IFPRI / RESEARCH INFRASTRUCTURE

RIAPA.ai
Model manual

The Rural Investment and Policy Analysis model behind the assistant: what it represents, what you can change, what it reports, and how to read the numbers.

International Food Policy Research Institute

Revised edition | 27 November 2026

A practical guide to the model, reviewing and running scenarios, and the reference codes used in input and result files.

UNDERSTAND THE MODEL

Structure, closures, interpretation

USE THE APP

Approve, save, compare

LOOK UP CODES

Inputs and outcomes

Support: info@riapa.ai

Contents

Click a section below, or use the PDF bookmarks to move through the manual.

1. What RIAPA is 3

2. What a country model contains 4

3. How RIAPA.ai works 4

4. Defining a scenario: the input files 6

5. Closures: the rules of the experiment 8

6. What comes back 9

7. Outcome variables 11

8. What the model can and cannot tell you 13

9. Reference: codes used in every file 14

10. Sharing results and citing RIAPA.ai 16

11. Country models 17

Start here. Section 3 explains how to use the app. Section 4 lists the input files. Section 7 explains the outcome codes; section 9 is the reference for activities, commodities, factors, households and consumption groups.

1. What RIAPA is

RIAPA (Rural Investment and Policy Analysis) is IFPRI's standard single-country computable general equilibrium model. It represents a whole national economy for one year: who produces what, who buys it, who earns the income and how prices bring supply and demand together. A scenario compares that year as it was with the same year as it would have been had a policy or a shock been in place. Everything in the economy adjusts at once, so an effect that starts in one sector reaches the rest through prices, wages, trade and household spending.

The model is built on a social accounting matrix: a consistent picture of every payment in the economy in the base year, assembled from national accounts, trade statistics, government budgets and a household survey. Behavior and market clearing are added through a small number of standard functional forms and equilibrium rules.

Table 1. How behavior and equilibrium are represented

Where	Functional form
Production	Constant elasticity of substitution (CES) between factors, fixed proportions (Leontief) over intermediate inputs
Imports	Constant elasticity of substitution between imported and domestic goods (Armington)
Exports	Constant elasticity of transformation (CET) between exports and domestic sales
Consumption	Linear expenditure system, one demand function per household group and commodity
Numeraire	The consumer price index or the domestic producer price index is held fixed
Closures	Rules that decide what adjusts: the current account, the government balance, savings and investment, and each factor market

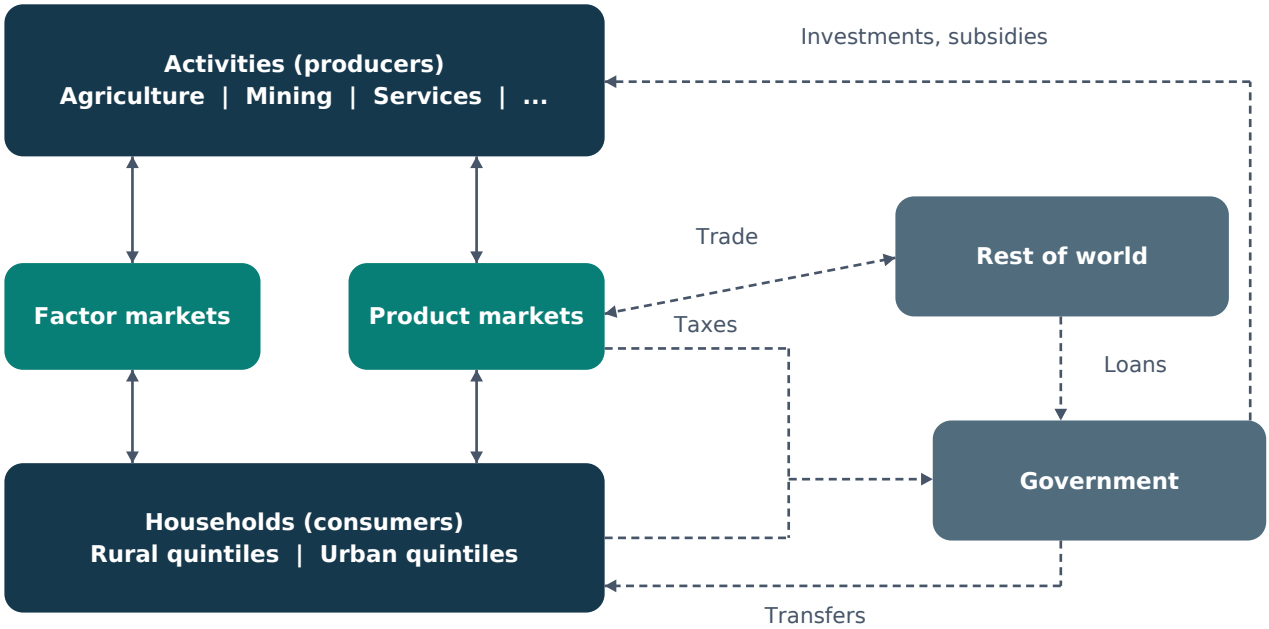

Figure 1. Stylized economy-wide circular flows as RIAPA represents them.

2. What a country model contains

Every country model shares the same 46-sector classification, so scenarios follow one common structure across countries; only sectors active in a country's base-year data can be shocked. Two earlier-generation country editions (Kenya 2019 and Malawi 2022) use narrower closure ranges, a 2017 purchasing power parity (PPP) poverty line, and unscaled model units for detailed sector and household outputs, as noted in sections 5–7.

Count	What it represents
46	production sectors, each with an activity that produces and a commodity that is traded and consumed (section 9)
10	household groups: rural and urban households split into five expenditure quintiles each
8	factors of production: four types of labor by education, agricultural land, and three types of capital
3	institutional accounts beyond households: enterprises (receiving non-agricultural capital income and paying direct taxes), the government, and the rest of the world
1	household survey behind the poverty and undernourishment results, with every surveyed household mapped to one of the ten groups

Because the household survey is linked post-solution to the model, a scenario does not stop at average incomes: each surveyed household's spending is revalued at the new prices and incomes, and poverty and undernourishment are recomputed from those households.

3. How RIAPA.ai works

RIAPA.ai helps you describe an economic change, prepare a scenario and explore the results. The RIAPA economic model calculates the simulation results. The AI assistant helps prepare the inputs and explain the outputs; review its proposed assumptions and explanations before using them. RIAPA.ai does not automatically compute biophysical impacts (crop yields, climate, livestock, fisheries, or pests and diseases); supply your own percentage changes and supporting evidence for those topics.

Stage	What happens
1. Define and approve	Describe what changes and by how much. The assistant checks whether the model can represent it and saves a named draft; after you approve, the system prepares the input files.
2. Solve and save	The economic model solves each alternative independently and archives verified result files.
3. Explore saved results	Ask questions, compare compatible runs, download CSVs, or request a report with charts.

A scenario needs something in the baseline to act on: for example, an import tariff cannot affect a good the country did not import in the base year. Check that the proposed changes match the available data. When reading an answer, distinguish your simulation results from baseline data, outside evidence and the assistant's interpretation.

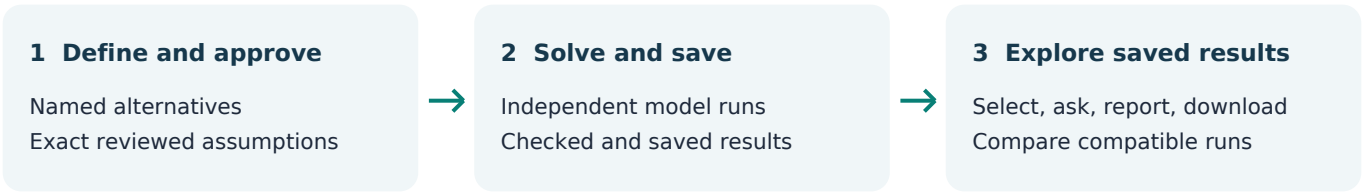

Figure 2. From exact reviewed assumptions to saved model results and follow-up analysis.

3.1 Review and run alternatives

Register and verify your email. A free verified account can use every country model. After signing up, open the verification link in your inbox and return to RIAPA.ai. Open **Edit your profile** to resend the link or choose **Check email status**. Your saved conversations and results remain available while verification is pending.

Before you start. Read the short guidance, tick the checkbox and choose **Continue**. You can reopen it under **Daily limits** (in the top-right bar); the **Usage and citation** page has the full guidance.

Choose a country/model. The Active model year describes the economy represented by the data; it is not a forecast year. Changing country or baseline year starts a new chat and keeps the earlier conversation.

Describe one to five named alternatives. State what changes and by how much. Each alternative starts from the same baseline for the chat's selected model. Changes do not accumulate across alternatives or later groups of scenarios. You choose the shock size; consider the limits of any reference values you use.

Review the exact proposal. The assistant saves a named draft showing each scenario's assumptions. Saving it does not start a simulation. Ask for revisions if needed; revising a draft disables approval of the older version. Click **Run scenarios** (or **Run 1 scenario**) in the proposal card to approve those scenarios, or reply **proceed** to approve the reviewed proposal when one draft is pending. Nothing runs before approval.

> **Your daily allowance.** Each verified account has an allowance of **20 scenarios per UTC calendar day**, across all models and conversations. Five alternatives count as five. The allowance resets at 00:00 UTC. Approval reserves a slot in that day's allowance. A scenario counts once submitted for calculation; if the solver cannot find an equilibrium solution, up to three non-convergent attempts per UTC day are automatically refunded. A failure before submission restores your slot immediately; an uncertain submission holds it until refreshed. Reopening or downloading results, or reconnecting to an existing job, does not count again.

To keep the shared service responsive, AI questions and report requests also have limits: normally 200 per day and 6 per minute, with one active response at a time per account. The app explains when to retry. The RIAPA.ai team may pause new work when the service-wide allowance is reached; saved results remain available.

3.2 Progress, recovery and saved results

Each alternative shows its own progress. Preparation, execution, solver validation and saving the result files are separate steps. One failed alternative does not erase another's results, and completed results remain saved in the chat.

If a response is interrupted, use **Refresh status** first; refreshing does not start a simulation. Use **Check or resume simulations** when approved scenarios are still pending. This continues an existing simulation without submitting a second copy. If a scenario says **Start not confirmed**, choose **Refresh status** first; if the status stays uncertain, contact the RIAPA.ai team before running it again.

A validated solve may still be waiting for its result files to be saved. Questions, reports and downloads become available only when those files are saved. If a finished batch offers **Retry saving results**, it retrieves the existing results without running the scenarios again. Solve status and file availability remain separate.

Select one completed, saved scenario beneath the results or in **Scenarios** above the chat to choose **Explain results**, **Write report**, **Download CSVs**, or **Run details**. Select two to five compatible saved runs and use **Compare scenarios** beneath the results (or **Compare selected scenarios** in **Scenarios**)

to compare their simulated outputs against the common baseline. Earlier runs remain available for later questions. Selecting a run focuses follow-up questions on that result; **Clear selection** returns to a general question.

> **Interpretation.** Outcomes are omitted from exported result CSVs when their change falls below the export threshold (smaller than 0.000001, i.e., 1e-6, in % or percentage points) or when an indicator is not supported in an earlier-generation edition; treat absent outcomes as unavailable rather than zero (see section 6). Compare only saved scenarios with matching baselines, model versions, units and poverty definitions. Most outcomes report percentage changes, whereas poverty and undernourishment report percentage-point changes. Saved poverty lines, PPP vintage, scenario context and units stay with their runs. Results are conditional estimates, not forecasts; check AI explanations against the result files and other evidence.

4. Defining a scenario: the input files

A scenario is a set of edits to 21 structured CSV input files. Most files have one row per sector, factor, or household group and a Scenario column that you update (three macro files have a single economy-wide row); you never add rows, because an absent row means that flow does not exist in the base year. The assistant edits these files for you and saves the prepared inputs with your scenario for documentation.

Four input conventions apply across the 21 files: _p_change files specify percent changes from the base year (10 means 10% more); `_sim` files specify tax or tariff rates as level percentages (base 5.2 becomes 15.2 for a 10-point rise); behavior files (`PRODELAS`, `impelas`, `expelas`, `FRISCH`) carry `Base` and `Scenario` parameter columns; and `CLOSURES.csv` holds integer rule codes described in section 5.

Productivity

File	Key column	What it changes	Note
`tfp_p_change.csv`	Activity	Total factor productivity of an activity, percent change	10 = a 10% rise in value added from the same primary factors (intermediate inputs stay in fixed Leontief proportion to gross output)
`fprd_p_change.csv`	Factor, Activity	Productivity of one factor in one activity, percent change	Land productivity in cereals, labor productivity in textiles

World prices

File	Key column	What it changes	Note
`pwm_p_change.csv`	Commodity	World price of imports, percent change	A fuel price spike: 30
`pwe_p_change.csv`	Commodity	World price of exports, percent change	A fall in beverage crop prices: -20

Taxes and tariffs (LEVELS in percent, not changes)

File	Key column	What it changes	Note
tm_sim.csv	Commodity	Import tariff rate	Base 5.2 -> set 15.2 to add 10 points
te_sim.csv	Commodity	Export tax rate	Only for commodities the country exports
tq_sim.csv	Commodity	Sales tax rate	A negative rate is a subsidy
ta_sim.csv	Activity	Tax on the output of an activity	
tf_sim.csv	Factor	Tax on the use of a factor	Payroll-type taxes
tins_sim.csv	Institution	Direct tax rate on households and enterprises	

Households and transfers

File	Key column	What it changes	Note
hpop_p_change.csv	Household	Population of a household group, percent change	Migration, growth
transf_row_p_change.csv	Household	Transfers from abroad, percent change	Remittances

Macroeconomic levers (one value each)

File	Key column	What it changes	Note
qg_p_change.csv	none	Real government consumption, percent change	Acts under s-i (savings and investment) closures 1 to 3 (section 5)
FSAV_p_change.csv	none	Foreign savings, percent change	Acts under rest-of-world (row) closure 1 (section 5)
EXR_p_change.csv	none	Nominal exchange rate, percent change; positive is a devaluation	Acts only under rest-of-world (row) closure 2 (section 5)

Factor supply

File	Key column	What it changes	Note
QFS_p_change.csv	Factor	Supply of a factor, percent change	Acts under factor closures 1, 2, and (newer models) 4; no effect under closure 3 (section 5)

Behavior (Base and Scenario columns)

File	Key column	What it changes	Note
PRODELAS.csv	Activity	Substitution between factors in production	Positive value other than 1 (CES solver parameterization cannot take exactly 1; use, e.g., 0.99 or 1.01)
impelas.csv	Commodity	Substitution between imported and domestic goods (Armington)	
expelas.csv	Commodity	Transformation between exports and domestic sales (CET)	
FRISCH.csv	Household	Frisch parameter of the demand system, between -10 and -1	More negative = less flexible demand

Model closure

File	Key column	What it changes	Note
CLOSURES.csv	Switch	One code per macro and factor market, see section 5	

Rules to remember

Lever	When it acts (see section 5 closures)
An exchange-rate change	acts only under a fixed exchange rate (rest-of-world closure row = 2). Under the default, the exchange rate adjusts so an exchange-rate shock has no effect.
A foreign-savings change	acts only under fixed foreign savings (rest-of-world closure row = 1).
A government-spending change	acts under investment closures s-i 1 to 3; under balanced closures 4 and 5, government consumption is fixed as a nominal share of absorption.
A factor-supply change	acts under factor closures 1, 2, and (newer models) 4; does nothing under fixed-wage / flexible-employment closure 3, where employment already adjusts freely.
A tax-rate change (tins, tq, ta, tm, te, tf)	acts directly under default government closure gov = 1, and under gov 2–15 only on tax instruments that do not scale endogenously to hold government savings fixed.

5. Closures: the rules of the experiment

A closure says what is free to adjust and what is held fixed. It is not a detail: the same shock under two closures produces two different experiments, and some levers do nothing unless the matching closure is set. The codes live in CLOSURES.csv, one line per switch, with one line for each of the eight factors.

Switch	Code	Meaning
dum	1	Consumer price index is the numeraire (the default)
dum	2	Domestic producer price index is the numeraire
s-i	1	Investment fixed, savings rates shift by the same number of percentage points
s-i	2	Investment fixed, savings rates scale proportionally

Switch	Code	Meaning
s-i	3	Savings-driven investment: investment adjusts to available savings (the default)
s-i	4	Balanced: nominal absorption shares fixed, savings rates shift by percentage points
s-i	5	Balanced: nominal absorption shares fixed, savings rates scale proportionally
gov	1	Government savings absorb the difference, tax rates fixed (the default)
gov	2	Direct tax rates shift by the same number of percentage points to hold government savings fixed
gov	3	Direct tax rates scale to hold government savings fixed
gov	4 / 5	Sales tax rates (TQ): 4 additive; 5 proportional
gov	6 / 7	Activity tax rates (TA): 6 additive; 7 proportional
gov	8 / 9	Import tariff rates (TM): 8 additive; 9 proportional
gov	10 / 11	Export tax rates (TE): 10 additive; 11 proportional
gov	12 / 13	Value-added tax rates (TV): 12 additive; 13 proportional
gov	14 / 15	Factor tax rates (TF): 14 additive; 15 proportional
row	1	Foreign savings fixed, the exchange rate adjusts (the default)
row	2	Exchange rate fixed, foreign savings adjust. Needed for any exchange-rate scenario.
one line per factor	1	Mobile and fully employed: one economy-wide wage clears the market
one line per factor	2	Activity-specific and fully employed: use is fixed in each activity and the sector-specific return clears each activity's factor market (the default for the three capital types)
one line per factor	3	Unemployment at a fixed wage: employment adjusts instead of the wage
one line per factor	4	Upward-sloping supply curve. Newer country models only.

Under government codes 2 to 15, government savings stay fixed and the selected tax rates adjust. Additive means the same percentage-point adjustment across eligible rates. Proportional means multiplying those rates by the same factor, which requires a nonzero baseline or scenario tax schedule (for example, proportional codes 7, 11, or 15 fail where that tax rate is zero in the base year unless activated by an input). The model solves for the adjustment endogenously. Additive value-added tax adjustment acts under code 12, whereas proportional VAT code 13 is currently unavailable across all 21 national models because native VAT schedules are inactive and VAT rates cannot be shocked directly via an input file.

> **Important factor-closure difference from the IFPRI-Globe world model in RIAPA.ai:** In national RIAPA models, factor **code 2** means activity-specific and **code 3** means fixed wage / flexible employment. In IFPRI-Globe, codes 2 and 3 are swapped.

Earlier-generation editions (Kenya 2019 and Malawi 2022) accept government codes 1 to 3 and factor codes 1 to 3 only, whereas current-generation editions (including Zambia 2019) implement the expanded 15-code government set (except unavailable proportional VAT code 13) and 4 factor codes (reflecting edition scope, not baseline year).

6. What comes back

The table lists files produced by the economic model. App downloads contain the available CSV tables and the scenario details described below.

File	Contents
`results.csv`	Reported outcomes with their base value, scenario value and difference; omits outcomes below the export threshold
`results_solve.csv`	Solver and model status. Values of 1 for both indicate that the model solved normally.
`resultsONAT.csv`	National accounts, sectoral GDP and output, prices and exchange rates
`resultsOAFS.csv`	The agrifood system outcomes
`resultsOHHD.csv`	Household consumption, poverty and undernourishment
`resultsOOTH.csv`	Activity, commodity and factor detail
`resultsOSHORT.csv`	A short headline selection
`results.gdx`	The model's internal GAMS solution file; not included in app downloads

Portal downloads add `Outcome_dictionary.csv` (mapping each outcome code to its plain-language label and unit) and `CITATION.txt` (model identifiers, scenario text, and paper citation).

Reading the numbers

Item	How to read it
Money	For national and sectoral monetary aggregates: billion US dollars, converted from the base-year currency using the model's fixed base-year exchange rate. Quantities are real: they are valued at base-year prices, so a change in a quantity is a change in volume, not in price.
The difference column (Diff_vs_Base)	A percent change, except for poverty and undernourishment rates (Pov_ and Hun_), where it is a change in percentage points.
Missing rows	results.csv omits outcomes whose changes fall below the export threshold (1e-6, or 0.000001, in % or pp) or indicators not supported in an earlier-generation edition. Treat any absent outcome as unavailable rather than zero unless the selected closure fixes that variable.
Per-capita household consumption (Cons_*)	Household consumption level columns (Cons_*, section 7.4) use the units documented in Outcome_dictionary.csv and Run details for the selected model; scales differ across editions (unscaled model units in earlier-generation Kenya 2019 and Malawi 2022 vs. standardized scales such as billion US dollars per thousand people where 0.001332 equals 1,332 US dollars per person). Rely on Diff_vs_Base percent changes when comparing across editions.
Detailed sector outputs and prices	Current-generation models report detailed quantities in billion US dollars at base-year prices and prices as relative price levels; earlier-generation Kenya 2019 and Malawi 2022 editions use unscaled model units. Always rely on Diff_vs_Base percent changes rather than raw level magnitudes.

Downloading results. Click **Download CSVs** beside a saved scenario. The ZIP contains the available result tables, saved inputs, scenario assumptions, model version and paper reference in CITATION.txt. Match each Outcome code to Outcome_dictionary.csv for its name and change unit. For example, GDP changes are percentages and poverty rate changes are percentage points. The ZIP archive does not include results.gdx or model source files.

7. Outcome variables

This section documents all exported outcome families and template patterns. Codes in angle brackets are filled in with a sector, commodity, factor, household, or consumption-group code from section 9, so `QA_acere` is the output of the cereals activity.

7.1 National accounts and sectors

Code	Meaning
GDPMP	GDP at market prices
GDPFC	GDP at factor cost
NETITAX	Net indirect taxes (GDPMP minus GDPFC)
AGR_GDP	Agriculture's contribution to GDP: value added at factor cost
IND_GDP	Industry's contribution to GDP, including mining, processing, utilities and construction
MAN_GDP	Manufacturing's contribution to GDP. Part of IND_GDP; do not add it to industry GDP.
SRV_GDP	Services' contribution to GDP
AGR_PD, IND_PD, MAN_PD, SRV_PD	Gross output of the same four sectors: total production value, including all intermediate inputs
PRVCON	Private consumption
FIXINV	Fixed investment
GOVCON	Government consumption
ABSORP	Absorption: private consumption plus fixed investment plus government consumption
EXPORTS	Exports
IMPORTS	Imports

Agriculture, industry and services add up to GDP at factor cost exactly. Manufacturing is part of industry. The GDP figures count only the value a sector adds; the output figures count everything it produces, inputs included, so they can move differently.

7.2 Prices and the exchange rate

Price indices are normalized against the selected numeraire and measure relative price shifts, not monetary inflation.

Code	Meaning
CPI	Consumer price index
DPI	Domestic producer price index
NEXR	Nominal exchange rate; a rise is a depreciation
REXR	Real exchange rate: NEXR times world prices over domestic prices
PDIND	Index of domestic prices
PWEIND	Index of world export prices
PWMIND	Index of world import prices
PWIND	Combined world price index
TOFT	Terms of trade: export prices over import prices
PRC_FOOD	Food price index (base = 100)

Code	Meaning
PRC_NFOOD	Non-food price index (base = 100)
PRC_FOOD_REAL	Food price index divided by the full household basket index, times 100. See section 11 for the food weight by model.

7.3 The agrifood system

The agrifood system is wider than agriculture: it adds processing, inputs supplied to both, the trade and transport margins on food, and food eaten away from home. Total agrifood GDP (AFS_AFS) equals primary agriculture (AFS_AGR) plus off-farm components (AFS_OFF); do not add direct agrifood GDP (AFS_DIR) and AFS_OFF together, because agro-processing (AFS_PRC) enters both.

Code	Meaning
AFS_AFS	The whole agrifood system's contribution to GDP
AFS_DIR	Direct agrifood component: primary agriculture plus agro-processing
AFS_AGR	Primary agriculture
AFS_PRC	Agro-processing
AFS_OFF	Off-farm parts of the system (everything except primary agriculture)
AFS_INP	Inputs supplied to agriculture and agro-processing
AFS_INP_AGR	Inputs to agriculture
AFS_INP_PRC	Inputs to agro-processing
AFS_TRD	Trade and transport margins on agrifood products
AFS_TRD_AGR	Margins on agricultural products
AFS_TRD_PRC	Margins on processed food
AFS_HFS	Food away from home: hotels and catering
AFS_HOT	Hotels
AFS_FSV	Catering

7.4 Households, poverty and nutrition

Code	Meaning
Cons_urban, Cons_rural	Per capita consumption of all urban and all rural households
Cons_urban_poor / _midd / _rich, Cons_rural_poor / _midd / _rich	Per capita consumption by quintile group (1-2 poor, 3-4 middle, 5 rich) for urban and rural households
Cons_<household>-<group>	Per capita consumption of one commodity group by one household group, for example Cons_hhd-r1-gstap, staples bought by the poorest rural quintile
Pov_nat, Pov_urb, Pov_rur	Poverty rate at the national poverty line: whole country, urban, rural. Absent where a country's survey has no national line
Pov_nat_3.00 / _4.20 / _8.30	Poverty at international lines in 2021 purchasing power parity: 3.00, 4.20 and 8.30 US dollars a day (plus _urb and _rur equivalents; Pov_nat_2.15 / _urb / _rur at US$2.15/day at 2017 PPP in the earlier-generation Kenya 2019 and Malawi 2022 editions)
Hun_nat, Hun_urb, Hun_rur	Share of people below the calorie requirement (undernourishment)

7.5 Sector, commodity and factor detail

Code	Meaning
QA_<act>, PA_<act>	Output and producer price of an activity
QQ_<com>, PQ_<com>	Quantity and price of a commodity on the domestic market, imports included
QM_<com>, PM_<com>	Import quantity and import price
QE_<com>, PE_<com>	Export quantity and export price
QF_<fac>_<act>	Use of a factor in an activity
WF_<fac>	Economy-wide wage or return of a factor
WFDIST_<fac>_<act>	That factor's return in one activity relative to its economy-wide return. It moves only for factors under closure 2 (where economy-wide WF stays fixed at 1, so WFDIST directly tracks the activity-specific return index)

8. What the model can and cannot tell you

Scope	Interpretation
It can	Compare the base year with and without a policy or shock; trace effects across sectors, prices, trade, incomes and household spending; report who gains and who loses, down to poverty and undernourishment by household group.
It cannot	Describe a path through time. Investment can adjust within the simulated year under the selected savings-investment closure, but the model does not simulate future capital accumulation, debt dynamics or year-by-year adjustment.
It cannot	Create flows the base year does not have: a sector that exported nothing cannot be taxed on exports, and a crop that is not in the data cannot be shocked.
Treat results as	Estimates conditional on the data and the elasticities in the input files, not forecasts. The size of an effect depends on assumptions you can inspect and change.

9. Reference: codes used in every file

9.1 The 46 sectors

Each sector has an activity code beginning with a and a commodity code beginning with c: cereals are acere when produced and ccere when traded or consumed.

Primary agriculture

Activity	Commodity	Sector
acere	ccere	Cereals
apuls	cpuls	Pulses
aoils	coils	Oilseeds
aroot	croot	Roots and tubers
avege	cvege	Vegetables
afrui	cfrui	Fruits
abecr	cbecr	Beverage crops
aocrp	cocrp	Other non-food crops
alive	clive	Livestock
amilk	cmilk	Raw milk
afore	cfore	Forestry
afish	cfish	Fishery

Mining

Activity	Commodity	Sector
amine	cmine	Energy-related mining
amino	cmino	Other mining

Agro-processing

Activity	Commodity	Sector
ameat	cmeat	Meat processing
afsea	cfsea	Fish and seafood processing
afveg	cfveg	Fruit and vegetable processing
afoil	cfoil	Fats and oils
adair	cdair	Dairy
agmll	cgmll	Grain milling
afobe	cfobe	Other food and beverages
aoapr	coapr	Non-food agro-industry

Other manufacturing

Activity	Commodity	Sector
atext	ctext	Textiles
awood	cwood	Wood products
apetr	cpetr	Petroleum products
afert	cfert	Fertilizers and herbicides
achem	cchem	Chemicals
anmet	cnmet	Non-metal minerals
ametl	cmetl	Metals
amach	cmach	Machinery and other equipment
aoman	coman	Other manufacturing

Utilities and construction

Activity	Commodity	Sector
aelec	celec	Electricity, gas and steam
awatr	cwatr	Water supply and sewage
acons	ccons	Construction

Services

Activity	Commodity	Sector
atrad	ctrad	Wholesale and retail trade
atran	ctran	Transportation and storage
ahotl	chotl	Hotels
arest	crest	Restaurants
acomm	ccomm	Information and communication
afsrv	cfsrv	Finance and insurance
areal	creal	Real estate activities
absrv	cbsrv	Business services
apadm	cpadm	Public administration
aeduc	ceduc	Education
aheal	cheal	Health and social work
aosrv	cosrv	Other services

9.2 Factors of production

Code	Meaning
flab-n	Labor, no education
flab-p	Labor, primary education
flab-s	Labor, secondary education
flab-t	Labor, tertiary education
flnd	Agricultural land
fcap-c	Capital in crops
fcap-l	Capital in livestock
fcap-o	Capital, all other activities

9.3 Households and institutions

Code	Meaning
hhd-r1 ... hhd-r5	Rural households, expenditure quintiles 1 (poorest) to 5 (richest)
hhd-u1 ... hhd-u5	Urban households, expenditure quintiles 1 to 5
ent	Enterprise account (an institution, not a household: it receives capital income and pays tax)

9.4 Consumption groups

The 46 commodities are grouped for the household, poverty and nutrition results.

Code	Meaning
gstap	Staples: cereals and grain milling
glegu	Legumes and oilseeds
groot	Roots and starchy tubers
gvege	Vegetables
gfrui	Fruits
gprot	Protein foods: meat, fish, livestock
gdair	Dairy
gafat	Fats and oils
gdisc	Discretionary foods: coffee, tea, processed foods
ggood	Non-food goods
ghous	Housing, utilities and energy
gserv	Services

10. Sharing results and citing RIAPA.ai

Download result tables from any saved scenario. Resources contains the research paper, this model manual and **Cite RIAPA.ai**. Choosing Cite RIAPA.ai copies the paper reference or downloads BibTeX and RIS for a reference manager. The app does not provide model source packages for any country.

When using results in a publication, presentation or public analysis, cite the research paper below and identify RIAPA.ai, the country model, baseline year, scenario assumptions and model version. The paper reference is included in downloaded results, copied reports and exported charts.

> **Research paper.** Mukashov, A.; Kim, S.; Fang, P.; Diao, X.; Thurlow, J.; Proctor, J.; Rennison, A. (2026). An agentic AI assistant for country-level economic modeling: Methods, data, and expert evaluation. IFPRI Discussion Paper 02424. International Food Policy Research Institute. https://hdl.handle.net/10568/183521

A citation identifies the method and tool; it does not replace checking the analysis. Report your assumptions, distinguish model estimates from forecasts or causal evidence, and retain the saved scenario identifiers so you can trace the results.

11. Country models

All 21 country models use national model release 5.2, each calibrated to its own social accounting matrix and household survey for the base year shown. Every registered account with a verified email can use all models below within its daily allowance. The baseline year is not a forecast year.

Country	Base year	Food weight	Country	Base year	Food weight
Bangladesh	2022	34.039889%	Nepal	2022	40.642153%
Cambodia	2022	35.201132%	Nigeria	2022	59.472581%
Ethiopia	2022	46.018026%	Pakistan	2023	45.351792%
Ghana	2022	40.470061%	Rwanda	2022	29.328638%
India	2022	33.444635%	Senegal	2021	54.430707%
Indonesia	2023	38.963769%	Sri Lanka	2023	30.183510%
Kenya	2019	31.158557%	Tanzania	2022	41.788219%
Kenya	2022	30.097824%	Uganda	2022	35.975091%
Malawi	2022	40.990957%	Viet Nam	2023	35.678568%
Mexico	2023	36.461760%	Zambia	2019	45.282159%
Mozambique	2022	45.625590%			

How to reproduce the real food price

For national model version 5.2, take the food and non-food index levels from the same column of `results.csv` (or `resultsONAT.csv` when exported). Multiply the food index by the food weight above (as a fraction) and the non-food index by the remaining weight. Their sum is the full household basket index. Divide the food index by that sum and multiply by 100. Repeat for Base and Scenario. The percentage change is 100 × (Scenario / Base − 1).

The weights come from households' base-year purchases of marketed commodities. The 19 newer models average each commodity's price relative to its base price. Kenya 2019 and Malawi 2022 first average commodity price levels and then scale each basket to 100 in the base year. Their food weights above include that base-price adjustment.

> **Kenya 2022 example.** With a 10% rise in the world import price of petroleum products, the food index is 99.69525962 and the non-food index is 99.97857574. At a food weight of 30.097824%, the full basket is 99.89330. The real food price index is 99.80174, a fall of 0.1983% from 100.

Earlier-generation editions (Kenya 2019, Malawi 2022) retain section 5's closure limits; the 19 current-generation editions implement the expanded closure set (with proportional VAT code 13 unavailable and proportional tax codes requiring a nonzero schedule).

> **Saved model releases.** Saved results record the exact model release used (such as 5.2), separate from the earlier/current edition differences noted in section 5. A release label does not mean the baseline year changed; earlier saved results remain readable, and scenarios can be compared only when releases and baselines match.

Questions about data or results: info@riapa.ai.