# Defining, Running, and Analyzing Counterfactual Scenarios Using ISIM-MAMS*

This material was prepared by Martín Cicowiez (CEDLAS-UNLP) and Marco V. Sánchez (UN-DESA) for the First Intensive Training Workshop of the Project "Strengthening Macroeconomic and Social Policy Coherence through Integrated Macro-Micro Modelling", Amman, November 12-15, 2012, which has been organized by the Ministry of Ministry of Planning and International Cooperation (MoPIC), UN-DESA, and UN-ESCWA.

The aim of this note is to describe in some detail the steps required to perform simulations with MAMS (Maquette for MDG Simulations) through the ISIM-MAMS interface. First (Section 1), we describe simulations related to policy and external shocks. Second (Section 2), we describe simulations related to the creation of fiscal space through domestic and external resources; besides, we discuss alternative spending patterns.In Section 3, we present scenarios related to the achievement of different MDGs. Finally, Section 4 poses some additional exercises.

## 1. Exogenous Policy and External Shocks Simulations

In this section, we show, step by step, how to define and run four counterfactual scenarios related to exogenous policy and external shocks using ISIM-MAMS with the "Debugistan" dataset (i.e., a dataset for a non-existent country). In order to implement the following examples, the reader should have successfully installed (a) GAMS, (b) ISIM-MAMS, and (c) the Debugistan dataset.

### *Example 1.1: increase in the world export price of food products*

In this first example, we will start by creating the ISIM-MAMS application file that will be used throughout the remaining of the exercises (see steps 1-3). Then, we will define and run a scenario that simulates a 25% increase in the world export price of food products during 2011-2015.

1. Open Excel.
2. Click on the ISIM-MAMS tab; it automatically opens a ribbon with MAMS-specific buttons.

* ISIM-MAMS (An Interface for MAMS (MAquette for MDG Simulations)) was developed for The World Bank Development Economics Prospect Group (DECPG); Hans Lofgren from the World Bank is the key author of the MAMS program code.

3. Click on ***New*** in the ***Application*** ribbon group (Figure 1.1). Then,

    1. Introduce the name Test for the new MAMS application.
    2. Select the Debugistan dataset.
    3. Select the MDG version of MAMS (Figure 1.2).

*Figure 1.1: create a New ISIM-MAMS Application 1*

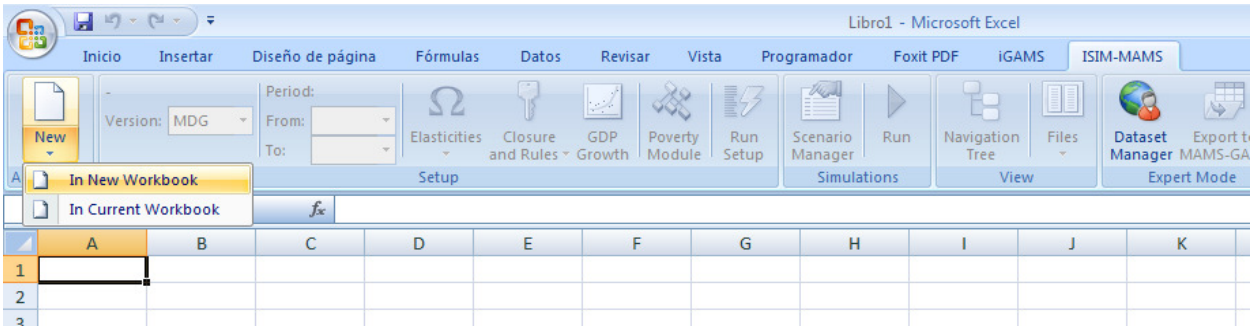
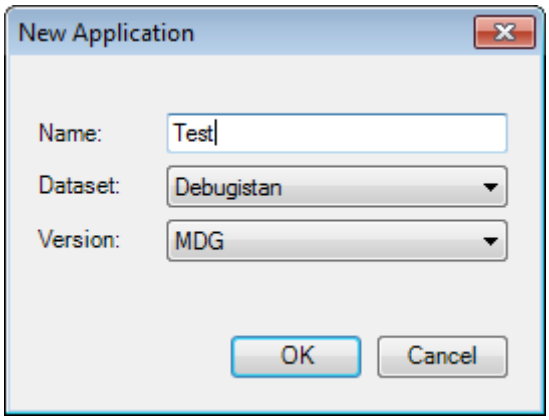
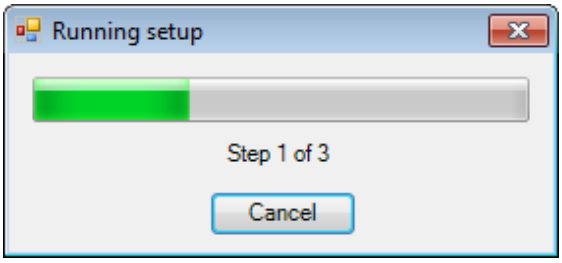



*Figure 1.2: create a New ISIM-MAMS Application 2*




4. Run the pre-programmed reference scenario by clicking on ***Run Setup*** in the ***Setup*** ribbon group. MAMS will be run and a window will show the progress in running MAMS (Figure 1.3). Tip: you may like to check what closure and rules are being used in order to understand the results generated for this pre-programmed reference scenario (it is important to do so, as this is the benchmark taken for all other simulations!).

*Figure 1.3: running Model Setup*




5. Open the ***Scenario Manager*** by clicking on ***Scenario Manager*** in the ***Simulations*** ribbon group. Then, click on ***New simulation*** to create a new simulation – at this point, the newly created simulation has no shocks associated with it. In the window that shows up (Figure 1.4),

    1. Introduce "pwefood" (i.e., the name we want to give to this example simulation) in the ***Name*** field.
    2. Introduce a short description in the ***Description*** field, which is good to associate the simulation with the change eventually imposed.
    3. Keep the Multi-pass default in the ***Mode*** field. Once finished, click OK. The newly created simulation will be added to the ***Scenario Manager*** (Figure 1.5).

*Figure 1.4: defining the New Simulation*

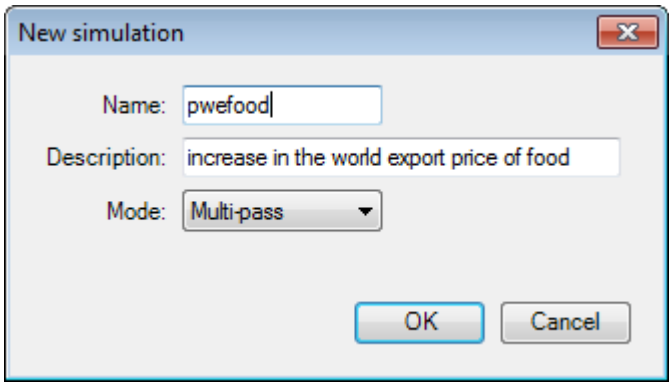
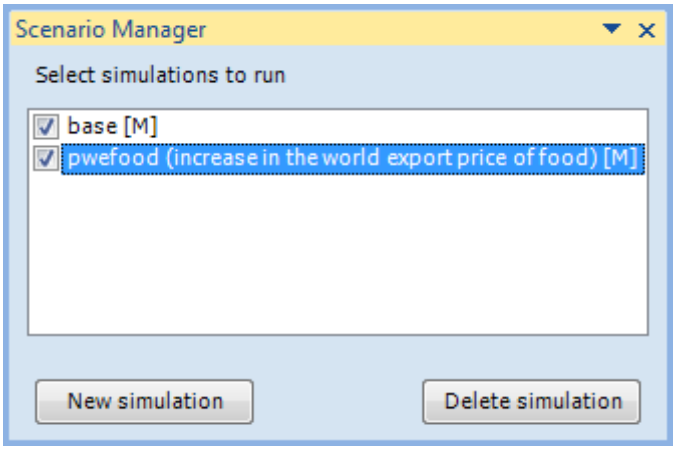


*Figure 1.5: Scenario Manager*

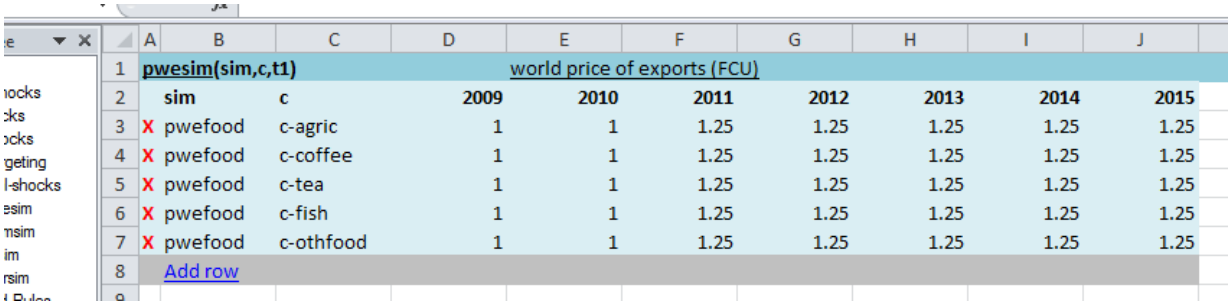



6. Go to the ***pwesim*** section in the ***external-shocks*** sheet. Note that the ***Navigation Tree*** can be used to move across the Excel file (Figure 1.6); to access the ***Navigation Tree***, click on the corresponding icon on the ***View*** ribbon group. To define the counterfactual scenario,

    1. In column sim (i.e., simulation), use the drop-down menu to select pwefood (i.e., the name that had been given to the simulation).
    2. In column c (i.e., commodity), use the drop-down menu to select one of the agricultural/food commodities – see the ***dictionary*** sheet in order to identify the food commodities in the Debugistan SAM.
    3. Click on ***Add row*** to add a new row to the ***pwesim*** shock parameter and then select one of the remainder agricultural commodities; repeat this step until all five food commodities identified in the Debugistan dataset are included as part of the pwefood simulation (c-agric, c-coffee, c-tea, c-fish, and c-othfood).[1]
    4. In columns 2009-2010, introduce number 1 (i.e., keep the base year value) for all the selected food commodities (Figure 1.6). Notice that the default simulation period for the Debugistan dataset is 2009-2015, with 2009 being the base year.
    5. In columns 2011-2015, introduce 1.25 (i.e., the equivalent to 25% in the ISIM-MAMS setting) for all the selected agricultural commodities.

[1] In reality, the simulation of a world price should affect both the export price and the import price of the commodity if this commodity is both exported and imported. Up to this point, we want to simulate a shock in the world export price only. In the two subsequent examples, we respectively shock the world import price only (example 1.2) and both world export and import prices (example 1.3). Simulating separately the shocks in world export and import prices for a commodity that is both exported and imported allows a better understanding of the results of a shock when both prices are changed simultaneously, where there is also interaction effects from changing both prices.

*Figure 1.6: Navigation Tree and defining shocks to the world price of exports*



| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | pwesim(sim,c,t1) | | | world price of exports (FCU) | | | | | |
| 2 | | sim | c | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| 3 | X | pwefood | c-agric | 1 | 1 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 4 | X | pwefood | c-coffee | 1 | 1 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 5 | X | pwefood | c-tea | 1 | 1 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 6 | X | pwefood | c-fish | 1 | 1 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 7 | X | pwefood | c-othfood | 1 | 1 | 1.25 | 1.25 | 1.25 | 1.25 | 1.25 |
| 8 | | Add row | | | | | | | | |

7. Run the selected simulations by clicking on ***Run*** in the ***Simulations*** ribbon group. Again, a window will show the progress in running MAMS.
8. Once finished, new sheets with reports will be added to the Excel file. The user can access the results through macro and meso reports, the dashboard, and a pivot table (Figure 1.7). Note that the ***repmacro-contents*** and ***repmeso-contents*** sheets can be used to navigate across the report tables.
9. Analyze the macro and meso results. Specifically, review the following results: macro aggregates, real exchange rate, government budget, sectoral structure of production and trade, and MDG indicators. Once finished, you can save the ISIM-MAMS application Excel file by following the Excel usual procedure (i.e., go to File | Save). Note that an ISIM-MAMS application Excel file is always associated with a country-specific dataset, Debugistan in our case.

*Figure 1.7: report example*

| 2 | Macro Report Contents | | | |
|---|---|---|---|---|
| 3 | **Table. Real macro indicators by simulation (% annual growth from first to final report year)** | | | |
| 4 | | | Final year | |
| 5 | **Indicator** | **2009** | **base** | **pwefood** |
| 6 | **Absorption** | 392.01 | 6.26 | 7.32 |
| 7 | **Consumption - private** | 276.70 | 6.09 | 6.74 |
| 8 | **Consumption - government** | 33.60 | 6.59 | 8.03 |
| 9 | **Fixed investment - private** | 61.73 | 6.64 | 8.93 |
| 10 | **Fixed investment - government** | 19.03 | 7.74 | 9.65 |
| 11 | **Stock change** | 0.96 | Eps | Eps |
| 12 | **Exports** | 71.53 | 7.37 | 7.70 |
| 13 | **Imports** | 116.28 | 6.33 | 8.50 |

## *Example 1.2: increase in the world import price of food products*

In this example, we start from the last step of example 1. Thus, there is no need to create a new ISIM-MAMS application Excel file and/or run the pre-programmed reference scenario.

1. Open the ***Scenario Manager*** by clicking on ***Scenario Manager*** in the ***Simulations*** ribbon group. Then, click on ***New simulation*** to create a new simulation. In the window that shows up,

    1. Introduce "pwmfood" to stand for the name of this new simulation in the ***Name*** field.
    2. Introduce a short description in the ***Description*** field.
    3. Keep the Multi-pass default in the ***Mode*** field. Once finished, click OK. The newly created simulation will be added to the ***Scenario Manager***.

2. Go to the ***pwmsim*** section in the ***external-shocks*** sheet. To define the counterfactual scenario, follow steps 6.1-6.5 of the previous example but using the ***pwmsim*** shock parameter and the pwmfood simulation. Note that you can copy the list of food commodities from the definition of the ***pwesim*** shock parameter used in the previous example.
3. Run the selected simulations by clicking on ***Run*** in the ***Simulations*** ribbon group. Again, a window will show the progress in running MAMS.
4. Once finished, the report sheets will be updated, including results for simulations pwefood and pwmfood, and the file can be saved.
5. Analyze the macro and meso results; specifically, review the following results: macro aggregates, real exchange rate, government budget, sectoral structure of production and trade, and MDG indicators.

## *Example 1.3: increase in the world price of food products*

In this example, we will simulate a new scenario that combines the previous two scenarios, pwefood and pwmfood. Having performed the previous two exercises successfully, one should be able to perform this third exercise without following any instructions! In fact, we do not provide detailed instructions in this case. In our implementation, the new scenario is named pwfood. The real macro indicators for each simulation should look like in Figure 1.8, before changing assumptions associated with the government closure rule (see below).

*Figure 1.8: simulation results for pwefood, pwmfood, and pwfood*

Macro Report Contents

**Table. Real macro indicators by simulation (% annual growth from first to final report year)**

| | | Final year | | | |
|---|---|---|---|---|---|
| **Indicator** | **2009** | **base** | **pwefood** | **pwmfood** | **pwfood** |
| **Absorption** | 392.01 | 6.26 | 7.32 | 6.08 | 7.12 |
| **Consumption - private** | 276.70 | 6.09 | 6.74 | 5.87 | 6.50 |
| **Consumption - government** | 33.60 | 6.59 | 8.03 | 6.44 | 7.88 |
| **Fixed investment - private** | 61.73 | 6.64 | 8.93 | 6.60 | 8.88 |
| **Fixed investment - government** | 19.03 | 7.74 | 9.65 | 7.60 | 9.51 |
| **Stock change** | 0.96 | Eps | Eps | Eps | Eps |
| **Exports** | 71.53 | 7.37 | 7.70 | 7.15 | 7.50 |
| **Imports** | 116.28 | 6.33 | 8.50 | 5.91 | 8.01 |
| **GDP at factor cost** | 319.17 | 6.50 | 6.97 | 6.43 | 6.90 |
| **Total factor employment (index)** | Eps | 4.96 | 5.64 | 4.89 | 5.57 |

## *Example 1.4: increase in remittances*

In this example, we will simulate a 100% increase in remittances (i.e., transfers from the rest of the world to households) relative to the base year during 2011-2015. In addition, we will also review the assumptions made to generate the pre-programmed reference scenario.

1. Open the ***Scenario Manager*** by clicking on ***Scenario Manager*** in the ***Simulations*** ribbon group. Then, click on ***New simulation*** to create a new simulation. In the window that shows up,

    1. Introduce "trhhdrow" to stand for the name of this new simulation in the ***Name*** field.
    1. Introduce a short description in the ***Description*** field.
    2. Keep the Multi-pass default for the ***Mode*** field. Once finished, click OK. The newly created simulation will be added to the Scenario Manager.

In the next steps, we will change some of the assumptions made to generate the pre-programmed reference scenario.

2. Go to the ***siclossim*** section in the ***closure-and-rules*** sheet to change the saving-investment. Then,

    1. In column sim, select trhhdrow.
    2. In column 2009, select 1 (can you explain the meaning of option 1?); note that option 1 will be applied to the whole simulation period.

3. Go to the ***govclossim*** section in the ***closure-and-rules*** sheet to change the government closure. Then,

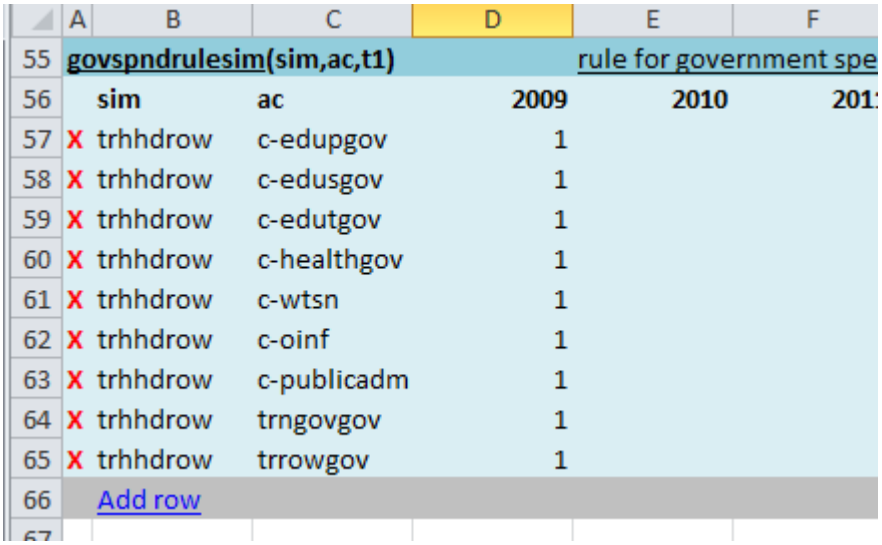
    3. In column sim, select trhhdrow.
    4. In column 2009, select 6 (can you explain the meaning of option 6?).

4. Go to the ***govspndrulesim*** section in the ***closure-and-rules*** sheet to change the rule for the government spending items (see Figure 1.9). Then,

    1. In column sim, select trhhdrow.
    2. In column ac, select c-edupgov.
    3. In column 2009, select 1 so that government spending in primary education is kept fixed at reference scenario values.
    4. Add rows to repeat steps 1-3 above for the rest of the commodities consumed by the government (i.e., c-edusgov, c-edutgov, c-healthgov, c-wtsn, c-oinf, and c-publicadm).
    5. Click on ***Add row***.
    6. In column sim, select trhhdrow.
    7. In column ac, select trngovgov.
    8. In column 2009, select 1 so that transfers from the government to the non-government domestic institutions are kept fixed at reference scenario values.
    9. Click on ***Add row***.
    10. In column sim, select trhhdrow.

11. In column ac, select trrowgov.
12. In column 2009, select 1 so that transfers from the government to the resto of the world are kept fixed – in foreign currency units -- at the reference scenario values.

*Figure 1.9: selecting rules for government spending items*



| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 55 | govspndrulesim(sim,ac,t1) | | | | rule for government spe | |
| 56 | | sim | ac | 2009 | 2010 | 201 |
| 57 | X | trhhdrow | c-edupgov | 1 | | |
| 58 | X | trhhdrow | c-edusgov | 1 | | |
| 59 | X | trhhdrow | c-edutgov | 1 | | |
| 60 | X | trhhdrow | c-healthgov | 1 | | |
| 61 | X | trhhdrow | c-wtsn | 1 | | |
| 62 | X | trhhdrow | c-oinf | 1 | | |
| 63 | X | trhhdrow | c-publicadm | 1 | | |
| 64 | X | trhhdrow | trngovgov | 1 | | |
| 65 | X | trhhdrow | trrowgov | 1 | | |
| 66 | | Add row | | | | |

5. Go to the ***govrecrulesim*** section in the ***closure-and-rules*** sheet to change the rule for the government receipts items. Then,

1. In column sim, select trhhdrow.
2. In column ac, select gborz.
3. In column 2009, select 1 so that government domestic borrowing generating interest-bearing debt is kept fixed at reference scenario values.
4. Click on ***Add row***.
5. On the new row, in column sim, select trhhdrow.
6. On the new row, in column ac, select gbormsz.
7. On the new row, in column 2009, select 1 so that government domestic borrowing via the monetary system (i.e., non-generating interest-bearing debt) is kept fixed at reference scenario values.
8. Click on ***Add row***.
9. On the new row, in column sim, select trhhdrow.
10. On the new row, in column ac, select fborgov.
11. On the new row, in column 2009, select 1.
12. Click on ***Add row***.
13. On the new row, in column sim, select trhhdrow.
14. On the new row, in column ac, select trgovrow.
15. On the new row, in column 2009, select 1.
16. Click on ***Add row***.

17. On the new row, in column sim, select trhhdrow.
18. On the new row, in column ac, select trgovngov.
19. On the new row, in column 2009, select 1.
20. Add rows to repeat steps 17-19 above for the three tax instruments identified in the Debugistan dataset: tax-dir, tax-imp, and tax-vat.

6. Go to the ***ngovpayrulesim*** section in the ***closure-and-rules*** sheet to change the rules for the different non-government payments (see Figure 1.10). Then,

    1. In column sim, select trhhdrow.
    2. In column ac, select trngovrow (aggregate transfers to non-government institutions from rest of world).
    3. In column 2009, select 1 so that the ***trnsfrpcsim*** shock parameter can be used to define the counterfactual increase in remittances.
    4. Add rows to repeat steps 2-3 above for the following non-government payments: trfacrow (aggregate transfers to factors from the rest of the world), fborngov (aggregate non-government borrowing from the rest of the world), and fdiz (foreign direct investment). Doing this, this set of non-government payments will be kept fixed at reference scenario values.

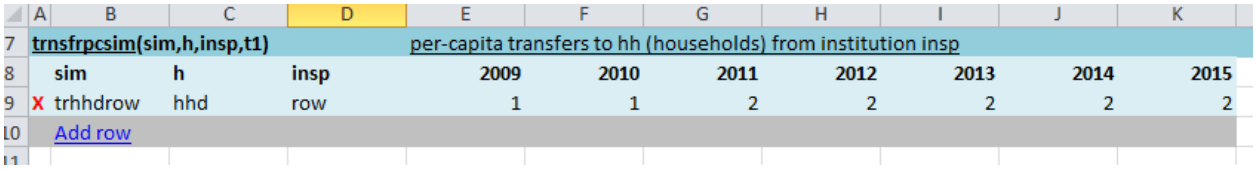
*Figure 1.10: selecting rules for non-government payments*

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 88 | ngovpayrulesim(sim,ac,t1) | | | | rule for non-government payment ac | | |
| 89 | | sim | ac | 2009 | 2010 | 2011 | 2012 |
| 90 | X | trhhdrow | trngovrow | 1 | | | |
| 91 | X | trhhdrow | trfacrow | 1 | | | |
| 92 | X | trhhdrow | fborngov | 1 | | | |
| 93 | X | trhhdrow | fdiz | 1 | | | |
| 94 | | Add row | | | | | |
| 95 | | | | | | | |

7. Go to the ***trnsfrpcsim*** section in the ***trnsfr-shocks*** sheet (Figure 1.11). To define the counterfactual scenario,

    1. In column sim, select trhhdrow.
    2. In column h (i.e., households), select hhd – note that the current version of the DebugistanSAM identifies only one household.
    3. In columns 2009-2010, introduce 1 (i.e., keep the base year value).
    4. In columns 2011-2015, introduce 2 so that remittances per capita are increased by 100% relative to the base year value of the reference scenario.

*Figure 1.11: defining shocks to per-capita transfers to households*



| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | trnsfrpcsim(sim,h,insp,t1) | | | | per-capita transfers to hh (households) from institution insp | | | | | | |
| 8 | | sim | h | insp | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| 9 | X | trhhdrow | hhd | row | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| 10 | | Add row | | | | | | | | | |

8. Run the new simulation by clicking on ***Run*** in the ***Simulations*** ribbon group.
9. As before, the report sheets will be overwritten with the new set of results. As an example, some results are shown in Figure 1.12.

*Figure 1.12: macro results for simulation trhhdrow*

| | A | B | C | D |
|---|---|---|---|---|
| 2 | Macro Report Contents | | | |
| 3 | **Table. Real macro indicators by simulation (% annual growth from first to final report year)** | | | |
| 4 | | | Final year | |
| 5 | **Indicator** | **2009** | **base** | **trhhdrow** |
| 6 | **Absorption** | 392.01 | 6.26 | 6.55 |
| 7 | **Consumption - private** | 276.70 | 6.09 | 6.40 |
| 8 | **Consumption - government** | 33.60 | 6.59 | 6.59 |
| 9 | **Fixed investment - private** | 61.73 | 6.64 | 7.10 |
| 10 | **Fixed investment - government** | 19.03 | 7.74 | 7.78 |
| 11 | **Stock change** | 0.96 | Eps | Eps |
| 12 | **Exports** | 71.53 | 7.37 | 6.94 |
| 13 | **Imports** | 116.28 | 6.33 | 6.60 |
| 14 | **GDP at factor cost** | 319.17 | 6.50 | 6.63 |
| 15 | **Total factor employment (index)** | Eps | 4.96 | 5.05 |
| 16 | **Total factor productivity (index)** | Eps | 1.54 | 1.58 |
| 17 | **Real exchange rate (index)** | Eps | 0.25 | 0.13 |
| 18 | **Headcount poverty rate (%)** | | Eps | Eps |
| 19 | *1. Unless otherwise noted, column for initial year shows data in LCU.* | | | |
| 20 | *2. For the poverty rate, the base-year and simulation columns show base-year rate and simulation-* | | | |
| 21 | | | | |

## 2. Fiscal Space Simulations

In this section, we will show, step by step, how to define and run counterfactual scenarios related to the creation of fiscal space using the Debugistan dataset. Thus, the following assumes that the reader has successfully created an ISIM-MAMS application Excel file using the Debugistan dataset; certainly, the Excel file from the previous set of examples can be used – just make sure it was saved.

## *Example 2.1: increase in foreign transfers (aid) channeled to the financing of human development spending*

In this example, we will define and run a scenario that simulates an increase in foreign aid during 2011 – 2015 that is channeled to the financing of human development spending (i.e., education, health and water and sanitation).

1. Create a new simulation using the ***Scenario Manager*** in the ***Simulations*** ribbon group. Then, click on ***New simulation***. In the window that shows up,

    1. Introduce "aid-hd" (as before, the name of the newly-created simulation) in the ***Name*** field.
    2. Introduce a short description in the ***Description*** field.
    3. Keep the Multi-pass default for the ***Mode*** field. Once finished, click OK. The newly created simulation will be added to the Scenario Manager.

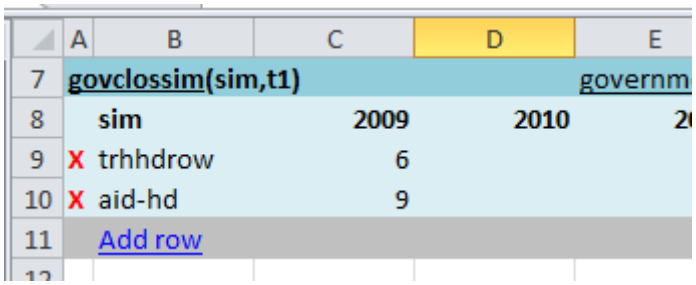
2. Go to the ***siclossim*** section in the ***closure-and-rules*** sheet to change the saving-investment closure. Then,

    1. In column sim, select aid-hd.
    2. In column 2009, select 1.

3. Go to the ***govclossim*** section of the ***closure-and-rules*** sheet to change the government closure (Figure 2.1). Then,

    1. In column sim, select aid-hd.
    2. In column 2009, select 9 (i.e., flexible government spending on one or more commodities).

*Figure 2.1: changing the government closure rule*



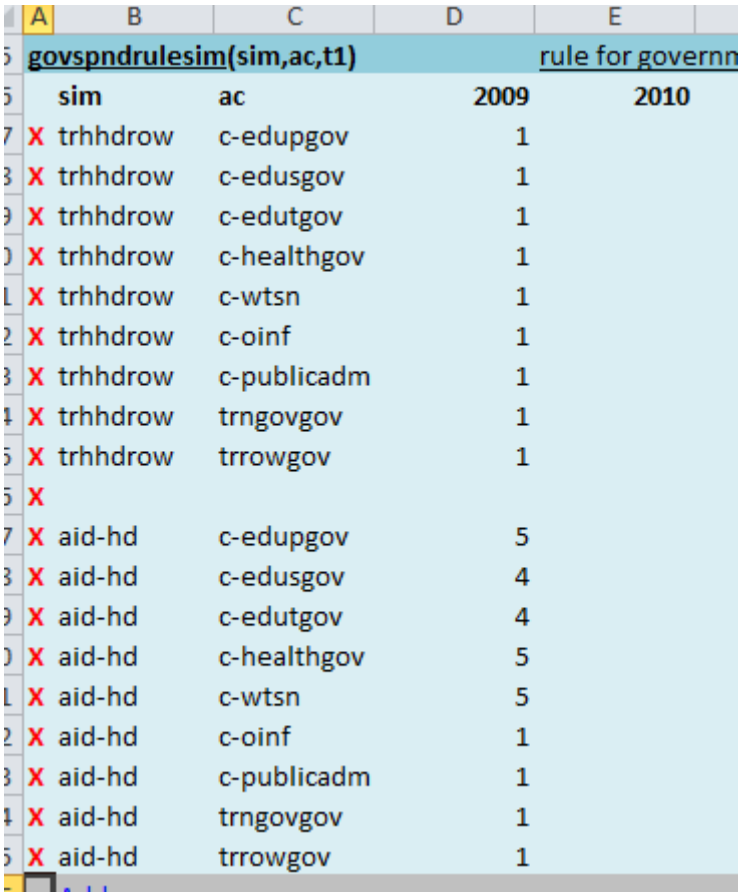
| | A | B | C | D | E |
|---|---|---|---|---|---|
| 7 | | govclossim(sim,t1) | | | governm |
| 8 | | sim | 2009 | 2010 | 2 |
| 9 | X | trhhdrow | 6 | | |
| 10 | X | aid-hd | 9 | | |
| 11 | | Add row | | | |

4. Go to the ***govspndrulesim*** section of the ***closure-and-rules*** sheet (Figure 2.2). Then,

    1. In column sim, select aid-hd.
    2. In column ac, select c-edupgov.
    3. In column 2009, select 5 (i.e., flexible government consumption).
    4. Add rows to repeat steps 1-3 above for the following human development (HD) commodities: c-healthgov, and c-wtsn – the description of which is given in the ***dictionary***.

5. Click on ***Add row***.
6. On the new row, in column sim, select aid-hd.
7. On the new row, in column ac, select c-edusgov (Secondary education, government).
8. On the new row, in column 2009, select 4 (i.e., fixed educational quality).
9. Add a row to repeat 7-8 for the c-edutgov commodity (Tertiary education, government).
10. Click on ***Add row***.
11. On the new row, in column sim, select aid-hd.
12. On the new row, in column ac, select c-publicadm (Public administration).
13. On the new row, in column 2009, select 1 (i.e., fixed growth rate).
14. Add a row to repeat 11-13 for the c-oinf commodity (Other infrastructure).
15. Click on ***Add row***.
16. In column sim, select trhhdrow.
17. In column ac, select trngovgov.
18. In column 2009, select 1; do you remember why?
19. Click on ***Add row***.
20. In column sim, select trhhdrow.
21. In column ac, select trrowgov.
22. In column 2009, select 1; do you remember why?

*Figure 2.2: selecting rules for government spending items – aid-hd*



| | A | B | C | D | E |
|---|---|---|---|---|---|
| 5 | | govspndrulesim(sim,ac,t1) | | | rule for governn |
| 6 | | sim | ac | 2009 | 2010 |
| 7 | X | trhhdrow | c-edupgov | 1 | |
| 8 | X | trhhdrow | c-edusgov | 1 | |
| 9 | X | trhhdrow | c-edutgov | 1 | |
| 10 | X | trhhdrow | c-healthgov | 1 | |
| 11 | X | trhhdrow | c-wtsn | 1 | |
| 12 | X | trhhdrow | c-oinf | 1 | |
| 13 | X | trhhdrow | c-publicadm | 1 | |
| 14 | X | trhhdrow | trngovgov | 1 | |
| 15 | X | trhhdrow | trrowgov | 1 | |
| 16 | X | | | | |
| 17 | X | aid-hd | c-edupgov | 5 | |
| 18 | X | aid-hd | c-edusgov | 4 | |
| 19 | X | aid-hd | c-edutgov | 4 | |
| 20 | X | aid-hd | c-healthgov | 5 | |
| 21 | X | aid-hd | c-wtsn | 5 | |
| 22 | X | aid-hd | c-oinf | 1 | |
| 23 | X | aid-hd | c-publicadm | 1 | |
| 24 | X | aid-hd | trngovgov | 1 | |
| 25 | X | aid-hd | trrowgov | 1 | |

5. Go to the ***govrecrulesim*** section of the ***closure-and-rules*** sheet. Then,

    1. In column sim, select aid-hd.
    2. In column ac, select trgovrow.
    3. In column 2009, select 2; this option allows to introduce a fixed GDP share for transfers to government from the rest of world – see ***govrecgdpsim*** below.
    4. Add rows and select option 1 in column 2009 for the ac elements trgovngov, gborz, gbormsz, and fborgov, tax-dir, tax-vat, and tax-imp – see the previous example for explanations.

6. Go to the ***govrecgdpsim*** section of the ***closure-and-rules*** sheet. Then,

    5. In column sim, select aid-hd.
    6. In column ac, select trgovrow.
    7. In columns 2009-2015, introduce the values shown in Figure 2.3. This selection will set the GDP share of transfers to government from the rest of the world at 10% during 2011-2015, and will keep the reference scenarios values for 2009 and 2010 (do you know where values for 2009 and 2010 were taken from? Hint: have a look at the macro reports for the base scenario).

*Figure 2.3: defining the GDP share of transfers from RoW to government*

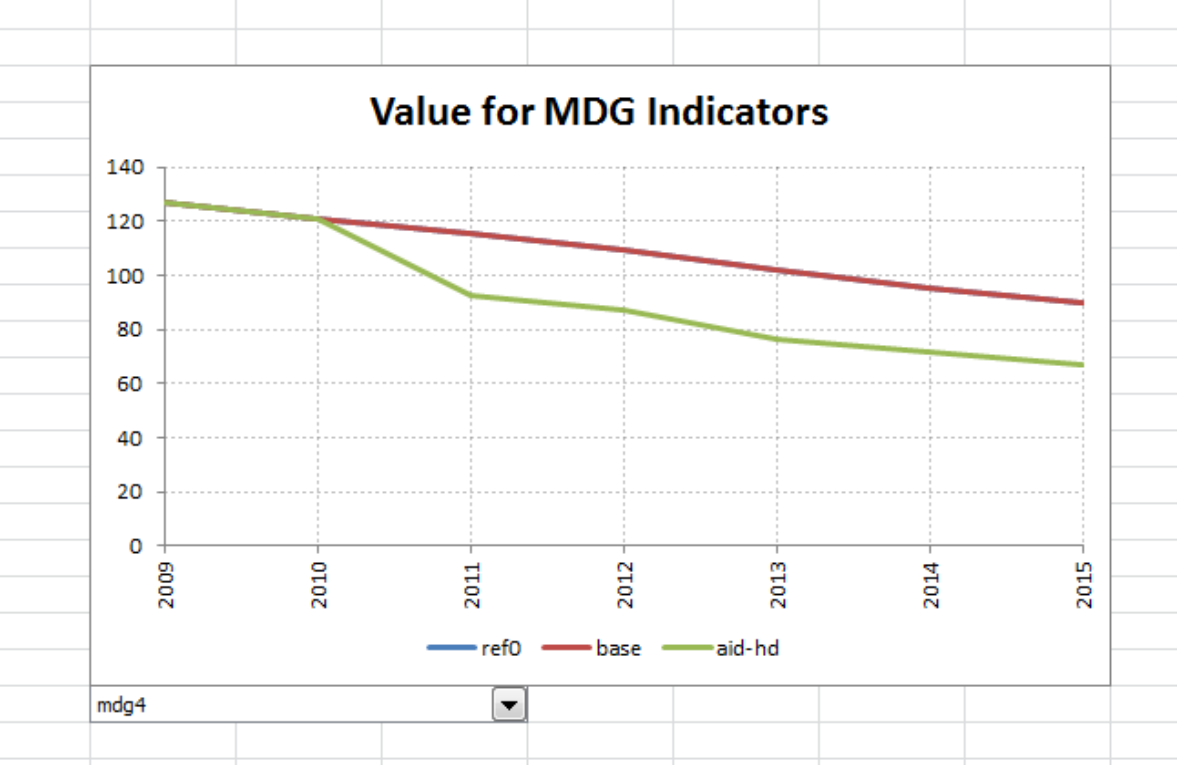
| | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| 23 | | govrecgdpsim(sim,ac,t1) | | | government receipt ac (GDP share) | | | | | |
| 24 | | sim | ac | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| 25 | X | aid-hd | trgovrow | 0.02627611 | 0.02627611 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| 26 | | Add row | | | | | | | | |

7. Go to the ***ngovpayrulesim*** section in the ***closure-and-rules*** sheet to change the rules for the different non-government payments. Then,

    1. In column sim, select aid-hd.
    2. In column ac, select trngovrow (aggregate transfers to non-government institutions from rest of world).
    3. In column 2009, select 1 so that remittances will be kept fixed at reference scenario values.
    4. Add rows to repeat steps 1-3 above for the following non-government payments: trfacrow (aggregate transfers to factors from the rest of the world), fborngov (aggregate non-government borrowing from the rest of the world), and fdiz (foreign direct investment).

8. Run the new simulation by clicking on ***Run*** in the ***Simulations*** ribbon group.
9. As before, the report sheets will be overwritten with the new set of results. For example, the dashboard will contain Figure 2.4, which shows an improvement in MDG 4.

*Figure 2.4: evolution of MDG 4*




## *Example 2.2: increase in foreign transfers channeled to the financing of "other" public infrastructure*

In this example, similar to the previous one, we will define and run a scenario that simulates an increase in foreign aid that is channeled to financing "other" public infrastructure spending (rather than human development as in the previous example).

1. Create a new simulation using the ***Scenario Manager*** in the ***Simulations*** ribbon group. Then, click on ***New simulation***. In the window that shows up,

    1. Introduce "aid-infra" in the ***Name*** field.
    2. Introduce a short description in the ***Description*** field.
    3. Keep the Multi-pass default for the ***Mode*** field. Once finished, click OK. The newly created simulation will be added to the Scenario Manager.

The remaining steps are similar to those of the previous example, but in this case the government consumption of c-oinf (i.e., Other public infrastructure) should be left flexible. What options should you select in ***govspndrulesim*** for the other commodities consumed by the government? In Figure 2.5 we show macro results for the aid-hd and aid-infra scenarios.

*Figure 2.5: macro results for simulations aid-hd and aid-infra*

| | | | | | |
|---|---|---|---|---|---|
| 2 | Macro Report Contents | | | | |
| 3 | **Table. Real macro indicators by simulation (% annual growth from first to final report year)** | | | | |
| 4 | | | Final year | | |
| 5 | **Indicator** | **2009** | **base** | **aid-hd** | **aid-infra** |
| 6 | **Absorption** | 392.01 | 6.26 | 7.83 | 7.78 |
| 7 | **Consumption - private** | 276.70 | 6.09 | 6.77 | 6.65 |
| 8 | **Consumption - government** | 33.60 | 6.59 | 13.66 | 6.64 |
| 9 | **Fixed investment - private** | 61.73 | 6.64 | 6.75 | 6.13 |
| 10 | **Fixed investment - government** | 19.03 | 7.74 | 14.31 | 24.14 |
| 11 | **Stock change** | 0.96 | Eps | Eps | Eps |
| 12 | **Exports** | 71.53 | 7.37 | 2.89 | 4.00 |
| 13 | **Imports** | 116.28 | 6.33 | 7.78 | 8.09 |
| 14 | **GDP at factor cost** | 319.17 | 6.50 | 6.92 | 6.89 |
| 15 | **Total factor employment (index)** | Eps | 4.96 | 5.72 | 5.69 |
| 16 | **Total factor productivity (index)** | Eps | 1.54 | 1.20 | 1.20 |
| 17 | **Real exchange rate (index)** | Eps | 0.25 | -1.14 | -0.71 |
| 18 | **Headcount poverty rate (%)** | | Eps | Eps | Eps |
| 19 | *1. Unless otherwise noted, column for initial year shows data in LCU.* | | | | |
| 20 | *2. For the poverty rate, the base-year and simulation columns show base-year rate and simulation-specific final-* | | | | |
| 21 | | | | | |

Note that a comparison of results between the present scenario and the previous one is not straightforward; can you explain why? Hint: compare the evolution of GDP and foreign transfers in both scenarios.

# 3. Human development goals simulations

In this section, we will show, step by step, how to define and run the counterfactual scenarios related to the achievement of different MDGs using use the Debugistan dataset. As explained, the following assumes that the reader has successfully created an ISIM-MAMS application Excel file using the Debugistan dataset; certainly, the Excel file from the previous set of examples can be used.

## *Example 3.1: targeting of MDG 2 with foreign borrowing financing*

In this example, we will define and run a scenario that imposes the achievement of a specific target for MDG 2 (i.e., intake/promotion) in 2015 with (a) government spending in primary education as the policy tool, and (b) foreign borrowing as the financing mechanism. Note that simulations with unrealistic targets may be infeasible (that is to say, may not take the model to reach a feasible solution).

1. Create a new simulation using the ***Scenario Manager*** in the ***Simulations*** ribbon group. Then, click on ***New simulation***. In the window that shows up,

    1. Introduce mdg2-fb in the ***Name*** field.
    2. Introduce a short description in the ***Description*** field.

3. Keep the Multi-pass default for the ***Mode*** field. Once finished, click OK. The newly created simulation will be added to the Scenario Manager.

2. Go to the ***siclossim*** section in the ***closure-and-rules*** sheet to change the saving-investment. Then,

4. In column sim, select mdg2-fb.
5. In column 2009, select 1.

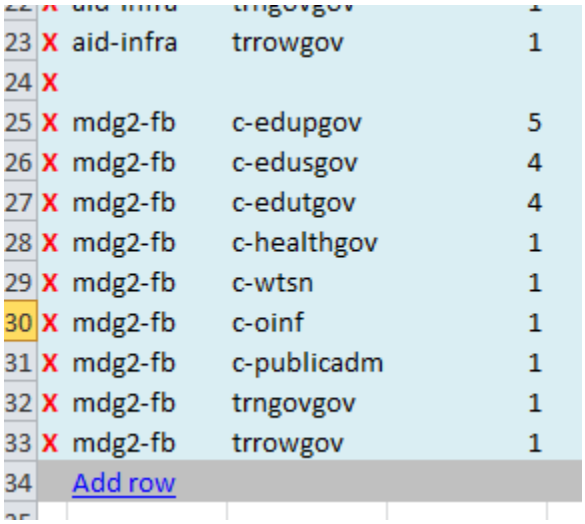
3. Go to the ***govclossim*** section of the ***closure-and-rules*** sheet. Then,

6. In column sim, select mdg2-fb.
7. In column 2009, select 5 (i.e., foreign borrowing).

4. Go to the ***govspndrulesim*** section of the ***closure-and-rules*** sheet (see Figure 3.1). Then,

1. In column sim, select mdg2-fb.
2. In column ac, select c-edupgov (i.e., the commodity related to the public provision of primary education – the policy instrument that will be used to target the MDG 2).
3. In column 2009, select 5.
4. Click on ***Add row***.
5. On the new row, in column sim, select mdg2-fb.
6. On the new row, in column ac, select c-edusgov (Secondary education, government).
7. On the new row, in column 2009, select 4 (i.e., fixed educational quality).
8. Add row to repeat 5-7 for commodity c-edutgov (Tertiary education, government).
9. Click on ***Add row***.
10. On the new row, in column sim, select mdg2-fb.
11. On the new row, in column ac, select c-health (Health, government).
12. On the new row, in column 2009, select 1 (i.e., govenrment consumption is fixed at reference scenario values).
13. Add rows to repeat 17-19 for commodities c-wtsn, c-healthgov, c-publicadm, and c-oinf.
14. Click on ***Add row***.
15. In column sim, select mdg2-fb.
16. In column ac, select trngovgov.
17. In column 2009, select 1.
18. Add a row to repeat steps 22-24 for trrowgov.

*Figure 3.1: selecting rules for government spending items – mdg2-fb*



| | | | | |
|---|---|---|---|---|
| 23 | X | aid-infra | trrowgov | 1 |
| 24 | X | | | |
| 25 | X | mdg2-fb | c-edupgov | 5 |
| 26 | X | mdg2-fb | c-edusgov | 4 |
| 27 | X | mdg2-fb | c-edutgov | 4 |
| 28 | X | mdg2-fb | c-healthgov | 1 |
| 29 | X | mdg2-fb | c-wtsn | 1 |
| 30 | X | mdg2-fb | c-oinf | 1 |
| 31 | X | mdg2-fb | c-publicadm | 1 |
| 32 | X | mdg2-fb | trngovgov | 1 |
| 33 | X | mdg2-fb | trrowgov | 1 |
| 34 | | Add row | | |

5. Go to the ***govrecrulesim*** and select option 1 for the following elements: gborz, gbormsz, fborgov, trgovrow, tax-dir, tax-vat, and tax-imp (can you explain why?); see step 5 of previous simulation trhhdrow.
6. Go to the ***mdgedutargetsim*** section of the ***mdg-targeting*** sheet (see Figure 3.2). Then,

    1. In column sim, select mdg2-fb.
    2. In column ac, select prom.
    3. In column acp, select c-edupgov.
    4. In column 2015, introduce 0.985.

*Figure 3.2: mdgedutargetsim – mdg2-fb*

| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | **mdgedutargetsim(sim,ac,acp,t1)** | | | targeted value for MDG or education indicator ac-acp by sim and year | | | | | | |
| 2 | | **sim** | **ac** | **acp** | **2009** | **2010** | **2011** | **2012** | **2013** | **2014** | **2015** |
| 3 | X | mdg2-fb | prom | c-edupgov | | | | | | | 0.985 |
| 4 | | Add row | | | | | | | | | |
| 5 | | | | | | | | | | | |

7. Go to the ***ngovpayrulesim*** section in the ***closure-and-rules*** sheet to change the rules for the different non-government payments. Then,

    1. In column sim, select mdg2-fb.
    2. In column ac, select trngovrow (aggregate transfers to non-government institutions from rest of world).
    3. In column 2009, select 1 so that remittances will be kept fixed at reference scenario values.

4. Add rows to repeat steps 1-3 above for the following non-government payments: trfacrow (aggregate transfers to factors from the rest of the world), fborngov (aggregate non-government borrowing from the rest of the world), and fdiz (foreign direct investment).

8. Run the selected simulations by clicking on ***Run*** in the ***Simulations*** ribbon group. Again, a window will show the progress in running MAMS.
9. Once finished, all the reports will be updated. As an example, we show macro and MDG results in Figure 3.3a and 3.3b, respectively.

*Figure 3.3a: macro results for simulation mdg2-fb and mdg4-db*

Macro Report Contents

**Table. Real macro indicators by simulation (% annual growth from first to final report year)**

| | | Final year | | |
|---|---|---|---|---|
| **Indicator** | **2009** | **base** | **mdg2-fb** | **mdg4-db** |
| **Absorption** | 392.01 | 6.26 | 6.79 | 4.59 |
| **Consumption - private** | 276.70 | 6.09 | 6.31 | 5.22 |
| **Consumption - government** | 33.60 | 6.59 | 9.28 | 13.26 |
| **Fixed investment - private** | 61.73 | 6.64 | 6.68 | Eps |
| **Fixed investment - government** | 19.03 | 7.74 | 10.12 | 24.62 |
| **Stock change** | 0.96 | Eps | Eps | Eps |
| **Exports** | 71.53 | 7.37 | 6.04 | 4.85 |
| **Imports** | 116.28 | 6.33 | 6.73 | 4.53 |
| **GDP at factor cost** | 319.17 | 6.50 | 6.67 | 4.80 |
| **Total factor employment (index)** | Eps | 4.96 | 5.15 | 4.40 |
| **Total factor productivity (index)** | Eps | 1.54 | 1.52 | 0.40 |
| **Real exchange rate (index)** | Eps | 0.25 | -0.09 | -0.18 |
| **Headcount poverty rate (%)** | | Eps | Eps | Eps |

*1. Unless otherwise noted, column for initial year shows data in LCU.*

*2. For the poverty rate, the base-year and simulation columns show base-year rate and simulation-specific final-*

*Figure 3.3b: MDG results for simulations mdg2-fb and mdg4-db*

Meso Report Contents

**Table. MDG indicators -- summary (values in 1990, first report year, 2015 [goal], and final repo**

| | **1990** | **2009** | **goal2015** | **base** | **mdg2-fb** | **mdg4-db** |
|---|---|---|---|---|---|---|
| **mdg1** | 56.00 | | 28.00 | | | |
| **mdg2** | | 15.50 | 100.00 | 60.06 | 89.42 | 73.57 |
| **mdg4** | 160.00 | 126.73 | 56.00 | 89.52 | 88.46 | 56.00 |
| **mdg5** | 506.00 | 388.94 | 131.00 | 279.58 | 276.44 | 178.83 |
| **mdg7w** | 44.00 | 73.80 | 89.00 | 77.63 | 77.80 | 77.04 |
| **mdg7s** | 43.00 | 63.78 | 71.50 | 65.49 | 65.57 | 65.23 |

*Units: % for MDGs 1, 2, 7a, and 7b; per 1000 for MDG 4; per 100,000 for MDG 5*

## *Example 3.2: targeting of MDG 4 with domestic borrowing financing*

In this example, we will define and run a scenario that imposes the achievement of a specific target for MDG 4 (i.e., under-five mortality rate) in 2015 with (a) government spending in health as the policy tool, and (b) domestic borrowing as the financing mechanism. Again, note that simulations with unrealistic targets may be infeasible (that is to say, may not take the model to reach a feasible solution).

1. Create a new simulation using the ***Scenario Manager*** in the ***Simulations*** ribbon group. Then, click on ***New simulation***. In the window that shows up,

    1. Introduce mdg4-db in the ***Name*** field.
    2. Introduce a short description in the ***Description*** field.
    3. Keep the Multi-pass default for the ***Mode*** field. Once finished, click OK. The newly created simulation will be added to the Scenario Manager.

2. Go to the ***siclossim*** section in the ***closure-and-rules*** sheet to change the saving-investment. Then,

    1. In column sim, select mdg4-db.
    2. In column 2009, select 1.

3. Go to the ***govclossim*** section of the ***closure-and-rules*** sheet. Then,

    1. In column sim, select mdg4-db.
    2. In column 2009, select 6 (i.e., domestic borrowing).

4. Go to the ***govspndrulesim*** section of the ***closure-and-rules*** sheet. Then,

    1. In column sim, select mdg4-db.
    2. In column ac, select c-healthgov (i.e., the commodity related to the public provision of health– the policy instrument that will be used to target the MDG 4).
    3. In column 2009, select 5.
    4. Click on ***Add row***.
    5. On the new row, in column sim, select mdg4-db.
    6. On the new row, in column ac, select c-edupgov (Primary education, government).
    7. On the new row, in column 2009, select 4 (i.e., fixed educational quality).
    8. Add rows to repeat 5-7 for commodities c-edusgov (Secondary education, government) and c-edutgov (Tertiary education, government).
    9. Click on ***Add row***.
    10. On the new row, in column sim, select mdg4-db.
    11. On the new row, in column ac, select c-wtsn.
    12. On the new row, in column 2009, select 1 (i.e., fixed growth rate).
    13. Add row to repeat 10-12 for commodities c-publicadm and c-oinf.
    14. Click on ***Add row***.
    15. In column sim, select mdg2-fb.
    16. In column ac, select trngovgov.

17. In column 2009, select 1.
18. Add a row to repeat steps 22-24 for trrowgov.

5. Go to the ***govrecrulesim*** and select option 1 for the following elements: gborz, gbormsz, fborgov, trgovrow, tax-dir, tax-vat, and tax-imp (can you explain why?).
6. Go to the ***mdgedutargetsim*** section of the ***mdg-targeting*** sheet. Then,

    1. In column sim, select mdg4-db.
    2. In column ac, select mdg4.
    3. In column acp, select dummy.
    4. In column 2015, introduce 56.

7. Go to the ***ngovpayrulesim*** section in the ***closure-and-rules*** sheet to change the rules for the different non-government payments. Then,

    1. In column sim, select mdg4-db.
    2. In column ac, select trngovrow (aggregate transfers to non-government institutions from rest of world).
    3. In column 2009, select 1 so that remittances will be kept fixed at reference scenario values.
    4. Add rows to repeat steps 1-3 above for the following non-government payments: trfacrow (aggregate transfers to factors from the rest of the world), fborngov (aggregate non-government borrowing from the rest of the world), and fdiz (foreign direct investment).

8. Run the selected simulations by clicking on ***Run*** in the ***Simulations*** ribbon group. Again, a window will show the progress in running MAMS.
9. Once finished, all the reports will be updated; see some results in Figure 3.3.

# 4. Additional Exercises

## *Exercise 4.1*

What assumption has been made for the evolution of tax receipts in the world price scenarios? Is this a reasonable assumption? Now, create additional simulations in order to run the world price scenarios using the following alternative closure and rules assumptions:

**Closure**

- **Government Closure (govclossim)** = direct tax rate is the clearing variable for the government budget.
- **Savings-Investment Closure (siclossim)** = household investment is the clearing variable (i.e., endogenous real growth, GDP and absorption shares).

**Government Spending (govspndrulesim) - Rules**

- Primary education = fixed growth rate at reference scenario values (i.e., fixed government consumption at reference scenario values).
- Secondary education = fixed growth rate at reference scenario values.
- Tertiary education = fixed growth rate at reference scenario values.
- Health = fixed growth rate at reference scenario values.
- Water and sanitation = fixed growth rate at reference scenario values.
- Other infrastructure = fixed growth rate at reference scenario values.
- Public administration = fixed growth rate at reference scenario values.
- Transfers from government to non-government domestic institutions = fixed growth rate at reference scenario values.
- Transfers from government to rest of the world = fixed growth rate at reference scenario values.

**Government Receipts (govrecrulesim) – Rules**

- tax-dir = endogenous – see govclossim (!).
- tax-vat = fixed rates at reference scenario values.
- tax-imp = fixed rates at reference scenario values.
- trgovrow = fixed growth rate at reference scenario values.
- trgovngov = fixed growth rate at reference scenario values.
- gborz = fixed growth rate at reference scenario values.
- gbormsz = fixed growth rate at reference scenario values.
- fborgov = fixed growth rate at reference scenario values.

**Non-Government Payments (ngovpayrulesim) - Rules**

- trngovrow = fixed growth rate at reference scenario values.
- trfacrow = fixed growth rate at reference scenario values.
- fborngov = fixed growth rate at reference scenario values.
- fdiz = fixed growth rate at reference scenario values.

In other to facilitate the solution of this exercise, we provide some example results.

*Figure 4.1: macro results for simulations pwefood-ex, pwmfood-ex, and pwfood-ex*

| | | | | | | |
|---|---|---|---|---|---|---|
| 2 | Macro Report Contents | | | | | |
| 3 | **Table. Real macro indicators by simulation (% annual growth from first to final report year)** | | | | | |
| 4 | | | Final year | | | |
| 5 | **Indicator** | **2009** | **base** | **pwefood-ex** | **pwmfood-ex** | **pwfood-ex** |
| 6 | **Absorption** | 392.01 | 6.26 | 6.75 | 6.10 | 6.58 |
| 7 | **Consumption - private** | 276.70 | 6.09 | 6.56 | 5.87 | 6.33 |
| 8 | **Consumption - government** | 33.60 | 6.59 | 6.59 | 6.59 | 6.59 |
| 9 | **Fixed investment - private** | 61.73 | 6.64 | 7.63 | 6.62 | 7.61 |
| 10 | **Fixed investment - government** | 19.03 | 7.74 | 7.59 | 7.72 | 7.57 |
| 11 | **Stock change** | 0.96 | Eps | Eps | Eps | Eps |
| 12 | **Exports** | 71.53 | 7.37 | 8.24 | 7.13 | 8.01 |
| 13 | **Imports** | 116.28 | 6.33 | 7.93 | 5.93 | 7.46 |
| 14 | **GDP at factor cost** | 319.17 | 6.50 | 6.65 | 6.44 | 6.59 |
| 15 | **Total factor employment (index)** | Eps | 4.96 | 5.32 | 4.91 | 5.27 |
| 16 | **Total factor productivity (index)** | Eps | 1.54 | 1.33 | 1.54 | 1.33 |
| 17 | **Real exchange rate (index)** | Eps | 0.25 | -2.36 | 0.27 | -2.31 |
| 18 | **Headcount poverty rate (%)** | | Eps | Eps | Eps | Eps |
| 19 | *1. Unless otherwise noted, column for initial year shows data in LCU.* | | | | | |

## *Exercise 4.2*

In this exercise, you will create a new scenario in order to simulate the creation of fiscal space through an increase in direct tax collection. Then, the additional fiscal space will be to finance government spending in (a) human development, or (b) infrastructure. The following assumptions should be applied:

### *Exercise 4.2.a description*

**Government Closure** = government spending is the clearing variable for the government budget.

**Savings-Invesment Closure** = same as exercise 1

**Government Spending (govspndrulesim) - Rules**

- Primary education = endogenous.
- Secondary education = fixed quality at reference scenario values.
- Tertiary education = fixed quality at reference scenario values.
- Health = endogenous.
- Water and sanitation = endogenous.
- Other infrastructure = fixed growth rate at reference scenario values (i.e., fixed government consumption at reference scenario values).
- Public administration = fixed growth rate at reference scenario values (i.e., fixed government consumption at reference scenario values).
- Transfers from government to non-government domestic institutions = fixed growth rate at reference scenario values.
- Transfers from government to rest of the world = fixed growth rate at reference scenario values.

**Government Receipts (govrecrulesim) – Rules**

- tax-dir = fixed rates at counterfactual values (see below) – (hint: use govspndgdpsim to impose to shock).
- tax-vat = fixed rates at reference scenario values.
- tax-imp = fixed rates at reference scenario values.
- trgovrow = fixed growth rate at reference scenario values.
- trgovngov = fixed growth rate at reference scenario values.
- gborz = fixed growth rate at reference scenario values.
- gbormsz = fixed growth rate at reference scenario values.
- fborgov = fixed growth rate at reference scenario values.

**Non-Government Payments (ngovpayrulesim) - Rules**

- trngovrow = fixed growth rate at reference scenario values
- trfacrow = fixed growth rate at reference scenario values
- fborngov = fixed growth rate at reference scenario values
- fdiz = fixed growth rate at reference scenario values

**Shock**

The direct tax rate during 2010-2015 is increased two times relative the base year value – hint: see shock parameter taxratesim.

In other to facilitate the solution of this exercise, we provide some example results in Figure 4.2.

*Figure 4.2a: macro results for simulations dirtax-hd and dirtax-infra*

Macro Report Contents

**Table. Real macro indicators by simulation (% annual growth from first to final report year)**

| | | Final year | | |
|---|---|---|---|---|
| **Indicator** | **2009** | **base** | **dirtax-hd** | **dirtax-infra** |
| **Absorption** | 392.01 | 6.26 | 6.33 | 6.39 |
| **Consumption - private** | 276.70 | 6.09 | 5.52 | 5.54 |
| **Consumption - government** | 33.60 | 6.59 | 10.68 | 6.62 |
| **Fixed investment - private** | 61.73 | 6.64 | 6.02 | 5.81 |
| **Fixed investment - government** | 19.03 | 7.74 | 10.74 | 17.50 |
| **Stock change** | 0.96 | Eps | Eps | Eps |
| **Exports** | 71.53 | 7.37 | 7.24 | 7.99 |
| **Imports** | 116.28 | 6.33 | 6.26 | 6.65 |
| **GDP at factor cost** | 319.17 | 6.50 | 6.58 | 6.66 |
| **Total factor employment (index)** | Eps | 4.96 | 5.30 | 5.40 |
| **Total factor productivity (index)** | Eps | 1.54 | 1.28 | 1.27 |
| **Real exchange rate (index)** | Eps | 0.25 | 0.20 | 0.23 |
| **Headcount poverty rate (%)** | | Eps | Eps | Eps |

*1. Unless otherwise noted, column for initial year shows data in LCU.*

*2. For the poverty rate, the base-year and simulation columns show base-year rate and simulation-specific final-*

*Figure 4.2b: MDG results for simulations dirtax-hd and dirtax-infra*

Meso Report Contents

**Table. MDG indicators -- summary (values in 1990, first report year, 2015 [goal], and final report year)**

| | 1990 | 2009 | goal2015 | base | dirtax-hd | dirtax-infra |
|---|---|---|---|---|---|---|
| **mdg1** | 56.00 | | 28.00 | | | |
| **mdg2** | | 15.50 | 100.00 | 60.06 | 86.27 | 79.73 |
| **mdg4** | 160.00 | 126.73 | 56.00 | 89.52 | 79.69 | 83.50 |
| **mdg5** | 506.00 | 388.94 | 131.00 | 279.58 | 250.36 | 261.69 |
| **mdg7w** | 44.00 | 73.80 | 89.00 | 77.63 | 77.20 | 78.85 |
| **mdg7s** | 43.00 | 63.78 | 71.50 | 65.49 | 65.30 | 66.06 |

*Units: % for MDGs 1, 2, 7a, and 7b; per 1000 for MDG 4; per 100,000 for MDG 5*

### *Exercise 4.2.b description*

The definition of this exercise is similar to exercise 2.a; simply adjust the government spending rules as you see fit (see Table 3.3).

## *Exercise 4.3: Targeting of MDG 2 with domestic borrowing financing*

Good luck! In Figure 4.4, we provide some example results in Figure 4.2.

*Figure 4.4a: macro results for simulations mdg2-db, mdg27-fb, and mdg4-ftr*

Macro Report Contents

**Table. Real macro indicators by simulation (% annual growth from first to final report year)**

| | | Final year | | | |
|---|---|---|---|---|---|
| **Indicator** | **2009** | **base** | **mdg2-db** | **mdg27-fb** | **mdg4-ftr** |
| **Absorption** | 392.01 | 6.26 | 6.11 | 7.65 | 8.06 |
| **Consumption - private** | 276.70 | 6.09 | 6.08 | 6.78 | 6.66 |
| **Consumption - government** | 33.60 | 6.59 | 9.37 | 13.10 | 12.16 |
| **Fixed investment - private** | 61.73 | 6.64 | 3.01 | 6.99 | 6.20 |
| **Fixed investment - government** | 19.03 | 7.74 | 10.25 | 11.84 | 21.51 |
| **Stock change** | 0.96 | Eps | Eps | Eps | Eps |
| **Exports** | 71.53 | 7.37 | 6.91 | 3.98 | 1.29 |
| **Imports** | 116.28 | 6.33 | 6.00 | 7.34 | 8.41 |
| **GDP at factor cost** | 319.17 | 6.50 | 6.35 | 7.03 | 6.72 |
| **Total factor employment (index)** | Eps | 4.96 | 4.94 | 5.47 | 5.63 |
| **Total factor productivity (index)** | Eps | 1.54 | 1.41 | 1.56 | 1.08 |
| **Real exchange rate (index)** | Eps | 0.25 | 0.17 | -0.77 | -1.59 |
| **Headcount poverty rate (%)** | | Eps | Eps | Eps | Eps |

*1. Unless otherwise noted, column for initial year shows data in LCU.*

*2. For the poverty rate, the base-year and simulation columns show base-year rate and simulation-specific final-year rates, res*

*Figure 4.4b: MDG results for simulations mdg2-db, mdg27-fb, and mdg4-ftr*

Meso Report Contents

**Table. MDG indicators -- summary (values in 1990, first report year, 2015 [goal], and final report year)**

| | 1990 | 2009 | goal2015 | base | mdg2-db | mdg27-fb | mdg4-ftr |
|---|---|---|---|---|---|---|---|
| **mdg1** | 56.00 | | 28.00 | | | | |
| **mdg2** | | 15.50 | 100.00 | 60.06 | 89.42 | 89.42 | 73.57 |
| **mdg4** | 160.00 | 126.73 | 56.00 | 89.52 | 89.71 | 83.31 | 56.00 |
| **mdg5** | 506.00 | 388.94 | 131.00 | 279.58 | 280.15 | 261.14 | 178.83 |
| **mdg7w** | 44.00 | 73.80 | 89.00 | 77.63 | 77.60 | 89.00 | 78.24 |
| **mdg7s** | 43.00 | 63.78 | 71.50 | 65.49 | 65.48 | 71.50 | 65.77 |

*Units: % for MDGs 1, 2, 7a, and 7b; per 1000 for MDG 4; per 100,000 for MDG 5*

## *Exercise 4.4: Targeting of MDG 2 and MDG 7 with foreign borrowing financing*

Good luck!

## *Exercise 4.5: Targeting of MDG 4 with foreign transfers (i.e., aid) financing*

Good luck!