



# *STAGE\_t: Market Clearing*



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## *Outline*

- Equation and Variable Counting
- Market Clearing
  - Commodities & Activities
  - Other Markets
  - Factor Market Clearing Options
    - Full Factor Mobility and Employment
      - ‘(new) classical’ assumption
    - Factor Immobility
      - Short run market clearing
    - Activity Inspired Restrictions on Factor Markets
      - ‘Realism’!!



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SAMs & Macroeconomy - Counting

$$t_{jk} = t_{jk}(y; p, f, \lambda) \longrightarrow \text{VARS} = [y] + [p] + [f] + [\lambda]$$
$$p = p(y; p, f, \lambda) \searrow$$
$$y = n + x \nearrow \text{EQNS} = [y] + [p] - 1$$
$$\text{Degrees of Freedom} = [f] + \lambda + 1$$

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Market Clearing

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## Market Clearing

- **Commodity markets**
  - Commodity supply = commodity demand
  - Production equilibrium
- **Other accounts**
  - Government account
    - Internal ‘balance’
  - Trade accounts
    - Trade (external) ‘balance’
  - Savings-investment account
    - ‘Walras’ law
- **Factor markets**
  - Factor supply = factor demand



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## Commodity & Activity Market Clearing

\* ### Commodity and activity market clearing

```

PRODEQUIL (a, c) ..
    QXAC (a, c) =E= IOQXACQXV (a, c) * QX (a) ;

QEQUIL (c) ..
    QQ (c) =E= QTTD (c)
        + SUM (a, QINTD (c, a) )
        + SUM (h, QCD (c, h) )
        + SUM (e, QED (c, e) )
        + QGD (c)
        + SUM [in, QINVD (c, in) ] + dstocconst (c)

;
    
```



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## Other Market Clearing

```

* ### Institutional account (market) clearing

GOVEQUIL..  KAPGOV =E= YG - EG ;

CAEQUIL..   CAPWOR =E= SUM[cm, PWM(cm) *QM(cm) ]
               + [SUM(f, YFWOR(f)) /ER]
               - SUM[ce, PWE(ce) *QE(ce) ]
               - SUM[h, howor(h) ]
               - SUM[e, entwor(e) ]
               - govwor
               - SUM[f, factwor(f) ] ;

* ##### Slack

WALRASEQ..   TOTSAV =E= INVEST + WALRAS ;
  
```

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## Factor Market Clearing

$$\sum_{insv} FSI_{insw, f} = \sum_a FD_{f, a}$$

```

FMEQUIL(f) ..
SUM(insw, FSI(insw, f)) =E= SUM(a, FD(f, a)) ;
  
```

**Assumes:**

1. Full employment
2. Full factor mobility

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# *Full Factor Mobility & Employment*

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# *Full Factor Mobility and Employment*

In theory  
factor payment = value of the marginal product of the factor

**In stg\_t, the payment to a factor is:**

$$WF(f) * WFDIST(f, a) * (1 + TF(f, a))$$

**Where**

|                |                                                  |
|----------------|--------------------------------------------------|
| $WF(f)$        | = economy-wide average price of factor f         |
| $WFDIST(f, a)$ | = activity specific factor proportionality pay't |
| $TX(f, a)$     | = factor use tax by activity                     |

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Full Factor Mobility and Employment

\*# Basic Factor Market Closure

$FSI_{inswf} = \overline{FSI}_{insw,f}$

$FSI.FX(insw,f) = FSI0(insw,f) ;$

$WFDIST_{f,a} = \overline{WFDIST}_{f,a}$

$WFDIST.FX(f,a) = WFDIST0(f,a) ;$

$Min\ WF_f = -\infty$

$WF.LO(f) = -inf ;$

$Max\ WF_f = +\infty$

$WF.UP(f) = +inf ;$

$Min\ FD_{f,a} = -\infty$

$Max\ FD_{f,a} = +\infty$

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Factor Immobility – Short Run

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### Factor Immobility – Short Run

**Fix the factor demand by activity**

$$FD_{fact,a} = \overline{FD}_{fact,a}$$

**Allow factor returns to vary by activity**

$$WFDIST.LO_{fact,a} = -inf$$
$$WFDIST.UP_{fact,a} = +inf$$

**Adjustment through WFDIST**

$$WF_{fact} = \overline{WF}_{fact}$$

\* activity specific capital

\* for activities

$$FD.FX(k,a) = FD0(k,a) ;$$

$$WFDIST.LO(k,a) = - inf ;$$
$$WFDIST.UP(k,a) = + inf ;$$

$$WF.FX(k) = WF0(k) ;$$

Add code below Basic Closure to modify the constraints

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### Other Factor Market Clearing Options

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## Activity Inspired Restrictions

- Assume that the supply of capital is fixed in agriculture
  - Agricultural capital is different from capital in other sectors

```
FD.FX("fcap_fix","aagric")      = FD0("fcap_fix","aagric") ;  
  
WFDIST.LO("fcap_fix","aagric") = -inf ;  
WFDIST.UP("fcap_fix","aagric") = +inf ;
```

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## Activity Inspired Restrictions

- Assume that the mining activity (“amins”) cannot expand production in the ‘solution period’
  - New mines typically takes a long time to establish
  - There may be an optimal extraction rate
  - Exports may be dominated by the output of the activity and it may be a small country
    - Diamonds in Botswana; Oil in Saudi Arabia
- Knowledge of what makes sense is important

**DO NOT USE TO PROVE YOUR PRIOR ASSUMPTIONS**

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Activity Inspired Restrictions

FD.FX(f,"amins") = FD0(f,"amins ") ;

WFDIST.LO(f,"amins ") = -inf ;

WFDIST.UP(f,"amins ") = +inf ;

Is this enough?

NO

CES at top level allows extra inputs through increased use of intermediates

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STAGE

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The End

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