AJAE appendix for Water Markets and Third Party Effects

by

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Note: The material contained herein is supplementary to the article named in the title and published in the American Journal of Agricultural Economics (*AJAE*).

Appendix A

This Claim uses equation (2) and the definition of a competitive equilibrium with no income flight. For the reader's convenience, equation (2) and the definition are repeated here:

$$\alpha \leq \alpha_I \equiv \rho p_s + \bar{w} + \sigma p_w. \tag{1}$$

Definition 1 *A competitive equilibrium with water trading restrictions σ is characterized by a service price p_s^* and welfare level $\bar{u}^*$ such that (i) the service good market clears*

$$G_p^s(p_s^*, \bar{w}) = e'(p_s^*)\bar{u}^* + \rho[1 - \alpha_I(p_s^*)] \tag{4}$$

and (ii) aggregate income is equal to aggregate expenditures

$$e(p_s^*)\bar{u}^* = G^s(p_s^*, \bar{w}) + G^a(p_s^*, \sigma) + \bar{w} + WR(p_s, \sigma) \tag{5}$$

where $\alpha_I(p_s^*) \equiv \rho p_s^* + \bar{w} + \sigma p_w$.

Claim 1 *The change in the service price and average utility level given a change in water trading restrictions are given by:*

$$\frac{dp_s}{d\sigma} = \frac{p_w(e'\alpha_I - e\rho)}{\left(G_{pp}^s - e''\bar{u} + \rho^2\right)e} \tag{6}$$

$$\frac{d\bar{u}}{d\sigma} = \frac{p_w \alpha_I}{e} > 0. \tag{7}$$

Proof. Take the total derivative of expressions (1), (4), and (5) with respect to p_s and σ to get

$$d\alpha_I = \rho dp_s + p_w d\sigma \tag{16}$$

$$G^s_{pp} dp_s = e'' \bar{u} dp_s + e' d\bar{u} - \rho d\alpha_I \tag{17}$$

$$e' \bar{u} dp_s + e d\bar{u} = G^s_p dp_s - [1 - \alpha_I] d\alpha_I + p_w d\sigma. \tag{18}$$

using $\pi(\alpha) - \pi(\alpha_I) = \alpha - \alpha_I$. Use equation (4) to simplify expression (18) to

$$e \frac{d\bar{u}}{d\sigma} = \alpha_I p_w, \tag{19}$$

and substitute equation (16) into expression (17), and rearrange terms to get

$$\left[G^s_{pp} - e'' \bar{u} + \rho^2\right] \frac{dp_s}{d\sigma} = e' \frac{d\bar{u}}{d\sigma} - \rho p_w. \tag{20}$$

Solving system (19) and (20) yields (6) and (7). Substituting (6) into (16) leads to

$$\begin{aligned} \frac{d\alpha_I}{d\sigma} &= p_w \frac{\rho \left[\alpha_I e'/e - \rho\right] + G^s_{pp} - e'' \bar{u} + \rho^2}{G^s_{pp} - e'' \bar{u} + \rho^2} \\ &= \frac{p_w}{p_s} \frac{\rho \alpha_I s(p_s) + p_s G^s_{pp} - p_s e'' \bar{u}}{G^s_{pp} - e'' \bar{u} + \rho^2} > 0 \end{aligned}$$

■

Appendix B

Corollary 1 *(i) Household service consumption increases as* σ *increases*

$$\frac{dx^c}{d\sigma}(\cdot) \geq 0$$

(ii) Aggregate service sector profit decreases (increases) as the service price decreases (increases) in σ*, with*

$$\frac{dG^s}{d\sigma} = G_p^s(p_s, \bar{w}) \frac{dp_s}{d\sigma}.$$

(iii) If the service price is decreasing in σ*, then agricultural service income necessarily falls with increased water trading. If the service price is increasing in* σ*, then the impact of water trading on agricultural service income is ambiguous, given by*

$$\frac{d}{d\sigma}\{\rho p_s [1-\alpha_I]\} = \rho \left\{ \frac{dp_s}{d\sigma}[1-\alpha_I] - p_s \frac{d\alpha_I}{d\sigma} \right\}.$$

(iv) The rents to each land quality fall (increase) as the service price is increasing (decreasing) in σ*, with*

$$\frac{d\pi}{d\sigma} = -\rho \frac{dp_s}{d\sigma}$$

for all $\alpha > \alpha_I$*.*

Proof. Point (ii), (iii) and (iv) are derived using the definitions of the corresponding aggregate revenue functions. For claim (i), As $x^c(p, \bar{u}) = e'(p)\bar{u}$, we have

$$\frac{dx^c}{d\sigma} = e''(p)\bar{u}\frac{dp}{d\sigma} + e'(p)\frac{d\bar{u}}{d\sigma}.$$

where $e'' < 0, e' > 0$, and $\frac{d\bar{u}}{d\sigma} > 0$. Consequently, when the service good price falls, $\frac{dx^c}{d\sigma}$ is positive and household service consumption increases. On the other hand, if the service good price increases, we have

$$\frac{dy^s}{d\sigma} = G_{pp}^s(p, \bar{w})\frac{dp}{d\sigma} > 0.$$

Since agricultural production falls, the demand for services coming from the agricultural sector falls. Hence, if aggregate service output increases it must follow that household service consumption increases. This also tells us when the service price increases, $e'(p)\frac{d\bar{u}}{d\sigma} > -e''(p)\bar{u}\frac{dp}{d\sigma}$, i.e., the welfare effects of increased water trading, $e'\frac{d\bar{u}}{d\sigma}$, dominate the price effects $-e''\bar{u}\frac{dp}{d\sigma}$. ■

Appendix C

We use the following Lemma to prove Claim 2. This Lemma uses the definition of a competitive equilibrium under income flight, repeated here as:

Definition 2 *A competitive equilibrium with income flight, water trading restrictions* σ, *and open labor markets is characterized by a service price* p_s^* *and welfare level* $\bar{u}_\gamma^*$ *such that (i) the service good market clears*

$$G_p^s\left(p_s^*, \bar{w}\right) = e'\left(p_s^*\right)\bar{u}_\gamma^*\left(1-\gamma\alpha_I^*\right) + \rho\left(1-\alpha_I^*\right), \tag{11}$$

and (ii) aggregate expenditure is equal to aggregate income

$$e\left(p_s^*\right)\bar{u}_\gamma^*\left(1-\gamma\alpha_I^*\right) = G^s\left(p_s^*, \bar{w}\right) + \int_{\alpha_I^*}^{1}[\pi(\alpha)-\pi(\alpha_I^*)]d\alpha + \left(\sigma p_w + \bar{w}\right)\left(1-\gamma\alpha_I^*\right) \tag{12}$$

where $\alpha_I^* \equiv \rho p_s^* + \bar{w} + \sigma p_w$.

Lemma 1 *At a competitive equilibrium with income flight, we have*

$$\frac{dp_s}{d\sigma} = \frac{p_w\left[e'\Delta - e\left(\rho + e'\bar{u}_\gamma\gamma\right)\right]}{\left(G_{pp}^s - J + \rho^2\right)e - e'\Phi\gamma\rho} \tag{21}$$

$$\frac{d\bar{u}_\gamma}{d\sigma} = \frac{p_w\left\{\left(G_{pp}^s - J + \rho^2\right)\Delta - \gamma\left(\rho + \bar{u}_\gamma\gamma e'\right)\rho^2\Phi\right\}}{\left(1-\gamma\alpha_I\right)\left[\left(G_{pp}^s - J + \rho^2 h(\alpha_I)\right)e - e'\Phi\gamma\rho\right]} \tag{22}$$

$$\frac{d\alpha_I}{d\sigma} = p_w\frac{\rho e'(1-\gamma)\alpha_I + eG_{pp}^s - ee''\bar{u}_\gamma\left(1-\gamma\alpha_I\right)}{\left(G_{pp}^s - J + \rho^2\right)e - e'\Phi\gamma\rho} > 0, \tag{23}$$

where

$$\begin{aligned} J &= e''\bar{u}_\gamma\left(1-\gamma\alpha_I\right) - e'\bar{u}_\gamma\gamma\rho < 0 \\ \Phi &= e\bar{u}_\gamma - \left(\bar{w} + \sigma p_w\right) > 0 \\ \Delta &= \gamma\Phi + (1-\gamma)\alpha_I > 0. \end{aligned}$$

and $\left(G_{pp}^s - J + \rho^2\right)e - e'\Phi\gamma\rho > 0$.

Proof. Take the total derivative of (11) with respect to $p_s, \bar{u}_\gamma$, and σ to get

$$G_{pp}^s dp_s = e''\bar{u}_\gamma\left(1-\gamma\alpha_I\right)dp_s - e'\bar{u}_\gamma\gamma\rho dp_s - \rho^2 dp_s + e'\left(1-\gamma\alpha_I\right)du - e'\bar{u}_\gamma\gamma p_w d\sigma - \rho p_w d\sigma$$

or,

$$\left[G_{pp}^{s}-J+\rho^{2}\right]\frac{dp_{s}}{d\sigma}-e'\left(1-\gamma\alpha_{I}\right)\frac{du}{d\sigma}=-p_{w}\left[e'\bar{u}_{\gamma}\gamma+\rho\right]. \tag{24}$$

Next, take the total derivative of (12) with respect to $p_s, \bar{u}_\gamma$, and σ, and use (11) to get:

$$e\left(1-\gamma\alpha_{I}\right)du-\gamma e\bar{u}_{\gamma}[\rho dp_{s}+p_{w}d\sigma]=(1-\gamma)\alpha_{I}p_{w}d\sigma-\gamma\left(\bar{w}+\sigma p_{w}\right)[\rho dp_{s}+p_{w}d\sigma],$$

hence

$$-\Phi\gamma\rho\frac{dp_{s}}{d\sigma}+e\left(1-\gamma\alpha_{I}\right)\frac{du}{d\sigma}=p_{w}\Delta, \tag{25}$$

Solving the system (24) and (25) gives (21) and (22). $\Phi \geq 0$ comes directly from (12), and implies $\Delta > 0$. We also have

$$\left(G_{pp}^{s}-J+\rho^{2}\right)e-e'\Phi\gamma\rho=e\left(G_{pp}^{s}-e''\bar{u}_{\gamma}\left(1-\gamma\alpha_{I}\right)+\rho^{2}\right)+e'\gamma\rho\left(\bar{w}+\sigma p_{w}\right)>0,$$

where (23) is deduced from (21) using $\frac{d\alpha_I}{d\sigma} = p_w + \rho\frac{dp_s}{d\sigma}$. ■

Similarly, Claim 2 uses equation (13) of the original document, repeated here:

$$\frac{d\bar{u}_{\gamma}}{d\sigma}=\frac{(1-\gamma)\alpha_{I}p_{w}}{\left(1-\gamma\alpha_{I}\right)e}+\gamma\frac{d\alpha_{I}}{d\sigma}\frac{\left[G^{s}\left(p^{*},\bar{w}\right)+\int_{\alpha_{I}^{*}}^{1}\left[\pi\left(\alpha\right)-\pi(\alpha_{I}^{*})\right]d\alpha\right]}{\left(1-\gamma\alpha_{I}\right)^{2}e}. \tag{13}$$

Claim 2 *(i) For $\gamma > 0$, increased water trading increases the average level of per capita utility:*

$$\frac{d\bar{u}_{\gamma}}{d\sigma}>0.$$

(ii) With complete income flight, i.e., $\gamma = 1$, the service sector price falls:

$$\left.\frac{dp_{s}}{d\sigma}\right|_{\gamma=1}<0.$$

Proof. With complete income flight (i.e., $\gamma = 1$) we have

$$e'\Delta-e\left(\rho+e'\bar{u}_{\gamma}\gamma\right)=-[e'(\bar{w}+\sigma p_{w}+e\rho]<0.$$

Hence, increased water trading always triggers a decrease in the service good price. The fact that water trading always triggers an increase in the average utility level is deduced from (13) using $\frac{d\alpha_I}{d\sigma} > 0$. ■

Appendix D

Claim 3 uses the service good market equilibrium condition

$$G_p^s(p_s, \bar{w}) = e'(p_s)\bar{u} + \rho[1 - \alpha_I + \beta \min\{c, \alpha_I\}]. \tag{14}$$

Claim 3 *In a competitive equilibrium with labor search costs:*

(i). *When* $\alpha_I < c$

$$\begin{aligned}
\frac{dp_s}{d\sigma} &= \frac{p_w(1-\beta)[s(p_s)(\alpha_I - c) - p_s\rho]}{p_s\left[G_{pp}^s - e''(p_s)\bar{u} + (1-\beta)\rho^2\right] + (1-\beta)c\rho s(p_s)} < 0, \\
\frac{d\bar{u}}{d\sigma} &= (1-\beta)\frac{p_w p_s}{e(p_s)} \frac{(\alpha_I - c)\left[G_{pp}^s - e''(p_s)\bar{u} + (1-\beta)\rho^2\right] + (1-\beta)c\rho^2}{p_s\left[G_{pp}^s - e''(p_s)\bar{u} + (1-\beta)\rho^2\right] + (1-\beta)c\rho s(p_s)}
\end{aligned}$$

with

$$\frac{d\bar{u}}{d\sigma} > 0 \text{ iff } \alpha_I > \frac{c\left[G_{pp}^s - e''(p_s)\bar{u}\right]}{G_{pp}^s - e''(p_s)\bar{u} + (1-\beta)\rho^2}. \tag{15}$$

(ii). *When* $\alpha_I > c$*, we have*

$$\begin{aligned}
\frac{d\bar{u}}{d\sigma} &= \frac{p_w p_s}{e(p_s)} \frac{(\alpha_I - c)\left[G_{pp}^s - e''(p_s)\bar{u} + \rho^2\right] + (1-\beta)c\rho^2}{p_s\left[G_{pp}^s - e''(p_s)\bar{u} + \rho^2\right] + s(p_s)(1-\beta)c\rho} > 0, \\
\frac{dp_s}{d\sigma} &= \frac{p_w[s(p_s)(\alpha_I - c) - p_s\rho^2]}{p_s\left[G_{pp}^s - e''(p_s)\bar{u} + \rho^2\right] + s(p_s)(1-\beta)c\rho}
\end{aligned}$$

with

$$\frac{dp_s}{d\sigma} > 0 \text{ iff } \alpha_I - c > p_s\rho^2/s(p_s).$$

Proof. First consider the case $\alpha_I \le c$. As

$$WR - SC = -(1-\alpha_I)\pi(\alpha_I) + \sigma p_w - \beta\alpha_I\pi(\alpha_I - c) - c(\alpha_I - \alpha_0)$$

we have

$$\begin{aligned}
G^a + WR - SC &= \int_{\alpha_I}^1 [\pi(\alpha) - \pi(\alpha_I)]d\alpha + \sigma p_w + \beta\int_0^{\alpha_I}[\pi(\alpha) - \pi(\alpha_I - c)]d\alpha - c(\alpha_I - \alpha_0) \\
&= \int_{\alpha_I}^1 (\alpha - \alpha_I)d\alpha + \sigma p_w + \beta\int_0^{\alpha_I}(\alpha - \alpha_I + c)d\alpha - c(\alpha_I - \alpha_0)
\end{aligned}$$

The analog to Walras' Law in Definition 1 is given by

$$e(p)\bar{u} = G^s(p_s) + \bar{w} + G^a + WR - SC. \tag{26}$$

Totally differentiating the above expression leads to

$$e'\bar{u}dp + ed\bar{u} = G_p^s dp - [1 - (1-\beta)(\alpha_I - c)](\rho dp + p_w d\sigma) + d\sigma p_w.$$

Using the market clearing condition (14), we get

$$ed\bar{u} = (1-\beta)[(\alpha_I - c)p_w d\sigma - c\rho dp]. \tag{27}$$

Differentiating (14) gives

$$G_{pp}^s dp = e'' dp \bar{u} + (1-\beta)e'/e[(\alpha_I - c)p_w d\sigma - c\rho dp] - \rho(1-\beta)(\rho dp + p_w d\sigma)$$

which upon rearranging terms yields

$$\frac{dp}{d\sigma} = \frac{p_w(1-\beta)[s(p_s)(\alpha_I - c) - p_s\rho]}{p_s[G_{pp}^s - e''\bar{u} + (1-\beta)\rho^2] + (1-\beta)c\rho s(p_s)} < 0$$

Plugging back into (27) leads to

$$\frac{d\bar{u}}{d\sigma} = (1-\beta)\frac{p_w p_s}{e(p_s)} \frac{(\alpha_I - c)[G_{pp}^s - e''\bar{u} + (1-\beta)\rho^2] + (1-\beta)c\rho^2}{p_s[G_{pp}^s - e''\bar{u} + (1-\beta)\rho^2] + (1-\beta)c\rho s(p_s)}$$

which gives the result. Consider now the case $\alpha_I > c$. Expanding (26), differentiating and rearranging terms gives

$$e(p)\bar{u} = G^s(p_s) + \bar{w} - c(\alpha_I - \alpha_0) + \int_{\alpha_I}^{1} [\alpha - \alpha_I]d\alpha + \beta \int_{\alpha_I - c}^{\alpha_I} [\alpha - \alpha_I + c]d\alpha + \sigma p_w$$

or

$$e' dp + ed\bar{u} = G_p^s dp - [1 - \alpha_I + \beta c + (1-\beta)c](\rho dp + p_w d\sigma) + d\sigma p_w$$

Using (14), the above expression simplifies to

$$ed\bar{u} = (\alpha_I - c)p_w d\sigma - c(1-\beta)\rho dp. \tag{28}$$

Differentiating (14) gives

$$G_{pp}^s dp = e'' dp \bar{u} + e'/e[(\alpha_I - c)p_w d\sigma - c(1-\beta)\rho dp] - \rho(\rho dp + p_w d\sigma)$$

which upon rearranging terms yields

$$\frac{dp_s}{d\sigma} = \frac{p_w[s(p_s^*)(\alpha_I^* - c) - p_s^*\rho^2]}{p_s^*[G_{pp}^s - e''(p_s^*)\bar{u} + \rho^2] + s(p_s^*)c(1-\beta)\rho}.$$

Plugging back into (14) leads to

$$\frac{d\bar{u}}{d\sigma} = \frac{p_w p_s^*}{e(p_s^*)} \frac{(\alpha_I^* - c)[G_{pp}^s - e''(p_s^*)\bar{u} + \rho^2] + c(1-\beta)\rho^2}{p_s^*[G_{pp}^s - e''(p_s^*)\bar{u} + \rho^2] + s(p_s^*)c(1-\beta)\rho}.$$

■

Appendix E

Social Accounting Matrices

We now provide an overview of the procedure used to calibrate the rural economy associated with the Social Accounting Matrix (SAM) given in Table 1.[1] In the following discussion we refer to this SAM as SAM1. The baseline model assumes there is no water trading, i.e., $\sigma = 0$. Both SAMs are modified versions of the International Food Policy Research Institute's national accounts data for Sweden, 1993.

The conceptual model has three primitives that require calibrating: the service sector production technology, the agricultural technology, and the utility function. Also required, is calculation of the threshold value α_I.

Consumption

The easiest primitive to calibrate is the utility function. We represent preferences by the Cobb-Douglas function $U(q_a, q_m, q_s) = (q_a)^{\xi_a} (q_m)^{\xi_m} (q_s)^{1-\xi_a-\xi_m}$, where q_a, q_m, and q_s are the aggregate level of agricultural, composite import, and service good consumption. Knowing ξ_a is the share of income spent on the agricultural good, we turn to SAM1 and see that the value of aggregate consumption is 108536 and the value of agricultural consumption is 33331.6. Then, $\xi_a = \frac{33331.6}{108536} = 0.3071$. Similar calculations yield $\xi_m = \frac{27299}{108536} = 0.2515$, and $1 - \xi_a - \xi_m = 0.4414$. Given the calibrated consumption shares, one simply derives the expenditure function

$$E(p_a, p_m, p_s)\, u \equiv \min_{(q_a, q_m, q_s)} \left\{ p_a q_a + p_m q_m + p_s q_s : u = (q_a)^{0.3071} (q_m)^{0.2515} (q_s)^{0.4414} \right\},$$

and uses Shepard's lemma to get the aggregate demand functions for agriculture, services, and the composite import good. As is common with calibration procedures, we set $p_a = p_m = p_s = 1$, which implies that the first entry in the "Household" column of SAM1 (27299) is q_a, the quantity of the agricultural good purchased by rural households.

[1] The rural economy corresponding to the SAM in Table 2 is derived analogously.

Production

Normalize the labor endowment to unity. Then the wage bill from agriculture and the service sector are 20992 and 25292 respectively, while commuter income is 14994. Hence,

$$\bar{w} = 20992 + 25292 + 14994 = 61277.$$

The share of labor demanded by the service sector is $l_d = \frac{25292}{\bar{w}} = 0.4127$, the share of labor working in the urban area is $ES = \frac{14994}{\bar{w}} = 0.2447$, and the share of labor working in agriculture is equal to $1 - 0.4127 - 0.2447 = 0.3426$. Then, the share of labor engaged in non-agricultural production is equal to $\alpha_I = \frac{25292+14994}{\bar{w}} = 0.6574$.

Represent the service sector production technology by the Cobb-Douglas function $y^s = A\,(l_d)^{\chi}\,K^{1-\chi}$, where K is the stock of sector specific capital, A is a scaling parameter, and χ is the output elasticity of labor, or equivalently, the cost share of labor in producing output. Given constant returns to scale, Neoclassical theory tells us the value of service sector output is equal to the cost of producing that output. Then, by SAM1, $\chi = \frac{25292}{59976} = 0.4217$, $K = 34685$, and the production technology must satisfy

$$y^s = 59976 = A\,(0.4127)^{0.4127}\,(34685)^{1-0.4127} \Rightarrow A = 186.29.$$

Given the calibrated values of χ and A, the service sector GDP function is given by

$$\tilde{G}^s\,(p_s, \bar{w}, K) \equiv \max_{l} \left\{ p_s \cdot 186.29 \cdot l^{0.4127}\,(34685)^{0.5873} - 61277 \cdot l : l \in (0,1) \right\}.$$

One then applies Hotelling's lemma to the sectoral GDP function $\tilde{G}^s\,(p_s, \bar{w}, K)$, and derives the service sector's supply and labor demand functions.

Finally, recall that in the conceptual model, the agricultural GDP function is given by

$$G^a\,(p_s, \sigma) \equiv \int_{\alpha_I}^{1} \left[\alpha - (\rho p_s + \bar{w} + p_w)\right] d\alpha = \int_{\alpha_I}^{1} \left[\alpha - (\rho p_s + 61277 + p_w)\right] d\alpha.$$

Consider first, the exogenous parameters ρ and p_w. To calibrate these values, note the observed value of service demand, 12071, is equal to $\rho\,(1 - \alpha_I)$, or $12071 = \rho \cdot 0.3426 \Rightarrow \rho = 35234$. Likewise, the observed value of water demand is 5700, hence $p_w = \frac{5700}{0.35} = 16286$.

With $p_a = 1$, the integral $\int_{\alpha_I}^{1} \alpha \; d\alpha$ is theoretical model's level of aggregate agricultural output. To calibrate the sectoral agricultural production technology we represent the aggregate agricultural output function by

$$y^a = \int_{\tilde{\alpha}_I}^{H} B\alpha d\alpha = \int_{\frac{\rho p_s + \bar{w} + \sigma p_w}{B}}^{H} B\alpha d\alpha. \tag{29}$$

where the value of best and worst quality land are respectively H and $\tilde{\alpha}_I$. To transform (29) so it is consistent with a labor supply normalized to unity, use the following function:

$$y^a = \int_{\tilde{\alpha}_I/H}^{H/H} BH^2\alpha d\alpha = \int_{\frac{\rho p_s + \bar{w} + \sigma p_w}{BH}}^{1} BH^2\alpha d\alpha.$$

To calibrate agriculture's cost function we use , where the cost function is given by

$$\int_{\frac{\rho + \bar{w}}{BH}}^{1} \left[\left(\rho p_s + \bar{w} + p_w \right) C \right] d\alpha$$

and C is a scaling parameter.

Given $p_a = p_s = 1$ and $\sigma = 0$, the parameters B, C, and H must satisfy the following system of equations:

$$\begin{array}{ll} \int_{\frac{96511}{BH}}^{1} BH^2\alpha d\alpha = 45637 & (y^a) \\ \int_{\frac{96511}{BH}}^{1} 113153 C d\alpha = 38763 & (\text{cost}) \\ \frac{96511}{BH} = 0.6574, & (\alpha_I^*) \end{array}$$

the solution of which is $B = 134065, C = 1.00001$, and $H = 0.907366$.

The above calibrated values are then used to calculate the equilibria defined in Definitions 1 and 2, which replicate the values in SAM1 and SAM2, where SAM2 is the SAM given in Table 2. Assume all entries are in million US dollar equivalents

Table 1: The Social Accounting Matrix, consumption shares and production cost shares where $s\left(p_s\right) > \psi\left(p_s\right)$

1993	Production Activities			Commodities			Productive Factors							
Prod. Activities	Manuf	Ag	Serv	Manuf	Ag	Serv	Labor	Captial	Land	Water	Household	Capital	Trade	Total Receipts
Manuf.														0
Ag					45637									45637
Serv						59976								59976
Commodities														
Manuf.											27299			27299
Ag											33331.6		12305	45637
Serv		12071									47905			59976
Factors														
Labor		20992	25292										14994	61277
Capital			34685											34685
Land		6874												6874
Water		5700											0	5700
Households							61277	34684.5	6874	5700				108536
Capital														0
Trade				27299										27299
Total Expenditures	0	45637	59976	27299	45637	59976	61277	34685	6874	5700	108536	0	27299	482894

	Ag	Serv
Labor Share	0.4600	0.4217
Capital Share		0.5783
Land Share	0.1506	
Water Share	0.1249	
Service share	0.2645	

Household Expenditure Shares	
Food	0.3071
Manuf	0.2515
Serv	0.4414

Table 2: The Social Accounting Matrix, consumption shares and production cost shares where $s\left(p_s\right) < \psi\left(p_s\right)$

SAM 2: $s\left(p_s\right) < \psi\left(p_s\right)$