

Macroeconomic Impacts and Development Outcomes for Low Income Countries: First Exploration of Macroeconomic Links to Ethiopia and Ghana Distribution and Poverty Models

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Contents

Summary	4
1. Background to the Research.....	6
2. Available Building Blocks for the new research on Macroeconomic Impacts and Development Outcomes.....	7
2.1 IMF macroeconomic models	7
2.2 Case Study or “Rapid Appraisal” Methods for macroeconomic impact analysis	7
2.3 Structural Models of income distribution and poverty outcomes.....	8
2.4 “Rapid Appraisal” of income distribution and poverty outcomes.....	8
3. Soft linking the available estimates of policy induced macroeconomic change to income distribution and poverty outcomes	8
4. The First Steps.....	9
4.1 Ethiopia: Macroeconomic Scenarios	9
Table 1: IMF Medium Term Projections: 2006-7 to 2012-13	11
4.2 The SAM Database for Ethiopia.....	12
Table 2: Economic Structure Ethiopia.....	13
4.3 The Distribution and Poverty Model	14
Table 3: Macro and Factor Market Closure.....	15
4.4 Linking the Macroeconomic Projections to the Distribution and Poverty Model for Ethiopia.....	16
Table 4a: IMF Baseline and Alternative Simulations Excluding PSURGE.....	18
Table 4b: PSURGE for Simulations	18
4.5 Ethiopia Results	19
5. Concluding Remarks	22
Appendix: Results Tables.....	23

Table R1.A: Baseline and Alternative – Major Economy-wide Indicators in the Short Run.....	23
Table R1.B: Price Surge – Major Economy-wide Indicators in the Short Run.....	24
Table R1.C: Baseline and Alternative – Major Economy-wide Indicators in the Medium Run	25
Table R2.A: Baseline and Alternative – Consumption by Household in the Short Run	26
Table R2.B: Price Surge – Consumption by Household in the Short Run.....	27
Table R2.C: Price Surge – Consumption by Household in the Short Run.....	28
Table R3.A: Baseline and Alternative – Equivalent Variation by Household in the Short Run.....	29
Table R3.B: Price Surge – Equivalent Variation by Household in the Short Run	30
Table R3.C: Baseline and Alternative – Equivalent Variation by Household in the Medium Run	31
Table R4.A: Baseline and Alternative – Savings by Institutions Including Households in the Short Run.....	32
Table R4.B: Price Surge – Savings by Institutions Including Households in the Short Run.....	33
Table R4.C: Baseline and Alternative – Savings by Institutions Including Households in the Medium Run	34
Table R5.A: Baseline and Alternative – Savings Shares by Institutions Including Households in the Short Run	35
Table R5.B: Price Surge – Savings Shares by Institutions Including Households in the Short Run.....	36
Table R5.C: Baseline and Alternative – Savings Shares by Institutions Including Households in the Medium Run	37
References	38

Summary

This strategic draft of a paper first outlines a new area of policy orientated research on the Macroeconomic Impact on LIC Development Outcomes. The initial pilot research uses IMF macroeconomic policy, an area of research that has challenged policy makers within the IMF and within the development community for a long time. The preliminary results for Ethiopia of a “soft link” from macroeconomic scenarios presented in an IMF Article IV report to a recent general equilibrium comparative static CGE model of distribution and poverty are reported. There are four key ideas in this project, to be applied initially to African LIC countries:

1. To “soft link” currently available IMF macroeconomic models to available income distribution and poverty models to provide estimates of poverty outcomes of IMF endorsed macroeconomic policies;
2. Where macroeconomic models are unavailable, to upgrade the quality of the macroeconomic “rapid appraisal” case studies built around IMF Letters of Intent and Article IV reports, so that macroeconomic scenarios can be soft linked to income distribution and poverty models;
3. Where the database for income distribution and poverty models is not available, develop a “rapid appraisal” approach to estimating income distribution and poverty impacts using a wide range of readily available structural and poverty indicators (See below “rapid appraisal”); and
4. Should the structural data assembled under 3 be sufficiently comprehensive to consider building small-to medium-sized SAMs that can be used to build structural income distribution and poverty models as in 1.

The macroeconomic scenarios suggested for Ethiopia in the 2009 Article IV report were principally designed to lower the level of domestic inflation and to offset the effects of the boom in world food and oil prices by limiting the increase in the fiscal balance in the short and medium Run, and by increasing access to foreign savings through the IMF. The real outcomes of the anti-inflationary policies in the Article IV scenarios were applied to the CGE model. The principal driver of the first distribution and poverty results for Ethiopia was the increase in foreign savings which produced an appreciation of the real exchange rate in the short and medium Run and an increase in welfare for rural as opposed to urban households. So far, a

consistent measure of the strength of the world price surge could not be found. IMF assistance to obtain an appropriate measure of the world price surge will be sought for the final version of the paper. Revised results for Ethiopia and comparative static results for Ghana should be available by the end of April.

1. Background to the Research

Policy-orientated research on the Macroeconomic Impact on LIC Development Outcomes has challenged policy makers within the IMF and within the development community for a long time. The results so far have been unsatisfactory. This project aims to fill a major gap with first examples from IMF macroeconomic policies.

This project has for key purposes, to be applied first to African LIC countries:

1. To “soft link” currently available IMF macroeconomic models to available income distribution and poverty models to provide estimates of poverty outcomes of IMF endorsed macroeconomic policies. The term “soft link” is from the climate modelling literature. It means an informal linking of models through the exogenous variables, rather than a formal linking of the models themselves. It is anticipated that the structural models of income distribution and poverty will be much more aggregated on the sectoral side than normally used for poverty analysis, but not factors or households.
2. Where macroeconomic models are unavailable, to upgrade the quality of the macroeconomic “rapid appraisal” case studies built around IMF Letters of Intent and Article IV reports so that macroeconomic scenarios can be soft linked to income distribution and poverty models. (See below on “rapid appraisal”). The IMF research department has offered assistance in gaining initial experience with their macroeconomic case studies. Only later in the main project will more independent macroeconomic scenarios be considered.
3. Where the database for income distribution and poverty models is not available, develop a “rapid appraisal” approach to estimating income distribution and poverty impacts using a wide range of readily available structural and poverty indicators (See below on “rapid appraisal”).
4. Should the structural data assembled under 3 be sufficiently comprehensive, consideration will be given to building small to medium sized SAMs that can be used to build structural income distribution and poverty model as in 1. Should we be successful in building such intermediate sized SAMs with modest sectoral treatment but more

disaggregated factor and household data, we would not expect the same degree of comprehensiveness or accuracy as for a full-sized SAM.

The key background idea to the project is applying “rapid appraisal” methodologies to fill the gaps in modelling availability. The idea is to develop a set of readily available macroeconomic data and a set of structural data on distribution and poverty which, when combined with rules of thumb from economic theory, can be used to inform a qualitative analysis of macroeconomic policy impacts and distribution and poverty outcomes. The idea behind such “rapid appraisal” analyses comes from the Sussex Method for the assessment of regional integration schemes (see the original DfID report Evans et al 2006)).

2. Available Building Blocks for the new research on Macroeconomic Impacts and Development Outcomes

2.1 IMF macroeconomic models

At present, the Fund has well-developed Dynamic Stochastic General Equilibrium (DSGE) macroeconomic models for only a few African LICs (see Berg et al., 2006). However, the real side of these models is unsuitable for income distribution and poverty impact analysis. The same is true of other macroeconomic models such as the IMMPA suite of models (see Agenor, 2007). Hence the idea is to soft link available DSGE models to structural models of distribution and poverty, as described in 2.3 below, and to develop “rapid appraisal” methodologies for 2.2 and 2.4.

2.2 Case Study or “Rapid Appraisal” Methods for macroeconomic impact analysis

At present, macroeconomic case studies are widely available through Letters of Intent and Article IV reports but are of variable quality. Where possible, they will be used for estimating macroeconomic impact soft links to income distribution and poverty outcome analysis as described in 2.3 below. Where available IMF case studies are weak, consideration will be given to develop them using a more systematic “rapid appraisal” methodology.

2.3 Structural Models of income distribution and poverty outcomes

There is a large literature on Computable General Equilibrium modelling of income distribution and poverty impacts of economic policy change (see for example Bourguignon, 2008). For some of these countries, there are SAMs suitable for Running dynamic recursive income distribution and poverty models. The DSGE macroeconomic models from 2.1 or the macroeconomic impact analysis from the “rapid appraisal” methods in 2.2 can be used to quantify key exogenous macro variables under baseline and other scenarios for the structural models of distribution and poverty such as: government and investment expenditure; private, government and foreign savings; and choice of other policies and instruments such as transfers to households, tariffs, direct and indirect taxes.

2.4 “Rapid Appraisal” of income distribution and poverty outcomes

Among the African LICs countries, there are large gaps in coverage of SAMs suitable for modelling income distribution and poverty impacts of macroeconomic policies. In these cases, the idea is to develop a “rapid appraisal” approach to estimating income distribution and poverty impacts using a wide range of readily available indicators. The key ideas for such a “Rapid Appraisal” approach can be found in technical reports of structural CGE models, where summary structural data from the underlying SAM is usually reported and used for a preliminary impact analysis of model shocks. (The Handbook of Trade and Poverty, Cirera et al., 2001) Where possible, such datasets will be upgraded to small-to medium-sized SAMs for formal structural and distribution and poverty analysis.

3. Soft linking the available estimates of policy induced macroeconomic change to income distribution and poverty outcomes

The heart of the concept note is in preparation for a programme of research over 2 years on how to soft link either formal or informal macroeconomic impact estimates to generate the formal or informal structural and income distribution outcome estimates from the Building Blocks described in 2.1 to 2.4 above, and on how to strengthen the rapid appraisal components in 2.2 and 2.4. The first step in this programme is to develop soft links between the estimates of key macroeconomic impacts to income distribution and poverty outcomes, that is, to soft link

macroeconomic impacts from 2.1 or 2.2 to distribution and poverty outcomes estimated by formal structural income distribution models as in 2.3. In the process, it is anticipated that the rapid appraisal components, 2.2 and 2.4, will be upgraded and attempts will be made to soft link formal or informal macroeconomic impact estimates as in 2.1 or 2.2 to the informal estimates of income distribution and poverty outcomes as in 2.4.

The key to the above research programme is to make operational the soft links set out in section 3, starting with soft links between 2.1 and 2.3, and between 2.2 and 2.3. For this purpose, two pilot countries have been chosen, Ethiopia and Ghana. Both pilot countries have large recent SAMs and Running income distribution and poverty models. The IMF has a DSGE model for Ghana, but has only used case study methods to estimate macroeconomic impacts for Ethiopia. In terms of the building blocks described, for Ghana the soft linkages will be based on the formal macroeconomic model as in 2.1 to a formal structural income distribution and poverty outcome model as in 2.3. For Ethiopia informal macroeconomic impacts estimated as in 2.2 will be soft linked to a structural income distributing and poverty outcome model as in 2.3. In this draft paper, only the Ethiopia results have been reported.

4. The First Steps

4.1 Ethiopia: Macroeconomic Scenarios

The account of Ethiopian macroeconomic policies reported here is based on IMF Country Report No 08/264 July 2008. It turned out that the soft links from the 2008 IMF Macroeconomic Projections for Ethiopia were quite straightforward. Clearly the projections are dated, but combined with the distribution and poverty model based on the 2005-6 Ethiopia SAM (Robinson et al 2010), it is possible to conduct an ex post feasibility experiment estimating the distribution and poverty impact of the macroeconomic projections in the IMF 2008 Ethiopia Country Report.

In 2008, the Ethiopian policy context was driven primarily by strong pro-growth development policies from 2003/4 consistent with poverty reduction, high domestic inflation and a world food and oil price “surge”. More recently, it became clear that demand was running ahead of the expansion in the capacity of the economy and international reserves had fallen to about 1.5 months of imports. The IMF argued that inflation was being led by rapidly rising food prices;

rising global prices were also playing a role but the mechanism was not clear. The surge in world oil prices placed further strain on Ethiopia's balance of payments.

The Ethiopian policy response was to address the macroeconomic imbalances as well as to absorb the severe world oil price shock in a manner that would least affect the momentum for growth and poverty reduction. They planned to reduce broad money growth to under 20 percent and support lower monetary growth by implementing a cautious fiscal policy that kept domestic borrowing well within the budget ceiling. IMF staff urged forceful measures to prevent inflation expectations from becoming ingrained and to strengthen the balance of payments.

The policy response to the macroeconomic situation as it emerged in 2008 is summarized in the projections from IMF (2008, p12), shown in Table 1 below.

Table 1: IMF Medium Term Projections: 2006-7 to 2012-13

% GDP unless otherwise stated	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13
Baseline	Actual	Projection	Projection	Projection	Projection	Projection	Projection
Real GDP growth (annual % Change)	11.4	8.4	6	6.5	7	7.5	7.5
Fiscal Balance (including grants)	-3.1	-4.4	-3.5	-3.7	-3.4	-3.4	-3.7
Current Account Balance (including grants)	-4.5	-4.8	-6.2	-6.1	-6.6	-5.7	-5
% GDP unless otherwise stated	2006-7	2007-8	2008-9	2009-10	2010-11	2011-12	2012-13
Alternative	Actual	Projection	Projection	Projection	Projection	Projection	Projection
Real GDP growth	11.4	8.4	7	7.5	8	8	8
Growth TFP relative to Baseline	0.00	0.00	1.00	1.00	1.00	0.50	0.50
Fiscal Balance (including grants)	-3.1	-4.4	-3.5	-3.7	-3.7	-3.7	-3.8
Current Account Balance (including grants)	-4.5	-4.8	-7.6	-7.3	-6.9	-5.7	-4.9

Source: Table 1 From IMF Country Report No 08/264 July 2008 p12.

Table 1 shows two sets of projections of the Fiscal Balance and Current Account Balance from the base year 2006-7 to 2012-13. Over the six-year projection period from 2006-7, the **Baseline** scenario allows a further decrease in the fiscal deficit, followed by a return in the final period to a level closer to the initial base level for 2006/7. In other words, the short-Run fiscal deficit was to increase in the adjustment transition before being reined in by macroeconomic policy measures by the final period of the projection. The current account deficit in the **Baseline** scenario also increases sharply, and is then reduced to a level closer to the initial base period. The profile of the **Alternative** scenario is very similar to the **Baseline**, the primary difference being a larger increase in the fiscal and current account balances in the transition to the final period, which has slightly higher levels in the base period. A powerful additional element enters into the **Alternative** macroeconomic scenario, namely an enhanced profile of the technical change or TFP improvement relative to the **Baseline**. The TFP effect is largely assumed to result from a range of policy measures assumed to complement the **Alternative** macroeconomic scenario such as additional grants for public spending, some of which would be allocated for

capital projects that have high import content and raise longer-term growth. Short-term growth is also higher than in the *Baseline* because finance for imports helps alleviate shortages of key commodities.

4.2 The SAM Database for Ethiopia

The 2006 SAM used in the distribution and poverty model general equilibrium or CGE model for Ethiopia is described in Ahmad et al (2010). It is highly disaggregated allowing for a large model with 50 activities, 22 commodities, 15 factors and 15 households. Agricultural activities are divided by region as are two factors, land and livestock. Only two out of five types of labour are mobile across activities and regions and capital is used only in manufacturing activities. There are 10 rural and 5 urban households, and foreign trade is divided by regions of origin and destination. Using the SAM, a brief summary of the economic structure of Ethiopia is shown in Table 2 below.

Table 2: Economic Structure Ethiopia

Description	Share	Share	Share	Share	Share	Share	Share
	Dom.	Total	Total	Exports	Imports	HH	Rural Poor
	Prod.	Imports	Exports	Output	D.Dem.	Cons.	Cons.
Teff	0.01	0	0	0	0	0.02	0.01
Wheat	0.01	0.04	0	0	0.49	0.02	0.04
Maize	0.01	0	0	0	0	0.01	0.02
Barley and sorghum	0.01	0	0	0	0	0.01	0.02
Export agriculture	0.04	0	0.34	0.73	0.02	0.03	0.03
Enset	0	0	0	0	0	0.01	0.01
Other agricultural products	0.04	0.01	0.04	0.11	0.08	0.06	0.06
Livestock	0.05	0	0.05	0.08	0.01	0.07	0.05
Home-produced agricultural products	0.12	0	0	0	0	0.2	0.29
<i>Total Agriculture</i>	<i>0.29</i>	<i>0.05</i>	<i>0.43</i>			<i>0.43</i>	<i>0.53</i>
Home-produced processed food, services	0.09	0	0	0	0	0.14	0.2
Flour and milling services	0.01	0	0.02	0.17	0.07	0.01	0.01
Other processed food, beverages, tobacco	0.03	0.03	0.03	0.1	0.23	0.06	0.04
Chemicals	0.01	0.12	0.02	0.2	0.82	0.04	0.04
Electricity	0.01	0	0	0	0	0.01	0
Water	0.01	0	0	0.05	0	0	0
Petrol	0	0.12	0	-	1	0.01	0.01
Intermediate and investment goods	0.02	0.09	0.03	0.15	0.57	0.01	0.01
Final consumer goods	0.03	0.34	0.07	0.2	0.78	0.12	0.07
<i>Total Manufactured Goods</i>	<i>0.21</i>	<i>0.7</i>	<i>0.17</i>			<i>0.4</i>	<i>0.38</i>
Construction services	0.11	0	0	0	0	0	0
Trade and transport services	0.18	0.17	0.3	0.14	0.22	0.03	0.01
Public admin, education, health services	0.11	0	0.01	0.01	0	0.03	0.02
Other services	0.1	0.07	0.1	0.09	0.02	0.12	0.08
<i>Total Construction and Other Services</i>	<i>0.5</i>	<i>0.24</i>	<i>0.41</i>			<i>0.18</i>	<i>0.11</i>
<i>Total</i>	<i>1</i>	<i>1</i>	<i>1</i>			<i>1</i>	<i>1</i>

Source: 2005-6 Ethiopia SAM

The structure of the Ethiopian economy follows a pattern of imports, exports, domestic production, and consumption that is familiar for low income developing countries. For trade, on the import side, agricultural products were about 5% for 2005/6 made up almost entirely of Wheat. Other large items imported include Chemicals, Petrol, Intermediate and Investment goods, Final Consumer Goods and Transport Services. On the export side, Export Agriculture (for example coffee) and Trade and Transportation Services are the largest items. Note that

Home-produced agricultural products, largely non-traded goods, form 12% of estimated domestic production.

The large degree of sector and regional disaggregation in the SAM is likely to ensure that the poverty and distribution impact results for macroeconomic scenarios are as large as possible. In later refinement of the work, regional, activity and commodity aggregations will be used to see how far the distribution and poverty results are affected by aggregation.

4.3 The Distribution and Poverty Model

The distribution and poverty general equilibrium model or CGE model for Ethiopia described in Appendix 2 used in this research is comparative static (see Robinson et al 2010). The key modelling assumptions are:

- Value added is modelled using constant elasticity of substitution (CES) production functions for factor inputs (land, livestock capital, various types of labour and non-agricultural capital).
- Intermediate inputs into production are determined as fixed shares of the quantity of output.
- Payments from each factor of production are allocated to households and other institutions using fixed shares derived from the base SAM.
- Household consumption is modelled using a Linear Expenditure System (LES) specification. Imported goods are assumed to be imperfect substitutes for domestically produced goods.
- Exported goods are imperfect substitutes for domestically produced and consumed goods.
- The domestic price of each commodity adjusts so that domestic supply equals domestic demand.
- Capital stock (including livestock capital) is fixed in each sector and region. Land is fixed by region, and is allocated across crops so that the value of the marginal return to land is equal across each crop in a given region.

- Labour markets have the total supply of labour of each skill type is fixed (and fully employed). Real wages adjust so that demand for labour is equal to supply.
- External accounts have fixed foreign savings (foreign capital inflows). With fixed foreign transfers, the trade balance (and fixed current account balance) are also fixed
- The real exchange rate adjusts to achieve an export supply and import demand that yield the fixed trade balance.
- The numeraire (i.e. reference price) of the model is the consumer price index. Thus, the model determines prices relative to this fixed CPI.
- The “macro closure” assumptions made are discussed below.
- The full set of equations for the distribution and poverty model are set out in Robinson et al (2010, Annex 1)

The “macro closure” assumptions made are crucial for the “soft linking” of the IMF Article IV projections for Ethiopia to the distribution and poverty model. Note that in the general equilibrium context, macro closure refers to the choice of exogenous and endogenous variables for saving and investment, for government, for foreign trade and for factor markets. The choices made for the scenarios Run for Ethiopia are shown in Table 3 below.

Table 3: Macro and Factor Market Closure

Savings-Investment	Fixed investment, savings endogenous
Government	Fixed Government Savings, government expenditure adjusts
World	Fixed foreign savings, real exchange rate endogenous
Factor markets	Fixed factor supplies, endogenous factor returns, specific capital in manufacturing in short Run
Numeraire	CPI

The choice of the macro closure provides a framework within which the macroeconomic scenarios described above can be assessed. Investment is exogenous and the rate of savings from private income adjusts so that investment can be financed. Government savings (or if negative, deficit) is a key macroeconomic policy variable, so it makes sense for government savings to be exogenous in the general equilibrium model and for government savings to be given by the

macroeconomic scenarios. With government savings exogenous, government expenditure is endogenous, adjusting so that with endogenous government income, the government income and expenditure balances are satisfied. For the rest of the world, foreign savings is a particularly important macroeconomic variable. As noted above, when foreign savings are exogenous, the real exchange rate in the general equilibrium model is endogenous. In summary, government savings and foreign savings in the macroeconomic scenarios are the key endogenous policy variables which appear in the general equilibrium model as exogenous variables as described in Table 3 above.

Other choice of closure will be checked for sensitivity as the results develop, for example the fixed supply of factors assumption in markets for unskilled labour. There is a considerable debate in Ethiopia on the nature of the market for foreign exchange, but for present purpose the real exchange rate adjusts to clear the foreign exchange market. Note that it is the real exchange rate that is flexible, not the REER as discussed in the macroeconomic literature. Here, the real exchange rate is the ratio of non-traded to traded goods prices as is used in the theory of international trade when there are traded and non-traded goods. The final set of macroeconomic scenarios used for the general equilibrium model is described in section 4.4 and in Table 4 below.

4.4 Linking the Macroeconomic Projections to the Distribution and Poverty Model for Ethiopia

In the simulations described in Tables 4a and 4b below, the short Run is taken to be roughly 3 years, and capital, used in manufacturing only, is sector specific, compared with the medium Run (roughly 5 years) is fully mobile within manufacturing. The description of the scenarios follows the conventions:

Across the column headings:

GAVSIM	is government savings by scenario
FSAVSIM	is foreign savings by scenario
TFP	is Total Factor Productivity change by scenario

World Price	is the change in the price of exports and imports used in the model by scenario
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Across the row headings, the scenario names are composites base on

BLINE	is Baseline
ALT	is Alternative
G	is Government Savings
F	is Foreign Savings
PWHEAT etc	are world prices of exports and imports
H	refers to “high” world price change for exports and imports
L	refers to “low” world price change for exports and imports
SR	short Run, roughly 3 years
MR	medium Run, roughly 6 years

Note that the BASE values for the differential rates of TFP in the Baseline and Alternative simulations described in Table 1 are assumed to be cumulative.

Table 4a: IMF Baseline and Alternative Simulations Excluding PSURGE

No		GSAVSIM		FSAVSIM		TFP	World Price
		BASE	% change	BASE	% change	% change	% change
1	G-BLINE-SR	3.26	-24.35	13.07	0.00	0.00	0.00
2	F-BLINE-SR	3.26	0.00	13.07	16.19	0.00	0.00
3	BLINE-SR	3.26	-24.35	13.07	16.19	0.00	0.00
4	G-ALT-SR	3.26	-24.35	13.07	0.00	0.00	0.00
5	F-ALT-SR	3.26	0.00	13.07	28.34	0.00	0.00
6	TFP-ALT-SR	3.26	0.00	13.07	0.00	2.00	0.00
7	ALT-SR	3.26	-24.35	13.07	28.34	2.00	0.00
8	PWHEAT-H	3.26	0.00	13.07	0.00	0.00	see Table 4b
9	PFUEL-H	3.26	0.00	13.07	0.00	0.00	see Table 4b
10	POTHER-H	3.26	0.00	13.07	0.00	0.00	See Table 4b
11	PSURGE-H	3.26	0.00	13.07	0.00	0.00	See Table 4b
12	BLINE-PSH-SR	3.26	-24.35	13.07	16.19	0.00	See Table 4b
13	ALT-PSH-SR	3.26	-24.35	13.07	28.34	2.00	See Table 4b
14	G-BLINE-MR	3.26	-24.35	13.07	0.00	0.00	0.00
15	F-BLINE-MR	3.26	0.00	13.07	5.06	0.00	0.00
16	BLINE-MR	3.26	-24.35	13.07	5.06	0.00	0.00
17	G-ALT-MR	3.26	-28.41	13.07	0.00	0.00	0.00
18	F-ALT-MR	3.26	0.00	13.07	4.05	0.00	0.00
19	TFP-ALT-MR	3.26	0.00	13.07	0.00	4.00	0.00
20	ALT-MR	3.26	-28.41	13.07	4.05	4.00	0.00
21	PSURGE-L	3.26	0.00	13.07	0.00	0.00	See Table 4b
22	BLINE-PSL-MR	3.26	0.00	13.07	0.00	0.00	See Table 4b
23	ALT-PSL-MR	3.26	-28.41	13.07	4.05	4.00	See Table 4b

Table 4b: PSURGE for Simulations

Commodities	Export % change	Import % change
PWHEAT-H	64.00	64.00
PFUEL-H	-	50.00
POTHER-H		
- Maize	28.00	28.00
- Barley and Sorghum	26.00	26.00
- Agricultural Exports	50.00	50.00
- Other Agriculture	50.00	50.00
- Livestock	30.00	30.00
- Food	10.00	50.00
PSURGE-L:		
- 25% of PSURGE-H		

The sources for Tables 4a and 4b are as follows: For Table 4a, The IMF estimates of the changes in government and foreign savings in Table 1 as a % of GDP by scenario. TFP differentials between scenarios are also shown in Table 1 and are included in Table 4a for the *Alternative* scenario. In Table 4a, the Base year levels of government and foreign savings shown are from the 2005/6 SAM (Ahmed et al (2010)). The per cent change in government and foreign savings in Table 4a combines the implied changes in the absolute values from Table 1 with the SAM Base year levels shown in Table 4a to get the % change in Table 4a which is used in the model. Thus, the % changes in government and foreign savings from Table 1 were applied to the model database so they could be used in the SAM based comparative static model. Since the critical results from a comparative static model are in % changes, the impact effects of the IMF scenarios in Table 1 are captured by the distribution and poverty model. Short and long Run TFP change was estimated cumulatively for the first 3 and for 6 years in Table 1. The worksheets from Robinson et al (2010) were used for the PSURGE export and import price change for Table 4b. Altogether, 24 simulations were calculated. They were grouped in the following way:

- Simulations 1-7 were for the short-Run with varying combinations of government and foreign savings and TFP.
- Simulations 8-12 examine the components of the PSURGE simulations for the high projects of world price change.
- Simulations 13-14 put together all the components of the SR simulations.
- Simulations 15-23 put together varying combinations of the MR simulations. There is less attention given to the PSURGE simulations, partly because their impact is explored in simulations 8-12, and partly because in the MR, the size of the PSURGE simulations is only 25% of those in the SR.

4.5 Ethiopia Results

The results tables shown in the Appendix are disaggregated by the 23 components of the major scenarios for the major economic variables covered: economy-wide indicators, household

consumption, equivalent variation by household,¹ savings and savings shares by institutions including disaggregated households. The scenarios are grouped into the short run (SR), the price surge, and the medium run (MR) with an aggregate MR price surge. All of the results are shown as a % change on base. Except for equivalent variation, all of the Base values are taken from the 2005/6 Ethiopia SAM. Some scenarios are disaggregated even though policy makers saw the underlying economic rationale crossing two or more disaggregated scenarios. For example, TFP projections are linked to additional grant funding which is included in foreign savings. A revised set of scenarios could be constructed which included successful and unsuccessful TFP growth, always including the additional grant funding included in foreign savings.

A first step towards understanding the results is to explore the impact of the different economic drivers and tracing the poverty impacts. Consider the principal drivers:

- Changes in government savings
- Changes in foreign savings
- Changes in world prices or terms of trade
- Total factor productivity or TFP

From Table R1.A it can be seen that a fall in government savings (increase in debt) leads to a large increase in government expenditure, but a small effect on all other economic indicators. The small decline of real exchange rate (the price of domestic goods over foreign goods) suggests a switch in expenditure between households and government from foreign to domestic in conformity with expectations, but the economic impact is small. This result is repeated throughout all the scenarios and indicators reported in the Appendix. This is not a comment on the effectiveness of the macroeconomic policies behind the projections of government savings (debt), but a reflection of the small real economic effects of the implied expenditure switching.

In contrast to the projected changes in government savings, the projected increase and then relative decline in foreign savings has substantial economic effects. First, the increased supply of

¹ Equivalent variation (EV) takes account of differences in consumer preference across households as revealed by observed spending patterns, and provides an exact money-metric measure of the change in utility due to the exogenous shock under consideration.

foreign exchange leads to an appreciation of the real exchange rate, lowering exports and increasing imports. Aggregate welfare as measured by the change in absorption (imports plus the production of importables) increases substantially as a result of the rise in foreign savings and is a dominant contributor to the impact effects of both the Baseline and Alternative scenarios in the SR and in the MR, as can be seen from the results tables.

The changes in world prices through the SR price surges shown in Table R.1B and the changes in SR TFP shown in Table R.1C are more problematic. Taking TFP first, the impact of the projected TFP improvement in the Alternative scenario is always large, stimulating exports compared with import competing production so that the real exchange rate depreciates. Similar results arise for the MR, shown in Table R1.C, however, there is no hard evidence to show that the increased grants will lead to the projected TFP changes. This SR and MR result should be regarded as speculative. Similarly, the data used to analyse the price surge was not from the Article IV country report, but was from a later project conducted for the World Food Programme in Ethiopia. The data was compiled in 2009 and was not projected on the same basis as the projections in the Article IV report. As can be seen from Table R.1.B, the SR “Price Surge Other” result had very large terms of trade and real exchange rate effects. Without further and much more careful analysis, this result should be discounted. The SR price surge results for Wheat and Fuel are of greater interest. The world price increase for wheat benefits exporters leading to a real exchange rate appreciation. On the other hand, imported wheat is consumed in urban households leading to a negative welfare effect as indicated by the decline in the terms of trade. In the case of fuel, there is no domestic fuel production so the rise in fuel prices leads to a depreciation of the real exchange rate and a strong negative terms of trade effect. The negative effects on the welfare of the fuel price increase is partly compensated for by the depreciation of the real exchange rate which leads to a substantial increase in exports.

The poverty impacts of the four drivers discussed above can be seen in Tables R2.A-C and Tables R3.A-C in the Appendix. Broadly speaking, the projected increases in government debt in the SR with no substantial decline in the MR leads to a modest decrease in the consumption of the poorest rural households. In contrast, the rise in foreign savings in the SR with only a modest reversal of the increase in the MR leads to substantial improvements in consumption of the poorest rural households. The SR increase in the price of wheat has mixed positive and negative effects on the poorest rural households and on urban poor households. In contrast, the SR

increase in the price of fuel has strong negative consumption effects across the board especially for the rural poor.

Tables R4.A-C also show the effects on savings of the different scenarios, the mirror image of the key results reported. For example, the SR increase in foreign savings given government savings leads to a sharp decline in household savings – a necessary consequence of the closure assumptions of the model. There is a fixed amount of investment that has to be financed, and if the foreign component increases and the government component does not change, then the household savings decline. This is the mechanism by which households gain from the increased foreign savings. Other closure assumptions could and should be explored in future work.

Finally, there is nothing in the model metric to analyse tradeoffs between additional current foreign savings that allow an increase in current household consumption, and a future repayment of the additional foreign savings and the associated cost in terms of further consumption foregone. Future work in this area would benefit from working in a recursive dynamic context.

5. Concluding Remarks

The above results for Ethiopia suggest that the soft link from the Article IV Baseline and Alternative macroeconomic scenarios to a general equilibrium model of the distribution and poverty is feasible and useful. The main driver of the results so far was the increase in foreign savings leading to an appreciation of the real exchange rate, a decline in exports and an improvement in rural relative to urban household welfare.

Much more needs to be done to flesh out the macroeconomic scenarios and the distribution and poverty consequences for Ethiopia, particularly in relation to an analysis of how rural households gain from the appreciation of the real exchange rate. Also, analysis is needed in relation to the change in government expenditure. The impact of alternative factor market closure needs to be explored and the impact of the surge in world market prices that took place over the period of analysis and aggregation of the SAM to gain insights on the best size of SAM for the analysis. It would be useful to repeat the analysis with a recursive dynamic version of the Ethiopia model. Analysis of Ghana results in the comparative static context is proceeding and will be reported as soon as possible.

Appendix: Results Tables

Table R1.A: Baseline and Alternative – Major Economy-wide Indicators in the Short Run

Description	BASE	G-BLINE-SR	F-BLINE-SR	BLINE-SR	G-ALT-SR	F-ALT-SR	TFP-ALT-SR	ALT-SR
GDP	128.60	-0.01	0.08	0.08	-0.01	0.10	2.00	2.10
Absorption	158.80	-0.01	1.40	1.40	-0.01	2.40	1.60	4.00
HH Consumption	114.80	-0.30	2.10	1.80	-0.30	3.70	2.00	5.30
Investment	28.20							
Gov. Expend.	15.90	2.40	-1.20	1.30	2.40	-2.10	1.80	2.20
Exports	16.80	0.09	-6.80	-6.70	0.09	-11.60	2.80	-8.70
Imports	47.00	0.03	2.10	2.10	0.03	3.80	1.00	4.80
Real Exchange Rate	1.00	-0.30	-3.00	-3.30	-0.30	-5.30	0.60	-4.90
Terms of Trade	100.00							
Invest. Share GDP	21.30	0.00	-0.50	-0.50	0.00	-0.90	-0.50	-1.40
FSAV share GDP	9.90	-0.03	1.20	1.20	-0.03	2.00	-0.10	1.90
Trade Def. share GDP	22.80	-0.08	0.80	0.70	-0.08	1.30	-0.30	0.90

Units: Billion birr and % change

Table R1.B: Price Surge – Major Economy-wide Indicators in the Short Run

Description	BASE	PWHEAT-H	PFUEL-H	POTHER-H	PSURGE-H	BLINE-PSH-SR	ALT-PSH-SR
GDP	128.60	-0.20	-0.20	-0.20	-0.20	-0.10	2.00
Absorption	158.80	-0.40	-1.90	2.20	0.03	1.20	3.70
HH Consumption	114.80	-0.50	-2.90	4.00	0.80	2.10	5.40
Investment	28.20						
Gov. Expend.	15.90	-0.20	1.80	-6.60	-5.30	-3.20	-2.20
Exports	16.80	-3.60	8.90	5.50	9.90	4.70	3.80
Imports	47.00	-2.20	-2.80	9.80	4.20	6.10	8.60
Real Exchange Rate	1.00	-1.00	3.20	-19.00	-17.30	-19.40	-20.30
Terms of Trade	100.00	-2.50	-5.60	17.40	8.40	8.40	8.40
Invest. Share GDP	21.30	-0.20	1.70	-3.60	-2.60	-2.90	-3.60
FSAV share GDP	9.90	-0.10	0.60	-2.20	-1.90	-0.90	-0.20
Trade Def. share GDP	22.80	-0.20	1.30	-5.10	-4.40	-3.70	-3.40

Units: Billion birr and % change

Table R1.C: Baseline and Alternative – Major Economy-wide Indicators in the Medium Run

Description	BASE	G-BLINE-MR	F-BLINE-MR	BLINE-MR	G-ALT-MR	F-ALT-MR	TFP-ALT-MR	ALT-MR	PSURGE-L	BLINE-PSL-MR	LT-PSL-M
GDP	128.60	-0.02	0.03	0.01	-0.02	0.02	4.00	4.10	-0.01	0.00	4.00
Absorption	158.80	-0.01	0.40	0.40	-0.02	0.40	3.30	3.60	-0.10	0.20	3.50
HH Consumption	114.80	-0.60	0.60	0.06	-0.70	0.50	4.10	3.90	0.04	-0.06	3.90
Investment	28.20										
Gov. Expend.	15.90	4.00	-0.30	3.80	4.70	-0.20	3.30	7.90	-1.70	2.30	6.40
Exports	16.80	-0.01	-2.30	-2.30	-0.01	-1.80	5.80	3.90	3.60	1.90	7.70
Imports	47.00	0.00	0.60	0.60	0.00	0.50	2.10	2.50	0.80	1.30	3.50
Real Exchange Rate	1.00	-0.02	-0.80	-0.80	-0.03	-0.70	0.80	0.10	-4.70	-5.40	-4.60
Terms of Trade	100.00								2.30	2.30	2.30
Invest. Share GDP	21.30	0.09	-0.10	-0.04	0.10	-0.10	-0.80	-0.80	-0.70	-0.70	-1.50
FSAV share GDP	9.90	0.01	0.40	0.40	0.01	0.30	-0.30	0.02	-0.50	-0.20	-0.50
Trade Def. share GDP	22.80	0.02	0.30	0.30	0.03	0.20	-0.70	-0.50	-1.20	-1.00	-1.60

Units: Billion birr and % change

Table R2.A: Baseline and Alternative – Consumption by Household in the Short Run

Description	BASE	G-BLINE-SR	F-BLINE-SR	BLINE-SR	G-ALT-SR	F-ALT-SR	TFP-ALT-SR	ALT-SR
Rural, Poor, Humid Lowlands Moisture Reliable	0.40	-1.40	4.60	3.20	-1.40	8.00	2.70	9.20
Rural, Poor, Moisture Sufficient Highlands – Cereals Based	8.30	-1.20	4.00	2.70	-1.20	6.90	2.60	8.20
Moisture Sufficient Highlands – Enset Based	3.90	-1.10	3.80	2.60	-1.10	6.60	2.50	7.90
Rural, Poor, Drought-Prone (Highlands)	7.10	-1.00	3.60	2.60	-1.00	6.30	2.40	7.70
Rural, Non-poor, Pastoralist (Arid Lowland Plains)	1.30	-0.60	3.50	3.00	-0.60	6.10	2.10	7.60
Rural, non-poor, Humid Lowlands Moisture Reliable	0.60	-0.90	3.60	2.80	-0.90	6.30	2.40	7.90
Rural, Non-poor, Moisture Sufficient Highlands – Cereals Based	28.80	-0.40	2.00	1.60	-0.40	3.50	2.20	5.30
Rural, Non-poor, Moisture Sufficient Highlands – Enset Based	11.60	-0.60	2.60	2.00	-0.60	4.60	2.30	6.30
Rural, Non-poor, Drought-Prone (Highlands)	21.80	-0.40	2.10	1.70	-0.40	3.70	2.10	5.40
Pastoralist (Arid Lowland Plains)	3.10	-0.20	2.70	2.50	-0.20	4.60	1.90	6.30
Small, Urban, Poor	2.60	0.70	0.40	1.10	0.70	0.60	1.00	2.30
Large, Urban, Poor	1.70	0.50	0.09	0.60	0.50	0.08	1.00	1.70
Small, Urban, Non-Poor	12.70	0.60	0.70	1.40	0.60	1.20	1.30	3.10
Large, Urban, Non-Poor	10.80	0.20	0.60	0.80	0.20	0.90	1.10	2.30
Total	114.80	-0.30	2.10	1.80	-0.30	3.70	2.00	5.30

Units: Billion birr and % change

Table R2.B: Price Surge – Consumption by Household in the Short Run

Description	BASE	PWHEAT-H	PFUEL-H	POTHER-H	PSURGE-H	BLINE-PSH-SR	ALT-PSH-SR
Rural, Poor, Humid Lowlands Moisture Reliable	0.40	1.20	-4.10	12.50	10.00	12.10	17.50
Rural, Poor, Moisture Sufficient Highlands – Cereals Based	8.30	0.90	-3.80	11.20	8.60	10.30	15.30
Moisture Sufficient Highlands – Enset Based	3.90	0.70	-3.50	9.70	7.10	8.80	13.60
Rural, Poor, Drought-Prone (Highlands)	7.10	-0.40	-3.60	8.00	4.10	5.90	10.40
Rural, Non-poor, Pastoralist (Arid Lowland Plains)	1.30	-3.70	-4.40	-4.30	-11.80	-9.40	-5.30
Rural, non-poor, Humid Lowlands Moisture Reliable	0.60	0.30	-3.90	7.00	4.00	6.00	10.80
Rural, Non-poor, Moisture Sufficient Highlands – Cereals Based	28.80	0.05	-2.60	7.70	5.50	6.50	10.00
Rural, Non-poor, Moisture Sufficient Highlands – Enset Based	11.60	-0.10	-2.90	10.10	7.50	8.80	12.80
Rural, Non-poor, Drought-Prone (Highlands)	21.80	-0.80	-2.70	4.60	1.40	2.70	6.20
Pastoralist (Arid Lowland Plains)	3.10	-3.30	-4.10	-6.00	-13.00	-10.80	-7.30
Small, Urban, Poor	2.60	-2.50	-2.20	-9.90	-14.50	-13.00	-11.60
Large, Urban, Poor	1.70	-1.80	-2.00	-11.00	-14.60	-13.60	-12.40
Small, Urban, Non-Poor	12.70	-1.50	-2.80	-5.20	-9.50	-7.80	-6.00
Large, Urban, Non-Poor	10.80	-0.80	-2.50	-4.70	-8.00	-7.00	-5.40
Total	114.80	-0.50	-2.90	4.00	0.80	2.10	5.40

Units: Billion birr and % change

Table R2.C: Price Surge – Consumption by Household in the Short Run

Description	BASE	G-BLINE-MR	F-BLINE-MR	BLINE-MR	G-ALT-MR	F-ALT-MR	TFP-ALT-MR	ALT-MR	PSURGE-L	BLINE-PSL-MR	ALT-PSL-MR
Rural, Poor, Humid Lowlands Moisture Reliable	0.40	-1.70	1.40	-0.30	-2.00	1.10	5.10	4.20	2.60	1.90	6.70
Rural, Poor, Moisture Sufficient Highlands – Cereals Based	8.30	-1.50	1.20	-0.30	-1.80	1.00	4.90	4.10	2.10	1.50	6.20
Moisture Sufficient Highlands – Enset Based	3.90	-1.40	1.20	-0.30	-1.70	0.90	4.70	4.00	1.80	1.20	5.70
Rural, Poor, Drought-Prone (Highlands)	7.10	-1.30	1.10	-0.20	-1.50	0.90	4.70	4.00	0.90	0.40	4.90
Rural, Non-poor, Pastoralist (Arid Lowland Plains)	1.30	-0.90	1.10	0.20	-1.00	0.90	4.10	4.00	-3.50	-3.50	0.30
Rural, non-poor, Humid Lowlands Moisture Reliable	0.60	-1.20	1.10	-0.07	-1.40	0.90	4.80	4.30	0.90	0.50	5.10
Rural, Non-poor, Moisture Sufficient Highlands – Cereals Based	28.80	-0.70	0.60	-0.06	-0.80	0.50	4.40	4.10	1.30	1.10	5.50
Rural, Non-poor, Moisture Sufficient Highlands – Enset Based	11.60	-0.90	0.80	-0.06	-1.00	0.60	4.60	4.20	1.80	1.50	6.10
Rural, Non-poor, Drought-Prone (Highlands)	21.80	-0.60	0.60	0.03	-0.70	0.50	4.30	4.10	0.20	0.02	4.20
Pastoralist (Arid Lowland Plains)	3.10	-0.50	0.80	0.40	-0.60	0.70	3.90	4.00	-3.80	-3.60	0.01
Small, Urban, Poor	2.60	0.50	0.09	0.60	0.60	0.08	2.80	3.50	-4.00	-3.40	-0.60
Large, Urban, Poor	1.70	0.30	0.03	0.40	0.40	0.02	2.40	2.90	-4.00	-3.60	-1.20
Small, Urban, Non-Poor	12.70	0.40	0.20	0.60	0.50	0.20	3.10	3.80	-2.60	-2.00	1.10
Large, Urban, Non-Poor	10.80	0.08	0.20	0.30	0.09	0.10	2.50	2.80	-2.20	-2.00	0.50
Total	114.80	-0.60	0.60	0.06	-0.70	0.50	4.10	3.90	0.04	-0.06	3.90

Units: Billion birr and % change

Table R3.A: Baseline and Alternative – Equivalent Variation by Household in the Short Run

Description	BASE	G-BLINE-SR	F-BLINE-SR	BLINE-SR	G-ALT-SR	F-ALT-SR	TFP-ALT-SR	ALT-SR
Rural, Poor, Humid Lowlands Moisture Reliable	0.40	-1.40	4.60	3.20	-1.40	8.00	2.70	9.20
Rural, Poor, Moisture Sufficient Highlands – Cereals Based	8.30	-1.20	4.00	2.70	-1.20	6.90	2.60	8.20
Moisture Sufficient Highlands – Enset Based	3.90	-1.10	3.80	2.60	-1.10	6.50	2.50	7.90
Rural, Poor, Drought-Prone (Highlands)	7.10	-1.00	3.60	2.60	-1.00	6.30	2.40	7.70
Rural, Non-poor, Pastoralist (Arid Lowland Plains)	1.30	-0.60	3.50	3.00	-0.60	6.10	2.10	7.60
Rural, non-poor, Humid Lowlands Moisture Reliable	0.60	-0.90	3.60	2.70	-0.90	6.30	2.40	7.80
Rural, Non-poor, Moisture Sufficient Highlands – Cereals Based	28.80	-0.40	2.00	1.60	-0.40	3.50	2.20	5.30
Rural, Non-poor, Moisture Sufficient Highlands – Enset Based	11.60	-0.60	2.60	2.00	-0.60	4.60	2.30	6.30
Rural, Non-poor, Drought-Prone (Highlands)	21.80	-0.40	2.10	1.70	-0.40	3.60	2.10	5.40
Pastoralist (Arid Lowland Plains)	3.10	-0.20	2.70	2.50	-0.20	4.60	1.90	6.30
Small, Urban, Poor	2.60	0.70	0.40	1.10	0.70	0.60	1.00	2.30
Large, Urban, Poor	1.70	0.50	0.09	0.60	0.50	0.07	1.00	1.70
Small, Urban, Non-Poor	12.70	0.60	0.70	1.30	0.60	1.10	1.30	3.10
Large, Urban, Non-Poor	10.80	0.20	0.50	0.80	0.20	0.90	1.10	2.30
Total	114.80	-0.30	2.10	1.70	-0.30	3.60	2.00	5.30

Units: % change

Table R3.B: Price Surge – Equivalent Variation by Household in the Short Run

Description	BASE	PWHEAT-H	PFUEL-H	POTHER-H	PSURGE-H	BLINE-PSH-SR	ALT-PSH-SR
Rural, Poor, Humid Lowlands Moisture Reliable	0.40	1.20	-4.10	12.20	9.70	11.70	17.10
Rural, Poor, Moisture Sufficient Highlands – Cereals Based	8.30	0.90	-3.80	10.90	8.30	10.00	14.90
Moisture Sufficient Highlands – Enset Based	3.90	0.60	-3.50	9.40	6.90	8.50	13.30
Rural, Poor, Drought-Prone (Highlands)	7.10	-0.40	-3.60	7.70	3.80	5.60	10.10
Rural, Non-poor, Pastoralist (Arid Lowland Plains)	1.30	-3.70	-4.50	-4.50	-12.00	-9.50	-5.50
Rural, non-poor, Humid Lowlands Moisture Reliable	0.60	0.30	-3.90	6.50	3.50	5.50	10.10
Rural, Non-poor, Moisture Sufficient Highlands – Cereals Based	28.80	0.03	-2.60	7.10	5.00	5.90	9.30
Rural, Non-poor, Moisture Sufficient Highlands – Enset Based	11.60	-0.20	-3.00	9.40	6.90	8.20	12.10
Rural, Non-poor, Drought-Prone (Highlands)	21.80	-0.80	-2.80	4.00	0.90	2.10	5.50
Pastoralist (Arid Lowland Plains)	3.10	-3.30	-4.20	-6.50	-13.40	-11.20	-7.80
Small, Urban, Poor	2.60	-2.60	-2.20	-10.00	-14.60	-13.10	-11.80
Large, Urban, Poor	1.70	-1.80	-2.10	-11.10	-14.70	-13.70	-12.50
Small, Urban, Non-Poor	12.70	-1.50	-2.80	-5.50	-9.80	-8.20	-6.40
Large, Urban, Non-Poor	10.80	-0.80	-2.60	-5.00	-8.20	-7.30	-5.80
Total	114.80	-0.60	-2.90	3.50	0.40	1.70	4.90

Units: % change

Table R3.C: Baseline and Alternative – Equivalent Variation by Household in the Medium Run

Description	BASE	G-BLINE-MR	F-BLINE-MR	BLINE-MR	G-ALT-MR	F-ALT-MR	TFP-ALT-MR	ALT-MR	PSURGE-L	BLINE-PSL-MR	ALT-PSL-MR
Rural, Poor, Humid Lowlands Moisture Reliable	0.40	-1.70	1.40	-0.30	-2.00	1.10	5.10	4.20	2.50	1.80	6.70
Rural, Poor, Moisture Sufficient Highlands – Cereals Based	8.30	-1.50	1.20	-0.30	-1.80	1.00	4.90	4.10	2.10	1.50	6.20
Moisture Sufficient Highlands – Enset Based	3.90	-1.40	1.20	-0.30	-1.70	0.90	4.70	4.00	1.80	1.20	5.70
Rural, Poor, Drought-Prone (Highlands)	7.10	-1.30	1.10	-0.20	-1.50	0.90	4.70	4.00	0.90	0.40	4.90
Rural, Non-poor, Pastoralist (Arid Lowland Plains)	1.30	-0.90	1.10	0.20	-1.00	0.90	4.10	4.00	-3.50	-3.50	0.30
Rural, non-poor, Humid Lowlands Moisture Reliable	0.60	-1.20	1.10	-0.07	-1.40	0.90	4.80	4.30	0.90	0.50	5.10
Rural, Non-poor, Moisture Sufficient Highlands – Cereals Based	28.80	-0.70	0.60	-0.06	-0.80	0.50	4.40	4.10	1.30	1.00	5.40
Rural, Non-poor, Moisture Sufficient Highlands – Enset Based	11.60	-0.90	0.80	-0.06	-1.00	0.60	4.60	4.20	1.80	1.50	6.10
Rural, Non-poor, Drought-Prone (Highlands)	21.80	-0.60	0.60	0.03	-0.70	0.50	4.30	4.10	0.10	-0.01	4.20
Pastoralist (Arid Lowland Plains)	3.10	-0.50	0.80	0.40	-0.60	0.70	3.80	4.00	-3.90	-3.70	-0.02
Small, Urban, Poor	2.60	0.50	0.09	0.60	0.60	0.08	2.80	3.50	-4.10	-3.40	-0.60
Large, Urban, Poor	1.70	0.30	0.03	0.40	0.40	0.02	2.40	2.90	-4.00	-3.60	-1.20
Small, Urban, Non-Poor	12.70	0.40	0.20	0.60	0.50	0.20	3.10	3.80	-2.60	-2.00	1.10
Large, Urban, Non-Poor	10.80	0.08	0.20	0.30	0.09	0.10	2.50	2.80	-2.30	-2.00	0.50
Total	114.80	-0.60	0.60	0.06	-0.70	0.50	4.10	3.90	0.01	-0.08	3.90

Units: % change

Table R4.A: Baseline and Alternative – Savings by Institutions Including Households in the Short Run

Description	BASE	G-BLINE-SR	F-BLINE-SR	BLINE-SR	G-ALT-SR	F-ALT-SR	TFP-ALT-SR	ALT-SR
Rural, Poor, Humid Lowlands Moisture Reliable	0.09	5.05	-13.31	-8.06	5.05	-23.08	-1.30	-19.16
Rural, Poor, Moisture Sufficient Highlands – Cereals Based	1.49	5.13	-13.57	-8.27	5.13	-23.47	-1.32	-19.52
Moisture Sufficient Highlands – Enset Based	0.74	5.28	-13.90	-8.49	5.28	-23.98	-1.45	-20.03
Rural, Poor, Drought-Prone (Highlands)	1.29	5.32	-13.91	-8.46	5.32	-23.99	-1.47	-20.03
Rural, Non-poor, Pastoralist (Arid Lowland Plains)	0.25	5.81	-14.34	-8.49	5.81	-24.67	-1.79	-20.60
Rural, non-poor, Humid Lowlands Moisture Reliable	0.12	5.71	-14.38	-8.63	5.71	-24.73	-1.60	-20.60
Rural, Non-poor, Moisture Sufficient Highlands – Cereals Based	3.64	5.72	-14.72	-8.98	5.72	-25.21	-1.55	-21.05
Rural, Non-poor, Moisture Sufficient Highlands – Enset Based	1.93	5.86	-14.93	-9.09	5.86	-25.54	-1.59	-21.32
Rural, Non-poor, Drought-Prone (Highlands)	3.14	5.85	-14.95	-9.12	5.85	-25.58	-1.67	-21.42
Pastoralist (Arid Lowland Plains)	0.59	6.22	-15.14	-8.99	6.22	-25.90	-1.99	-21.72
Small, Urban, Poor	0.23	6.74	-16.03	-9.48	6.74	-27.27	-2.69	-23.27
Large, Urban, Poor	0.15	6.67	-16.56	-10.10	6.67	-28.07	-2.70	-24.15
Small, Urban, Non-Poor	1.03	6.91	-16.17	-9.48	6.91	-27.48	-2.44	-23.16
Large, Urban, Non-Poor	0.87	6.56	-16.60	-10.24	6.56	-28.13	-2.63	-24.24
Summary all Savings								
Households Total	15.56	5.82	-14.81	-8.99	5.82	-25.38	-1.71	-21.27
Government Savings	3.26	-24.35		-24.35	-24.35			-24.35
Foreign Savings	13.07	0.08	12.54	12.66	0.08	21.24	0.23	21.83
Total Savings	31.89	0.39	-2.09	-1.69	0.39	-3.67	-0.74	-3.91

Units: Billion birr and % change

Table R4.B: Price Surge – Savings by Institutions Including Households in the Short Run

Description	BASE	PWHEAT-H	PFUEL-H	POTHER-H	PSURGE-H	BLINE-PSH-SR	ALT-PSH-SR
Rural, Poor, Humid Lowlands Moisture Reliable	0.09	-0.82	6.49	-4.83	-0.39	-6.41	-16.37
Rural, Poor, Moisture Sufficient Highlands – Cereals Based	1.49	-0.91	6.82	-5.77	-1.23	-7.31	-17.28
Moisture Sufficient Highlands – Enset Based	0.74	-1.20	7.27	-7.52	-3.03	-9.06	-19.02
Rural, Poor, Drought-Prone (Highlands)	1.29	-1.34	7.12	-8.61	-4.41	-10.28	-20.09
Rural, Non-poor, Pastoralist (Arid Lowland Plains)	0.25	-3.89	6.93	-19.38	-18.08	-22.57	-31.06
Rural, non-poor, Humid Lowlands Moisture Reliable	0.12	-2.16	7.16	-12.71	-9.41	-14.85	-24.34
Rural, Non-poor, Moisture Sufficient Highlands – Cereals Based	3.64	-2.01	7.93	-10.35	-6.10	-12.21	-22.23
Rural, Non-poor, Moisture Sufficient Highlands – Enset Based	1.93	-2.55	8.15	-10.81	-6.87	-12.95	-22.99
Rural, Non-poor, Drought-Prone (Highlands)	3.14	-2.54	8.08	-13.24	-9.53	-15.36	-25.12
Pastoralist (Arid Lowland Plains)	0.59	-3.98	7.56	-22.61	-21.18	-25.64	-34.22
Small, Urban, Poor	0.23	-3.88	8.51	-25.64	-23.68	-28.14	-37.25
Large, Urban, Poor	0.15	-3.80	10.03	-28.13	-25.23	-30.00	-39.12
Small, Urban, Non-Poor	1.03	-3.99	8.52	-26.48	-24.65	-28.98	-37.88
Large, Urban, Non-Poor	0.87	-3.83	10.02	-28.20	-25.34	-30.22	-39.28
Summary all Savings							
Households Total	15.56	-2.36	7.92	-13.34	-9.65	-15.36	-25.07
Government Savings	3.26					-24.35	-24.35
Foreign Savings	13.07	-1.82	3.64	-20.99	-19.85	-8.88	-0.72
Total Savings	31.89	-1.90	5.36	-15.11	-12.85	-13.62	-15.01

Units: Billion birr and % change

Table R4.C: Baseline and Alternative – Savings by Institutions Including Households in the Medium Run

Description	BASE	G-BLINE-MR	F-BLINE-MR	BLINE-MR	G-ALT-MR	F-ALT-MR	TFP-ALT-MR	ALT-MR	PSURGE-L	BLINE-PSL-MR	ALT-PSL-MR
Rural, Poor, Humid Lowlands Moisture Reliable	0.09	5.19	-4.14	1.11	6.05	-3.31	-0.24	2.55	0.27	2.46	3.09
Rural, Poor, Moisture Sufficient Highlands – Cereals Based	1.49	5.28	-4.22	1.11	6.15	-3.38	-0.27	2.54	0.05	2.25	2.87
Moisture Sufficient Highlands – Enset Based	0.74	5.46	-4.33	1.17	6.37	-3.46	-0.51	2.40	-0.48	1.80	2.21
Rural, Poor, Drought-Prone (Highlands)	1.29	5.51	-4.33	1.22	6.42	-3.47	-0.52	2.44	-0.89	1.43	1.84
Rural, Non-poor, Pastoralist (Arid Lowland Plains)	0.25	6.02	-4.44	1.59	7.02	-3.55	-0.99	2.41	-4.87	-2.25	-2.22
Rural, non-poor, Humid Lowlands Moisture Reliable	0.12	5.93	-4.48	1.45	6.92	-3.59	-0.66	2.63	-2.33	0.23	0.56
Rural, Non-poor, Moisture Sufficient Highlands – Cereals Based	3.64	5.96	-4.60	1.35	6.95	-3.69	-0.56	2.66	-1.28	1.22	1.68
Rural, Non-poor, Moisture Sufficient Highlands – Enset Based	1.93	6.11	-4.68	1.42	7.13	-3.75	-0.62	2.69	-1.50	1.09	1.51
Rural, Non-poor, Drought-Prone (Highlands)	3.14	6.12	-4.67	1.43	7.14	-3.75	-0.77	2.55	-2.31	0.28	0.55
Pastoralist (Arid Lowland Plains)	0.59	6.50	-4.71	1.77	7.59	-3.77	-1.28	2.41	-5.77	-2.91	-3.10
Small, Urban, Poor	0.23	7.11	-5.04	1.99	8.30	-4.04	-2.04	2.00	-6.58	-3.43	-4.29
Large, Urban, Poor	0.15	7.10	-5.19	1.83	8.29	-4.16	-2.50	1.41	-7.00	-3.99	-5.28
Small, Urban, Non-Poor	1.03	7.27	-5.07	2.12	8.49	-4.07	-1.84	2.36	-6.80	-3.53	-4.16
Large, Urban, Non-Poor	0.87	7.01	-5.19	1.74	8.19	-4.16	-2.44	1.37	-7.01	-4.09	-5.33
Summary all Savings											
Households Total	15.56	6.08	-4.63	1.44	7.09	-3.71	-0.84	2.47	-2.37	0.21	0.40
Government Savings	3.26	-24.35		-24.35	-28.41			-28.41		-24.35	-28.41
Foreign Savings	13.07	0.32	4.16	4.51	0.37	3.34	0.41	4.17	-5.43	-1.92	-1.46
Total Savings	31.89	0.61	-0.55	0.06	0.71	-0.44	-0.24	0.01	-3.38	-3.18	-3.31

Units: Billion birr and % change

Table R5.A: Baseline and Alternative – Savings Shares by Institutions Including Households in the Short Run

Description	BASE	G-BLINE-SR	F-BLINE-SR	BLINE-SR	G-ALT-SR	F-ALT-SR	TFP-ALT-SR	ALT-SR
Rural, Poor, Humid Lowlands Moisture Reliable	0.27	0.28	0.24	0.25	0.28	0.21	0.26	0.22
Rural, Poor, Moisture Sufficient Highlands – Cereals Based	4.66	4.88	4.12	4.35	4.88	3.70	4.64	3.91
Moisture Sufficient Highlands – Enset Based	2.32	2.43	2.04	2.16	2.43	1.83	2.30	1.93
Rural, Poor, Drought-Prone (Highlands)	4.05	4.25	3.56	3.77	4.25	3.19	4.02	3.37
Rural, Non-poor, Pastoralist (Arid Lowland Plains)	0.79	0.84	0.69	0.74	0.84	0.62	0.79	0.66
Rural, non-poor, Humid Lowlands Moisture Reliable	0.38	0.40	0.33	0.35	0.40	0.30	0.38	0.31
Rural, Non-poor, Moisture Sufficient Highlands – Cereals Based	11.40	12.01	9.93	10.55	12.01	8.85	11.31	9.37
Rural, Non-poor, Moisture Sufficient Highlands – Enset Based	6.06	6.39	5.26	5.60	6.39	4.68	6.01	4.96
Rural, Non-poor, Drought-Prone (Highlands)	9.85	10.39	8.56	9.11	10.39	7.61	9.76	8.06
Pastoralist (Arid Lowland Plains)	1.85	1.96	1.61	1.72	1.96	1.43	1.83	1.51
Small, Urban, Poor	0.73	0.77	0.62	0.67	0.77	0.55	0.71	0.58
Large, Urban, Poor	0.48	0.51	0.41	0.44	0.51	0.36	0.47	0.38
Small, Urban, Non-Poor	3.21	3.42	2.75	2.96	3.42	2.42	3.16	2.57
Large, Urban, Non-Poor	2.73	2.90	2.33	2.50	2.90	2.04	2.68	2.16
Summary all Savings								
Households Total	48.78	51.42	42.44	45.16	51.42	37.79	48.31	39.97
Government Savings	10.22	7.71	10.44	7.87	7.71	10.61	10.30	8.05
Foreign Savings	40.99	40.87	47.12	46.98	40.87	51.60	41.39	51.98
Total Savings	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Units: shares %

Table R5.B: Price Surge – Savings Shares by Institutions Including Households in the Short Run

Description	BASE	PWHEAT-H	PFUEL-H	POTHER-H	PSURGE-H	BLINE-PSH-SR	ALT-PSH-SR
Rural, Poor, Humid Lowlands Moisture Reliable	0.27	0.27	0.27	0.30	0.30	0.29	0.26
Rural, Poor, Moisture Sufficient Highlands – Cereals Based	4.66	4.71	4.73	5.18	5.28	5.00	4.54
Moisture Sufficient Highlands – Enset Based	2.32	2.34	2.36	2.53	2.58	2.44	2.21
Rural, Poor, Drought-Prone (Highlands)	4.05	4.07	4.12	4.36	4.44	4.20	3.81
Rural, Non-poor, Pastoralist (Arid Lowland Plains)	0.79	0.78	0.81	0.75	0.75	0.71	0.64
Rural, non-poor, Humid Lowlands Moisture Reliable	0.38	0.38	0.39	0.39	0.40	0.37	0.34
Rural, Non-poor, Moisture Sufficient Highlands – Cereals Based	11.40	11.39	11.68	12.04	12.28	11.58	10.43
Rural, Non-poor, Moisture Sufficient Highlands – Enset Based	6.06	6.02	6.22	6.36	6.47	6.10	5.49
Rural, Non-poor, Drought-Prone (Highlands)	9.85	9.79	10.11	10.07	10.23	9.65	8.68
Pastoralist (Arid Lowland Plains)	1.85	1.81	1.89	1.69	1.68	1.60	1.43
Small, Urban, Poor	0.73	0.71	0.75	0.64	0.64	0.60	0.54
Large, Urban, Poor	0.48	0.47	0.50	0.41	0.41	0.39	0.35
Small, Urban, Non-Poor	3.21	3.15	3.31	2.78	2.78	2.64	2.35
Large, Urban, Non-Poor	2.73	2.68	2.86	2.31	2.34	2.21	1.95
Summary all Savings							
Households Total	48.78	48.55	49.97	49.80	50.57	47.80	43.01
Government Savings	10.22	10.42	9.70	12.04	11.73	8.96	9.10
Foreign Savings	40.99	41.03	40.33	38.16	37.70	43.24	47.89
Total Savings	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Units: shares %

Table R5.C: Baseline and Alternative – Savings Shares by Institutions Including Households in the Medium Run

Description	BASE	G-BLINE-MR	F-BLINE-MR	BLINE-MR	G-ALT-MR	F-ALT-MR	TFP-ALT-MR	ALT-MR	PSURGE-L	BLINE-PSL-MR	ALT-PSL-MR
Rural, Poor, Humid Lowlands Moisture Reliable	0.27	0.28	0.26	0.27	0.28	0.26	0.27	0.27	0.28	0.28	0.28
Rural, Poor, Moisture Sufficient Highlands – Cereals Based	4.66	4.88	4.49	4.71	4.92	4.53	4.66	4.78	4.83	4.92	4.96
Moisture Sufficient Highlands – Enset Based	2.32	2.43	2.23	2.34	2.45	2.25	2.31	2.37	2.39	2.44	2.45
Rural, Poor, Drought-Prone (Highlands)	4.05	4.25	3.89	4.10	4.28	3.93	4.04	4.15	4.15	4.24	4.26
Rural, Non-poor, Pastoralist (Arid Lowland Plains)	0.79	0.84	0.76	0.81	0.84	0.77	0.79	0.81	0.78	0.80	0.80
Rural, non-poor, Humid Lowlands Moisture Reliable	0.38	0.40	0.37	0.39	0.40	0.37	0.38	0.39	0.38	0.39	0.40
Rural, Non-poor, Moisture Sufficient Highlands – Cereals Based	11.40	12.01	10.94	11.55	12.11	11.03	11.36	11.70	11.65	11.92	11.99
Rural, Non-poor, Moisture Sufficient Highlands – Enset Based	6.06	6.39	5.81	6.14	6.44	5.86	6.03	6.22	6.17	6.32	6.36
Rural, Non-poor, Drought-Prone (Highlands)	9.85	10.39	9.44	9.99	10.48	9.52	9.80	10.10	9.96	10.20	10.24
Pastoralist (Arid Lowland Plains)	1.85	1.96	1.78	1.88	1.98	1.79	1.83	1.90	1.81	1.86	1.86
Small, Urban, Poor	0.73	0.77	0.69	0.74	0.78	0.70	0.71	0.74	0.70	0.72	0.72
Large, Urban, Poor	0.48	0.51	0.46	0.49	0.52	0.47	0.47	0.49	0.47	0.48	0.47
Small, Urban, Non-Poor	3.21	3.43	3.07	3.28	3.46	3.10	3.16	3.29	3.10	3.20	3.19
Large, Urban, Non-Poor	2.73	2.91	2.61	2.78	2.94	2.63	2.67	2.77	2.63	2.71	2.68
Summary all Savings											
Households Total	48.78	51.43	46.78	49.46	51.87	47.18	48.49	49.98	49.29	50.49	50.65
Government Savings	10.22	7.69	10.28	7.73	7.27	10.27	10.25	7.32	10.58	7.99	7.57
Foreign Savings	40.99	40.88	42.94	42.82	40.86	42.55	41.26	42.70	40.12	41.52	41.78
Total Savings	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Units: shares %

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