# Swapping variables in the closure

Swapping variables

- Endogenous & exogenous variables can be 'swapped' in the closure

- BUT must always have same number of endogenous variables as there are equations in the model

- Think carefully about the appropriate variable to include in the swap

Review

- Our data shows an output subsidy on food production in the EU
- This subsidy per unit of output is the difference between the price paid to producer (PS) and the market price (PM)
  - with PS>PM.
- In the first experiment, both PS and PM fell by 1.09%
- As a result, food output in the EU also fell, by 3.53%

- If government is subsidising producers, then the fall in price need NOT result in a fall in supply
- Instead, the government could INCREASE the subsidy, so as to maintain the producer price (PS) at its original level
- There could be NO supply response

S

PS

TO

PM

D

QO
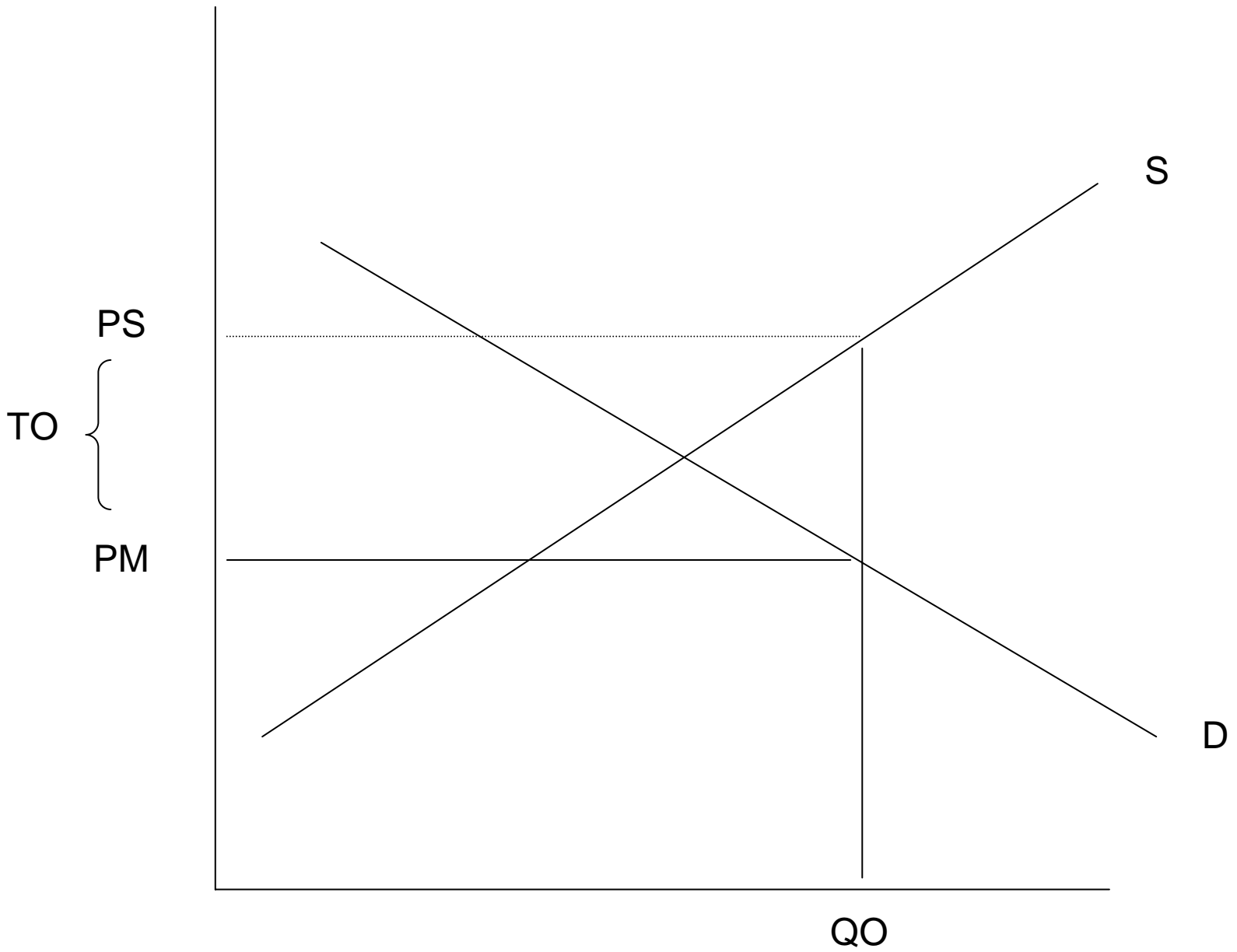
- To simulate this, we will hold QO("food","eu") constant
  - This fixes food production at the base level and
  - *qo*("food","eu") will equal zero
- But if market price falls, we will have to allow the output subsidy to increase.
- So *to* will have to be made endogenous

to(i,r)

- Look in GTAP.TAB for to(i,r)
  - i=NSAV_COMM
  - r=REG
- Also check in GTAP.TAB for the contents of NSAV_COMM.
- We see that NSAV_COMM comprises the sets
  - ENDW_COMM, TRAD_COMM and CGDS_COMM

The swap

- Therefore *to*(i,r) comprises several values
- We want to make   *to*("food","eu") endogenous
- We will swap it with *qo*("food","eu") which becomes exogenous
- But there are still many other components of to(i,j) that are to remain exogenous

They are….

- *to*("mnfcs","eu")
- *to*("svces","eu)
- *to*(ENDW_COMM,"eu")
- *to*(CGDS_COMM,"eu")
- *to*(NSAV_COMM,"ssa")
- *to*(NSAV_COMM,"row")

Setting up the simulation: the Closure

- In RunGTAP load the *tariff1* experiment:
- In the Closure:
- **Add** *qo*("food","eu")
- **Delete** *to*
- **Add:**
- *to*("mnfcs","eu")
- *to*("svces","eu)
- *to*(ENDW_COMM,"eu")
- *to*(CGDS_COMM,"eu")
- *to*(NSAV_COMM,"ssa")
- *to*(NSAV_COMM,"row")

- Check the shock – keep the same as in the *tariff1* experiment
- Save this experiment:
- File name fixqo
- Description tariff1 with fixed EU food output
- Now SOLVE

The solution

- For "food" and "eu" we find:
- *qo*=0
- *ps*=-1.99%
- *pm*=-4.56%
- *to*=+2.70%
- The ratio VOA/VOM has risen by 2.7%
- The EU's welfare loss is much greater than in the *tariff1* experiment—WHY?

- The tricky part with swaps is getting the closure right!!
- to(i,r) has many components
- You need to be very sure about the elements in each set
- Make sure each combination of those elements is included in the closure