2.5. Exercise

Price shock scenario

Davide Pignotti

Thünen Institute, Humboldt University of Berlin

Background

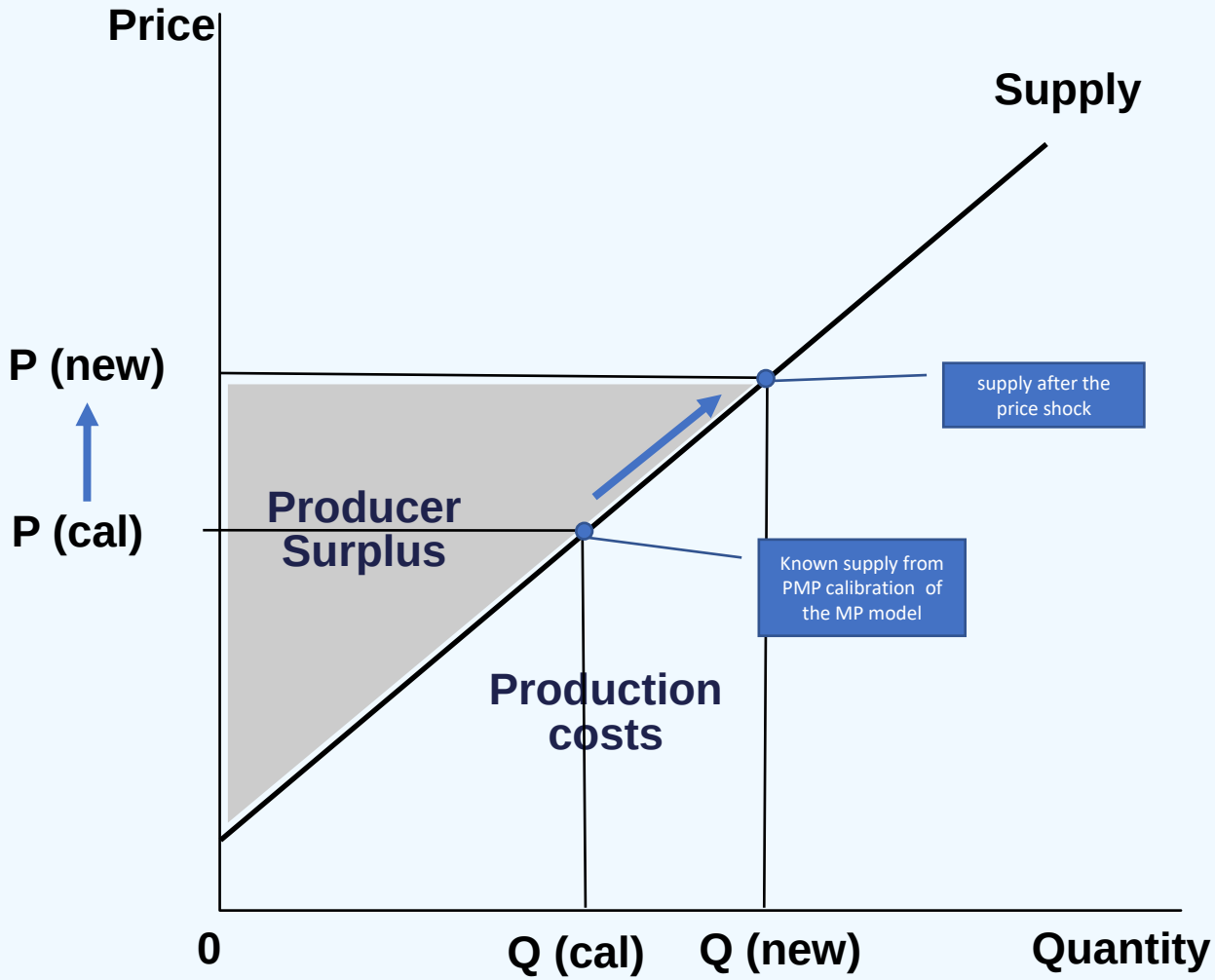
- We want to introduce a shock (+30%) for the producer price (UVAG) of cow and buffalo milk (COMI) in Denmark.

- Normally prices are endogenously computed after the market module is solved. If we want to introduce an exogenous price, we can only do it by solving only the supply model

Background: only supply

- When running only supply models prices are exogenous and can be changed
- Pros:
  - Execution time is lower (no iterations)
  - Reduced set of regions (member states) possible
- Cons:
  - result file “res_2” might be overwritten by a run only supply results
  - No market related tables

Economic background



Scenario shifters

Scenario shifters are already pre-defined in CAPRI

→ you can find them in the “..\gams\sets.gms“ file

```
"..\gams\sets.gms"

   SET ScenShifterPos_COLS "Scenario shifter positions"


    /
                            "ChangeFactor"      "Change factor applied to to the calibration point, (1.02 = 2% increase)"
                            "PercentageChange"  "Percentage change compared to the calibration point, defined in points (10=10% increase)"
                            "AbsoluteLevel"     "Absolute value"
                            "AbsoluteChange"    "Absolute change, added to the calibration point"
* for min max feed shares the number of dims is not enough
                            "ChangeFactorShareFeedMax" "Percentage change applied to min/max feed shares"
                            "ChangeFactorShareFeedMin" "Percentage change applied to min/max feed shares"

    /;
```

Important code parts

If we define a scenario shifter, where does it enter the code?
→ you can find it in the "..\gams\capmod\inflation_and_trend_interpolation.gms" file

```
"..\gams\capmod\inflation_and_trend_interpolation.gms"
*
*       ----- take over price changes from scenario definition
*
        DATA(MS,"UVAG",IO,"Y")  $ DATA(MS,"UVAG",IO,"AbsoluteLevel")    = DATA(MS,"UVAG",IO,"AbsoluteLevel");
*
        DATA(MS,"UVAG",IO,"Y")  $ DATA(MS,"UVAG",IO,"AbsoluteChange")   = DATA(MS,"UVAG",IO,"Y") + DATA(MS,"UVAG",IO,"AbsoluteChange");
*
        DATA(MS,"UVAG",IO,"Y")  $ DATA(MS,"UVAG",IO,"ChangeFactor")     = DATA(MS,"UVAG",IO,"Y") * DATA(MS,"UVAG",IO,"ChangeFactor");
*
        DATA(MS,"UVAG",IO,"Y")  $ DATA(MS,"UVAG",IO,"PercentageChange") = DATA(MS,"UVAG",IO,"Y") * (1. + DATA(MS,"UVAG",IO,"PercentageChange")/100);
*
```

How to read this?
If ($) there is a value for the element *DATA(MS,"UVAG",IO,"CHANGEFACTOR")*
then: *DATA(MS,"UVAG",IO,"Y")* = *DATA(MS,"UVAG",IO,"Y")* * *DATA(MS,"UVAG",IO,"CHANGEFACTOR")*

→ If a value for the change factor has been defined, the producer price in the baseline will be the price in the baseline * the change factor

The objective function

```
"..\gams\supply\Supply_model.gms"

*---------------------------------------------------------------------------

OBJEQF_..  v_obje =E= SUM(RUNR,
*           --- revenues - variable costs
            v_linObjePart(RUNR) - v_sumOfPmpTermsLevls(RUNR
*           --- contribution of PMP terms for feeding
           + v_sumOfPmpTermsFeed(RUNR)
           - v_pmpCostLandMarket(RUNR

           - v_landSupCost(RUNR)
           );

*---------------------------------------------------------------------------

*            + sales valued with expected prices
*            - purchases of inputs valued with expected prices
*            - sum cost of variable inputs excluding feed, young animals
*            + sum of premiums
LINEAR_(RUNR)..    v_linObjePart(RUNR)  =E=
*       --- sales/purchases valued by "unit value" price
*           from gross Economic Accounts for Agriculture
*
  SUM(RUNR_OMOBJE(RUNR,OM_OBJE),
       v_netPutQuant(RUNR,OM_OBJE) * ( SUM(R_RAGG(RUNR,MSACT),

      (%data%(MSACT,"UVAG",OM_OBJE,"Y"))

…

*      --- activity levels multiplied with
*          variable costs (excluding feed and animals), negative values
*          premimums for specific alternatives
*          premimums defined in policy data set
+ SUM((MPACT,A)  $ p_technFact(RUNR,MPACT,"LEVL",A),
             v_actLevl(RUNR,MPACT,A)  * (p_linObjeCont(RUNR,MPACT,A)
     +%data%(RUNR,MPACT,"PRME","Y")*(1+p_technFact(RUNR,MPACT,"PRME",A))))
…
;
```

Important code parts

```
 "..\gams\sets.gms"

   SET OM_OBJE(ROWS) "Goods in objective of supply model" /
     SWHE , DWHE , RYEM , BARL , OATS , MAIZ , OCER , PARI,
     RAPE , SUNF , SOYA , OLIV,
     PULS , POTA,  SUGB , TEXT, TOBA,
     TOMA , OVEG,  APPL , OFRU, CITR, TAGR,  TABO,  TWIN
     COMI ,
     BEEF , PORK , SGMI , SGMT , EGGS , POUM ,

     SET.OYANI_ROWS,
$iftheni.Pes24 %PEST_DISAGG%==on
     set.pesModDis,
$endif.Pes24
     SET.FNUT_ROWS
*
*    **** use of bulk feedingstuff
*
     FCER ,FPRO ,FENE ,FMIL ,FOTH /;
```

Introducing the shock

We manually create a .gms where we include the shock we want to apply to the baseline ans store it in *..\gams\pol_input\userScens*

```
* --- Agricultural policy file for the base year or baseline

$INCLUDE "pol_input\cap_after_2014\ref.gms"

* ---------------------------------------------------------
 ---------------------------------------------------------
   DATA(RU,mCact,pestoAgg,"AbsoluteChange") = eps;
*
* ------------------------------------------------------------------------------------------
*     Introducing exogenous price change for cow and buffalo milk
* ------------------------------------------------------------------------------------------
  DATA(RMSSUP,"UVAG","COMI","ChangeFactor") = 1.30;
```

Where:

RMSSUP = Countries with behavioural function in the supply model
UVAG = unit value gross production (producer price)
COMI = Cow and buffalo milk
ChangeFactor = Element of the set „Scenario shifter positions“

Expectations

After increasing the cow milk price by 30 %, what would happen to:

- Supply
- Land use (arable versus grassland, total UAA)
- Yield
- Income
- Trade
- Environmental indicators (GWP)
- Mineral fertilizer use

Exercise 2.5. price shock

- Introduce a price change of +30% of the cow milk (COMI) for Denmark
- Save the following scenario file under the folder gams\userScens\MilkPriceIncrease30.gms
- Run the scenario for Denmark, proof that the price shock was translated into the model!
- **The results are already provided on the wiki!**
- Fill the cloze at the end of the presentation

Relevant tables in the exploiter

- Price changes: Prices -> Prices
- For supply, hectare and herd size, income by activity see: farm -> supply details
  (Dairy cows are differentiated in DCOL and DCOH and they are “activities” producing the good “COMI”)
- Total supply of commodities: markets -> Product balances, detailes
- Total revenues, costs and income: welfare -> welfare overview
- Quantity and EAA values: welfare-> Economic Accounts for agriculture

Cloze for Exercise 2.5

- The supply of milk increases in Denmark by __%
- The supply elasticity of cow milk is __. Is it elastic?
- The herd size in Denmark for dairy cows in total increases by __ (1000 heads)
- The area devoted to pasture changes by _%. Check what happens at disaggregated level (Intensive and extensive grassland)
- The agricultural income (welfare overview) increases by _% , animal specific input costs increase by _% and animal output by _%