Handout for the Group Presentations

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INTERNATIONAL MONETARY FUND

SPRING 2019

This handout contains the necessary materials for the group presentation stage of the workshop. Specifically, the following information is provided:

1. The background of the hypothetical case study.
2. Step-by-step instructions on how to compute the equilibria and export the results.
3. The policy scenarios that each group is tasked to analyze.

Background:

The authority of Utopia, a low-income country, is considering increasing its fiscal revenues. The research department of the Utopian authority has modeled the key structure of the economy succinctly using the toolkit model. The department shares all the results it computed through a dedicated site at GitHub: https://github.com/zjutangxin/toolkit_ver2_dist, where the results relevant to the current reform is saved under the folder ./Examples/Workshop_IMF_2019/.

To simulate the status quo of the economy, first use the Load button of toolkit_ss to read benchmark.mat, which contains the parameter values and equilibrium prices of the benchmark economy. After loading the data, use the Solve and Save button to compute the stationary equilibrium. The following content will be printed to the terminal.

```
>
 Market Clearing Conditions:
             Service.Y    Agri.Y    Manu.W    Farm.W  Interest
    Error =    -0.0000   -0.0000   -0.0000    0.0000    0.0000
    Price =    20.5149   18.8420    6.0879    3.8283    0.0074

 Model Fit:
Parameter       Moments      Para.Values  Errors     Model     Data
Serv.Pref       Serv.C          0.4945    0.0144    0.2244    0.2100
Manu.Pref       Manu.C          0.8168    0.0182    0.3482    0.3300
Var.Rural       R.Gini.C        0.2338   -0.0013    0.2587    0.2600
Var.Urban       U.Gini.C        0.6250    0.0030    0.4030    0.4000
```

```
Tax.A           TAX/GDP         0.0645   -0.0018    0.0782    0.0800
Tax.Corp        CIT/TAX         0.1155    0.0000    0.3000    0.3000
Tax.Inc         PIT/TAX         0.0555    0.0242    0.1942    0.1700
Agri.Z          Serv.Y          0.7434    0.0174    0.1774    0.1600
Manu.Z          Manu.Y         10.1858    0.0587    0.3887    0.3300
Export.Z        Export.Y        0.6845    0.0130    0.0960    0.0830
Agri.Z          Agri.Y          0.7434   -0.0891    0.3379    0.4270

 Equilibrium Prices:
          ps   20.5148750240
          pa   18.8419821670
          w     6.0879102010
          wf    3.8282763460
          r     0.0074152810

 Total Tax Revenue:    1.35009869832141
 Net Tax:              1.35009869832141

Time =   1 mins  12 secs Elapsed
```

Once the equilibrium is computed, a window will prompt you to select a folder to save all the intermediate results. When this is done, please use the Export button to export all results in Microsoft Excel format. The following information will be printed to the terminal when exporting the results.

```
>
Macro Aggregates Exported!
Urban Distribution on Saving Exported!
Rural Distribution on Saving Exported!
Results Export Complete!
```

In the exported files, all numbers are model values, with aggregate variables in billions of Utopia Dollars ($), and individual variables in unit Utopia Dollar. At the current status quo, Utopia has a GDP of $17.26. The domestic revenues equal to approximately 8% of GDP, leaving the total tax revenue $1.35. The Minister of Finance proposes to the parliament that an additional revenue of 2% GDP should be raised in the future. If successfully implemented, the reform would bring an additional $0.35 of tax revenues, making the total tax revenues equal to $1.70. The government has access to three tax instruments, value-added tax on consumption, personal income tax on formal employment, corporate income tax on firms in the formal sector. To help parliament members make decisions, the research department has simulated the macroeconomic and distributional impacts of four possible scenarios and shared the results in the same folder. The four scenarios and the corresponding files are as follows. We use VAT as an example here. Other scenarios share a same structure.

1. Raise the tax by VAT, with all tax revenues used for national defense.
   - vat2g.mat: parameters and equilibrium prices for the new stationary equilibrium.
   - vat2g_trans_22.mat: parameters and equilibrium prices for the transition path of 20 periods. The "extra" two periods are the original and new steady state.
   - VAT_Trans_22periods.txt: the transition path of 20 periods.
   - VAT_Trans_42periods.txt: the transition path of 40 periods.
2. Raise the tax by CIT, with all tax revenues used for national defense.
   - The corresponding files are: cit2g.mat, cit2g_trans_22.mat, CIT_Trans_22periods.txt, and CIT_Trans_42periods.txt.
3. Raise the tax by PIT, with all tax revenues used for national defense.
   - The corresponding files are: pit2g.mat, pit2g_trans_22.mat, PIT_Trans_22periods.txt, and PIT_Trans_42periods.txt.
4. Raise the tax by VAT, with 50% of the tax revenue allocated to a cash transfer program targeting the rural area.
   - The corresponding files are: vat2g_trfs.mat, vat2g_trfs_trans_22.mat, VATTRFS_Trans_22periods.txt, and VATTRFS_Trans_42periods.txt.

The research department also provides further instructions on how the files can be used. Again, in the interests of space, we use value-added tax increase as illustration.

1. To compute the stationary equilibrium after the tax reform, use the Load button of toolkit_ss to read vat2g.mat. Use the Solve and Save again to compute the stationary equilibrium, save the results, and use the Export button to save all results in Microsoft Excel format.
2. To compute the transition path of 20 periods, first use the Load button of toolkit_trans to read vat2g_trans_22.mat. Then please copy VAT_Trans_22periods.txt to folder ./bin_trans/ and rename it to eprices_out.txt. Use the Solve and Save button to evaluate the transition path and Export to save all the results in Microsoft Excel format. The following information will be printed to the terminal when solving for the transition path.

```
>
 Transition Period =  22
 Evaluate at Equilibrium Path.
 Load existing path.
 urban dist error nt-1 =   1.997838474975151E-005
 urban dist error nt   =   9.441884687294566E-010
 rural dist error nt-1 =   1.872605297514804E-004
 rural dist error nt   =   9.969929049002957E-010
```

```
          1 max. error on fvec    3.063957244364701E-006
 Time     2.62005208333333
 finished
```

Likewise, when exporting the results to Excel format, the following information will show in the terminal.

```
>
Please wait until the terminal reports all results exported.
Model Parameters Exported!
Macro Aggregates Exported!
Urban Distribution Exported!
Rural Distribution Exported!
All Results Exported!
```

3. If instead you prefer to compute a longer transition path of 40 periods, simply change the `Length to Solve` to 42, and copy and rename `VAT_Trans_42periods.txt` instead. The rest of the process remain the same as above. Recall that the transition path is an asymptotical concept, 20-periods and 40-periods transitions are both approximation to the true asymptotical path, and are NOT implementing the policy in 20 or 40 periods. In other words, the difference is purely mathematical.

4. The `Welfare` button of `toolkit_trans` can be used to compute the welfare decomposition of a policy reform. When asked, please select the folder where you have saved the results of the transition path. The program will compute the welfare decomposition from both steady state comparisons and when transitional dynamics are included.

Note: Notice that the two steady states will also be computed and exported when solving for the transition path. Therefore, strictly speaking, step 1 is not necessary for the purpose here. But it is a good practice from a pedagogical point of view, because in actual applications, the two steady states have to be solved before the transition path. Also the transition path may not be necessary for all applications.

Parliament members are divided into four groups to discuss the potential benefits and costs of each proposed reform. The Chancellor request each group to thoroughly evaluate the overall, regional, and sectoral macroeconomic, as well as distributional impacts of their designated reform. They are also expected to be able to back up their arguments with solid economic theory, and are more than welcomed to report any additional issues of concerns that they find important. A parliament debate is scheduled to be held on 05/15/2019 (11:45am – 12:45pm).