable models (such as two-stage least squares [2SLS] and control function estimations), the ESR model is the most flexible causal estimation method that minimizes cross-sectional modeling errors, which may arise due to the assumption that the effects of observable and unobservable household characteristics are the same for all farmers, by allowing two separate specifications for households below and above mean commercialization index.

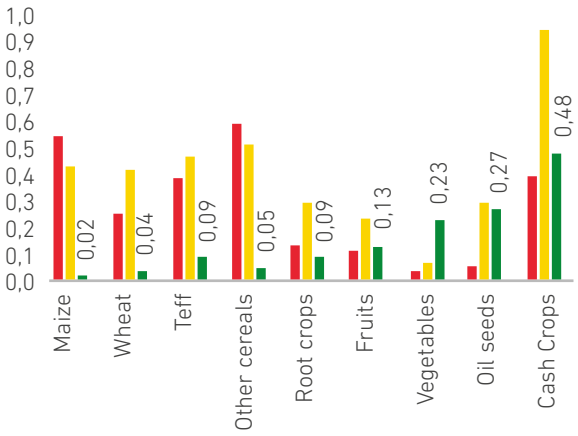
In this model, the determinants of market participation are estimated by regressing the latent variable representing the propensity of households' market participation above the mean commercialization index (Pi*) on a vector of household characteristics (such as the gender of household heads, age in years of household heads, literacy status of household heads, family size, access to credit, access to private and/or social transfers). Given that the ESR model (discussed in previous slide) may suffer loss of information in the selection equation due to aggregating a continuous commercialization index variable into binary, this paper also uses a maximum likelihood estimator of continuous outcome with a continuous endogenous regressor under the recursive bivariate regression (RBR) model, to improve causal inference on the effect of market participation of rural households on their per adult real consumption expenditure. The RBR jointly determines equations per adult real consumption expenditure of rural households against market participation of rural households as measured by commercialization index.

The SIVQR estimator of Kaplan and Sun (2017), which is similar to the two-stage least squares estimator in terms of specifying exclusion restriction for the endogenous regressors, was also used to specify a quantile level. In this model, instead of assuming that every rural household has the same coefficients $\beta 1$ as noted in the ESR model, each household was assumed to have its own coefficient vector b, differing by household.

Despite its positive welfare impacts, the market participation of rural farmers is low as land cultivation choices are inclined toward rural staples consumption

The level of market participation among Ethiopian farmers remains low, depending on farmers' production choices. The overall commercialization index of households in rural Ethiopia is around 17 percent, implying that rural farmers' sales of agricultural produce equate to about 17 percent of their output value. Households that produce staples market the lowest share of their output (Figure 57), while producers of cash crops and the foods most consumed in the urban areas generally sell more of their output. The commercialization rates

Figure 57. Rural households market orientation



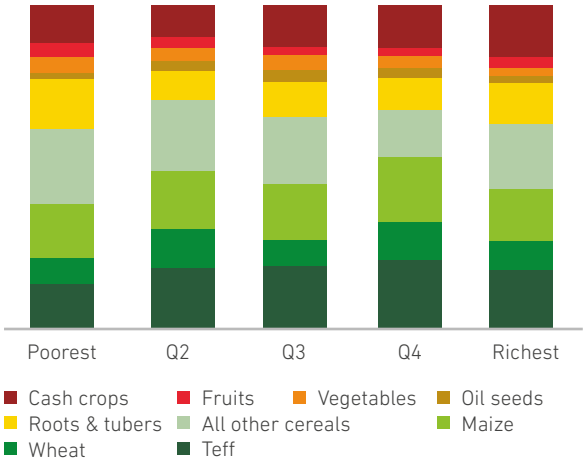
Source: Authors' estimates from ESS 2018/19.

of maize are 2 percent and other cereals—millet and sorghum—less than 5 percent, while teff's commercialization index of 9 percent is better than other cereals. Cash crops—coffee and khat—are highly commercialized, followed by oil seeds, and then fruits and vegetables. The degree of market participation is to some extent determined by farmers' production choices between staples consumed in rural areas and crops in high demand in domestic urban markets or global markets.

There is a general mismatch between what most rural farmers produce and the food items with a higher demand potential in urban or global markets. Households, particularly the poorer ones, are primarily driven to meet their subsistence demands. The evidence from the study shows that much land use allocation is oriented to staple food production, maize, cereals, and roots and tubers. As such, poor households are less likely to produce for the market, as shown in Figure 58. Rural households at the bottom of the income distribution are more likely to engage in maize and root crop production, and less inclined to produce for the market compared with their richer counterparts.

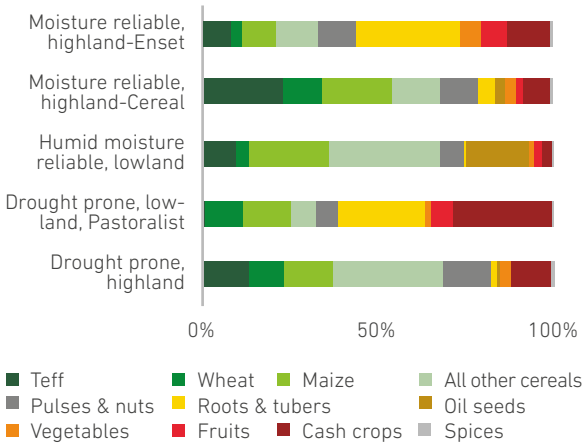
Agriculture potential is a very important factor in crop choice. The share of area cultivated by crop and agroecological zones shows that teff is commonly produced in high agriculture potential areas in highland regions, while maize is more commonly produced in high agriculture potential areas in lowland regions. Households in drought-prone highland areas devote more land to cultivation of other cereals, such as sorghum and millet, while those in lowland drought-prone areas and the highland enset[4] ecological zones devote more land to roots and tubers (Figure 59). An empirical investigation of determinants of households' land use choices between maize, wheat, barley, teff, fruits (as a group), other cereals (sorghum and millet), cash crops, root crops and oil seeds accounting for the interdependency of land use choices across crops within households, market access, prices and farmer knowledge, among others (see Box 7), confirms that land suitability is an important determinant of how much land households devote to different crops. Households devote a significantly higher share of land to the most suitable crops in their areas, by about 36.4 percentage points for maize, 49.6 percentage points for wheat, and 40.9 percentage points for coffee.

Figure 58. Share of cultivated land by crop and income group (%)



Source: Authors' estimates from ESS 2018/19.

Figure 59. Share of land allocated to cash crops by ecological zones (%)



Source: Authors' estimates from ESS 2018/19.

[4] Enset (Ensete ventricosum), also known and the Ethiopian or "false" banana, is a member of the same botanical family as the banana, but unlike its cousin it is not grown for its fruit.

The primacy of food self-sufficiency drives rural farmers' land use choices and government attention toward production of staples

The self-sufficiency motive to produce staple crops overrides considerations for land suitability for market-oriented non-staple crop production. There is an asymmetric response to land use depending on the suitability of major staples such as maize. When the land is most suitable for the production of cereals such as maize, households devote less land to all other crops. However, smallholder farmers do not reduce the share of land devoted to maize or teff, even when their land is more suitable for market-oriented crops such as fruits and coffee, instead of another cereal crop such as barley (Table 19). The higher land share devoted to the most suitable crop in these instances is achieved by reducing production of the other market-oriented crops, i.e., when coffee is the most suitable crop, farmers use more land for its production in place of fruits and oil seeds

Table 19: Relationship between crop commercialization and nutritional outcome of households

	Change in share of land devoted to crop (proportion)								
Land Suitability for Each Crop	**Maize**	**Wheat**	**Barley**	**Teff**	**Fruits**	**Other Cereals**	**Cash Crops**	**Root Crops**	**Oil Seeds**
Maize Suitability: Yes	0.364	-0.017	-0.024	-0.079	-0.015	-0.128	-0.099	-0.025	-0.020
Wheat Suitability: Yes	-0.073	0.496	-0.030	-0.105	-0.009	-0.099	-0.084	-0.009	-0.019
Barley Suitability: Yes	-0.093	-0.024	0.625	-0.095	-0.012	-0.084	-0.154	0.005	-0.030
Fruits Suitability: Yes	-0.004	-0.038	0.012	0.009	0.096	-0.076	-0.162	-0.033	-0.025
Coffee Suitability: Yes	-0.005	-0.032	0.003	-0.021	-0.085	-0.076	0.406	-0.048	-0.019

Source: Authors' estimates from ESS 2018/19.
Notes: Seemingly Unrelated Regression results. Coefficients in green font are not statistically significant.

Box 7: Estimation of determinants of land use choices among rural smallholder farmers in Ethiopia

The determinants of land use choices are analyzed using a Seemingly Unrelated Regression (SUR) framework. Unlike Ordinary Least Squares (OLS), the SUR analytical framework acknowledges the non-zero correlation between the error terms of the individual equations that define the factors influencing each land use choice, thereby reducing bias. In the SUR setup, the endogenous variable is the share of land allocated to different crops, in this case the shares of land under wheat, teff, fruits, cash crops and oilseeds, as the high value crops; and the shares of land under maize, barley, other cereals and root crops, as the low value crops. In a related layer of analysis, the shares of land under the crops are aggregated to the shares of land under high and low value crops in a two-equation system.

The analysis is conducted at the landholder level using the ESS 2018/19 data. The regressors are categorized into demographic (gender, education, household size), credit access, land sale rights and landholder age and market (prices of different crops, prices relative to nearest regional capital prices, and crop-to-crop relative prices). Bio-physical factors are also included, namely Galor and Ozak Caloric Suitability Index (CSI) and crop suitability dummies (that is, if crop is among the three most suitable in the area) drawn from the FAO GAEZ database. Lastly, SUR estimates also control for area-level and extension factors, such as the existence of a woreda office, a micro finance entity, an irrigation scheme, an extension program, advisory services and notice boards.

production, while maintaining the land allocated to maize, for example. Thus, smallholder farmers double down on staples production when the land is more suitable for their production but keep growing their main staple anyway even when the land is more suitable for non-staple crops instead. Therefore, they devote a higher share to staples production than they should when marketed-oriented crops could be more productive, implying that other factors are at play.

Facing land constraints, most rural households maximize the land that they own to produce their own food first. Households owning less land seem to maximize production of staple foods for subsistence. The production of roots and tubers is concentrated among the smallest farmers that own less than 0.25 ha. The share of households that grow teff and wheat (cereals with urban demand), pulses and oilseeds increase across the landholding classes, but declines among households that hold more than 2 ha (Figure 60). On the other hand, households with more fertile land can devote a significant share of their land to cash crop production (Figure 61).

Land use patterns suggests that smallholder farmers are likely to diversify into other crops only once their subsistence needs are met. The more fertile the land, the lower the amount of land that households would need to produce enough staples to meet their minimum subsistence needs, freeing up the remaining land for the production of other crops. This notion is supported by the observed relationship between land use choices and a geospatial index of caloric suitability, estimated from applying machine learning to predict the maximum caloric potential of land for productive crops in each area. Estimates using this proxy of land fertility show that households with more fertile land devote a significant share of their land to cash crop production (Figure 61), controlling for other factors such as prices and farmer knowledge that may influence land use decisions. Given the land constraints that poor households face, improving the yields of staple crops could facilitate households' diversification into production for the market.

Public extension services have also been biased toward the production of staples in promoting self-sufficiency. Households whose land is covered by an extension program have a higher share of land devoted to teff and maize, even after accounting for other factors, such as the crop suitability of the land, market access and relative prices. But households receiving advisory services from other sources devote less land to maize

Figure 60. Land allocation across crops by ownership (% of area cultivated), 2019

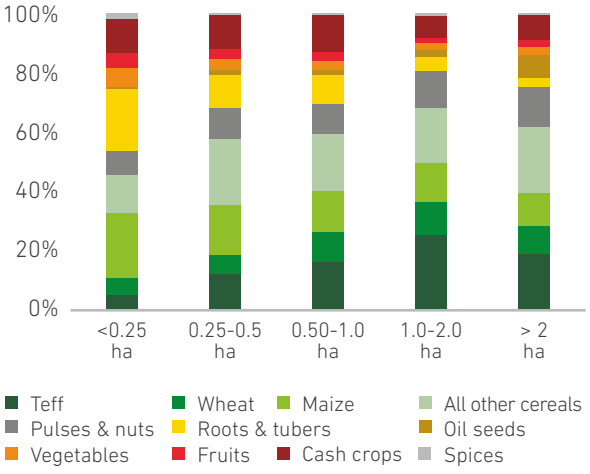
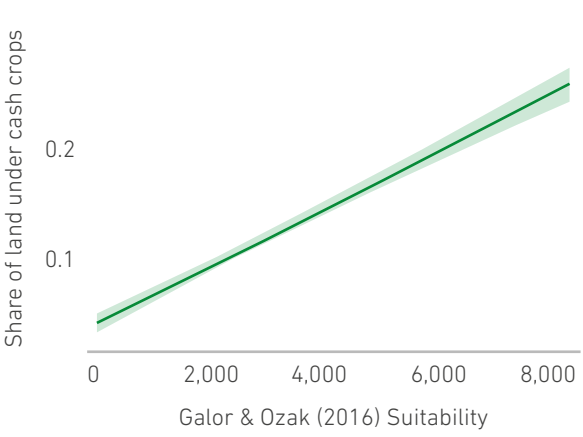


Figure 61. Share of land allocated to cash crops by land fertility, 2019



Source: Authors' estimates from ESS 2018/19.
Notes: The plot in Figure 61 is based on a non-parametric regression of share of land under cash crops and the crop suitability index. The estimates are backed by results from Seemingly Unrelated Regressions of land use choices.

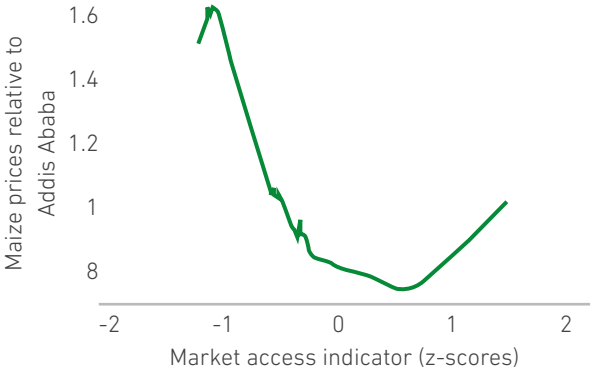
and teff. This implies that public extension services are currently biased toward staple food production, in line with the Government's food self-sufficiency objective, given the country's history of food insecurity.

Low market access increases costs and promotes self-sufficiency

Production choices—in terms of crops and farm enterprise—are influenced by rural connectivity and market accessibility, highlighting the importance of food market integration in influencing land use choices. In general, the commercialization index of fruits and vegetables, oil seeds, cash crops and livestock products improve with households' access to an all-season road and proximity to the regional capital (Figure 62). A larger proportion of households in areas with better rural connectivity and access to markets produce fruits and vegetables, oil seeds and cash crops than those in areas with lower rural and market accessibility indicators. Proximity to small and medium towns is associated with higher commercialization index of spices and herbs. commercialization indices of fruits and vegetables, oil seeds, and cash crops are higher for households with the shortest travel time to the regional capital. Furthermore, commercialization indices of fruits and vegetables and oil seeds are higher for households in areas with large weekly markets than those in areas without large weekly markets.

Market isolation results in higher local prices in areas where some staples are consumed the most. The price of maize is much higher, especially in remote areas (Figure 63). This encourages such households to produce for self-sufficiency. Estimates suggests that households produce less and less of other crops the higher the price of maize becomes relative to the nearest urban center, for example. In cases where households with poor connectivity produce a surplus, the decision to store commodities

Figure 63. Food price variation and market access, 2019

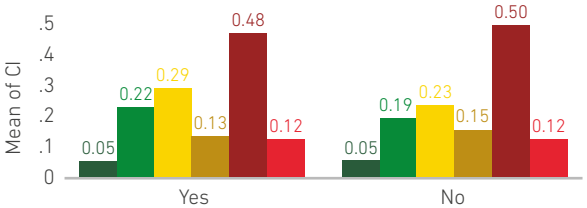


Source: Authors estimates from ESS 2018/19.

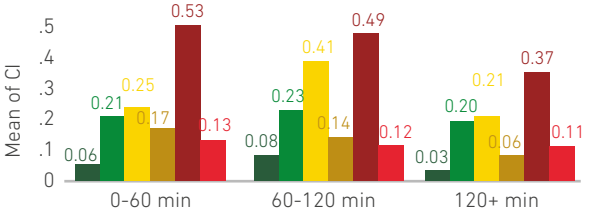
Notes: Based on non-parametric regressions of community market survey prices for an enumeration area relative to Addis Ababa prices.

Figure 62. Rural connectivity and market participation, 2019

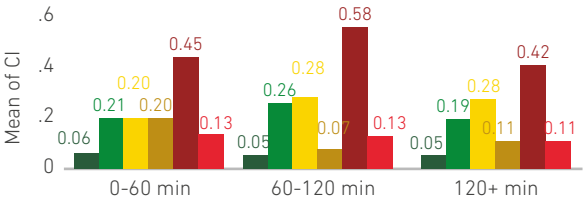
A. Commercialization index of agricultural products by presence of large weekly market



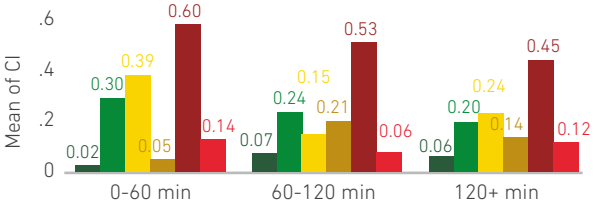
B. Commercialization index of agricultural products by proximity to small town



C. CI of agricutlural products by proximity to medium town



D. CI of agricultural products by proximity to regional capital



Staples | Fruits and vegetables | Oil seeds | Spices and herbs | Cash crops | Livestock products

Source: Authors' estimates based on ESS 2018/19.

for own consumption is based on high transaction costs that make trade unattractive to households.

Market isolation exacerbates the price volatility of major staples across regions and over time, which disincentivizes market participation among risk-averse households. Analysis of monthly price data from 2011 to 2017 on teff, wheat and maize, reveals regional price disparities that affect commercialization of these crops. The share of land that households devote to maize production increases with its price volatility, as measured by the standard deviation of the monthly price of the crop in each region over time (Figure 64). The commercialization index of maize also declines with an increase in its regional price volatility (Figure 65). Estimates also suggest that a 1.0 percent increase in the regional standard deviation of the price of teff is associated with a 9.8 percent reduction in the commercialization index. However, no statistically significant relationship is observed between the variation in the price of wheat and the commercialization index for teff. Estimates also show a negative relationship between the relative prices of staples to cash crops and market participation, reflecting household concerns over food availability.

New analysis suggests that rural connectivity—the determining factor for market isolation—is the most critical determinant of market participation. In the model, which jointly estimates the determinants of the degree of market participation and its impact of household consumption, it is found that rural accessibility is significantly correlated with market participation. Estimates suggests that proximity to roads—a measure of market integration—is the most important predictor of market participation, with households in a community within 2 km of an asphalt road selling 10 percentage points or double the output of comparable households more than 2 km from a road (Figure 66)This is consistent with the price

Figure 64. Share of area under maize cultivation and maize price variation

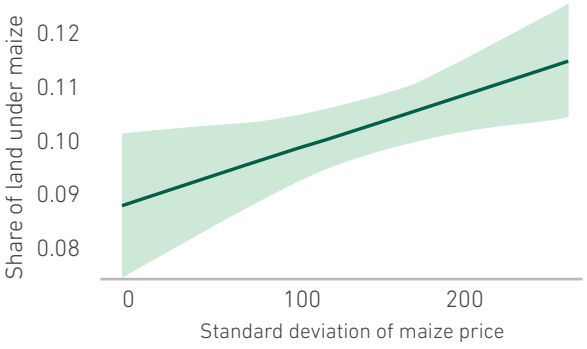
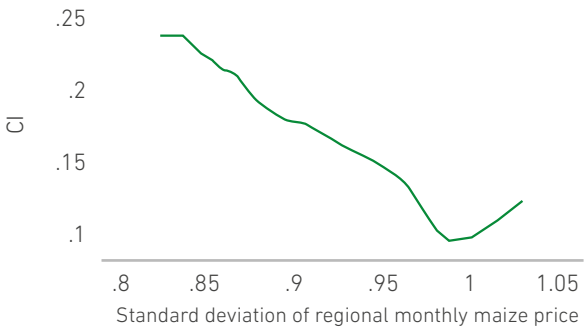


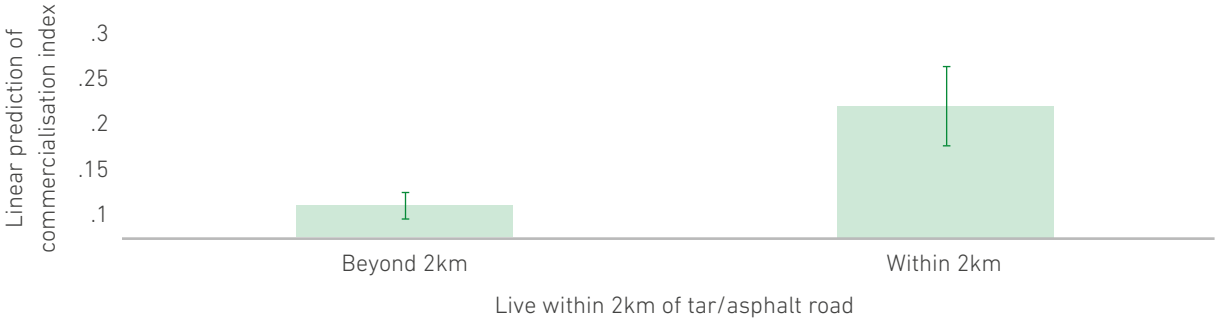
Figure 65. Commercialization index (CI) and maize price variation



Source: Authors' estimates from ESS 2018/19.

Notes: Estimates in Figure 64 are based on non-parametric regressions of the share of land cultivated on maize to the standard deviation (S.D) of monthly regional maize prices; Figure 65 plots predicted commercialization index (CI) from the recursive bi-variate regressions on the standard deviation (SD) of monthly regional maize prices.

Figure 66. Predicted margins of commercialization index by connectivity



Source: Authors' estimates based on ESS 2018/19.

Notes: Predicted margins from Recursive Bivariate Regression Model of market participation and household consumption.

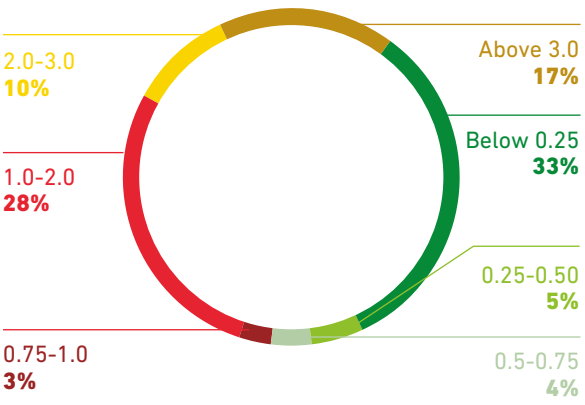
wedge hypothesis, arguing that remoteness increases transaction costs, which makes trade unattractive by increasing the cost of acquiring food from the market, while depressing returns from marketing surplus production. This, together with the fact that market isolation increases price volatility in the event of shocks, reduces smallholder market participation, first by incentivizing them to focus on producing for own consumption, and then by encouraging them to hoard the surpluses they produce.

Market participation is further limited by low surplus availability due to low productivity and post-harvest losses

The inability to produce adequate food to meet subsistence needs hinders market participation. Most rural households neither produce sufficient food to meet their subsistence needs nor have a surplus to sell. For this analysis, an indicator for surplus availability for cereals was calculated for rural households by dividing a household's output of maize, teff and wheat by the estimated required production needs to meet the household's minimum caloric requirements per capita from these crops, given their shares in the consumption basket. A value below 1 suggests a production deficit, as the household's production falls short of its minimum caloric intake requirements, while a value of above 1 suggests a surplus. Based on this indicator, about 45 percent of rural households do not generate a surplus and only one-quarter of rural households produce twice as much as their dietary needs for these crops (Figure 67). Estimates show that a 1 percent increase in the output production relative to the caloric requirement results in a 0.3 percent increase in the share of output sold by rural farmers in Ethiopia. Households with low output relative to their caloric needs sell a smaller share of their output on the market, if at all. Failure to generate a surplus is therefore a major constraint to farmers' market participation.

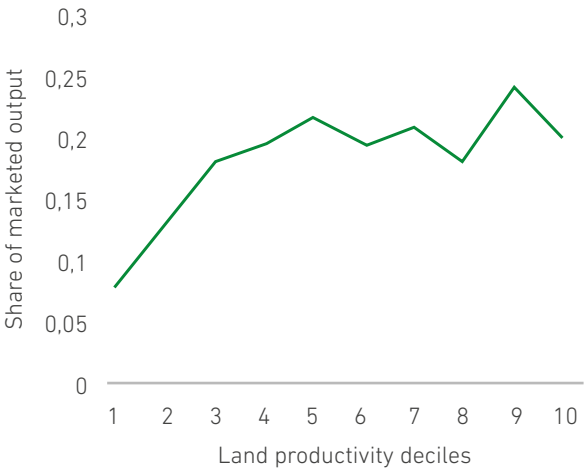
By limiting surplus generation, low agricultural productivity in rural areas constrains households' market participation. As noted earlier, there are significant yield gaps for key crops such as maize, wheat and teff, which partly explains the higher share of households failing to generate a surplus. Market participation is therefore expected to increase with rising productivity. Indeed, estimates based on the ESS 2018/19 show that the average crop commercialization index increases with land productivity (Figure 68). Post-harvest losses further reduce the surplus availability, contributing to the low levels of commercialization. A 1 percent increase in post-harvest losses leads to an equivalent of 1 percent decline in the commercialization index, suggesting that reducing post-harvest losses can improve market participation in Ethiopia. However, this does not appear to be a major factor, as reported post-harvest losses are low, averaging less than 1 percent of output.

Figure 67. Rural households' distribution by marketable surplus range, 2019



Source: Authors' estimates from ESS 2018/19.

Figure 68. Marketed output as share of production by land productivity, 2019



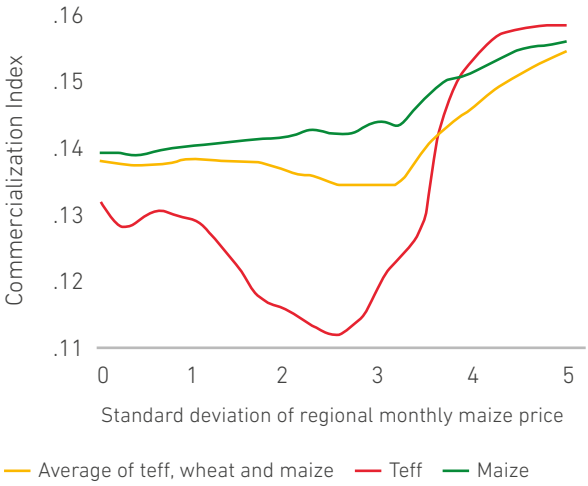
Source: Authors' estimates from ESS 2018/19.

High exposure to shocks discourages households from market participation

Climate-related shocks affect both land productivity, risk tolerance, and the appetite for market engagement. Land productivity is significantly lower in areas exposed to higher impacts of weather and climate-related shocks, reducing surplus availability. In addition, high exposure to climate shocks discourages smallholder farmers from investing in high-risk, high-return technologies, such as inorganic fertilizers, further depressing productivity (Kebede, 2022). In the absence of market integration, food prices increase more sharply and the purchasing power of cash transfers or any other income source declines, especially in drought years (Dietrich & Schmerzeck, 2019). In response, households accumulate large food storage reserves before marketing their surplus. The analysis shows that the share of marketed output starts increasing when households have surpluses that are three times their caloric requirement (Figure 69).

Consumption-smoothing measures facilitate market participation, as these provide an alternative to surplus hoarding as a copying strategy for dealing with shocks. The commercialization index is around 5 percent higher among recipients of social assistance than non-recipient households with similar characteristics. Similarly, households with more easily monetized assets, such as livestock, and those with greater social capital, have a higher commercialization index. As Dietrich and Schmerzeck (2019) argue, access to alternative consumption-smoothing measures helps households cope with shocks without adopting measures that reduce their market participation.

Figure 69. Teff and maize surplus availability and commercialization index (CI)



Source: Authors' estimates based on ESS 2018/19.
Notes: Predicted margins from Recursive Bivariate Regression Model of market participation and household consumption.

Building resilience, promoting risk mitigation and post-harvest loss management are critical for promoting greater market participation. Improvement in post-harvest handling minimizes losses and allows for the availability of marketable surpluses, which incentivizes market participation. In addition, investments and adoption of climate smart agriculture technologies are likely to improve land productivity and welfare, and household resilience to climate and/weather-related shocks and stresses. Other strategies, such as crop diversification, are also found to improve market participation.

Market distortions depress returns and discourage participation

Government intervention in output markets constrains trade and results in a decline in trade balances of other crop commodities (Woldie and Siddig, 2009). The Government of Ethiopia placed export restrictions on cereal crops to stabilize the domestic supply. However, export bans have not been effective in stabilizing prices and supply, or in improving welfare. Bans keep domestic producer prices low (Figure 70), which acts as a disincentive to production in terms of both planting decisions (there is an incentive to divert production to crops not subjected to a ban) and productivity enhancing and/or cultivated area expanding investment, in addition to market participation (AGRA, 2019). Instead, bans create real costs in terms of friction and the costs associated with the absence of predictability and transparency (AGRA, 2019). Ethiopia is the only country in the East Africa region whose nominal protection rates for maize protection suggest that there is a price disincentive faced by farmers (Figure 71).

Improving market integration, agricultural productivity, market incentives, resilience to shocks and risk mitigation

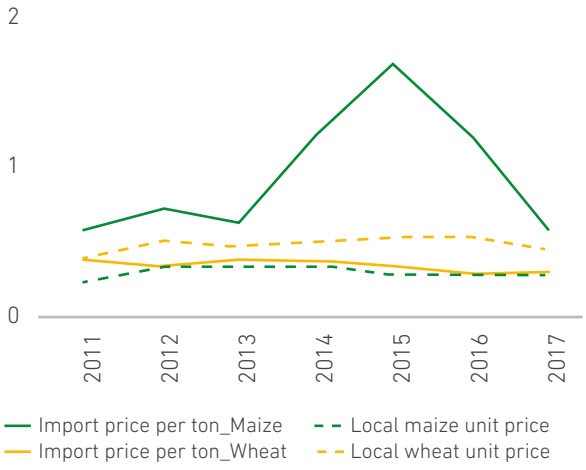
The above analysis shows that the market participation of smallholder farmers has net positive benefits but is constrained by low market integration, low productivity, high exposure to shocks and unfavorable incentives due to government intervention. Faced with these constraints, rural households prioritize being self-sufficient by focusing their production on the staples that they consume most, instead of those consumed more in urban areas or other market-oriented non-staple foods. Consequently, households double down on staple production even when other crops would be more productive and hoard their surpluses as a coping mechanism to shocks, reducing the availability of market surpluses.

Increasing the market orientation of smallholder farmers thus requires improving their access to markets, the adoption of productivity enhancing interventions, and strengthening their resilience to shocks. This requires the following:

- Improving connectivity to markets and food markets to promote greater market participation, as this integrates food markets and provides incentives for households to shift from autarky to market-based systems.
- Improving extension services to encourage change in crop use and increase productivity, including that of staples, through multiple agriculture technologies (MATs).
- Investment and adoption of climate smart agriculture technologies to strengthen household resilience to climate/weather-related shocks and improve land productivity.
- Market deregulation and the removal of trade controls to improve the incentives for increased production.
- Access to land, even if only through user rights and tenure security, can help households make effective use of family labor, improve their nutritional status, and participate in markets.

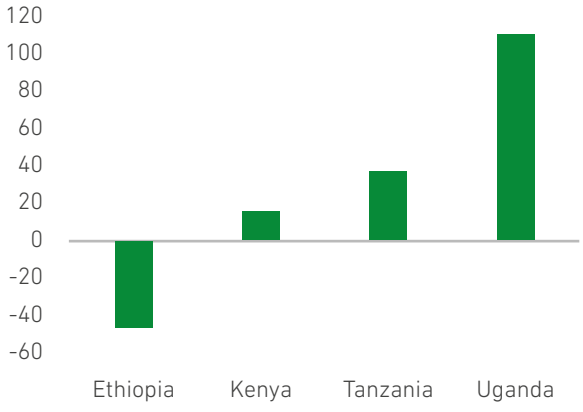
Given the predominance of the food self-sufficiency motive, improving the yields of cereals will be a cornerstone for increasing market orientation of smallholder farmers. There is clear evidence that households diversify into production of other market-oriented crops without necessarily reducing the staple food production. Their ability to meet

Figure 70. Maize and wheat price parity, (US$ '000)



Source: FAOSTAT.

Figure 71. Nominal rates of protection at the farmgate, 2017



Source: FAOSTAT.

those needs frees land up for other crops, facilitating the desired change in land use choices toward high value crops, while also providing a market surplus for households to sell. Thus, increasing market orientation is not necessarily incompatible with food-self-sufficiency objectives.

The agriculture commercialization cluster (ACC) approach piloted in Ethiopia is promising in addressing many of these constraints. The ACC approach develops commodity value chains in geographic clusters focused on both cereals and horticulture crops (Box 8). The clustering increases market linkages and raises prices for farmers, as they can negotiate and supply larger groups. It solves the issue associated with land fragmentation through the mobilization of farmers to commit to production of the cluster commodity under their land while retaining ownership. It encourages adoption of multiple technologies through fostering adoption of environmentally sustainable farm practices and technologies, a comprehensive package of extension services, and access to input credit. Results reported from the program's second-year performance report show that farmer production clusters resulted in a significant increase in yields and production volumes, and thus generated a higher marketable surplus. However, access to finance, which is still heavily dependent on government provision, and improved seed varieties for crops such as wheat, remained a challenge as agriculture technology development remains mostly government dependent.

Box 8: Agriculture Commercialization Clusters

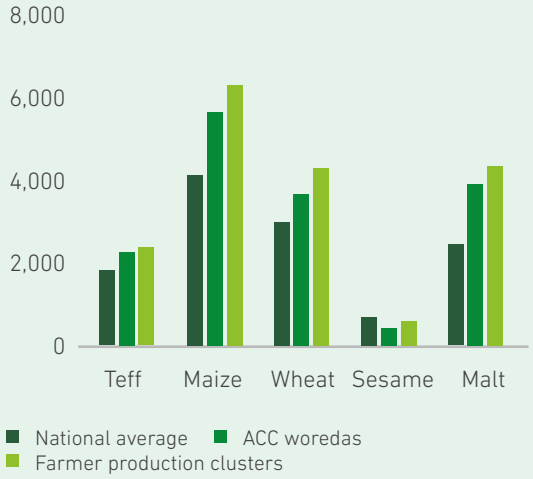
The ACC is a geographic focused approach to market-driven value chain development to improve the livelihoods of smallholder farmers. It was launched in 2018 as a five-year program focusing on 10 commodities—maize, teff, wheat, malt barley, sesame, avocado, banana, mango, onions and tomatoes—across 30 clusters, in 300 *woredas* across four regions (Oromia, Amhara, SNNP and Tigray). The ACC has five strategic objectives, namely: (i) increased farmer incomes; (ii) adoption of climate smart agriculture practices; (iii) enhanced market mechanisms; (iv) increased commodity supply to Intergrated Agro-Industrial Parks; and (v) on-and-off farm jobs creation. It comprises 15 projects and two systematic interventions that promote a comprehensive package of solutions to address the multiple constraints faced by smallholders. These include different mechanisms for delivering advisory services, ensuring access to inputs through ramping up seed production and access to input credit, investments in irrigation, improving market linkages through investment promotion and market information systems, improving natural resource management, and facilitating land consolidation and input/output aggregation through formation farmers clusters.

One of the transformative concepts under the ACC is the farmer production clusters, which are instrumental in supporting farmers to grow their incomes by increasing marketable surpluses generation and farm profitability through increased commercialization. Farmer production clusters (FPCs) consolidate land and provide a commitment device for adopting best farming practices. Farmers voluntarily contribute as least 0.25 ha to form at least 15 ha of contagious land for the cluster and commit to cultivating the same crop, following the full package of farm practice recommendations. The approach is also gender sensitive in requiring the cluster management team to elect four members, including one, but preferably two, women representatives. The FPCs generate economies of scale, helping smallholder farmers solve perennial aggregation problems, making commercialization more profitable, increasing farmers' ability to supply larger

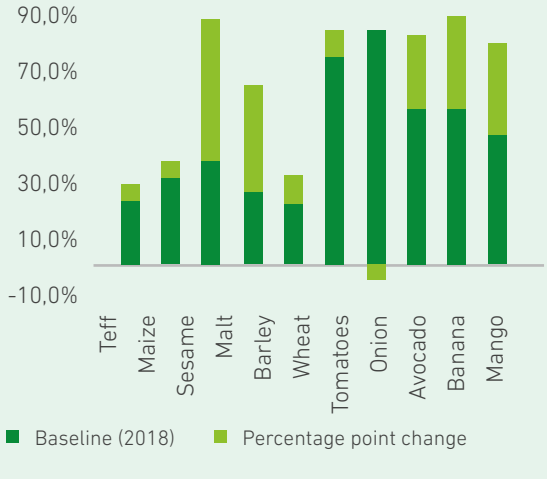
quantities with better bargaining power, and making access to otherwise expensive agriculture equipment more affordable. The results so far have been encouraging, with significant increases in yields and marketable surpluses, especially among FPCs.

Access to finance and improved seed varieties, however, remain a key challenge under the ACC, despite key investments in these areas. Seed production is promoted mainly through support for cooperative-based seed producers, relying on public research for technology development and government guarantees for access to credit. In its first two years, access to input credit has depended on government financing through the Regional Bureaus of Agriculture (RBA), which have faced challenges in the limited availability of government financing and high default risks. Regarding these two aspects, the interventions under the ACC are still heavily state-dependent and, consequently, experience the same challenges with access to inputs and finance in the sector. A shift toward more private sector delivery of solutions might be necessary to speed up progress on these two areas.

Comparison of crop yields (Kg/Ha)



Marketable surplus by ACC crop (2018-21)



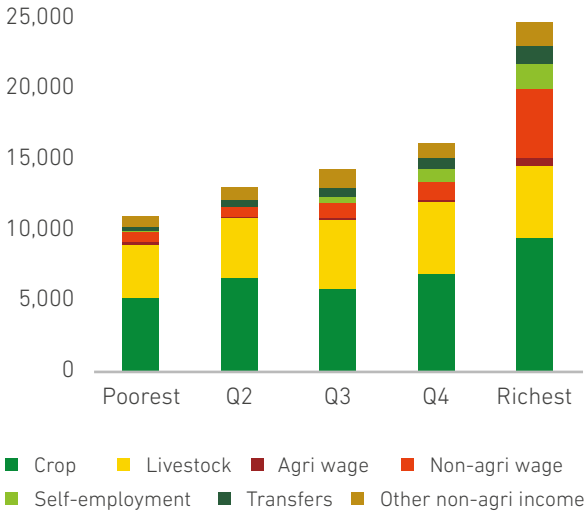
Livelihood diversification into off–farm activities in the agri–food system and beyond

Livelihood diversification into off-farm activities is a major driver of rural income growth and poverty reduction

Livelihood diversification is a strong driver of poverty reduction in rural areas across the world. The transition from agriculture to non-agriculture tends to be slow. Initially, households diversify their livelihood portfolio by adding non-agriculture income sources from household businesses, wage work and remittances, before some begin exiting the agriculture sector altogether. This is manifested in a decline in the share of agricultural income, even as the share of households engaged in agriculture remains high. For example, over 80 percent of rural households in Vietnam and Cambodia were still engaged in agriculture in 2020, despite agriculture making up between 34 and 38 percent of rural incomes there. A similar pattern is also observed in other East African countries like Uganda and Tanzania. International evidence suggests that this livelihood diversification into non-farm activities is a key driver of poverty reduction in rural areas (Egyei, Harrison, & Adzovor, 2013; J. O. Lanjouw & Lanjouw, 2001). In Vietnam for example, rising non-agricultural incomes were primarily responsible for the reduction in rural poverty over the 2010–18 period (Pimhidzai & Niu, 2021).

In Ethiopia, better-off rural households also generate more income from non-agriculture sources. Though the difference in agricultural incomes between the bottom and the top 20 percent of households in 2019 is large (Br 5,561 in 2019, or 62 percent), there is an even bigger difference in non-agricultural incomes. The richest 20 percent earned at least five times more from non-agricultural income sources than the poorest 20 percent. The difference in average non-agricultural incomes (Br 7,849 in 2019) accounts for a larger share of income differences between the two groups (Figure 72). More rigorous estimates in the literature suggest that non-farm participation increases the incomes of rural households by about 19 percentage points (Danso-abbeam, Dagunga, and Ehiakpor, 2020).

Figure 72. Average household incomes (Ethiopian birr) by consumption quintile and income source, 2019



Source: Authors' estimates based on ESS 2018/19.

The shift from primary agriculture production to downstream segments of the agri-food system and beyond—which is now starting to occur in Ethiopia—will offer opportunities for households to diversify their livelihoods. Employment in primary agriculture declined, even as the number of rural workers increased between 2013 and 2021, which is a sign of rural economic structural transformation beginning to occur. More than 500,000 more jobs were created in the food services segment of the agriculture food system (wholesale and retail) and about 1 million more people now work in jobs beyond the agri-food system. Thus, opportunities are emerging in the food system and beyond. However, agriculture still dominates rural employment and incomes and, as a result, diversification remains limited.

Diversification is limited by low rural enterprise development due to a challenging business environment and lack of demand at the local level

Engagement in non-farm activities in Ethiopia is lower than in other countries in the region. About 23 percent of rural workers in Ethiopia are employed outside primary agriculture production, compared with 34 percent in Kenya and more than half of the rural workers in Vietnam (Figure 73). Fewer rural households in Ethiopia generate income from household enterprises (14 percent) compared with its comparators in the region, such as Tanzania (41 percent) or in Asia, such as Vietnam (27 percent) (Figure 74). Consequently, while agriculture made up three-quarters of rural incomes in Ethiopia in 2019, it contributed to only 38 percent of rural incomes in Cambodia in 2019, one-third of rural incomes in Vietnam in 2018, and 59 percent in Uganda in 2019 (Figure 74). With the COVID-19 pandemic, far fewer households in Ethiopia operated a household enterprise. According to estimates from the HFPS conducted by the World Bank, the share of rural households owning a business declined by one-third, to around 13 percent of households at the end of 2020.

For most rural households, the low access to off-farm employment is compounded by the low quality of opportunities accessible to them. While the richest 20 percent households, and to some extent the second-richest 20 percent, earn significantly more non-farm employment incomes, the level of participation is similar across the entire socio-economic distribution. There are some notable differences in the returns and composition of non-farm incomes between the poor and non-poor. A higher share of the bottom 40 percent households earns non-farm income from wage employment (20 to 23 percent of households) than the richest households (14 percent of the 4th and 5th quintiles), while a higher share of the richer households earns incomes from non-farm enterprises than the bottom households. Moreover, the richer households engaged in non-farm activities earn more from such activities than the poor, with differences more pronounced for non-farm business incomes. A

Figure 73. Comparison of rural employment composition, 2018/19

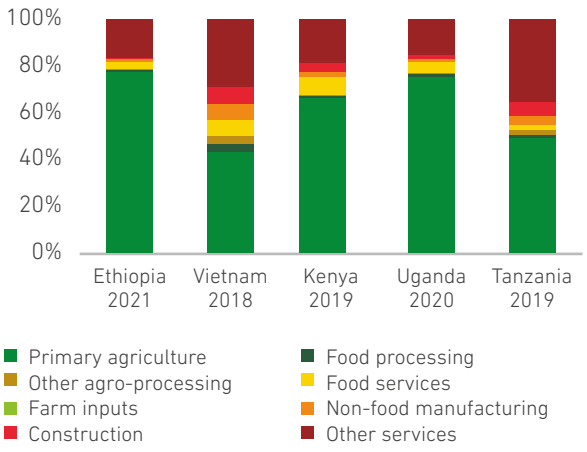
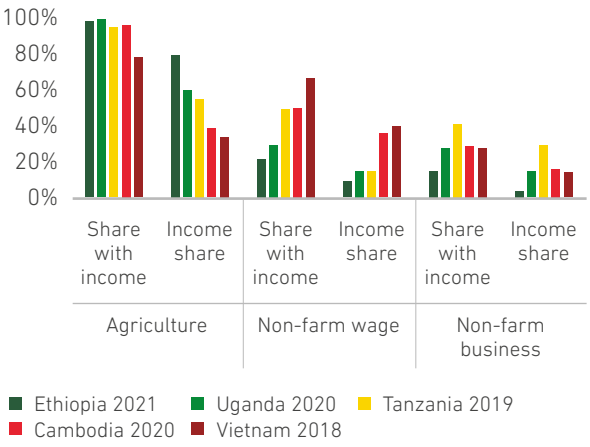


Figure 74. Comparison of household participation and contribution of income sources (%), 2018/19



Source: Authors' estimates from: Left: Ethiopia – LFS 2021; Vietnam – VHLSS, 2018; Kenya – KIHBS 2019; Uganda – UNPS 2019/20; Tanzania – NPS 2019. Right: RuLIS 2021, VHLSS 2018 and CSES 2019/20.

Notes: The pre-COVID-19 pandemic estimates are used for Uganda.

household business run by one of the richest 20 percent rural households on average brought in around Br 11,000 in 2019, compared with just Br 321 typically brought in from a non-farm enterprise run by those among the poorest 20 percent of rural households (Table 20). For non-farm wages, the differences in average earnings seem to be linked to low wage earning among low educated people (Figure 75). The poor also tend to work more for private individuals that establishments, so they mostly take casual jobs. Estimates show that casual wage jobs are associated with lower household per capita consumption (World Bank, 2020b). Thus generating better quality non-farm employment opportunities, based on meaningful value addition in the rural economy, is essential to improving access to welfare enhancing diversification opportunities.

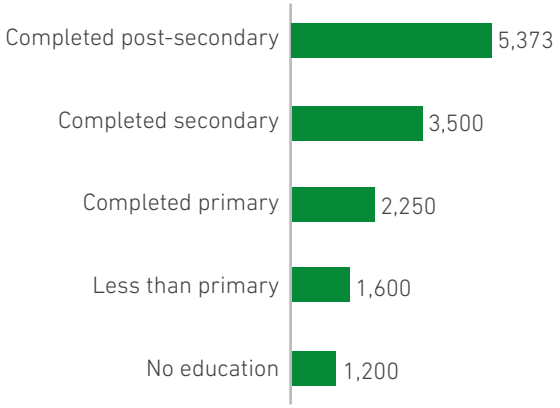
Meaningful value addition in rural areas has been limited by a challenging business environment, resulting in low job creation in the food processing and agri-food industry. Recent estimates from the Large and Medium Scale Manufacturing (LMSM) and SME surveys suggest that fewer than 1,000 large and medium agri-industry firms operated in Ethiopia, none of which is based in rural areas or small towns, where firms in this sector are mostly informal micro-enterprises. Consequently, fewer than 200,000 out of 27 million rural workers in Ethiopia, excluding Tigray, are employed in either food processing or agri-industrial processing (Table 21). These segments employ fewer than 1 million workers (or 0.8 percent of the workforce) in the entire economy, while they employ about 2.4 million workers in Kenya, highlighting the sectors' relative under-development in Ethiopia.

Table 20: Rural household annual income sources by quintile, 2019

	Non-farm wage		Non-farm business	
Welfare Quintile	Share with income (%)	Average Income among Earners	Share with income (%)	Average Income among Earners
1st	20%	7,384	11%	321
2nd	23%	4,255	13%	935
3rd	17%	8,959	16%	4,394
4th	14%	10,183	18%	4,567
5th	14%	22,279	18%	11,090

Source: Authors' estimates from RuLIS 2021.

Figure 75: Average wages by level of education, 2021



Source: Authors' estimates from LFS 2021.

Notes: Average incomes are in Ethiopian Birr, 2019 prices; Estimates for education attainment in 2021 exclude Tigray, which was not covered by the survey due to conflict.

Table 21: Net job creation in rural areas in Ethiopia, 2013–21

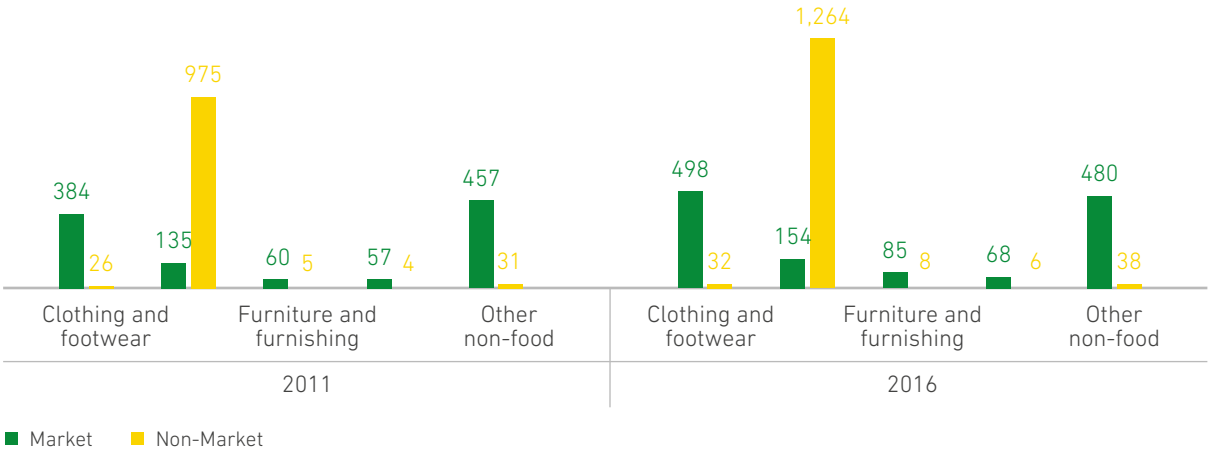
	2013		2021		Contribution to Rural Jobs Growth	
Sector	Number employed	Share (%)	Number employed	Share (%)	Net Jobs Created	Net jobs Share (%)
Primary agriculture	22,011,925	83%	21,249,693	78%	(762,232)	-84%
Food processing	139,738	1%	195,195	1%	55,457	6%
Food services - wholesale/retail	283,999	1%	811,533	3%	527,534	58%
Agro-industrial processing	93,573	0%	96,313	0%	2,740	0%
Non-AFS	3,964,870	15%	5,049,413	18%	1,084,543	119%
Total	26,494,105		27,402,147		908,042	

Source: Authors' estimates based on LFS 2013 and 2021.
Notes: Estimates from the LFS 2013 exclude Tigray for comparability with the LFS 2021 which did not cover Tigray.

Rural non-farm demand is still low, which reduces the viability of rural enterprises serving local markets. Data from the last survey used to measure poverty in Ethiopia—the Household Expenditure and Consumption Survey 2015/16—indicate that much of household non-farm consumption is on water and energy, which are primarily non-market-based. The rest of non-food spending is largely market-based, but the spending levels are very low. The per capita spending on clothing and footwear in 2016, for example, was less than Br 500, equivalent to just US$20 per person at the time (Figure 76).

A recent study investigating rural intra-household labor participation in off-farm activities highlighted the key constraints in access to off-farm jobs at the community, household, and individual levels. The study considered how location factors, such as connectivity and population density, influence the creation of, and access to, non-farm opportunities in rural areas, and whether there are non-farm employment spillovers from proximity to urban areas. It also investigated how labor supply factors, such as the household farming system, endowments (such as land, education, and demographics), and gender norms, influence participation in non-farm work. The analysis was undertaken using a household production model emphasizing household joint decision-making in the estimation of the determinants of off-farm participation (see Box 9). The ESS 2018/19 data were combined with connectivity and market-access indicators generated from geospatial data from the Ethiopia Transport Network Layer 2020 and satellite imagery-based population data to accurately account for the influence of *woreda*-level location factors. The discussion that follows is based on the key constraints identified from this analysis.

Figure 76. Per capita non-food spending by market source, (Ethiopian Birr, 2016 prices)



Source: Authors' estimates based on Household Consumption and Expenditure Survey (HCES) 2011/12 and 2015/16.

Low economic density due to remoteness and sparse populations in rural areas emerges as a constraint to rural enterprise growth and job creation. Off-farm opportunities in rural areas are mostly in the services sector, which requires higher population densities to thrive, and hence more off-farm opportunities are available in high population density areas (Figure 77). Estimates from the household production model described above show that job prospects for both males and females continuously improve as population density increases (Figure 78). Sensitivity analysis confirms that higher non-farm employment prospects in high population density areas reflect inherently more opportunities in population density areas, rather than being an outcome of people moving to where opportunities are already high (hence increasing these areas' population densities).[5]

Figure 77. Sectoral employment shares (%) and *woreda* population density, 2019

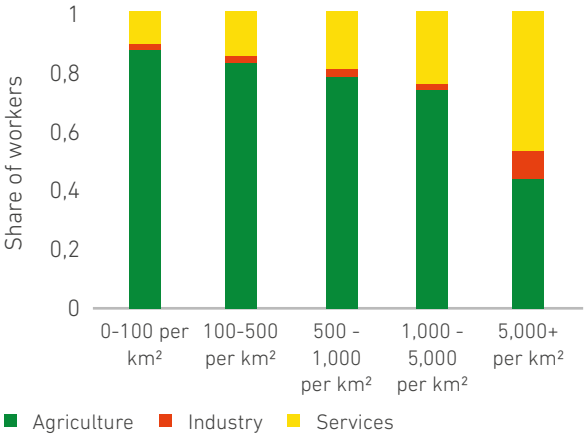
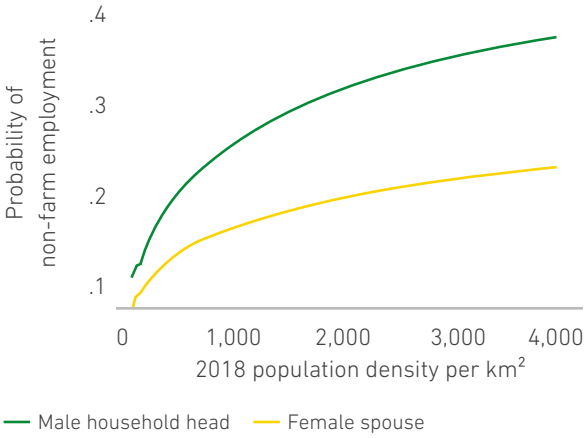


Figure 78. Rural off-farm job prospects and population density, 2019



Source: Authors' estimates based on ESS 2018/19.

Notes: Right panel – Estimates from a simultaneous probit estimation of off-farm participation for pairs of a household head and eldest member in rural areas. This shows the predicted marginal probabilities of being in non-farm work plotted against the local population density, separately for male household heads and female spouses.

[5] There is potential reverse causality in a positive correlation between population density and off-farm employment, as people also tend to move into areas where employment prospects are greater, thereby increasing the population density of those areas. We undertook robustness checks to rule out reverse causality by using lagged population density estimates in the regressions and find a similar positive relationship between woreda-level population density and off-farm job prospects.

Box 9: Estimation of intra-household non-farm participation in rural Ethiopia

The determinants of off-farm labor participation in rural Ethiopia are calculated by estimating a farm household production model using a simultaneous probit estimation regression for joint non-farm participation of household heads, spouses, and adult children within the household (Corsi and Salvioni, 2012; World Bank, 2019a). This analysis is restricted to rural households, jointly estimating the probability of engaging in either a non-farm wage or self-employment activity for household heads and eldest working member pairs (about 80 percent being female spouses). In the conceptual framework for the model, households allocate their labor between farm and non-farm activities, subject to their individual, household, and farm characteristics, as well as local conditions that include proximity indicators to capture access to markets. Rural-urban spillovers are reflected by the relationship between rural off-farm employment and urban-proximity indicators in our estimation model.

Variable type		Variables	Data Source
Individual characteristics		Age, gender, education, marital status	ESS, 2018/19
Household characteristics		Presence of under 5 children, presence of elderly, land ownership	ESS, 2018/19
Farm Characteristics		Dummies for crop type (maize, teff, wheat and barley) and livestock, farm potential wetness index, farm slope	ESS, 2018/19
Local conditions	Labor market conditions	Sector employment shares (agriculture, industry, services), relative prices (with Addis Ababa as benchmark) for teff, maize, wheat, and barley	ESS, 2018/19
	Geographical conditions	Population density	ESS, 2018/19
		Travel time to nearest urban centers (any type; small towns of 20,000 to 50,000 people)	Ethiopia Transport Network Layer 2020
		Market access index - combines travel time with destination population	Gridded Population V4 (GPWv4), Land-Scan Global (LSG), WorldPop (WDP)
	Access to services	Presence of banks, presence of markets	ESS, 2018/19

Proximity indicators are based on travel time between origin and destination pairs (*woreda* to all other *woredas*; *woreda* to all urban centers). This is calculated from GIS data extracted from the 2020 transport network for Ethiopia by determining the shortest possible path for each origin-destination pair and the speed of travel based on the type of roads connecting the pair. Similarly, accessibility in terms of population is estimated by attaching population data to the destination pairs (*woredas*, urban). Three global population datasets are used to supplement each other: Gridded Population of the World Version 4 (GPWv4) dataset; the LandScan Global Population Distribution (LSG) dataset; and the WorldPop Spatial Distribution of Population (WDP) 1 km dataset. Total reachable populations within 30 minutes, 60 minutes, 120 minutes, and 180 minutes are calculated from each origin *woreda*.

Using *woreda*-to-*woreda* origin-destination matrices as inputs, accessibility in terms of market access was approximated for each *woreda* as the sum of travel time weighted by population to the destination *woredas* (Donaldson and Hornbeck, 2016; World Bank, 2019a). The market-access indicator is estimated by the following equation:

$$MA_0 = \sum_{o \neq d} \tau_{od}^{-\theta} N_d$$

where MA_0 is market access at woreda "o", τ_{od} is the trade cost between two *woredas* "o" and "d", N_d is the population of *woreda* "d", and N_d is the trade elasticity. Trade costs between two *woredas*, τ_{od} is defined by $\tau_{od} = exp\ (\lambda time_{od})$ with λ=0.02 and $time_{od}$ the optimal travel time between woredas using the transport network of 2020. The trade elasticity, θ has a value of 8.28 (Eaton and Kortum, 2002).

Under-development of agriculture value chains due to supply-side constraints add to low rural demand

By hindering value chain development, supply-side constraints, such as the lack of supportive infrastructure, constrain rural enterprise formation and growth. The spatial length of a rural-urban value chain is elongated with development of logistical infrastructure, which reduces transportation costs and improves storage (e.g., cold chains). This not only expands the catchment area of semi-perishable food crops, but also facilitates production and semi-processing to take place further from cities. Semi-perishable products can be produced and packaged away from the urban consumption centers, for example. Value-chain studies conducted in Ethiopia show that the lack of supportive infrastructure is one of the major business challenges constraining rural enterprises. Limited infrastructure, such as road connections and storage facilities (e.g., cold storage to maximize meat market potential), renders rural areas and small cities less favorable for establishing processing factories. This is compounded by high transaction costs that reduce profitability (e.g., for coffee and sesame).

The limitation of foreign investment into the trading sector potentially slows down value-chain development and job creation. Private investment in the retail sector could be a catalyst for value-chain development and alter the geography of agro-processing. Modern retailers with centralized procurement tend to sell processed foods more cheaply and develop a sizable market for medium and large processors (Reardon (2015), which allows processing to be located further from cities, as shown in the evolution of pig processing in China (Schneider, 2011). Both supermarket chains and large processors provide key markets for modern wholesalers and logistics firms generating better quality jobs in the midstream segments of the food system. They also trigger the introduction of private standards and the shifting of financial transactions from spot to contract transactions. A recent cost-benefit analysis of opening the trading sector to foreign investment shows that opening the retail sector brings significant net benefits to both suppliers and buyers in the country (IFC, 2021).

Limited access to finance and foreign currency further constrains rural enterprise development. Insufficient access to finance at the production, collection, and processing levels affect all types of enterprises. At a macro level, credit provision to the private sector has been crowded out by state-owned enterprises (SOEs) that receive preferential access to credit. The private sector received only 12 percent of bank credit in 2020, a share that has been stagnant in recent years and below the SSA average of 20 percent. As a result, only 16 percent of private sector firms in Ethiopia use credit from banks, far lower than in Kenya, where 41 percent of the private sector use credit from the banks (World Bank, 2019a). Insufficient loan amounts and an inability to meet loan requirements are often cited as the main reasons for firms failing to access credit, according to estimates from the Ethiopia Large and Medium Manufacturing Industry

Survey. The survey also shows that the inability to procure raw materials and inputs, due to irregular access to foreign currency, is the most critical challenge faced by manufacturing firms across all subsectors in Ethiopia. Thus, macroeconomic distortions in the financial sector and exchange rate misalignment pose a major challenge for actors in the postproduction phases of the agri-food system.

At the household level, meeting subsistence needs dominates household labor allocation decisions in favor of agriculture production

The primacy of meeting subsistence needs also holds back farmers from engaging in non-farm activities. Estimates from the household production model suggest that households' non-farm engagement is determined by factors such as access to land, food prices, or access to markets in a manner that encourages households to devote more labor to agriculture. This signals that households prioritize meeting their own food needs through their production when deciding on the division of labor between farm and off-farm activities, given their land resources and the market factors they face.

Table 22: Probability of engaging in non-farm work and land ownership

	Household engages in nonfarm	Male household Head	Female Spouse
No land	0.25	0.20	0.14
Less than 0.2 ha	0.24	0.19	0.12
0.20 - 0.50 ha	0.19	0.14	0.10
0.5 - 1 ha	0.16	0.12	0.09
1 - 2 ha	0.15	0.10	0.08
More than 2 ha	0.13	0.09	0.07

Source: Authors' estimates based on ESS 2018/19.
Notes: Estimates from a simultaneous probit estimation of off-farm participation for pairs of a household head and the eldest member. The average of predicted marginal probabilities of being in nonfarm work are tabulated for male household heads and female spouses and at the household level.

Off-farm engagement is partly driven by push factors, such as a lack of agricultural land. Those from households with more land are less likely to engage in non-farm activities compared with similar individuals in land-poor households. Both male household heads and female spouses in landless households are twice as likely to be involved in non-farm work as those in households owning more than 2 ha of land, but similar in all other respects (Table 22). This suggests that households allocate most of their labor to agriculture and are less inclined to engage in non-farm work when land resources are available.

Consumers facing higher staple food prices compared with other regions in Ethiopia devote more labor to agriculture. Our estimates accounting for the effect of local economic development conditions, such as remoteness on non-farm employment, still find that net food consumers tend to engage less in non-agriculture activities the higher the staple food prices in local markets are relative to the prices in Addis Ababa (Figure 79 and Figure 80). Net producers react differently depending on whether the crop they produce is consumed more in urban areas, and hence a higher price signals high external demand, or whether they are consumed more in rural areas, where external demand is low and prices are high, driven by market isolation instead. For teff, the higher income from high prices enables males in net producer households to engage in non-agriculture activities, though results suggest that women are left with the production responsibilities and become less likely to engage in non-farm work. For maize, a higher price reflects market isolation rather than strong urban demand, and hence the relationship between relative prices and engagement in non-farm work is weaker among maize producers.

Food market isolation and higher prices thus incentivize households to be food self-sufficient and engage less in non-agriculture activities. Prices for food items that are consumed the most in rural areas are usually higher in less connected *woredas*, incentivizing households to produce staples. Staple food producers engage less in non-agriculture activities, suggesting a trade-off between the allocation of labor toward meeting subsistence needs and alternative income-generating sources (Figure 81). Thus, market isolation also reduces households' incentive to engage in non-farm work, since they would face higher prices for purchasing food, leading them to prioritize production to meet their own food needs instead.

Figure 79. Off-farm job participation by local maize prices relative to Addis Ababa, 2019

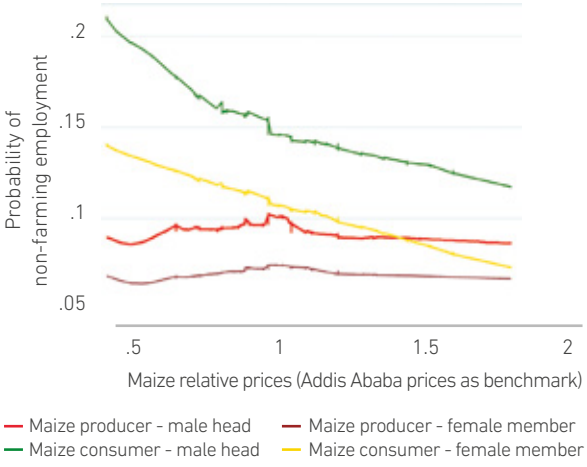
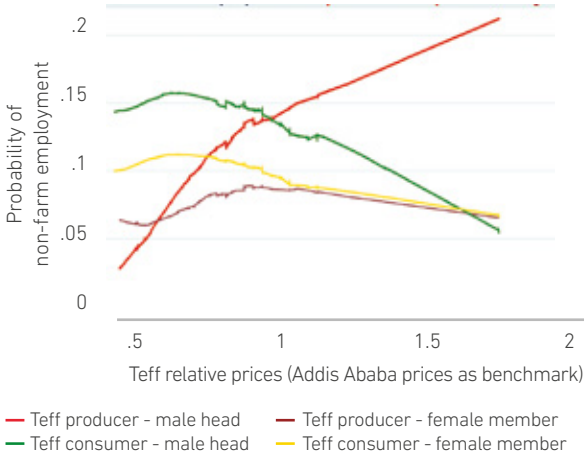


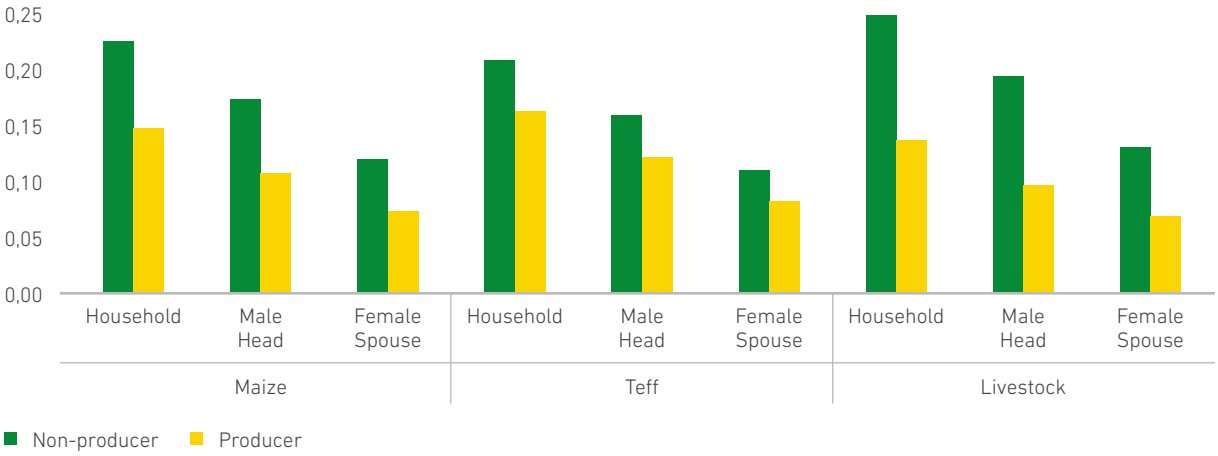
Figure 80. Off-farm job participation by local teff prices relative to Addis Ababa, 2019



Source: Authors' estimates based on ESS 2018/19.

Notes: Estimates from a simultaneous probit estimation of off-farm participation for pairs of a household head and eldest member. Predicted marginal probabilities of being in non-farm work based on crop price changes for male household heads and female spouses are plotted again the crop's local market price relative to Addis Ababa separately for producers and consumers of maize (Figure 79) and teff (Figure 80).

Figure 81. Probability of non-farm employment (%) by staple food production status, 2019



Source: Authors' estimates based on ESS 2018/19.

Notes: Estimates from a simultaneous probit estimation of off-farm participation for pairs of a household head and eldest member. The average of predicted marginal probabilities of being in non-farm work for male household heads and female spouses are tabulated for producers and non-producers of livestock, maize and teff at the household level and for male household heads and female spouses.

At the individual level, lack of education and gender biases limit access to off-farm opportunities, especially for women

There is a huge gender disparity in access to off-farm jobs disadvantaging women. There are fewer women than men engaged in off-farm work across all age groups (Figure 82). These differences in non-farm employment prospects are large among young men and women. A rural woman aged between 20 and 25 years of age has a 12 percent chance of engaging in non-farm work, while a male in that age group with a similar background has close to a 20 percent chance. The gaps are smaller among older people, as the non-farm employment prospects for both males and females are low, falling below 10 percent among people over the age of 55 years.

Access to off-farm opportunities is primarily limited by low education, with low educated women facing the lowest off-farm employment prospects. Off-farm job prospects of people with secondary education are more than double the prospects of primary educated people, even after accounting for other factors, such as location, farm types, and prices (Figure 83). However, the gap is wider between women with and without secondary education. Our statistical model predicts that a woman in the 25–45 years age bracket has a 33 percent chance of being in non-farm employment if she is secondary educated, but less than a 10 percent chance if she has no secondary education, keeping all other factors the same. The gender disadvantage in off-farm employment is also more evident among men and women without secondary education.

The development of a secondary economy in the post-primary production phases of the agri-food system is critical for creating off-farm jobs in rural areas

With low density a key limiting factor for rural off-farm job creation, three factors point to the potential for the development of the agri-food system in generating off-farm jobs in rural Ethiopia. First, growth in low-density economies is driven by absolute advantages. For rural households in Ethiopia that absolute advantage would be in agriculture. Second, growth in low-density economies is dependent on external demand. Growth in urban food demand due to rising incomes and population along with the global agri-food trade, are the external sources of demand that Ethiopia's agro-based rural economy can tap into. Simulations using growth in urban populations between 2010 and 2020 show material contributions to improving employment prospects in rural areas by around 10 percent in low-density areas only. Third, growth is delivered by SMEs due to limited economies of scale. International evidence suggests that, during the transition phases of the food chain, the value chains are long and fragmented, and hence dominated by MSMEs, in what Reardon (2015) calls the "quiet revolution". The stylized drivers of growth in low-density areas are consistent with a transition in the food system geared toward serving urban and global markets.

Figure 82. Probability of non-farm employment (%) by gender and age, 2019

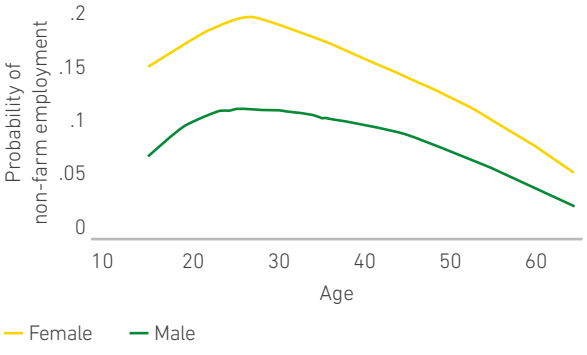
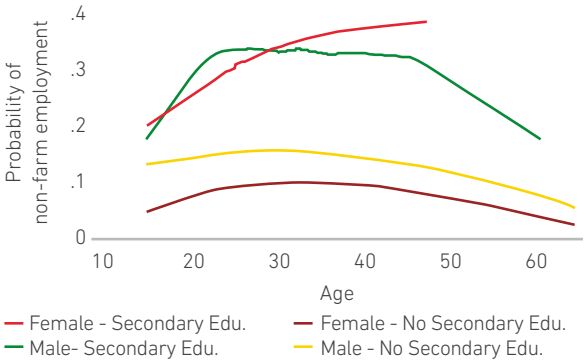


Figure 83. Probability of non-farm employment (%) by gender, age, and secondary education attainment, 2019



Source: Authors' estimates based on ESS 2018/19.

Notes: Estimates from a simultaneous probit estimation of off-farm participation for pairs of a household head and eldest member. Figure 82: Predicted marginal probabilities of being in non-farm work plotted against age, undertaken separately for females and males. Figure 83: Predicted marginal probabilities of being in non-farm work plotted against age, undertaken separately for females and males with and without secondary education.

The potential for job creation in the agri-food system is demonstrated in the Second Agriculture Growth Project (AGP II). Data from a survey of job creation under the project show that more than 500,000 jobs were created in the marketing component of the project (Table 23), even though many of these jobs were only temporary. These jobs were created through support to common interest groups, which are informal micro-enterprises. This demonstrates that the development of rural enterprises in the agri-food system has the potential to create job opportunities for rural households to diversify their livelihoods by adding income sources. That close to 300,000 jobs were also created under agriculture public support services further demonstrates that jobs could be created within both the downstream and upstream segments of the food system more broadly.

Improving rural connectivity is critical for linking rural areas to urban and global markets, making up for rural areas' low economic density. Due to the importance of external markets as a growth driver for rural areas, connectivity and market linkages will be key for job creation in the post-production phases of the agri-food system. Estimates of non-farm employment from the household production model show that job prospects only start to improve noticeably when the level of market access is about 0.5 standard deviations from the average—such as the market access levels of Adama (Figure 84). There are significant employment spillovers from urban to rural areas, which rapidly decline beyond an hour's commuting distance between a rural woreda and the nearest urban center. This suggests the importance of being connected to secondary cities, which tend to be closer, for rural non-farm employment generation (Figure 85).

Table 23: Job creation in the Ethiopia Agriculture Growth Project, 2015–2020

Component	Temporary		Permanent		Total	
	Number	Share	Number	Share	Number	Share
Agricultural Public Support Services	271,289	38.4%	3,856	1.7%	275,144	29.4%
Agricultural Research	46	0.0%	338	0.1%	385	0.001%
Small Scale Irrigation	123,222	17.4%	4,569	2.0%	12790	13.7%
Agriculture Marketing & Value Chains	312,671	44.2%	217,724	95.9%	530,395	56.8%
Project Management, Capacity Building & M&E	19	0.0%	661	0.3%	680	0.1%

Source: World Bank (2022d).

Figure 84. Predicted probability of non-farm employment and market access index, 2019

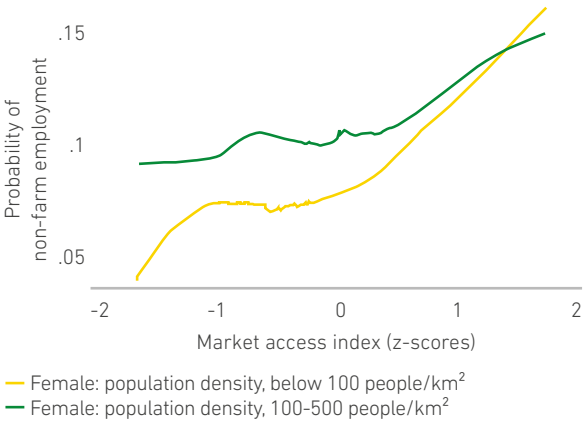
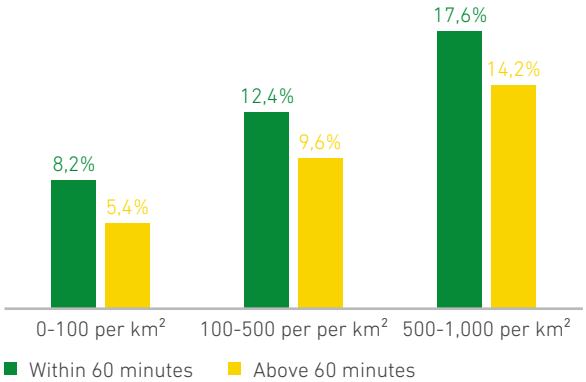


Figure 85. Non-farm employment prospects (%) and proximity to towns with populations between 20,000 and 50,000 people, 2019

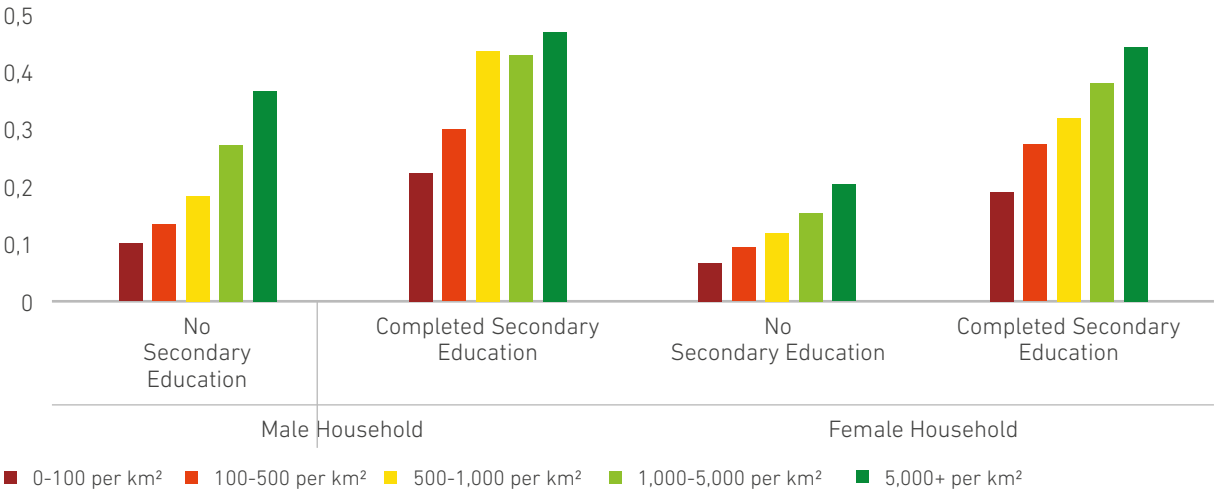


Source: Authors' estimates based on ESS 2018/19.
Notes: Estimates from a simultaneous probit estimation of off-farm participation for pairs of a household head and eldest member. Predicted marginal probabilities of being in non-farm work plotted against. Figure 84: market access for male household heads and female spouses, done separately for each local population density category. Figure 85: travel time to small towns and their local population density.

Given low education levels, skills development is required to facilitate the growth of rural enterprises and individual access to opportunities. Post-production activities, such as marketing, business development services, procurement and contract management, are more skills-oriented. Agriculture services—another key source of jobs—are also skills-oriented. At the current stage, which is likely in the medium-term scenario given how "supermarkets" are only just beginning to emerge in Ethiopia, the value chains are fragmented and long, with opportunities created in the food services segment that are labor-intensive and dominated by MSMEs. The skills emphasis will be on business and financial management skills. Better education and skills development also help close the gender gap. Statistical predictions from the household production model show that job prospects for male household heads and female spouses with secondary education increase by a similar margin as population density increases, though non-farm job prospects increase much more for male household heads than female spouses among people without a secondary education (Figure 86).

Improving the business-enabling environment to attract private investment in agriculture value chains will be essential for creating a post-production secondary economy. First, the process of moving food from farms to urban and global markets requires improved logistical infrastructure, from warehouses, cold-storage chains, and marketplaces. Second, the development of rural MSMEs requires improving their access to finance, as the experience of common interest group investment shows. Third, reducing barriers to entry to encourage private sector investments in the agri-food system, especially in input markets, logistics and retail sectors, will be important for reorganizing production and processing further away from cities. One such barrier is the restriction of foreign ownership in the trading sector. At a later stage of the transition of the food system, value chains will consolidate, becoming more capital- and knowledge-intensive and changing institutional arrangements. Strengthening institutional arrangements to improve contract enforcement, food safety standards and traceability will become more critical. At an economy-wide level, addressing macro-level imbalances will help address some of the key constraints faced by agro-businesses, such as a lack of foreign currency. According to the World Bank (2019) Enabling Business for Agriculture, Ethiopia has a low ranking, with a score of 46.12 out of 100, lower than its comparators Kenya (64.8), Uganda (52.1) and Vietnam (61.41). This means that the country has the least favorable regulatory environment for enabling the business of agriculture compared with its comparators.

Figure 86. Probability of non-farm employment by secondary education attainment and population density, 2019



Source: Authors' estimates based on ESS 2018/19.

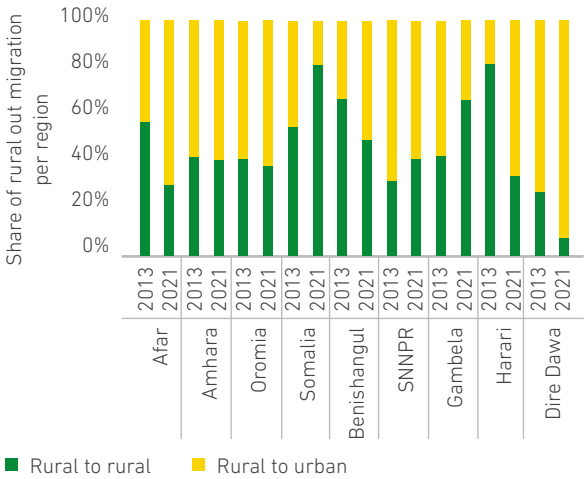
Notes: Predicted as the marginal probability of nonfarm employment for male household heads and female spouses in rural areas from a simultaneous probit estimation of off-farm participation for pairs of a household head and eldest member are tabulated by local population density and level of education.

Enhancing opportunities through labor mobility

Internal labor mobility is an important pathway for improving access to income-generating and risk-diversifying opportunities, both for the migrants themselves and their families back home. It also relaxes the inefficient allocation of resources in rural areas and, in turn, improves rural living standards (Beegle, Weerdt, &andDercon, 2011; Gröger and Zylberberg, 2016). In Ethiopia, about 5 million people moved from their place of birth to another location within the country between 2015 and 2021 according to estimates from the latest national labor force survey (LFS 2021). More than 60 percent of internal migrants originated from rural areas, either to other rural areas (25 percent) or from rural-to-urban areas (34 percent). The working-age group accounts for 81 percent of those who moved from their rural origin, demonstrating that internal migration is a phenomenon of the working-age population in search of better opportunities.

The migration patterns in Ethiopia suggest the rural population will continue to grow in the coming years, as rural-to-urban migration is not large enough to offset the increases in the rural population due to high fertility. The rural population increased by 24.4 percent between 2013 and 2021, notwithstanding the increase in rural-to-urban migration of 20.8 percent. The pattern of rural-to-urban, as well as intra-rural, migration shares to total internal migration, has broadly remained similar. However, there are variations at the regional level in the flow of recent migrants in the five years before 2021, compared with the migrant flows before 2013. The share of migrants moving from rural Afar, Benishangul, and Harari to any urban center increased but declined in Somali, the SNNP regions, and Gambela (Figure 87). Moreover, cross-regional mobility has decelerated in recent years compared with the trend observed before 2013 (Figure 88). Thus, migration largely remains an intra-regional phenomenon.

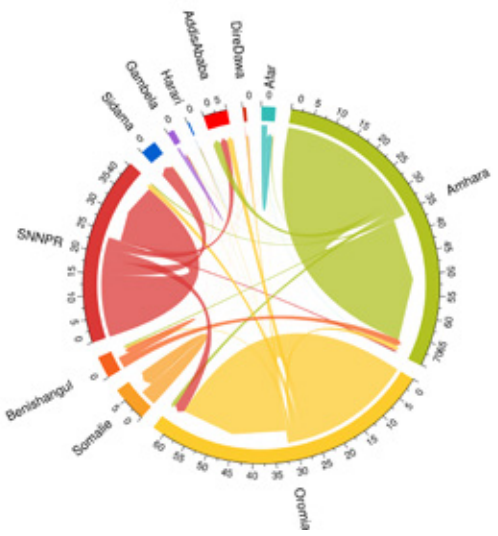
Figure 87. Moving from rural Amhara and Oromia to urban areas unchanged between 2013 and 2021



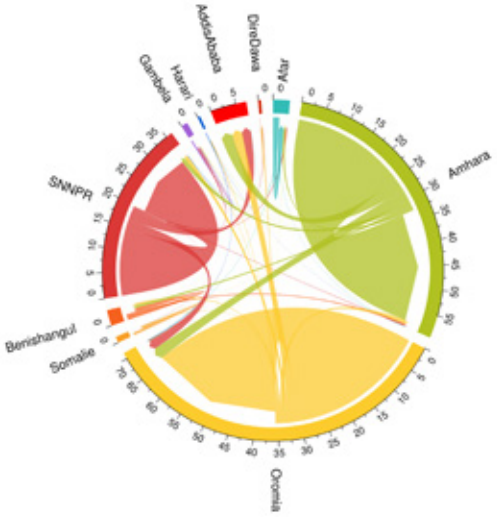
Source: Authors' estimates based on LFA 2013, 2021.
Notes: The share is to the total internal migration of the origin region.

Figure 88. The flow of migrants: 2008–21

Panel A: Flow of migrants: 2008–13



Panel B: Flow of migrants: 2015–21



Sources: Authors' estimates based on LFS 2013, 2021.
Notes: For comparability, estimates from LFS 2013 were computed excluding data from Tigray, which was not covered in the LFS 2021.

Migration enhances welfare in migrant-origin households in Ethiopia

Migration increases welfare among migrant-origin households in rural areas, contrary to concerns that internal migration could stall development in migrant-origin communities. In Ethiopia, arguments about rural-urban migration stalling the development of the rural economy assume that migration among labor-constrained households would reduce agricultural output. However, with surplus labor supply in rural areas, migration has a positive effect instead by raising labor productivity and output per worker. This, in turn, also raises household consumption. In addition, remittances that migrants send back home contribute to households' income and become a source of investment and a coping mechanism during shocks. This improves resilience and prevents households from falling back into poverty, as demonstrated earlier. On average, remittances from urban migrants were equivalent to one-third of the receiving household's consumption per capita in 2016, and more than double that among the poorest quintiles (Figure 89). As a consumption-smoothing mechanism, remittances encourage risk-taking behavior, such as increasing market participation among smallholder farmers. Evidence of these positive impacts is presented in Chapter 3. Tracking migrants and non-migrants after five years in 18 villages in Ethiopia, de Brauw, Mueller, and Woldehanna (2018) also find positive impacts on real consumption levels among migrants, demonstrating the net positive benefits of migration.

Barriers to internal labor mobility thus slow down the welfare improvement process of rural households and, in turn, affect sustainable escape from deprivation. Thus, tackling and finding new ways of leveraging labor mobility out of low economic density areas would help mitigate the disadvantages in rural areas. This section describes the mobility barriers that are rooted in households' shock prevalence, and their human, social and financial capital. These are analyzed based on an econometric model estimating the likelihood of a household having a migrant, the main results of which are presented in Figure 90.

Figure 89. Size of remittance income relative to total consumption for the receivers (%), 2012-2016

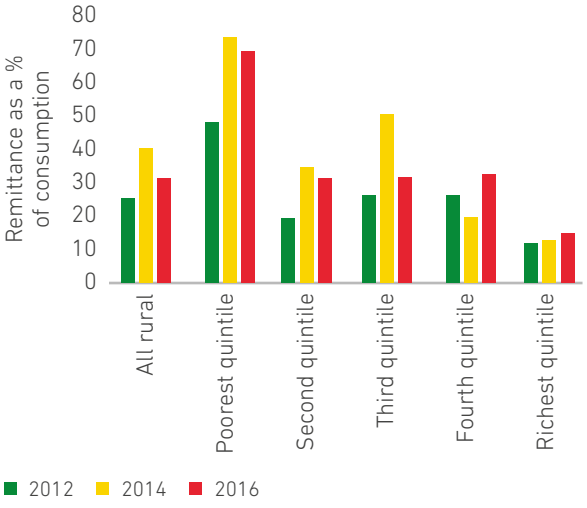
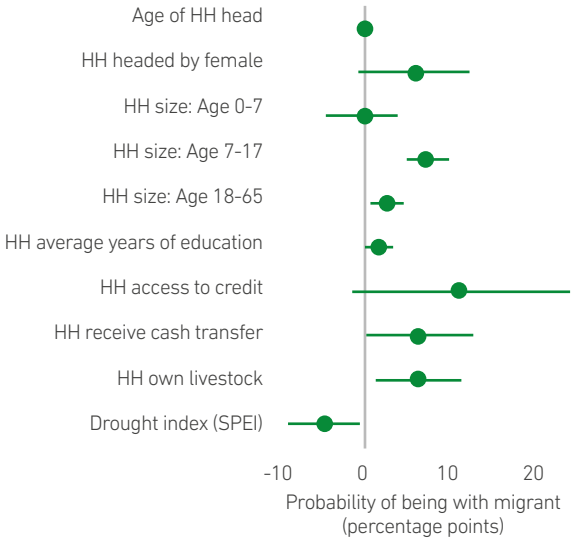


Figure 90. Marginal effects correlated with migration



Source: Authors' estimates based on ESS 2011/12, 2013/14, 2015/16.
Note: Figure 90 shows marginal effects and a 95 percent confidence interval. SPEI refers Standard Precipitation-Evapotranspiration Index, calculated for a four-month accumulation period, i.e., the month of June, July, August, and September for a historical drought year. The livestock ownership variable takes a value of 1 if the household owns livestock above the national median total livestock units and 0 otherwise. The access-to-credit variable has a value of 1 if the households received a credit amount greater than the rural median and 0 otherwise. Amhara region is used as a reference region.

Lack of human and social capital traps members of rural households in their rural places of origin

Social capital plays an important role in facilitating internal migration through established networks. The migration decision, as well as the success of migrants, is closely correlated with the presence of meaningful social capital, proxied by whether a household is already receiving remittances either from a rural, or urban area, or from abroad. This is a sign that a household is connected with the outside world other than just in the home place. Estimates comparing similar households in 2011/12 in terms of their likelihood of having a migrant in the second visit (2013/14) or the third visit (2015/16) show that the probability of having at least one person from a rural household migrate increases by 7.5 percentage points in the presence of these networks. The lack of a social network thus decreases the likelihood of household members migrating.

Low human capital further deters migration. Having poorly educated members or a smaller number of working-age members also reduce the possibility that any of them migrates. Having one fewer working-age household member than average in 2011 was associated with a 9.7-percentage-point lower likelihood of sending a household member to another location between 2012 and 2016. Estimates using the average number of years of schooling to measure the education level of household members show that, even in large productive households, being poor in human capital blocks rural household members from migrating (Figure 91). Households without any member who had completed secondary or above education in 2011 did not have a migrant during the following four years.

Liquidity constraint limits migration

A financial investment is needed to undertake migration and this could constrain migration among the poor. At the very least, migrants incur transport costs to the place of destination. Once there, they incur additional costs for transportation, food, and accommodation during job searches, depending on their networks and the length of their job search. Households in the bottom 40 percent in 2012 made up only one-quarter of households with a migrant during 2012–16 (Figure 92), suggesting that financially worse-off households were less likely to send out members. Indeed, estimates show that households that initially had above-average livestock ownership—a proxy of wealth more easily convertible into cash—had a significantly higher chance of having a migrant during 2012–16.

Figure 91. The change in probability of having a migrant by household members' average years of education

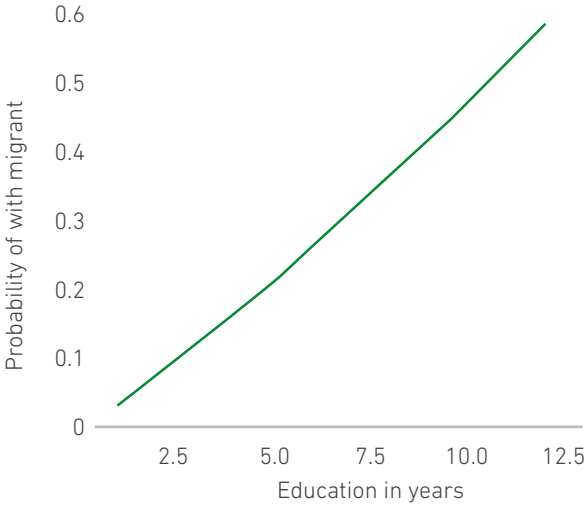
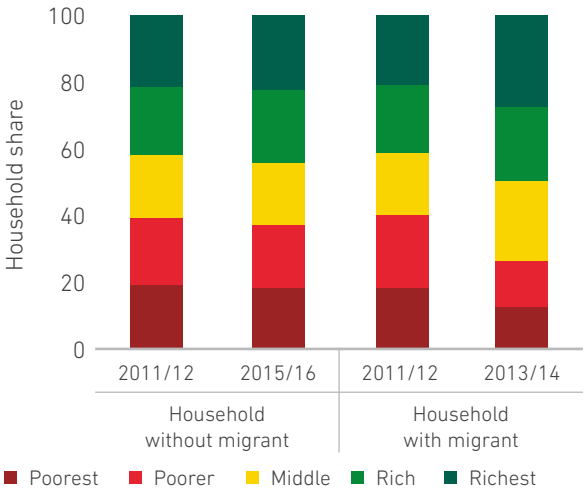


Figure 92. The share of households with and without a migrant, by rural quantile pre-migration and post-migration



Source: Authors' estimates based on ESS 2011/12.
Note: Left: The figure shows the predicted probability of a household having a migrant during 2012–16, based on a logit regression using household characteristics in 2011/12.

Liquidity constraints explain why the financially worse-off households are less likely to send out migrants. Financing migration can be costly and poor rural households may be unable to participate in migration unless there is a means of relaxing their liquidity constraints. The bottom 40 percent of households without migrants were also without access to credit or received smaller amounts than the rural median. Multivariate estimates show that households with access to larger credit amounts were more than 15 percentage points more likely to send out a migrant later. Receiving cash transfers increases the chance of someone migrating from a household by 7.5 percentage points. This supports the notion that the lack of liquidity keeps rural households from participating in the migration process, as these poorer households are unable to finance the upfront costs of migration. These liquidity constraints could be addressed through unconditional cash transfers or improving access to credit.

Job search costs and administrative barriers raise the financial cost of migration

The high costs of migration imposed by challenges in destination areas increase the barriers to migration for liquidity-constrained households, even though the returns to migration could be high. The average monthly wage, (hours worked multiplied by the hourly wage in Figure 93) in urban areas is three times higher than rural agricultural wages, and significantly higher than average agricultural incomes (including income from crops, livestock, renting agricultural inputs, and wage income in agriculture). Thus, returns from rural-to-urban migration are positive in the medium term. Therefore, non-wage factors making integration into destination areas more difficult and costly for migrants in the immediate term are a barrier to migration for people from liquidity-constrained rural households. Qualitative studies suggest that migrants find that the job search process is more difficult than anticipated and that they face administrative barriers in obtaining kebele IDs, inhibiting their access to government services. Many typically find the transition to urban life onerous, with females facing additional challenges.

Addressing the job search challenges and burdensome administrative procedures would reduce the financial cost and barriers to migration. This can be achieved by interventions that help connect migrants to jobs, such as job intermediation services and programs such as youth mentorship or apprenticeship that help the youth to signal their skills, improving the job-matching process. It also requires streamlining administrative procedures and the burden of proof these often place on migrants.

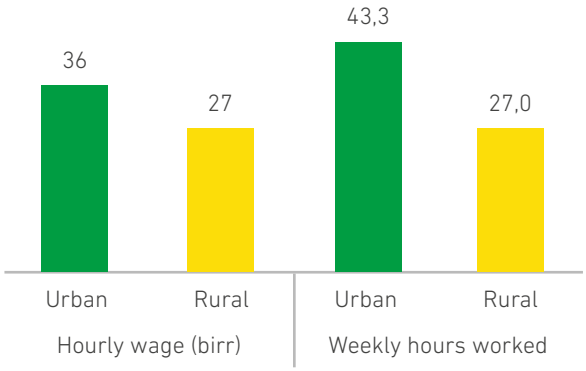
> ***The bottom 40 percent of households without migrants were also without access to credit or received smaller amounts than the rural median.***

Table 24: Households' liquidity status defines the probability of sending out a household member to another location

Liquidity access in 2011/12	Had a migrant in 2012–16	
	Yes	No
Received cash transfer	34.54	27.03
Accessing credit	41.87	27.7

Source: Authors' estimates based on ESS 2011/12, 2015/16.

Figure 93. Hourly wages and weekly hours worked by rural and urban residents, 2019



Source: Authors' estimates based on ESS 2019.

Adapting urban areas to rising populations is needed to reinforce the urban pull for migrants

More fundamentally, the cost of migration in destination areas can be reduced by investments in urban development. Both private and public investments expanding the urban industrial base create more employment opportunities, improving the job matching prospects thus reducing job search costs for both urban residents and migrants alike. Investments in low-cost housing and expansion of public service delivery also reduce costs for migrants and make urban life more hospitable, thus reducing a big barrier to migration. Thus, adapting urban areas to expanding populations through investments in urban infrastructure, housing and social services both helps relieve pressure from rising populations while also helping migrants integrate socially and economically (World Bank, 2022b).

PRIORITIES FOR INCREASING HOUSEHOLD INCOME

The analysis above has identified key opportunities, pathways and multiple constraints to raising rural incomes. A key question for policy makers is on the relative importance of these constraints, the proposed interventions to address them and their impact. To answer these questions, the discussion below identifies five outcomes or transmission channels for increasing rural incomes across the three pathways discussed in the previous section, then summarizes the key constraints and proposed solutions for achieving these outcomes. Their importance is then evaluated based on the sizes, and position of different groups of rural households in the welfare distribution, and how they relate to limits and changes within the government's agriculture and rural development policy and broader directions in economic reforms.

Strategic focus areas for increasing rural incomes

To expand opportunities for rural households and grow their incomes, policy interventions should promote a shift toward market orientation among smallholder farmers, create opportunities for livelihood diversification, and reduce barriers for rural labor mobility. Interventions to achieve these should focus on addressing constraints to achieve the following five outcomes:

i. Changing incentives for households to produce for the market;

ii. Increasing agriculture surplus generation and availability;

iii. Overcoming the disadvantage of low economic density in remote, sparsely populated areas;

iv. Promoting rural enterprise development in the non-farm segments of the food system; and

v. Expanding the pull factors and reducing costs for rural urban migration.

Changing incentives for households to produce for the market

Increasing the market orientation of smallholder farmers is centered on shifting their land use choices away from self-sufficiency-driven production decisions to market demand-driven production choices. This requires tilting the trade-off between self-sufficiency and market orientation in favor of the latter. That means addressing factors that incentivize or make it more optimal for households to become self-sufficient due to the perceived high costs or reduced expected benefits from market-driven production. The identified factors affecting the incentives faced by households are: (i) market isolation; (ii) risks to shocks from climate change and price volatility; (iii) depressed returns due to state intervention in output markets; (iv) high transaction costs; and (v) a bias in extension service provision toward cereals production. Interventions addressing these constraints are:

- *Improving rural connectivity* – Improving connectivity is critical for market integration, which helps reduce food prices and volatility in isolated areas, especially during droughts.

- *Eliminating export controls* – Surplus maize producers in particular face low domestic prices compared with international markets, and the prospect of local demand contractions given maize's very low-income elasticity of demand in urban areas. Regional markets are the only growth market for surplus maize producers, but these are currently inaccessible due to an export ban.

- *Improving market linkages* – Connecting farmers to markets improves demand signals, while reducing transaction costs, raising expected earnings from market orientation. Potential interventions to improve market linkages include: (i) strengthening market information systems; (ii) contract farming, which is a clear signal and assurance for demand that also

reduces marketing costs; and (iii) production alliances to reduce aggregation costs and make it more profitable to produce for the market on small plots.

- *Revamping extension service provision* – Extension service provision needs to focus on market-oriented advisory services in addition to technology adoption.

- *Agriculture insurance and climate information*– Developing agriculture insurance products is an important risk mitigation measure that will protect households against production failures and excessive price volatility. This boosts the expected returns from market orientation, with household incomes preserved in the event of poor harvests or low prices. In Kenya, agriculture insurance has been successfully combined with digital agro-weather advisories to ensure smallholder farmers make more informed and timely decisions in their farming. Studies conducted by the World Bank point to an increase in maize yields to an average of 970 kg per ha compared with 210 per ha for non-beneficiaries when farmers access agro-weather information. Higher incomes of KSh 9,402 (Kenyan shillings) from maize sales were obtained from the beneficiaries with access to insurance and climate information compared with KSh 3,918 for non-beneficiaries. In Ethiopia a similar trend is observed. The pattern of teff yields and incomes are similar in Ethiopia, where beneficiaries recorded an average yield of 1,656 kg per ha compared with 771 kg per ha for non-beneficiaries. The average income obtained from teff for beneficiaries was Br 19,760 compared with Br 17,878 for non-beneficiaries.

Increase agriculture surplus generation and availability

Farmers, especially cereal producers, should have surplus output to sell to participate profitably in markets. These surpluses can be generated by increasing land productivity and preserved by minimizing post-harvest losses. The analysis presented above shows that key constraints to surplus generation and availability are: (i) low adoption of multiple agriculture technologies; (ii) exposure to climate-induced shocks; and (iii) hoarding of surpluses to cope with climate shocks. Interventions to address these concerns are:

- *Extension service provision* – Expansion of both private and public extension services provision is necessary to increase adoption of multiple agriculture technologies (MATs). Empirical analysis suggests that the utilization of extension services increases the adoption of MATs.

- *Promoting climate smart agriculture technologies* – Strengthening resilience to climate change is essential for increasing agricultural productivity in the face of increased rainfall and temperature variability (Tesfaye et al., 2020; Teklewold, Gebrehiwot and Bezabih, 2019). It also changes households' risk calculations, facilitating the adoption of high-risk high-return agriculture technologies, such as inorganic fertilizers, and reducing farmers' incentives to hoard their surpluses (Dasgupta & Robinson, 2021; Kebede, 2022). The important climate smart agriculture interventions that can be promoted include: (i) irrigation, which currently has low coverage; (ii) conservation agriculture; and (iii) crop diversification.

- *Promoting post-harvest handling technologies* – Post-harvest losses reduce the available surpluses and negate households' efforts to maintain buffer stocks to cope with shocks. The adoption of metal storage (metal silos) has been found to almost completely reduce storage loses and save farmers an average of 150–200 kg of grain (Gitonga, Groote, Kassie, & Tefera, 2013). Post-harvest management training and hermetic storage bags reduced storage losses by about 77 percent (Chegere, Eggert and Söderbom, 2021). Improved harvesting techniques also reduce losses.

- *Improving access to credit* – This is important both to facilitate technology adoption, which

evidence shows is partly constrained by liquidity constraints, especially mechanization, and as a consumption-smoothing measure to promote the adoption of risky technologies in the face of shocks and to manage the timing of households' participation in markets.

- *Input market reforms* – The availability of inputs, the right kind at the right time, has been a constraint to intensification of input use. This was primarily driven by state controls in input markets such as fertilizer, the opening up of which should encourage investment in local production and increase range and availability. To encourage mechanization, the availability of agricultural equipment suited for smallholder farm structures, and the development of rental and sharing markets, are important.

Overcoming the disadvantage of low economic density in remote, sparsely populated areas

A major reason behind the lack of non-farm opportunities in rural areas is low demand due to a small internal market, leading to fewer and smaller rural enterprises and hence fewer jobs created. Rural enterprises in these circumstances can only thrive by serving external markets. This requires addressing the challenges of: (i) low market access; and (ii) low linkages with prospective customers.

Overcoming the disadvantage of low economic density in remote, sparsely populated areas requires interventions for promoting rural enterprise development in the non-farm segments of the food system that include:

- *Improving rural connectivity* – Reducing travel times to urban centers through improved secondary road connections is needed to significantly increase market access and employment generation in rural areas. The analysis presented in this report shows a dramatic increase in access to off-farm jobs as market access improves because of improving road infrastructure. There are significant employment spillovers from urban to rural areas, which rapidly decline beyond one hour's commuting distance between a rural woreda and the nearest urban center, implying significant gains from connection to secondary towns that are closer to most rural areas.

- *Improving market and other supporting infrastructure* – Supporting infrastructure is required to better serve external markets by providing the means for preserving and getting the goods to markets, as well as the trading points. The required supportive infrastructure ranges from: (i) logistical infrastructure, such as warehouses and cold chains; (ii) delivery services; and (iii) physical marketplaces.

- *Digital marketplace developments* – It is also important to connect low density areas to the network economy though more direct linkages to customers. This can be done by developing digital marketplaces whose success depends on: (i) increasing digital connectivity and reducing costs; and (ii) expanding mobile payments to facilitate digital transactions.

Facilitate rural enterprise development and participation in the non-farm segments of the food system

The development of rural enterprises is important for off-farm rural job creation. For rural areas, fulfilling rising demand for food in urban areas and agriculture commodities globally is the source of external demand that can drive growth. Participation in the non-farm segments of these agriculture value chains presents opportunities for MSMEs in rural areas. Taking advantage of these opportunities requires addressing challenges with the business environment, namely: (i) a lack of access to finance; (ii) barriers to entry and the high cost of doing business caused by state intervention across key nodes of the value chains; and (iii) limited skills. The required interventions to address these constraints are:

- *Developing rural finance* – De-risking lending to the rural economy and improving access

to start-up capital to micro-enterprises are instrumental for enterprise development. Measures to address these issues are: (i) lines of credit coupled with technical assistance for rural finance, akin to the support provided for SMEs under the Ethiopia SME Finance Project; (ii) the establishment of a credit rating system to reduce collateral requirements; and (iii) matching grants for common interest groups, cooperatives, and MSMEs.

- *Reducing state interventions* – State intervention creates barriers to entry either through market concentration or market regulations that increase the cost of doing business. These can be reduced by adopting the following measures: (i) market deregulation in input licensing, input pricing and maize price controls; (ii) encouraging private sector provision of services such as logistical infrastructure, marketplace development, cold chains etc.

- *Skills development* – Developing skills will be instrumental for providing the human resources required for skills-intensive activities in the post-production economy, such as marketing and business development. It is also important for capacitating the management of rural enterprises and the development of agriculture services. In the short term, this can be addressed by: (i) supporting vocational training for the rural youth and capacity building for cooperatives; and (ii) developing an ecosystem of business development services. In the long term, investments facilitating the transition to secondary education are required.

Expanding the urban pull factors and reducing costs for migration

Easing the process of integration of migrants into urban areas is important for reducing the cost of migration and promoting mobility. Migration has both social and economic costs that can be a deterrent to prospective migrants. These costs are driven by: (i) frictions in the job matching process, which can make the job search costly and unaffordable to those without savings to tap into; and (ii) barriers to access to services. These constraints can be addressed with measures on three fronts:

- *Expansion of urban-based public and private investments* – There is need to reinforce the urban pull factors for migration by expansion of investments in urban-based export industries, public investment in urban infrastructure and services, and both public and private investment in affordable housing. This increases the expected net benefits of rural-urban migration by expanding access to opportunities while reducing costs of integrating in urban areas through improving access to affordable housing and services.

- *Connecting jobseekers to jobs* – Improving systems that facilitate matching of jobseekers to job vacancies, and programs that help jobseekers signal their skills are important for reducing job search costs. Measures in this direction include: (i) strengthening labor market information systems by setting up an employment agency and strengthening public employment services; and (ii) expanding youth apprenticeships.

- *Streamlining administrative procedures* – Administrative procedures should be streamlined to improve access to services and ease the process of migrants to integrate and adjust to urban life. The key interventions will be: (i) minimizing the burden of requirement from obtaining kebele IDs by reducing the minimum length of stay and removing the requirement for a release letter; and (ii) streamlining ID reforms and household registration.

> ***Developing skills will be instrumental providing the human resources required for skills-intensive activities in the post-production economy***

Impact of different policy interventions on different segments of the rural society

The constraints to achieving each of the five outcomes or transmission channels for increasing rural incomes are pertinent to all rural households, albeit to varying degrees. A cluster analysis on the ESS 2019 data identifies four groups of rural households (Table 25). These are categorized and classified: as (i) remote, low-value cereals dependent (group 1); (ii) remote, high-value cereals dependent (group 2); (iii) less remote, diversified (group 3); and (iv) connected, high-value crop dependent (group 4). Their characteristics and priority areas for expanding incomes are discussed below.

Table 25: Taxonomy of rural households in Ethiopia

	Remote, low-value cereals dependent (42%)	Remote, high-value cereals dependent (32%)	Less remote, diversified (31%)	Connected, high-value crops dependent (2%)
Consumption per adult equivalent per year	12,732	12,642	15,028	19,851
Land productivity	18,176	22,589	23,612	16,170
Labor productivity	65	87	78	83
Highest number of years of education in the household	5.6	5.0	7.3	6.6
Land owned by the household (ha)	0.91	0.98	1.08	1.31
HH distance in (km) to nearest major road	19	21	16	5
Nearest population center within 5 km	0%	0%	2%	97%
Large weekly market in the community	34%	90%	61%	12%
Has communication assets	37%	44%	67%	52%
HH owns a nonagricultural business	6%	13%	29%	3%
Has diversified livelihood	7%	14%	44%	11%
Household cultivates cash	53%	46%	63%	76%
Household grew teff	31%	47%	39%	26%
Household grew maize	63%	52%	62%	88%
Household grew wheat	19%	32%	23%	0%
Household grew coffee	39%	19%	46%	10%
Household using irrigation	4%	11%	11%	9%
Household using inorganic fertilizers	51%	73%	70%	71%
Household using improved seeds	34%	38%	47%	8%
Climate smart agriculture practices	1%	16%	5%	47%
Households receiving a credit	10%	19%	20%	0%
Moisture-reliable areas (lowland, high-land-cereal, highland-enset)	55%	76%	73%	20%

Source: Authors' estimates based on ESS 2018/19.
Notes: The four groups of households are identified applying a cluster analysis to the rural sample of the ESS 2018/19 data.

The remote, low-value cereals dependent households' group (group 1) accounts for 42 percent of all rural households. These are households with low education, predominantly located in maize-producing areas, but that have the lowest level of productivity and connectivity (i.e., they have poor access to roads and are furthest from markets), use fewer market inputs, less irrigation and climate smart technologies, and yet a considerable share of households live outside moisture-reliable ecological areas. Increasing market orientation, through both expanding surplus generation and crop diversification, is the most critical pathway for increasing incomes of this group. The top priority is improving adoption of agriculture technologies with improved seed varieties, fertilizers, irrigation and climate smart agriculture technologies. Ethiopia is way below its comparators (Tanzania, Uganda, Cambodia and Thailand) in terms of laws and regulations on fertilizers. The second priority will be improving crop diversification to encourage more uptake of cash crops. Both priority areas require improving the policy and regulatory environment, and efficiency of agriculture input markets, combined with access to appropriate extension services. A third priority is reducing price distortions by removing the maize export bans (which is their primary crop) and exchange rate alignment as they produce mostly export-oriented crops.

The remote, high-value cereals dependent households' group, the second group, accounts for 32 percent of the rural population. It comprises households with similar income levels and low education as the first group, but that are more dependent on cereals with high urban demand (i.e., wheat and teff), have higher labor productivity, are concentrated in moisture-reliable highland areas, are more likely to use inorganic fertilizers and have access to weekly markets, but are slightly further from roads and have low usage of improved seeds. Increasing market participation, through expanding surplus generation, is the most important pathway for this group. It also has scope for diversification into non-farm segments of the food system through development of domestic value chains for grains. Increasing availability of improved seeds is the top priority along with improving connectivity to domestic markets. This requires increasing investment in agriculture technology development for improved seed varieties for teff and wheat, and efficiency of their supply, by attracting private investment into agriculture technology development, multiplication, and distribution. Development of domestic supply chains for grains, including improving market linkages, warehousing, and attracting private investment into grain processing and milling are important interventions, with potential spillovers for off-farm job creation.

The third group, made up of less remote and more diversified households, comprises 31 percent of rural households. It has higher incomes than the first two groups, is dependent on maize but more diversified into cash crops production (mostly coffee), as well as non-farm income sources. This group is also concentrated in moisture-reliable areas, with higher average education levels and living slightly closer to roads. Livelihood diversification into non-farm activities is a primary pathway for increasing incomes of the third group, with increasing market orientation as secondary. Development of export value chains offers opportunities for expanding incomes in the non-farm segments of the food system, while the elimination of price distortions in export output markets (incentives for premium coffee production, exchange rate alignment, and elimination of maize price controls) will boost agricultural incomes. Improving market linkages, and access to credit and logistics are the top priorities for value-chain development and off-farm diversification. Improving access to improved seed varieties is also an important priority for this group, given the low level of adoption, even though they are better off than the rest of the groups.

The fourth group of connected, high-value crop-dependent households is the smallest, making up only 2 percent of rural households. It has the highest average incomes, comprising well-connected households that are near roads, not far from urban markets, and have mobile connectivity but have the lowest access to credit and use of improved seed varieties. These households own more land, have very diversified agriculture crop production but the

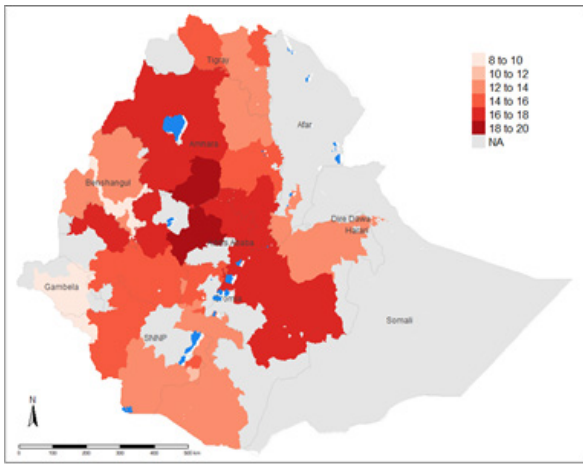
lowest diversification into off-farm activities despite being better connected. They are dependent on maize and concentrated in drought-prone areas, and more likely to use climate smart technologies. Livelihood diversification, through promoting rural enterprise development, is an important pathway for this group given their high connectivity. Improving access to credit should be a top priority. Access to improved seeds is another important priority given the group's low land productivity.

The top priorities are different for these groups depending on their dependance of high export potential crops relative to domestic urban consumption crops, level of crop diversification, rainfall reliability, technological adoption, and roads connectivity. These patterns differ across and within regions (Map 1). For households outside moisture-reliable areas, irrigation investments are a top priority. For those households that are dependent on cereals with low urban demand but high export potential (e.g., maize) and those in coffee-producing areas, price distortions, export controls and the exchange rate are important priorities. For households producing cereals with high urban demand, the top priority is the generation of a marketable surplus through improved technology adoption, better market linkages and connectivity to domestic markets, along with supporting infrastructure. Such areas also have greater potential for job creation in non-farm segments of domestic value chains, which requires improving the enabling environment for rural enterprise development. The issues of improving efficiency of input markets, adoption of agriculture technologies and access to roads are cross-cutting priorities across all groups, except for connectivity for the fourth group.

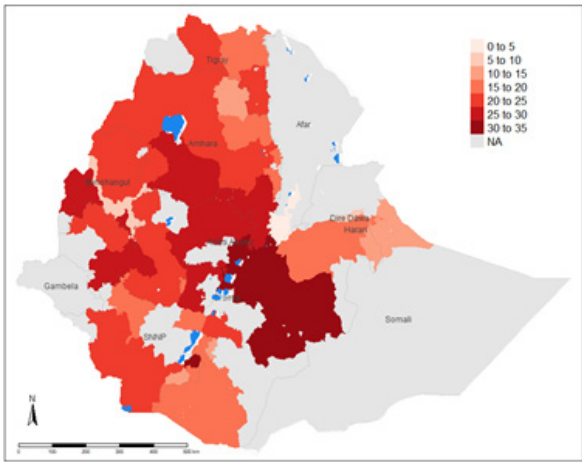
Despite the significant differences between the four groups, many of the indicators are still low, except for the fourth group. Among the first three groups, the highest shares of households using irrigation, improved seeds and climate smart technologies are about 11, 47 and 16 percent, respectively. This implies that the adoption of agriculture technologies is generally low. The average distance to the nearest road ranges from 16 to 19 km, access to credit is between 10 and 20 percent, and the average years of education of most educated household members ranges between 5.6 and 7.3 years. Therefore, connectivity and access to finance are also a major challenge for 98 percent of the population, together with low levels of education. The differences in characteristics across groups and their levels of income highlight the importance of market orientation, access to markets, and the use of technologies to improve livelihood diversification into off-farm opportunities and increasing rural incomes.

Map 1: Agricultural productivity by crops and zone

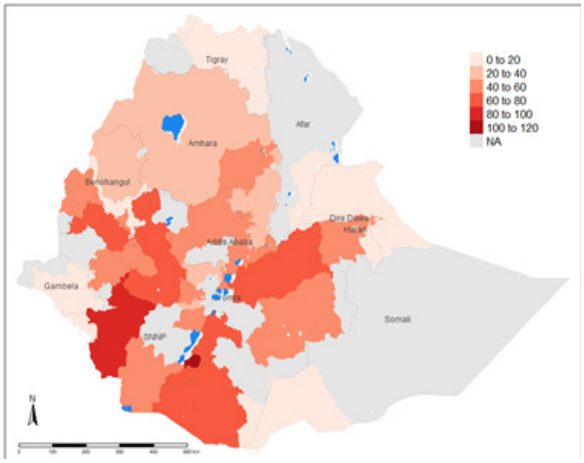
Teff



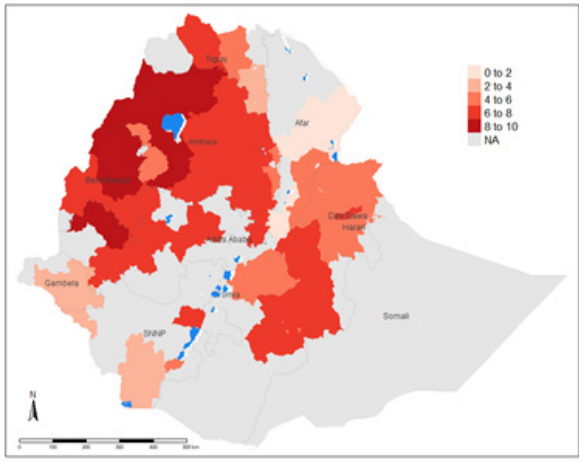
Wheat



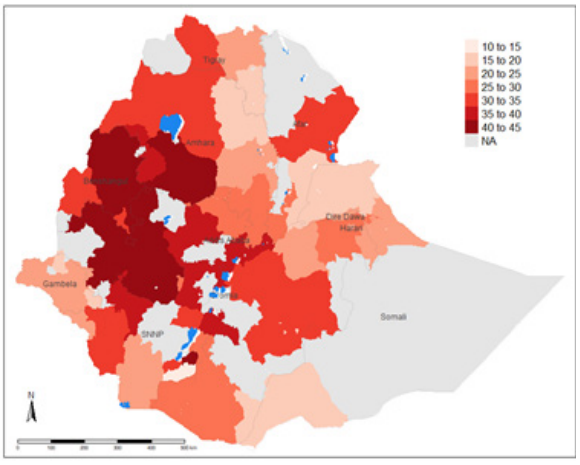
Coffee



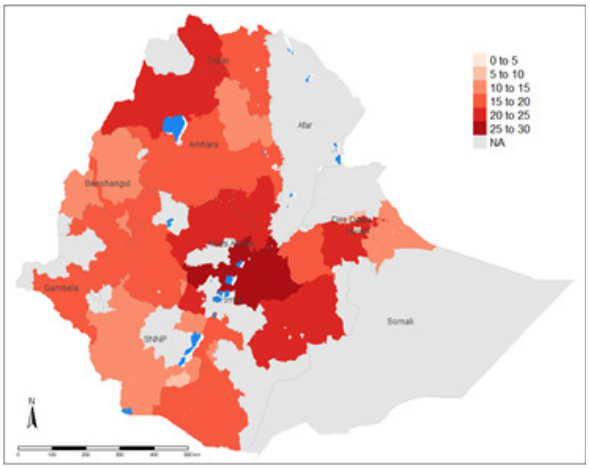
Sesame



Maize



Barley



Source: Authors' estimates from the AGS 2021.

Evolution and feasibility of policies supporting rural incomes

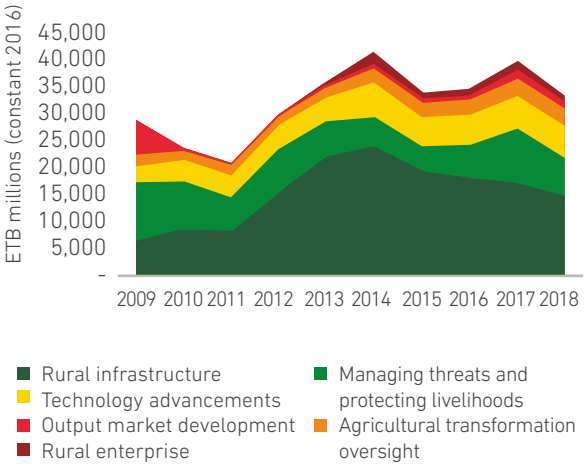
For close to five decades, initially based on the socialist ideology of the previous regime and then continued through the "developmental state" approach of the current government, Ethiopia has followed policies that put the public sector at the center of economic growth initiatives. This has been most pronounced in agricultural and rural development (ARD). The Government of Ethiopia has a very hands-on policy in input distribution, particularly for fertilizer, improved seeds and breeds, and artificial insemination (AI) services. It relies heavily on public services for the introduction of new technologies and agriculture practices, has vested ownership of land and water resources, and leads on infrastructure development. The ARD policy has been effective in terms of promoting technology advancement in smallholder agriculture, contributing to productivity gains, mostly in cereals. But the dominant role of government in input and output markets and state-led infrastructure development has constrained private sector development and introduced price distortions, adversely affecting production decisions and returns to farmers.

Government-led rural infrastructure and agriculture technology development

Rural infrastructure

The Government has long recognized the need to increase investment in rural infrastructure, focusing primarily on natural resource development and rural connectivity. Accordingly, it has prioritized investments on rural road networks, both small-scale and large-scale irrigation schemes, water development for livestock, and on structures to protect and rehabilitate degraded and/or rapidly degrading landscapes. This is reflected in the pattern of ARD public spending (Figure 94). A recent review of government public expenditures in ARD, undertaken in a joint study by the World Bank and FAO/MAFAP, shows that, since 2012, spending on rural infrastructure development is over half of total ARD spending.

Figure 94. Composition of ARD expenditures, 2009–18*



Source: ARD PER Dataset, 2021.

Rural infrastructure development relies almost entirely on public resources, particularly investments in irrigation infrastructure and water development for livestock, and for road construction. These investments started from a low base and, as a result, a large investment gap exists. For instance, irrigation coverage, which expanded under the agriculture growth project Phases 1 and 2, only reached 7 percent of arable land by 2021. Charging for the use of developed resources is uncommon in Ethiopia and, while mentioned, is not well articulated in government policy and strategy documents, and therefore operation and maintenance (O&M) tends to be weak. Watershed and rangeland development is undertaken by mobilizing community labor, while still under the direction of the Government, albeit within a well-developed local-level participatory approach. The ARD policy has not yet developed an approach to encourage private and on-farm investment in rural infrastructure. But the Government is currently working on reforms for the mobilization of multiple sources of funding for rural infrastructure development. It is also implementing reforms to improve natural resource management, while continuing with public ownership.

Support for infrastructure, such as through market centers, warehouses and wet-processing centers, has also been provided primarily by the Government. As a result, there has been under-investment in this type of rural infrastructure.

The lack of access to wet-processing centers, for example, is one of the reasons why the main method for coffee processing has not been widely adopted. The lack of market centers with proper storage facilities also contributes to high post-harvest losses that depress returns, especially for perishable products.

Access to extension services

While the ARD policy recognizes that research is important, the main emphasis is on agriculture extension services. Accordingly, the Government expanded its extension services in the early 2000s to cover most of the country, establishing Farmer Training Centers (FTCs) at the sub-district (*kebele*) level and manning each FTC with three Development Agents (DAs) specializing in crop production, livestock husbandry and natural resource management. Nonetheless, the functional status of FTCs varies, with some classified as model FTCs, while others provide only basic services and are barely functional. In coffee- or horticulture-producing areas, the three DAs are supported by coffee or horticulture experts and, in a few areas with irrigation potential, irrigation agronomists are also in place. The main thrust of the policy is to reach as many farmers as possible with simple, standard messages on new technologies (mostly improved seeds and fertilizers), with a heavy emphasis on cereals and improved agricultural practices, such as row planting, integrated pest management, improved animal husbandry, etc. While the messages are somewhat limited, the expansion of extension services has been significant. The number of DAs increased from 2,500 in 1995 to 12,500 in 2002 and then to 70,000 in 2020, and they currently serve 80 percent of farm households across the country (Bachewe et al., 2017).

To maintain healthy growth in agriculture, the policy approach will need to become more nuanced. This includes the generation of a wider set of new technologies and, therefore, greater investment in agricultural research, and helping to transition from agricultural extension that focuses on the dissemination of a narrow set of basic technologies, toward more sophisticated technical and economic advice, tailor-made to farmers' circumstances and market opportunities, as well as expanding the menu of technologies through further research. This could be beyond the capacity of the public service alone and requires: (i) a policy shift to leverage investments that are both public and private for agricultural research; (ii) mobilizing different actors in extension delivery; and (iii) promoting modern delivery modalities (e.g., using digital technologies). Recent reforms have been introduced to: (i) facilitate greater plurality in the delivery of agricultural services, including agricultural extension and research, to allow for more nuanced approaches to technology generation and dissemination; and (ii) a greater focus within agricultural research and extension systems on technologies and agricultural practices that help farmers adapt to changing (and more erratic) conditions, including integrating climate information into agricultural advisory services. The focus is therefore on reorienting the messages and delivery modes, and not necessarily simply on increasing the number of government extension service providers.

Private sector engagement

Similar to the rest of the economy, private sector participation has not been a key pillar of agriculture and rural development in Ethiopia. The scant attention paid to rural enterprise development is reflected in the small budget share of ARD allocated to this area over the past decade. Under the homegrown economic reform agenda, over the past two years the Government has undertaken a comprehensive review and revision of its policy, with an overarching thrust of revisiting the dominant role of the public sector in both service delivery and agricultural markets. The Government is opening up to greater private sector participation and promoting market-based approaches for smallholder agricultural development. Some of the key areas for private sector participation include agriculture services provision, infrastructure development, including market development, cold chains and warehouses,

input production and distribution, and agriculture output marketing and processing. However, the transition to greater private sector participation is hampered by market distortions and regulations that present a challenging business environment for the private sector. Some of these market distortions are highlighted below.

Government market interventions

Input markets

Unlike several other African countries, Ethiopia does not support direct input subsidies and no funding is allocated to such subsidies in the budget. Instead, the Government controls input distribution and influences profit margins that cooperatives and other input distributors can charge on fertilizer and seed sales, and keeps margins low at the level of multiplication/imports. The Government's hands-on policy in input distribution is demonstrated by the predominance of public agencies (government nurseries, breeding stations, animal feed production units, AI facilities, etc.) and parastatals in the import, multiplication and sometimes delivery (as in the case of AI services) of key agricultural inputs and related services. The biggest actors in the distribution of agricultural inputs are farmers' cooperatives and their unions, backed by the Government. There are also Input Directorates at the Federal Ministry of Agriculture (MoA) and Regional Bureaus of Agriculture (BoA) that are responsible for overall market coordination and providing input demand projections to key actors in the agricultural input supply chain. They determine the prices of inputs produced or channeled through the public system and assign inputs that are imported or produced by public enterprises to different cooperatives/unions or woreda agricultural offices for subsequent sale to farmers. Because the Government focuses on direct engagement, its capacity for oversight and regulation is limited.

The Government has a hands-on policy in input distribution that has kept prices low but tends to crowd out the private sector, as it reduces the incentive to participate in the input supply system. Such a policy results in supply that is inconsistent with demand. All fertilizer is imported by the Government through the Ethiopian Agricultural Business Corporation (EABC) under the direction of the MoA, which is currently the sole importer of chemical fertilizer into the country. Improved seeds are developed by government research institutes and their multiplication is undertaken by the Ethiopia Agriculture Business Cooperation (EABC), regional seed companies, and a small network of private seed growers and cooperative-based seed producers (CBSP). The participation of private seed multipliers is limited. The Government also conditions access to basic and pre-basic seeds on predetermined sales prices that are intended to keep prices to farmers low. Thus, incentives for private actors to engage in the seed supply system are weak.

Nonetheless, private seed companies (both local and foreign) have started to emerge as potential actors alongside the public sector. None of them develops their own varieties, relying mostly on EIAR, RARIs, and EABC for (pre-)basic seed of improved varieties. Consequently, there is under-investment in improved seed varieties, especially outside the key cereal crops. Ethiopia scores poorly under the 2019 Enabling Business of Agriculture indicator "supplying seed," with a score of 55 in relation to its regional comparator countries Kenya (77.47), Tanzania (79.47) and Uganda (75.65). This indicator, which assesses regulations, as well as the time and cost of registration of a seed variety, suggests that a better regulatory environment for varieties and seed is required. Thus, liberalization of agricultural input markets and shifting the Government's focus toward building capacity for regulation as opposed to direct delivery is therefore necessary.

Output market price distortions

The prices of agricultural outputs, particularly grains, are distorted, which disincentivizes surplus production by rural farmers. The Government has prioritized household food security and national food sovereignty through food and cash transfers, and livelihood development initiatives in rural areas. It has also subsidized imports of wheat and edible oil and put in place grain export bans and marketing

restrictions with a view of controlling price escalation of basic foods and ensuring supplies for urban populations. Prices are therefore kept artificially low. For oilseeds and wheat, this has been further compounded by periodic imports (wheat, palm oil, and food aid), subsidized distribution, and a general lack of transparency about the quantity and timing of imports, overall stocks and pricing. While the Government plans to revisit the restrictions on grain exports and gradually eliminate subsidized imports of wheat and edible oil, they remain a key pillar of the Government's food security policy, which needs urgent reform.

The establishment of the Ethiopian Commodity Exchange (ECX) brought access to market data, created orderly markets, and mitigated price risks that curb market participation by smallholder farmers. The ECX connects 3.5 million smallholder farmers to markets. However, being the sole mode through which crops such as coffee can be exported, the ECX marketing restrictions through approved regional centers increase the costs of doing business to trade in these products, reducing the passthrough of market prices to farmers. Its pricing mechanism also fails to adequately incentivize the production and processing of high-quality coffee, resulting in low-quality coffee processing dominating the market. This needs to be reviewed.

Land markets

As per Article 40 of the 1995 Constitution, ownership of all rural and urban land and the country's water resources are vested in the state. However, particularly for land, rural households have user rights that cannot be arbitrarily withdrawn. Furthermore, rural land can be leased out, as well as inherited. Rules governing the transfer of user rights (i.e., leasing to a third party that allows consolidation of land holdings by more progressive farmers) are ambiguous and vary across the country. Land certification and registration have been progressing, but without formally enacted registration and cadastral laws. Thus, some land (e.g., pastoral and communal land) is often not demarcated, registered, or mapped. While rules permit for joint titling of land use rights, only 44 percent of land is under joint title, with 36 percent of titled land only male-owned and 20 percent under female title. The policy allows the expropriation of land use rights for developmental (and other) purposes, and land holdings are often redistributed following the development of irrigation schemes and watershed/rangeland management initiatives. Rules governing the use of agricultural land (land use planning) have not been developed and this renders land administration complicated, with mandates overlapping various government levels. Land administration is therefore often inefficient, diverse and hinders investments aimed at improving and protecting land. Agricultural production is therefore not guided by approaches that would promote optimum uses of land and requirements for investments to protect land from degradation.

Financial Access

Rural finance remains a key challenge. Most financing measures are through preferential access to credit, in some cases delivered by Regional Bureaus of Agriculture in the case of inputs or guarantees to favored institutions such as cooperatives. At the national level, there are credit controls that, for a prolonged period, provided preferential access to SOEs, resulting in stagnating credit provision to the private sector. Limited technical capacity for credit risk assessments for SMEs, especially rural enterprises, has further constrained credit provision to the agriculture sector. Furthermore, rural finance is approached from the perspective of availing resources to finance production activities, but with very few options developed for managing risk. Agriculture insurance is thus underdeveloped, limiting households' options for dealing with climate-related shocks. This disincentivizes market participation by risk-averse households that prefer to hold extra buffer stocks instead. Meanwhile, government reforms and progress in these areas have been slow.

Foreign Currency Markets

The exchange rate in Ethiopia is overvalued and accompanied by exchange rate controls on foreign currency retention and withdrawals resulting in shortages and credit rationing. While the Government has started devaluing the currency and has devalued by more than 40 percent in the past 18 months, the real exchange rate has continued to appreciate due to high inflation. The parallel exchange rate premium has ranged between 25 and 30 percent over this period. The exchange rage misalignment and forex controls have two adverse impacts on the agriculture sector. Although input imports have preferential access to foreign currency, its scarcity results in delays in accessing foreign currency, causing irregular input availability. Moreover, the overvalued exchange rate penalizes agriculture exporters, depressing their returns. Various simulations provide robust evidence that agriculture exporters are net beneficiaries from an exchange rate alignment in Ethiopia.

Resilience

The Government's emphasis on household food security and increasing the productivity of cereal production lays the foundation for improving rural incomes. Analysis in this report finds that farmers will only produce for the market if their basic consumption needs are met first—i.e., if their access to food is ensured—much of which is predicated on growth in cereal production. Moving forward, the challenge is to build on this foundation and shift from food security support toward building the resilience of agricultural production systems. For example, the approach to agricultural technology development and dissemination is focused on increasing agricultural yields under normal conditions, providing few solutions to help farmers withstand shocks, deal with variable weather and shifting seasons, or diversify into new production streams. Similarly, natural resource management is promoted from the perspective of rehabilitating/protecting the physical environment, with little thought regarding linking related investments with opportunities for diversifying into more robust production systems. Under its revised ARD policy, the Government aims to build greater capacity to control the incidence of crop and livestock pest/disease outbreaks and promote more sustainable agricultural practices to control environmental degradation and their impact on livelihoods.

Restrictions on the free movement of labor

Beyond strong government intervention in markets and economic development, there is also a tradition of controlling the movement of labor. This takes the form of household registration requirements and the need to obtain *kebele* IDs, which are required to access government services. These requirements slow the integration of migrants and discourage migration. While the role of rural-urban migration in linking rural areas to opportunities is acknowledged, policy makers are more concerned about urban services being overwhelmed by an expanding urban population. Consequently, policies around rural-urban migration are still largely focused on discouraging it. There are concerns over the outflow of labor from rural areas damaging the agriculture sector, but the analysis presented in this report suggests the opposite effect. As such, rural-urban migration is an important pathway for facilitating both agricultural transformation and linking the rural youth to off-farm opportunities.

Priority policies

The constraints to rural income growth identified in this RID reflect the limits that the past ARD model has reached, together with the interventions required to take rural development to the next stage. A set of priority areas for interventions is therefore proposed here, based on two broad sets of criteria. The first is the impact of the constraints on: (i) changing incentives for households to produce for the market; (ii) increasing agriculture surplus generation through productivity gains and greater resilience to climate shocks; (iii) mitigating the disadvantage of low economic density due to remoteness; (iv) rural enterprise development along the non-farm segment of the food system; and (v) reducing the cost of migration. An additional priority is addressing unequal access to physical and human assets for women and gendered norms that keep women on farms. Under these criteria, the impact of the constraints considers whether it is cross-cutting across pathways, whether there is quantitative evidence of impact on agriculture surplus generation and production orientation, or whether it benefits the poor. A second broad set of criteria is the feasibility of solutions to address the constraints in terms of difficultness of implementation, government buy-in and asymmetry of benefits across groups.

Twelve priority areas are identified from the prioritization process. These are discussed below, along with their priority ranking. They are summarized in Table 26 presenting the immediate interventions and Table 27 presenting the medium- to long-term interventions. The medium- to long-term interventions are those where solutions are difficult to implement due to technical challenges or political economy challenges, or where the interventions require a long gestation period to bear results.

Addressing infrastructure gaps focused on connectivity, irrigation, land structures for protecting or rehabilitating eroding landscapes and other supporting infrastructure

Improving connectivity and supporting infrastructure is crucial for both increasing smallholder farmers' market orientation and agriculture value-chain development to creating off-farm jobs, while investment in irrigation are important for increasing agricultural productivity for the largest and one of the poorest groups of rural households. The Government has devoted significant resources in recent years to rural infrastructure development. However, continued government investment is required to improve rural connectivity, especially feeder roads, access to irrigation and supporting infrastructure. It is also necessary to mobilize additional funding beyond the public sector. A priority area is establishing an irrigation fund that includes both public and private funding from levying water, whose current fee levels and collection rates are very low and are insufficient to cover the O&M costs of irrigation schemes. The main constraint on this is the absence of clear regulations and guidelines concerning the implementation of water use charges and irrigation service fees. The high impact of infrastructure investment on increasing market orientation, agriculture surplus generation and off-farm job creation, makes addressing infrastructure gap a high priority for immediate government action.

Private sector participation in delivery of supporting infrastructure

In line with the reform thrust for increased private sector participation, government investments in infrastructure should use, or be complemented by, approaches that incentivize private on-farm investments, and private sector participation in infrastructure development, especially on supporting infrastructure. Such an approach is consistent with government reforms aimed at shifting from a state- to private sector-led development model. The expanded availability of infrastructure through private sector creation has a big impact on value-chain development and elongation. It allows for production to take place from cities, creating rural jobs in the process, and hence has a cross-cutting impact on both agricultural and non-agricultural incomes. It is therefore a high priority area for government action.

Agriculture input market deregulation

While restrictions on the input markets, for example, the importation of fertilizer, are being loosened,

there remains a strong a reliance on public agencies for agriculture technology development, influence on pricing of inputs sourced from the public research system, preferential treatment to cooperatives remain prevalent and a number of public agencies that are engaged in the production and distribution of agricultural inputs particularly in the livestock subsector. Even under the ACC, input provision is based by promoting government backed co-operatives, which has yielded some results, but still limited in terms of technological development. The government ought to shift focus from direct delivery of agricultural inputs to oversight and regulation of input supply, particularly to ensure that a minimum quality of inputs is maintained, which requires investments in building the capacity for regulation. This is recognized in the policy reform and a new Agricultural Regulation Agency has been established but is yet to be fully capacitated and to lay down the systems required to effectively regulate input supply. With technology application, especially improved seeds low across all groups of rural households, and strong government buy-in, input market deregulation are a high priority area for immediate intervention.

Agriculture output market deregulation

The Government's intervention in output markets, especially the maize export bans, has artificially suppressed the price of grains. This has reduced incentives, as well as market opportunities, for surplus production for cereals. There is therefore a need to eliminate export restrictions. However, the cereal export ban remains a core part of the Government's strategy to support urban food security. The policy reform has opened up the opportunity to revisit how this is done and to loosen restrictions on exports and provide a more transparent system. In the context of rising food inflation, the loosening of export restrictions is unlikely to receive immediate traction, hence it is categorized as a top but medium- to long-term priority.

Improving market linkages

The Government needs to shift to market facilitation instead of being a market player, by focusing on developing public goods such as market information systems, and by strengthening rules and regulation around contracting, and improving the environment for enterprise growth along agriculture value chains. This includes a combination of direct support to both co-operatives and government under the AGP, as well as MSMEs as planned under the FSPR in the short term, which the Government is making good progress on. However, opening the trading sector to foreign investment would have a strong catalyst effect on agriculture value-chain development, which could alter the geography of food production and processing with strong benefits to rural households' groups producing urban consumed goods or those that have diversified into cash crops. The trading sector has been kept on the negative list of sectors where foreign investment is permitted. However, the policy leaves open the option of revisiting these restrictions, but that opening is still being discussed suggests implementation will be slow. The interventions in this area are therefore deemed a medium- to long-term priority.

Re-orienting extension services provision

The Government's public service-led approach has promoted the adoption of basic agriculture technologies that contributed to improvements in yields. Extension services coverage increased significantly. Since this is mostly biased toward cereals and only delivered simple messages, the challenge is now to shift toward more sophisticated market-oriented messages, which is best achieved by permitting a plurality of advisory services provision and promoting commercial approaches in the government research system. Re-orienting extension services is a high priority intervention, given its impact on technological adaptation and farmers production orientation. The high government attention this area is receiving is warranted.

Financial sector reforms

Laws and regulations on the use of warehouse receipts and a functional warehousing system place Ethiopia above its comparators (second only to Tanzania) on the regulatory framework for agriculture finance. However, credit controls at the macro level, along with preferential access, have resulted in credit rationing. This has affected the agriculture sector more due to typical challenges faced by SMEs that dominate the sector, lack of capacity for risk assessment for lending to the agriculture sector, and the underdevelopment of financial instruments, including insurance products, designed for agriculture. The sector thus still relies to a larger degree on direct government financing for access to input for farmers (high default rates and limited of funding have been reported as constraints to input credit for agriculture commercialization clusters) and cooperatives. A low take up of agriculture finance instruments (e.g., weather-based crop insurance) suggests high implementation challenges, making this a low priority area for short-term intervention.

Foreign Currency reforms

An overvalued exchange rate, and foreign currency controls along with preferential access, have also resulted scarcity and rationing of forex, while imposing an implicit tax on exporters, especially in the agriculture sector. The lack of foreign currency is a major constraint for the private sector economy wide. The Government's homegrown economic reform agenda recognizes the need to address foreign exchange misalignment but consensus on the impacts of this policy is lacking. The distributional impacts are also asymmetric, with those currently receiving preferential treatment likely to lose out. The Government has pursued with devaluation but not fast enough to depreciate the real exchange rate in the high inflation environment and it has also rolled back on previously relaxed export retention policies, signaling the difficulty of implementing reforms in this area. The forex reforms are thus deemed a medium-term priority area of reforms under the current environment.

Improving natural resource governance and land administration

Natural resource governance for both land and water would also need attention to complement the scale-up of investments in rural infrastructure. Ethiopia has gone a long way in terms of establishing a system for watershed and rangeland management that includes investments on land through government support and community mobilization and investments in irrigation development. However, practices on benefit sharing, distribution of rehabilitated farmlands and access to rehabilitated communal lands and developed irrigation infrastructure are ad hoc, discretionary, and not always equitable—distorting incentives for proper management and protection of resources. Furthermore, oversight on natural resource use including information on the resource base, land use planning, and oversight on water use (to avoid over exploitation of ground water resources and to promote equitable water sharing arrangement with downstream users) is lacking. While the formal land user rights have expanded, including joint land titling, the restrictions on land transactions and the transfer of user rights under the current system should be addressed to allow for greater efficiency in land use and to promote land consolidation. There is also a need to develop a land management database to improve land registration and enforce joint titling and women's land rights. This is a top but challenging priority area, and hence this should be considered for medium- to long-term implementation.

Relaxing constraints on the movement of labor

There is limited traction on improving opportunities for rural-urban migration, but this remains an important pathway for expanding access to off-farm opportunities to the rural population, particularly the rural youth. This is therefore considered a medium priority area for long-term implementation.

Expanding urban investments

There is need to reinforce the urban pull through expansion of urban-based (export) industries by attracting government and private investment into these areas and adapting urban areas to expanding populations by expanding government investment into urban infrastructure and public service delivery. These are critical for encouraging and managing rural-urban migration. There are significant quantified effects of migration on agricultural productivity and land markets that shows attracting labor from rural to urban areas has transformational benefits, but at the beginning only the slightly better educated youth are likely to migrate. This is therefore considered a medium priority area for long-term interventions.

Gender equality enhancement

It is important to address gender gaps in education and training, access to land, as well as norms around women's occupations and roles within households to equalize access to opportunities. It has both short-term priority interventions, such as vocational training and long-term priority areas related to increasing schools' progression, especially for girls.

Table 26: Short-term priority intervention areas for increasing rural incomes

Constraint	Pathway	Priority Level	Interventions
Investment gaps			
Low rural connectivity	• Market-oriented production • Increasing economic density	High	• Rural roads investments
Limited access to irrigation	• Agriculture surplus generation	Medium	• Irrigation investments
Low access to climate-smart agriculture technologies	• Agriculture surplus generation	High	• Investment in R&D for climate-smart agriculture technologies • Incentives for on-farm private investments
Lack of logistical infrastructure	• Rural enterprise development • Market-oriented production	High	• Investments in modernized physical markets, cold chains, warehouses and storage facilities
Depleting natural resources	• Agriculture surplus generation	High	• Land structures for protecting or rehabilitating eroding landscapes
Market related constraints			
Input shortages and unavailability	• Agriculture surplus generation • Rural enterprise development	High	• Liberalization of input markets
Weak price incentives due to market distortions	• Market-oriented production • Rural enterprise development	High	• Streamlining marketing restrictions • Revising the incentive structure to promote premium coffee production
Low market linkages	• Market-oriented production	Medium	• Contract farming • Market information systems • Direct support to farmer groups and SMEs
Risk management financial instruments	• Agriculture surplus generation	Low	• Vegetation index-based insurance • Livestock based insurance
High job search costs	• Reducing barriers to migration • Market-oriented production	Medium	• Employment intermediation services • Youth apprenticeships • Expand investments in urban based industries
Capacity constraints			
Limited access to complex, market-focused, advisory services	• Agriculture surplus generation • Market-orientated production • Rural enterprise development	High	• Plurality of extension services • ICT based advisory service delivery mechanisms • Retraining of extension services providers
Low education and skills	• Reducing barriers to migration • Market-oriented production	High	• Gender-focused vocational training
Gender biases in intra-household labor allocation	• Rural enterprise development • Market orientation	High	• Gender representation in decision making structure & enterprise group formation
Policies and regulations			
Lack of access to credit	• Agriculture surplus generation • Rural enterprise development • Reducing barriers to migration	Medium	• Input voucher system • Elimination of credit controls & preferential treatment
Land fragmentation limits technological adoption	• Agriculture surplus generation	High	• Cluster approach • Develop equipment rental markets suitable for small farm sizes
Gender bias in land access	• Market-orientated production	Medium	• Enforcing land co-titling

Table 27: Medium-term priority intervention areas for increasing rural incomes

Constraint	Pathway	Priority Level	Interventions
Investment gaps			
Low digital connectivity	• Market-oriented production • Increasing economic density	High	• ICT infrastructure development
Limited access to irrigation	• Agriculture surplus generation	Medium	• Rationalizing institutional arrangements • Review regulations and legal provisions for water user charges to increase
Distorted incentives for natural resource management	• Agriculture surplus generation	High	• Improve natural resource governance and land management systems
Poor access to urban services deterring migration	• Reducing barriers to migration	High	• Urban infrastructure investments
Market related constraints			
Weak price incentives due to market distortions	• Market-oriented production	High	• Elimination of export bans
Limited knowledge and private sector investment in value chain development	• Rural enterprise development	High	• Open trading sector to foreign ownership
Capacity constraints			
Low education and skills	• Reducing barriers to migration • Market-oriented production	High	• Fostering school progression, especially among girls
Policies and regulations			
Lack of access to credit for rural enterprises	• Rural enterprise development	High	• Strengthening financial institutions capacity for credit assessment
Exchange rate misalignment	• Rural enterprise development • Market-oriented production	Medium	• Exchange rate unification • Remove foreign exchange controls
Burdensome administrative procedures for IDs	• Reducing barriers to migration	Medium	• Reducing minimum stay requirements for obtaining Kebele IDs • Removing release letter requirement • Digital IDs
Limited access to public services and housing for migrants	• Reducing barriers to migration	Medium	• Expand public investment in urban infrastructure, housing and services
Land fragmentation limitations to mechanization	• Agriculture surplus generation	Medium	• Remove restrictions on land transactions and transfer of user rights
Barriers to trade	• Agriculture surplus generation • Rural enterprise development	Medium	• Free trade agreements • Strengthening capacity and enforcement of SPS

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