CAPITAL FLOWS AND REAL EXCHANGE RATE FLUCTUATIONS FOLLOWING SPAIN’S ENTRY INTO THE EUROPEAN UNION

After financial openings, like that in Spain and Mexico in the late 1980s, large capital inflows have been accompanied by substantial appreciations in the real exchange rate.

This work shows that, to capture the timing of capital inflows and the changes in the relative prices of nontraded goods, frictions in factor markets are important.

The model here stresses that frictions are important to capture fluctuations in both the real exchange and trade balance.

REAL EXCHANGE RATE

$$RER = NER \times \frac{P_{ger}}{P_{esp}}$$

$$\text{units: } \frac{\text{pesetas}}{\text{deutsche marks}}$$

$$\times \frac{\text{deutsche marks/German basket}}{\text{pesetas/Spanish basket}}$$

$$= \frac{\text{Spanish baskets}}{\text{German basket}}$$

Suppose $P^T_{esp} = NER \times P^T_{ger}$(law of one price)

$$RER^N = \frac{P^T_{esp}}{P^T_{ger}} \times \frac{P_{ger}}{P_{esp}} = \frac{(P_{ger}/P^T_{ger})}{(P_{esp}/P^T_{esp})}$$

RER^N is the part of the real exchange rate explained by the relative price of nontraded goods.

What is left over in RER is the part explained by the terms of trade.

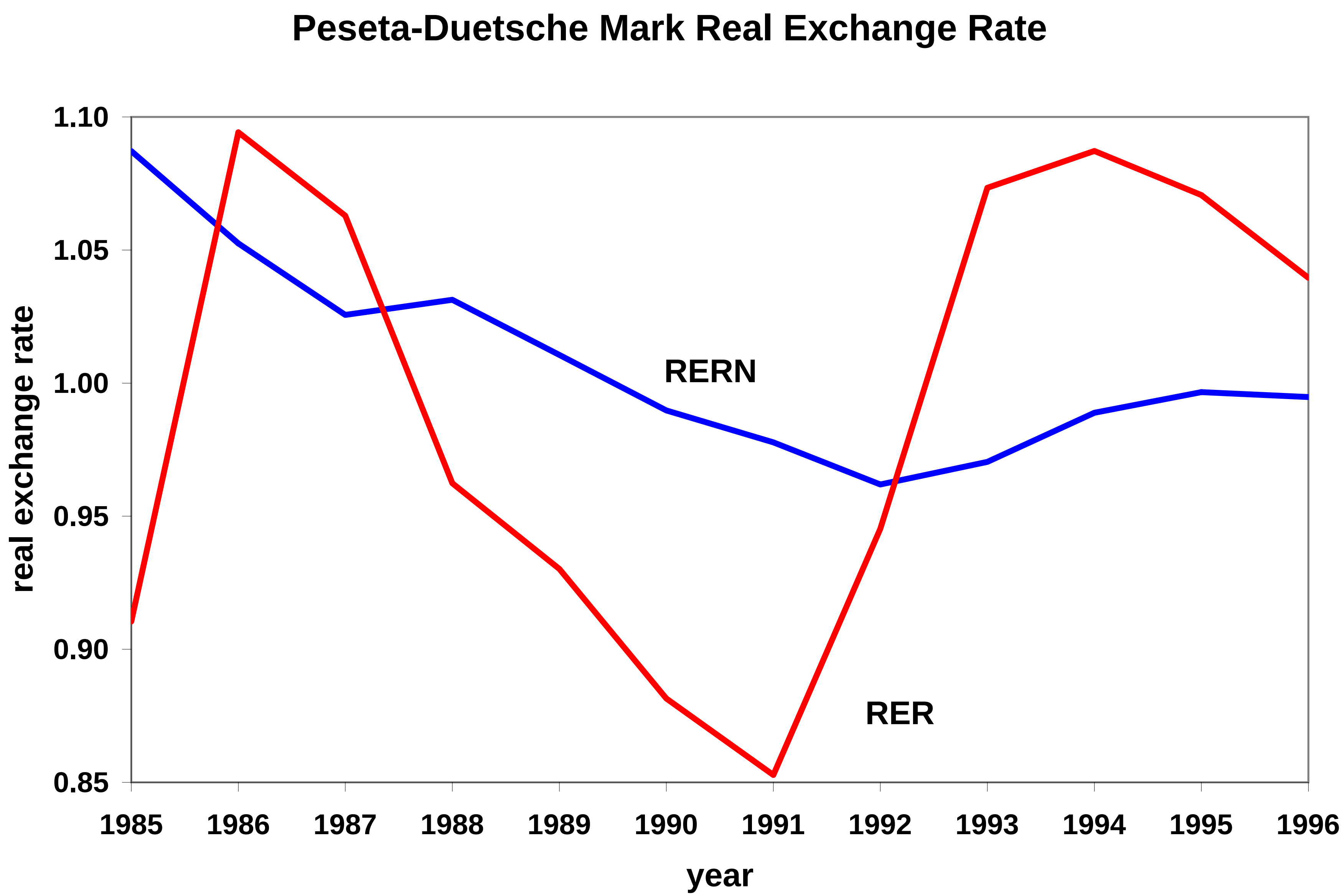
$$RER^T = \frac{NER \times P^T_{ger}}{P^T_{esp}}$$

Notice that

$$RER = RER^T \times RER^N$$

TRADED: Agriculture and Industry

NONTRADED: Construction and Services


Peseta-Duetsche Mark Real Exchange Rate
real exchange rate
1.10
1.05
1.00
0.95
0.90
0.85
RERN
RER
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
year

MODELING CAPITAL FLOWS INTO SPAIN

$$Y_j = AN_j^{1-\alpha}K_j^{\alpha}$$

$$y_j = Ak_j^{\alpha}$$

$$r_j = \alpha A k_j^{\alpha-1} - \delta$$

$$y_{esp} = 21,875 \qquad (1986)$$

$$y_{ger} = 27,879$$

$$k_{esp} = 45,528$$

$$k_{ger} = 73,618$$

$$\frac{y_{esp}}{y_{ger}} = \left(\frac{k_{esp}}{k_{ger}}\right)^{\alpha}$$

Let $\alpha = 0.3020$

$$\frac{y_{esp}}{y_{ger}} = 0.8649$$

in data

$$\frac{y_{esp}}{y_{ger}} = 0.7847$$

Differences in capital per worker explain 63 percent of differences in output per worker between Spain and Germany.

HOW LARGE SHOULD CAPITAL FLOWS BE?

Calibrate

$$A_{esp} = y_{esp}/k_{esp}^{\alpha} = 857.3298$$

$$A_{ger} = y_{ger}/k_{ger}^{\alpha} = 945.0353$$

Equate marginal products

$$\alpha A_{esp} k_{esp}^{\alpha-1} = \alpha A_{ger} k_{ger}^{\alpha-1}$$

$$k_{ger} = 73{,}618 \quad \text{implies} \quad k_{esp} = 64{,}030$$

Spanish capital stock would have to increase by 18,502, which is 85 percent of Spanish GDP, 41 percent of Spanish capital stock.

$$\left(r_{ger} = 0.057 \quad \text{implies} \quad r_{esp} = 0.088\right)$$

THE MODEL

Consumers

$$\max \sum_{t=0}^{\infty} \beta^t (\epsilon c_{Tt}^{\rho} + (1-\epsilon) c_{Nt}^{\rho})/\rho$$

subject to

$$c_{Tt} + p_t c_{Nt} + a_{t+1} = w_t \bar{\ell} + (1+r) a_t$$

$$a_t \geq -A$$

where

$$a_t = q_{t-1} k_t + b_t.$$

COST MINIMIZATION + ZERO PROFITS

$$
\begin{aligned}
w_t &= A_T(1-\alpha_T)(k_{Tt}/\ell_{Tt})^{\alpha_T} \\
&= p_{Nt}A_N(1-\alpha_N)(k_{Nt}/\ell_{Nt})^{\alpha_N}
\end{aligned}
$$

$$
\begin{aligned}
1+r &= (A_T\alpha_T(\ell_{Tt}/k_{Tt})^{1-\alpha_T} + (1-\delta)q_t)/q_{t-1} \\
&= (p_{Nt}A_N\alpha_N(\ell_{Nt}/k_{Nt})^{1-\alpha_N} + (1-\delta)q_t)q_{t-1}
\end{aligned}
$$

$$
\begin{aligned}
p_{Tt} &= 1 = q_t\gamma G(z_{Nt}/z_{Tt})^{1-\gamma} \\
p_{Nt} &= q_t(1-\gamma)G(z_{Tt}/z_{Nt})^{\gamma}
\end{aligned}
$$

FEASIBILITY CONDITIONS

$$c_{Nt} + z_{Nt} = A_N k_{Nt}^{\alpha_N} \ell_{Nt}^{1-\alpha_N}$$

$$k_{Tt} + k_{Nt} = k_t$$

$$\ell_{Tt} + \ell_{Nt} = \bar{\ell}$$

$$k_{t+1} - (1-\delta)k_t = G z_{Nt}^{\gamma} z_{Tt}^{1-\gamma}$$

$$c_{Tt} + z_{Tt} + b_{t+1} = A_T k_{Tt}^{\alpha_T} \ell_{Tt}^{1-\alpha_T} + (1 + r_t) b_t$$

CALIBRATION

$$y_N = 1.0481 k_N^{0.2869} \ell_N^{0.7131}$$

$$y_T = 1.0214 k_T^{0.3109} \ell_T^{0.6891}$$

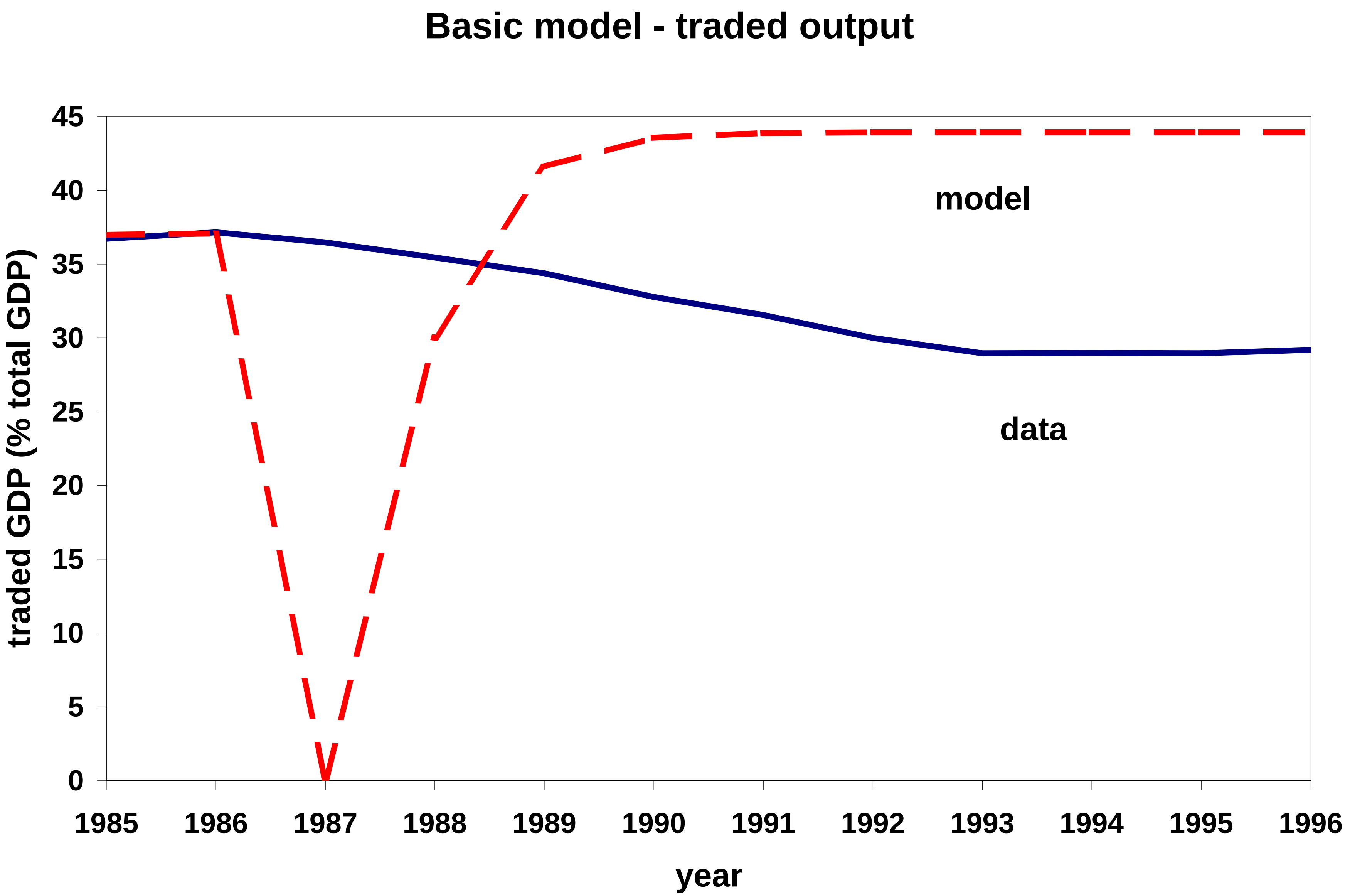
$$x = 1.9434 z_T^{0.3802} z_N^{0.6198}$$

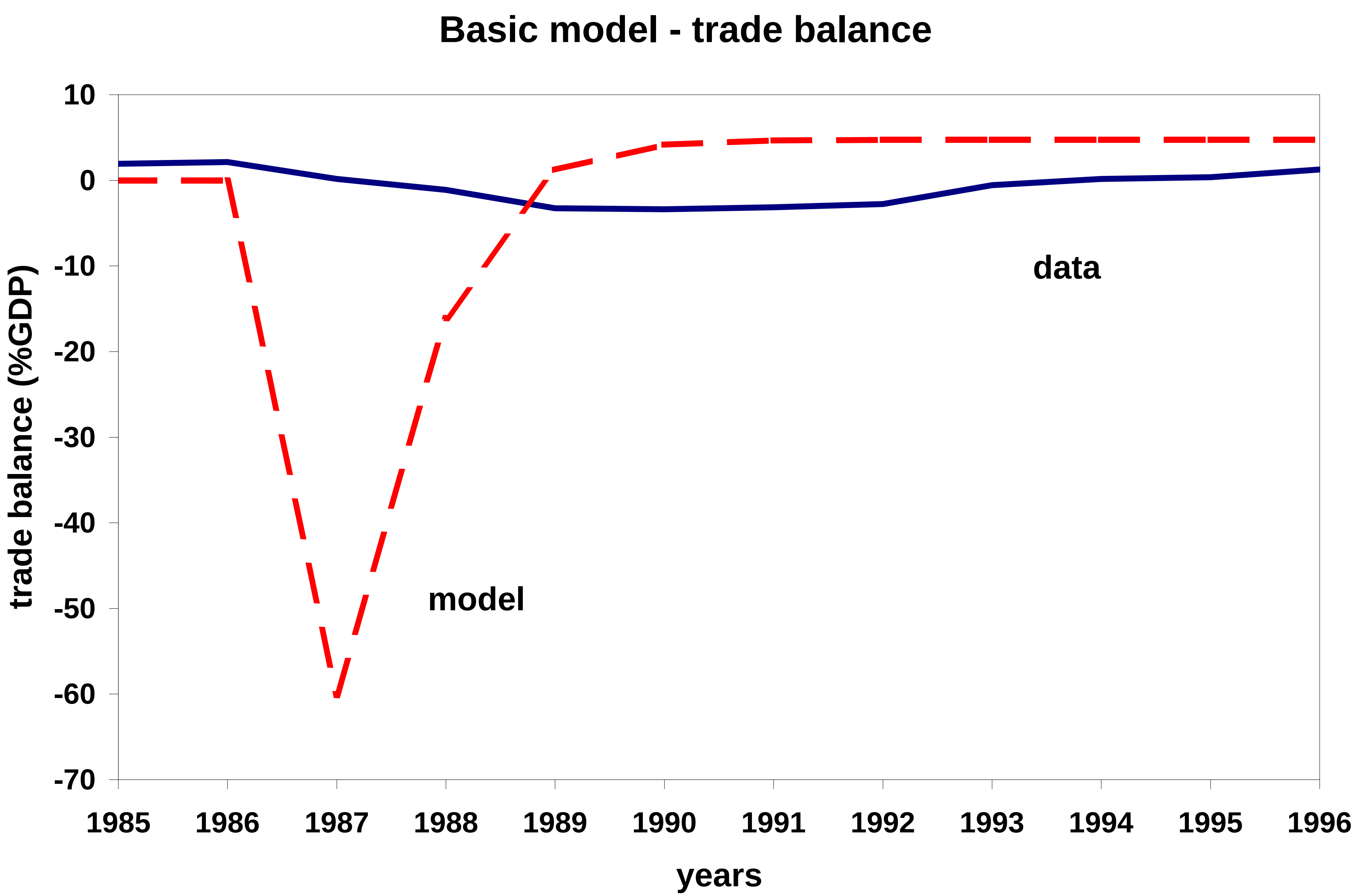
$$\delta = (\delta k/y)/(k/y) = 0.0576$$

$$\epsilon = \frac{(c_N/c_T)^{1-\rho}}{1+(c_N/c_T)^{1-\rho}} = \frac{0.5830^{1-\rho}}{1+0.5830^{1-\rho}}$$

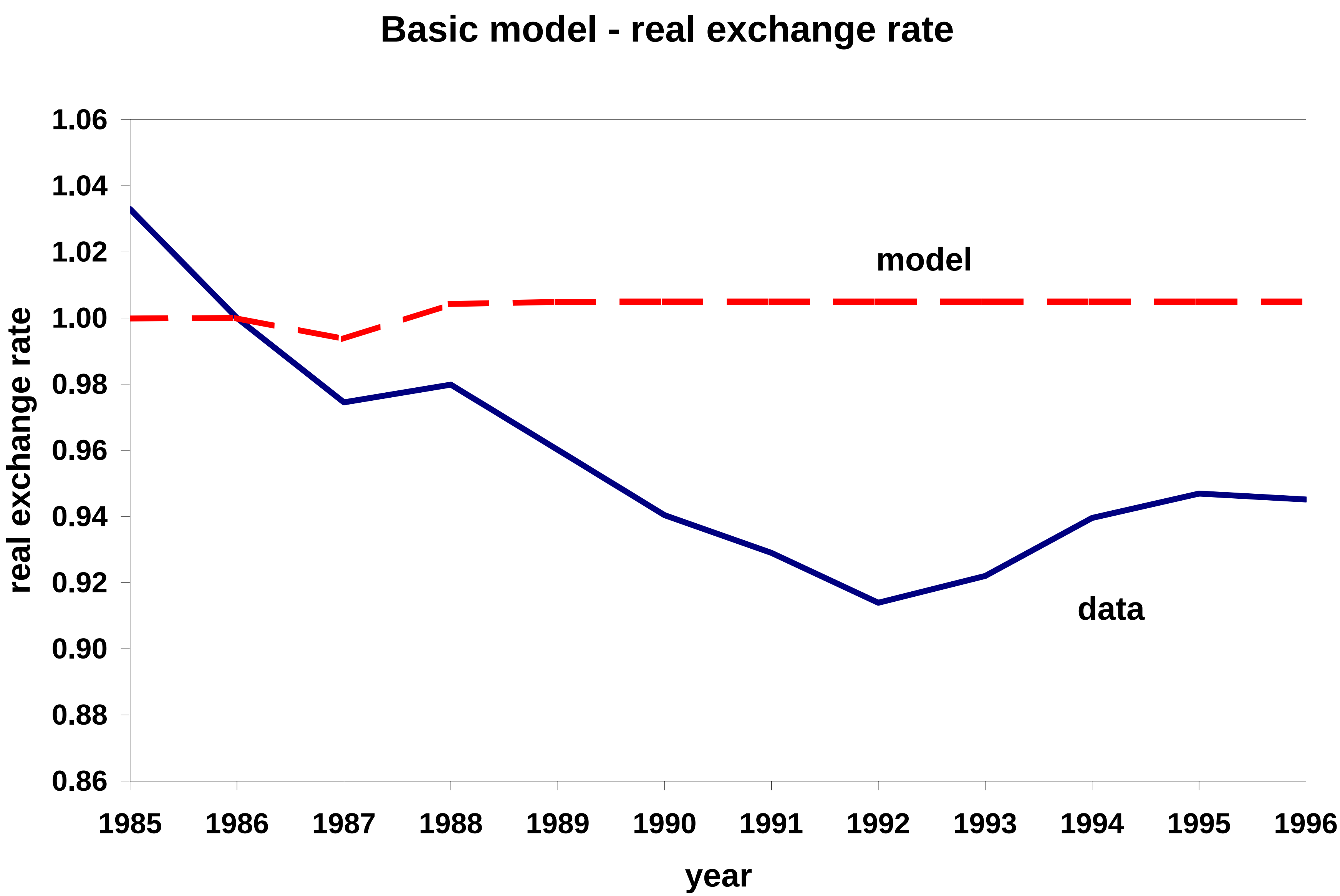
$$\beta = 1/(1+r^*) = 0.9463$$

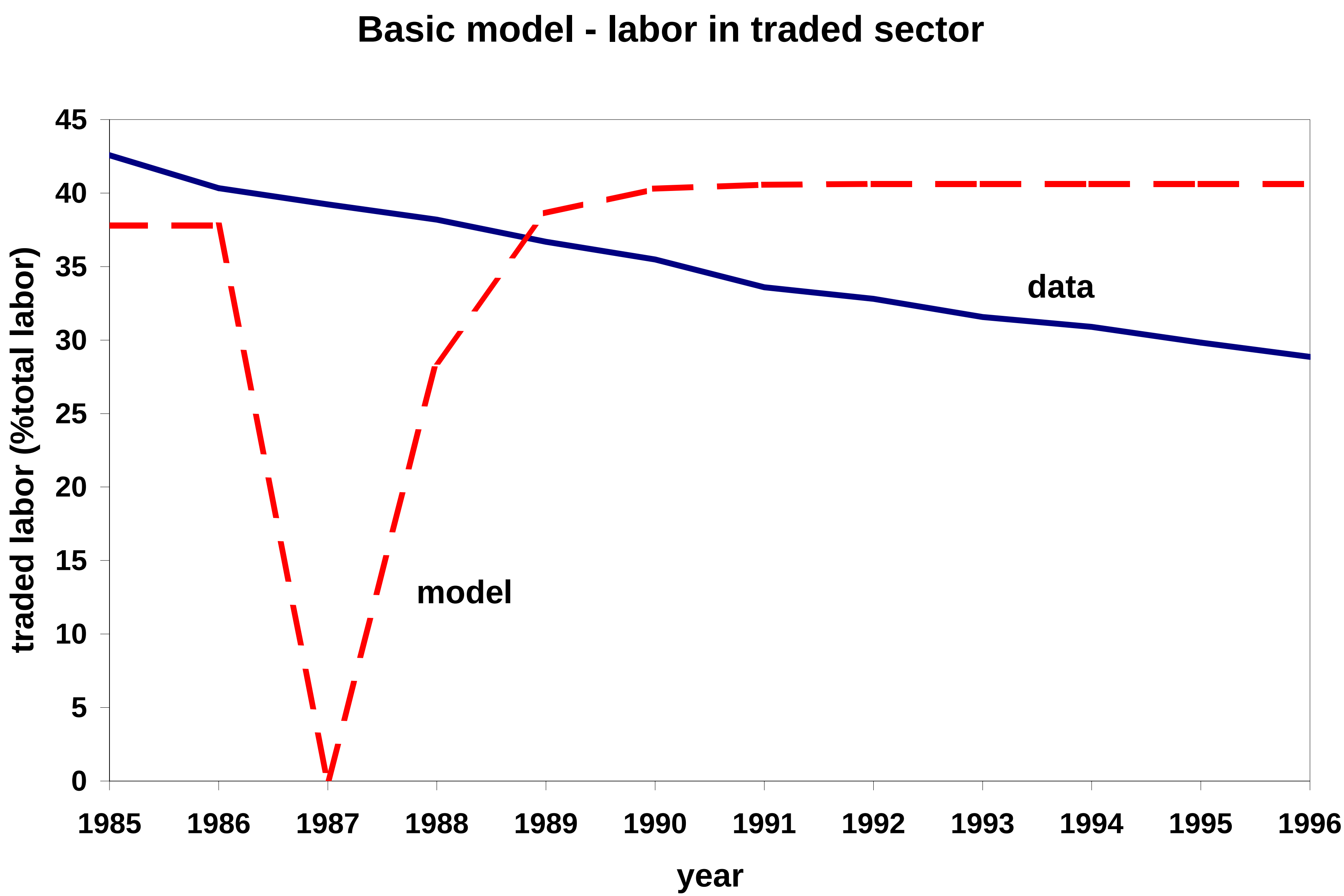
$$r = \alpha A_{ger} k_{ger}^{\alpha-1} - \delta$$


Basic model - traded output
traded GDP (% total GDP)
45
40
35
30
25
20
15
10
5
0
model
data
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
year

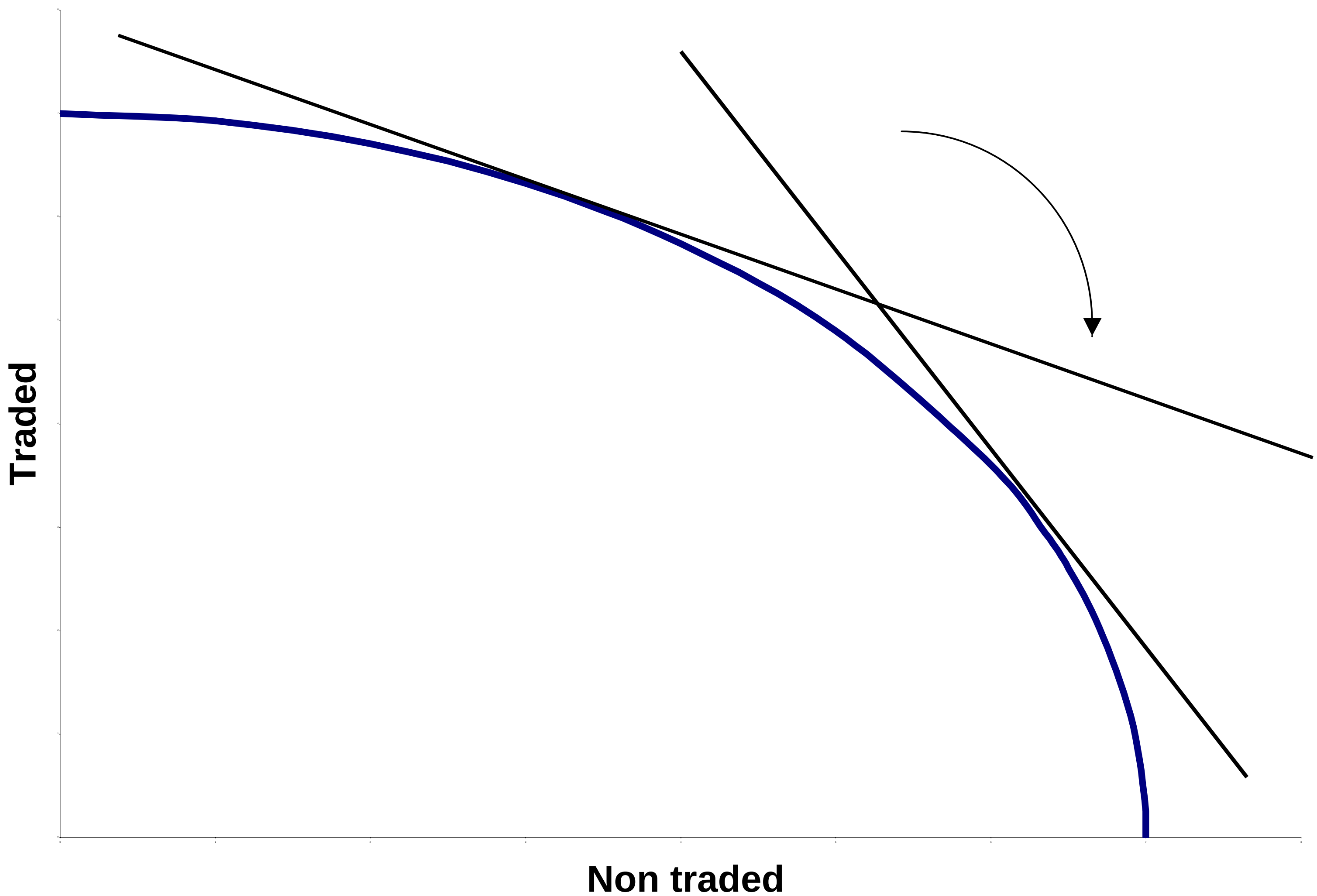


Basic model - trade balance
10
0
-10
-20
-30
-40
-50
-60
-70
trade balance (%GDP)
data
model
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
years


Basic model - real exchange rate
1.06
1.04
1.02
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
real exchange rate
model
data
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
year


Basic model - labor in traded sector
traded labor (%total labor)
45
40
35
30
25
20
15
10
5
0
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
year
data
model

Production possibilities frontier



LABOR ADJUSTMENT FRICTIONS

$$\ell_{Nt+1} \leq \lambda \ell_{Nt}$$

$$\ell_{Tt+1} \leq \lambda \ell_{Tt}$$

$$\lambda > 1$$

(In the numerical experiments $\lambda = 1.01$.)

CAPITAL ADJUSTMENT FRICTIONS

$$x_{Nt+1} + x_{Tt+1} \leq G z_{Nt}^{\gamma} z_{Tt}^{1-\gamma}$$

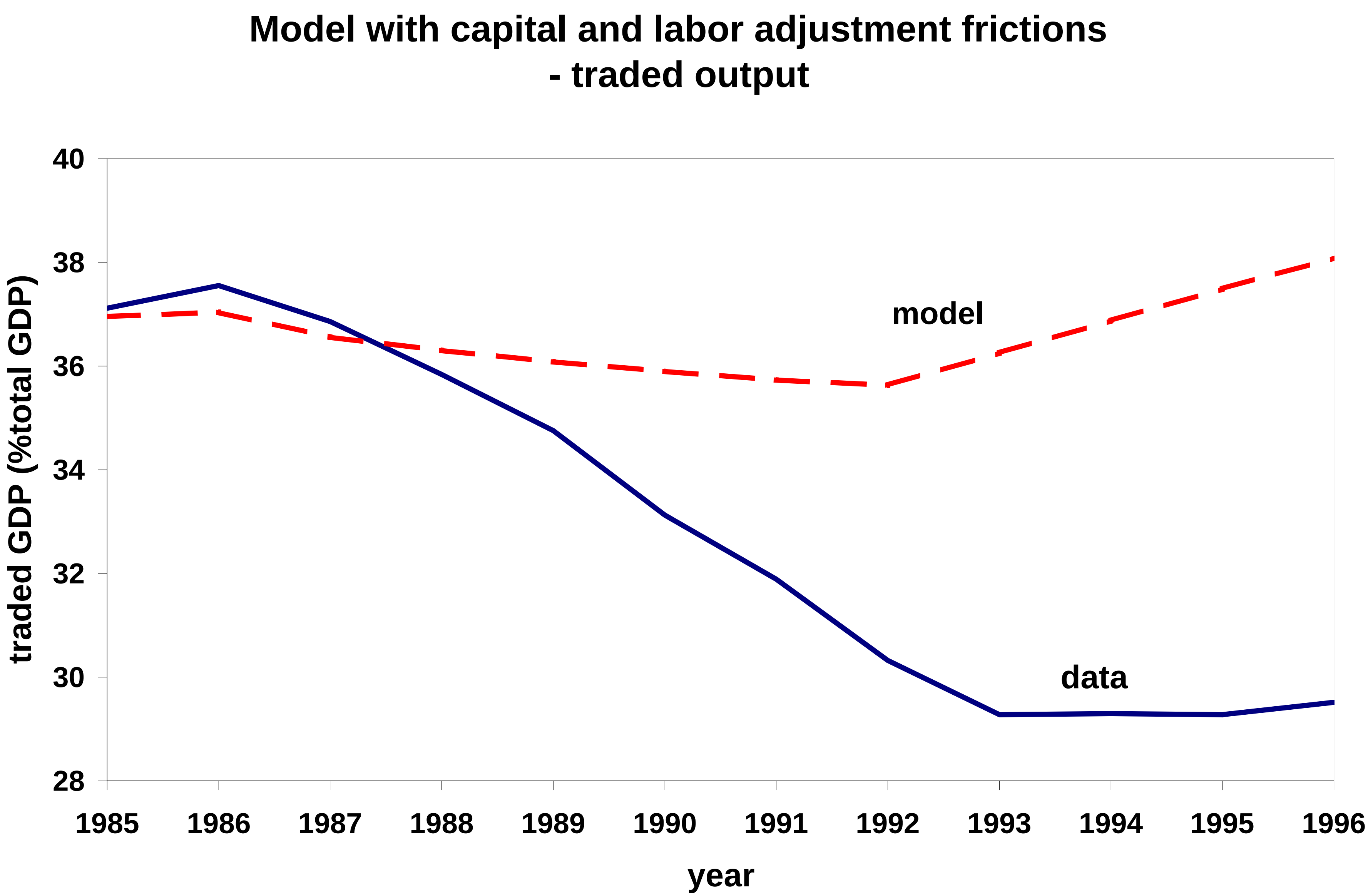
$$k_{Nt+1} \leq \phi(x_{Nt+1}/k_{Tt}) k_{Nt} + (1-\delta) k_{Nt}$$

$$k_{Tt+1} \leq \phi(x_{Tt+1}/k_{Tt}) k_{Tt} + (1-\delta) k_{Tt}$$

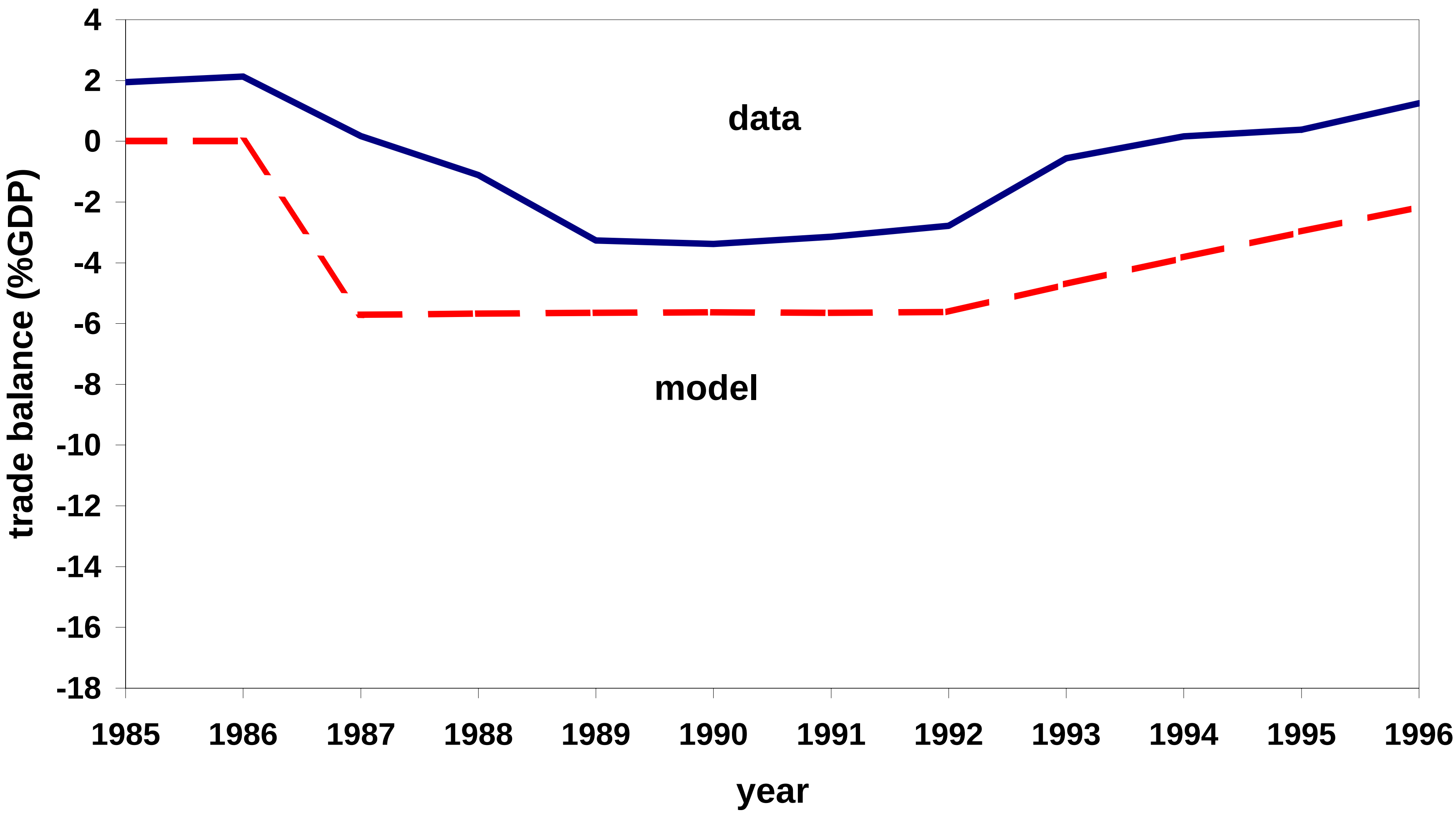
$$\phi'(x/k) > 0,\ \phi''(x/k) < 0,\ \phi(\delta) = \delta,\ \phi'(\delta) = 1$$

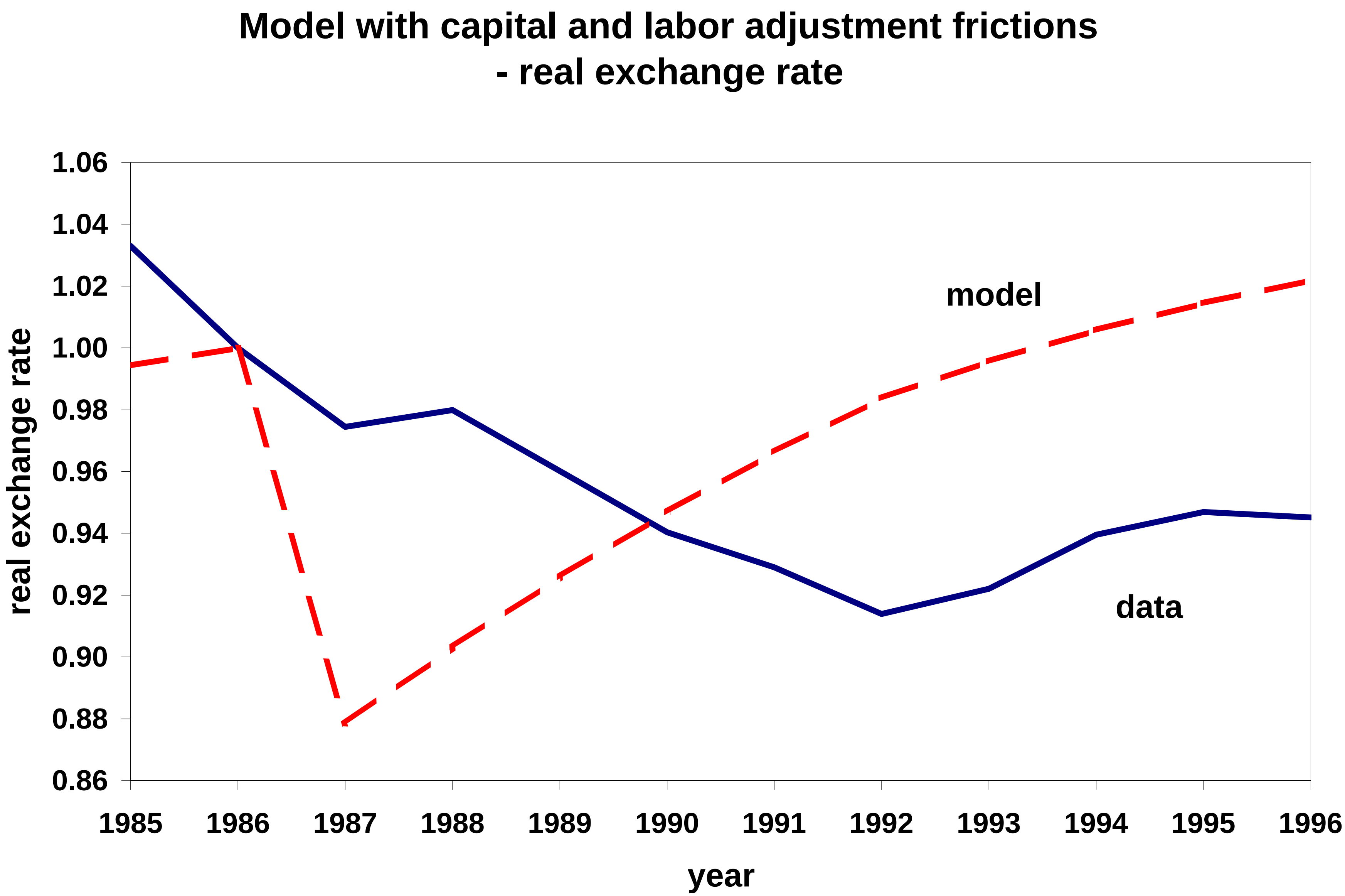
$$(\phi(x/k) = (\delta^{1-\eta}(x/k)^{\eta} - (1-\eta)\delta)/\eta,\ 0 < \eta \leq 1)$$

(In the numerical experiments $\eta = 0.9$.)


Model with capital and labor adjustment frictions
- traded output
40
38
36
34
32
30
28
traded GDP (%total GDP)
model
data
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
year

Model with capital and labor adjustment frictions - trade balance





Model with capital and labor adjustment frictions
- real exchange rate
real exchange rate
1.06
1.04
1.02
1.00
0.98
0.96
0.94
0.92
0.90
0.88
0.86
model
data
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
year

Model with capital and labor adjustment frictions - labor in traded sector