This synthesis study was prepared by Jeni Klugman (task leader) drawing on a range of work and background contributions, with Paul Dorosh playing a leading role, together with Josef Loening. The team worked closely with colleagues from the Economic Development Research Institute (EDRI), coordinated by Hashim Ahmed, a team from the Addis Abada University led by Dr Mulat, the World Food Program (WFP), and the International Food Policy Research Institute (IFPRI), and consulted with donors and the IMF, through meetings coordinated by DFID. A series of valuable background papers were commissioned from local and international institutions, listed above, together with the engagement of development partners. The contributions of Mesfin Bezawagaw were invaluable and enabled finalization of the report. Senait Kassa Yifru provided excellent support throughout. Ishac Diwan and Kenichi Ohashi helped to guide the work. The financial support of the Canadian, British and US governments is gratefully acknowledged.
CURRENCY EQUIVALENTS
(as of July 10, 2007)
Currency unit = Ethiopian Birr (ETB)
US$1 = Birr 9.0311 [this should be updated to December]

FISCAL YEAR
July 8 – July 7

WEIGHTS AND MEASURES
Metric System

LIST OF ACRONYMS

AAU Addis Ababa University
BOP Balance of Payment
CPI Consumer Price Index
CSA Central Statistical Agency
DA Development Agent
DPPA Disaster Prevention Preparedness Agency
EC European Community
EDRI Economic Development Research Institute
EGTE Ethiopian Grain Trade Enterprise
FAO Food and Agricultural Organization
GDP Gross Domestic Product
GoE Government of Ethiopia
HICES Household Income Consumption Expenditure Survey
IFPRI International Food Policy Research Institute
IMF International Monetary Fund
MOARD Ministry of Agriculture and Rural Development
MOFED Ministry of Finance and Economic Development
NBE National Bank of Ethiopia
PASDEP A Plan for Accelerated and Sustained Development to End Poverty
PSNP Productive Safety Net Program
SNNPR Southern Nations, Nationalities and Peoples’ Region
US United States
USAID United States Agency for International Development
VAT Value Added Tax
WFP World Food Program
WMS Welfare Monitoring Survey
Table of Contents

LIST OF ACRONYMS ................................................................................................. i
EXECUTIVE SUMMARY ......................................................................................... V
I. INTRODUCTION ..................................................................................................... 1
II. KEY FEATURES OF GRAIN MARKETS IN ETHIOPIA .............................................. 5
   Marketed output has been increasing................................................................ 7
   Regional differences in food price inflation are limited........................................ 7
   Opportunities for international trade................................................................... 8
   Recent survey findings on food price developments: Etheya, Yetmen & Bako ........ 12
III. METHODOLOGICAL APPROACH ........................................................................ 16
IV. TESTING THE INITIAL HYPOTHESES ................................................................. 21
   1. Excess Demand ................................................................................................. 21
   2. Trade Effects: Export Diversification ............................................................... 22
   3. Monetization of Food Aid ................................................................................ 23
   4. Farmer and marketing behavior – co-operatives and credit .............................. 26
V. SIMULATION RESULTS ........................................................................................ 29
   Analysis of Changes Trends in Real Prices, 2002/3 – 2005/6.................................. 29
   Analysis of Changes in Real Prices, 2005/6- 2006/07 ........................................... 30
   Simulated impacts of the PSNP on real grain prices ......................................... 33
VI. WELFARE IMPACTS .......................................................................................... 34
   Consumption of Major Cereals .......................................................................... 34
   Price Changes and Household Welfare: Total Food Expenditures ................. 35
   Concentration Curve Analysis ......................................................................... 38
   Summary ............................................................................................................. 41
VII. EMERGING CONCLUSIONS, AND POLICY IMPLICATIONS ............................. 42
   Policy Implications ......................................................................................... 43
   Next Steps ....................................................................................................... 45
REFERENCES ............................................................................................................ 46
ANNEX 1. Measurement of the Consumer Price Index in Ethiopia, and Recent Revisions ...... 49
ANNEX 2. Estimating Crop Production in Ethiopia .................................................... 52
ANNEX 3. Trend, Seasonal and Random Components of Movements in the Consumer Price Index ............................................................................................................. 56

List of Boxes

Box 1: Estimating Crop Production in Ethiopia .......................................................... 6
Box 2: Price Trends in International Cereal Markets .................................................. 10
Box 3: Recent Central Actions to Curb Money Growth and Inflation ......................... 17
Box 4: Response of Central Banks to Persistent Inflationary Pressures: Recent International Experience .................................................................................................. 18
Box 5: Do Food Prices Overshoot in Ethiopia? ......................................................... 19
Box 6: Use of cash transfers by PSNP beneficiaries ..................................................... 24
Box 7: Traders view on the impact of PSNP ............................................................. 25
Box 8: Trends in Livestock Prices ........................................................................... 30
Box 9: Summary Overview of Household Welfare and Food Price Change Literature ............................................................. 36
List of Figures

Figure 1: Rapid Food Price Increases, 2000-07 ................................................................. 1
Figure 2: Growth in Grain Production and Cereals Prices, % .............................................. 2
Figure 3: Real Growth Trends of Major Sectors of the Economy (EFY) ............................... 3
Figure 4: Cereal Production: Area under Cultivation, and Yields (Base year=2003/4) .......... 5
Figure 5: Comparison of CSA and WFP/FAO Cereal Production Estimates ....................... 6
Figure 6: Food Inflation Trends, by Region ........................................................................... 8
Figure 7: Ethiopia Domestic, Import and Export Parity Prices for Wheat, 1998-2007 ............ 9
Figure 8: Ethiopia Domestic, Import and Export Parity Prices for Maize, 2000-07 ................ 11
Figure 9: Cereal Prices in International Markets, 2000-2007 ............................................ 12
Figure 10: Real Price Trends, 2000 – 2007 ......................................................................... 20
Figure 11: Ethiopia: Expansion of Area Planted by Crop, 2003-2007 ................................. 23
Figure 12: Food Aid Delivery and Disbursement (in ‘000 metric tones) ............................... 25
Figure 13: Credit Access Trends ......................................................................................... 28
Figure 14: Teff Market—Price Effects of Shifts in Supply and Demand ............................... 31
Figure 15: Effects of PSNP 2005-06: Cash vs Equivalent Food Aid Transfer ....................... 33
Figure 16: Per Capita Cereal Consumption by Region, 2000 ............................................. 34
Figure 17: Net Seller and Buyers of Grain Among Farmers .................................................. 35
Figure 18: Impact of Food Price Increases .......................................................................... 37
Figure 19: Concentration curve for cereals: rural areas 1994-2004 ..................................... 39
Figure 20: Concentration curve for cereals: urban areas 1994-2004 ................................. 40
Figure 21: Non-parametric estimates of effect of relative prices on rural consumption, 1994-2004 ................................................................. 41
Annex Figure 1: Comparison of CSA and WFP/FAO Cereal Area estimates ....................... 54
Annex Figure 2: Comparison of CSA and WFP/FAO Cereal Yield estimates ....................... 54
Annex Figure 3: Ethiopia: Decomposition of Changes in the National Food and Non-Food CPI, 1997-2007 ...................................................................................... 57

List of Tables

Table 1: GDP by Economic Activity at Constant Prices (million birr) .................................. 3
Table 2: Expansion of Road Infrastructure in Ethiopia, 1997-2006 ...................................... 7
Table 3: World Bank Commodity Price Forecasts through 2015 ......................................... 10
Table 4: Household consumption habits and perceptions about wellbeing, self-reported .... 15
Table 5: Ethiopian Aggregate Price inflation, (percent) ......................................................... 16
Table 6: Changes in monetary stance in selected countries since 2005 .............................. 17
Table 7: Real Prices of Major Cereals: 2003-06 ................................................................. 20
Table 8: Merchandise Exports (in millions of US$) ............................................................. 22
Table 9: Own Price and Income Elasticities of Demand ....................................................... 29
Table 10: Supply, Demand and Real Prices of Major Cereals, 2003/04 to 2005/06 – Simulated and Actual Results (Trend Growth Rates) ........................................................................ 30
Table 11: Simulations of Increased Production and Effect on Price ..................................... 30
Table 12: Simulations of Increased Production and Effect on Price: Alternative Specifications .............................................................................................................. 33
Table 13: The Importance of Grain in Household Expenditures, 2004 .................................. 35
Table 14: Commodity expenditure shares in urban and rural Ethiopia: 1994-2004 ................ 38
Annex Table 1: Number of markets covered and basket of commodities by region .......... 50
Annex Table 2: Major groups in the 2000 and 2006 based CPI and weights at the country level ...... 51
Annex Table 3: Food Price Inflation in Ethiopia, 2003-2006 ............................................. 58
Annex Table 4. Estimated income elasticities, from concentration curves: rural areas .... 58
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Abebe Shimeles and Andinet Delegn, *Inflation and the Poor in Ethiopia*.

Ahmed, Hashim (2007c), *Structural Analysis of Price Drivers in Ethiopia*.

Diao, Xinshen, *Using an Economy-Wide Multi-Market Model to Analyze Ethiopia’s Food Price Inflation*.

Dorosh, Paul and Ludovic Subran, *Food Markets and Food Price Inflation in Ethiopia*.

Gray, George, *Estimating Crop Production in Ethiopia*.


Mulat Demeke, et al., *Findings of the survey in Bako, Yetmen and Eteya on food price developments*, Economics Department, Addis Ababa University.
EXECUTIVE SUMMARY

Since 2004/5, high inflation has become a significant concern in Ethiopia, and shows no signs of abating in 2007. In the latest official inflation figures for October 2007, the 12-month annualized national rate has reached almost 18 percent, with price increases continuing to be broad-based—food increasing by 18 percent and non-food items by 16 percent. This appears puzzling, because national crop output has also increased significantly over the same period. More recently, international commodity prices have also taken off.

At the request of the Ethiopian authorities, analysis was undertaken by Bank staff in collaboration with EDRI and local researchers to study the nature and causes of rises in grain prices, focusing on structural factors. Our methodological approach uses changes in real prices, that is, the prices of teff, wheat and maize, relative to changes in overall prices. We found that medium-term trends in real prices of wheat, maize and teff are broadly consistent with official figures on supply, and estimated increases in demand due to population and per capita income growth. The exception is the large increase in teff prices in 2006-07 (in both nominal and real terms), which remains a puzzle given that at observed market prices; officially reported supply exceeds estimated demand. It is possible that increases in private/cooperative stocks (made more attractive by negative real interest rates on credit) may have played a major role in price seasonality and overall price movements in 2006-07. It is nonetheless the case that these real price increases in teff, while visible to the population, represent only a small part (about 5 percent) of overall food price inflation.

We investigate several hypotheses, and find:

- The partial shift from food aid to cash transfers as part of the PSNP has had positive, but not large, effects on market prices for farmers. However, even together with food transfers, the total size of the program in 2006-07 is only about 1 percent of GDP. Assuming about two-thirds of transfers in-kind is imported food; the net effect of increased supply of cereals plus increased demand because of higher household incomes is an insignificant increase in food prices (less than 0.5 percent).

- The activities of cooperatives may be affecting the structure of the market and improving the bargaining power of farmers (especially in the teff market).

- Global factors are unlikely to directly affect domestic prices in the short to medium run, since Ethiopian prices are below import parity, and based on international forecasts through 2015 for wheat and maize, are likely to remain so.

- The domestic supply is likely to run behind demand in a high growth context, especially since production increases have been driven by area expansion, and trends in yields remain disappointing, further increases in relative prices are likely.

We found evidence of increased marketing of grain production. However agriculture markets in Ethiopia are generally underdeveloped and competition is limited. The private sector is not currently in a position to take the risks involved in purchasing, storing and marketing grain, particularly if food aid purchases and deliveries are unpredictable. The newly introduced commodity exchange is intended to help address these issues.
We also examine the welfare impacts of grain inflation. This is complex, especially for rural households, given the simultaneous production and consumption decisions inherent in their livelihood systems, and the responsiveness of consumption decisions to price and incomes. Nevertheless the micro analysis based on the HICES and urban panel data, suggests several important findings.

- Overall, rises in the relative price of food tends to benefit rural households, though the exact magnitude needs to be investigated further.
- Changes in the prices of teff, wheat and maize tend to affect more the people at the higher income quintile in rural areas, while in urban areas they tend to affect those at the lower income quintiles.
- The recent hike in relative prices has increased the urban cost of living by 8-12 percent in urban areas.
- Inflation could worsen urban income inequality significantly.
- Demand for teff, maize and wheat tends to be elastic, with evidence of substitutability, especially between teff and wheat. In urban areas, all three types of cereals tended to be necessities, with inelastic price responses.

Policy Implications

The policy implications relate largely to the structural and institutional agenda which affect agricultural development in Ethiopia. These can be summarized as follows.

- First is the importance of sound monetary policy in the context of maintaining Ethiopia’s record of macro-economic stability. While recent measures adopted by the authorities on this front are encouraging in this respect, given the importance of inertia and inflationary expectations, further measures and some time may be needed to offset the current momentum of rapidly rising price levels. The authorities are already working with the IMF to review additional measures that might be needed to maintain a stable macroeconomic framework and overall growth objectives. Possible further measures include containing public expenditure, issuing more T-bills to mop up liquidity, and further tightening of monetary policy.

- Second, negative real interest rates in official credit markets are likely to distort storage, marketing and investment decisions. Negative real interest rates could thus reduce marketed supply, and also boost house prices and renting costs, both which are observed in Ethiopia. ‘Enhanced financial services for accelerated growth’ is already a key pillar of the PASDEP (pillar XVI). This agenda includes actions to improve financial sector regulation and supervision, improving the payments system and gradually increasing domestic interest rates to support savings, and will be supported by, among other things, the World Bank’s financial sector capacity building operation, effective in 2007.

- Third, we find that policy-induced barriers to private trade (e.g. import tariffs, restrictions on credit and level of stocks, VAT on large sales of milled grain, and uncertainty regarding government policy) add to costs and risks for private traders and prevent Ethiopia from taking advantage of private sector imports as a means to avoid price spikes. While international commodity prices are presently high and expected to remain so in the medium term, this remains a major longer term issue to be addressed.
- Fourth, we highlighted the need for policymakers to account for potential price impacts of future changes in supply of food aid. This dialogue can be linked to discussions around the PSNP.

- Fifth, a coordinated strategy developed and implemented in partnership with the private sector to foster greater private storage of grains in cooperation with food aid agencies, together with the recently established Commodity Exchange, for a select group of commodities, with its associated institutions, such as the use of warehouse receipts, should help smooth prices in the future.

- Sixth, targeted measures to compensate adversely affected households, like those which have already been initiated for wheat in urban areas, could play a role in alleviating adverse impacts, although success in addressing inflation more generally will have larger payoffs.

Finally, but certainly not least, the analysis drew attention to a fundamental long term challenge for Ethiopia, and that is the likely limits on future area expansion, that in turn will slow growth in food production in the absence of significant yield improvements.

While recent growth in agricultural output has been impressive, the rural agenda remains large, and overall progress has been disappointing especially in enabling improvements in agricultural productivity. Subsistence agriculture on small plots of land with limited irrigation and fertilizer use remains the predominant farm model. This is coupled with severe environmental degradation in many parts of the country, which is a major drag on productivity, and high climatic variability and thus vulnerability to recurrent weather shocks.

The PASDEP emphasizes, among other things, private sector involvement in agricultural production and better resource management (pillar II), including irrigation (VII), and includes targets related to increased labor and land productivity, production of cereals, livestock value-added and medium and large scale irrigated land. Among the expected areas of progress are better functioning input markets (including import and financing rules, role of private sector), strengthened role of MFIs and rural finance, progress on the land certification action plan (phases 1 and 2) and the expanded extension system working on an innovative and demand driven basis.

**Next Steps**

This study sheds some light on the challenges facing policymakers in Ethiopia, but much remains to be better understood. Informal discussions among the WFP, EC, and IFPRI have helped to identify further analysis to inform a better understanding of grain markets and help strengthen policy and operational decision-making, including changes in consumption patterns, commercialization, and storage and trade flows and cereal value chains.

The emerging agenda highlights the need to deepen the focus of policymakers on underlying medium term structural issues, which are mostly broader than the operation of grain markets per se. Priorities for further analysis relate to such basic issues as the rural-urban transformation, including public investment policies related to growth corridors and the development of small towns and road infrastructure linking rural areas with urban centers, and the agenda around improving agricultural productivity; work on issues related to crop marketing, generating and sharing timely market information with traders, and other aspects related to agricultural market efficiency to understand price stickiness and behavioral factors; and follow up on the recent review of ARD public expenditure, to assess its effectiveness and impact on increased agriculture productivity. Progress on these fronts would help to address the structural challenges facing Ethiopia in sustaining rapid growth.
I. INTRODUCTION

1. Over the past three years, food price inflation in Ethiopia has been persistently high, and overall inflation has been in double figures (Figure 1). While the spike in 2002 can be broadly explained by the drought-induced output shock that year, over the period as a whole, food price – and in particular grain price – trends present a puzzle in several respects. Crop output has reportedly grown at an average of 23 percent over the period 2004-2006, yet food price inflation has averaged 11 percent and more specifically, grain price inflation 12 percent (Figure 2).\(^1\) This is a serious concern for policy-makers, not least because the poor spend most of their income on food, and are adversely affected by rising prices. Even in rural areas, it is estimated that about half the population are net buyers of food.

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Figure 1: Rapid Food Price Increases, 2000-07

Source: Staff estimates based on official data.

---

\(^1\) Annex 1 provides a methodological overview of CPI measurement in Ethiopia. The analysis in this note uses the macro economic data based to December 2000. See also http://dsbb.imf.org/Applications/web/gdds/gddscountrycategorydcreport/?strcode=ETH&strcat=PCPI0.
2. Alongside maintaining macro-economic stability, the development challenges facing Ethiopia are daunting. High population growth, low productivity and dependence on unreliable rain and structural bottlenecks all pose challenges for sustaining the rapid growth that is needed to reduce widespread poverty. Growth remains the overriding objective of the Ethiopian Government. On this important front, the recent record has been strong. Since recovering from the severe drought shock of 2002/03, the economy has registered several consecutive years of robust real growth. Beyond this, there has been encouraging progress in improving many other material aspects of wellbeing in Ethiopia, and several indications that the economy is also going through major structural changes.

3. Recent growth has been broad-based, with agriculture providing a major driver (Table 1 and Figure 3). Over the three-year period (2003/04 – 2006/07), the average real growth rate for agricultural value-added was 13 percent, while performance in the non-agricultural sectors was also strong in historical terms: for manufacturing, 10 percent, and public sector education and health sectors, 12 and 11 percent respectively. A distinguishing characteristic of recent growth has been the strong role of private consumption, compared to the pattern of the 1990s where the public sector tended to play the leading role.

Source: Staff estimates based on official data.
Table 1: GDP by Economic Activity at Constant Prices (million birr)

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</table>

Source: MOFED.

Figure 3: Real Growth Trends of Major Sectors of the Economy (EFY)

Source: Staff estimates based on official data.
4. During the period since this study was first requested by the Ethiopian government, inflation has become a global problem. At the global level, inflation has risen both because of supply side issues (ethanol, crop failures, speculation, rise in crude oil prices which affect transportation cost) as well as demand side factors (global boom). We take this context into account, although our analysis suggests that, at present, the "pass through" to domestic prices in Ethiopia is small. At the same time, it is useful to bear in mind that many developing countries are facing the policy challenge of addressing high inflation.

5. The issue of food price inflation has attracted rising concern in the national media and among policy makers, academics and of course the public at large, as well as among development partners. This study was undertaken in response to specific request to the World Bank from the Government of Ethiopia, and was carried out in close collaboration with local partners, in particular EDRI and AAU staff, and international partners including IFPRI and WFP. It builds on an initial phase in early 2007, which provided a rapid assessment of drivers of high food inflation, and in particular a report by AAU team summarizes evidence and prioritizes hypotheses to be tested through further analysis. The financial support of the Canadian, British and US governments to finance additional diagnostic work is gratefully acknowledged.

6. The structure of this note is as follows. We review the key features of Ethiopian grain markets, before laying out a basic methodological approach to analyze the drivers of inflation, followed by a review of the relative importance of different explanatory factors on the demand, supply and marketing sides. We then turn to explore the impacts of food price changes on households, drawing on the most recent household data available. The final section highlights emerging policy conclusions.
II. **KEY FEATURES OF GRAIN MARKETS IN ETHIOPIA**

7. Ethiopia’s grain markets have attracted a wealth of research and analysis over time, given their centrality to the economy, and the emphasis on agricultural production in the government’s growth strategy. This note does not seek to do justice to all the literature on grain markets, but is limited to reviewing key recent developments that are potentially relevant to price movements, and a closer examination of real price trends. We examine trends in production and yields, regional differences in inflation, and the role of international trade. We rely largely on official data, in particular CSA data on prices and production, the national Household Income and Expenditure Survey (HICES) and macro-economic data from the Ministry of Finance and Economic Development (MOFED) and the National Bank of Ethiopia (NBE). We complement this with the results of specially commissioned surveys and focus group work in selected grain growing regions, along with other data on domestic prices (from the Ethiopian Grain Trading Enterprise, EGTE) and international prices (from the Food and Agriculture Organization and other sources).

**Production has been rising**

8. There have been large increases in Ethiopia’s cereal production since 2002. The total production of cereals has recovered and grown since the 2002 drought, primarily driven by large increases in area under cultivation (Figure 4). There have been increases in average cereal yields, but to a lesser extent. For 2006-07, preliminary estimates of yields are 16 percent higher than yields in 2001-02 (the crop year before the drought).

**Figure 4: Cereal Production: Area under Cultivation, and Yields (Base year=2003/4)**

Source: Staff estimates based on official data.

9. Accurate production estimates are a critical underpinning of reliable analysis of economic trends in Ethiopia. There are three different sources available, which for the past several years reveal different results (Figure 5). The general trend is similar, but to markedly different extents, in particular, the WFP/FAO production figures are consistently higher; and the Bellmon analysis was typically the most conservative FN one exception is 2006 when Bellmon estimates actually exceeded CSA data. This may be explained by a change in the reference years used in the last Bellmon survey.
A review of the methods and results over the past several years suggests that the CSA methodology of crop estimation and forecast is potentially the most accurate, timely and cost-effective technique for estimating production on a regular basis. However although there are some concerns about this methodology that contribute to non-sampling errors, and which would tend to result in the overestimation of yields (Box 1; Annex 1).

**Figure 5: Comparison of CSA and WFP/FAO Cereal Production Estimates**

![Comparison of CSA and WFP/FAO Cereal Production Estimates](image)

*Source: Based on data from Gray (2007).*

**Box 1: Estimating Crop Production in Ethiopia**

For the last six years, crop production in Ethiopia has been regularly subject to three different assessments, undertaken by three different institutions for different purposes, viz. the Ethiopian Central Statistical Agency (CSA) FAO/WFP, and by a USAID team undertaking an annual Bellmon analysis.

- CSA undertakes a two-stage exercise involving an initial area assessment combined with a yield forecast and a subsequent yield estimate based on crop cutting. The information is used to determine overall national crop production from small-scale producers in the Meher season. It is not an estimate of overall food availability but should track changes in agricultural production systems, yields and productivity in general.

- The FAO/WFP exercise is an assessment of annual food production that is compared with estimated demand based on standard nutritional requirements to determine the national food balance and availability of stocks for local purchase.

- The Bellmon analysis is designed to assess the potential disincentive effects of anticipated food aid imports. As such, it combines an assessment of annual production with an empirically derived estimate of demand to determine a national food balance as one of the elements that can affect the potential disincentive effects of imported food aid.

It is not surprising that within a given year, the results from these different approaches can differ considerably. Differences in method, with a focus on the CSA assessment, are provided in Annex 1. The procedure followed by CSA has been designed to be statistically valid and to generate useful confidence limits for the estimates. A stratified random sampling procedure is followed, using enumeration areas to determine the areas sown and productivity of individual households. Enumeration areas are selected on a weighted random basis, and households within each area are equally selected at random. The results are analyzed at the zonal level and subsequently aggregated by region and for the country as a whole. Specific procedures are detailed for each stage of the assessment, areas of each field are physically measured by bearing and length, and crop harvesting is based upon randomly drawn quadrants.
However, there are a number of major drawbacks to the CSA methodology that contribute to non-sampling errors, and which would tend to result in the overestimation of yields. Future attention could be given to addressing these non-sampling errors, in particular, trials to assess the accuracy of the crop-cutting procedures as indicators of economic production both on a per crop basis and under different harvesting conditions could be carried out.


Marketed output has been increasing

11. As agricultural output has risen, so too has the share of output that goes to market. Data from the national households surveys in 1999 and 2005 indicate that the share of the quantity of food consumed that the own-consumption share of rural households fell from 70 to 62 percent; (i.e., the share of food purchased rose from 30 to 38 percent). This increase in the share of food purchased from markets tends to raise the average price of food for a rural household (because of the marketing margins embedded in the price of purchased food). Increases in market purchases also imply an increase in the transactions demand for money (which ceterus paribus reduces the inflationary impact of increases in money supply). (See Ahmed, 2007b, c.)

Regional differences in food price inflation are limited

12. It might be expected that inadequate infrastructure and undeveloped markets in Ethiopia restrict trade between surplus and deficit grain producing rural regions. On the other hand, in recent years there have been large investments in roads, and new market centres outside Addis are rapidly developing – e.g. Jimma, Bahir Dar, Dessie, Mekelle, Shasemene and Dire Dawa. Table 2 reflects the rapid improvements in roads under the sector development program albeit Goma a low base. This could enable better market integration although possibly reducing flows into Addis.

Table 2: Expansion of Road Infrastructure in Ethiopia, 1997-2006

<table>
<thead>
<tr>
<th>Indicator, measured as percentage share</th>
<th>1997</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>asphalt roads in good condition</td>
<td>17</td>
<td>60</td>
</tr>
<tr>
<td>gravel roads in good condition</td>
<td>25</td>
<td>45</td>
</tr>
<tr>
<td>rural roads in good condition</td>
<td>21</td>
<td>46</td>
</tr>
<tr>
<td>area more than 5km from an all weather road</td>
<td>79</td>
<td>73</td>
</tr>
</tbody>
</table>


13. Several earlier studies (Gabre-Madhin et al; Rashid 2006; Baffes and Gautam, 2005) found evidence of co-integration of wholesale prices across markets in much of Ethiopia, that is, prices move together in the long-run. This is consistent with our finding that the three most populous regions (Amhara, Oromiya and SNNP) as well as Addis had similar rates of food inflation over the period, with cumulative rates of 62 – 70 percent. This suggests that markets in Amhara and Oromiya are closely integrated with the Addis market (Figure 6 and Annex Table 3). The outliers are Tigray
and Dire Dawa, which had significant lower rates (39 and 41 percent, respectively). In Tigray, this can be traced to lower growth in prices of teff (81, vs. 112 percent in Oromiya), wheat (37 vs. 71 percent) and sorghum (41 vs. 58 percent).

**Figure 6: Food Inflation Trends, by Region**

![Graph](image)

*Source: Staff estimates based on official data.*

14. Thus, within Ethiopia, we find evidence of market integration and co-movements in price, with the exceptions of Tigray and Eastern Ethiopia. This suggests that wholesale markets of major cereals work reasonably well. Positive factors over the recent period include improved transport (better roads) and communications (mobile phones), which are reducing transaction costs. At the same time, in light of the vast international literature on market integration, we do not argue that market integration in Ethiopia has been conclusively established.

**Opportunities for international trade**

15. Although Ethiopia’s wholesale markets for cereals are generally well-integrated internally, the evidence suggests that they are poorly integrated with international markets. Historically this was in large part because the high level of food aid imports depressed domestic prices and there by limited opportunities for profitable private import or export trade. This has been shown in various food – aid dependent countries, including for example Malawi, as well as Ethiopia. Even during periods when domestic prices relative to import and export parity prices suggest opportunities for profitable trade, other factors (such as uncertainty over possible shifts in government policy, restrictions on access to foreign exchange, lack of credit) have inhibited private trade. For example, at present there is 15 percent tax on food imports into Ethiopia easing of these barriers to trade combined with investments in transport infrastructure could enable private sector imports to help increase food supply and stabilize prices in times of production shortfalls, as it has in Bangladesh and other countries (del Ninno, Dorosh and Subbarao, 2007).

16. A review of domestic versus import parity prices for wheat should distinguish time periods:
For the period 2001-2004, domestic wheat prices were generally below import parity prices. This situation reflected average or above-average harvests in Ethiopia and historically moderate levels of international wheat prices. It also reflected substantial volumes of food aid imports (mainly in the form of wheat), that added to domestic supplies and reduced prices to the benefit of net consumers, to the detriment of net sellers.

From 2005 to early 2007, domestic wheat prices were approximately equal to import parity prices (calculated without the 15 percent VAT) (Figure 7). Thus, during this period, there was potential scope for private sector imports of ordinary wheat on a commercial basis. Although high gluten wheat suitable for special baking purposes was imported during this period, there were apparently little or no private sector imports of ordinary wheat, in part because of uncertainties regarding timely access to foreign exchange by private traders. Private sector imports are also hampered by uncertainties regarding possible restrictions on stocks and difficulties with access to credit, in addition to the wedge created by the VAT which taxes imports and wheat processed by large mills but does not cover domestic wheat milled by small mills.

**Figure 7: Ethiopia Domestic, Import and Export Parity Prices for Wheat, 1998-2007**

![Graph showing Ethiopia domestic, import and export parity prices for wheat, 1998-2007.]

Notes: Import parity ($/ton) estimated as fob US Gulf (US hard red winter) + $25 freight to Djibouti + $60/ton transport and marketing costs to wholesale Addis. Import parity is calculated without taxes.  
Source: Dorosh and Subran (2007).

17. The large increase in world wheat prices in 2007 has substantially raised import parity prices and once again put domestic prices substantially below import parity levels. International wheat prices are forecast to rise further (see Box 2 and Table 3). In the absence of significant depreciation of the Birr, a decline in world wheat prices, and/or a substantial decrease in Ethiopia’s supply because of a fall in production or a cut in food aid imports, domestic wheat prices will likely remain below import parity levels for wheat and there will be no incentive for private imports of ordinary wheat.
For maize, comparisons of domestic prices with export parity levels suggest there were opportunities for profitable exports to Kenya in 2001 following bumper maize harvests in Ethiopia. However, the combination of very high transport costs and the fact that prices in the Kenyan market fell sharply that year reduced scope for exports. In subsequent years, despite a recovery of prices in Kenya, the increase in real domestic maize prices, combined with continued high transport costs, continue to make private trade unprofitable (Figure 8). The large gain in world maize prices in 2006, due in part to increased global demand for maize for ethanol production, raised import parity prices substantially above domestic maize prices. The sharp rise in domestic maize prices beginning in mid-2007, however, has brought domestic prices near import parity levels. Further analysis is needed as to the cause of the recent price increase, which may be reversed, at least partially, following the 2007-08 harvest. At the same time maize price forecasts suggest that prices will remain at historically high levels through 2015 (Box 2 and Table 3).

**Box 2: Price Trends in International Cereal Markets**

Cereal prices rose sharply in international markets in 2006 and 2007 due to a combination of increased demand for maize for ethanol production, poor harvests in several major exporting countries and a decline in carry-over stocks.

Prices of maize rose by 45 percent between July 2006 and January 2007 due mostly to increases in demand for ethanol production in the U.S., the world’s largest maize producer and exporter. Ethanol now accounts for about 20 percent of total U.S. maize production; exports account for about another 20 percent. Throughout 2007, maize prices have remained high, though broadly stable, as ethanol demand has continued; high energy and fertilizer prices have also contributed to continued high maize prices.

Wheat prices soared in late 2007 due to poor weather in several major exporting countries (Australia, Canada, major producers in the EU and Ukraine) which reduced harvests. This production shortfall occurred at a time when carry-over stocks were already low, exacerbating upward pressure on prices. Given low stocks of major producers / exporters, wheat markets will be particularly susceptible to large price increases in the short run if there are further production shortfalls.

Ethiopia currently does not import substantial quantities of maize, so the price increases for maize in international markets has little direct effect. The rise in international wheat prices could have more serious implications for the country, however. This could arise from several sources, most importantly because of the increased cost of higher gluten content wheat imported for baking purposes, a possible reduced availability of food aid due to the higher costs of wheat for donors, and an increase in the import parity price for private trade which raises the price ceiling at which private imports could stabilize domestic wheat prices.

*Source: Authors and World Bank Development Prospects Group.*

**Table 3: World Bank Commodity Price Forecasts through 2015**

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</thead>
<tbody>
<tr>
<td>Grains</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Maize</td>
<td>$/mt</td>
<td>58.4</td>
<td>125.3</td>
<td>109.3</td>
<td>88.5</td>
<td>121.9</td>
<td>163.0</td>
<td>175.0</td>
<td>170.0</td>
<td>165.0</td>
<td>160.0</td>
<td>155.0</td>
</tr>
<tr>
<td>Rice, Thailand, 5%</td>
<td>$/mt</td>
<td>126.3</td>
<td>410.7</td>
<td>270.9</td>
<td>202.4</td>
<td>304.9</td>
<td>322.5</td>
<td>340.0</td>
<td>350.0</td>
<td>360.0</td>
<td>340.0</td>
<td>320.0</td>
</tr>
<tr>
<td>Sorghum</td>
<td>$/mt</td>
<td>51.8</td>
<td>128.9</td>
<td>103.9</td>
<td>88.0</td>
<td>122.9</td>
<td>161.0</td>
<td>175.0</td>
<td>170.0</td>
<td>165.0</td>
<td>160.0</td>
<td>155.0</td>
</tr>
<tr>
<td>Wheat, US, HRW</td>
<td>$/mt</td>
<td>54.9</td>
<td>172.7</td>
<td>135.5</td>
<td>114.1</td>
<td>192.0</td>
<td>251.0</td>
<td>290.0</td>
<td>250.0</td>
<td>230.0</td>
<td>220.0</td>
<td>200.0</td>
</tr>
</tbody>
</table>

*Source: World Bank.*
19. Over the past several months, the concern about rising food prices has become generalized around the world, with very significant increases in international commodity prices. Recent trends and forecasts for wheat and maize are summarized in Box 2 and presented in Figure 9. Since Ethiopia has traditionally been rather closed in terms of private sector grain trade, for the reasons described above, our analysis suggests that this has not yet impacted domestic prices, and is unlikely to have immediate effects. We do note however that a study by Ayalew (2007) suggested that inflation in major trading partners do significantly impact domestic food prices. This study uses an annual econometric model based on data over about a 20 year period. From the regressions, he finds correlations between international prices and domestic prices. Yet this was a period where Ethiopia had almost no private sector imports or exports of wheat or maize on the international market and the comparisons of border prices with domestic prices shows no incentive for maize trade. Although there were incentives for private sector trade in ordinary wheat in the first half of 2007, uncertainty regarding foreign exchange and government domestic policy towards storage and distribution of wheat discouraged private trade. In sum, the micro-economic evidence of current prices and interviews with traders indicated that in the past few years, there was no direct transmission mechanism from international markets to domestic cereal markets.
20. In sum, our analysis suggests that international factors have not played a large role in driving grain inflation in Ethiopia over the past several years. However it is important to underline that the forecasted high prices through 2015 mean that commercial grain imports are unlikely to provide Ethiopia with a respite from domestic price pressures. The World Bank’s Development Prospects Group has produced forecasts for maize and wheat which suggest rising prices through this year, and levels that significantly exceed 2006 levels through 2015 (Table 3). High international prices do underline the importance of productivity and marketing improvements that are needed in Ethiopia in order to stabilize domestic prices (see below).

Recent survey findings on food price developments: Etheya, Yetmen & Bako

21. A team from Addis Ababa University was commissioned to conduct a rapid survey in order to document trends in production, consumption and marketing in three sites. The sites were chosen as among the major wheat (Etheya), teff (Yetmen) and maize (Bako) growing areas of the country, and because earlier survey work had established a good understanding of the local economies in these villages, a representative household sample and good local networks.

22. Highlights from the preliminary results provide useful insights, especially for the past three years (2004/5-2006/7):²

- Crop output had increased in all the three sites – but the rate of increase varied: typically 3-5 percent per annum and at higher rates in 2005/06 for maize in Bako (22 percent) and in

² For a full and interesting review, please refer to the background paper, by Demeke et al.
2006/07 for teff in Yetmen (13 percent). When compared to 1999, production has sharply declined in Bako while significantly increasing in Eteya.

- The production increases were largely driven by area expansion: yield levels were stable or falling, except for wheat. Compared to 1999, both maize and teff yields declined, due to declining quantity and quality of inputs. That wheat yields increased significantly despite the decline in fertilizer use was traced to better practices, including more frequent crop rotation. Fertilizer use per hectare had declined in all sites since 1999, and there was no utilization of improved seeds in Yetmen.

- Some diversification of production was observed: in Yetmen towards oilseeds (cash crop) and in Eteya, there has been a five fold increase in the number of farmers growing potato and a two-fold increase in pea-growing farmers. On the other hand, farmers in Bako had reduced the cultivation of pepper (cash crop) and have shifted towards growing low yield sorghum. Bako farmers continued to grow maize partly for subsistence reasons, and because agro-ecological conditions are more suited to this than to other local cereals. It is not diversification into high value crops that affected market supply in Bako: focus group discussions suggest that pest problems have discouraged a shift to teff and/or pepper.

23. In terms of marketed supply sales and farm-gate prices, over the past three years:

- Interestingly, for maize, farm-gate prices had actually fallen over the period (.93 Birr/kg in 2006/7 versus .97 and 1.0 in the two preceding years), and the marketed share of production has declined somewhat (48 percent in 2006/7 versus 62 and 55 percent in the two preceding years). Average stock levels have increased, and distress sales have eased. Market supply of maize in Bako has decreased in recent years because of a general decline in production, as yields have sharply declined and prices are low.

- The share of teff sold increased from 30 percent in 2004/05 to around 36 percent in 2005/06 and 2006/07. Farmers received different market price of Teff than the average price: in 2006/07 the market price was around 3.6 Birr/kg while the average price received by the farmer fluctuated around 3.4 Birr per kg.

- In terms of marketed supply of wheat, the share sold increased from 49 to 54 percent over the past three years, while the market price increased significantly, from Birr 2.0/kg in 1999/00 to Birr 4.6/kg in 2006/07. In Eteya, the share of farmers who held stocks in 2006/07 increased from 47 to 67 percent over the past twelve months, with food security being the reason cited.

- Marketing avenues:
  - In Bako, marketing was mainly via grain traders – only 2-4 percent reported selling to cooperatives – although higher prices paid by coops are believed to affect the market price. It appears that prices would have been lower if there were no cooperatives’, hence a hypothesis that farmers’ improved bargaining power through cooperatives has contributed to high grain prices has some credence in Bako.
  - In Yetmen, the share of farmers selling to co-operatives increased from 9 to 19 percent over the past three years. But cooperatives are reporting a much higher level of purchase possibly indicating direct purchase from traders or middlemen. Traders in Yetmen have been forced to catch up with the higher prices cooperatives offering, which pushed up the price of teff, reflecting better bargaining power of farmers.
Marketing behavior has changed in Eteya. The proportion of sales in total production increased from 49 percent in 2004/05 to 54 percent in 2006/07. Hence, however, the vast majority (90-97 percent) of farmers sell their produce to grain traders, while the proportion of farmers selling to cooperative declining over time.

24. Local expectations are that prices will continue to increase. About 86 percent of households surveyed in Bako, regarding maize; in Eteya, 84 percent of respondents indicated that they expect an increase in prices citing low production, high demand and high input prices. The majority of teff farmers expected the current price trend to continue largely due to increased demand, low production and exports.

25. Overall, however, the results pertaining to crop production, livestock sales and off-farm income suggest that many farmers have failed to attain sustainable improvements in their livelihoods over the past three years, especially in Bako. There were no significant changes in off farm income (for example in Bako, more people were working off-farm, but earning less on average), and remittances were insignificant. At the same time, the burden of taxes has been reduced significantly.

26. The responses to questions about their incomes, consumption habits and perceptions of wellbeing reveal a mixed picture (Table 4). The situation appears to be worsening in Bako, but is better in the teff and wheat producing areas.

- Overall, more than three quarters of the maize farmers in Bako believe that their incomes had declined over the last three years, stable for 12 percent while the rest (12 percent) believe their incomes have improved. Just over half of the respondents indicated that the frequency of meals has declined while 40 percent observed no change. Frequency of festivals either declined or was stable. Trends with regard to nutritional status of children were similar, and self-reported food security status declined for 62 percent of respondents, with no change for 30 percent. Perceptions about health showed that those reporting to have experienced a drop or no change accounted for about 55-66 percent of respondents.

- In Yetmen, about half of the sample farmers believe that their wellbeing has improved. For example, the frequency of meals had increased for about 43 percent of the sample, and was constant for half; trends in family nutritional status were similar. Overall income of the family reported increased for 59 percent of the households, whereas 23 percent felt there had been declines over the last three years.

- In Eteya, about three fourths of the households reported that their families’ overall income has increased (reflected also in reported improvements in housing conditions), while 18 percent experienced no change; 7 percent saw a decline in their overall income.
Table 4: Household consumption habits and perceptions about wellbeing, self-reported

<table>
<thead>
<tr>
<th></th>
<th>Overall income</th>
<th>Frequency of meals</th>
<th>Nutritional status of children</th>
<th>Food security situation</th>
<th>Health status of family</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bako (Maize)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased/improved</td>
<td>12</td>
<td>9</td>
<td>10</td>
<td>8</td>
<td>39</td>
</tr>
<tr>
<td>Decreased/deteriorated</td>
<td>77</td>
<td>51</td>
<td>58</td>
<td>63</td>
<td>35</td>
</tr>
<tr>
<td>No change</td>
<td>12</td>
<td>40</td>
<td>30</td>
<td>30</td>
<td>19</td>
</tr>
<tr>
<td>Not known</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td><strong>Yetmen (Teff)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased/improved</td>
<td>59</td>
<td>43</td>
<td>54</td>
<td>54</td>
<td>50</td>
</tr>
<tr>
<td>Decreased/deteriorated</td>
<td>23</td>
<td>6</td>
<td>1</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>No change</td>
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<td>51</td>
<td>42</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>Not known</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td><strong>Eteya (Wheat)</strong></td>
<td></td>
<td></td>
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<tr>
<td>Increased/improved</td>
<td>74</td>
<td>20</td>
<td>46</td>
<td>69</td>
<td>50</td>
</tr>
<tr>
<td>Decreased/deteriorated</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>No change</td>
<td>19</td>
<td>72</td>
<td>47</td>
<td>23</td>
<td>34</td>
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<tr>
<td>Not known</td>
<td>-</td>
<td>-</td>
<td>1</td>
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</table>

Source: Survey Data from background paper by Demeke et al. (2007).

27. The results of this recent fieldwork suggest that the rate at which cereal production and supply increased has lagged behind demand. In particular, maize producing households in Bako have been hard hit by local declines in maize production and have limited alternative opportunities. Declining yields appear to be associated with a combination of poor quality of seeds, unaffordable fertilizer prices and declining soil fertility. In fact, low maize prices, rather than high prices, are among their major problems facing the community. In Yetmen and Eteya, the situation is somewhat better, although again it is area expansion rather than improvements in productivity which are driving production increases.

28. The key policy implication is that efforts to increase agricultural production through such productivity enhancing measures as access to inputs could make a difference, especially since the expansion of area under cultivation will not be able to continue indefinitely.
III. METHODOLOGICAL APPROACH

29. In order to understand the reasons behind grain price inflation, it is necessary to separate the effects of overall inflation from the changes in the real price of food, the latter being defined as the price of food relative to the overall price index. The trends are summarized in Table 5. Our analysis focuses specifically on changes in the real price of food, and does not attempt to explain overall nominal inflation. This study focuses on medium-term inflation (over 1-2 years) rather than short-term inflation (month-month), using the CPI series based on December 2000 (see Annex 1).

30. Overall inflation, which is taken as given for the purposes of the analysis below, is affected by a broader set of factors, including monetary growth. The high rate of money supply growth and the relatively slow increase in velocity over the period does suggest that money supply was likely a major factor in overall inflation, at least in the medium term.

<table>
<thead>
<tr>
<th>Table 5: Ethiopian Aggregate Price inflation, (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative 2002-2006a</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>52.5</td>
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<tr>
<td>Annualized 2003-06</td>
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</tbody>
</table>

*a*December to December. See para 30 for definitions.

31. A recent paper prepared by staff of the Central Bank, Ayalew (2007), estimated that the monetary impact on overall prices was 0.6 (that is a ten percent increase in money supply would increase the rate of inflation by 6 percent while food inflation would increase by an even bigger magnitude, 8 percent. The analysis is based on annual data for the period 1965-2005. However, the interpretation of these estimates is tricky, since ideally one should not use M2 but a measure of “excess money” (or a money gap). At the same time, the finding of a relatively large short-run effect for food is consistent with the approach in this paper, and the arguments laid out in Box 3 about overshooting (that is, that food price overshoot their equilibrium values in the case of an unanticipated monetary expansion).

32. The Government has recently taken several measures designed to slow monetary growth and reduce inflationary expectations (Box 3). These would be expected to have some impact on aggregate inflation. Other large developing countries which have recently adopted monetary policy measures to address inflation include India and South Africa. Many central banks have tightened monetary policy during the last few years against the backdrop of persistent inflationary pressures represented by inflation, especially in view of continued strength of demand, ample liquidity and possible pass-through from past and present increases in oil and other commodity prices (see Table 6 and Box 4).

3 Short term movements in food prices in Ethiopia are characterized by marked seasonal components, as well as by trend and irregular components (see Annex 3).
Box 3: Recent Central Actions to Curb Money Growth and Inflation

In 2007, the National Bank of Ethiopia (NBE) adopted several measures to curb the growth in money supply and inflation. The NBE raised the reserve requirement rate from 5 to 10 percent, and the interest rates on deposits from 3 to 4 percent, in order to mop up the liquidity in the system. This was intended to contain inflationary pressures arising from monetary developments, and bring inflation down to around 10 percent. In doing so, the NBE acknowledged the multiple causes of inflation, while taking action on policies within its own control. These actions were expected to reduce the growth rate of monetary base by around 10 percentage points (from about 29 percent in 2007 to 19.5 percent in 2008), which NBE technical studies have suggested are needed to reach the inflation target.

Based on detailed studies and sensitivity analyses conducted for each bank, and an overall assessment of the composition of excess reserves in the system, the NBE expects significant liquidity reductions from private and public commercial banks. Private banks are expected to slow the 'excessively' fast growth over the last year (where the outstanding loan portfolio had risen by up to 45-65 percent), while public commercial banks, especially the Commercial Bank of Ethiopia, will continue reducing their excess liquidity beyond the reserve requirement, by increasing their holding of treasury bills. At the same time, the NBE intends to shift the composition of lending activities to the national government, from direct advances to T-bills.

<table>
<thead>
<tr>
<th>Country</th>
<th>Key Policy Rate</th>
<th>Changes in Policy Rate (Basis points)</th>
<th>Cumulative Change since April 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2005-06</td>
<td>2006-07</td>
</tr>
<tr>
<td>Industrial Economies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>Cash Rate</td>
<td>0</td>
<td>75</td>
</tr>
<tr>
<td>Canada</td>
<td>Overnight Rate</td>
<td>125</td>
<td>50</td>
</tr>
<tr>
<td>Euro area</td>
<td>Main Refinancing</td>
<td>50</td>
<td>125</td>
</tr>
<tr>
<td>Japan</td>
<td>Uncollateralised</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>UK</td>
<td>Official Bank Rate</td>
<td>-25</td>
<td>75</td>
</tr>
<tr>
<td>US</td>
<td>Federal Funds Rate</td>
<td>200</td>
<td>50</td>
</tr>
<tr>
<td>Developing Economies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>Repo Rate</td>
<td>50</td>
<td>125</td>
</tr>
<tr>
<td>China</td>
<td>Benchmark 1-year</td>
<td>0</td>
<td>81</td>
</tr>
<tr>
<td>Israel</td>
<td>Key Rate</td>
<td>125</td>
<td>-75</td>
</tr>
<tr>
<td>Korea</td>
<td>Overnight Call Rate</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td>South Africa</td>
<td>Repo Rate</td>
<td>-50</td>
<td>200</td>
</tr>
<tr>
<td>Thailand</td>
<td>14-day Repurchase Rate</td>
<td>225</td>
<td>50</td>
</tr>
</tbody>
</table>
Box 4: Response of Central Banks to Persistent Inflationary Pressures:
Recent International Experience

**China.** In view of strong growth in money supply and credit, the People’s Bank of China increased the benchmark 1-year lending rate by 72 basis points since end-June 2007 – 27 basis points effective July 21, 2007, 18 basis points effective August 22, 2007 and 27 basis points effective September 18, 2007 – to 7.29 per cent, i.e., a total hike of 171 basis points since April 2006. Apart from continued issuances of its own bills to mop up liquidity, the PBC raised the cash reserve ratio (CRR) by another 150 basis points since end-June 2007 — to 13.0 per cent. The CRR has, thus, been increased by 550 basis points since July 2006.

**South Korea.** Against the backdrop of the domestic economy likely to maintain its upward trend, ample liquidity in the financial markets and financial market prices showing increased volatility following the recent international financial market unrest, the Bank of Korea raised its policy rate by 50 basis points during the second quarter of 2007-08 –25 basis points each in July, 2007 and August, 2007 – to 5.0 per cent (a cumulative increase of 175 basis points since October 2005).

**South Africa.** Amongst other emerging economies, the South African Reserve Bank raised its policy rate by 100 basis points - 50 basis points each in August, 2007 and October, 2007 – to 10.50 per cent. The policy rate has been raised by 300 basis points since June 2006 to contain inflationary pressures emanating from oil and food prices and high rates of household consumption expenditure.

**India.** The Reserve Bank of India has continued with its policy of active demand management of liquidity through the use of all the policy instruments at its disposal flexibly, as and when the situation warranted. It has raised the policy rate by 175 basis points in the last two and half years and increased the CRR by another 50 basis points with effect from the fortnight beginning August 4, 2007. The CRR was earlier raised by 50 basis points in two stages of 25 basis points each effective April 14, 2007 and April 28, 2007.

**UK.** In view of steady growth in output, continued rapid growth in credit and broad money, limited spare capacity in businesses and elevated most indicators of pricing pressure, the Bank of England has raised its policy rate by 25 basis points in July 2007 to 5.75 per cent – a cumulative increase of 125 basis points since the tightening began in August 2006.

**Euro Area.** The European Central Bank, seeing risks to the price outlook from further increases in the prices of oil and agricultural products as well as stronger than expected wage developments and increase in the pricing power raised the policy rate by 25 basis points in June 2007 – a cumulative increase of 200 basis points since the tightening began in December 2005.

*Source: Macroeconomic and Monetary Developments - Mid-Term Review 2007-08, Reserve Bank of India.*

33. At this point, however lagged inflation now likely also explains a large part of inflation dynamics in Ethiopia (Box 5). That is, expectations of future inflation may themselves drive inflation — a point generally acknowledged in applied and theoretical analysis, and also suggested to be the case in Ethiopia (Loening and Dorosh 2007). The recent wage increase in the public sector may have some spillover effects to other sectors; and drive the inflation process.

---

4 There is a very large literature on this, summarized for example at http://www.federalreserve.gov/newsevents/speech/Bernanke20070710a.htm
Box 5: Do Food Prices Overshoot in Ethiopia?

There is a body of empirical and theoretical literature dealing with the impact of macro policies on agricultural prices, in particular low food prices adjust to the expansion of money supply. Many studies conclude that, as monetary expansion takes place, the speed of adjustment in relation to food items is greater than that for manufactured goods.

In a much-cited paper Frankel (1986) develops a theoretical framework embodying a strand of empirical observations to analyze the dynamic adjustment of agricultural prices. He assumes two goods: agricultural (“auction”) goods and manufactured (“customer”) goods. These two commodities have different price adjustment mechanisms. Manufactured goods adjust sluggishly, while agricultural product prices adjust instantaneously. The degree of food price overshooting depends whether the monetary shock is anticipated and to what degree manufactured and agricultural products can be treated as substitutable assets. If both manufactured and agricultural goods can be treated as substitutable assets, the short-run movement of agricultural commodity prices will overshoot their long-run response following an unanticipated expansion of the monetary stock. Similarly, a reduction in the real interest rate (due to increased money supply) is likely to induce high real food prices.

This theory gains support from a number of empirical studies. For example, in an analysis of the US and Asian markets (Saghaian et al. 2002, 2005) agricultural markets confirm the overshooting hypothesis with long time-series and applied statistical techniques: a monetary shock to the economy seems to induce an initial large response of food prices, followed by a subsequent but sluggish decline. For Ethiopia, Gebre-ab (2006) points out that distinguishing features of price formation process of food crops can be examined through a comparison with how prices of manufactures are formed; and that sluggish food price adjustments to their long-run equilibrium could play a significant role. There is no empirical analysis available along these lines for Ethiopia, this could be interesting area for further investigation.

34. During the period 2002-2006, the general consumer price index (CPI) rose by 52.5 percent. If the growth in supply of food had been equal to the growth in demand for food, prices of food would have increased by the same rate as the average of all prices in the economy (52.5 percent). Instead, food prices increased by a total of 62.3 percent, i.e., 6.5 percent relative to the general CPI, and 18 percent relative to non-food. This suggests that structural factors specific to food markets are also at play.

35. In mathematical terms, the basic methodology can be presented as follows. Nominal changes in food prices (Pf) are decomposed into changes in overall prices (CPI) and changes in real prices (Pf/CPI):

Real food prices = \( g \) (food supply, food demand)

\[
%\Delta(Pf/CPI) = %\Delta CPI + \sum %\Delta(Pf_i/CPI)
\]

36. The trends in the real prices of major cereals over the period 2002 – 2006 (Table 7 and Figure 10), reveals several important points, specifically:

- The cumulative increase over the period is significant only for teff. That is, the respective price rise for teff totaled 26.3 percent, for wheat, only 5 percent, and the relative price of maize actually fell by 27.2 percent.
- There are significant variations in real prices by crop over time.

5 Throughout this paper, consistent with Ethiopian practice, annual price changes are measured from December to December. Cumulative inflation rates are measured from December 2002 to December of current year.
- *Teff*: little change 2003-05; increase concentrated in 2006 (exceeding 26 percent); 
- Wheat: drop in 2003; increases in 2004-06, especially 2005; and 

Table 7: Real Prices of Major Cereals: 2003-06

<table>
<thead>
<tr>
<th>Year</th>
<th>Teff</th>
<th>Annual Wheat</th>
<th>Maize</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>-0.065</td>
<td>-0.251</td>
<td>-0.379</td>
</tr>
<tr>
<td>2004</td>
<td>0.030</td>
<td>0.083</td>
<td>0.344</td>
</tr>
<tr>
<td>2005</td>
<td>0.041</td>
<td>0.198</td>
<td>-0.067</td>
</tr>
<tr>
<td>2006</td>
<td>0.261</td>
<td>0.081</td>
<td>-0.065</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Teff</th>
<th>Wheat</th>
<th>Maize</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>0.263</td>
<td>0.050</td>
<td>-0.272</td>
</tr>
<tr>
<td>2006*</td>
<td>0.180</td>
<td>0.078</td>
<td>-0.096</td>
</tr>
</tbody>
</table>

Annualized Cumulative Rate

<table>
<thead>
<tr>
<th>Year</th>
<th>Teff</th>
<th>Wheat</th>
<th>Maize</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-06*</td>
<td>0.060</td>
<td>0.012</td>
<td>-0.076</td>
</tr>
<tr>
<td>2003-06*</td>
<td>0.042</td>
<td>0.019</td>
<td>-0.025</td>
</tr>
</tbody>
</table>

Source: Calculated from EGTE cereal prices and CSA CPI.
Notes: Cereal prices are wholesale Addis. * Fitted growth rate.

Figure 10: Real Price Trends, 2000 – 2007

Source: Calculated using EGTE wholesale price data and aggregate CPI as deflator (Dec 2000 = 100).

37. Large seasonal fluctuations in both nominal and real prices for grain commodities are still characteristic of Ethiopia. Seasonal price patterns remained largely unchanged through 2006, suggesting little structural change in markets to that point. (We note that this finding differs from that laid out in Ahmed (2007), where it is argued that access to credit and storage has virtually eliminated seasonality.) Further, we observe that the seasonality of real and nominal prices has been fairly similar.
IV. TESTING THE INITIAL HYPOTHESES

38. Several hypotheses have been advanced to explain food price inflation in Ethiopia, which can be summarized under the broad headings of demand and supply side factors, and marketing constraints (see Demeke et al., 2007). An important goal of this note is to examine and quantify the relative importance was to test these hypotheses, viz. (1) Excess demand; (2) Trade effects; (3) Introduction of the PSNP; and (4) Changes in farmer and marketing behavior due to increased bargaining power via co-ops (most important for teff market). We examine each of these in turn.

1. Excess Demand

39. It is important to distinguish between aggregate supply and demand at the macro-level, which determine the average price level and overall inflation in the economy, and supply and demand for food at the micro-level, which determines food prices relative to overall inflation.

40. At the macro-level, shifts in aggregate supply and aggregate demand determine changes in overall prices in the economy, i.e. the overall rate of macro-inflation. In a conventional neo-classical model, aggregate supply is generally considered to be very inelastic with respect to changes in the overall price level, i.e., increases in the nominal price of output have relatively little effect on production levels because of constraints in key factors of production such as land, capital and skilled labor. Where there is substantial underutilized capacity, however, aggregate supply may well be responsive to changes in demand and prices. Over time, aggregate supply can be increased through changes in technology and investments in private, public and human capital.

41. Aggregate demand, the total of household consumption, investment, public sector and net export demand is more likely to shift in the short term than aggregate supply. Gains in household income and consumption, net foreign capital inflows, government spending in excess of revenues, grants from abroad, and expansion in credit that raises domestic spending and investment can all contribute to increased aggregate demand.

42. Real output growth, as recorded by official GDP statistics, averaged 10 percent per year over the 2002/03-2006/07 period – 14 percent for agriculture, 10 percent for construction and 12 percent for the public sector. This is a cumulative rise of 48 percent. Average price levels, as measured by the CPI, grew even faster (by a total of 53 percent from December 2002 to December 2006), which is suggestive that growth in aggregate demand was even faster than growth in aggregate supply. Disentangling the contributions of constraints on aggregate supply and factors contributing to increased aggregate demand (monetary policy, public and private spending shifts in consumer and investor behavior, etc.,) to macro-economic inflation is beyond the scope of this paper, however.

43. At the micro-level in food markets, the average of all food prices increased by 6 percent relative to the CPI over the period December 2002 to December 2006. This suggests that the increase in demand exceeded the increase in the total supply of food. Examination of the real prices of individual food commodities (i.e., the nominal prices deflated by the overall price index), indicates that the largest increases in real prices took place for teff, wheat and livestock products. Section VI discusses the causes of these real price changes in more detail.
2. **Trade Effects: Export Diversification**

44. A second major hypothesis advanced as a cause of food price inflation in Ethiopia was that a shift in production to export crops significantly reduced the supply of food and at the same time raised farmer incomes and their own demand for food. As indicated in Table 8, there have indeed been significant increases in non-traditional agricultural exports. Flowers have emerged as a significant category in a boom in horticulture exports, while the share of Ethiopia’s traditionally dominant export—coffee—fell from 59 percent in 1996/97 to 35 percent in 2005/06. The value of oilseeds exports has increased, albeit from a low base, by a factor of 20. There has also been strong growth in the live animal and meat categories of commodity exports.

<table>
<thead>
<tr>
<th></th>
<th>1996/97</th>
<th>2004/05</th>
<th>2005/06</th>
<th>2006/07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coffee</td>
<td>355.0</td>
<td>335.4</td>
<td>354.3</td>
<td>424.2</td>
</tr>
<tr>
<td>Pulses</td>
<td>11.9</td>
<td>35.5</td>
<td>37.0</td>
<td>70.3</td>
</tr>
<tr>
<td>Oilseeds</td>
<td>11.4</td>
<td>125.0</td>
<td>211.4</td>
<td>187.4</td>
</tr>
<tr>
<td>Leather and leather products</td>
<td>57.3</td>
<td>67.6</td>
<td>75.0</td>
<td>89.6</td>
</tr>
<tr>
<td>Live animals and meat</td>
<td>5.4</td>
<td>27.4</td>
<td>46.1</td>
<td>52.3</td>
</tr>
<tr>
<td>Fruits and vegetables</td>
<td>7.0</td>
<td>16.1</td>
<td>13.2</td>
<td>16.2</td>
</tr>
<tr>
<td>Chat</td>
<td>33.5</td>
<td>100.2</td>
<td>89.1</td>
<td>92.8</td>
</tr>
<tr>
<td>Gold</td>
<td>64.0</td>
<td>59.4</td>
<td>64.7</td>
<td>97.0</td>
</tr>
<tr>
<td>Flowers</td>
<td>7.8</td>
<td>22.1</td>
<td>63.6</td>
<td></td>
</tr>
<tr>
<td>Other exports</td>
<td>53.2</td>
<td>73.0</td>
<td>87.9</td>
<td>91.7</td>
</tr>
<tr>
<td><strong>Total exports of goods, f.o.b.</strong></td>
<td>598.7</td>
<td>847.3</td>
<td>1,000.6</td>
<td>1,185.1</td>
</tr>
</tbody>
</table>

Source: NBE.

45. The evidence suggests that while there may well have been some substitution effects, with farmers shifting to non-traditional crops, or at least diversifying out of cereals, this expansion has not been large compared with the increase in area cultivating cereals (Figure 11). Specifically the area cultivated with edible oils and pulses increased by 372 thousand hectares (23.6 percent). At the same time if, edible oils and pulses area cultivated had only increased at the same rate as average for all crops (21.3 percent), area planted to cereals could have increased by a further 0.6 percent. Given a supply increase of this magnitude, and using an elasticity of demand of -0.6 (see below), major cereal prices would have been about 1.1 percent lower.
Figure 11: Ethiopia: Expansion of Area Planted by Crop, 2003-2007

Source: Staff estimates based on official data.

46. Increased incomes from exports also generate demand effects. These are analyzed in the next chapter. In fact, since changes in export crop production represent only a very small share of the increases in real GDP and total incomes, these demand effects on food prices are not significant. Thus, increase export crops are not a major cause of the observed changes in relative prices of food.

3. Monetization of Food Aid

47. Ethiopia, as a poor country subject to recurrent climatic droughts and chronic poverty in significant parts of the country, has traditionally relied heavily on food aid. In 2005, through the Productive Safety Net Program (PSNP), Ethiopia started a shift in policy away from imported food aid, to cash transfers and local purchase of food. In its first year, the PSNP supported 4.83 million beneficiaries, over 62 percent of whom received cash. The number of beneficiaries swelled to nearly 7.2 million in 2006 and 2007, with the share of beneficiaries receiving cash varying between 64 and 45 percent.

48. Recent surveys suggest that the cast transfers have been an important source of food expenditure (see Box 6). The 2007 plan called for cash disbursements to 50 percent of beneficiaries. The increased use of cash and local purchases of food since 2005 has reduced annual food aid imports, which had averaged about 27 percent of the local grain market (715,000 metric tons) in the decade to 2003 (AAU, 2006). This is evident in Figure 12, which shows trends up to and since the peak during the drought in 2003. With the introduction of the PSNP in 2005-06, total imports of wheat (essentially all food aid) fell by 484,000 tons (about half) to 377 thousand tons. In dollar terms, this represents a decline in the value of food aid in form of food by about US$112 million, between 2003-2006 or 63 percent in the past four years, relative to the previous peak.

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6 National Bank of Ethiopia.
Box 6: Use of cash transfers by PSNP beneficiaries

A PSNP survey of 960 households conducted by the Institute of Development Studies (Sussex) and Indak International Pvt. (Addis Ababa) suggests, not surprisingly, that cash transfers are used in a much more diverse way than are food rations. At the same time, almost all beneficiaries used some of their cash to buy staple (80 percent) or other (11 percent) food. Cash transfers were also used by over half of beneficiaries to buy groceries (59 percent), and clothes (41 percent), and while investments in economic activities were relatively less frequent, the amounts used were large, as shown in the table below.

Use of PSNP cash transfers

<table>
<thead>
<tr>
<th>Use of Cash</th>
<th>Households</th>
<th>Percentage</th>
<th>Average spent (Br)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bought staple food</td>
<td>486</td>
<td>80.1%</td>
<td>162.2</td>
</tr>
<tr>
<td>Bought groceries</td>
<td>355</td>
<td>58.5%</td>
<td>34.3</td>
</tr>
<tr>
<td>Bought clothes</td>
<td>249</td>
<td>41.0%</td>
<td>91.5</td>
</tr>
<tr>
<td>Paid for health costs</td>
<td>178</td>
<td>29.3%</td>
<td>62.5</td>
</tr>
<tr>
<td>Debt repayment</td>
<td>95</td>
<td>15.7%</td>
<td>84.8</td>
</tr>
<tr>
<td>Paid for education costs</td>
<td>93</td>
<td>15.3%</td>
<td>27.6</td>
</tr>
<tr>
<td>Paid taxes</td>
<td>89</td>
<td>14.7%</td>
<td>17.5</td>
</tr>
<tr>
<td>Bought seeds for farming</td>
<td>88</td>
<td>14.5%</td>
<td>64.6</td>
</tr>
<tr>
<td>Bought other food</td>
<td>66</td>
<td>10.9%</td>
<td>84.4</td>
</tr>
<tr>
<td>Bought livestock</td>
<td>50</td>
<td>8.2%</td>
<td>131.1</td>
</tr>
<tr>
<td>Bought fertiliser</td>
<td>26</td>
<td>4.3%</td>
<td>67.5</td>
</tr>
<tr>
<td>Social obligations</td>
<td>24</td>
<td>4.0%</td>
<td>19.0</td>
</tr>
<tr>
<td>Used for business</td>
<td>6</td>
<td>1.0%</td>
<td>124.2</td>
</tr>
<tr>
<td>Lent money to others</td>
<td>1</td>
<td>0.2%</td>
<td>9.1</td>
</tr>
<tr>
<td>Gave cash to help others</td>
<td>0</td>
<td>0.0%</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Disaggregating the spending of cash transfers:

- Between beneficiaries who received cash only and those who received both cash and food does not reveal any significant differences. For instance, both sets of beneficiaries spent an average of 43 percent of their cash on purchasing food from the market.

- Across income quintiles reveals few striking differences between the lowest and highest quintiles. Poorer groups are marginally more likely to buy staple food and much more likely to buy other food, but all groups are equally inclined to spend some PSNP cash on groceries and clothes. The clearest trend across wealth categories is in terms of social obligations – better off groups are more likely to use PSNP cash for social obligations (although the numbers involved are small).

- Spent on investment purposes – agriculture, business, education, health, and so on – there are some interesting trends across income quintiles. The poorest beneficiaries were almost twice as likely to use PSNP cash to repay debts and to pay for health care. Interestingly, poorer beneficiaries were also more likely to buy livestock.
49. In principle and in practice, major changes in the amount of food aid would be expected to significantly affect prices. Indeed an underlying concern about food aid relates to the potential negative impacts on domestic producers. Recent analysis of agricultural distortions in Ethiopia as part of a global study highlighted the disincentives, through reduced prices, due to the high influx of food aid, estimating negative impacts on domestic prices to be of the order of 2-26 percent for wheat, 3-13 percent for maize and 2-11 percent for teff (Rashid, Assefa and Ayele, 2006). To the extent that the PSNP has reduced aid, a previously depressing influence on prices has been eliminated.

50. Recent surveys have revealed diverse views of traders on PSNP (Box 7). Overall, the focus group discussions do provide some basis for concern about the potential negative impacts of food aid, and especially cash transfers, on the functioning of local markets. Although traders are generally supportive of cash transfers, since this stimulates demand for their goods, a number perceive that price inflation of basic items has followed the introduction of cash transfers.

Box 7: Traders view on the impact of PSNP

A recent survey of the PSNP (Box 5) interviewed more than 40 traders in the 16 communities where the household survey was conducted, to solicit their views about the impacts of the PSNP on local trade and prices. While quantitative analysis undertaken for this study yields more representative results, the focus group results are of interest.

Views about the impact of PSNP were quite diverse, and included the following:-
‘Normal’ price seasonality, no effect of PSNP:
‘No change was created on the price of food due to PSNP; rather it is the seasons that create price changes.’ [Grocery trader, SNNPR]
‘Currently the price for major food crops is high. It is not due to the PSNP programme but due to the high demand in other areas. Even if the local people are receiving food from the PSNP programme, still they buy food items from the market.’ [Grain trader, Oromiya]
‘Safety Net has helped many, especially those who do not have land and sons to support them. Household income has increased. Expenditure on non-food items has increased. However food prices usually fluctuate, this is not necessarily linked with Safety Net food transfer.’ [grocery trader, Amhara]

7 These estimates are obviously sensitive to price elasticities used in the calculations, although the authors state that the price depressing impacts hold under a wide range of elasticity.
PSNP transfers have visible effects on demand and prices:

“When farmers’ aid is in cash we have good market, but when the aid is in food our market falls.”
[grain trader, Tigray]
“When there is food aid the price will fall down, but when the aid is cash we will be benefiting.”
[grain trader, Tigray]

Exchanging of food aid (wheat) for cheaper & preferred staples on local markets (such as maize):

“When food is paid some sell the wheat at a high price and buy maize instead for a lower price.”
[food trader, SNNPR]
“I have seen a large supply of wheat into the market due to the PSNP and the food aid programme. So the price for this commodity is less.”
[food trader, Oromiya]
“After the Safety Net Programme came some people sell the wheat at high price and buy maize at lower prices. Therefore we sell maize more than before.”
[grain trader, Amhara]

Increased purchasing power of beneficiaries from cash transfer put up prices of food and other basic commodities:

“People started to spend better than ever before, even on consumable items such as salt, sugar, coffee that I am selling in the market.”
[grocery trader, Amhara]
“When cash is paid more people buy food commodities. After the Safety Net Programme started, food prices were raised in the market.”
[food trader, SNNPR]
“Farmers have benefited by having more cash to buy food. However the price of sorghum rose by 10 Birr per quintal after PSNP beneficiaries received their cash.”
[livestock trader, Amhara]

51. The PSNP affects the demand as well as the supply sides of the grain market. The actual size of the PSNP in 2006 was 0.8 billion birr of safety net cash transfers, and 326,000 tons of cereals (the latter equivalent to approximately 0.8 billion birr). However as we show below, the total value of the cash transfers to households was equivalent to about 0.7 percent of GDP: the effect of the cash transfers on cereal demand was thus small we estimate the effect to be about 0.5 percent, applying 0.7 income elasticity of demand.

4. Farmer and marketing behavior – co-operatives and credit

Co-operatives

52. Farmers’ cooperatives play a key role in supply of farm inputs (especially fertilizer) and are involved in output market to a lesser extent. The role of cooperatives on the input side has increased rapidly – during last production year, nine agricultural marketing unions have imported about 70 percent of the fertilizer against three unions importing 24 percent in 2004/05. In the product market, cooperatives provide storage facilities and play key role in the improving the bargaining power farmers to their produce. However, while expanding rapidly, according to the PASDEP, farmers’ cooperatives account for only 10 percent of the market share for agriculture products. Currently there are about 6000 farmer primary cooperative with membership of more than 2 million operating all over the country. There are a reported 93 cooperative unions, formed by the farmers’ primary cooperatives.

53. The AAU survey specially commissioned to inform this study, in each site, Bako Tibe Woreda (Oda Haro) – maize; Gondie – wheat; Yetmen, in Enemay Woreda, focus groups of both farmers and traders emphasized the expanding role of cooperatives (see above for details). The discussions suggested:
In Yetmen, farmers’ sales to traders sharply declined since 2004/05, and the share of coops in total local purchase increased from about 30 to 90 percent in 2006/07. Cooperatives are buying at higher price (10 to 15 birr higher per quintal) and provide various incentives to farmers, like gifts and dividends.

In Oda Haro, it was felt that farmers’ bargaining power has increased as a result of the cooperatives and improved access to credit (see Figure 13).

In Gondie, effect of access to mobile telephone on bargaining power was noted, in addition to coops.

Credit

54. Another aspect relevant to production and market behaviour of farmers is access to credit. It is estimated that only 14 percent of the adult population has access to financial services compared to 20 percent for the region (World Bank, 2007), though it is believed that access of farmers to credit has improved significantly in Ethiopia in recent years. Access to finance is seen by the private sector as a key obstacle to doing business - with 60 percent of respondents of the 2006 survey reporting to be constrained by access to finance (World Bank, Doing Business, 2007).

55. Historically, food prices typically followed a pattern whereby prices fall during the months of November to March and climb up again during the months of June through September. This seasonal price pattern is linked to the marketing behavior of farmers. Farmers sell their produce early at low prices in order to settle debt and for other necessities (distress selling) and buy food and seed at higher prices later in the lean seasons. Typically farmers finance this cycle through borrowing during the plowing and sowing periods, repaying after the harvest. It has been observed that distress selling and high credit costs locked farmers into a vicious cycle of borrowing to cover production costs and consumption during the lean season, and being forced to sell at low prices to repay debts at harvest. Lack of off- farm employment activities in rural Ethiopia contributed to the problem, since farmers were unable to diversify their income sources (Ahmed 2007a).

56. In recent years, the financial sector has attracted additional resources and new entrants, slowly increasing its size and reach. One of the positive developments has been the rapid expansion of number of bank branches: increasing from 421 in 2005/06 to 494 in 2006/07. While the outreach of the financial institutions is gradually spreading throughout the country, their concentration around Addis Ababa remains high. For example, the capital city accounts for about 37 percent of the bank branch network, 48 percent of the insurance branch network, and 41 percent of microfinance institutions.

57. The government has implemented a number of recent policy measures to support farmers, which have influenced food prices. There has been an expansion in farmers’ access to credit at favorable terms such that they can maintain liquidity to purchase farm inputs and diversify their asset base (e.g., by raising livestock). The increase in access has been rapid, albeit from a low base (Figure 13). This is channeled through micro-finance institutions and through other arrangements coordinated by the Ministry of Agriculture and Rural Development (MOARD) and regional agriculture offices.
Over time, competition and efficiency in the financial sector have improved, although the sector remains dominated by large public financial institutions. Overall progress in financial sector deepening and resource mobilization remains modest relative to potential. For example, lending to the private sector by the banking system has remained at around 32 percent over the past two years.

Interest rate spreads have been falling over time, which indicates better intermediation, and in 2006/07 stood at 6.7 percentage points. However given the high inflation rate, the real interest rate remains negative. As Ahmed (2007) points out, the short term impact of negative interest rates may not be adverse, in that the loans may be used to expand productive capacity. However, negative interest rates likely also affect individual, farmer and firm incentives to save – rather than save money (which depreciates with inflation), it is more rational to ‘save’ surpluses in forms that will not depreciate – like grain. This may be affecting storage decisions of farmers, cooperatives and traders.

Finally, but not least, structural changes in teff markets may have affected price determination (see above). Earlier studies have suggested that better access to credit and price information as well as improved organisation in the co-ops have allowed farmers to plan their grain sales more strategically (GOE/EDRI 2007). If we take the example of Yetmen, investigated by the AAU team, we find that cooperatives and traders are engaged in a competition for the teff market. In this case, the cooperative union in Bichena (with about 19 coops) doubled its total purchases between 2004/5 and 2005/6 and expected more this year. One farmer/trader reported selling his own teff production to a village coop, but also purchased teff for his own business for later sales. Indeed local traders believe that local price increases are mainly caused by cooperatives’ purchasing activities, citing the observation that in late May, coops reduced their purchasing activities (mainly because their stores were full) and this coincided with a 10 percent decline in teff prices. Traders claim that their access to grains has been “crippled” over the past two years. In 2004/05 farmers sold 75 percent of their output to traders (cooperatives purchased during only for one month that year), and some traders fear that in the coming year they will be out of business.

This chapter has reviewed the main candidates to explain the persistently high grain inflation in Ethiopia. However reviewing each hypothesis in isolation does not enable a good sense of the relative importance of the various factors. The next chapter seeks to quantify the trends in relative grain prices, and to see the extent to which these can be explained by supply and demand, and key structural factors.
V. SIMULATION RESULTS

62. In order to investigate the behaviour of cereal prices over the past five years, and undertake specific simulations related to the PSNP, a simple one-period multi-market model with exogenous production levels was created. Two basic simulations were undertaken with this simple model. First, to explain real food price changes, we distinguish two time periods: 2003-04 to 2005-06, and 2005-06 to 2006-07, and estimate the price effects of (exogenous) production shocks and income changes and compare against actual market price movements. Second, we examine the impacts of the PSNP.

63. The simplifying assumptions underlying these simulations can be summarized as follows:

- Market integration – since almost all households interact with the market as either gross sellers or buyers. Of course, an important caveat in Ethiopia is that a high share of the population lives far from major markets and face large transactions costs.
- Long-run income and expenditure elasticities can be used to estimate short run effects – as presented in Table 9.
- Only one national household is modeled—there are no differential household income effects in the basic model.

<table>
<thead>
<tr>
<th></th>
<th>Income</th>
<th>Own Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teff</td>
<td>0.857</td>
<td>0.659</td>
</tr>
<tr>
<td>Wheat</td>
<td>0.801</td>
<td>0.611</td>
</tr>
<tr>
<td>Maize</td>
<td>0.796</td>
<td>0.485</td>
</tr>
</tbody>
</table>

Source: Diao (2007).

Analysis of Changes Trends in Real Prices, 2002/3 – 2005/6

64. Trends in cereal supply, demand and real prices, between 2002/4 and 2005/6, show output growth rates of teff, wheat and maize of 14, 17 and 15 percent, respectively. However the net supply of wheat grew by an average of 11 percent since net imports declined over this period. Using the long run income elasticities, we estimated that demand for these foods rose by about 9 percent per year due to growth in population and per capita incomes.

65. With supply increasing faster than demand, model simulations show real price declines of all three cereals of magnitudes that are broadly similar to those actually observed (compare the last two columns of Table 10). However these exclude the effects of differential income growth across households and cross-price effects of demand, for which more refined simulations are needed. When we include estimates of cross-price effects of demand (e.g., the estimated impact of a price rise in teff on wheat demand), this closes the unexplained gap between estimated wheat demand (at actual

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8 Additional simulations were run with a medium-term model with endogenous production.
market prices) and estimated supply to just 5 percent of net production. Medium-term trends in livestock prices are also broadly consistent with estimated supply and demand trends (Box 8).

Table 10: Supply, Demand and Real Prices of Major Cereals, 2003/04 to 2005/06 – Simulated and Actual Results (Trend Growth Rates)

<table>
<thead>
<tr>
<th></th>
<th>Production</th>
<th>Supply</th>
<th>Demand*</th>
<th>Real Simulated Price*</th>
<th>Real Addis Market Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teff</td>
<td>14</td>
<td>14</td>
<td>9.0</td>
<td>-7.3</td>
<td>-6.6</td>
</tr>
<tr>
<td>Wheat</td>
<td>17</td>
<td>11</td>
<td>8.6</td>
<td>-4.3</td>
<td>-9.0</td>
</tr>
<tr>
<td>Maize</td>
<td>15</td>
<td>14</td>
<td>8.6</td>
<td>-10.8</td>
<td>-4.2</td>
</tr>
</tbody>
</table>

* Denotes simulated variable.
Source: Staff estimates.

Box 8: Trends in Livestock Prices

The average consumer price of livestock products rose by about 15 percent in real terms between 2002-03 and 2006-07, while real value added in the livestock sector (as measured in the national accounts) stagnated.

Since demand for livestock products tends to increase faster than per capita incomes, this is estimated to have increased by about 20 percent.

Thus the observed real price increases are consistent with slow overall net supply growth. Further analysis is needed for specific livestock products and to take into account possible changes in net trade.

Analysis of Changes in Real Prices, 2005/6- 2006/07

66. For the latter part of the period, 2006-07, using official production figures for wheat and maize, simulated changes in real prices are close to those actually observed in markets. In other words, the estimated adjustment to production required to replicate observed change in real market prices is small: -5 percent for wheat and -3 percent for maize, which is within the margin of statistical error (Table 11).

67. However the behavior of teff market prices remains a puzzle. Observed real market prices for teff rose sharply in 2006-07; model simulations suggest that with a 17 percent increase in production (and a 13 percent increase in demand), real prices should have fallen. Hence there is a large, unexplained gap between supply and simulated demand at observed market prices is about 420 thousand tons – which is equivalent to 15 percent of total teff production in 2005/6.

Table 11: Simulations of Increased Production and Effect on Price

<table>
<thead>
<tr>
<th></th>
<th>Production (% change)</th>
<th>Supply (% change)</th>
<th>Simulated Demand Shift (%)</th>
<th>Simulated Real Price (%)</th>
<th>Historical Real Price (%)</th>
<th>Required Production Adjustment (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teff</td>
<td>17.5</td>
<td>17.5</td>
<td>11.4</td>
<td>-8.3</td>
<td>23.3</td>
<td>-20.0</td>
</tr>
<tr>
<td>Wheat</td>
<td>25.2</td>
<td>16.7</td>
<td>16.0</td>
<td>-1.0</td>
<td>5.5</td>
<td>-5.0</td>
</tr>
<tr>
<td>Maize</td>
<td>20.8</td>
<td>20.4</td>
<td>10.5</td>
<td>-18.5</td>
<td>-12.3</td>
<td>-3.0</td>
</tr>
</tbody>
</table>
68. A simple depiction of the price effects of shifts in supply and demand in the teff market between 2005-6 and 2006-7 is presented in Figure 14. In 2005-06, supply and demand are equated at P0. In 2006-07, reported supply increases by 310,000 tons to S1; if no shift in demand, then price would fall from P0 to P1. Given an estimated demand shift of 11 percent, from D0 to D1, at the observed market price in 2005-06 of P1*, supply exceeds demand by 420 thousand tons.

Figure 14: Teff Market—Price Effects of Shifts in Supply and Demand

69. There are several candidates to explain the estimated supply-demand gap in the teff market in 2006-07.

- Production may have been over-estimated because of changes in CSA methodology. As noted above, for the first time CSA included subjective adjustment factors from local officials in the preliminary production estimates. However, it is unclear why this overestimation should only affect teff, and not other grains.

- Privately held stocks may have accumulated above normal levels due to lack of alternative savings and consumption options. As noted above, real interest rates are significantly negative for formal sector savings and access to financial instruments is generally low.

- In the expectation of grain prices continuing to rise, private traders may hoard supplies, although available evidence does not lend support to this hypothesis. A recent Rapid Rural Appraisal in PSNP and non-PSNP areas interviewed 265 traders in 31 towns and found that traders have not accumulated significant stocks of wheat, teff or maize, although among the 16 Cooperative Unions that were surveyed there was some accumulation of stocks. Also, according to the USAID/VOCA study (2006), total storage capacity of the grain trading
cooperatives is less than 45,000MT with extremely poor quality, and thus unlikely to influence the market.

- Higher exports than officially reported, given the formal ban on teff exports. However since normal exports are estimated at only about 10 thousand tons per year (only 2-3 percent of the unexplained supply-demand gap), this is unlikely to be major factor.

- Underestimation of consumer demand may be an issue. In particular we know that teff is a preferred consumption grain, and represents an important share of urban consumption, especially for the better off. Thus to the extent that urban incomes are rising and the middle class is growing in Addis and other towns, the long run estimates of income elasticity may be under-estimating this impact on demand and therefore price.

70. The shift in seasonal patterns of teff price movements observed in 2006-07 suggests that private stock behavior and structural changes in teff markets likely account for about half of the gap between estimated demand and supply. Teff prices did not experience their normal seasonal rise in the December 2006 to September 2007 period, so the change in average real prices for October 2006-September 2007 crop year (10.4 percent) is significantly less than the 30 percent rise in real prices from December 2005 to December 2006 or the 24 percent rise in real prices for the October-September crop years. With a lower price increase of 10.4 percent, the simulated gap between net teff supply and demand is reduced to only 245 thousand tons, 12 percent of official estimates of net teff production in 2006/07.

71. Estimates of the effects of production changes and demand shifts using a regionally disaggregated multi-market model give similar results (Table 12). Including estimated effects of price changes of all food commodities on demand for teff, wheat and maize makes little difference to the simulated effects on real teff prices (-5.6 percent, versus -8.3 percent with the simple model), though a somewhat larger effect for wheat. Moreover, if the northern cereal market is not integrated with the rest of the country (as suggested to some extent by previous econometric analysis of wholesale markets) and has little effect on the main national market, changing the price effect from -5.6 under the integrated market assumption to -1.8 percent under the regionalized market assumption.

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9 Storage capacity of each of the primary cooperatives range from 200-1000 tons, while cooperative unions (formed by 2 or more primary cooperatives) have an average capacity of 2000 tons.

10 See Gebre-ab (2007) for a discussion of a disequilibrium expectations framework for analyzing teff market stockholding and price behaviour.
Table 12: Simulations of Increased Production and Effect on Price: Alternative Specifications

<table>
<thead>
<tr>
<th>Historical Real Price Change</th>
<th>1997</th>
<th>2006</th>
<th>Maize</th>
</tr>
</thead>
<tbody>
<tr>
<td>December-December</td>
<td>28.8</td>
<td>7.4</td>
<td>-7.1</td>
</tr>
<tr>
<td>October-March</td>
<td>23.3</td>
<td>5.5</td>
<td>-12.3</td>
</tr>
<tr>
<td>Crop Year (October-September)</td>
<td>10.4</td>
<td>-0.8</td>
<td>-6.4</td>
</tr>
<tr>
<td>Simple Model</td>
<td>-8.3</td>
<td>-1.0</td>
<td>-18.5</td>
</tr>
<tr>
<td>Full Multi-market Model</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated National Market</td>
<td>-5.6</td>
<td>-11.3</td>
<td>-12.2</td>
</tr>
<tr>
<td>Regional Model*</td>
<td>-1.8</td>
<td>-10.5</td>
<td>-11.4</td>
</tr>
</tbody>
</table>

* Results shown for the Regional Model are for the combined Central-Southern Highland, Eastern Highland and Humid Lowland (i.e. excluding the Northern Highland region).

Source: Diao (2007) and Dorosh and Subran (2007).

Simulated impacts of the PSNP on real grain prices

72. We also use the model to quantify the price effects of the introduction of the PSNP. Food aid effects are apparent on the supply side, in a depressing influence on food prices. A cutting back of food aid (and net domestic availability) raised real wheat prices by approximately 29.3 percent (Figure 15).

Figure 15: Effects of PSNP 2005-06: Cash vs Equivalent Food Aid Transfer

Source: Model simulations from Dorosh and Subran (2007).

73. The PSNP is transferring cash to large numbers of households – however the model suggests that the demand-side effects on prices are relative small. The net effect of PSNP replacing food aid transfers is a sharp increase in real wheat prices due to the reduction in supply. Overall, our analysis suggests that the magnitude of the effects have not been large, and do not support the arguments that have been made recently that PSNP is driven inflation in Ethiopia.
VI. WELFARE IMPACTS

74. For the average Ethiopian, food amounts to 58 percent of total consumption. Cereals form the lion share—about half of food consumption and one-fourth of average expenditure. In this section, we first present a descriptive analysis of basic consumption patterns of the major cereals (teff, wheat, maize, sorghum and barley) across various household groups. We then examine the effects of price changes on household welfare using on individual households’ food consumption and production.

Consumption of Major Cereals

75. Not surprisingly, given the size and diversity of Ethiopia, the level and type of grain consumption varies by region, due to differences in household preferences, income, prices, and so on. Among rural households, per capita consumption of teff is significantly higher for non-poor households than for poor households and is higher in the northern highlands than the south-central highlands. The regional pattern is reversed for maize and wheat, for which per capita consumption of rural households is higher in the south-central highlands than in the northern highlands, controlling for total expenditures (Figure 16).

Figure 16: Per Capita Cereal Consumption by Region, 2000

[Bar chart showing consumption levels of maize, wheat, teff, and sorghum in different regions]


76. Using nationally representative household data (HICES, 2004) available at the time of the analysis we can examine patterns of household expenditure. This shows that there are also major differences in urban and rural consumption, with expenditure shares of teff higher and those of maize and sorghum lower than in rural areas (Table 13).

77. Of course, given the agricultural basis of the Ethiopian economy, many households also produce some grain. Net sellers of grain benefit from higher prices. We can use the HICES data to
establish net sellers and net buyers, with the qualification that incomes tend to be under-reported. Looking at the effects of price changes by crop on farmers in terms of net sellers and buyers, *teff* price increases tend to benefit farm households since 40 percent of farmers are net sellers of *teff* and only 10 percent of farmers are net buyers of *teff*. Wheat and maize price increases have mixed effects on farm households, since 20 percent of farmers are net buyers of wheat and more than 30 percent of farmers are net buyers of maize (Figure 17).

Table 13: The Importance of Grain in Household Expenditures, 2004

<table>
<thead>
<tr>
<th>Category</th>
<th>Ethiopia Mean</th>
<th>Ethiopia Share (%)</th>
<th>Urban Mean</th>
<th>Urban Share (%)</th>
<th>Rural Mean</th>
<th>Rural Share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total household expenditure (Birr/month)</td>
<td>682</td>
<td>56.2</td>
<td>907</td>
<td>49.9</td>
<td>639</td>
<td>57.4</td>
</tr>
<tr>
<td>Total food expenditure</td>
<td>354</td>
<td>4.7</td>
<td>354</td>
<td>7.9</td>
<td>25</td>
<td>4.2</td>
</tr>
<tr>
<td><em>Teff</em></td>
<td>26</td>
<td>4.3</td>
<td>14</td>
<td>2.2</td>
<td>28</td>
<td>4.6</td>
</tr>
<tr>
<td><em>Wheat</em></td>
<td>12</td>
<td>2.0</td>
<td>2</td>
<td>0.4</td>
<td>14</td>
<td>2.3</td>
</tr>
<tr>
<td><em>Barley</em></td>
<td>27</td>
<td>4.5</td>
<td>6</td>
<td>1.1</td>
<td>31</td>
<td>5.1</td>
</tr>
<tr>
<td><em>Maize</em></td>
<td>25</td>
<td>4.2</td>
<td>5</td>
<td>1.0</td>
<td>29</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Note: Statistics are weighted and show averages for all households in the sample. “Share” is mean share of selected categories out of total household expenditure.

Source: HICES 2004 data.

Figure 17: Net Seller and Buyers of Grain Among Farmers

Source: Calculated from IFPRI/CSA Survey, 2005

Price Changes and Household Welfare: Total Food Expenditures

Analysis of distributional impacts of changes in overall food prices (including cereals, as well as other food) needs to account for differences in production and consumption patterns, and behavioral responses to price changes. Numerous studies have analyzed the welfare impact of food price changes in various countries (see Box 9). Most obviously, food prices changes affect average rural and urban households differently. Overall, rural households tend to gain from increases while urban households tend to lose, though the final rural effects depend on the composition of net buyers and sellers and the importance of induced wage responses.
Box 9: Summary Overview of Household Welfare and Food Price Change Literature

General findings:

- The pioneering statistical work of Deaton (1989, 1997) analyzes the increase of rice prices and their distributional implications in rural and semi-rural Thailand. Higher rice prices provide direct benefits to all households, but the main beneficiaries are not the poorest or the richest households, but middle-income groups.
- Ravallion (1990) looks at the welfare effects of food price changes in rural Bangladesh. The short-run distributional effects are likely to benefit the rural rich while the rural poor lose. Considering induced wage responses, however, the long-run effects appear to be more positive for the poorest households.
- Barret and Dorosh (1996) address rice price changes in rural Madagascar. The welfare increase of rice price changes is concentrated among larger and richer farmers in particular regions. Poor farmers face significant negative welfare effects.
- Budd (1993) examines food price changes in rural Côte d’Ivoire. Most households are net sellers, but the magnitudes sold are small. Income elasticities with respect to food price change are small. The effects are quite diverse and depend on composition of the food basket and geographical location.
- Mude (2005) looks at welfare and distributional impacts of rice price policy in rural and urban Kenya. A reduction in maize price would decrease rural and urban poverty, and inequality will fall.
- Minot and Goletti (2000) analyze rice price changes in Viet Nam. Surplus regions in rural Viet Nam would gain, while food deficit regions and urban areas would lose from change in rice prices. Higher rice prices would benefit the average urban household to the expense of urban households. The quantitative effects of rice price change are small.
- Christiaensen and Derny (2007) review case studies for Eastern Africa. Their findings suggest that a number of factors matter, such as the net marketing position, productivity and wage induced changes, and the integration of markets. On balance, they conclude that many poor households are net food buyers. Higher food prices may further impoverish rural and urban populations.

For Ethiopia:

- Levinson and McMillan (2004) look at the welfare impacts of wheat price change associated with food aid in Ethiopia using the 2000 HICES and WMS. Households would generally benefit from a reduction in wheat price, with the benefits being proportionally larger for the poorest households.
- Through regression analysis, Dercon (2006) identifies the determinants of poverty changes during the 1990s in 15 villages in rural Ethiopia. The main factors driving consumption changes are relative price changes. Higher relative food prices would benefit the poor, though this would not be the only factor.

In sum, results and methods differ considerably. Authors focus at individual crops or food baskets, such as Budd (1993) and Ravallion (1990). All studies consider hypothetical food price changes, typically 10 percent. With the exception of Ravallion (1990) and to some extent also Mude (2005), studies do not consider induced wage responses. Authors typically do not discuss the inherent statistical problems measuring food production, incomes, and expenditures. This may partly contribute to the varying results.

79. Country specific econometric analysis was commissioned to inform this note (see background papers by Loening and Oseni (2007), and Abebe and Delegen (2007)). Using data from the 2000 WMS/HICES, Loening and Oseni (2007) estimates that a hypothetical 10 percent increase in food prices, holding production levels and other sources of income constant, would increase rural income levels by 1-2 percent while decreasing the urban incomes by 4 percent. The benefit for rural households is biased towards better-off households than low income smallholders. Interestingly,
however, in the case of urban households, the hardest hit in the short run are those falling in the middle income brackets (Figure 18).\textsuperscript{11}

80. There are intra-rural differences as well, between net sellers and net buyers. More than half of rural households are net food sellers and on average they gain from food price increases. A 10 percent rise in food prices increases rural net sellers’ income levels by 4 percent in the short run. Net food buyers tend to lose from the same price change, decreasing the rural net buyers’ income levels by 4 percent.

Figure 18: Impact of Food Price Increases

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure18.png}
\caption{Impact of Food Price Increases}
\end{figure}


81. At the same time, the aggregate welfare impacts of the observed food price changes at national level in Ethiopia are small, reflecting opposing welfare impacts between urban and rural net sellers, and rural net buyers) Based on the relative food price change of 23 percent during January 2000 to April 2007, and holding per capita non-agricultural incomes and non-food prices constant in real terms, the expected total welfare effect is an increase of 0.7 percent relative to initial household income. Using national expenditure quintiles, the middle-income groups benefited most from the food price increase.

82. Looking behind the national averages, the net welfare results are mixed.

- A distinction by location indicates that rural household real income increases by about 4 percent, while income for urban households decreases by 8 percent.
- Regionally (albeit using uniform national prices), we find that the main urban centers and Tigray experience the largest net welfare decreases because of the direct effect of price changes, while net welfare in SNNPR and Benishangul increased.

\textsuperscript{11} We rely on the 2000 WMS/HICES since both income and expenditure data is required for the analysis. The 2004 HICE income data has not been made public. Nor also that analyzing the welfare impacts of food price changes requires some approximation techniques. The robustness of the conclusions has been tested with a sensitivity check and analysis of changes of the asset structure of rural households (see Loening and Oseni, 2007).
• For the rural net buyers, we find a decrease of about 7 percent and for rural net seller households, an increase of around the same magnitude.

• The decomposition of rural households by quintile shows that high-income groups gain relatively more, though the top quintile represents relatively few wealthy households.

• Differentiated urban welfare effects show that the effects have been negative for all income groups but in particular the urban poor.

83. Decomposing by time period, we find that most of the relative price change occurred prior to 2005. About 70 percent of the total welfare effects arose during the period between January 2000 and December 2005.

84. Detailed analysis of the effects of price changes of individual commodities using the Addis Ababa University and University of Gothenburg household panel data set provides similar results for total food expenditures (background paper by A. Shimeles and A. Delegn).\textsuperscript{12} As in the 2000 WMS/HICES data, the panel data set shows that consumption expenditures between 1994 and 2004 went largely to food and drink (Table 14). Cereals account in rural areas about 42 percent and in urban areas about 22 percent of total consumption expenditure, of which teff, wheat and maize play a major role.

<table>
<thead>
<tr>
<th>Items</th>
<th>Urban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and drinks</td>
<td>0.61</td>
<td>0.80</td>
</tr>
<tr>
<td>Clothing</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>Health and education</td>
<td>0.11</td>
<td>0.02</td>
</tr>
<tr>
<td>Energy</td>
<td>0.07</td>
<td>0.02</td>
</tr>
<tr>
<td>Transport</td>
<td>0.05</td>
<td>0.01</td>
</tr>
<tr>
<td>Others</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>Total</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Number of observations</td>
<td>6250</td>
<td>5125</td>
</tr>
</tbody>
</table>


Concentration Curve Analysis

85. To establish empirically the extent of the bias that inflation may have against the poor, the simplest approach is to construct concentration curves: the expenditure profile of a specific commodity (or sets of commodities) can be used to infer whether the rise in price affects households in different income groups differently or uniformly. Concentration curves are generalized forms of the popular summary distributional measure known as the Lorenz curve. This exercise can provide

\textsuperscript{12} The panel survey sample consists of data on 3000 households (equally divided between urban and rural) collected in five rounds between 1994 and 2004. Further description of the nature of the data, the sampling methods involved in collecting it, and other features are discussed in Bigsten et al. (2005).
rich information on the welfare implications of increases in commodity prices (see e.g., Yitzhaki and Slmerod, 1991).

86. As shown in Figure 19, the rural concentration curves for teff and wheat lie slightly above the Lorenz curve and in some quintiles the three curves cross, which implies that there is mixed welfare dominance for the poor and non-poor households (Howe, 1993). Consumption of maize seems to be consistently closer to the 45° line, suggesting that this is an essential good consumed by low consumption groups. In contrast, in general, price increases in teff and wheat could hurt non-poor groups more.

**Figure 19: Concentration curve for cereals: rural areas 1994-2004**

![Concentration curve for cereals: rural areas 1994-2004](image)

*Source: Shimeles and Delegn (2007) using data from the Gothenberg/AAU panel household survey.*

87. In urban areas the situation seems to be different (Figure 20). Teff and wheat tend to be necessities for all income groups; with maize above the per capita expenditure line (i.e. it is more important for the poor than the non-poor). The overall share of teff in total cereal consumption is much higher in urban areas.\(^{13}\)

\(^{13}\) A summary of estimates of income elasticities of demand is given in Annex Table 2. The overall picture of price responsiveness emerging from the panel data is that the three cereals tend to be price elastic in many specifications, with evidence of wheat being a close substitute for teff, especially in cereal areas.
88. The panel data analysis commissioned for this study suggests that urban consumption patterns exhibit significant non-linearities in a large group of commodities, especially for higher consumption quintiles. In general, in addition to cereals, such items as sugar, kerosene, electricity, pulses, coffee and tea, fall under the category of “necessities” – so that an increase in the relative price of any of these commodities will have larger adverse effects for the poor (see Annex Table 4).

89. A complementary approach is to evaluate by how much overall inequality changes due only to changes in relative prices holding each household income constant. For this particular purpose we use the urban HICES 1999/2000 (described above), since it has a wider coverage and is nationally representative. Econometric analysis commissioned for this study suggests that the Gini coefficient would have worsened by about 2 percentage points between 2000 and 2006 due only to inflationary processes. If the trend of rising income inequality reported by Bigsten and Shimeles (2007) for the decade 1994-2004 has continued, this regressive inflationary impact would have exacerbated this disequalising trend.

90. Finally, but not least household panel data enables investigation of price responses of consumption, as in Dercon (2004). Figure 21 depicts the relationship between relative prices and consumption growth in rural areas for the period 1994-2004. The positive relationship depicts the fact that the higher relative prices of agricultural goods, for net sellers, mean both income and consumption gain. Interestingly, even for net buyers, this pattern suggests that higher relative prices would mean higher incomes, which is consistent with Dercon (2004). While they lose due to the negative direct effect on consumption, the size of this effect depends on the elasticity of price as well as income and expenditure shares of the purchased goods on total consumption. Indirect effects could include diversification toward high monetary value crops, wage effects, and so on. Quantitative results suggest that changes in relative prices of agricultural goods are responsible for as much as 20 percent of the variation of consumption expenditure in rural areas.

Source: Shimeles and Delegn (2007).
Figure 21: Non-parametric estimates of effect of relative prices on rural consumption, 1994-2004

Source: Shimeles and Delegn (2007).

Summary

91. In sum, measuring the welfare impact of inflation for rural households is challenging given the simultaneous production and consumption decisions inherent in their livelihood systems (a complexity from which we have abstracted in this analysis), and the responsiveness of consumption decisions to price and incomes. Nevertheless, the micro analysis suggests several important findings.

- Overall, rises in the relative price of food tends to benefit rural households, though the exact magnitude needs to be investigated further.
- Changes in the prices of teff, wheat and maize tend to affect more the people at the higher income quintile in rural areas, while in urban areas they tend to affect those at the lower income quintiles.
- The recent hike in relative prices has increased the urban cost of living by 8-12 percent in urban areas.
- Inflation could worsen urban income inequality significantly.
- Demand for teff, maize and wheat tends to be elastic, with evidence of substitutability, especially between teff and wheat. In urban areas, all three types of cereals tended to be necessities, with inelastic price responses.
VII. EMERGING CONCLUSIONS, AND POLICY IMPLICATIONS

92. High inflation has become a significant concern in Ethiopia, and shows no signs of abating in 2007. In the latest official inflation figures for October 2007, the 12-month annualized national rate has reached to almost 18 percent, with price increases continuing to be broad-based – food increasing by 18 percent and non-food items by 16 percent. Within food, cereals prices have increased by 16 percent, implying that the prices of other food items have increased even more rapidly over the past year, by 19 percent.

93. We found that medium-term trends in real prices of wheat, maize and teff are broadly consistent with official figures on supply, and estimated increases in demand due to population and per capita income growth. The exception is the large increase in teff prices in 2006-07 (in both nominal and real terms), which remains a puzzle. We showed that at observed market prices; officially reported supply exceeds estimated demand by 410 thousand tons (equivalent to about 15 percent of net production), though the estimated gap based on October-September crop-year real price changes is about half that size, suggesting that increases in private/cooperative stocks (made more attractive by negative real interest rates on credit) may have played a major role in price seasonality and overall price movements in 2006-07. Other possible explanations for the remaining gap include an over-estimation of production. It is nonetheless the case that these real price increases in teff, while visible to the population, represent only a small part (about 5 percent) of overall food price inflation.

94. In terms of the hypotheses under investigation, we found the following:

- The partial shift from food aid to cash transfers as part of the PSNP has had positive, but not large, effects on market prices for farmers. However, even together with food transfers, the total size of the program in 2006-07 is only about 1 percent of GDP. Assuming about two-thirds of transfers in-kind is imported food; the net effect of increased supply of cereals plus increased demand because of higher household incomes is an insignificant increase in food prices (less than .5 percent).

- One explanation which gained support from our investigation is that the activities of cooperatives are affecting the structure of the market and improving the bargaining power of farmers (especially in the teff market).

- In the medium term, the domestic supply is likely to run behind demand in a high growth context, especially since production increases have been driven by area expansion, and trends in yields remain disappointing, further increases in relative prices are likely.

95. We found evidence of increased marketing of grain production. It is nonetheless the case that agriculture markets in Ethiopia are generally underdeveloped and competition is limited. The private sector is not currently in a position to take the risks involved in purchasing, storing and marketing grain, particularly if food aid purchases and deliveries are unpredictable.
96. In this context, one conclusion of the study, consistent with present policy directions of the GOE, is that a coordinated strategy, developed and implemented in partnership with the private sector, is needed to foster greater private storage of grains in cooperation with food aid agencies. The planned Commodity Exchange, for a select group of commodities, and its associated institutions, such as the use of warehouse receipts, should help smooth prices and eventually allow farmers as well as traders to forward contract, and lock-in harvest prices. The commodity exchange is expected to create market information and transparency at various levels: on market prices, issues relating to supply and demand of commodities, quality of products, and on the reliability of market stakeholders.

Policy Implications

97. The policy implications which emerge from this study relate largely to the structural and institutional agenda which affect agricultural development in Ethiopia. These can be summarized as follows.

- First is the importance of sound monetary policy in the context of maintaining Ethiopia’s record of macro-economic stability. While recent measures adopted by the authorities on this front are encouraging, given the importance of inertia and inflationary expectations, further measures and some time may be needed to offset the current momentum of rapidly rising price levels. The challenges faced in Ethiopia are similar to those being faced by governments around the world, whose recent policy actions were summarized in Box X. Many central banks have tightened monetary policy during the last few years against the backdrop of persistent inflationary pressures represented by inflation, especially in view of continued strength of demand, ample liquidity and possible pass-through from past and present increases in oil and other commodity prices. The authorities are already working with the IMF to review additional measures that might be needed to maintain a stable macroeconomic framework and overall growth objectives. Possible measures include containing public expenditure, issuing more T-bills to mop up liquidity, and further tightening monetary policy.

- Second, we suggested that negative real interest rates in official credit markets are likely to distort storage, marketing and investment decisions. Negative real interest rates could thus reduce marketed supply, and also boost house prices and renting costs, both which are observed in Ethiopia. ‘Enhanced financial services for accelerated growth’ is already a key pillar of the PASDEP (pillar XVI), which raises the agenda around financial sector development and reforms that are needed to meet the access and performance targets that are laid out in the PASDEP. This agenda could include actions to improve financial sector regulation and supervision, improving the payments system, gradually increasing domestic interest rates to support savings, and reviewing the micro-lending program under the Government’s Food Security Program to target different groups of low-income beneficiaries. This agenda will be supported by, among other things, the World Bank’s financial sector capacity building operation, which became effective in 2007.

- Third, we observed that there are policy-induced barriers to private trade, (including import tariffs, restrictions on credit and level of stocks, VAT on large sales of milled grain, and uncertainty regarding government policy). These add to costs and risks for private traders and prevent Ethiopia from taking advantage of private sector imports as a means to avoid

14 See World Bank, 2007, Country Economic Memorandum, Volume II.
price spikes. While international commodity prices are presently high (and uncompetitive in domestic markets), this remains a major longer term issue to be addressed.

- Fourth, we highlighted the need for policymakers to account for potential price impacts of future changes in supply of food aid. This dialogue can be linked to discussions around the PSNP.

- Fifth, a coordinated strategy developed and implemented in partnership with the private sector to foster greater private storage of grains in cooperation with food aid agencies, together with the recently established Commodity Exchange, for a select group of commodities, with its associated institutions, such as the use of warehouse receipts, should help smooth prices in the future.

- Sixth, targeted measures to compensate adversely affected households, like those which have already been initiated for wheat in urban areas, could play a role in alleviating adverse impacts, although success in addressing inflation more generally will have larger payoffs.

- Finally, but certainly not least, the analysis drew attention to a fundamental long term challenge for Ethiopia, and that is the likely limits on future area expansion, that in turn will slow growth in food production in the absence of significant yield improvements.

98. While recent growth in agricultural output has been impressive, the rural agenda remains large, and overall progress to date has been disappointing especially in enabling improvements in agricultural productivity. Subsistence agricultural on small plots of land with limited irrigation and fertilizer use remains the predominant production model in much of Ethiopia. Coupled with this are severe environmental degradation in many parts of the country, which is a major drag on productivity, and high climatic variability which means that the country remains vulnerable to recurrent weather shocks.

99. The PASDEP emphasizes the importance of enhanced food security through employment generation, private sector involvement in agricultural production and better resource management (pillar II), including irrigation (pillar VII), and includes targets related to increased labor and land productivity, production of cereals, livestock value-added and medium and large scale irrigated land. Among the expected areas of progress are better functioning input markets (including import and financing rules, role of private sector), strengthened role of MFIs and rural finance, progress on the land certification action plan (phases 1 and 2) and the expanded extension system working on an innovative and demand driven basis. There is a valuable foundation on which to build, given the evolution of decentralization and the role of local governments over time. There has been significant improvement in basic services, and some major improvements in farm level diversification and marketing opportunities. Three development agents (DAs) and two health extension workers are supposed to be present in every kebele. These are locally trained and recruited staff. Field reports suggest that decentralized decision-making and implementation processes are working much better, although the quality of services remains wanting in many ways, mainly due to lack of resources for complementary inputs and the limitations of the physical infrastructure presently available in many rural areas.

100. A recent WB ARD-PER shows that the government’s financial support to agriculture and rural development has been strong, and is expected to expand significantly under the PASDEP. For instance, in 2005, ARD absorbed about 25 percent of total public expenditure, or 50 percent of total expenditure on pro-poor programs, equivalent to 17 percent of agriculture GDP. While the size of
ARD expenditure is keeping with its central role in the Government’s development strategy, little is known about the impact on agriculture productivity and growth.

Next Steps

101. This study has shed some light on the challenges facing policy makers in Ethiopia, but much more remains to be better understood. Informal discussions among the WFP, EC, and IFPRI has been initiated to identify the areas of further analysis to contribute towards a better understanding of grain markets and help strengthen policy and operational decision-making, including changes in consumption patterns, commercialization, and storage and trade flows and cereal value chains. This is a welcome initiative, and should help to underpin the improvements in information sharing and data bases for food security policies that are needed.

102. The agenda emerging from this synthesis highlights the need to deepen the focus of policymakers on the underlying medium term issues, which are mostly broader than the operation of grain markets per se. In this context, the priorities for further analysis relate to such basic issues as the rural-urban transformation, including public investment policies related to growth corridors and the development of small towns and road infrastructure linking rural areas with urban centers, and the agenda around improving agricultural productivity. The specific analytical priorities include:

- Further examination of the welfare impacts of price movements, based on a comparison 2000/2004 HICE or other sources. This could be part of the ongoing poverty analytical program of the WB. This would also seek to improve the data situation for the coming periods as this issue will continue to be of relevance.

- Work on issue related to crop marketing, generating and sharing timely market information with traders, and other items related to agricultural market efficiency to understand price stickiness and behavioral factors. Work on agricultural input markets would fit into this, by examining price formation and market behaviour for key agricultural inputs.

- In complement, there are opportunities for more closely looking at the effectiveness of ARD public expenditure and impact on increased agriculture productivity, in support of maintaining low inflation in the medium-term.

103. Progress on the policy front, underpinned by advances on key aspects of the rural analytical agenda would help to address the structural challenges facing Ethiopia in sustaining rapid growth.
REFERENCES


Dercon Stephan, Food Insecurity in Ethiopia, A discussion paper for DFID, October 2000.


ANNEX 1. MEASUREMENT OF THE CONSUMER PRICE INDEX IN ETHIOPIA, AND RECENT REVISIONS

The Consumer Price Index (CPI) measures the average change in the price paid by consumers for a fixed market basket of goods and services. It is usually based on the weights of the goods and services in household expenditure and their current market prices.

In Ethiopia, compilation of CPI started in 1963, with monthly reports for different basket of commodities for Addis Ababa only. The base was 1963. Following the integrated HICES in 1995/96, a new CPI was developed with more diversification of the index – urban, rural and national – with some breakdown of commodities. However, this classification has created aggregation problem, so that the classification was then changed into country level and regional level CPI. Subsequently, the base year changed to December 2000.

Recently, a December 2006 base was introduced. This was used to update the previous CPI series and the newly selected basket is more diversified, with revised weights. For the purposes of analysis in this note, however, the series based on December 2000 is used.

Regional Coverage

The CPI that CSA produces covers the 11 regions and the national level. These twelve monthly CPI reports are based on the results of the HICES conducted by the CSA in 2004/2005 from which expenditure weights are derived for major household goods and services, adjusted using the December 2006 retail prices of the goods and services as a base period. The new series is constructed for country as a whole and Regional States including Dire Dawa and the Addis Ababa City Administration. Similar indices have been utilized at Addis Ababa Level since 1963 and at Country, Urban and Rural Levels since 1995/96 and in Country and Regional level since 2000.

Commodity Coverage

The twelve general indices are divided into two major groups, that is, food and non-food. The non-food index includes ten major groups, namely: Beverages; Cigarettes and Tobacco; Clothing and Footwear; House Rent, Construction Materials, Water, and Fuel and Power; Furniture, Furnishing, Household Equipment and Operation; Medical Care and Health; Transport and Communication; Recreation, Fruits; Oil, Fats and Spices; Potatoes, Other Tubers and Stems; Coffee Beans (whole) and Tea Leaves; Other Food Items; Milling Charges; and Food taken Away from Home. The new CPI includes more detailed 'housing, construction materials, water and fuel and power' components.

Methodology

Up-to-date data on retail prices are collected in selected sample market places located in representative urban centers in each zone/ special woreda of the country (Annex Table 1). A total of 119 market places were selected for the retail price survey. In each marketplace an enumerator is assigned to undertake the data collection. The price data is collected between the 1st-15th day of each month. To calculate the monthly regional consumer price indices, geometric means of prices of the specific regions are used. The distribution of the market place of each region and items included in the basket of commodities are shown in the table below.
### Annex Table 1: Number of markets covered and basket of commodities by region

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of markets</th>
<th>Basket of commodities</th>
<th>Dec 2000=100</th>
<th>Dec 2006=100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tigray</td>
<td>8</td>
<td>114</td>
<td>143</td>
<td></td>
</tr>
<tr>
<td>Afar</td>
<td>4</td>
<td>85</td>
<td>153</td>
<td></td>
</tr>
<tr>
<td>Amhara</td>
<td>20</td>
<td>118</td>
<td>144</td>
<td></td>
</tr>
<tr>
<td>Oromia</td>
<td>24</td>
<td>127</td>
<td>161</td>
<td></td>
</tr>
<tr>
<td>Somale</td>
<td>6</td>
<td>85</td>
<td>122</td>
<td></td>
</tr>
<tr>
<td>Benishagul Gumuz</td>
<td>6</td>
<td>111</td>
<td>142</td>
<td></td>
</tr>
<tr>
<td>SNNP</td>
<td>31</td>
<td>130</td>
<td>152</td>
<td></td>
</tr>
<tr>
<td>Gambella</td>
<td>3</td>
<td>105</td>
<td>103</td>
<td></td>
</tr>
<tr>
<td>Harari</td>
<td>2</td>
<td>102</td>
<td>158</td>
<td></td>
</tr>
<tr>
<td>Addis Ababa</td>
<td>12</td>
<td>175</td>
<td>193</td>
<td></td>
</tr>
<tr>
<td>Dire Dawa</td>
<td>3</td>
<td>121</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>119</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

An important factor in constructing a Consumer Price Index is the selection of the representative basket of goods and services. Including all consumption items into the market basket of goods and services is both cumbersome and unnecessarily costly in term of data collection and processing. It does not make sense to include goods or services with an insignificant weight since these will not move the price compared to the general market trend. Hence expenditure on the selected goods and services in the regional baskets is above a cut-off point.

**Weights**

The national CPI aggregates the regional group indices and the contributions of the five large regions which, in terms of the magnitude of expenditure, account for more than 95 percent. These regions are Oromia, Amhara, SNNP, Addis Ababa and Tigray.

According to the weights for food and non-food groups in Annex Table 2, in the December 2006-based CPI, about 57 percent of household expenditure is spent on food. This share is about 3 percentage points lower than the December 2000 based CPI. Similarly, the expenditure on non-food components increased from 40 percent to 43 percent.
Annex Table 2 Major groups in the 2000 and 2006 based CPI and weights at the country level

<table>
<thead>
<tr>
<th>Major Groups</th>
<th>Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000 based</td>
</tr>
<tr>
<td>Food</td>
<td>0.6008</td>
</tr>
<tr>
<td>Non-food</td>
<td>0.3992</td>
</tr>
<tr>
<td>Beverages</td>
<td>0.0201</td>
</tr>
<tr>
<td>Cigarettes and Tobacco</td>
<td>0.0051</td>
</tr>
<tr>
<td>Clothing and Footwear</td>
<td>0.0926</td>
</tr>
<tr>
<td>House Rent, Construction Materials, Water and Fuel and</td>
<td>0.1544</td>
</tr>
<tr>
<td>Furniture, Furnishing, Household Equipment and</td>
<td>0.0494</td>
</tr>
<tr>
<td>Medical Care and Health</td>
<td>0.0120</td>
</tr>
<tr>
<td>Transport and Communication</td>
<td>0.0199</td>
</tr>
<tr>
<td>Recreation, Entertainment and Education</td>
<td>0.0101</td>
</tr>
<tr>
<td>Personal Care and Effects</td>
<td>0.0092</td>
</tr>
<tr>
<td>Miscellaneous goods</td>
<td>0.0264</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1.0000</strong></td>
</tr>
</tbody>
</table>
ANNEX 2. ESTIMATING CROP PRODUCTION IN ETHIOPIA

For the last six years, crop production in Ethiopia has been regularly subject to three different assessments, undertaken by three different institutions for different purposes. The three assessments are undertaken by the Ethiopian Central Statistical Agency (CSA) FAO/WFP, and by a USAID team undertaking an annual Bellmon analysis.

- CSA undertakes a two-stage exercise involving an initial area assessment combined with a yield forecast and a subsequent yield estimate based on crop cutting. The information is used to determine overall national crop production from small-scale producers in the Meher season. It is not an estimate of overall food availability but should track changes in agricultural production systems, yields and productivity in general.

- The FAO/WFP exercise is an assessment of annual food production that is compared with estimated demand based on standard nutritional requirements to determine the national food balance and availability of stocks for local purchase.

- The Bellmon analysis is designed to assess the potential disincentive effects of anticipated food aid imports. As such, it combines an assessment of annual production with an empirically derived estimate of demand to determine a national food balance as one of the elements that can affect adverse effects of imported food aid.

It is not surprising that within a given year, the results from these different approaches can differ considerably. The focus of this note is on the CSA assessment, since that generates the official estimates used by the Government for a range of purposes.

The CSA assessment is undertaken in two interdependent parts. The first part is a crop forecast, made during the latter half of the Meher season, when the areas sown to each crop are estimated and the yields of each crop are forecast. This forecasting procedure relies upon the yields determined for the previous year, which are combined with a “condition factor” to determine current expected yields. The condition factor is based upon growers’ estimates of relative increases or decreases in yield for each crop, together with inputs from development agents (DAs) and heads of farmers associations and additional information regarding exceptional weather conditions, incidence of pests and diseases and availability of improved seeds and/or fertilizers. The result is a best estimate of relative yield, which can be used together with the previous year’s yield data and updated area’s sown, to forecast production. This forecast is normally released between January and May following the Meher harvest.

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15 This annex is a synopsis of the report by George Gray (2007), “Estimating Production.”

16 The additional input of DAs and heads of Farmers Associations was used for the first time for the latest 2006/07 forecast. Previous forecasts have relied upon grower input only.
The second part of the CSA procedure consists of crop cutting and measurement, undertaken at the end of the Meher season to determine actual yield levels. This data can be combined with the estimates of area sown to determine a final estimate of production. This estimate is normally released by CSA between May and July in the next year and forms the basis of that next year’s yield forecast. It is important to bear in mind, however, that crop-cutting data may not be wholly accurate indicators of yields – for example, because of differences between cutting a quadrat and harvesting a crop. It has been suggest that in general crop cutting estimates can be anything between 30-10 percent of an overestimation of yields.\(^{17}\)\(^{18}\) This means that while the published standard errors reflect the variance in the sample data, the correlation between the sample data and the actual economic yield may be different.

The procedure followed by CSA has been designed to be statistically valid and to generate useful confidence limits for the estimates arrived at. A stratified random sampling procedure is followed, using enumeration areas to determine the areas sown and productivity of individual households. Enumeration areas are selected on a weighted random basis, and households within each area are equally selected at random. The results are analyzed according to Zone and subsequently aggregated for each region and for the country as a whole. Specific procedures are detailed for each stage of the assessment, areas of each field are physically measured by bearing and length, and crop harvesting is based upon randomly drawn quadrants. If all procedures are followed according to the original design, then the results should be representative of Meher production.

The CSA procedure does not assess commercial and state farm production (estimated to cover approximately 1 percent of all land sown to cereals and 2 percent of cereal production). Neither does it include any assessment of Belg production, the significance of which is subject to considerable debate. It does however now include production from resettlement areas. As such, the CSA data provides a useful estimate of national production trends. CSA data can be compared annually to determine how much land has been sown to each of the main Meher crops and what level of productivity has been achieved in each zone, region or the country as a whole.

Comparison of Results

The three estimates of production differ. In terms of area estimates, as shown in Annex Figure 1, WFP/FAO area estimates have been consistently higher than that for CSA from 2001 through 2006. This has been attributed to a variety of factors including the omission of resettlement areas, land too steep to be surveyed, state and commercial farms and specific areas (including all of Gambella). However, after allowing for all of these factors, the difference between the two estimates is still more than 17 percent. Since the WFP/FAO result lies well beyond the confidence limit of the CSA data, it appears that the two methodologies are not comparable.

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In terms of cereal yield, the direction of the differences between CSA and WFP/FAO estimates has varied over time (Annex Figure 2).

Prior to 2004, CSA yields exceeded those recorded by the WFP/FAO study. Since 2004, however, the CSA yield increases have been more moderate and WFP/FAO cereal yield data have been 13.3 percent, 17.7 percent and 9.8 percent higher than CSA estimates for 2004, 2005 and 2006, respectively.

Coefficients of variation for yield data are not given in the CSA figures, but are given for production overall and these coefficients will by definition be greater than those for yield (since the aggregate must also include the coefficients of variation for area). The coefficients are quite consistent, varying between 2.02 and 2.3 percent, indicating that in each of the last three years, the WFP/FAO mean figure for cereal yields has been statistically different to the CSA result at a significance level of at least 99 percent.
In terms of overall cereal production, the three surveys have produced the production estimates presented in Annex Figure 2 above. The general trend is similar, but to markedly different extents, in particular:

- The WFP/FAO production figures are consistently higher; and
- The Bellmon analysis was the most conservative of all for the years 2002-2005; it actually exceeded CSA data in 2006. The latter may be explained by a change in the reference years used in the last Bellmon survey.\(^\text{19}\)

**Conclusions**

Accurate production estimates are a critical underpinning of reliable analysis of economic trends in Ethiopia. A review of the methods and results over the past several years suggests that the CSA methodology of crop estimation and forecast is potentially the most accurate, timely and cost-effective technique for estimating production on a regular basis. However, there are a number of major drawbacks to the CSA methodology that contribute to non-sampling errors and which significantly reduce the statistical validity of the results below the levels quoted in the statistical bulletins, and which would tend to result in the overestimation of yields. Future attention could be given to addressing these non-sampling errors, in particular, trials to assess the accuracy of the crop-cutting procedures as indicators of economic production both on a per crop basis and under different harvesting conditions could be carried out.

\(^{19}\) Prior to 2006, given the uncertainty over previous crop estimates, the Bellmon analysis used 2000/1 and 2001/2 as reference points, since it was believed that these were memorable high production years and also years for which CSA and WFP/FAO data were similar. The ensuing years varied considerably across regions in terms of productivity and it was considered more useful to ask farmers for their assessments of yield relative to these reference years. The Bellmon analysis therefore differed from the CSA forecast which used the previous year’s crop estimate as its basis for comparison.
ANNEX 3. TREND, SEASONAL AND RANDOM COMPONENTS OF MOVEMENTS IN THE CONSUMER PRICE INDEX

Decomposition of changes in the food and non-food price indices into trend, seasonal and random components (using the X12-ARIMA seasonal adjustment methodology of the US Bureau of Census) indicates large seasonal fluctuations in the changes in the food price index and a much smaller seasonal variation in non-food prices (Annex Figure 3).

This pattern has not changed substantially in recent years, suggesting that seasonality in prices remains a characteristic of grain markets in Ethiopia. At the same time, the magnitude of the seasonal fluctuation has diminished somewhat, possibly reflecting improvements in the availability of storage, and capacity and incentives to store (see Ahmed, 2007).
Annex Figure 3: Ethiopia: Decomposition of Changes in the National Food and Non-Food CPI, 1997-2007

Calculated by Josef Loening, World Bank from CSA data.
### Annex Table 3: Food Price Inflation in Ethiopia, 2003-2006

<table>
<thead>
<tr>
<th></th>
<th>Annual</th>
<th>Cumulative</th>
<th>Annualized cumulative rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ethiopia</td>
<td>Addis Amhara</td>
<td>Oromia</td>
</tr>
<tr>
<td>2003</td>
<td>0.084</td>
<td>0.085</td>
<td>0.179</td>
</tr>
<tr>
<td>2004</td>
<td>0.096</td>
<td>0.069</td>
<td>0.090</td>
</tr>
<tr>
<td>2005</td>
<td>0.149</td>
<td>0.126</td>
<td>0.133</td>
</tr>
<tr>
<td>2006</td>
<td>0.190</td>
<td>0.264</td>
<td>0.170</td>
</tr>
<tr>
<td>Weights</td>
<td>100.0</td>
<td>6.9</td>
<td>25.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source*: Calculated from CSA data.

*Notes*: The six regions shown in this table have a total weight of 96.6. Annual inflation rates are measured from December of the previous year to December of the current year. Cumulative inflation rates are measured from December 2002 to December of the current year.

### Annex Table 4. Estimated income elasticities, from concentration curves: rural areas

<table>
<thead>
<tr>
<th>0&lt;Elaticity of income&lt;1 (&quot;Necessities&quot;)</th>
<th>&gt;Elasticity of income (&quot;superior goods&quot;)</th>
<th>Elasticity of income &lt;0 (Inferior goods)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>Teff</td>
<td></td>
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<tr>
<td>Transport</td>
<td>Wheat</td>
<td></td>
</tr>
<tr>
<td>Kerosene</td>
<td>Charcoal</td>
<td></td>
</tr>
<tr>
<td>Personal care</td>
<td>Meat</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Pulses</td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td>Spices</td>
<td></td>
</tr>
<tr>
<td>Matches, Battery, Fuel wood, Salt</td>
<td>Enset (with crossing)</td>
<td></td>
</tr>
<tr>
<td>Coffee</td>
<td>Milk</td>
<td></td>
</tr>
<tr>
<td>Sugar (with crossing)</td>
<td>Pasta (with crossing)</td>
<td></td>
</tr>
<tr>
<td>Bread</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooking oil</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>