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Preliminary Results on Mobility of Labor Study

The investigation into mobility of labor between the agricultural and non-agricultural sectors of the economy has produced certain preliminary numerical results. Many of these results cannot be accepted, on economic grounds. They are presented here with the object of eliciting possible explanations of the results and suggestions as to improvement.

The variables employed in the structural relations were as follows: excluding those variables appearing only in definitions and identities:

$\Delta N_{1t} = N_{1t} - N_{1t-1}$  = the change in the number of individuals desiring employment in agriculture

$\Delta N_{2t} = N_{2t} - N_{2t-1}$  = the change in the number of individuals desiring employment in non-agriculture

$y_1$  = per capita real disposable income of agricultural workers (including proprietors)

$y_2$  = per capita real disposable income of non-agricultural workers (including proprietors)

$U$  = number of individuals unemployed (all in non-agriculture)

$R$  = total population of the United States

$c$  = per capita real consumption of all individuals

$y$  = per capita real disposable income of all individuals

$x_1$  = real agricultural output per head of total population

$x_2$  = real non-agricultural output per head of total population

$P_1$  = index of prices received by farmers, deflated by the general price level

$p_2$  = index of prices received by the non-agricultural sector, deflated by the general price level.

$z$  = real per capita net investment

$t$  = time

$L_1$  = number of individuals working in agriculture

$L_2$  = number of individuals working in non-agriculture

$D_1$  = agricultural depreciation in real terms

$D_2$  = non-agricultural depreciation in real terms

$s_1$  = real payments of agriculture to non-agriculture for goods used in production, per head of total population

$v_1$  = real value of agricultural goods consumed on the farm per agricultural worker.

$P_A$  = index of prices paid by agriculture for consumption goods, deflated by the general price level.

Endogenous variables:  $\Delta N_1, \Delta N_2, L_1, L_2, U, x_1, x_2, Y, y_1, y_2, v_1, c, s_1, p_1, p_2, P_A$ .

Predetermined variables:  $R, t, \overset{real}{money}$  investment, money depreciation, and all lagged variables.

Time period: 1920-41, inclusive

For identities, see page 5 ~~previous paper~~

Equations:

(1) 
$$\Delta N_{1t} = \alpha_{10} + \alpha_{11}y_{1t} + \alpha_{12}y_{2t} + \alpha_{13}U_t - \alpha_{14}R_t$$

$$+ \alpha_{15}y_{1,t-1} + \alpha_{16}y_{2,t-1} + \alpha_{17}U_{t-1}$$
Mobility of labor equation

(2) 
$$\Delta N_{2t} = \alpha_{20} + \alpha_{21}y_{1t} + \alpha_{22}y_{2t} + \alpha_{23}U_t + \alpha_{24}R_t$$

$$+ \alpha_{25}y_{1,t-1} + \alpha_{26}y_{2,t-1} + \alpha_{27}U_{t-1}$$
Mobility of labor equation

(3) 
$$c_t = \alpha_{30} + \alpha_{31}y_t + \alpha_{32}y_{t-1}$$
Consumption function

$$(4) \quad x_1 = \alpha_{40} + \alpha_{41}P_{1t} + \alpha_{42}P_{2t} + \alpha_{43}z_t + \alpha_{45}y_t$$

Demand for Agricultural goods

$$(5) \quad x_2 = \alpha_{50} + \alpha_{51}P_{2t} + \alpha_{52}P_{2,t-1} + \alpha_{53}t$$

Supply of non-agricultural goods

$$(6) \quad R_t x_{1t} = \alpha_{60} L_1^{\alpha_{61} + \alpha_{62}t} D_1^{\alpha_{63} + \alpha_{64}t}$$

Agricultural production function

$$(7) \quad R_t x_{2t} = \alpha_{70} L_2^{\alpha_{71} + \alpha_{72}t} D_2^{\alpha_{73} + \alpha_{74}t}$$

Non-agricultural production function

$$(8) \quad s_{1t} = \alpha_{80} + \alpha_{81}P_{1t} + \alpha_{82}P_{1,t-1}$$

Demand by agriculture for goods used in production

$$(9) \quad v_{1t} = \alpha_{90} + \alpha_{91}P_{1t} + \alpha_{92}P_{At}$$

Demand by agriculture for home consumption

Preliminary results were obtained by the limited information method for equations (1), (2), (4), (6) and (7). We omit constant terms:

$$(1) \quad \Delta N_{1t} = - .099y_{1t} + 1.02y_{2t} - .022U_t - 6.16R_t$$

$$+ .59y_{1,t-1} + 1.1y_{2,t-1} + .034U_{t-1}$$

$$(2) \quad \Delta N_{2t} = 2.07y_{1t} - 1.85y_{2t} - .013U_t + 47.03R_t$$

$$- 1.71y_{1,t-1} - 4.88y_{2,t-1} - .068U_{t-1}$$

$$(4) \quad x_{1t} = - .16p_{1t} - 1.36p_{2t} + .112z_t + .03y$$

$$(6) \quad \log R x_1 = - (.110 + .013t) \log L_1 - (.019 - .051t) \log D_1$$

$$(7) \quad \log R x_2 = (.39 + .18t) \log L_2 + (.22 - .35t) \log D_2$$

We include, for comparison, some least squares fits:

$$(4) \quad x_{1t} = - .19p_{1t} - 2.45p_{2t} + .042z_t + .048y$$

$$s^2 = 2.2158$$

$$(6) \quad \log Rx_1 = (2.24 - .0017t) \log L_1 + (.22 - .0307t) \log D_2$$

$$\delta^2/s^2 = 2.1887$$

$$(7) \quad \log Rx_2 = (.92 + .089t) \log L_2 - (.025 + .17t) \log D_2$$

$$\delta^2/s^2 = 2.1572$$

Identities

$$(10) R_t Y_t = L_{1t} Y_{1t} + L_{2t} Y_{2t}$$

$$(11) o_t + z_t = Y_t$$

$$(12) U_t = R_{2t} - L_{2t}$$

$$(13) N_{1t} = L_{1t}$$

$$(14) L_{1t} Y_{1t} = R_t (x_{1t} - s_{1t}) + E_{1t}$$

$$(15) L_{2t} Y_{2t} = R_t (x_{2t} + v_{1t} - x_{1t}) + E_{2t}$$

$$(16) \dot{Y}_{2t} = P_t (D_{1t} - D_{2t})$$

$$(17) D_{1t} = \frac{Q_{1t}}{P_t^a}$$

$$(18) D_{2t} = \frac{Q_{2t}}{P_t^b}$$

$$(19) P_t^a = S(P_{2t}, P_{2t-1}, \dots)$$

$E_1$  (predetermined) = agricultural imputed rent + revaluation of agricultural inventories + transfer payments to agriculture - taxes paid by agriculture - agricultural depreciation,

$E_2$  (predetermined) = revaluation of nonagricultural inventories + transfer payments to nonagriculture - taxes paid by agriculture - nonagricultural depreciation.

$Q_{1t}$  = money depreciation of agricultural sector

$Q_{2t}$  = money depreciation of nonagricultural sector

$P_t^a$  = price index implicit in depreciation deflated by general price level