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COST-BENEFIT ANALYSIS OF USAID/ETHIOPIA SELECTED VALUE CHAINS OF AGRICULTURAL PROJECTS IN ETHIOPIA

AMDe, GRAD, LMD, and PRIME PROJECTS

SUMMARY REPORT

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**United States Agency for International Development
Learning, Evaluation, and Analysis Project
(AID-OAA-C-11-00169)**

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AMDe, GRAD, LMD, AND PRIME PROJECTS**

SUMMARY REPORT

**Prepared for:
U.S. Agency for International Development/Ethiopia**

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List of Acronyms

AGP	Agricultural Growth Program
AMDe	Agricultural Market Development
CBA	Cost-Benefit Analysis
EBCR	Economic Benefit-Cost Ratio
ECF	Economic Conversion Factor
ECX	Ethiopian Commodity Exchange
ETB	Ethiopian Birr
EIRR	Economic Internal Rate of Return
ENPV	Economic Net Present Value
FCUs	Focused Cooperatives and Unions
FEP	Foreign Exchange Premium
FIRR	Financial Internal Rate of Return
FNPV	Financial Net Present Value
FtF	Feed the Future Program
GRAD	Graduation with Resilience to Achieve Sustainable Development
Ha	Hectare
HABP	Households Assets Building Program
kg	Kilogram
km	Kilometer
MoA	Ministry of Agriculture
MFI	Microfinance Institution
MT	Metric Ton
LEAP	Learning, Evaluation, and Analysis Project
LMD	Livestock Market Development
PRIME	Pastoralist Areas Resilience Improvements and Market Expansion
PSNP	Productive Safety Net Program
US	United States of America
USAID	United States Agency for International Development
VAT	Value-Added Tax
VC	Value Chain

Introduction and Project Descriptions

This document presents the results of the cost-benefit analysis (CBA) that was conducted for the selected United States Agency for International Development (USAID) interventions of Agricultural Market Development (AMDe), Graduation with Resilience to Achieve Sustainable Development (GRAD), Livestock Market Development (LMD), and Pastoralist Areas Resilience Improvements and Market Expansion (PRIME) projects in 2012. Project descriptions are as follows:

- **Agribusiness and Market Development (AMDe):** This project seeks to sustainably reduce poverty and hunger by improving the efficiency and competitiveness of value chains. Thus the project should enhance opportunities for better jobs and higher income for rural households in Ethiopia. Project interventions are planned for 83 *woredas* (districts) involved with the wheat, maize, sesame, coffee, and honey value chains.
- **Livestock Market Development (LMD):** This project aims to foster growth and reduce poverty by improving the competitiveness of selected livestock value chains in target *woredas* within four Ethiopian regions. This plan will benefit large numbers of smallholders and pastoralists and reduce hunger through productive job creation and higher incomes for rural households. The target value chains are dairy, meat and live animals, and hides, skin, and leather.
- **Graduation with Resilience to Achieve Sustainable Development Project (GRAD):** This project contributes to sustained food security for chronically and transitory food-insecure households in rural Ethiopia. The project is expected to work with 65,000 chronically food-insecure households that are presently benefiting from the Productive Safety Net Program (PSNP) and include approximately 10,000 lead farmers and village market agents—input suppliers, agro vets, collectors, graders, and processors. The project seeks to graduate 50,000 chronically food-insecure households from safety-net project support in 16 targeted *woredas* and help increase each household yearly income by \$365 by the end of the 5-year project. These activities will focus on potential opportunities in five value chains: dairy, honey, meat, pulses, and vegetables.
- **Pastoralists Resiliency Improvement and Market Expansion Project (PRIME):** This project is designed to increase incomes and improve the resiliency and adaptive capacity of pastoral communities to weather shocks through market expansion. PRIME will be implemented in selected pastoral and agro-pastoral districts (*woredas*) of the Somali, Afar, and Oromia regions.

The main objectives of these projects are the reduction of poverty and hunger through increasing the income of the targeted households and stimulating sustainable economic growth. These objectives will be achieved through investments in each project's selected value chains, which have been chosen to improve their overall productivity, efficiency, and effectiveness.

Methodology

Extensive field research was conducted to collect primary data. A complete range of stakeholders, including local implementing partners, private experts, research institutes, and households, was interviewed to collect the information. During the field visits, the research team attempted, whenever possible, to interview two groups of households: successful households (to determine their key success points) and households that were not yet engaged in the activities (to determine the main constraints).

These data have been used to construct CBA models of the proposed interventions. Project models are based on the real profile of the cash inflows and cash outflows of the targeted households.¹ The financial net cash flows are used to determine the financial outcomes of the interventions, such as the financial net present value (FNPV) and financial internal rate of return (FIRR). For the GRAD project, a new structure of loans has been designed and proposed that is better suited for the targeted households and will increase their likelihood of repaying the loans.

Economic conversion factors (ECFs)² have been calculated to adjust the financial cash-flow statements for any market distortions that are present in the economy of Ethiopia. These ECFs are used to translate the purely private financial flows into economic values that reflect the flow of costs and benefits to the nation as a whole. A wide range of taxes is applied to business activities in Ethiopia, including a value-added tax (VAT) of 15 percent, customs duties of 0 to 35 percent payable on imports, a turnover tax of 2 percent, a corporate income tax of 30 percent, an income tax on wages of 0 to 35 percent, and an excise tax from 10 to 100 percent. The government also heavily subsidizes some goods. For instance, bull's semen is sold to farmers for US\$0.22, while the cost of production is estimated at US\$1.22. In addition, there is a foreign exchange premium (FEP) of 6.5 percent in Ethiopia.³ These ECFs are used to adjust the financial cash flows to determine potential economic outcomes of the interventions, such as the economic net present value (ENPV) and economic internal rate of return (EIRR). Finally, the CBA models are used to measure and assign the distribution of the interventions' net benefits to their respective stakeholders.

Taking into consideration the variety of climatic conditions and production systems in Ethiopia, the CBA models are designed to be easily adjusted to predict outcomes of the interventions in different regions of Ethiopia by changing their key parameters in the models' Table of Parameters. The models can then automatically recalculate all corresponding figures.

The CBA models and draft reports have also been sent to the projects' local implementing partners. Any comments and recommendations provided by the partners are included, when applicable, in the final reports.

¹ PRIME analysis is based on the cash flows of the industrial facilities.

² The economic prices of tradable goods account for the real resources consumed or products produced by a project and hence are not the same as the prices (gross of tariffs and sales taxes) paid by users or the prices (gross of subsidies and net of export taxes) received by suppliers. Taxes and subsidies associated with importable or exportable goods are simply the transfer between the government and importers or exporters; they are not part of the economic cost or benefit. A *conversion factor* is defined as the ratio of a commodity's economic price to its financial price.

³ The economic cost of foreign exchange is often expressed in project evaluations as a proportion of the market exchange rate ($E^{\text{econ}}/E^{\text{market}}$). The percentage by which E^{econ} exceeds E^{market} is typically referred to as the foreign exchange premium.

CBA Results

CBAs have been completed for 21 interventions of the AMDe, GRAD, LMD, and PRIME projects. These analyzed interventions represent approximately US\$34.27 million out of the total US\$163 million invested by USAID in all these projects' interventions.

Financial and Economic Analysis

Table 1, below, presents an analyzed share of USAID's total investment and the interventions' economic returns.

Table 1. Aggregate financial and economic returns of the projects

Project (1)	Beneficiaries (households) (2)	Cost of the interventions (3)	ENPV (4)	EIRR (project based) (5)	Economic benefit-cost ratio for each US\$1 invested by USAID (6)
AMDe	383,788 ⁴	US\$9.23 mill	US\$84.67 mill	101.67%	US\$9.17
GRAD	65,000 ⁵	US\$11.50 mill	US\$82.51 mill	NA	US\$7.17
LMD	33,100 ⁶	US\$11.40 mill	US\$82.24 mill	NA	US\$7.21
PRIME	371,769	US\$2.14 mill	US\$28.23 mill	108.94%	US\$13.19
TOTAL/MEDIAN	930,557	US\$34.27 mill	US\$277.65 mill	88.88%	US\$8.19

Column 2 of table 1 presents the total number of the households that benefit from the USAID/Ethiopia Feed the Future (FtF) program. The total number of beneficiaries is estimated at 930,557 households. The median EIRR of the USAID investments is 88.88 percent, meaning that for every USAID dollar invested now, the country as a whole will receive additional income of 88.88 cents in each of the next 10 years.

Column 3 of table 1 presents the analyzed fraction of USAID investment in the four FtF projects. The total cost of the analyzed USAID investment is US\$34.27 million, which represents 21 percent of the total USAID/Ethiopia FtF portfolio.

Column 4 of table 1 presents the total ENPV (or the difference between the sums of discounted economic benefits and economic costs) of the 21 analyzed interventions for each of the four projects. The ENPVs have been derived using a 12 percent economic opportunity cost of capital. The total ENPV of the analyzed interventions is US\$277.65 million.

Column 5 of table 1 presents the median EIRR of the 21 interventions that have been analyzed. For purely technical reasons, the EIRR of some GRAD interventions could not be calculated. Four value chains—vegetables, pulses, honey, and meat—have been analyzed under the USAID/Ethiopia GRAD project portfolio. In the case of the vegetables value chain, the investment is structured to minimize the benefiting

⁴ The total number of beneficiaries for the AMDe and PRIME projects is derived as a ratio of the total benefits of the interventions and the net benefits per household.

⁵ The total number of beneficiaries is taken from the GRAD investment proposal.

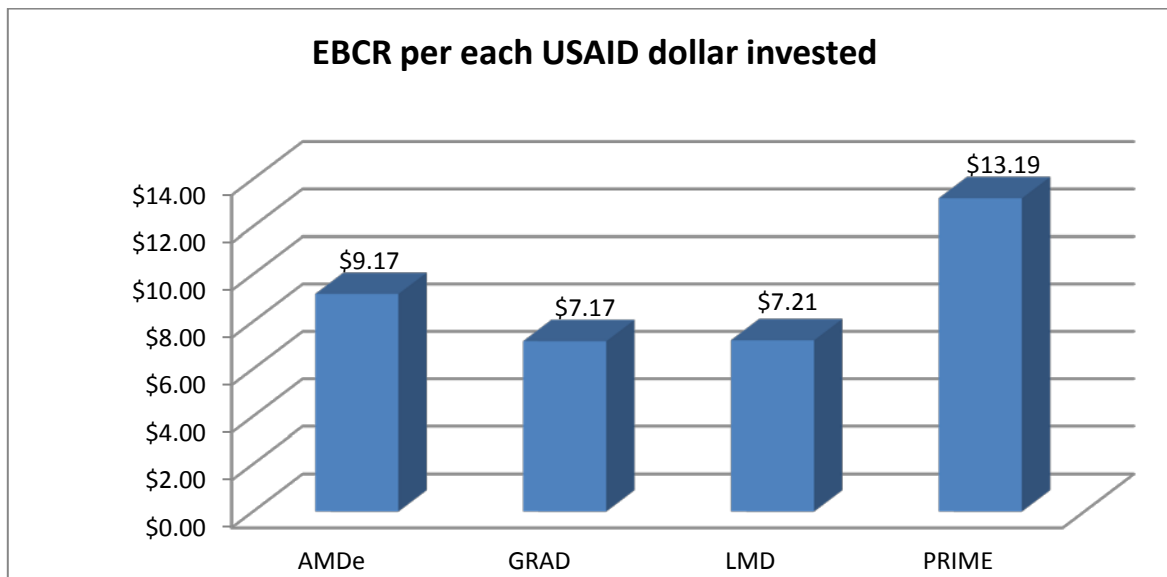
⁶ The total number of beneficiaries is based on the assumption that the specific targets of the LMD project will be reached.

households' required expenditures. For instance, the irrigation pump used to produce vegetables is shared by a number of the households. Such an intervention structure results in positive net cash flows in all years, even in the year when Ethiopian beneficiaries are making investments. In a case when all yearly net cash flows of a project are positive/negative, the internal rate of return cannot be defined. This technical problem is also present in the analysis of the pulses value chain. Hence, the median EIRR of the GRAD portfolio itself cannot be defined (or should be based on the remaining two value chains).⁷

For the CBA of the LMD portfolio, the economic benefits of USAID support have been derived as incremental benefits realized by the households if the characteristics of the livestock industry were to change. For instance, in the case of the dairy-sector analysis, the dominant type of farm is modeled assuming significant changes in that sector. The economic benefits are then estimated as the incremental benefits realized by the households if some important production coefficients were to be positively affected by the LMD project (such as calving intervals, access to sexed semen, livestock mortality rate, milk losses, and so forth). In this case, although it is possible to derive the monetary economic benefits of the investments, the EIRR of the investments cannot be estimated, because many of those changes assume yet further changes in other areas of economic activity.

Column 6 of table 1 shows the derived economic benefit-cost ratio (EBCR) for each dollar invested by USAID/Ethiopia. The economic benefits are defined as ENPVs to Ethiopians as a whole, and the cost is defined as USAID's investment cost. The median EBCR for the four projects is estimated at US\$8.19, a large ratio that indicates a high probability of success of the programs. The median EIRR is 88.88 percent, which also indicates significant economic returns on the investments. In comparison, the median EIRR in the six FtF priority countries (Bangladesh, Ghana, Uganda, Rwanda, Tanzania, and Haiti) is 22 percent.⁸ Figure 1, below, compares the EBCRs of these four projects.

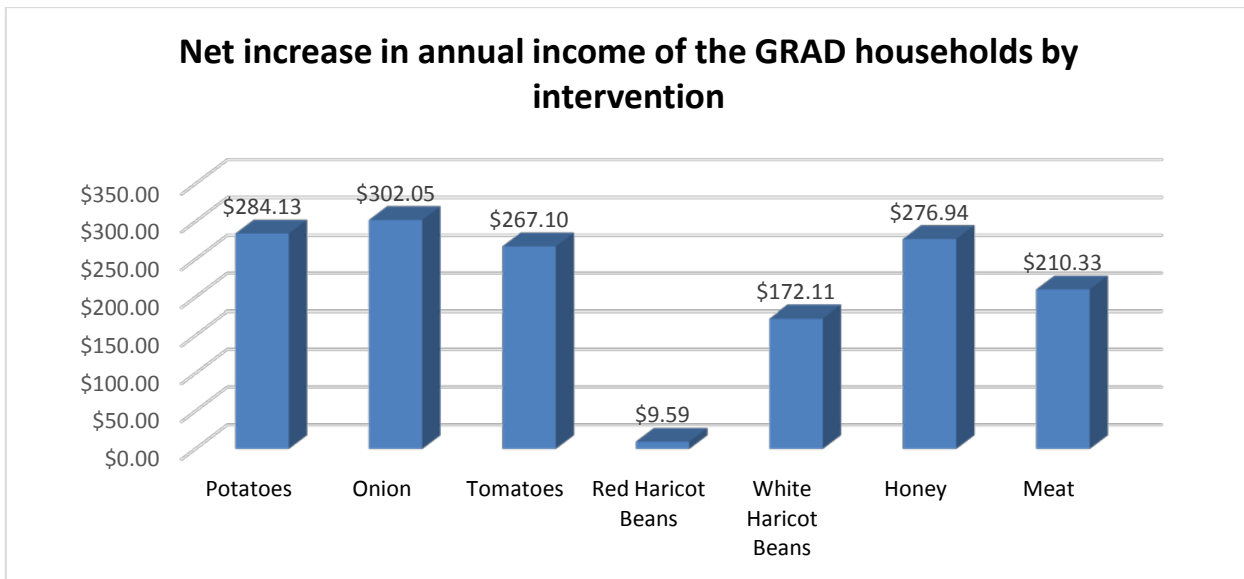
Figure 1. Economic benefit-cost ratios of AMDe, GRAD, LMD, and PRIME projects



⁸ <http://www.usaid.gov/who-we-are/organization/bureaus/bureau-economic-growth-education-and-environment/office-economic>.

Although the EBCR of the GRAD project is the lowest among the four projects, it is important to note that the main targeted group of the GRAD project is chronically food-insecure households. Economic returns for such a group are usually below average due to the very limited amount of equity capital invested per household and the relatively low productivity of the land in these regions. The main objective of the GRAD project is to increase the annual income of the targeted chronically food-insecure households by US\$365.00 per year. The estimated increase in the annual income of the households is presented in figure 2, below.

Figure 2. Estimated increase in the annual income of the households, including opportunity cost of family labor



Although the estimated increase in the targeted households’ income is below the goal of US\$365.00 per year for each individual value chain, the GRAD program’s design ensures that households benefit from more than one value chain intervention. For instance, farmers benefiting from interventions in the haricot beans value chains may also start honey production or purchase a few small ruminants for consequent fattening due to the GRAD project. Given the high annual increase in income expected, ranging from US\$172.11 to US\$302.05 (except for the red haricot beans value chain), engaging in more than one value chain per household virtually guarantees a significant improvement in the livelihoods of chronically food-insecure households.

It should be noted that these new expected incomes supported by the GRAD project will contribute to other currently existing sources of household income. Thus GRAD graduates are expected to exceed the US\$365.00 threshold as a result of numerous income streams.

The average EBCR of the PRIME project is significantly higher than the others. Such a high ratio is affected by the fact that the analyzed interventions⁹ of the PRIME project are to be conducted in a co-financing arrangement with private investors. The average equity contribution of the private investors amounts to 70 percent of the total cost of investment. In addition, both of the analyzed PRIME interventions are the first-movers in the pastoral area of Ethiopia. A huge livestock concentration in the region amounts to almost 50 percent of the total Ethiopian livestock population. However, due to years of political instability, the region

⁹ The analyzed PRIME interventions include the “establishment of abattoir facility” intervention and the “establishment of milk-processing plant” intervention.

has historically suffered from underinvestment in commercial livestock facilities. Recently, the region has become relatively politically stable, but private investors are still generally reluctant to invest due to the perceived high risk of their investments. A positive change in this situation, due to USAID support, will allow the country to realize significant economic returns. The economic returns will increase if first-movers projects succeed in acting as demonstration mechanisms for other private investors.

Figure 3, below, presents the ENPVs of the projects, the total USAID/Ethiopia investment under each of the projects, and the respective shares of the USAID investment that the CBA covers.

Figure 3. ENPV and USAID’s investment coverage, by CBA (US\$ million)

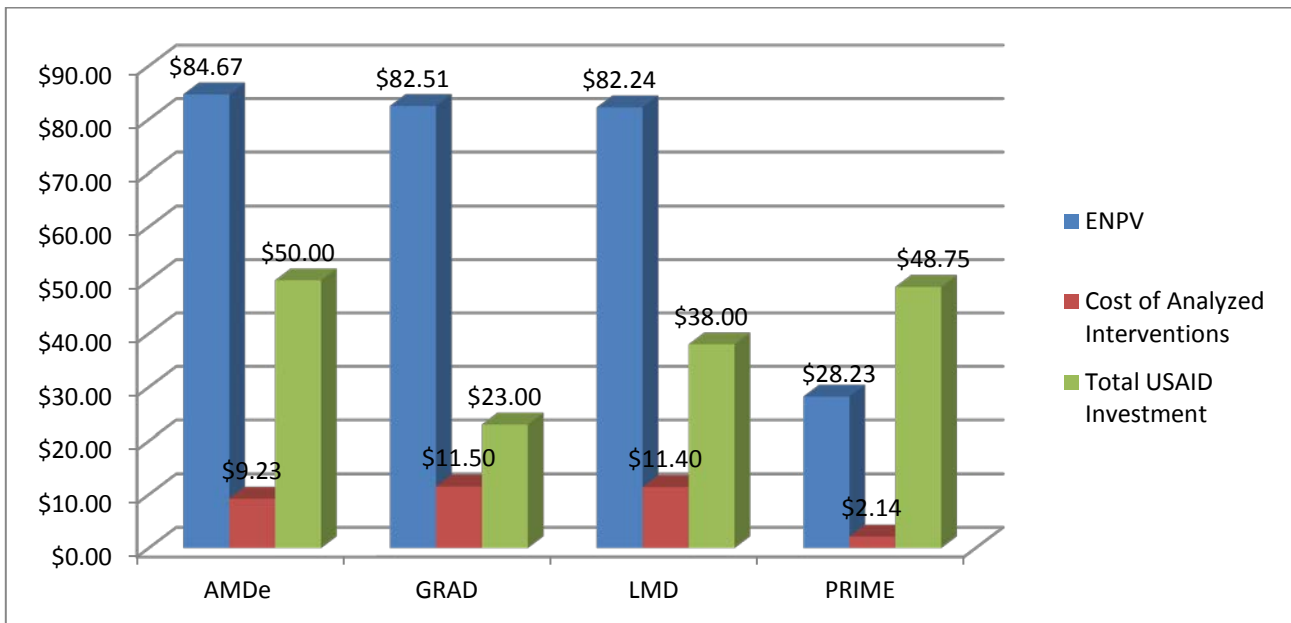
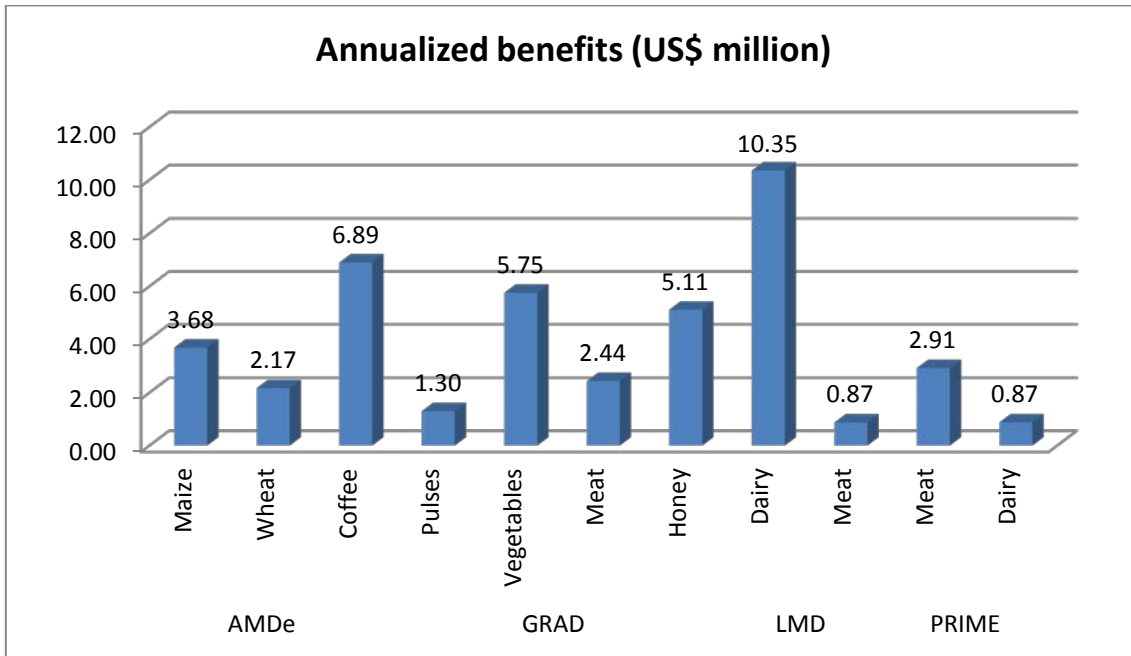


Figure 4, below, compares the annualized benefits of the analyzed interventions of these four projects by the value chain.

Figure 4. Annualized economic benefits of the AMDe, GRAD, LMD, and PRIME projects, by value chain



Low annualized benefits of the meat value chain under the LMD project are realized because the main constraint of the meat sector in the highlands of Ethiopia is the high cost of livestock feed (i.e., concentrate feed). Average land holdings are also very low in the highlands of Ethiopia, making it virtually impossible to fatten steers via free grazing. The analyzed LMD interventions in the meat value chain are assumed to result in a 10 percent decrease in the cost of feed for the benefiting households and to provide access to capital for the households that currently have financial constraints preventing them from starting the beef-fattening activity. Even a 10 percent decrease in the feeding cost—a significant improvement—cannot overcome the problem of the high cost of feeding components.

The analysis of the meat value chain under the GRAD project focuses on the fattening of small ruminants (i.e., lambs and kids). The high cost of livestock feed in Ethiopia makes it unprofitable to fatten small ruminants using feed concentrates. The intervention is therefore assumed to be focused on the households that are able to fatten the animals via free grazing. The cost of free grazing is significantly less than the cost of feed concentrates, allowing for profits.

In contrast, the USAID investment in the meat value chain under the PRIME project creates an abattoir facility in the region that includes 50 percent of the total Ethiopian livestock population, which previously did not have such a facility. The closest abattoir facility is located approximately 600 kilometers (km) away from the region. The facility’s scale is small relative to the livestock population and corresponding growth rate, however; in time, a significant positive economic externality may arise (if the abattoir facility is successful) that is associated with an increased number of private investors coming to the region. The private investor’s estimated FIRR is 52.32 percent. Increased competition may result in increased purchase prices for livestock, leading to the transfer of a fraction of this significant income from entrepreneurs to pastoral households. However, such factors are impossible to estimate ahead of time; hence, they are not included in this analysis.

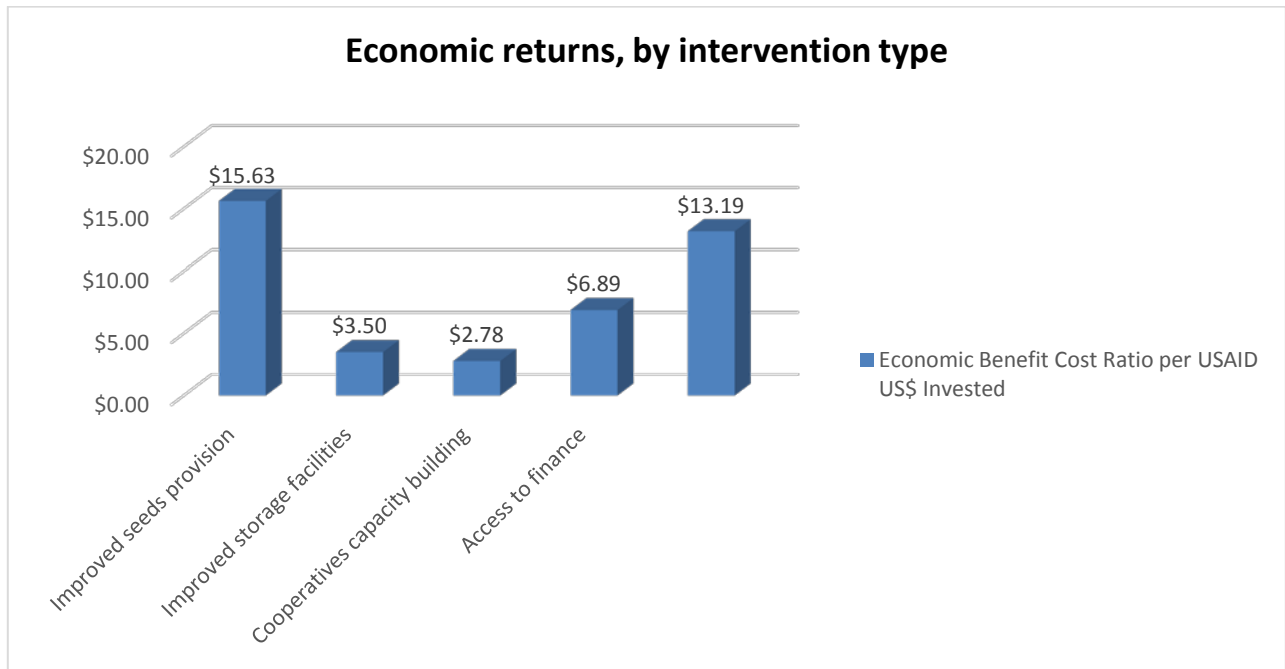
The dairy investments’ annualized benefits under the PRIME project are much lower than their benefits under the LMD project (US\$0.87 million, compared to US\$10.33 million). The analyzed intervention in the dairy value chain of the PRIME project is the establishment of a milk-processing plant with the total investment cost of US\$0.76 million, compared to US\$9.33 million in investments analyzed in the LMD dairy value chain. For comparison purposes, if the investment in the PRIME project were increased to the same level as that of the LMD project, the annualized benefits of the PRIME dairy value chain investments would be US\$13.77 million, compared to US\$10.35 million in the LMD project. Table 2, below, presents the financial and economic returns by value chain for the four projects.

Table 2. Economic returns for the four projects, by value chain

Project	Value chain	ENPV	EIRR
AMDe	Maize	US\$20.79 mill	114.00%
	Wheat	US\$12.28 mill	89.33%
	Coffee	US\$51.60 mill	Not defined
	Honey (per household)	US\$1,270.0	76.00%
GRAD	Pulses	US\$7.34 mill	Not defined
	Vegetables	US\$32.50 mill	Not defined
	Honey	US\$28.89 mill	88.42%
	Meat	US\$13.78 mill	Not defined
LMD	Dairy	US\$77.33 mill	Not defined
	Meat	US\$4.91 mill	Not defined
PRIME	Live animals and meat	US\$21.70 mill	115.28%
	Dairy	US\$6.53 mill	Not defined
TOTAL/MEDIAN	-	US\$277.65 mill	88.88%

Figure 5, below, presents the EBCR by intervention type. The “improved seeds provision,” “improved storage facilities,” and “cooperative capacity building” are the three intervention categories in the AMDe project. The “access to financial resources” with the GRAD project and the “establishment of industrial facilities” are interventions in the PRIME project. Some of the LMD project interventions are unique and do not fall into any of these categories. For instance, such interventions as provision of access to sexed semen or reduction of calving intervals are unique to the LMD project.

Figure 5. EBCRs, by intervention category



Stakeholder Impact Assessment

The main beneficiaries of the four projects are the targeted Ethiopian households (farmers and their cooperatives), the local communities (in the case of the PRIME project), labor involved in production, livestock and milk traders, private entrepreneurs, and the government of Ethiopia.

The households benefit from the value chains' overall improvement in productivity, which then allows the households to overcome the constraints that previously existed in the value chains and operate in a more effective and efficient manner. The total present value of the households' benefits, discounted at a 12 percent real rate of return, is estimated at US\$162.45¹⁰ million over an average evaluation period of 10 years. Family labor is treated as a cost of production in the CBA of all USAID interventions. There is no evidence of a significant difference between the financial cost of family labor and the economic opportunity cost of family labor in Ethiopia. The wages paid for family labor, however, remain within the families and hence increase these households' annual income.¹¹

In the case of the AMDe project, the households benefit from having access to improved varieties of seeds for production. The households also benefit from project-provided access to storage facilities to minimize post-harvest losses. Access to these storage facilities also allows the households to wait for better market conditions and sell part of their production when market prices are high. The absence of these storage facilities along with the households' desperate need for cash (i.e., to repay loan obligations right after the harvest seasons) now force the households to sell their production at the time of harvest season when market prices are at their lowest level. Access to storage facilities not only allows the households to wait to go to market until they can get better prices for their commodities but also lets them obtain part of their annual

¹⁰ The figure is calculated without the AMDe project, because the CBAs of some of the AMDe interventions were not finalized during the time of this study.

¹¹ The assumption is valid only if the alternative labor activities are not available for the family labor force.

income during periods of the year when income from agricultural activities is not usually available (i.e., during the drought periods).

Currently one of the main problems at the individual farmer level in Ethiopia is insufficient funds to start crop-production activities. During interviews with 15 women in Ethiopia, all of them argued that access to microfinance loans would be the best help that donors could provide to them. Some of the AMDe interventions are designed to provide or improve access to capital for the benefiting households. In addition, the targeted households benefit from interventions directed toward increasing the cooperatives' market share. The cooperatives' profits will eventually be distributed to the households in the form of dividends, thus increasing their income.

Low productivity levels characterize small-scale farming activities in Ethiopia, mainly due to households' inability to purchase modern inputs for production, such as improved seed varieties, modern beekeeping equipment, and irrigation pumps. The GRAD project provides households with access to financial resources (through loans) to enable them to purchase the required inputs for production. These inputs enable the households to increase their financial returns from ongoing activities or to start new types of agricultural production. In addition, the GRAD project provides training to households to help them increase their overall production efficiency. The beekeeping interventions are also perfectly suited for landless households or households that have very small land holdings.

The LMD project improves the livestock sector in the highlands of Ethiopia by eliminating a range of constraints, including the unavailability of reliable artificial-insemination services, the prohibitive cost of livestock feeding, the unavailability of sexed semen, and veterinary services. Eliminating these constraints significantly increases the returns at the household level.

The CBA of the PRIME project focuses on the interventions designed to provide households with access to industrial facilities for processing their main agricultural products.¹² Without these interventions, these facilities cannot exist in the pastoralist areas. The commercial abattoir facility allows the pastoralist households to have a stable market for their animals. In addition, the abattoir facility creates a demand for lambs and kids, which are traditionally not considered financially attractive to be sold at that stage. The market does not currently demand this category of small ruminants, and their high concentration also contributes to significant overgrazing in the area. The abattoir facility allows the destocking of lambs and kids and reduces the level of overgrazing. The abattoir facility also allows the households to significantly destock their herds during drought seasons and use the resultant financial resources to buy feed for the rest of the herd. The proposed milk-processing plant is the first facility processing camel's milk in Ethiopia.

The present value of the benefits to the participating PRIME milk and meat producers (farmers) is estimated at US\$11.34 million, discounted at a 12 percent real rate of return. In addition to increasing income for the dairy households, the facility also has a positive effect on the pastoralists' health status. Pastoralists consume milk throughout the day. Currently, the supply of pasteurized milk in the region is very limited. Local cafeterias mainly purchase raw milk, which is later "smoked" to increase its shelf life. Frequent electricity shortages and, in some instances, the complete absence of cooling facilities in local cafeterias negatively affect the quality of milk consumed. A domestic supply of pasteurized milk to some extent overcomes these quality issues.

¹² In addition to the analyzed interventions, the PRIME project also includes such interventions as vocational trainings and interventions designed to help the pastoralists who are currently moving away from pastoralism.

The private entrepreneurs benefiting from the PRIME project contribute 5 percent¹³ of the project's net income to the local community for constructing primary schools, educating local medical staff, opening small hospitals, providing scholarships for the best students, and so forth. In the case of the PRIME project, the local communities benefit because *both* projects—the abattoir and the milk-processing plant—contribute 5 percent of their net incomes for an estimated present value of US\$270,000, discounted at a 12 percent real rate of return. This 5 percent contribution is an economic benefit for the community and therefore has been factored into the analysis.

The establishment of industrial facilities under the PRIME project also creates new jobs, hence helping reduce unemployment in Ethiopia. These two projects create an additional 294 full-time labor positions, plus some labor is needed on a part-time basis. For instance, the abattoir facility hires additional labor for the periods when it operates a double shift (i.e., during the de-stocking interventions). The part-time labor requirements of the two projects are estimated at the average level of 20 percent of the annual full-time labor requirements. Hence, the creation of approximately 353 labor positions can be attributed to the analyzed PRIME interventions.

Livestock and milk traders benefit because of the increased quantity of live animals and milk sold. The present value of benefits to the livestock traders is US\$2.37 million, which they realize in addition to the required 12 percent return on their activities.

The PRIME project is focused in the pastoral areas of Ethiopia. The unstable political situation in the region and its close proximity to the border with Somalia have created a high level of riskiness for private investors, resulting in their unwillingness to invest in the region. For instance, although almost half the Ethiopian livestock population is concentrated in this region, the closest abattoir facility is located approximately 600 km away, close to Addis-Ababa. Although the situation in the region has significantly improved in recent years, private investors still require an abnormal rate of return on their investments to compensate for the risks associated with the venture. The PRIME project's investment-cost subsidy increases the return on the private investment, which helps investors mitigate their risks and allows them to engage in highly productive investments that yield high private returns as well as high economic returns to the country as a whole.

The government of Ethiopia benefits because of the increased tax revenues these interventions create directly and indirectly. The government of Ethiopia levies taxes directly on a range of inputs used in the production of the selected value chains. The increased demand for these inputs and income tax payments for some of the projects generate direct tax receipts for the government of Ethiopia.¹⁴ In addition, tax revenues are indirectly generated through the increased availability of foreign exchange. The increased exports of livestock products and crops, such as beef, honey, and pulses, allow the country to earn foreign exchange. Dairy products, such as cheese and powdered milk, are currently imported to Ethiopia in large quantities. The dairy-processing facility, for instance, would also produce butter and cheese as by-products of milk pasteurization. The increased domestic production of these products would reduce the number of imports, thus resulting in foreign exchange savings. The total present value of the government benefits for the GRAD, LMD, and PRIME projects is estimated at US\$27.38 million.

¹³ The 5 percent contribution is made by most of the local businesses operating in the region to a pooled fund that is spent for the local community's benefit.

¹⁴ The total direct tax flow of analyzed interventions as well as the amount of FEP generated is calculated and presented as government benefits in the stakeholder analysis section of this document. The net government benefits presented in the stakeholder analysis section of this document are derived after the deduction of FEP foregone for the purchase of importable production inputs as well as subsidies presented in the country's economy.

Critical Variables Subject to Change

The yield of cereal crops and the scale of improved-seed distribution are the most critical variables that the implementing partners and USAID should monitor under the AMDe project. In the case of the honey value chain, it is also important to note that the AMDe interventions are highly dependent on the implementation of other agricultural support programs in Ethiopia. The AMDe honey value chain interventions focus on the promotion of exporting Ethiopian honey, but the main constraints for this sector are limited honey production and the honey's poor quality. Other agricultural support programs being conducted in Ethiopia address these constraints, thus making the AMDe project directly dependent on the success of these programs.

The GRAD project also has a number of critical variables that need to be monitored. The total amount of loans obtained by any household must be sufficient for the purchase of the full range of inputs required for production. For instance, during the time of the analysis, the maximum loan amount available for the farmers from microfinance institutions (MFIs) was around US\$222.00, but most productive value chains, such as honey and vegetables, require loans of US\$444.00 to US\$556.00. The level of efficiency of training programs should also be monitored. The real yield of the commodities should be monitored over time, and the corresponding CBA models should be updated to more accurately reflect the outcomes of the interventions.

The LMD project's CBA is based on the specific targets to be achieved by the project, including:

1. the mortality rate of cattle in the highlands of Ethiopia, which the improved veterinary services should help reduce from the current 3 percent to 2 percent per year;
2. the calving interval, which can be reduced from 425 to 380 days through improvement in artificial-insemination services;
3. the number of households that have stable access to sexed semen via these artificial-insemination services;
4. the cost of animal feed, which should be reduced with the expansion in supply; and
5. the number of households that have access to financial resources to start the production of fodder or/and dairy farming using cross-breed cattle.

USAID should monitor the rate of production utilization of the abattoir facility and dairy-processing plant. These two PRIME interventions can go beyond the assumed 100 percent of total capacity (one shift per day for 300 days each year) to running two shifts per day, thus increasing the outcomes of the interventions, or they may fall below 100 percent of total capacity, thus reducing the returns from these interventions.

Sensitivity Analysis

Tables 3, 4, 5, and 6, below, present the key variables that have the most significant impacts on the outcomes of the interventions for the AMDe, GRAD, LMD, and PRIME projects, respectively.

Table 3. Key variables affecting the outcomes of the interventions of the AMDe project

Value chain	Key variables	Description
Maize, wheat, coffee, and honey	Yield	A change in the increased commodities' yield (maize, wheat, and coffee) strongly affects the interventions' financial and economic returns. The CBA shows that access to the improved varieties of seeds has a positive incremental impact on the households. The real increase in the yield of the commodities, however, should be monitored by the local implementer to ensure the intervention's success. The break-even coffee yield is 0.42 MT/ha versus 0.70 MT/ha as a baseline scenario, allowing for a 40% negative change in the coffee yield before the ENPV of the intervention becomes negative. The intervention in the maize value chain assumes a 43.3% increase in the commodity's yield due to the intervention. The threshold number for the maize yield is estimated at 23%. For the wheat value chain, the break-even point of the increase in the commodity yield is 40%, compared to the 56% proposed by the AMDe project. The honey yield would have to drop from 38kg/bee hive to 12 kg/bee hive to make the activity economically not feasible.
	Commodity price	The financial analysis is very sensitive to a decrease in the commodities' farm-gate prices. The training programs at the farm level should be carefully designed to stimulate the production of better-quality commodities, thus allowing households to obtain higher market prices for their products. The interventions' returns at the cooperative level are very sensitive to the commodities' market price due to the cooperatives' low profit margins.
Honey	Yield	Efficient honey production at the household level is possible only if the intervention comes as a complete input package. The two factors significantly affecting the honey yield that the implementing partners should control are: <ul style="list-style-type: none"> • access to financial resources sufficient for purchasing the proper equipment for modern beekeeping activities; and • proper training programs to ensure that the households are able to achieve reasonable quality and yields of honey. Any missing component in this package destroys the intervention by reducing its yields to the level of traditional beekeeping activities, thus erasing beekeepers' incentive to purchase modern beehives.

Table 4. Key variables affecting the outcomes of the interventions of the GRAD project

Value chain	Key variables	Description
Pulses and vegetables	Yield	Each commodity's yield within the pulses and vegetables value chains is a function of many factors. Access to improved varieties of seeds and proper training programs are the most important factors that the implementing partners of the GRAD project should monitor and control. The yield of onions would have to fall from the proposed 13 MT/ha to 9.5 MT/ha for the intervention to become financially unprofitable for the farmers. The average yield of the improved varieties of onion seeds in the region is 10 MT/ha, which is above the threshold number. The potatoes and tomatoes value chains' break-even points are 13.5 MT/ha and 9.2 MT/ha, respectively. The proposed interventions' yields of potatoes and tomatoes are 12 MT/ha and 19 MT/ha, respectively. The threshold yield for haricot beans is 1.0 MT/ha versus the proposed 2.4 MT/ha.
	Commodity price	The commodities in the pulses and vegetables value chains are internationally tradable goods that are greatly affected by world prices. Although world prices are beyond the control of the implementing partners, establishing strong market linkages between the producers and traders may reduce these price fluctuations and increase the likelihood of the interventions' successful outcomes.
	Drought frequency	In recent years, Ethiopia has faced an increase in the frequency of droughts. Such interventions as replicating and distributing drought-resistant varieties of seeds go a long way toward ensuring the success of the GRAD interventions and increasing their financial and economic benefits. The intervention in the GRAD vegetables value chains is designed to provide farmers with access to irrigation through the provision of pumps to help farmers cope with the frequent droughts in Ethiopia.
Honey	Yield	The two factors significantly affecting the honey yield that the implementing partners should control are: <ul style="list-style-type: none"> • access to financial resources sufficient for the purchase of proper equipment for modern beekeeping activities; and • proper training programs to ensure that households are able to achieve reasonable quality and yields of honey. Any missing component in this package lessens the intervention's payoff by reducing honey yields to the level of traditional beekeeping activities.
Meat	Price of live animals and cost of feed	The key assumptions underlying the analysis of the interventions in the meat value chain are the purchase prices of unfattened small ruminants and the selling price of fattened animals. The market price is the function of each animal's life weight. The implementing partners of the project need to carefully structure the feeding calendar to allow farmers to purchase animals when market prices are low and sell them during the holidays when market prices are at their peak. The loan repayment schedule should also be adjusted accordingly.

Table 5. Key variables affecting the outcomes of the interventions of the LMD project

Value chain	Key assumptions	Description
Dairy	Calving interval	The calving interval has a tremendous impact on dairy smallholders' financial returns. It is a function of many factors, including the availability of artificial-insemination services, the animals' nutritional status, and access to quality veterinary services. The sensitivity analysis shows that for this intervention, the calving interval is the most important factor in determining returns at the household level. The break-even calving interval for the dairy value chain intervention is 480 days versus the proposed 425 days.
Dairy/live animals and meat	Feed cost	The cost of feed accounts for 60%–70% of the total cost of livestock and milk production. Any increase or decrease in the total cost of feeding has a significant impact on the outcomes of the interventions and should be carefully monitored by the local implementing partners. An average increase in feeding cost of 25%–30% jeopardizes some of the LMD interventions.

Table 6. Key variables affecting the outcomes of the interventions of the PRIME project

Value chain	Key variables	Description
Meat	Cost of livestock	The cost of live animals is a key variable affecting the outcomes of the project. The project increases demand for livestock in the area, which results in upward pressure on livestock prices. However, significant increases in the price of live animals lower the financial rate of return of the commercial abattoir project unless production volume also increases. An average increase in the cost of live animals of 7% results in negative returns on investment for the private entrepreneur. To prevent demand pressures resulting in significant price increases, the abattoir facility purchases live animals from a diverse range of markets.
	Selling price of meat	The project mainly targets the export market. The prices of meat might fall for a period of time due to unforeseen conditions, such as livestock-disease outbreaks that lead to an embargo Ethiopian meat exports. The break-even point for the project to be profitable is 9% below the current international market price of beef.
	Livestock inventory	The abattoir facility maintains a significant livestock inventory in an attempt to stabilize the price of livestock inputs for the production. The high inventory level helps reduce the price risk but also imposes a significant cost on the abattoir's operations.
	Drought frequency	The establishment of the abattoir facility in the Somalia region by itself acts as an emergency response intervention during periods when drought hits the region. The CBA reveals strong financial incentive for the abattoir to run a second or even third production shift if the supply of live animals increases. During the drought seasons, pastoralists increase their sales of live animals and use the financial resources obtained to feed the rest of their herds.
Dairy	Export price of camel's milk	The milk-processing plant is the first in Ethiopia that targets the Somali people's preferences for camel's milk. This milk's current export price is very high because of its unavailability in the market. The price is likely to fall over time as the availability of camel's milk increases. This fall in the export price of milk down to the domestic price level results in an approximately 270% decrease in the private entrepreneur's FNPV. However, most of the pastoral dairy farmers' benefits remain, because the project's financial profitability for the private investor also remains.
	Quantity of camel's milk being exported	The CBA assumes that 40% of the pasteurized camel's milk is exported (an assumption taken from the feasibility study of the private entrepreneur). A significant drop in the quantity of camel's milk exported has a large negative

Value chain	Key variables	Description
		impact on the intervention's outcome.

Conclusion and Recommendations

Although the targeted number of beneficiaries and the general focus of the particular projects under the FtF USAID/Ethiopia portfolio are outlined in the proposals submitted by the implementing partners, the exact interventions, their implementation mechanisms, their estimated costs, and the nature of their expected benefits are frequently not defined at the beginning of the projects' implementation. This process of intervention definition often is completed several months after the implementation partner begins its work. For instance, the LMD project predicts that 200,000 households will benefit from the project, but the exact methods for achieving these benefits (i.e., the set of interventions) are still under evaluation by the implementing partner several months following the initial proposal, thus partially limiting this CBA's ability to derive precise estimates of the projects' net outcomes. Although the analysis is able to derive estimates of benefits per participating farmer, without explicit data regarding the number of farmers involved in the particular interventions and their total costs, it is almost impossible to derive estimates of their total net benefits. Hence, to have an impact on expenditure decision making, the CBAs undertaken by the FtF programs should be ongoing throughout the life of the projects.

The CBA finds that the **AMDe project** is of benefit to the targeted households as well as to the country's economy as a whole. The average ratio of the present value of the economic benefits to the present value of the cost of the interventions is US\$9.17 for every US\$1 invested, thus showing significant economic returns. The recommendations and drawbacks of the analyzed interventions are listed below.

1. Wheat and maize value chains:

- ✓ Private traders and cooperatives currently share the commodities market. The set of interventions focuses on increasing the proportion of the commodities marketed through Focused Cooperatives and Unions (FCUs), which has the side effect of reducing private traders' income by artificially pricing them out of the market.
- ✓ It is important to separate the net impact of different types of interventions to properly understand the picture. Such interventions as the provision of access to improved seeds and other inputs of production increase the productivity and competitiveness of selected value chains. By default, this increase is distributed between different value chain actors, including the private traders. The traders are the most dynamic link available to connect the farmers to the market. The interventions designed to increase the share of the market serviced by the cooperatives also increase the income of cooperatives and, hence, result in the increased income of the households through the distribution of dividends. However, some of those benefits are realized through reductions in private traders' income, which may not completely erase the project's net benefits but means that at least some of the money transferred to cooperatives and their smallholder constituents comes out of traders' hands.

- ✓ The interventions' joint impact may not lead to a negative change in the traders' income compared to the baseline situation (no interventions/status quo). Instead, it result in an allocation of the benefits of the productivity-increasing interventions that is more concentrated on the target group of beneficiaries.
- ✓ The benefits to the economy result from the increased production due to the corresponding interventions. The interventions that are designed to increase the market share serviced by the cooperatives do not by themselves help focus the direction of these benefits on the farmers, nor do they create any additional net benefits for the Ethiopian economy.¹⁵ In addition, because these benefits (such as increased payment of dividends) are spread over a large number of member households, the per-household impacts of both cooperative-focused interventions are relatively small.

2. Coffee value chain:

- ✓ Cultivating high-yield varieties of coffee based on the “model” farm approach promoted by the ministry of agriculture yields the highest FNPV when compared to farming traditional (low-input) high-yield varieties, but this model requires substantially more labor and physical inputs than the alternative low-input approach. In monetary terms, the high-yield model farm imposes a significant cash-outlay burden of around US\$1,000, equivalent to 20 percent of the potential total income of a typical Oromiyan household. This perhaps explains why there has been a low adoption or conversion rate to the model coffee-farming initiative. Ethiopia can reach more than twice as many farmers by offering financial and input support for the low-input approach, which yields a higher adoption rate and greater net benefits in comparison with present prevailing traditional practices.
- ✓ The design of the interventions with the objective of improving the traceability of the coffee sold at the Ethiopian Commodity Exchange (ECX) has been found to be ineffective. The proposed interventions for increasing coffee traceability focus on refining the ECX's grading precision, through which most coffee, except for coffee consumed in house, must be traded and exported by law. During field visits and discussions with many stakeholders at different levels of the coffee value chain, the study team found that traceability erosion occurs not because of ECX's imprecise coffee cupping and grading standards but rather because of ECX's treatment of coffee as a bulk commodity. Many aspects of ECX operations, from the information-clouding design of the coffee contracts available on the ECX trading floor to the way coffee shipments to ECX warehouses are stored in bulk, exacerbate the problem. In light of this information, the study team determined that the proposed interventions are misplaced and ineffectual in combating traceability erosion.
- ✓ The idea of storing coffee in silos rather than bags further exacerbates the loss of identity preservation and increases the risk of spoilage, together adding to the likelihood of price discounts. Both measures should be discouraged.

¹⁵ Transfer of resources within the economy does not result in any economic growth.

- ✓ Management policies with respect to bulk and first-in-first-out sales and delivery of coffee should be rethought to allow prospective buyers to trace the coffee supply. For a start, the ECX should consider allowing sellers' identities to be revealed in their ECX contracts on an optional basis. The shipments should also be stored separately to preserve the coffee's complete (spatial and business) identity, at extra storage or handling costs or an ECX commission fee. Sellers and buyers who find it advantageous to do so subscribe to these services, because they not only allow the sellers to earn premiums on high-quality coffee but also help overcome information asymmetry between smallholder farmers and traders. The latter acquire more bargaining power and thus earn higher incomes from their coffee.

3. Honey value chain:

- ✓ The Ethiopian honey sector's main constraints are the poor quality of honey produced through traditional beekeeping activities and the very limited quantities of honey produced that can meet export standards. Interviews with honey-exporting companies in different regions of the country reveal a high level of international interest in Ethiopian honey, but the main constraint of these exporting companies is the limited supply of raw materials. The Ethiopian honey-exporting companies' inability to deliver a stable supply to their customers is the main factor contributing to the Ethiopian honey sector's weak international reputation. The AMDe interventions' main focus is to stimulate honey exports.
- ✓ None of the AMDe honey value chain interventions has the objective of increasing production of high-quality honey. The main objective of the interventions is to divert honey sales from the domestic market to the export market. Significant financial resources are allocated for the promotion of Ethiopian honey in international exhibitions. Such promotions without the necessary ability to deliver the product to the international market may only contribute to the Ethiopian honey industry's weak reputation.
- ✓ The CBA team does not find any strong necessity to subsidize honey exporters to participate in international exhibitions. Honey-exporting companies in Ethiopia have adequate resources and a direct interest in participating in such activities.
- ✓ Although the scope of the AMDe honey value chain interventions is on agribusiness and the marketing component of a larger agricultural growth program (AGP), the Ethiopian honey sector's status quo makes the AMDe program highly dependent on the success of the other AGP components. If the AGP supports to promote domestic honey production fail, the AMDe's potential success is jeopardized.
- ✓ The general recommendation, therefore, is to move funds from the interventions designed to promote honey export toward agribusiness support in the form of technical assistance in disseminating modern beekeeping techniques to small-scale honey producers. Currently, most of the Ethiopian honey-exporting companies purchase raw materials from particular regions of the country and provide technical and financial support to the supplying households. Agribusiness support in this area is likely to produce better results.

The **GRAD** interventions' CBA reveals that the average economic returns of the project are below the average of the remaining three projects. However, this number is offset by the fact that the GRAD project primarily targets chronically food-insecure people. The GRAD project's average EBCR is estimated at US\$7.17 per US\$1 invested. The main conclusions, recommendations, and drawbacks of the project are listed below.

1. Vegetables value chain:

- ✓ The analysis reveals that the most promising interventions among the GRAD project are in the vegetables and honey value chains.
- ✓ The loan size currently available for the targeted households is not sufficient to purchase the full range of required inputs for the production of vegetables (potatoes, onions, and tomatoes). The maximum loan amount available for new clients from MFIs is limited to US\$222.22. The loan size required for the project to be successful is estimated at US\$499.72, US\$596.11, and US\$561.94 for the potato, onion, and tomato value chains, respectively. Taking into consideration that the main targeted group of households is chronically food insecure, it is impractical to assume that they have the funds needed to make an equity contribution. Therefore, the loan size should be increased for these three value chains. For instance, one of the main inputs for vegetable production is an irrigation pump. The CBA assumes that four farmers share the pump, which is the optimal scale of sharing taking into consideration the cost of the pump and weather conditions in Ethiopia. However, if the number of farmers sharing the pump increases in an attempt to reduce the required loan size/household, some of them have access to the pump only after the optimal timing for the planting/irrigation of vegetables. This situation lowers the average returns per household and creates conflict within the group.
- ✓ The CBA team also reveals that estimated yields of vegetables used by the GRAD project's implementing partners in the investment plan are abnormally high when the agricultural systems of Ethiopia are considered. These high estimations create an inflated value for the benefits accruing to the households.
- ✓ This overestimation of the benefits to the households and the reduced loan size cause an incorrect proposed loan structure for the households. The CBA shows that the loan repayment period should be expanded from 1 to 3 years, with a grace period of 5 months, along with the loan size to enable the households to successfully cover their debt obligations; otherwise, the credit history of the households may be at risk, which then prevents them from obtaining new loans. The CBA team has designed and proposed a new loan structure.
- ✓ Interventions in the GRAD vegetables value chain also assume that the households obtain pumps for production from government support programs, such as the Households Assets Building Program (HABP). Pumps are one of the most critical inputs, so making this assumption imposes a significant risk on the interventions' outcomes.

2. Livestock value chain:

- ✓ High livestock feed prices characterize the Ethiopian livestock sector. The high cost of livestock feed concentrates makes it unprofitable to fatten animals (small ruminants) when inexpensive feed ingredients, such as crop residues, are not available.
- ✓ The initial proposal in the GRAD project's investment plan for the livestock intervention includes four annual rounds of fattening small ruminants, which are not consistent with Ethiopian households' current practice of two fattening rounds per annum.
- ✓ The original structure of the intervention proposed by the implementing partner results in negative economic and financial returns at the household level. The original structure of the intervention assumes that the households have four fattening rounds per year with almost no usage of feed concentrates. The main source of feed is assumed to be grass available around the farmers' houses. It is also assumed that such a fattening structure allows the small ruminants to gain around 300 grams of live weight per day. However, when the cost of an appropriate feed ration that does allow such a live weight gain is factored into the analysis, the financial and economic returns of the activity become negative. The original investment plan has since been adjusted to be consistent with the households' ongoing practice. The analysis reveals that any positive impact on the households' livelihood occurs only when the free-grazing feeding scheme is possible. The implementing partners therefore should carefully design the feeding calendar, taking into consideration regional climatic conditions.

3. Honey value chain:

- ✓ The CBA indicates that producing honey via modern beekeeping technologies is one of the most promising interventions in the GRAD project. The estimated annual real increase in the targeted households' incomes is equal to US\$276.94, ranking third after interventions in the onion and potato value chains.
- ✓ Honey production also does not change the patterns of land usage and hence is perfectly suitable for landless households. This intervention is also a good substitute for the interventions in the meat value chain that yield negative results.
- ✓ The loan size, however, should be enlarged to allow the households to purchase the appropriate beekeeping equipment. The sufficient loan size is estimated to be US\$388.89. The CBA indicates that households have sufficient net cash flows to meet their debt obligations if the loan size is expanded.

4. Pulses value chain:

- ✓ The CBA indicates that the intervention in the white pea beans value chain yields a significantly higher net increase in households' annual income as compared to the interventions in the red haricot beans value chain (i.e., present value of net income of US\$172.11 versus US\$9.59).
- ✓ There is little demand for the domestic consumption of white pea beans at the household level; the main market for this commodity is the export market. The high volatility of the international prices

of the white pea beans and the limited domestic demand impose significant risks on the outcomes of the intervention. It is therefore recommended that the GRAD households producing white pea beans be linked to the exporters and that strong seasonal contractual arrangements be designed to stabilize the price of outputs for the households.

- ✓ The structure of the GRAD interventions in the pulses value chain assumes that the main supplier of the improved varieties of seed is branches of the Ministry of Agriculture (MoA). However, the field visits revealed that although the seeds are available at the MoA offices, the quality of these seeds is highly questionable, because improved varieties of seeds are frequently mixed with poor-quality seeds. It is therefore recommended that alternative and more reliable sources of improved seeds be found for the GRAD households.

The **LMD project**'s CBA shows that the potential interventions, if properly structured, result in significant economic returns. The average ratio of the present value of economic benefits to the present value of the cost of the interventions is estimated at US\$7.20 per US\$1 invested.

The implementing partner of the LMD project has stated that the project's focus is not on the production side of the value chain. Taking into consideration, however, that the main targeted beneficiaries of the USAID FtF program are the households, the program needs to create a positive change in some of the key technical production coefficients. Such a positive change, whether directly on the production side, policy side, or market side, is necessary to improve Ethiopian households' livelihoods. Therefore, the project's key milestones should focus on a range of production coefficients or cost variables in the value chains that determine the economic returns at the household level. The CBA team has not observed such milestones being formulated for monitoring the projects' outcomes. The main conclusions of the potential LMD interventions' CBA are as follows:

- ✓ The most promising interventions are in the feed and artificial-insemination services sectors. Any improvement in the status quo of these sectors will have a major impact on the livelihood of the targeted smallholders.
- ✓ Limited effort should be spent on the interventions directed toward minimizing milk losses and reducing interest rates on loans at the household level. The sensitivity analysis indicates that the current milk losses have only a small impact on the financial returns at the household level. The interest rate on loans from MFIs is highly subsidized by the government of Ethiopia and far below the ongoing market interest rate. The loan size, however, is very limited, frequently forcing the households to look for alternative sources of financing.
- ✓ The CBA shows significant potential for livestock-fattening activities (fattening of large ruminants)¹⁶ to improve incomes at the household level. The scarcity of livestock feed at attractive prices prevents many households from participating in this activity. The interventions designed to reduce the cost of feed yield increased incomes for the households and increased livestock exports from the country.

¹⁶ The LMD meat value chain's CBA focuses on cattle fattening and indicates the activity's profitability if it is structured properly. The returns on the cattle fattening are significantly above the returns of small ruminant fattening, but the input cost is high as well.

- ✓ The interventions designed to give access to loans sufficient for the purchase of the inputs required to start livestock-fattening activities are very promising. Many of the farmers interviewed perceived these cattle-fattening activities as a full-time employment opportunity during the period when crop production is not possible. Most of the farmers preserve crop residues from their harvests. The quantity of this residue and the financial resources available are the main factors determining the quantity of livestock purchased for fattening. However, small-scale farmers usually lack the financial resources to purchase more than one animal for consequent fattening. Access to finance thus allows them to increase their scale of production.
- ✓ Cross-breed cows greatly increase the level of milk production. It is highly profitable for the farmers to introduce cross-breed heifers and raise them as milk-producing cows. The LMD project should link dairy farmers and the private sector to enhance the supply of such cross-breed animals to the dairy farmers of Ethiopia.
- ✓ The interventions designed to provide access to sexed semen significantly increase the income of the households and the economic returns of the dairy farmers in Ethiopia.

The **PRIME project**'s average economic returns are greater than those of the AMDe, GRAD, and LMD projects, with the average EBCR estimated at US\$13.19. However, due to the very early stage of the PRIME project, in this CBA, only two of the PRIME interventions are analyzed. In addition, both interventions depend on co-financing with the private sector. The main findings and conclusions are as follows:

- ✓ The analyzed projects are first-movers in the area, particularly in the case of camel's-milk processing in Ethiopia. The first-mover advantage is commonly offset by the higher risk levels associated with uncertainty about the commodity market. In the case of the PRIME project, the milk-processing plant intervention has a strategic character: If it succeeds, it creates a new country-wide market for pasteurized camel's milk. Taking into consideration the huge population of camels in the pastoral areas of Ethiopia, this may eventually make a significant contribution to the economy of the country. A USAID subsidy that contributes an average of 30 to 35 percent of the total investment cost significantly reduces the risks borne by the private investors associated with this investment.
- ✓ In addition to the risks associated with an introduction of the new product, the pastoral areas (Jijiga city, Ethiopia) have been characterized as politically unstable regions due to their close proximity to the border with Somalia. The projects, if successful, demonstrate to the private sector that the situation in pastoralist areas has changed (i.e., has become profitable and politically stable) and then should attract other private investors, to the pastoralists' benefit.
- ✓ Because of the significant risk of introducing a new product (pasteurized camel's milk) at a relatively high price, the strategy to moderately enhance the private milk-processing plant appears to be most prudent.
- ✓ The commercial-abattoir project appears to be very promising, because it provides a market in which to sell an abundance of livestock. Previously, farmers in the region have faced an uncertain market for live animals. The pastoral area is characterized by its huge concentration of small ruminants with live weights of 18 to 20 kg. Although this category of small ruminants is highly

demanded in the international market, traders prefer to purchase animals with live weights of 30 to 35 kg due to their significant weight losses as well as high mortality rates when transported for slaughter to distant locations or to neighboring countries. In addition, livestock traders from neighboring countries dominate the livestock markets. Field visits revealed that the pastoral households frequently complain that foreign traders manipulate the livestock prices through speculation. For instance, traders may start purchasing small quantities of the livestock at high prices while waiting for the general daily-market price level to increase. As soon as all alternative buyers leave the market due to the high prices, traders lower the prices even below the initial level, making significant profits. In such a market system, the presence of a stable domestic livestock purchaser (the abattoir facility) directly benefits the small-scale livestock producers.

- ✓ A major drought happens approximately every 10 years in the area. Due to climate changes, these incidents of drought may become more frequent. The establishment of a commercial abattoir in the region allows the households to increase their commercial off-take during the drought years and significantly reduce their losses during such times.
- ✓ The CBA reveals that during the drought seasons, it is profitable for the abattoir facility to increase its purchases of live animals, even without reducing the price paid per kilogram of live weight. Hence, the destocking programs at the abattoir level may run without USAID involvement. The abattoir facility is also maintaining a significant quantity of land to produce fodder. The private investor plan is to exchange the fodder for the live animals during the drought seasons should the facility face a shortage of working capital to increase its livestock purchases.
- ✓ The abattoir facility also creates demand for the lamb and kid categories of small ruminants. The market does not currently desire this category of animals, and a high concentration of lambs and kids in the area contributes to significant overgrazing. Destocking these animals therefore also reduces the level of overgrazing in the area.