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Actions towards food safety: choosing labels or self-protection

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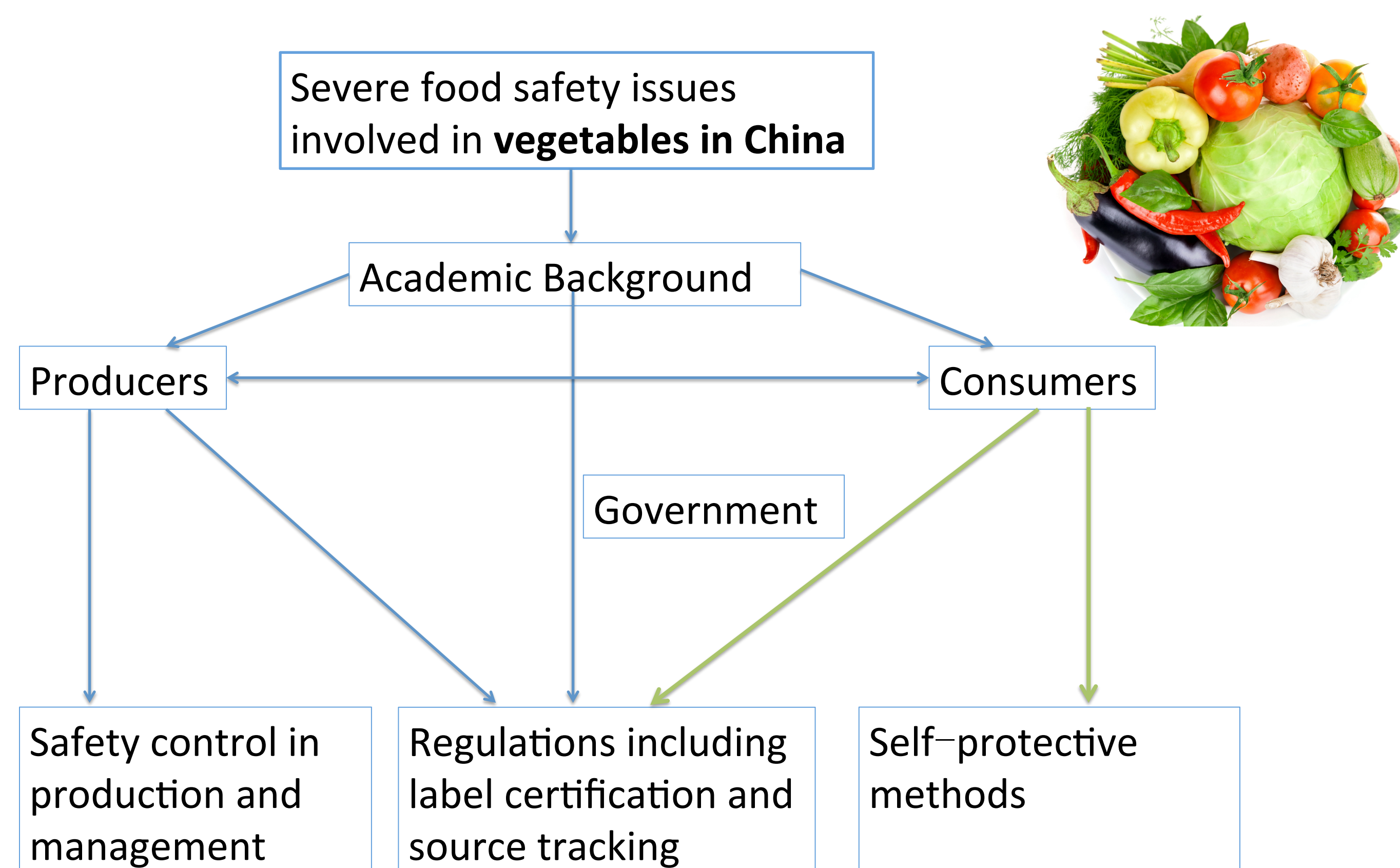


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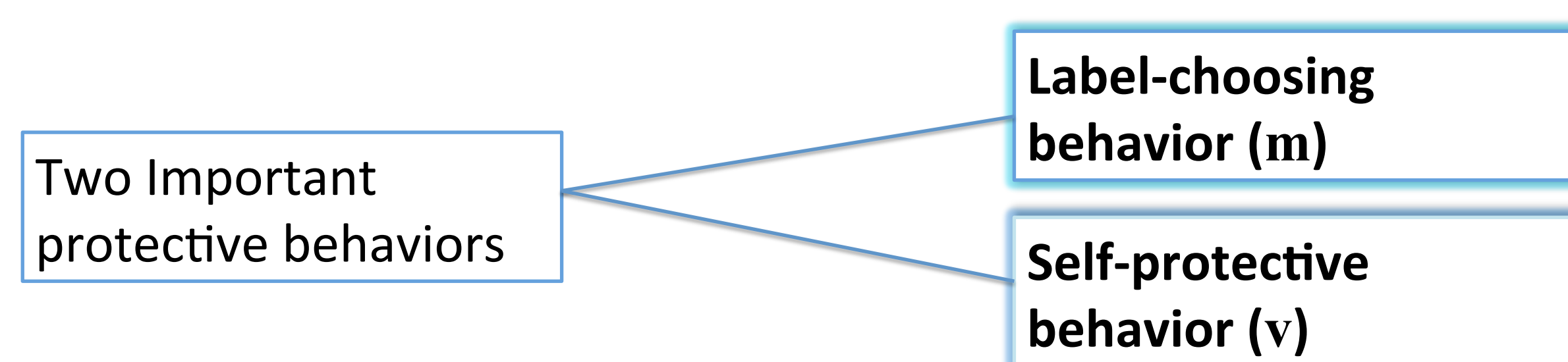
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1. Introduction



2. Objectives

- Provide theoretical rationale of consumers' optimal choices of different protective behaviors so as to meet their demand for food safety.
- Treat a protective behavior as a production process with a special focus on the cost.
- Deeply discuss the mixed effects of factors that affect consumers' protective behaviors, with a special focus on the factor –income.



3. Theoretical Model

Expected Utility Framework:

$$EU = \pi U_b(X, Y) + (1 - \pi) U_g(X, Y)$$

$$M = wT + A = p_x X + Y$$

$$\pi = \pi(\pi^0, m, v)$$

Household Productive Framework:

$$\text{Min}_{\{t_1, t_2, z_1, z_2\}} C = w(t_1 + t_2) + p(z_1 + z_2)$$

$$S.T. \quad m = m(t_1, z_1, a)$$

$$v = v(t_2, z_2, b)$$

Pursuing Food Safety—Get the optimal level of protective behaviors:

$$\text{Max}_{m, v} EU = \pi(\pi^0, m, v)(U_b - U_g) + U_g$$

$$S.T. \quad I = wT + A - p_x X^* - Y^* = C(m, v, w, p, a, b)$$

.....

$$m = m^*(\pi^0, w, p, a, b, I)$$

$$v = v^*(\pi^0, w, p, a, b, I)$$

Comparative static analysis:

- With respect to behavior production technologies:

$$\frac{\partial m^*}{\partial b} = \frac{\partial m^U}{\partial b} - C_b \frac{\partial m^*}{\partial I}$$

$$\frac{\partial v^*}{\partial b} = \frac{\partial v^U}{\partial b} - C_b \frac{\partial v^*}{\partial I}$$

- With respect to wage rate

$$\frac{\partial m^*}{\partial w} = T \cdot \frac{\partial m^*}{\partial A} - C_w \frac{\partial m^*}{\partial A} - \frac{\lambda C_v^3}{D} \cdot \frac{\partial(C_m / C_v)}{\partial w}$$

$$\frac{\partial v^*}{\partial w} = T \cdot \frac{\partial v^*}{\partial A} - C_w \frac{\partial v^*}{\partial A} + \frac{\lambda C_m C_v^2}{D} \cdot \frac{\partial(C_m / C_v)}{\partial w}$$

Propose two Hypotheses:

- Behavior production technologies have positive effects on the corresponding protective behavior.
- Non-wage income has positive effects on both protective behaviors, nevertheless the wage rate will discourage self-protective behavior and prompt label-choosing behavior.

X : the primary food item; Y : other composite goods.
Two health states of life: U_b is the bad state when adverse health outcome occurs, and U_g is the good state.

w : wage rate.

T : the household's total time endowment for working.

A : non-wage income.

p_x : full price of X relative to full price of Y .

π : perceived risk.

π^0 : actual risk.

t_1, t_2 : time spent to "produce" a certain level of label-choosing behavior and self-protective behavior respectively.

z_1, z_2 : other resources used in behavior production besides time.

X^*, Y^* : the optimal level of consumption bundles in the purchase decision.

4. Empirical Model

Bivariate Tobit Model:

$$y_{ji}^* = x_{ij} \beta_j + \varepsilon_{ji}, \quad i = 1, 2, \dots, n, j = 1, 2$$

$$y_{ji} = \begin{cases} y_{ji}^*, & y_{ji}^* > 0 \\ 0, & y_{ji}^* \leq 0 \end{cases} \quad \varepsilon_i = \begin{pmatrix} \varepsilon_{1i} \\ \varepsilon_{2i} \end{pmatrix} \sim N(0, \Sigma) = N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_1^2 & \rho\sigma_1\sigma_2 \\ \rho\sigma_1\sigma_2 & \sigma_2^2 \end{pmatrix}\right)$$

Taking into concern four different combinations of joint probability, we thus do a full MLE estimation.

5. Results

| Variables | Label-choosing behavior | | Self-protective behavior | |
|-----------|---|---------|--------------------------|---------|
| | Estimates | Std.Err | Estimates | Std.Err |
| km | 0.2425*** | 0.0574 | 0.0468 | 0.0577 |
| kv | 0.0456 | 0.0691 | 0.2028*** | 0.0712 |
| w | -0.0002 | 0.0005 | -0.0040*** | 0.0006 |
| A | 0.0030** | 0.0014 | 0.0057*** | 0.0015 |
| age | -0.0016 | 0.0009 | 0.0031*** | 0.0010 |
| gender | -0.0057 | 0.0259 | 0.0014 | 0.0265 |
| education | 0.0135*** | 0.0051 | 0.0088* | 0.0051 |
| children | -0.0237 | 0.0282 | -0.0485* | 0.0289 |
| old | -0.0278 | 0.0293 | 0.0139 | 0.0298 |
| constant | -0.2209 | 0.1039 | -0.0641 | 0.1038 |
| Wald Chi2 | 87.9900 (p-value=0.0000) | | | |
| | ρ = 0.0653, Std.Dev = 0.0499, p-value = 0.191 | | | |

6. Conclusion

- Behavior production technologies have significant positive effects on the corresponding protective behaviors. This finding has important policy implications for those aimed at improving consumers' levels of protective behaviors.
- Mostly importantly, income has mixed effects on the protective behaviors. Non-wage income works purely to increase the level of both types of protective behaviors as long as they are normal. The effect of wage-income, however, is much more complicated.