Marginal Probability Density Function (PDF) of $\ln S_1$, $\ln S_2$

Legend:
- Marginal PDF of $\ln(S_1)$; $N(0, \sigma_{11})$ $\sigma_{11} = 4$
- Marginal PDF of $\ln(S_2)$; $N(0, \sigma_{22})$ $\sigma_{22} = 1$

Y-axis: Probability Density Function

X-axis: $\ln W_1$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$
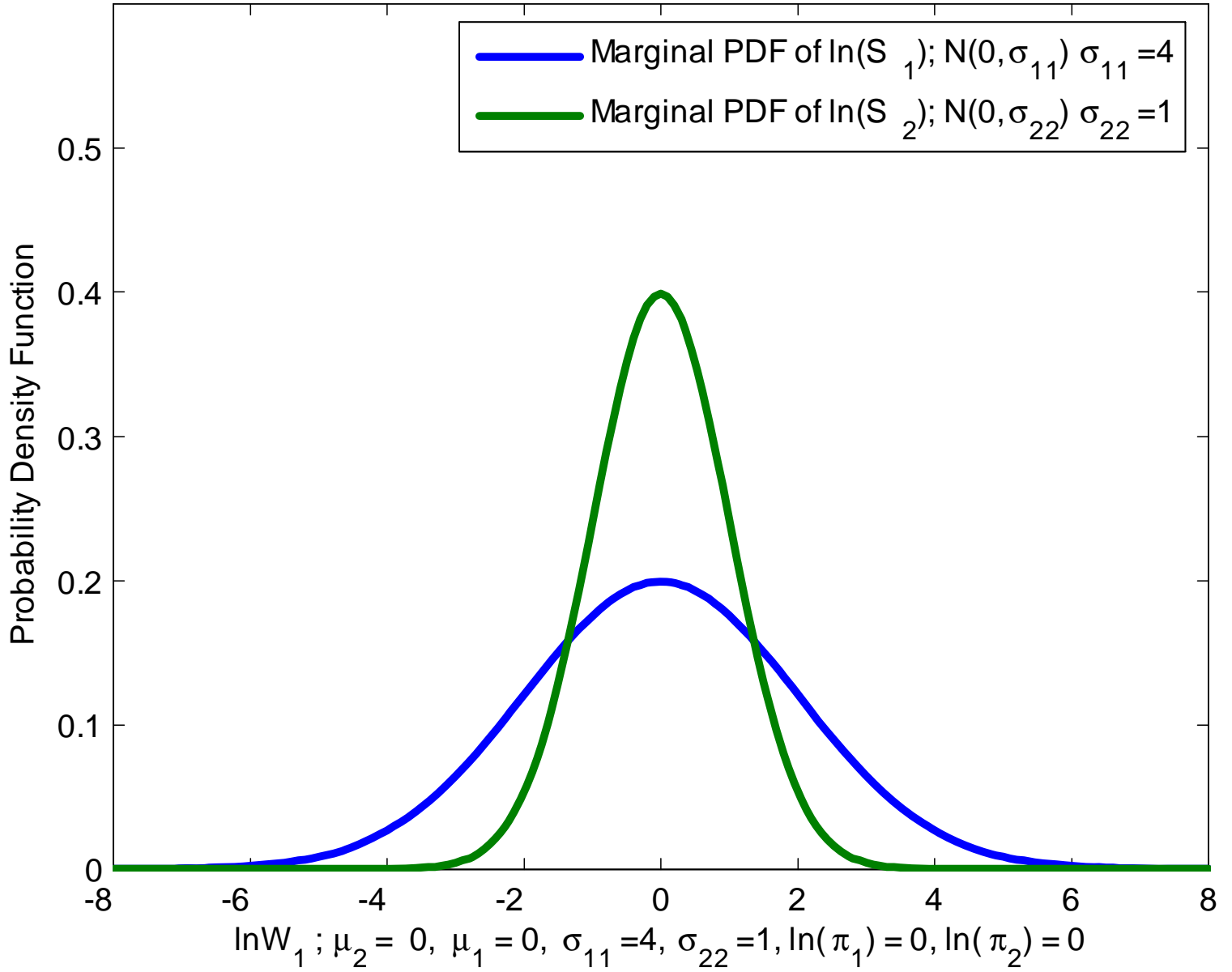
$$\ln S_1 = \ln(\mu_1) + U_1; \quad \ln S_2 = \ln(\mu_2) + U_2;$$

$$\begin{bmatrix} U_1 \\ U_2 \end{bmatrix} \sim N\left( 0, \begin{bmatrix} 4 & \sigma_{12} \\ \sigma_{12} & 1 \end{bmatrix} \right); \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$
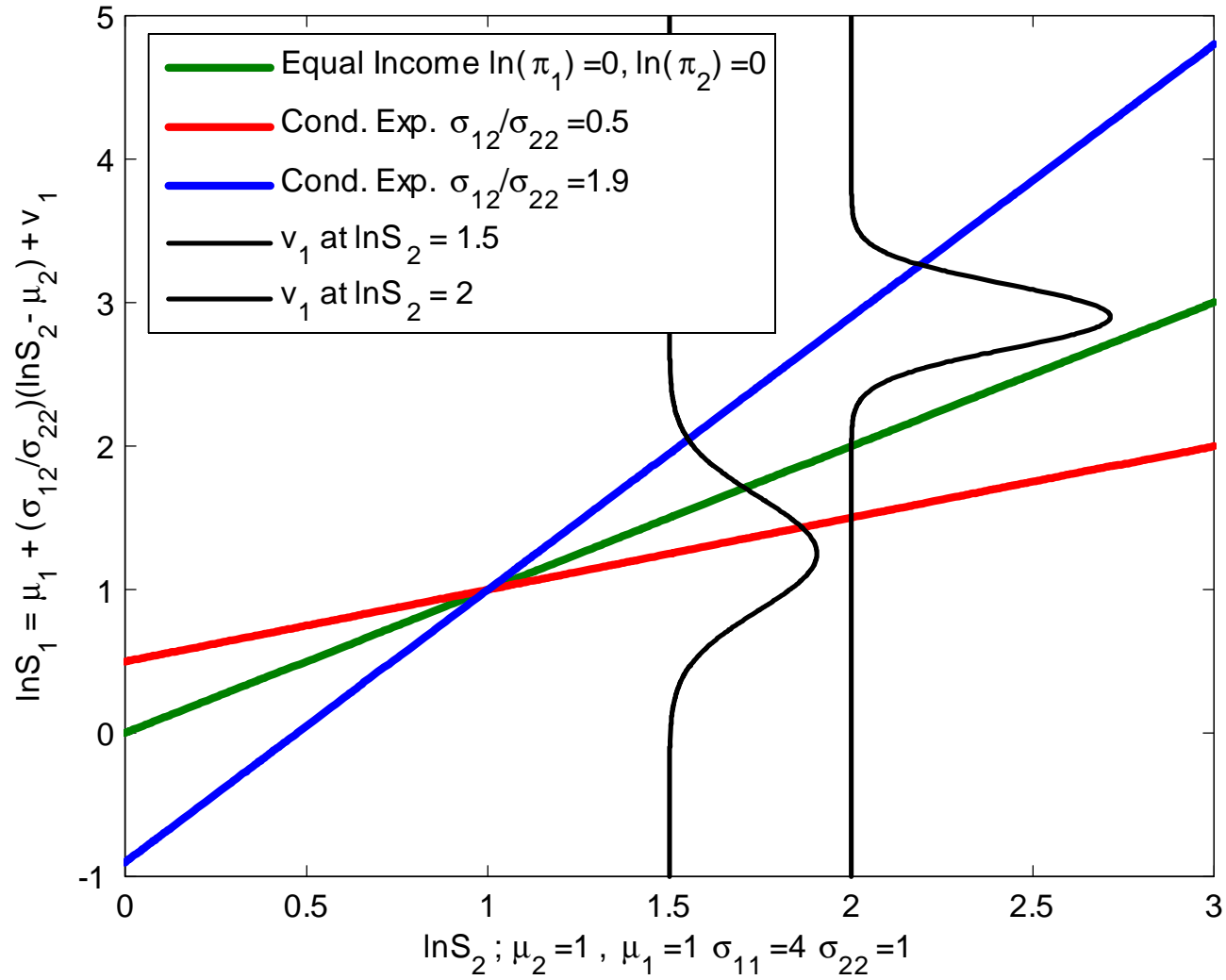
# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & \sigma_{12} \\ \sigma_{12} & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \;\; \sigma_{12} = 0.5, \;\; 1.9;$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- Equal Income $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.9$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

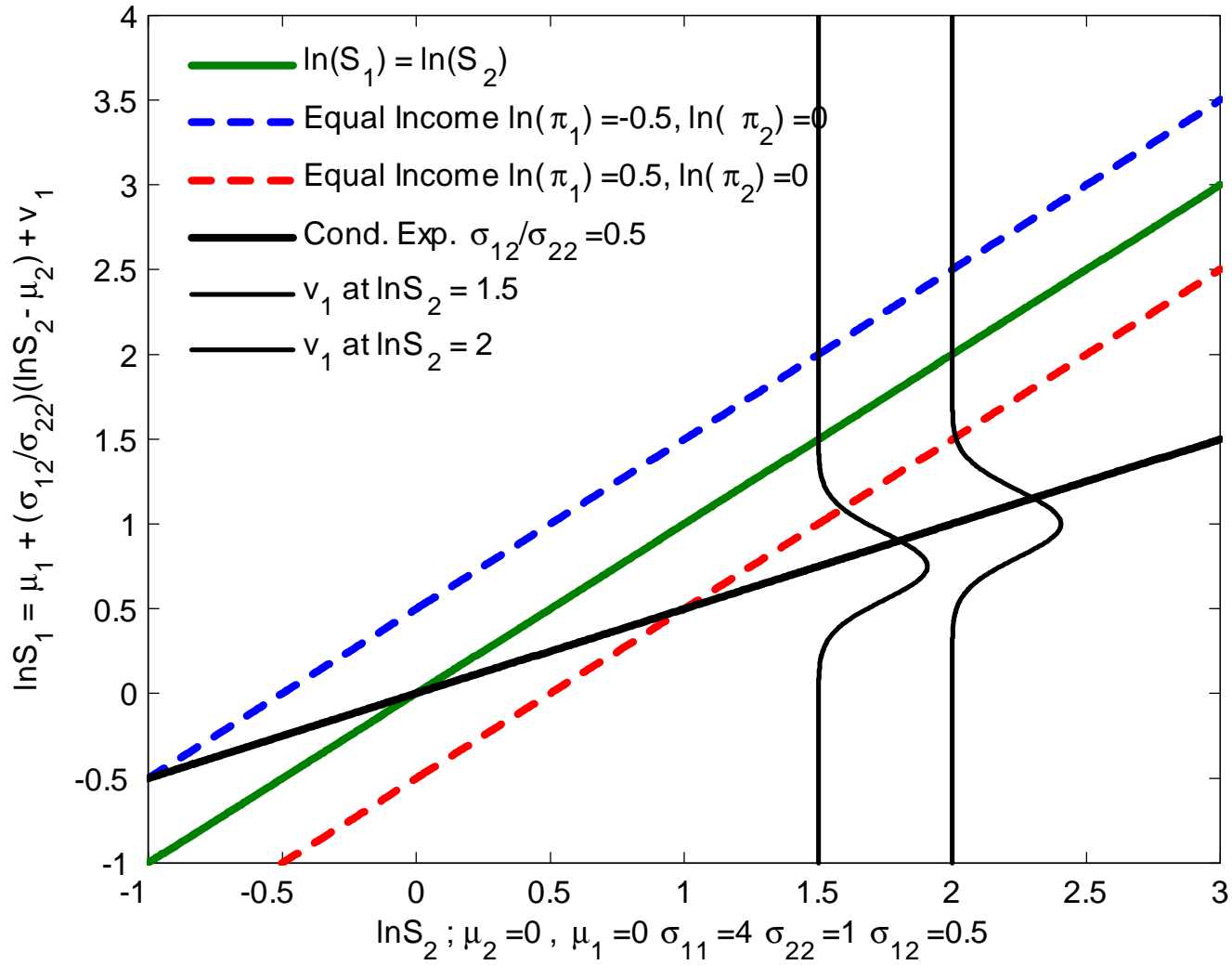X-axis: $\ln S_2$ ; $\mu_2 = 1$ , $\mu_1 = 1$ $\sigma_{11} = 4$ $\sigma_{22} = 1$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\ \ \sigma_{12} \\ \sigma_{12}\ \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix}; \ \ \sigma_{12} = 0.5, \ \ 1.9;$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

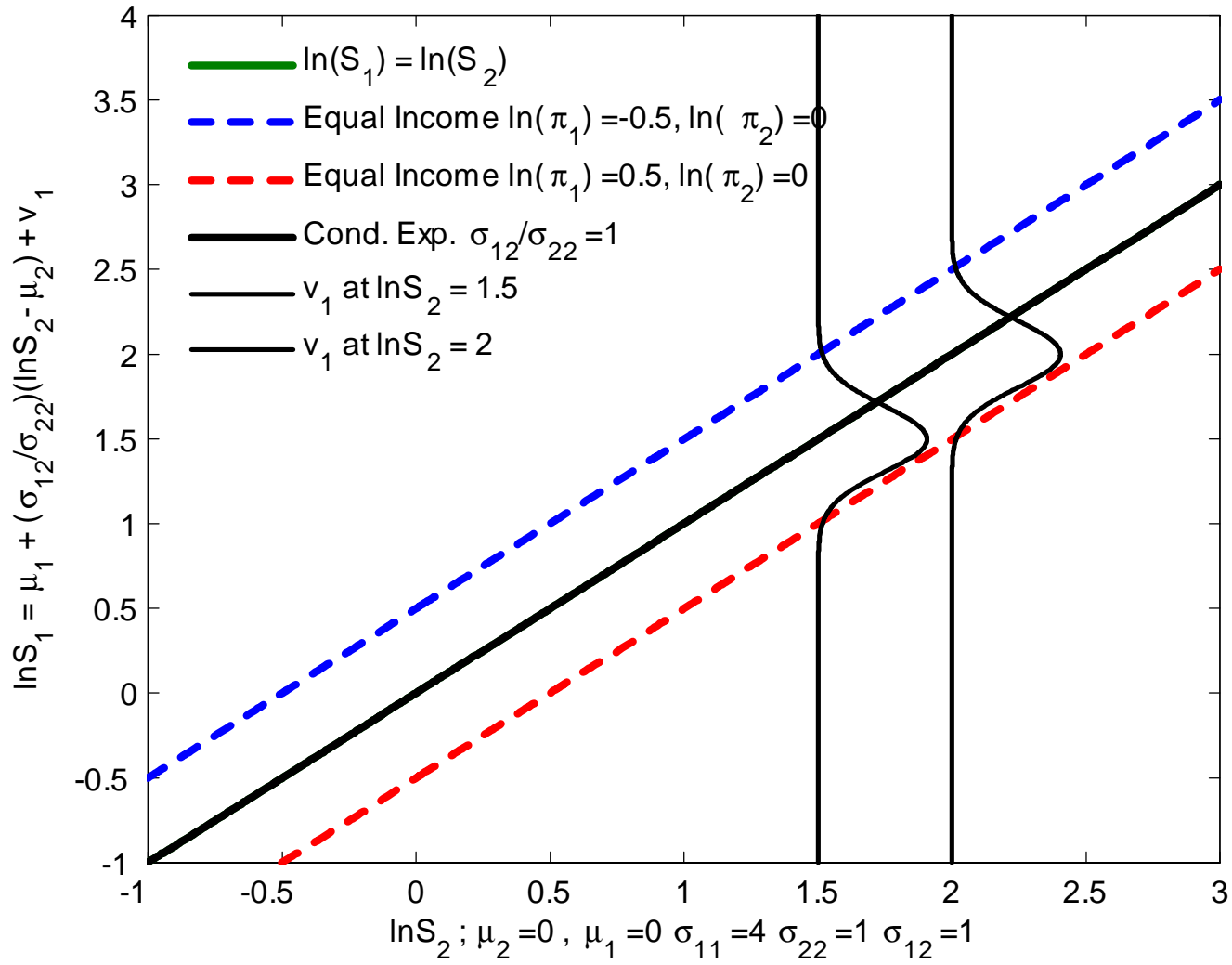X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0.5$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
$$ln(\pi_1) = -0.5 \quad \text{and} \quad ln(\pi_1) = +0.5$$

Parameters:
$$\begin{bmatrix} \sigma_{11} \, \sigma_{12} \\ \sigma_{12} \, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.5 \\ 0.5 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} ;$$
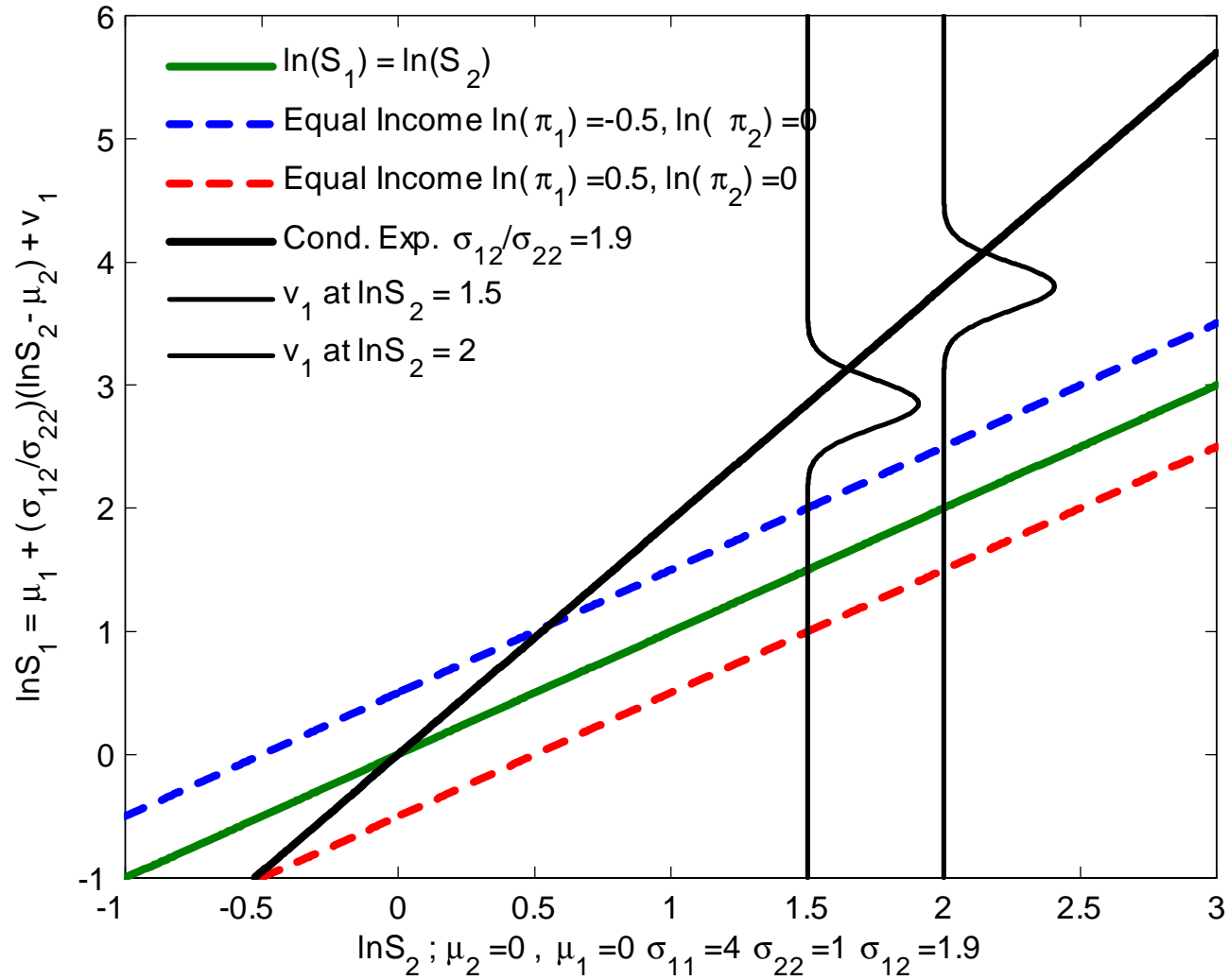
Graph of $\ln S_1 = f(\ln S_2)$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
$$ln(\pi_1) = -0.5 \quad \text{and} \quad ln(\pi_1) = +0.5$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1 \\ 1 \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.9$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

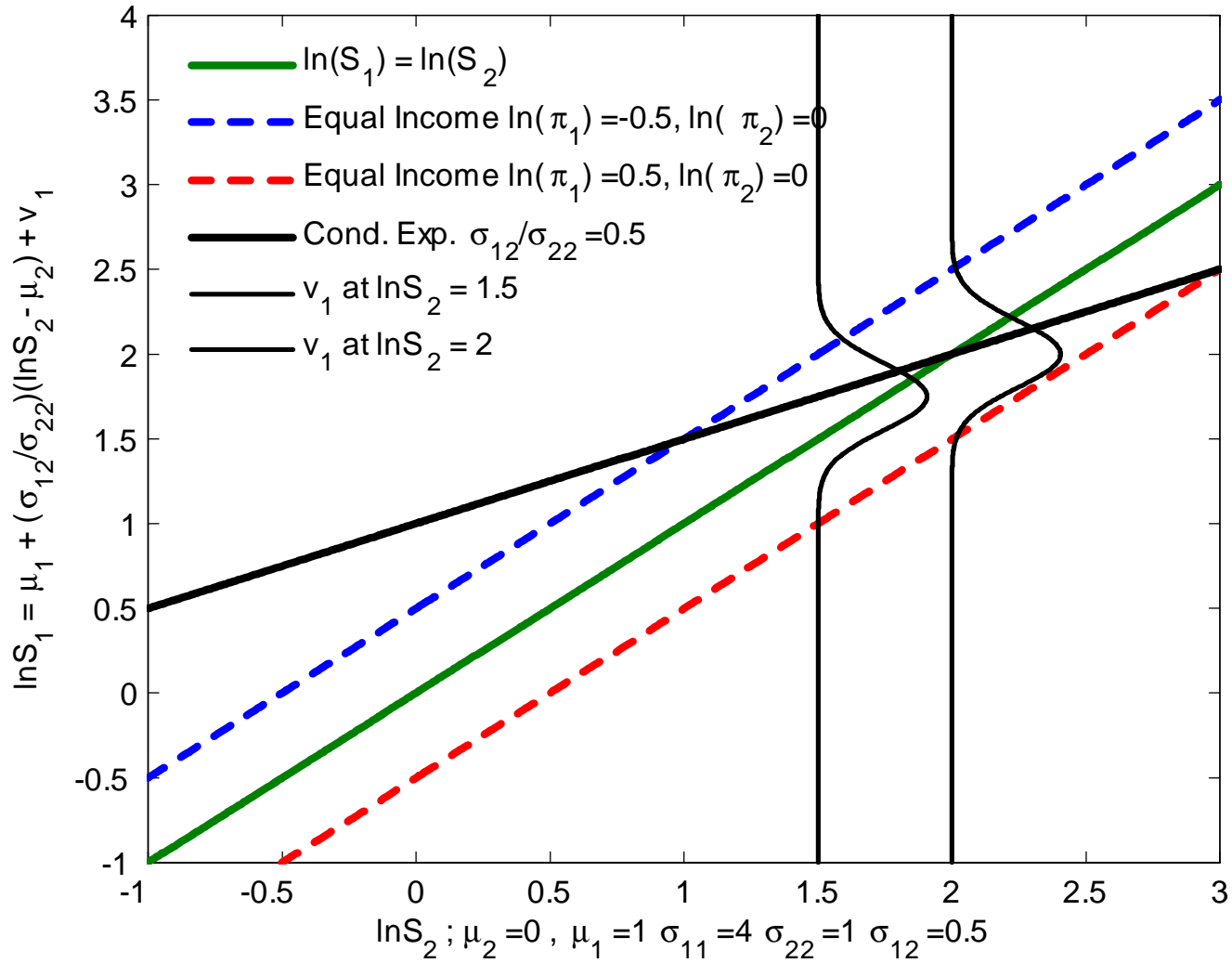X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1.9$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$ln(\pi_1) = -0.5 \quad \text{and} \quad ln(\pi_1) = +0.5$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.9 \\ 1.9 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

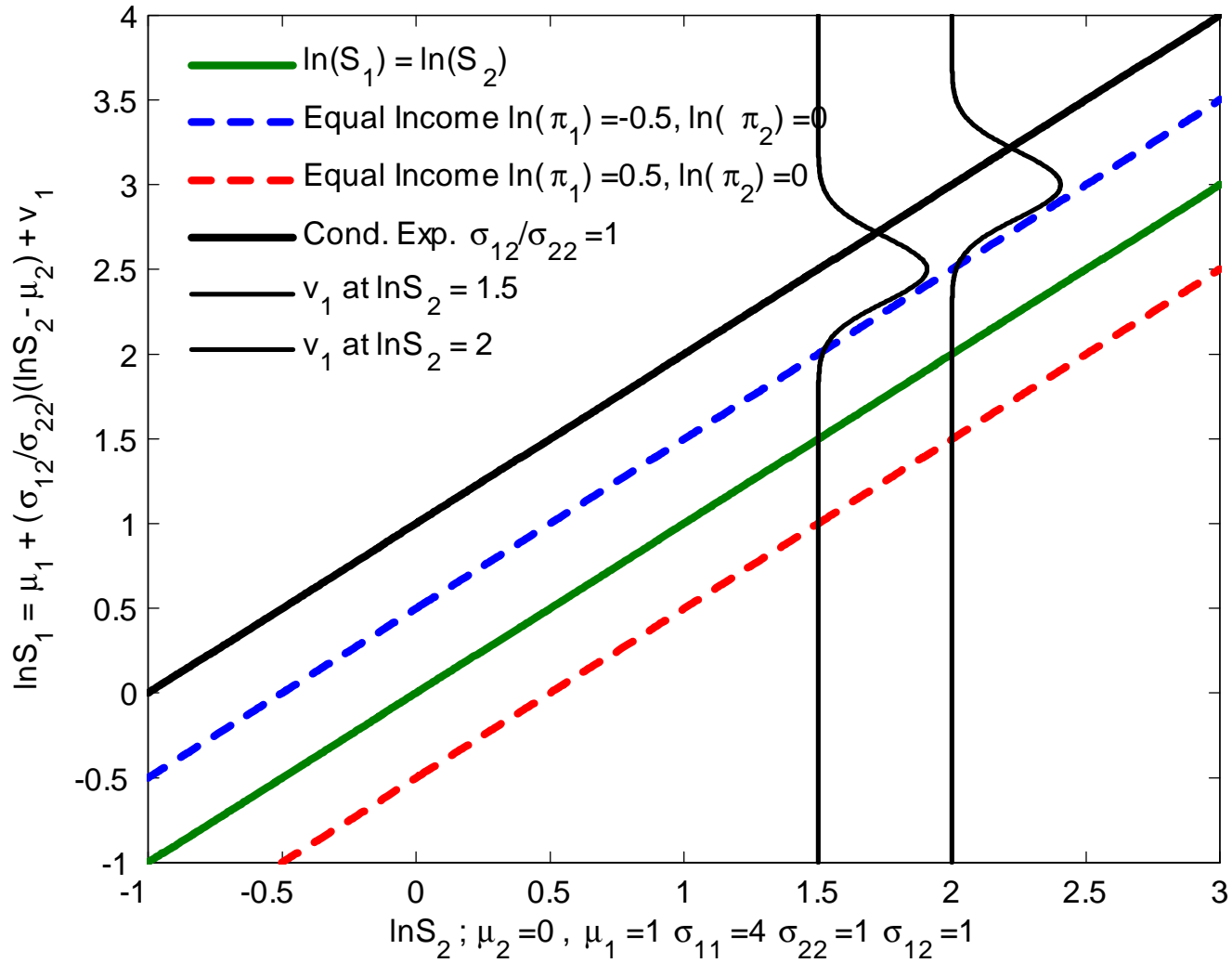X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 1$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0.5$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
$$ln(\pi_1) = -0.5 \quad \text{and} \quad ln(\pi_1) = +0.5$$

Parameters:
$$\begin{bmatrix} \sigma_{11} \, \sigma_{12} \\ \sigma_{12} \, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.5 \\ 0.5 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \end{bmatrix};$$
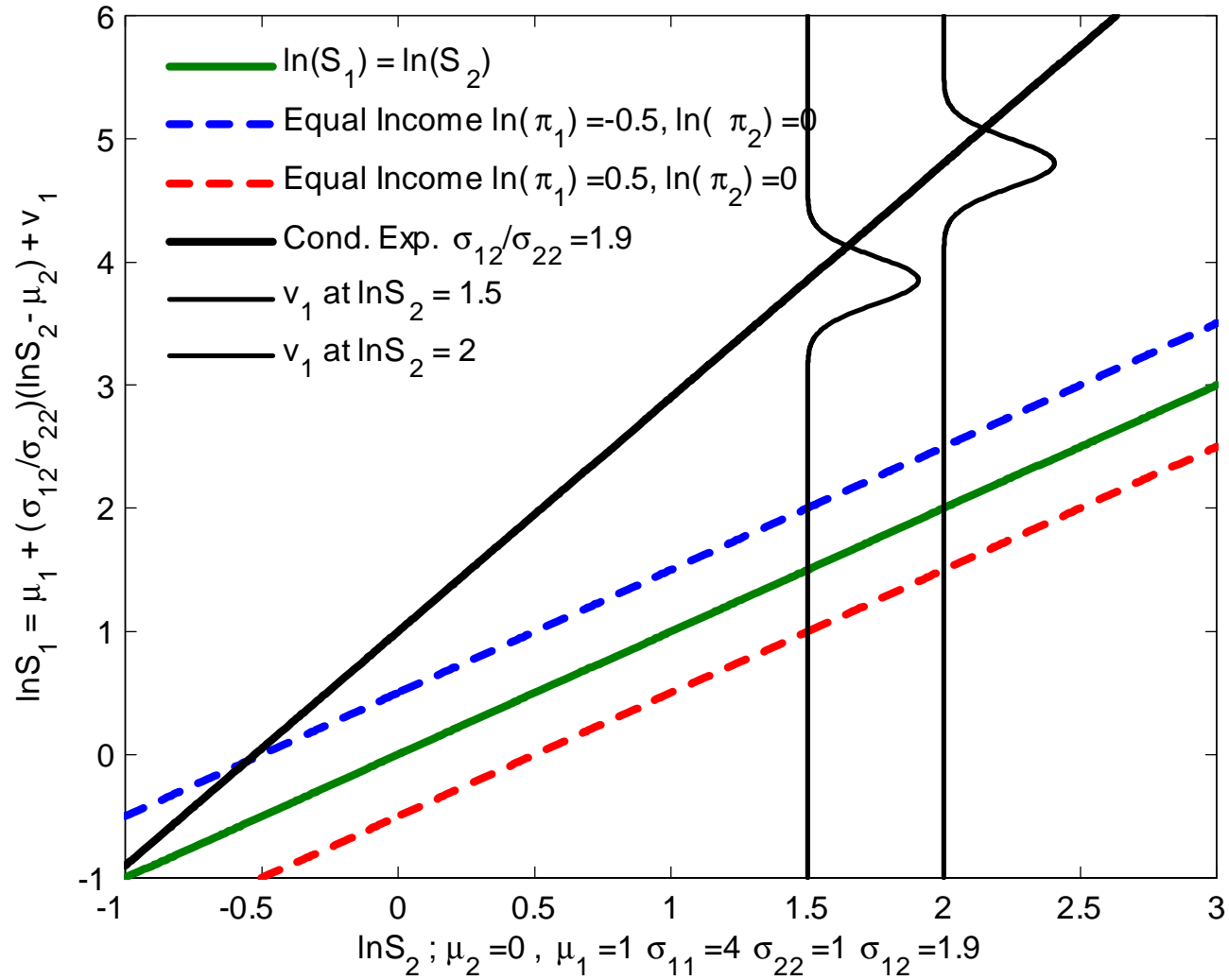
# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$ln(\pi_1) = -0.5 \quad \text{and} \quad ln(\pi_1) = +0.5$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.9$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

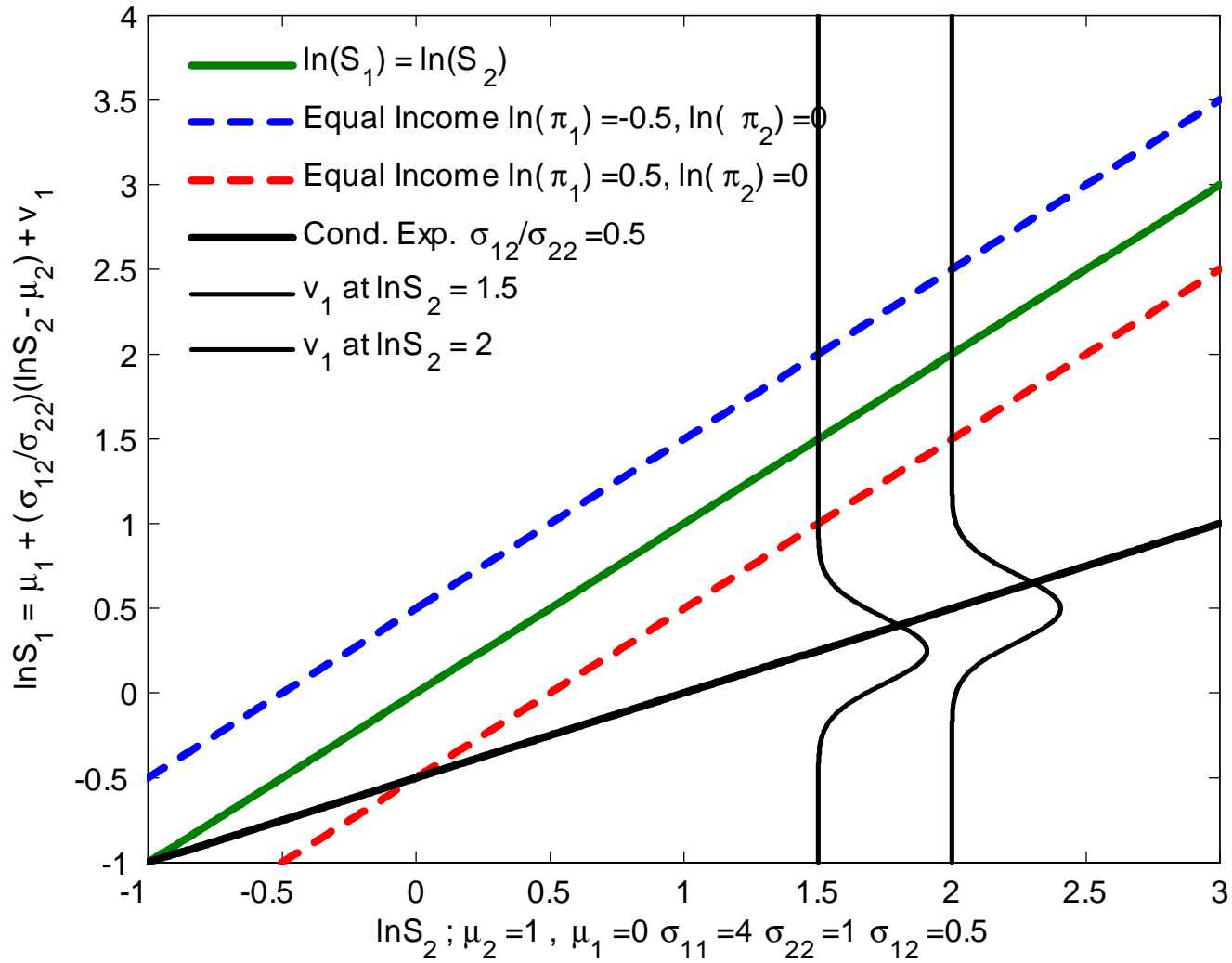X-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 1$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1.9$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} (\ln S_2 - \mu_2) + v_1$$
$$ln(\pi_1) = -0.5 \quad \text{and} \quad ln(\pi_1) = +0.5$$

Parameters:
$$\begin{bmatrix} \sigma_{11}\,\sigma_{12} \\ \sigma_{12}\,\sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\,1.9 \\ 1\,1.9 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

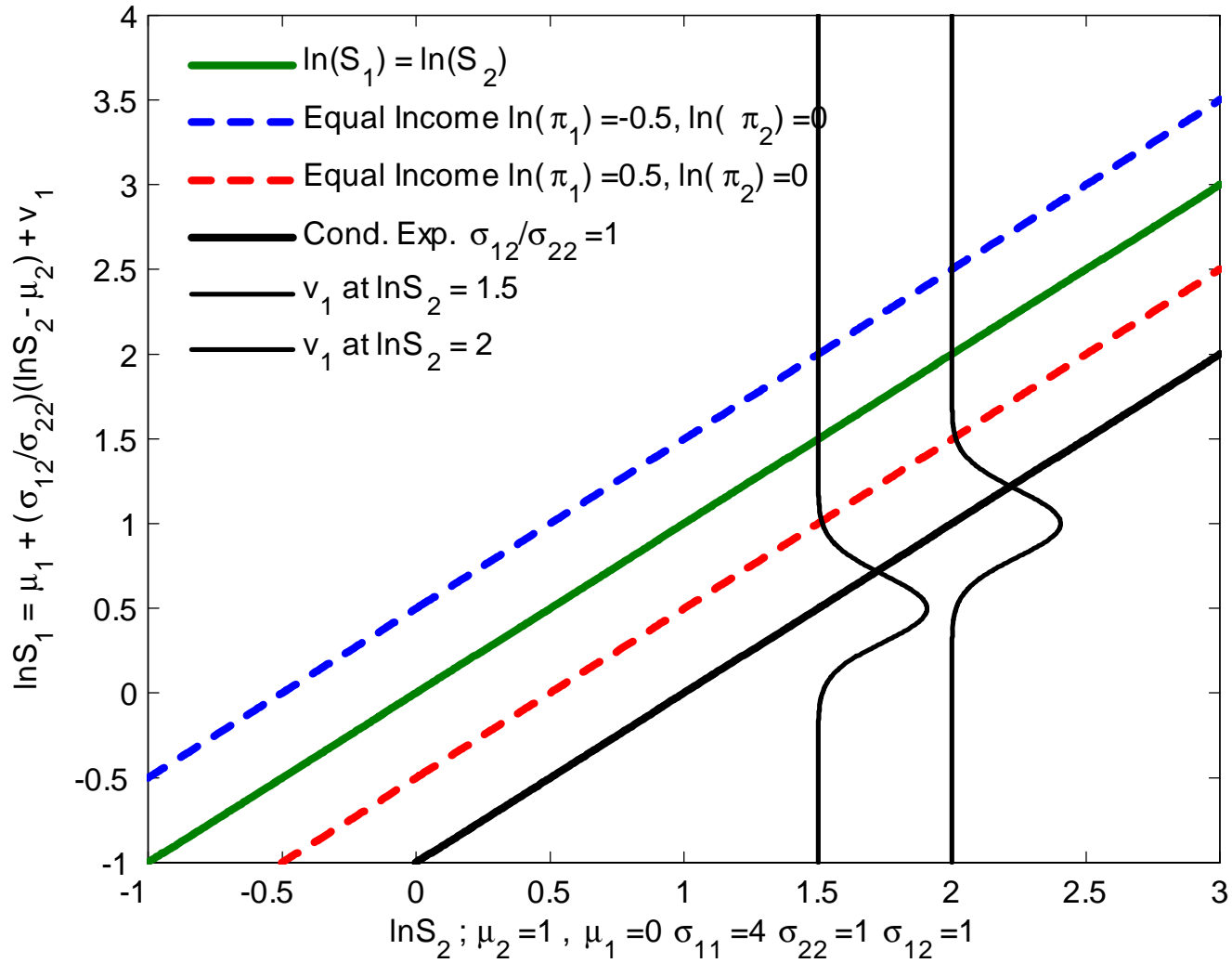x-axis: $\ln S_2$ ; $\mu_2 = 1$, $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0.5$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$ln(\pi_1) = -0.5 \quad \text{and} \quad ln(\pi_1) = +0.5$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\, \sigma_{12} \\ \sigma_{12}\, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.5 \\ 0.5 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$
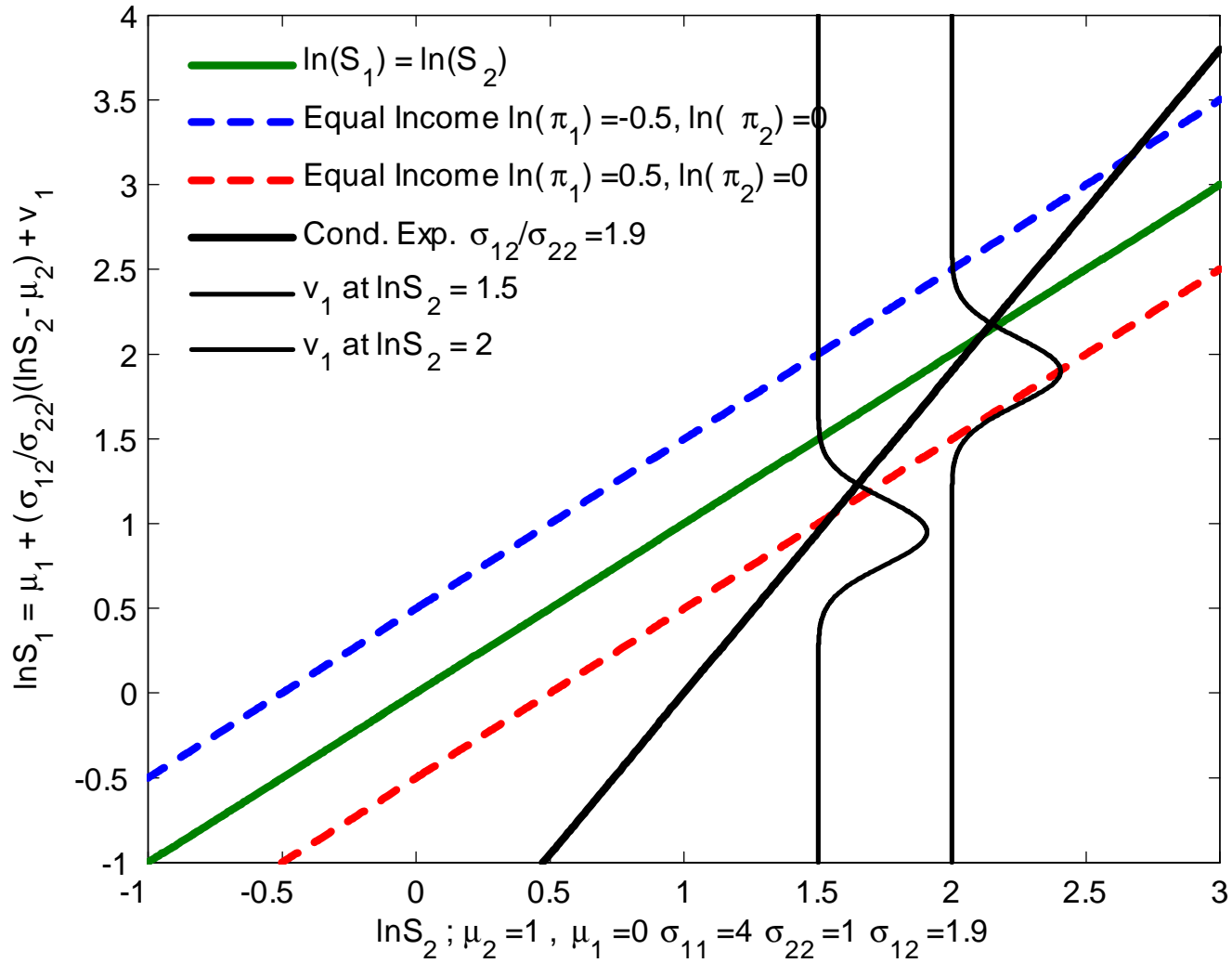


$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$ln(\pi_1) = -0.5 \quad \text{and} \quad ln(\pi_1) = +0.5$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \, \sigma_{12} \\ \sigma_{12} \, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \, 1 \\ 1 \, 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.9$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

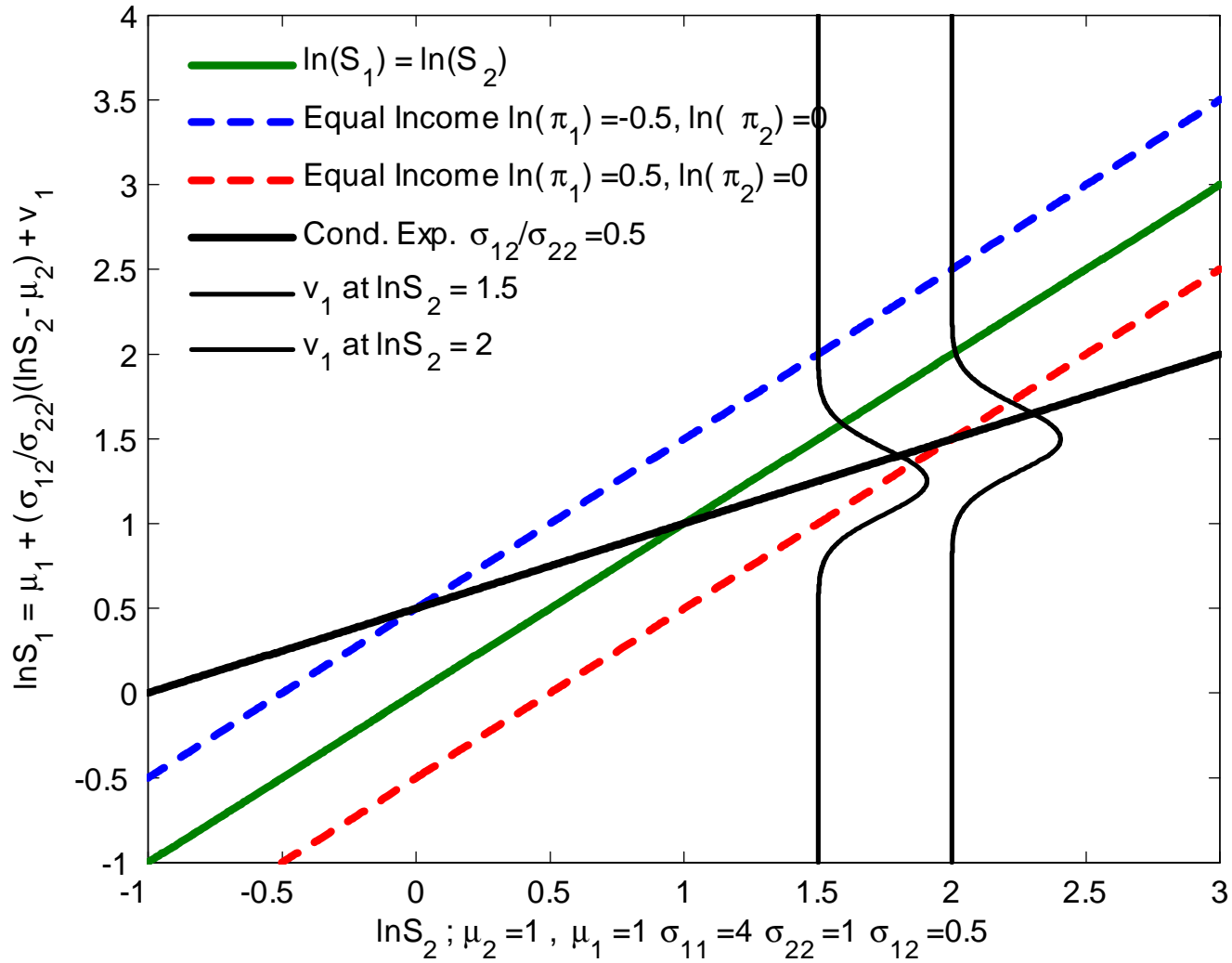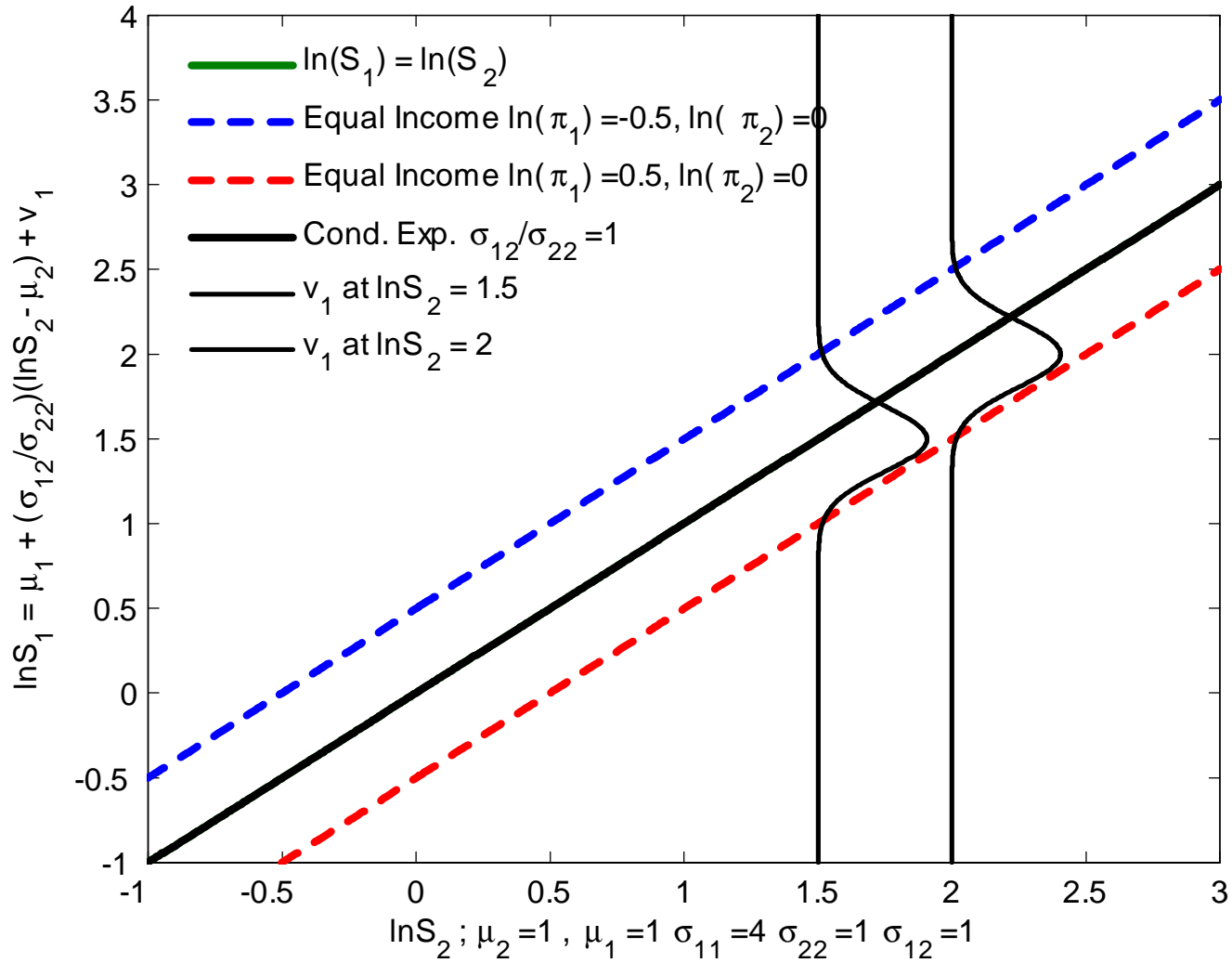X-axis: $\ln S_2$ ; $\mu_2 = 1$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1.9$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$ln(\pi_1) = -0.5 \quad \text{and} \quad ln(\pi_1) = +0.5$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\,\sigma_{12} \\ \sigma_{12}\,\sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\,1.9 \\ 1\,1.9 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 1 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

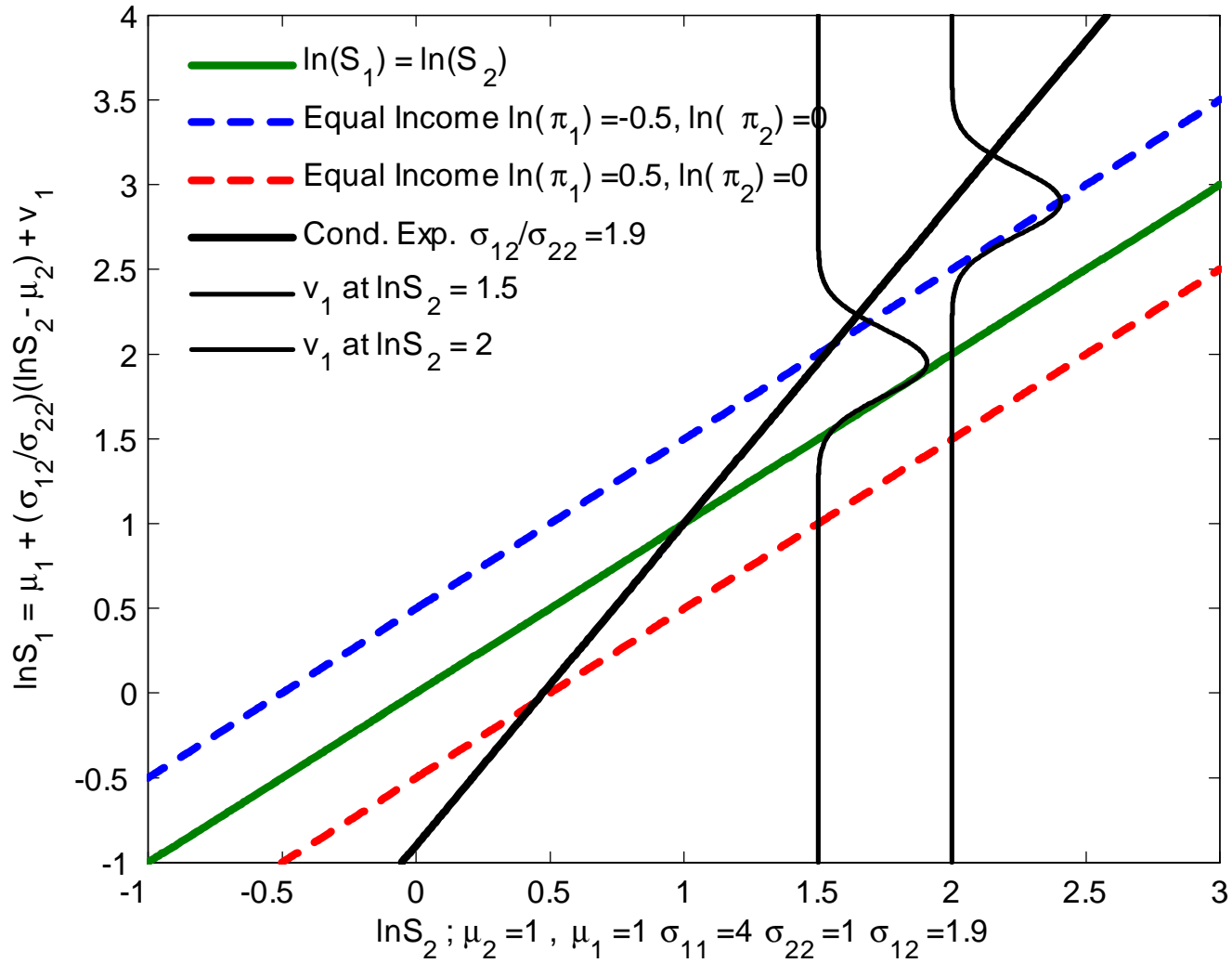x-axis: $\ln S_2$ ; $\mu_2 = 1$ , $\mu_1 = 1$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0.5$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
$$ln(\pi_1) = -0.5 \quad \text{and} \quad ln(\pi_1) = +0.5$$

Parameters:
$$\begin{bmatrix} \sigma_{11}\,\sigma_{12} \\ \sigma_{12}\,\sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.5 \\ 0.5 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix};$$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 1$ , $\mu_1 = 1$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1$
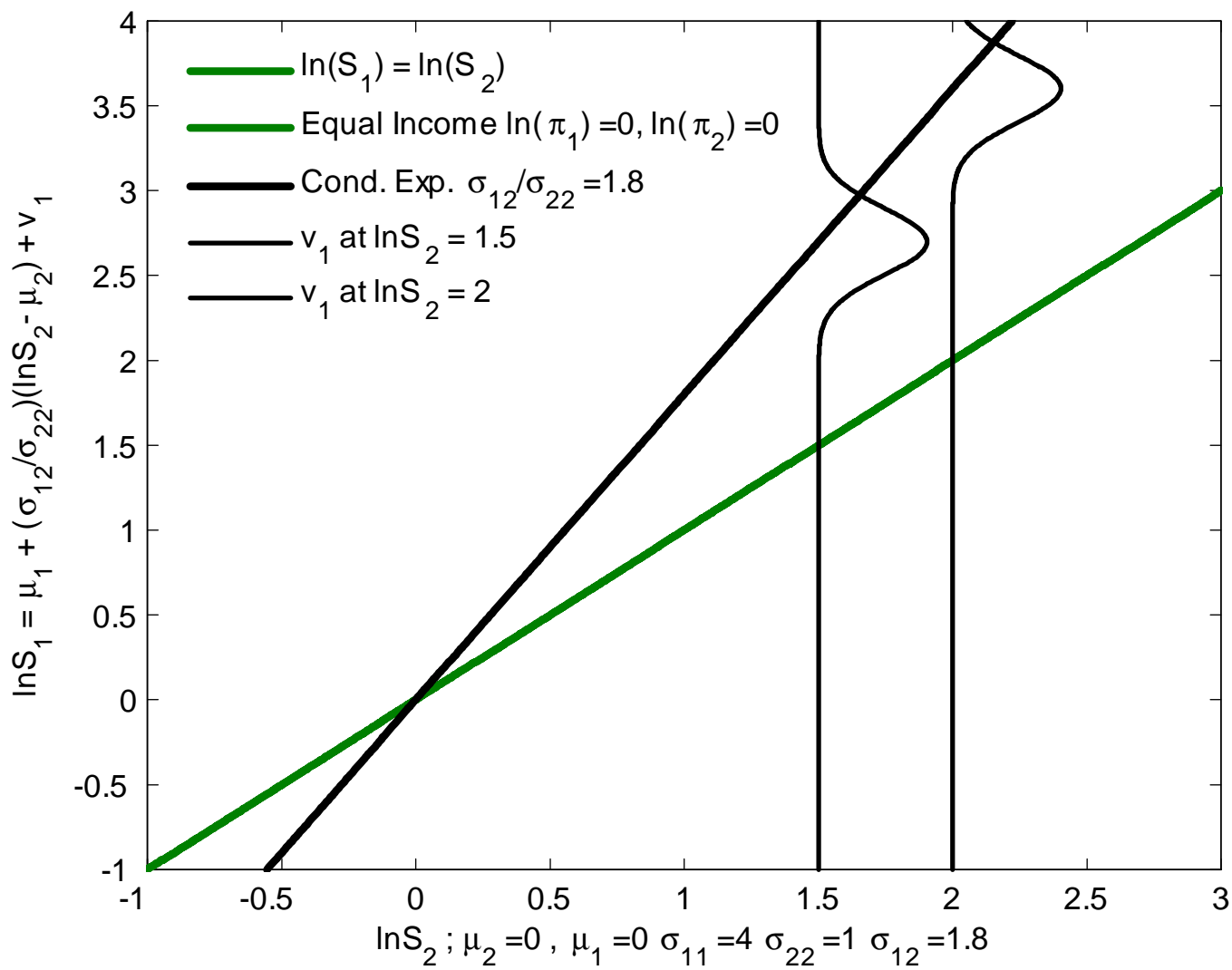
$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$ln(\pi_1) = -0.5 \quad \text{and} \quad ln(\pi_1) = +0.5$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \, \sigma_{12} \\ \sigma_{12} \, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\,1 \\ 1\,1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.9$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 1$ , $\mu_1 = 1$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1.9$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
$$ln(\pi_1) = -0.5 \quad \text{and} \quad ln(\pi_1) = +0.5$$

Parameters:
$$\begin{bmatrix} \sigma_{11}\,\sigma_{12} \\ \sigma_{12}\,\sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\,1.9 \\ 1\,1.9 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 1 \end{bmatrix};$$
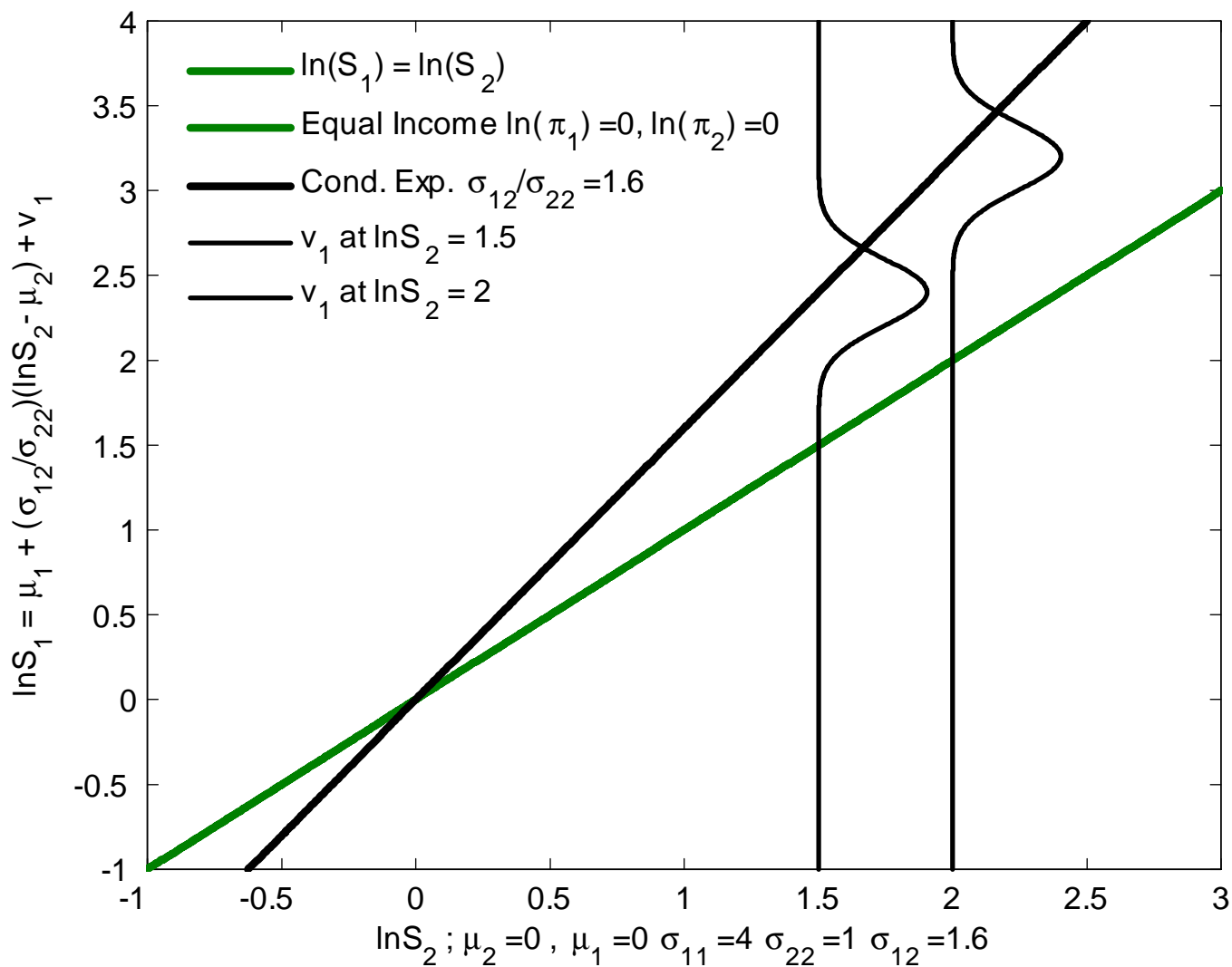
# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.8$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1.8$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} (\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1.8 \\ 1.8 \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$
$$\mu_1 = \mu_2 = 0.$$
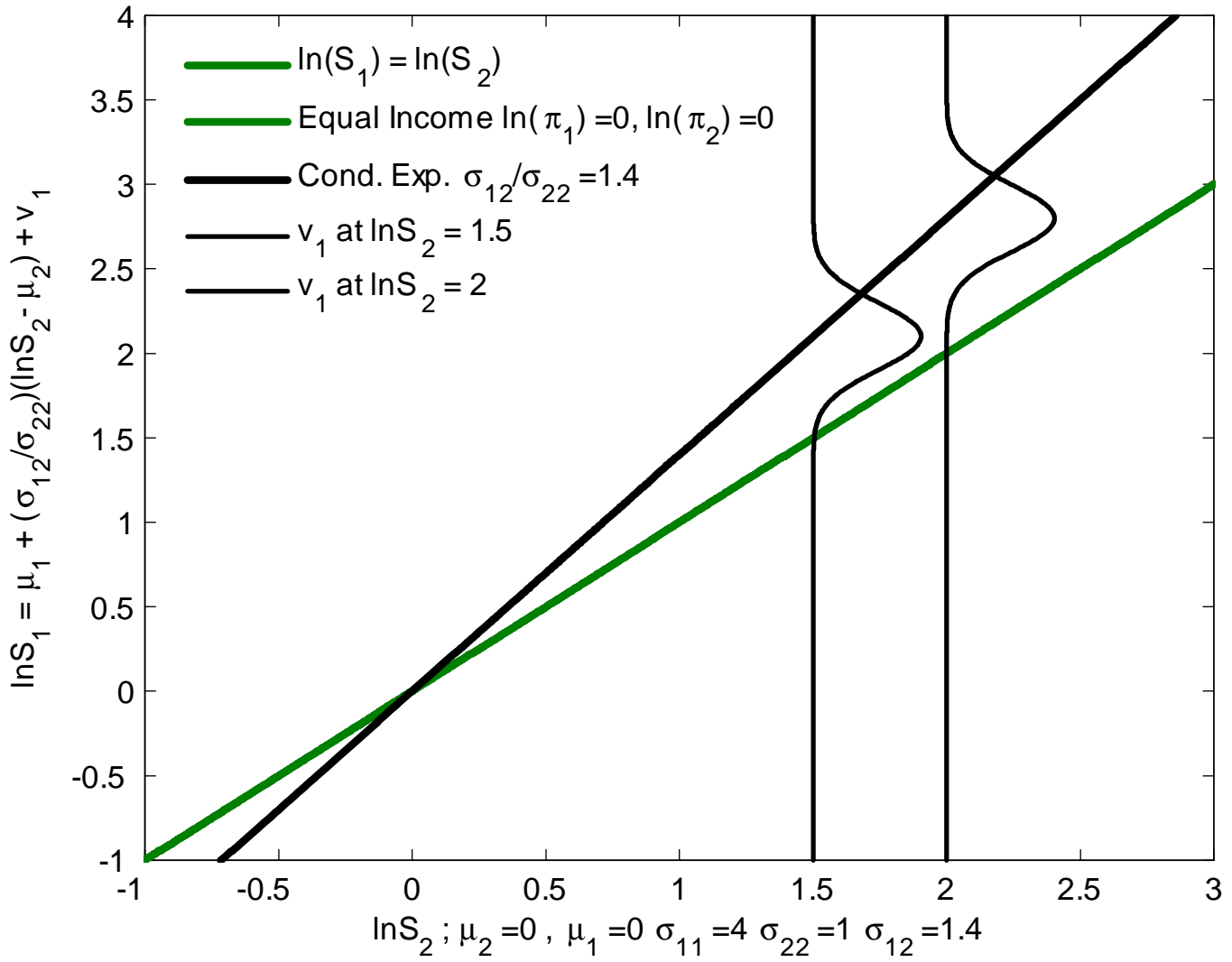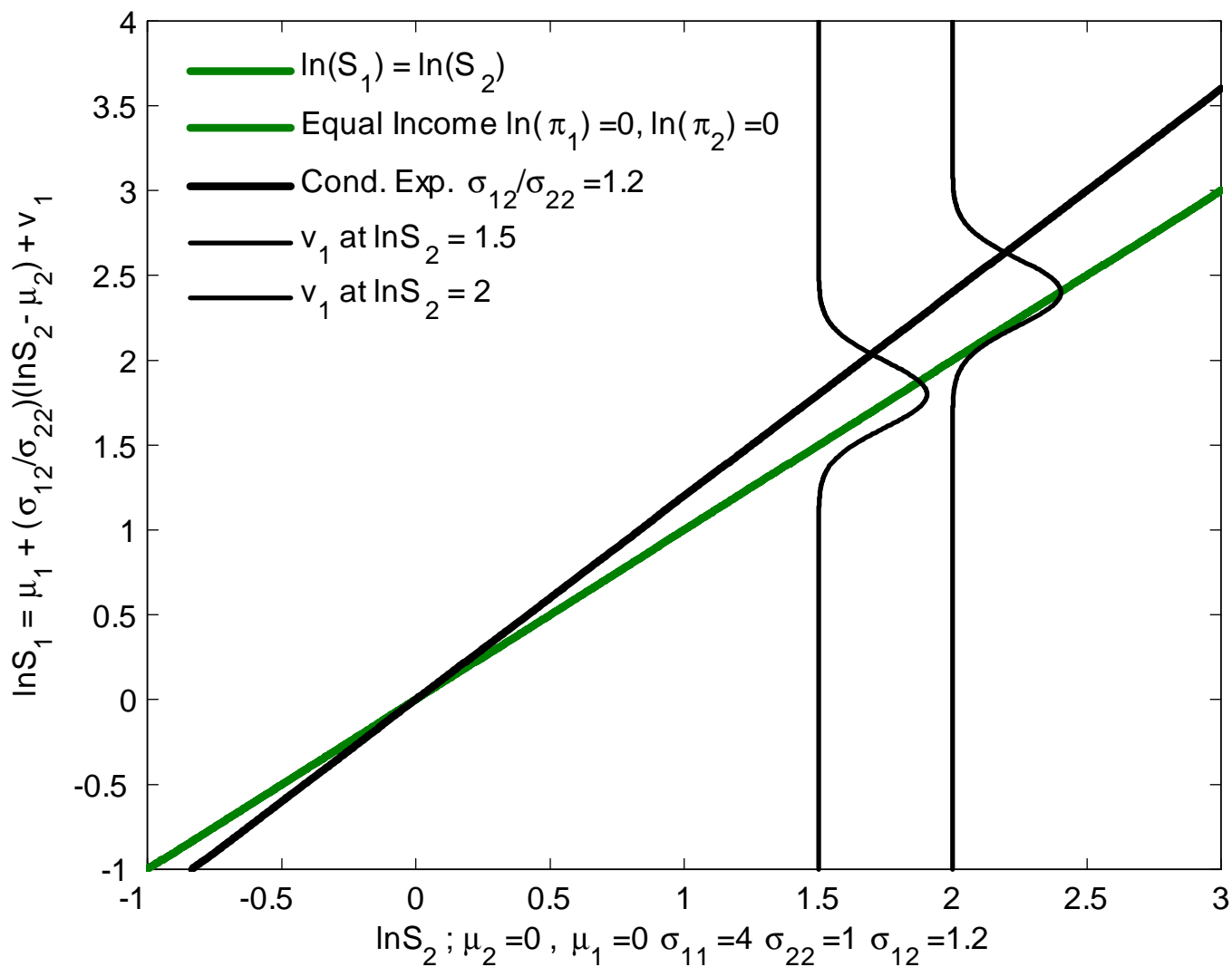
Graph of $\ln S_1 = f(\ln S_2)$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \, \sigma_{12} \\ \sigma_{12} \, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.6 \\ 1.6 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$
$$\mu_1 = \mu_2 = 0.$$

# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\,\sigma_{12} \\ \sigma_{12}\,\sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.4 \\ 1.4 & 1 \end{bmatrix}, \begin{bmatrix} \ln\pi_1 \\ \ln\pi_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
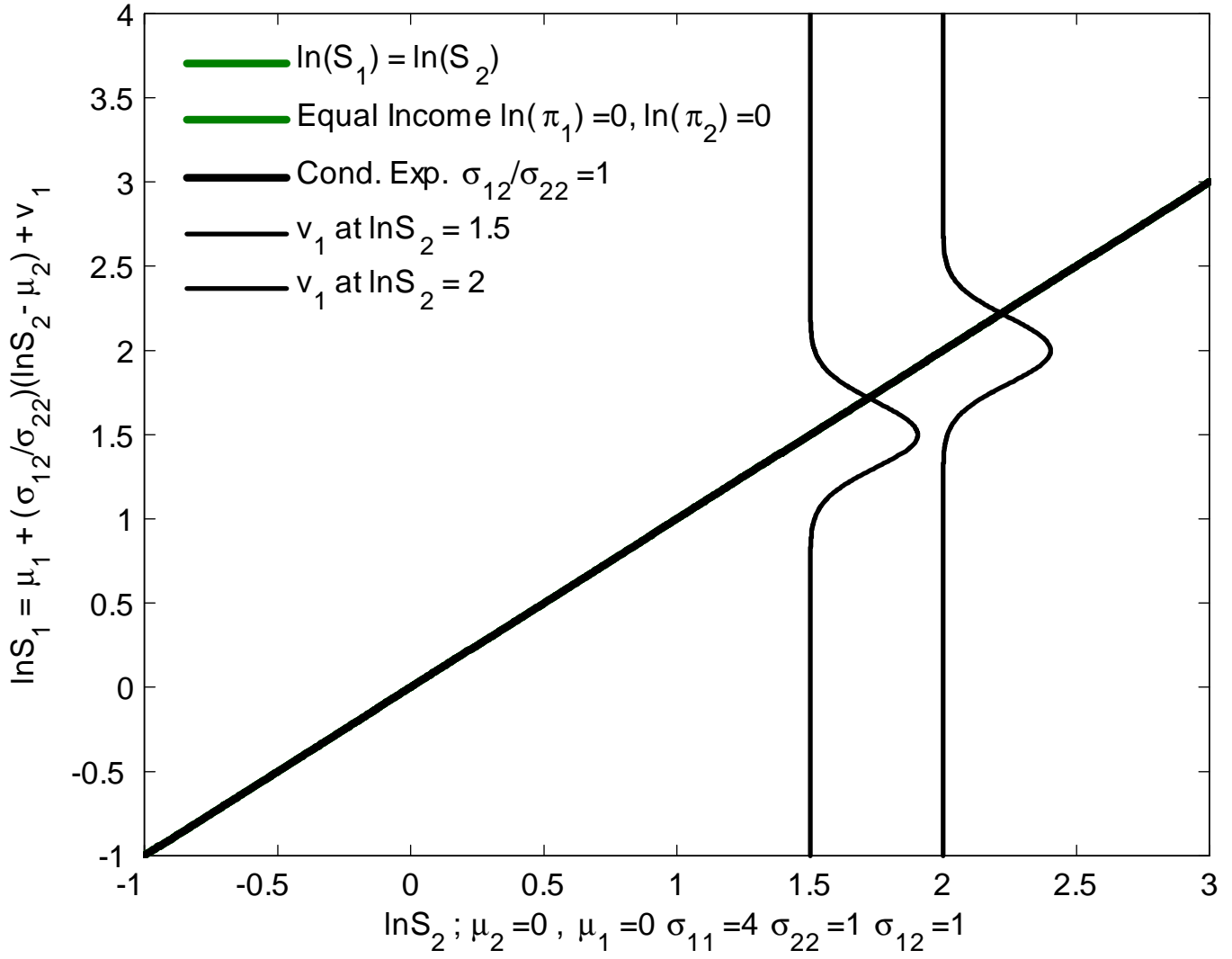
# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} \left( \ln S_2 - \mu_2 \right) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \, \sigma_{12} \\ \sigma_{12} \, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.2 \\ 1.2 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
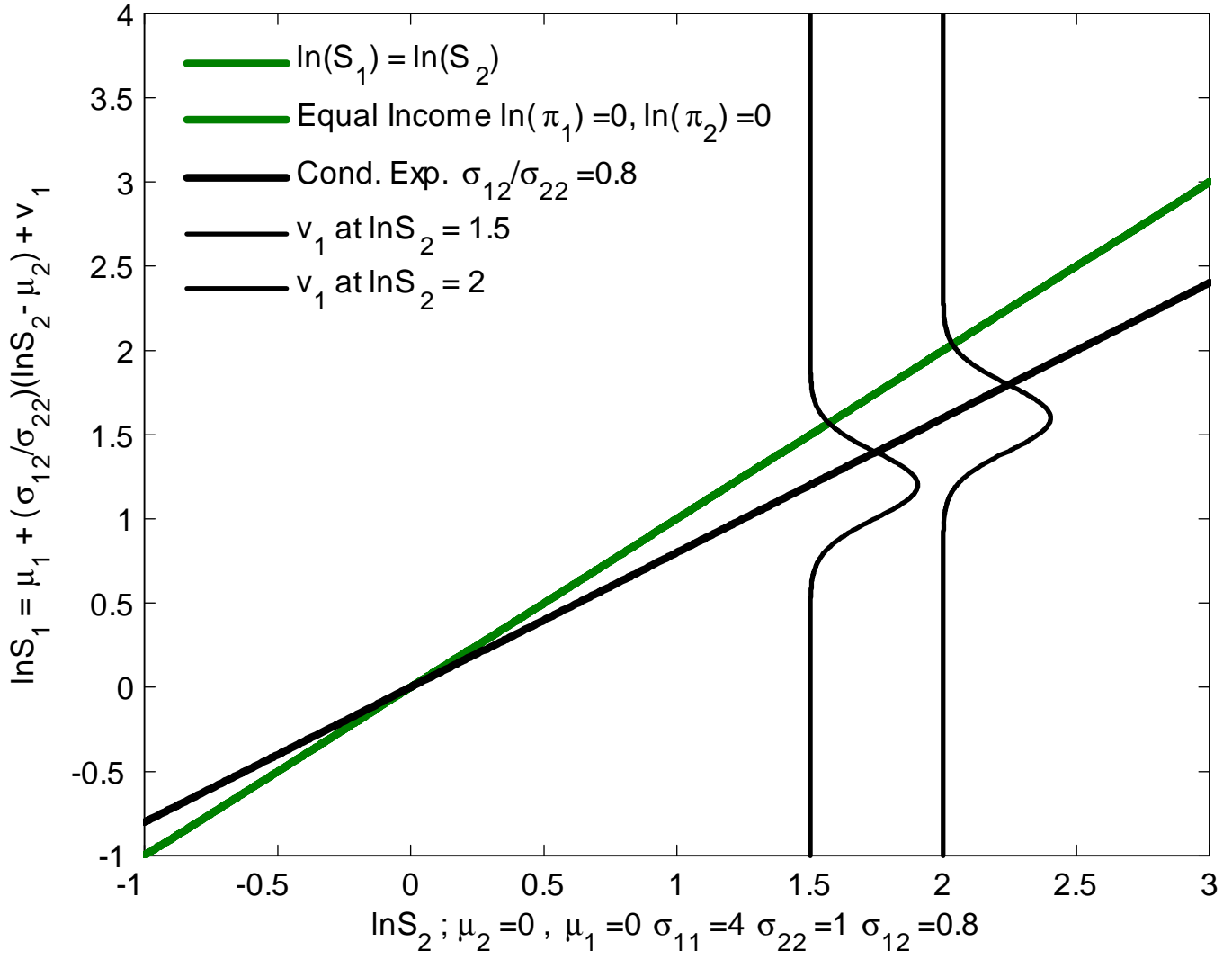
# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\, \sigma_{12} \\ \sigma_{12}\, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.0 \\ 1.0 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
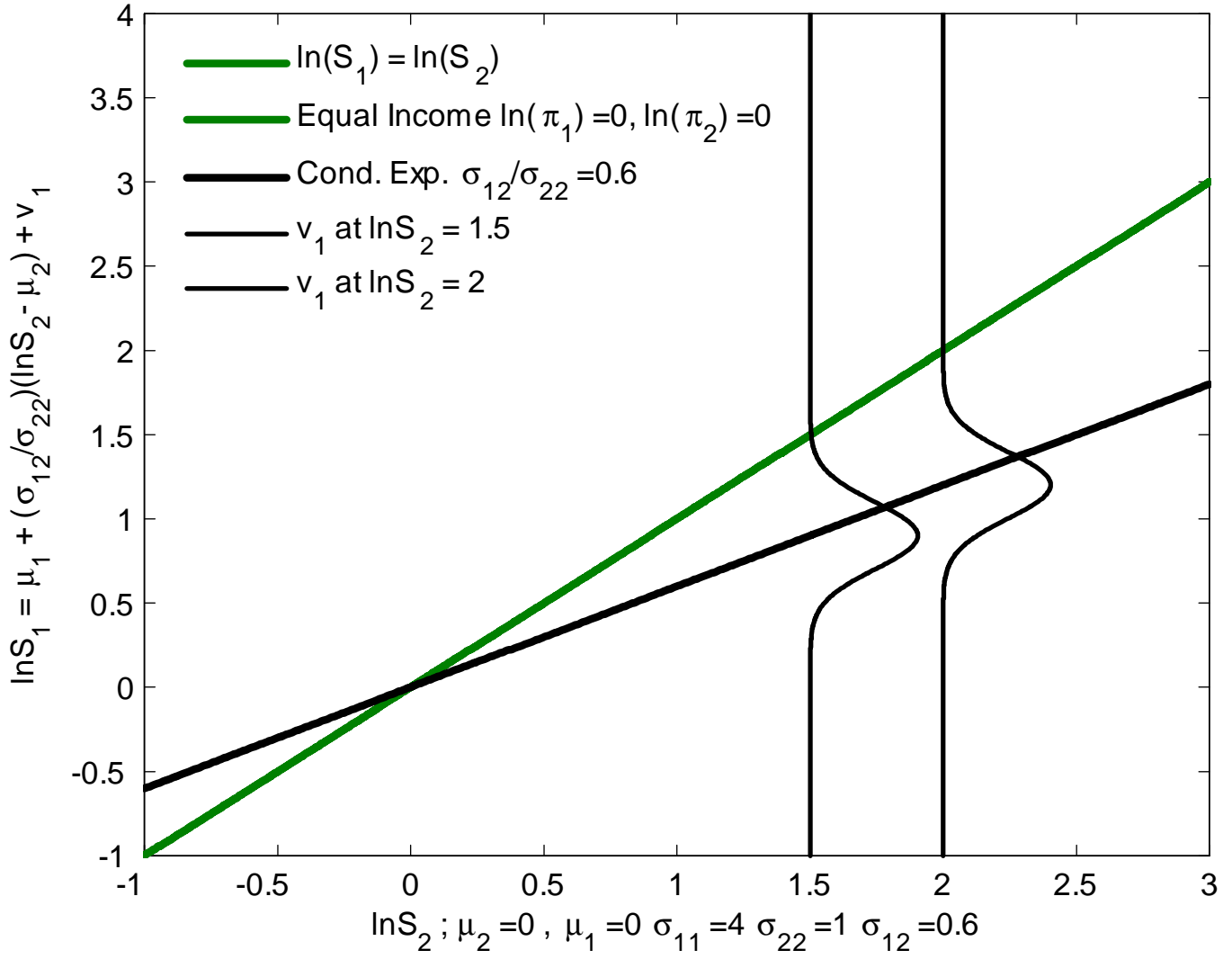
# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.8$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$  $\sigma_{11} = 4$  $\sigma_{22} = 1$  $\sigma_{12} = 0.8$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \, \sigma_{12} \\ \sigma_{12} \, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \; 0.8 \\ 0.8 \; 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

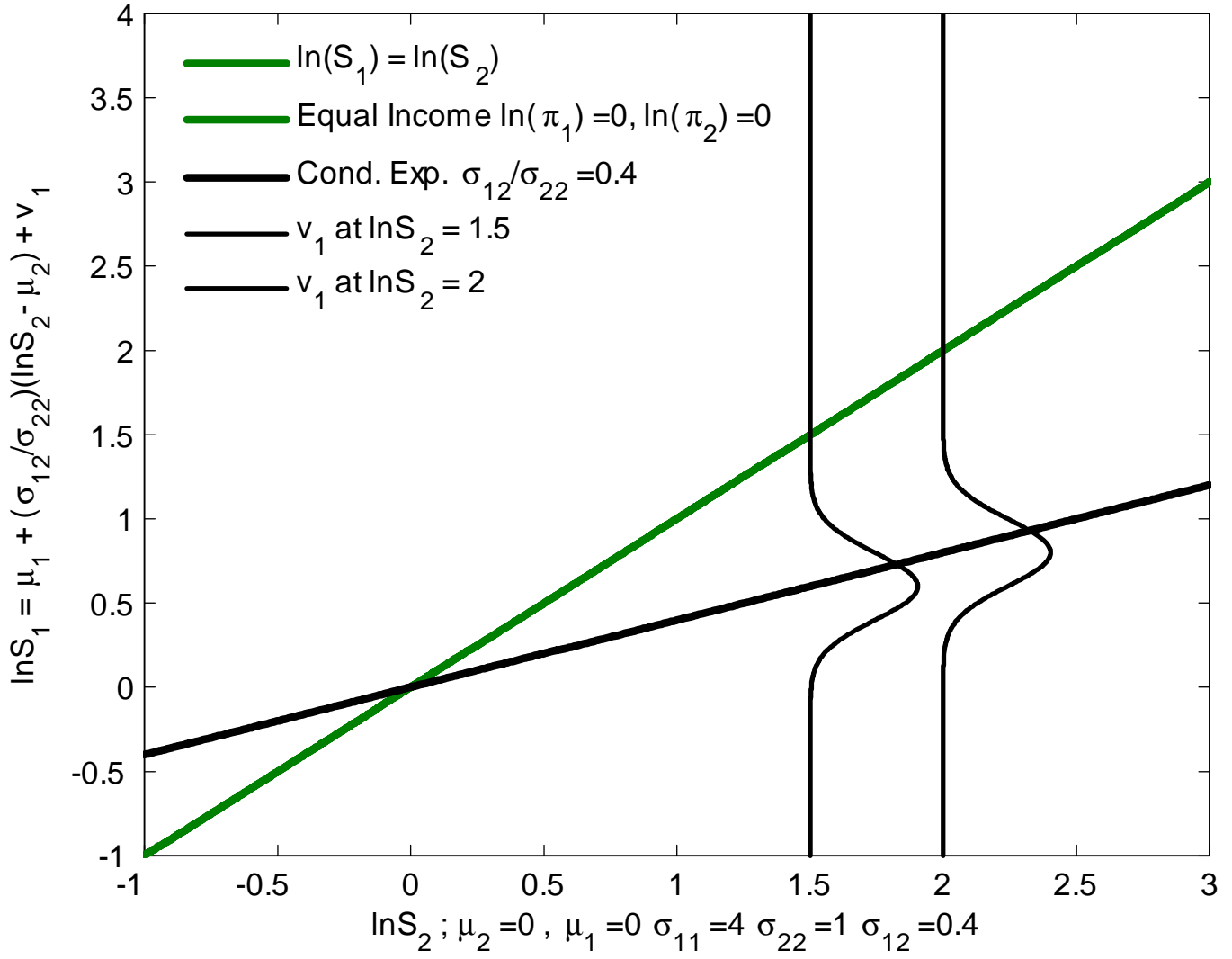$$\mu_1 = \mu_2 = 0.$$

## Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} (\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\,\sigma_{12} \\ \sigma_{12}\,\sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.6 \\ 0.6 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
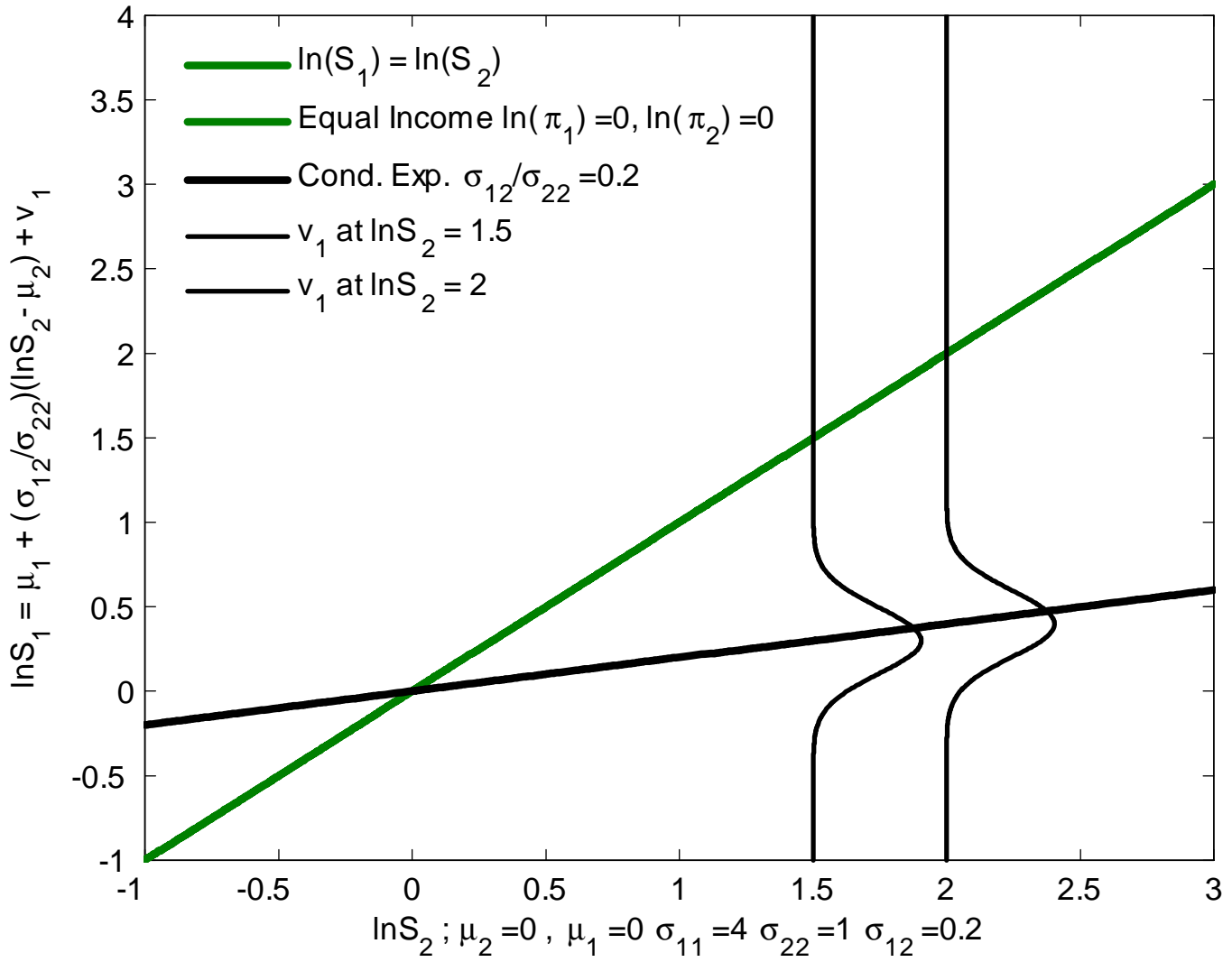
Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.4$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$; $\mu_2 = 0$, $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0.4$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\,\sigma_{12} \\ \sigma_{12}\,\sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.4 \\ 0.4 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$

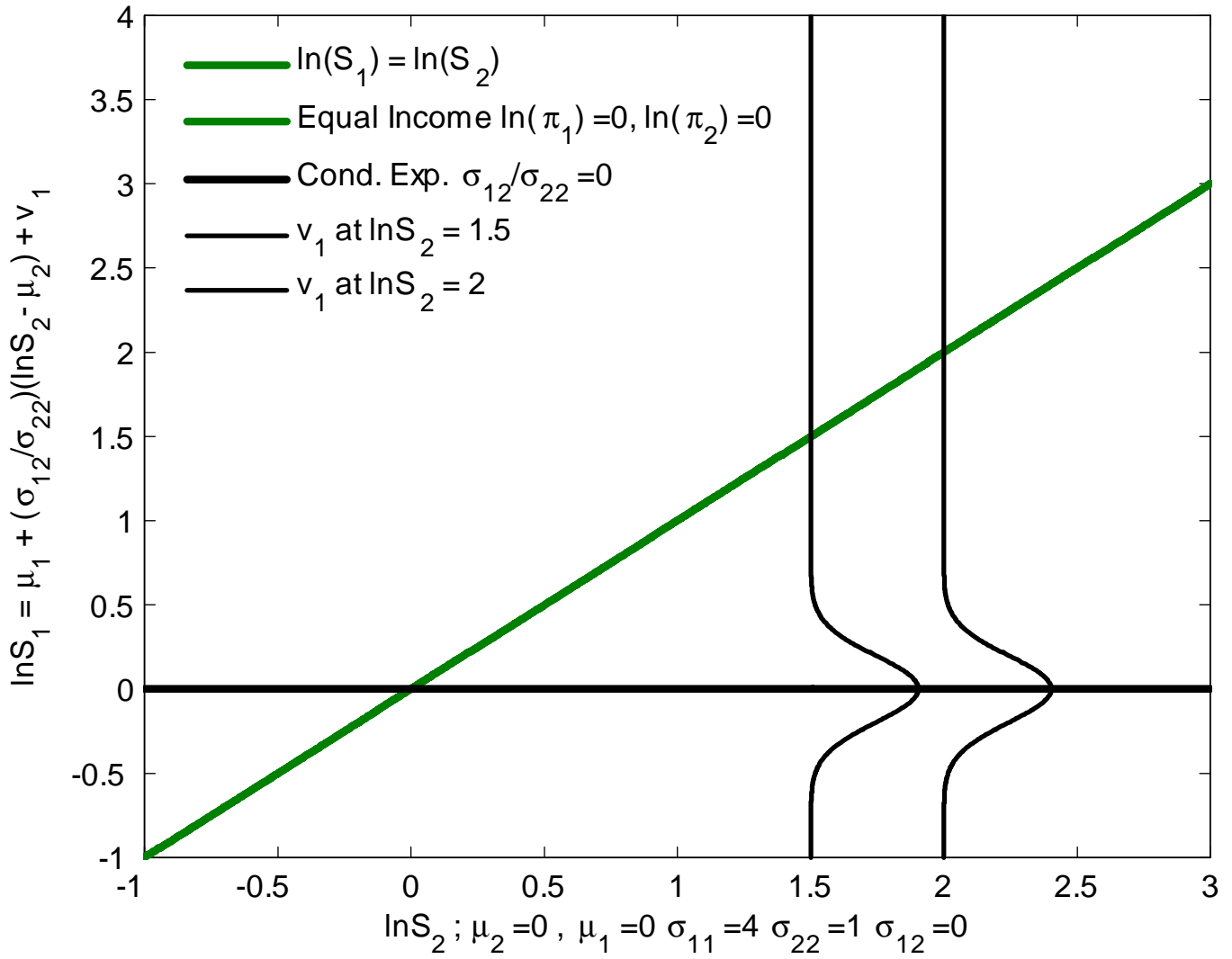# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} (\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 0.2 \\ 0.2 \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
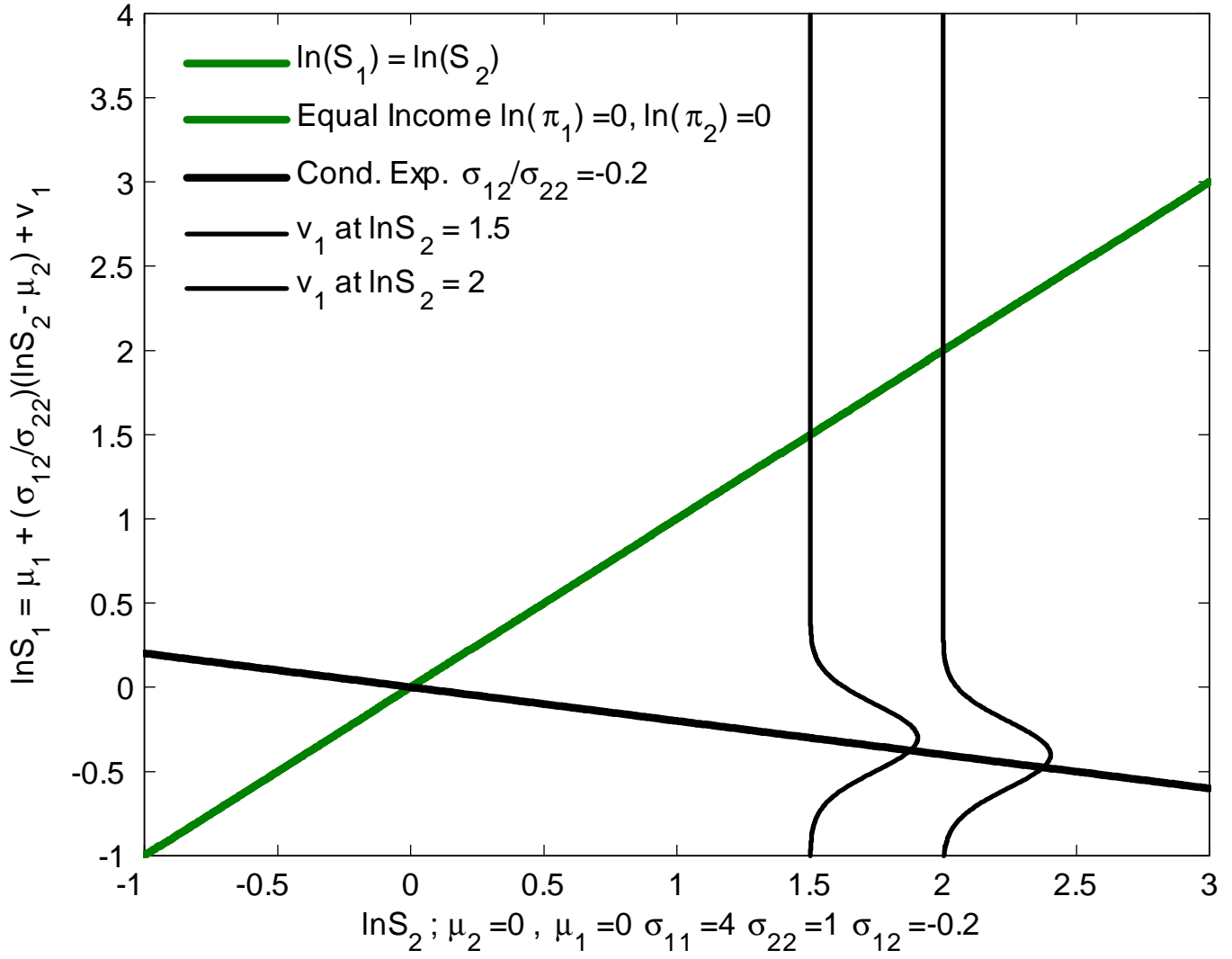
# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 0 \\ 0 \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
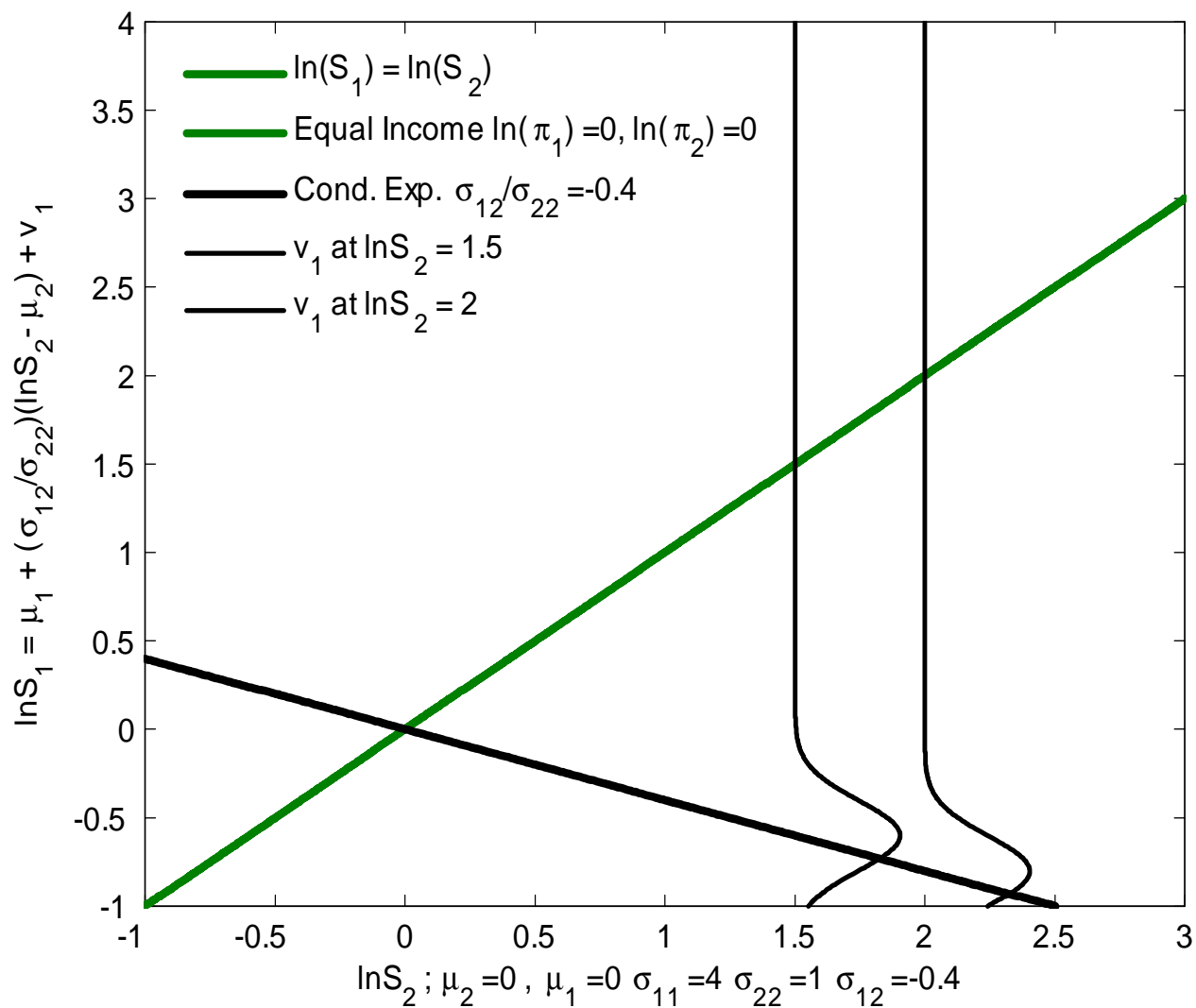
# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \; \sigma_{12} \\ \sigma_{12} \; \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & -0.2 \\ -0.2 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = -0.4$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = -0.4$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\, \sigma_{12} \\ \sigma_{12}\, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & -0.4 \\ -0.4 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
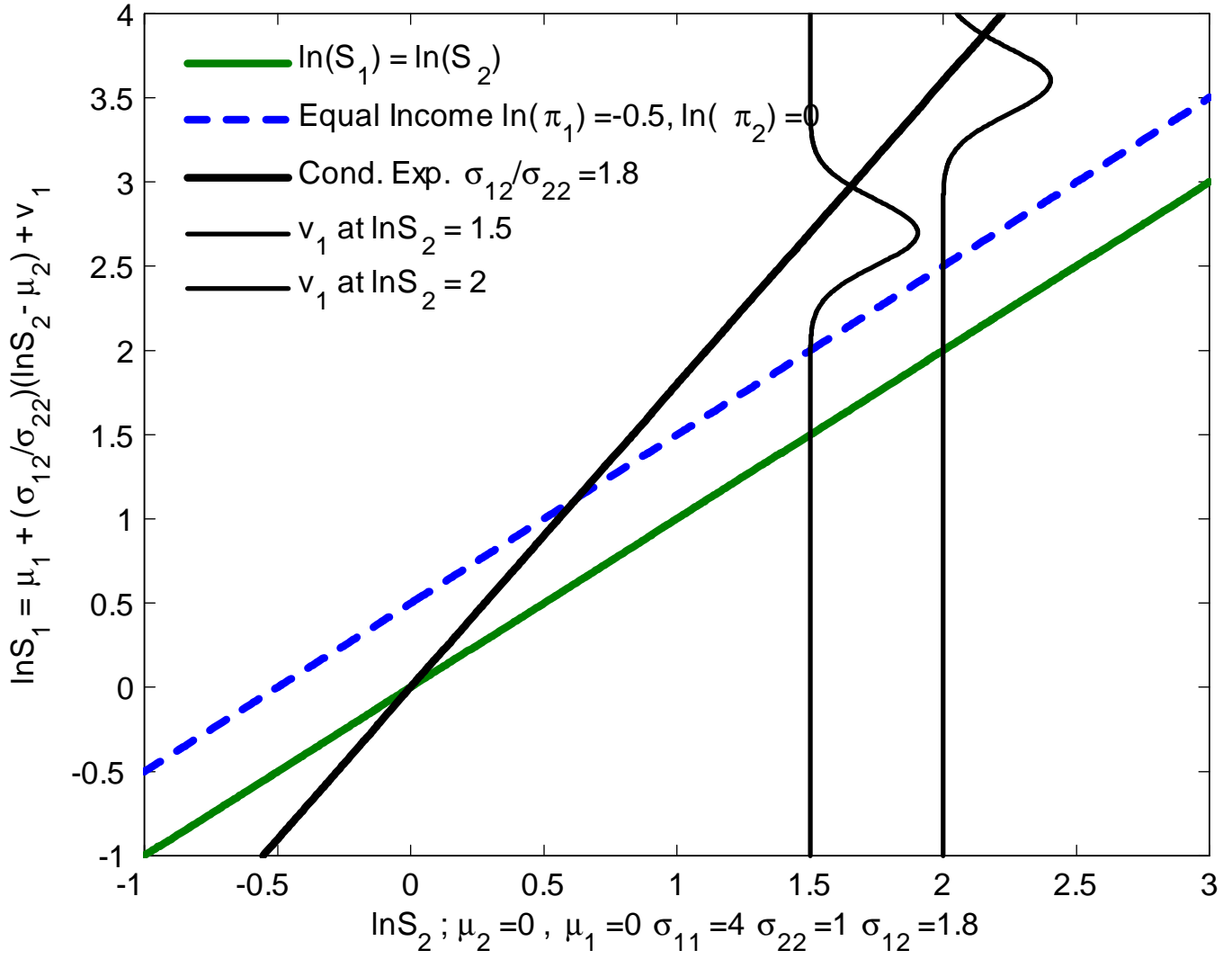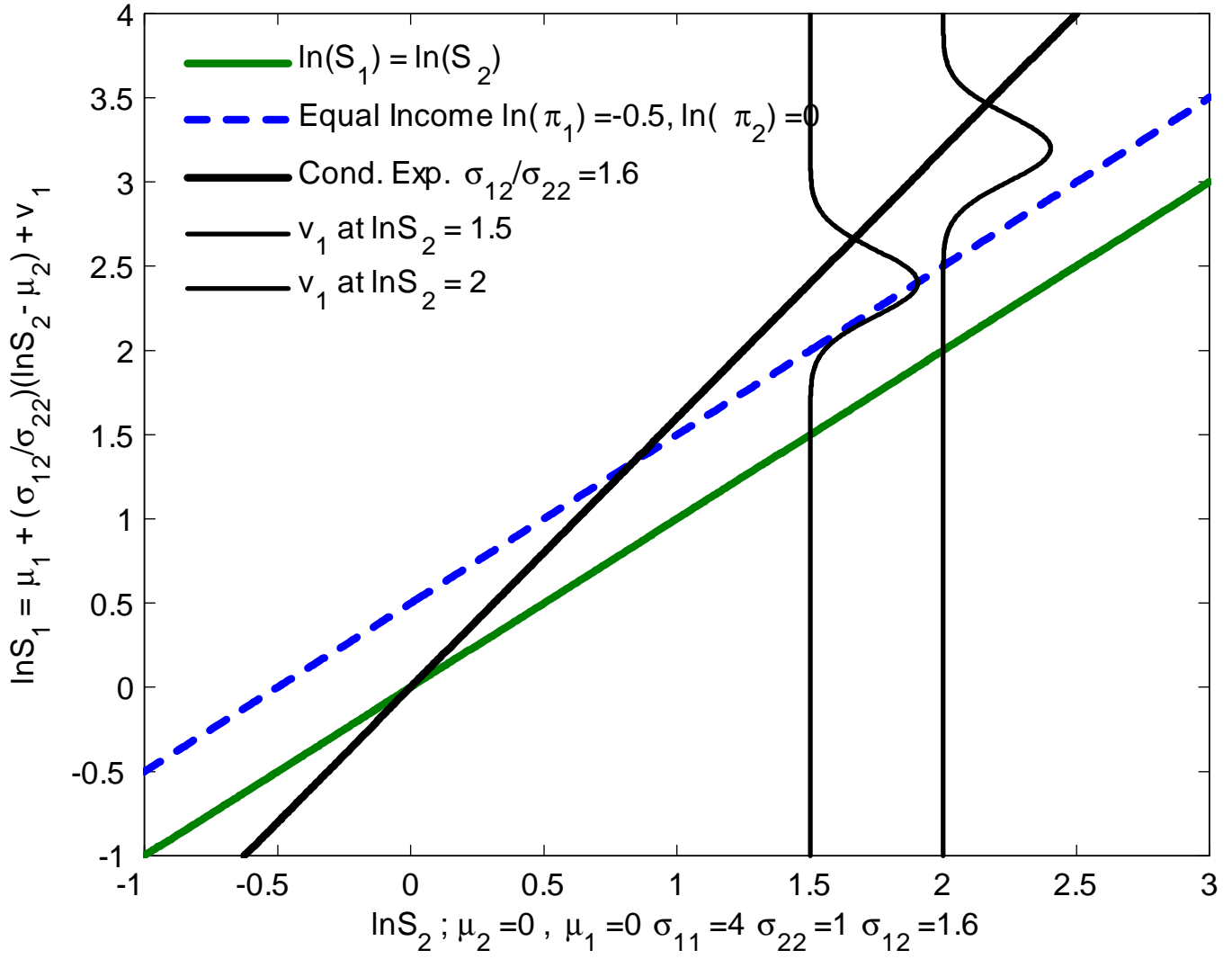
# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.8$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$  $\sigma_{11} = 4$  $\sigma_{22} = 1$  $\sigma_{12} = 1.8$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ \ 1.8 \\ 1.8 \ \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

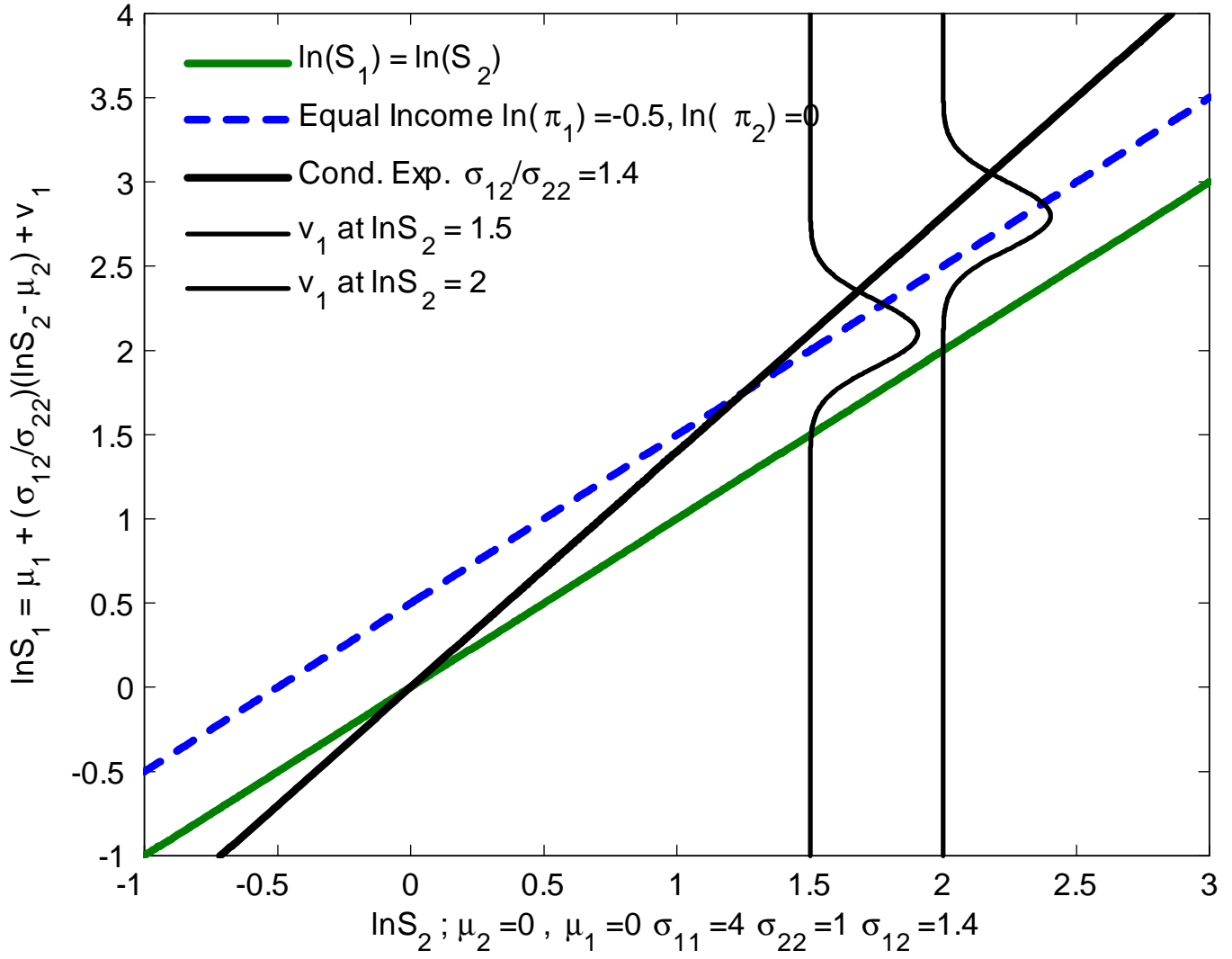$$\mu_1 = \mu_2 = 0.$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.6$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1.6$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.6 \\ 1.6 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

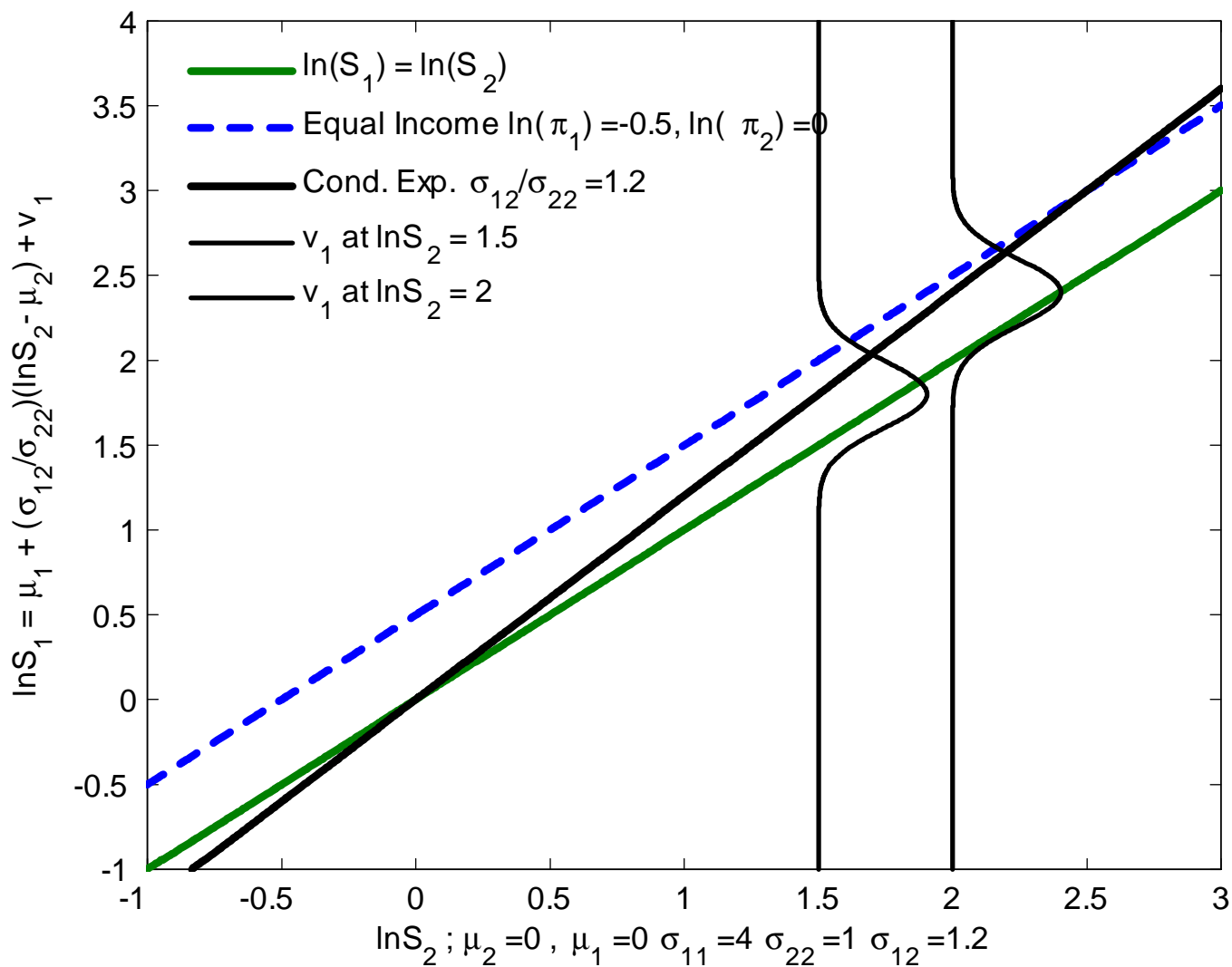$$\mu_1 = \mu_2 = 0.$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.4$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1.4$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1.4 \\ 1.4 \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$
$$\mu_1 = \mu_2 = 0.$$
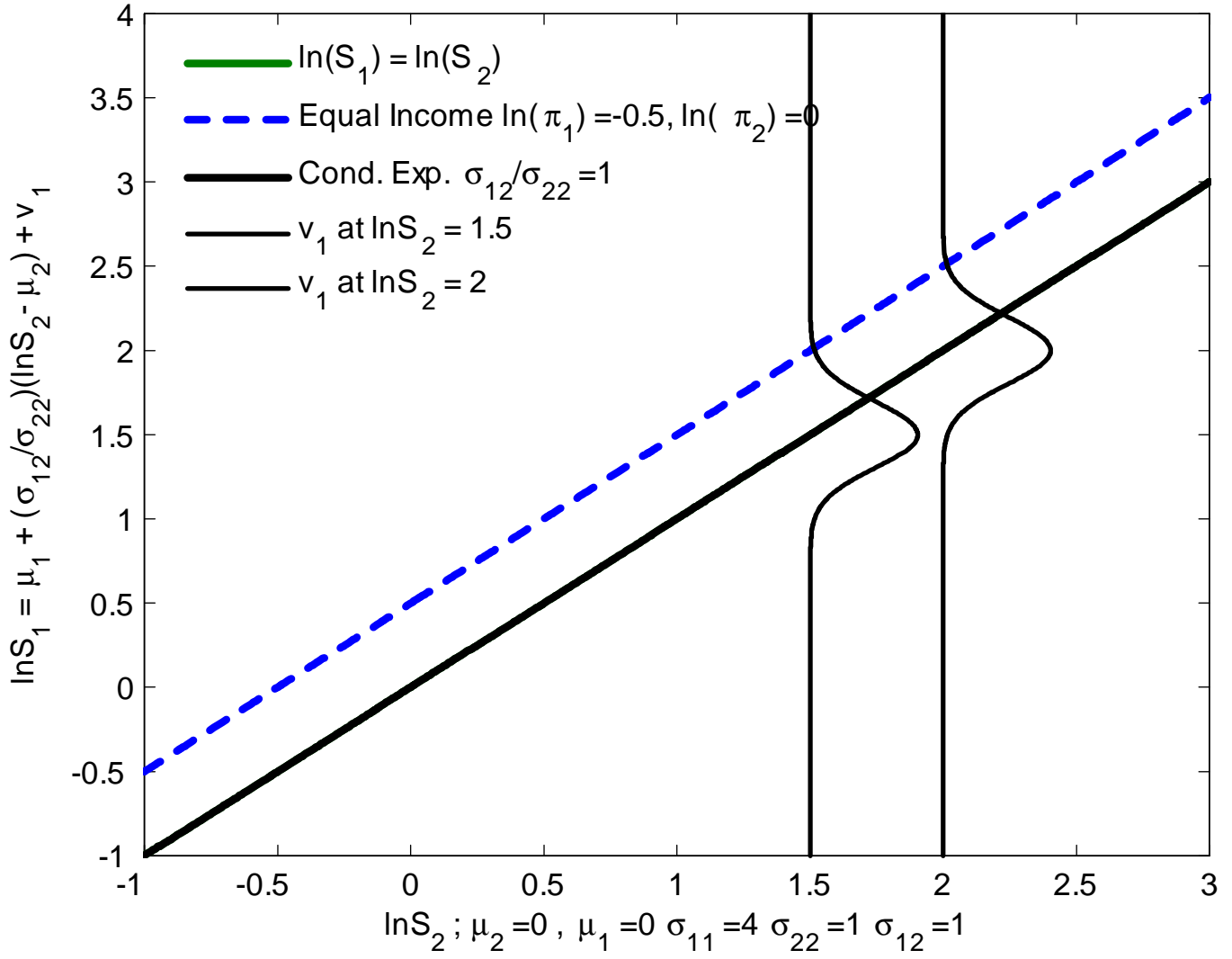
# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.2$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1.2$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \; \sigma_{12} \\ \sigma_{12} \; \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \; 1.2 \\ 1.2 \; 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$
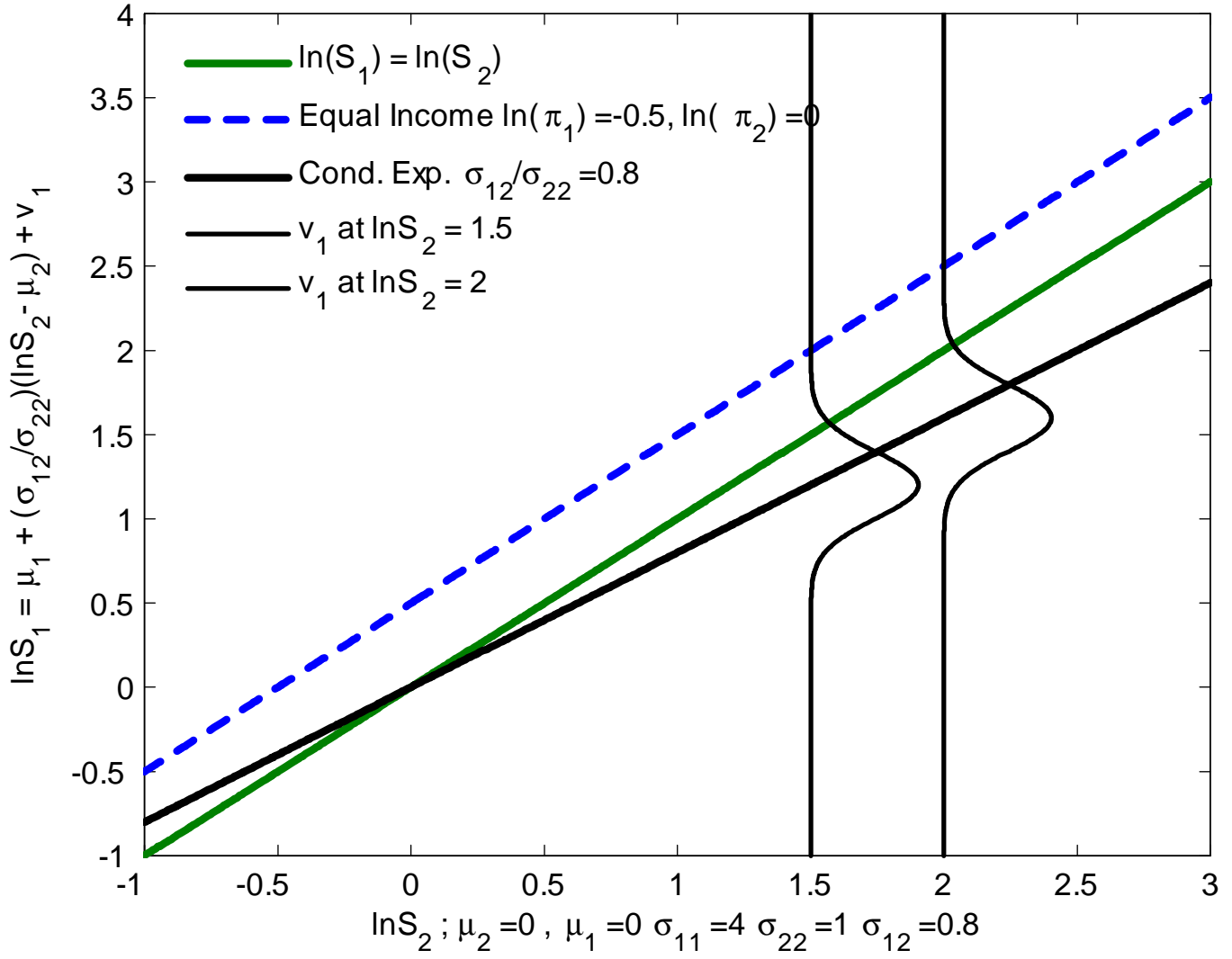
$$\mu_1 = \mu_2 = 0.$$

Graph of $\ln S_1 = f(\ln S_2)$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\ \ 1.0 \\ 1.0\ \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

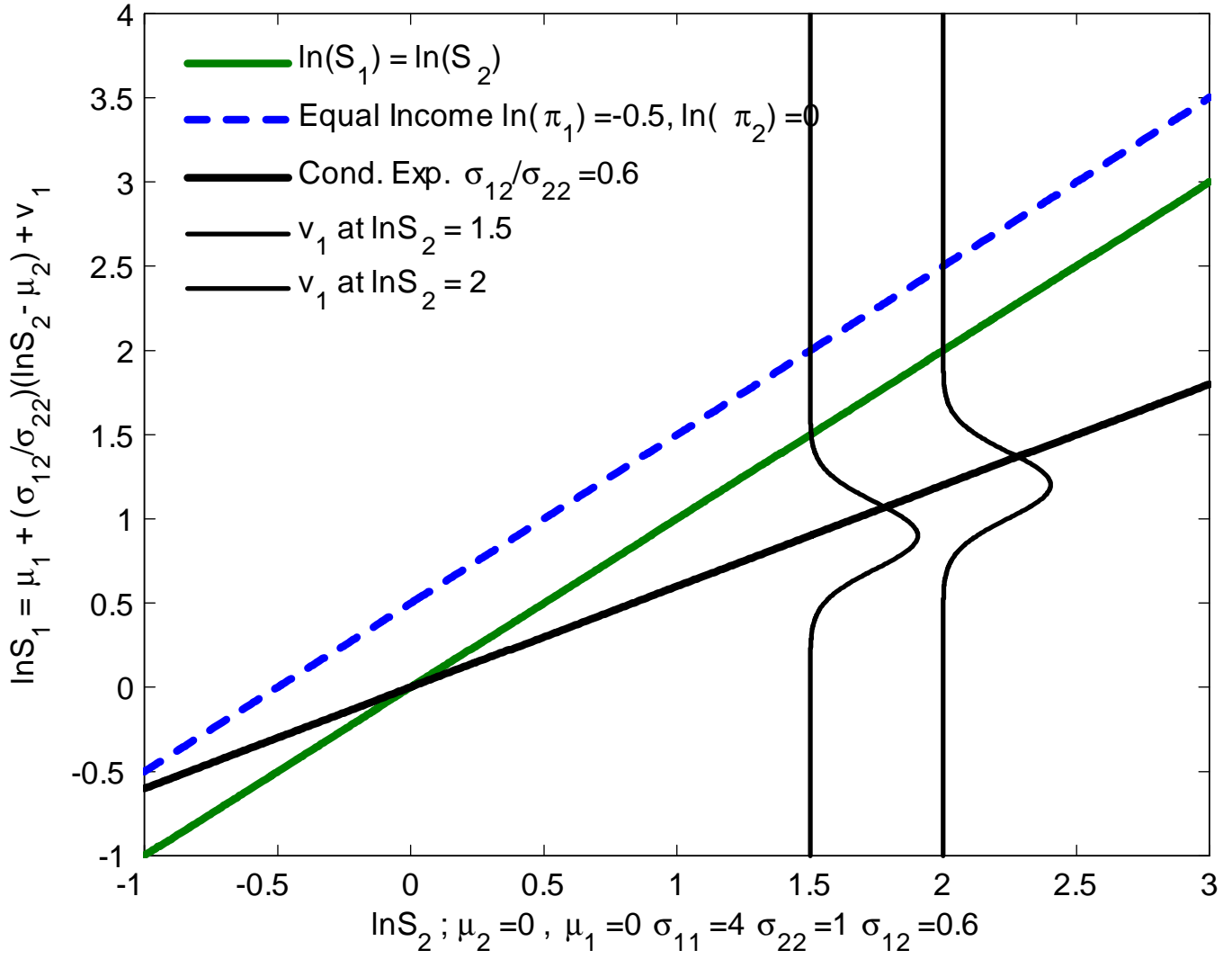$$\mu_1 = \mu_2 = 0.$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.8$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0.8$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.8 \\ 0.8 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
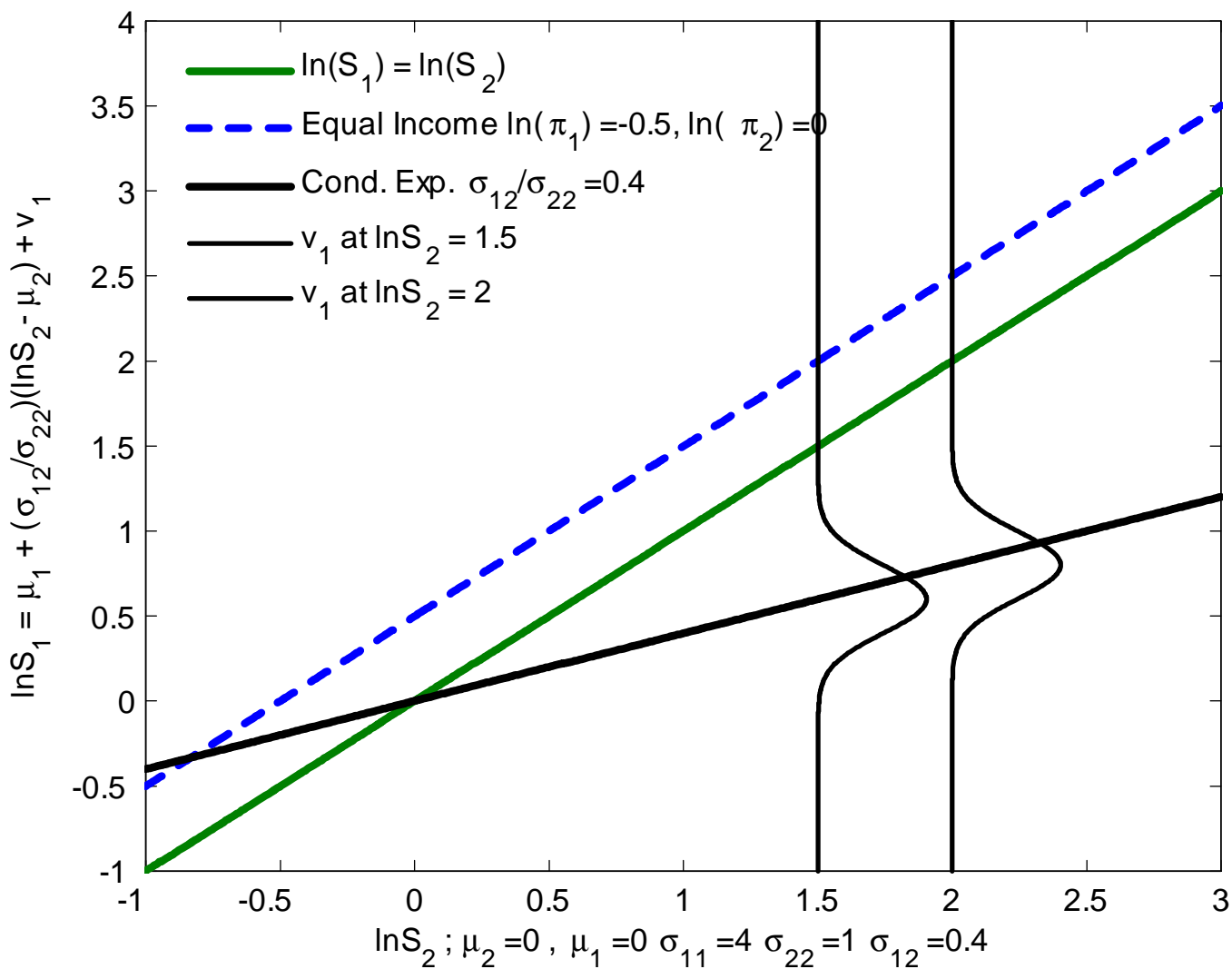
Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.6$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0.6$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ \ 0.6 \\ 0.6 \ \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

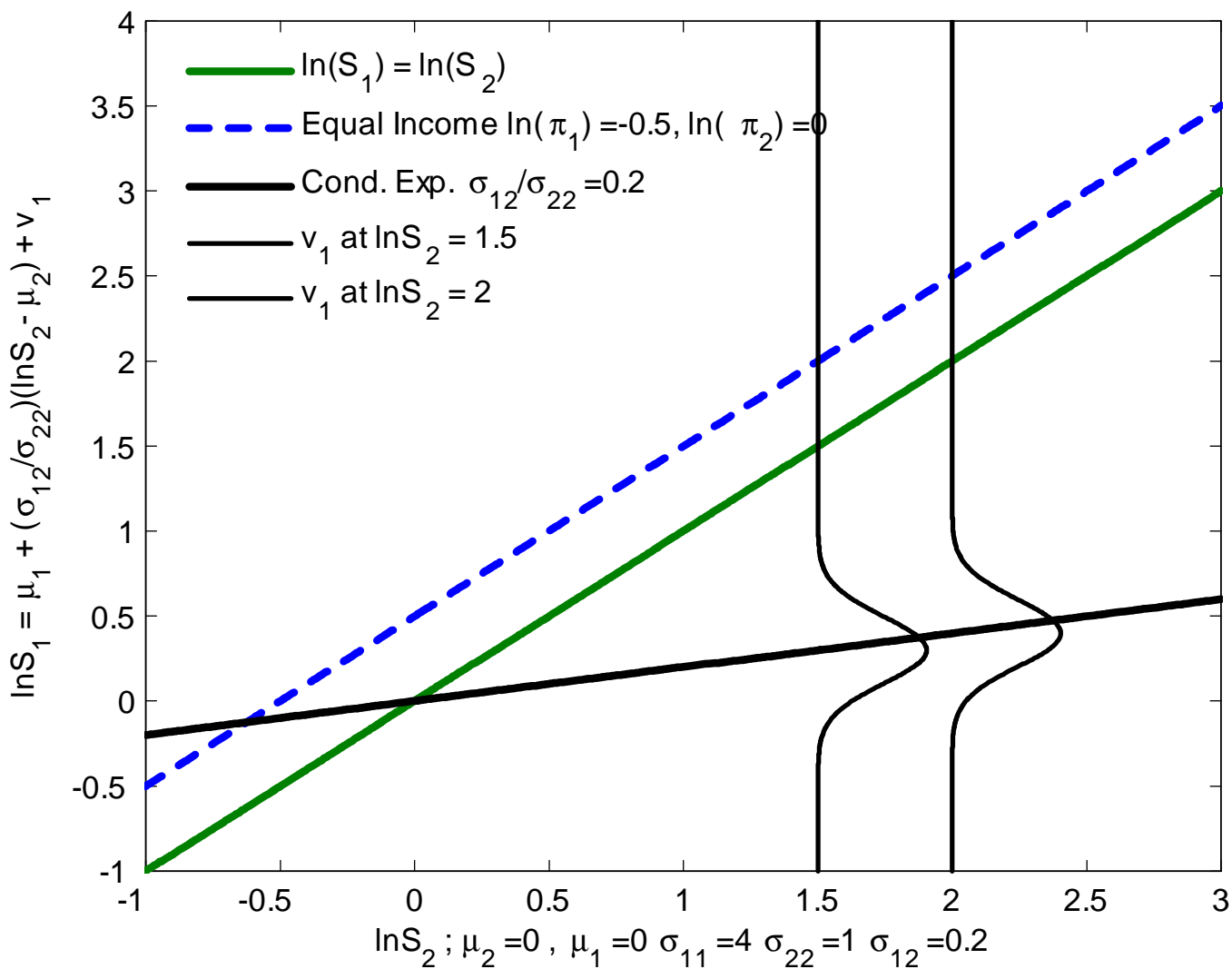$$\mu_1 = \mu_2 = 0.$$
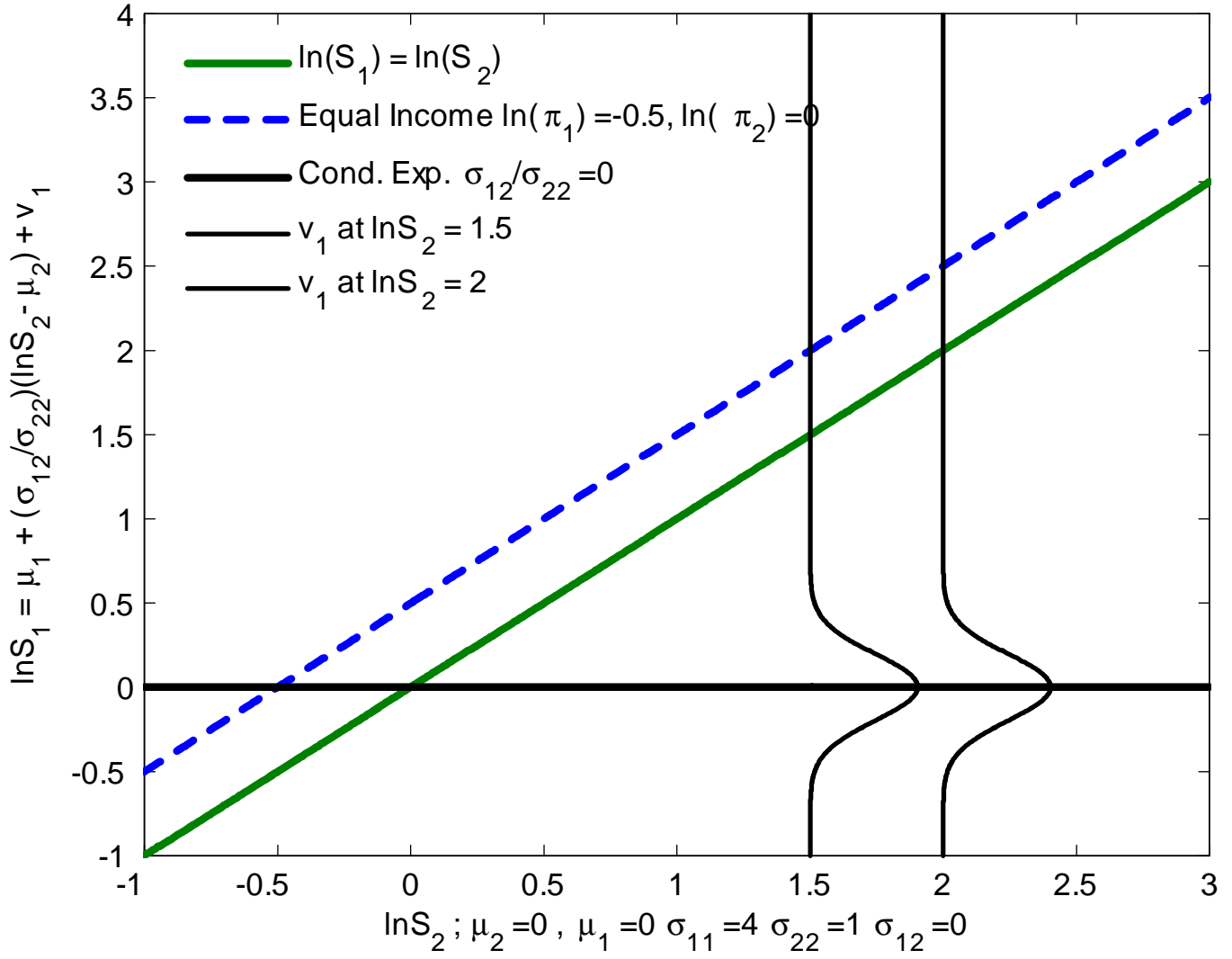
# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.4$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$  $\sigma_{11} = 4$  $\sigma_{22} = 1$  $\sigma_{12} = 0.4$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ \ 0.4 \\ 0.4 \ \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
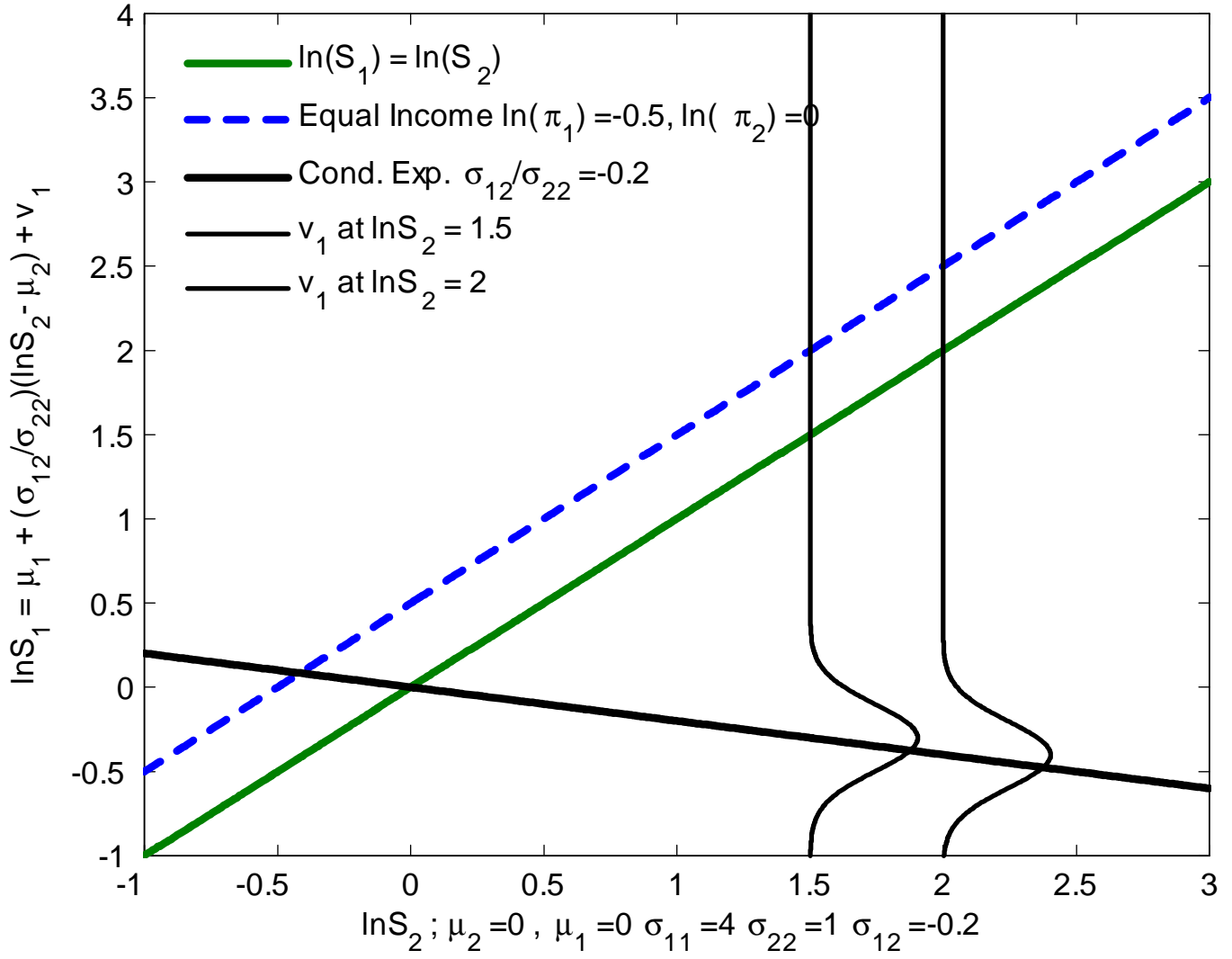
# Graph of $\ln S_1 = f(\ln S_2)$



**Legend:**
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.2$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

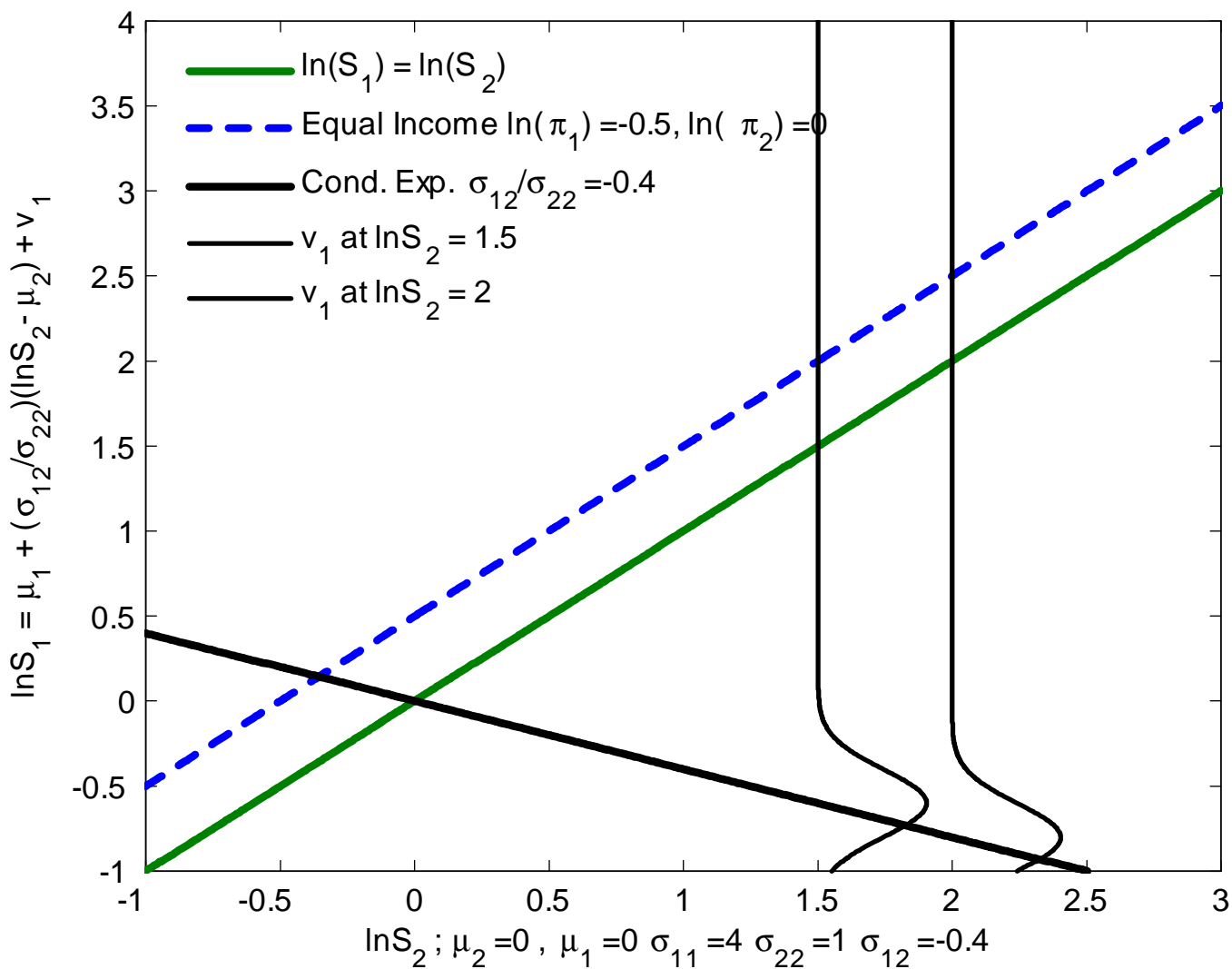x-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0.2$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \, \sigma_{12} \\ \sigma_{12} \, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.2 \\ 0.2 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix} ;$$
$$\mu_1 = \mu_2 = 0.$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \, \sigma_{12} \\ \sigma_{12} \, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \, 0 \\ 0 \, 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
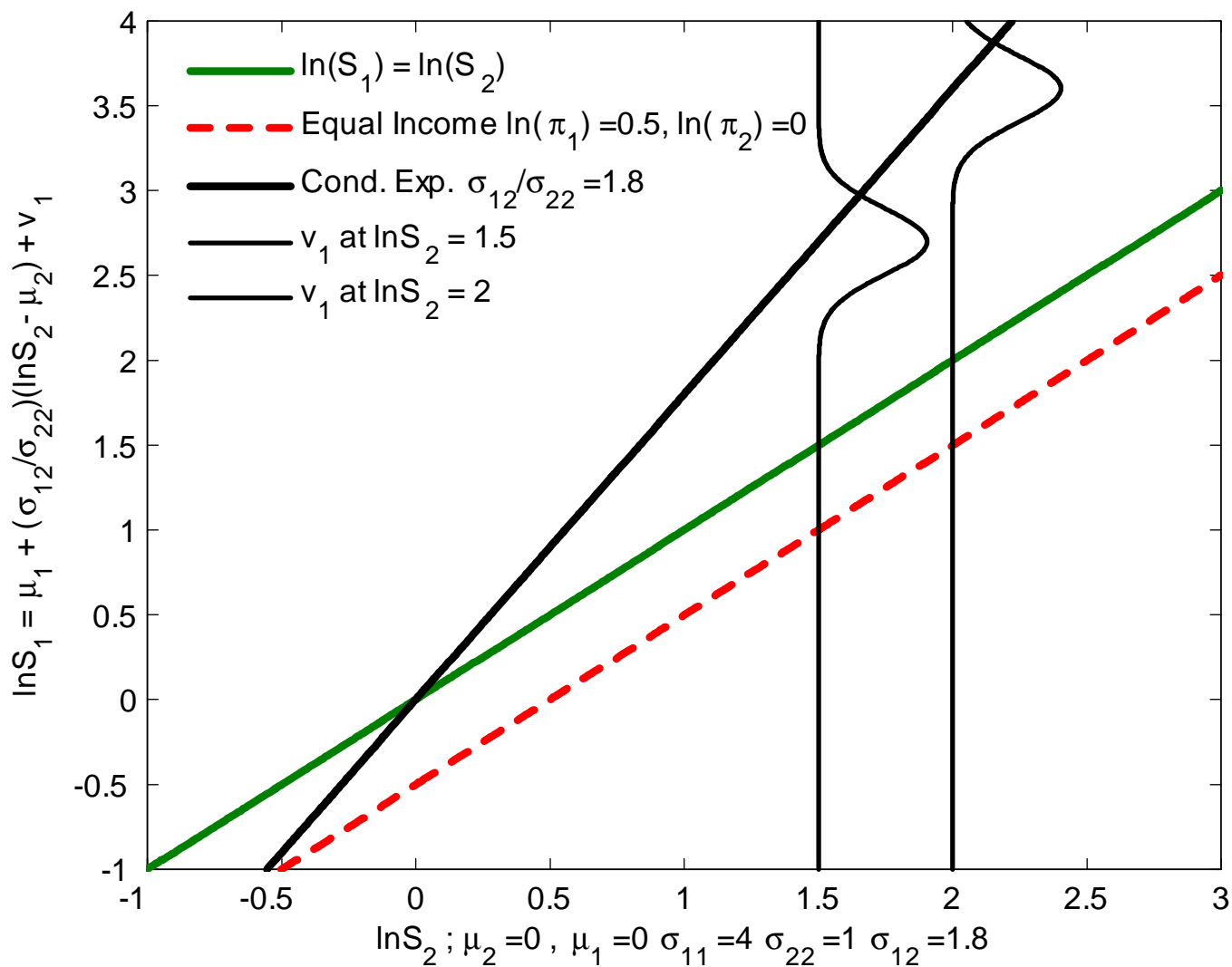
Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = -0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = -0.2$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = -0.2$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\,\sigma_{12} \\ \sigma_{12}\,\sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & -0.2 \\ -0.2 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
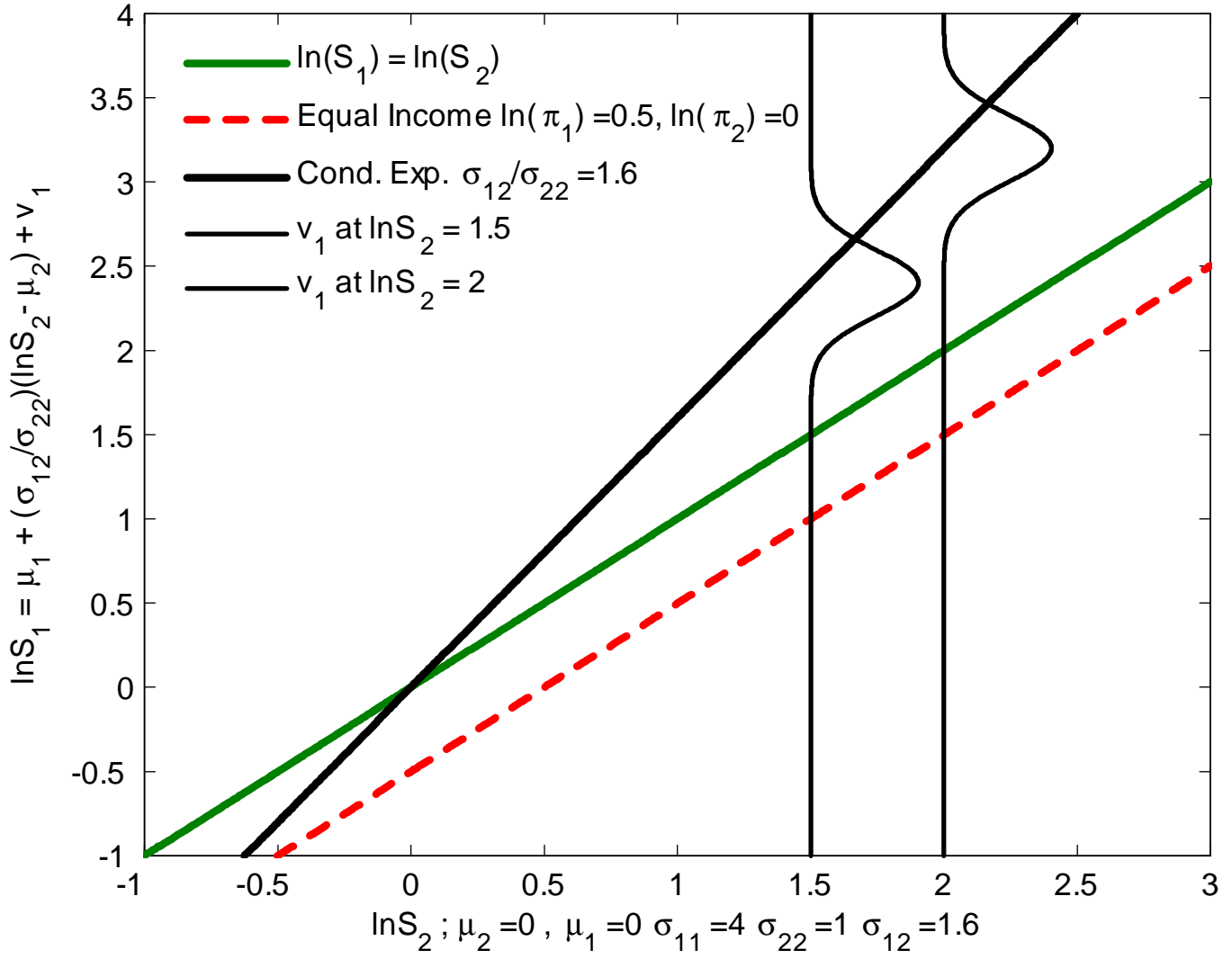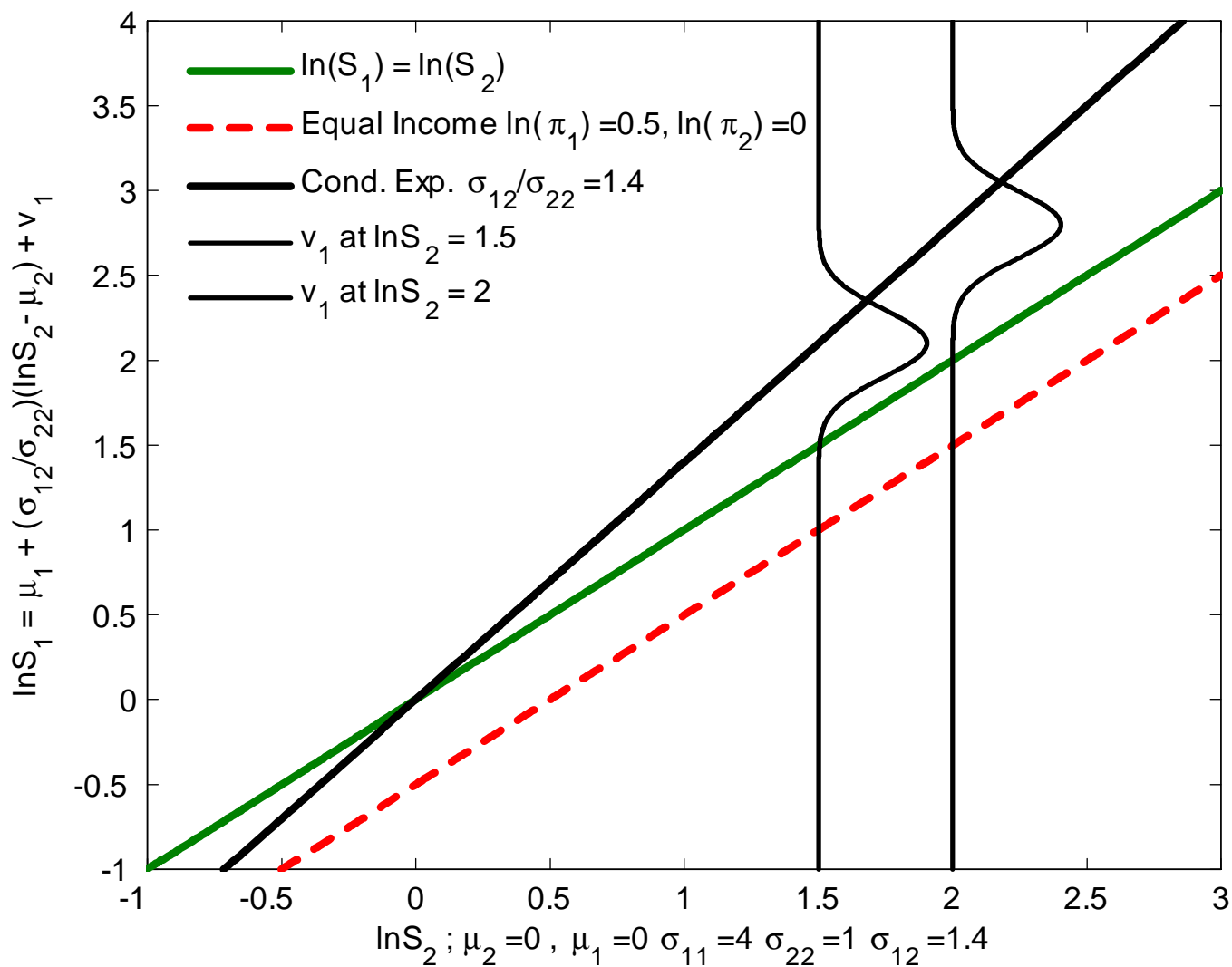
# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \; \sigma_{12} \\ \sigma_{12} \; \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & -0.4 \\ -0.4 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.8$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1.8$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1.8 \\ 1.8 \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0.5 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
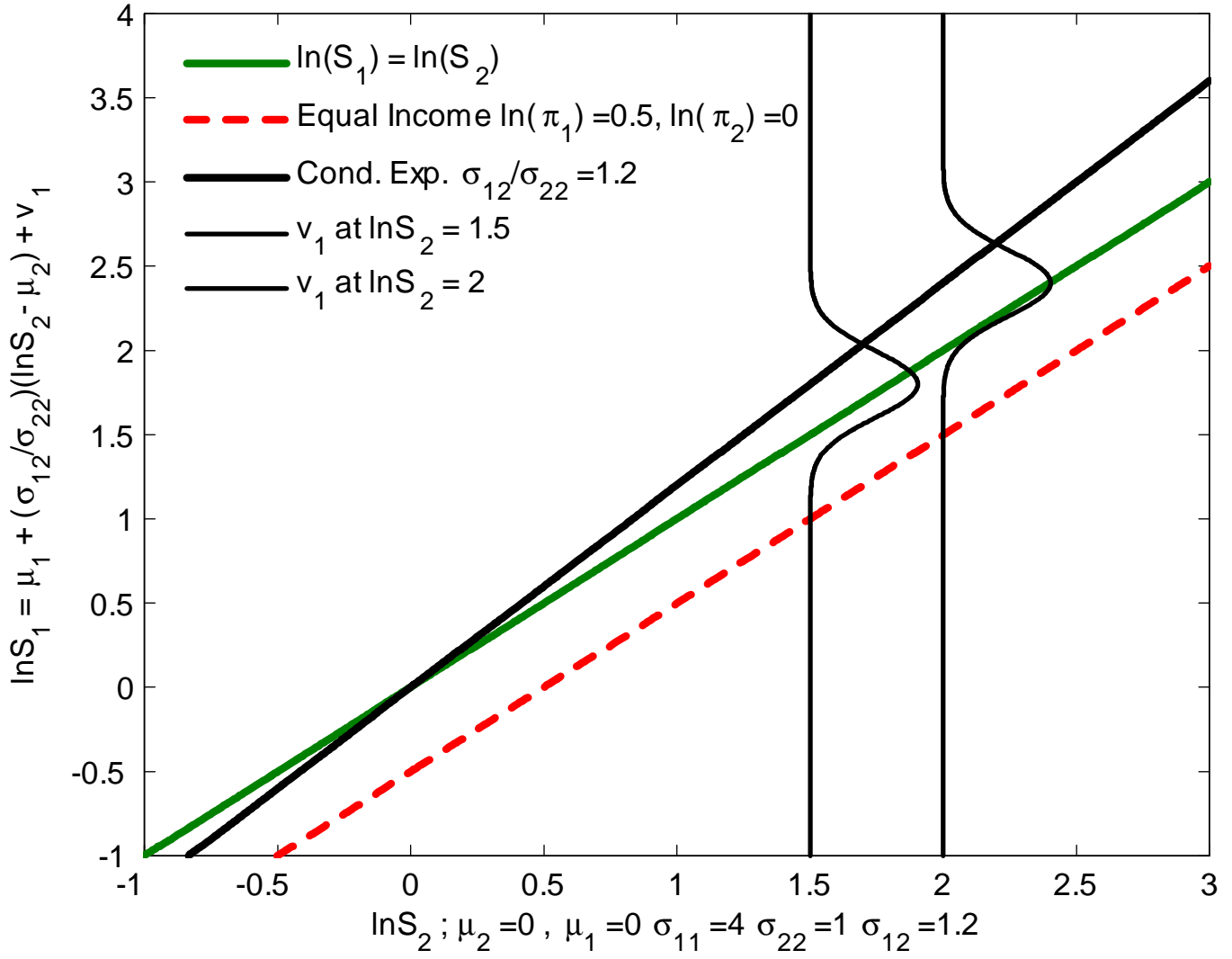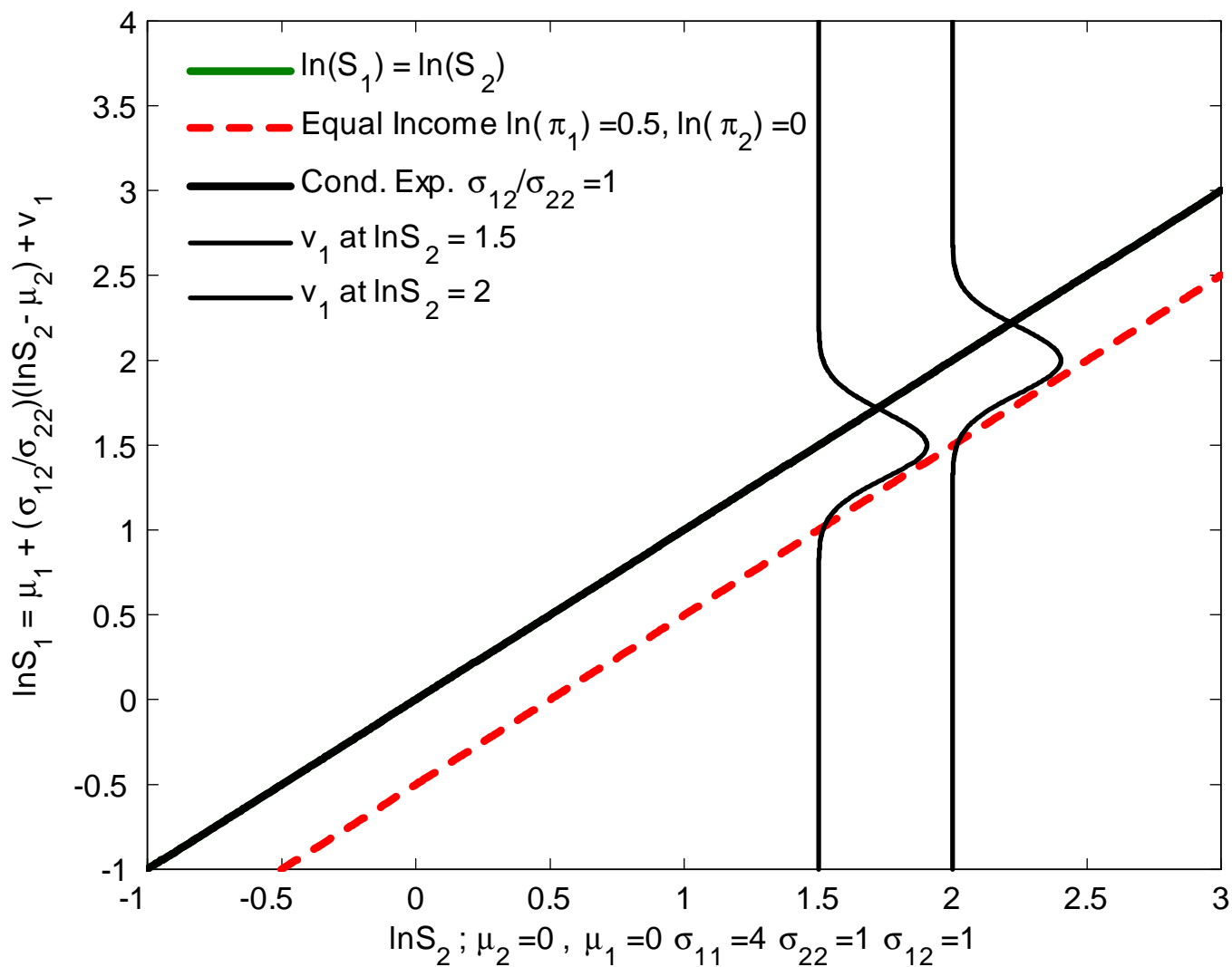
Graph of $\ln S_1 = f(\ln S_2)$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1.6 \\ 1.6 \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0.5 \\ 0 \end{bmatrix};$$
$$\mu_1 = \mu_2 = 0.$$

## Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.4$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$; $\mu_2 = 0$, $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1.4$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.4 \\ 1.4 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0.5 \\ 0 \end{bmatrix};$$
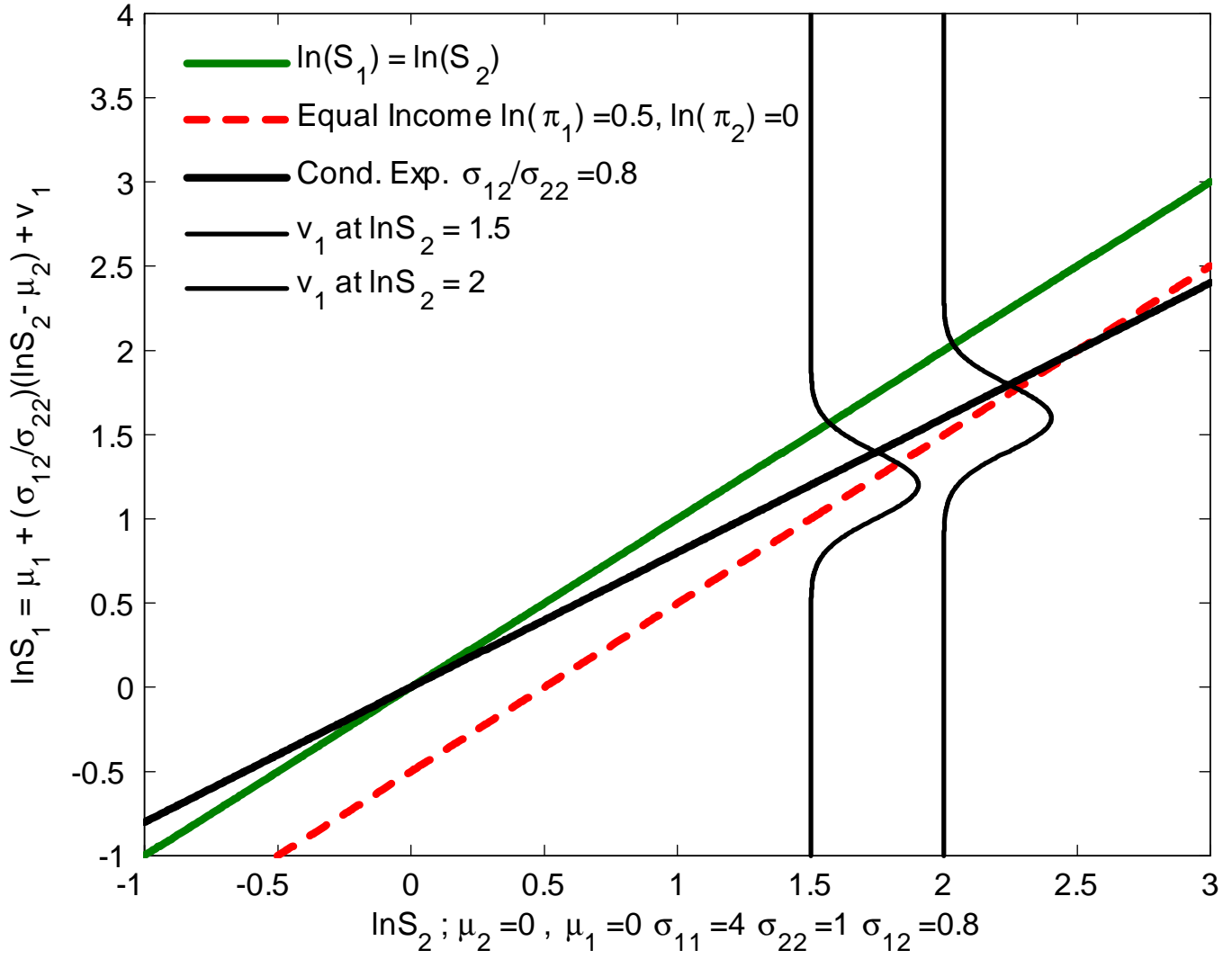
$$\mu_1 = \mu_2 = 0.$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.2$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1.2$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\ \ 1.2 \\ 1.2\ \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
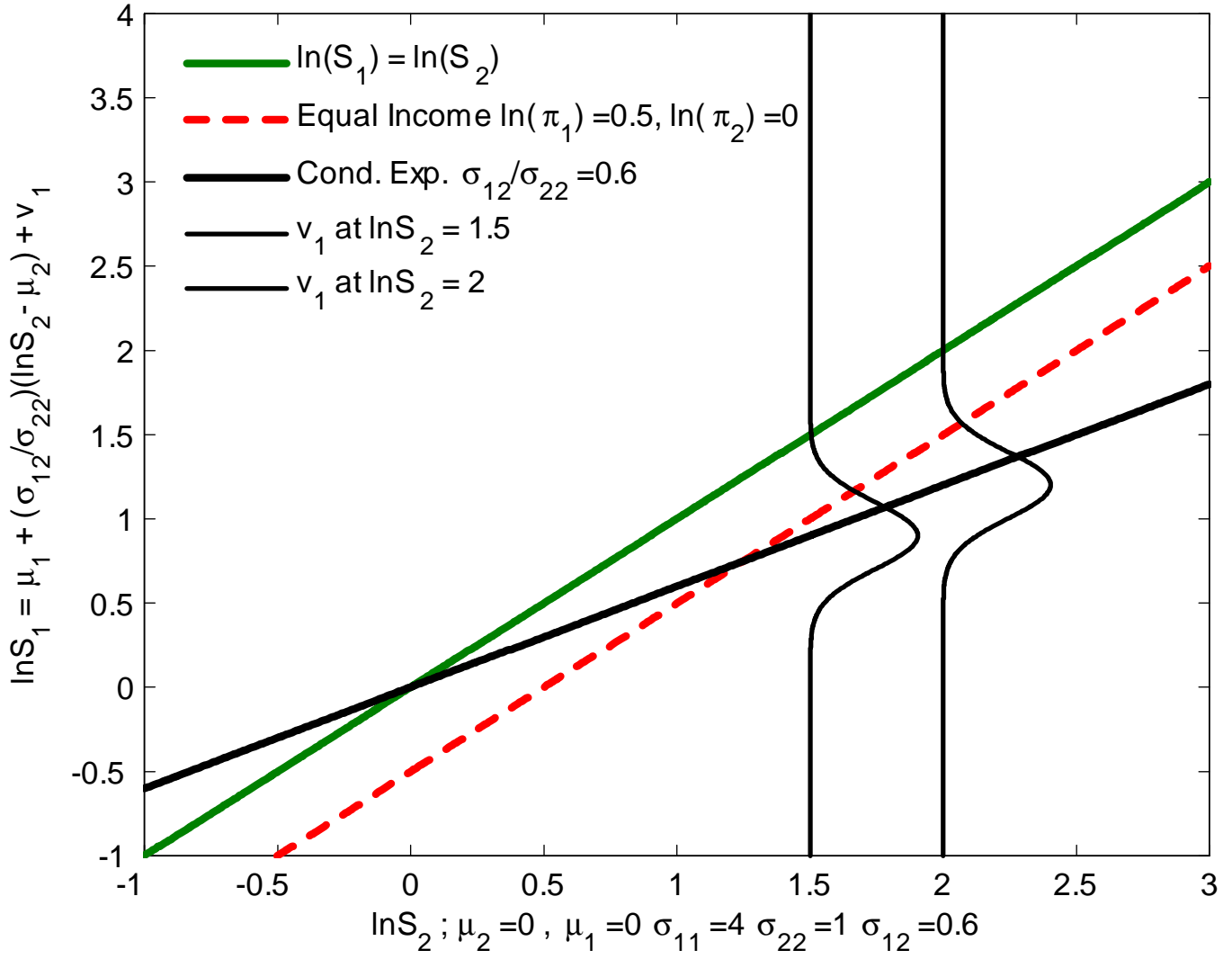
# Graph of $\ln S_1 = f(\ln S_2)$



**Legend:**
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 1$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.0 \\ 1.0 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

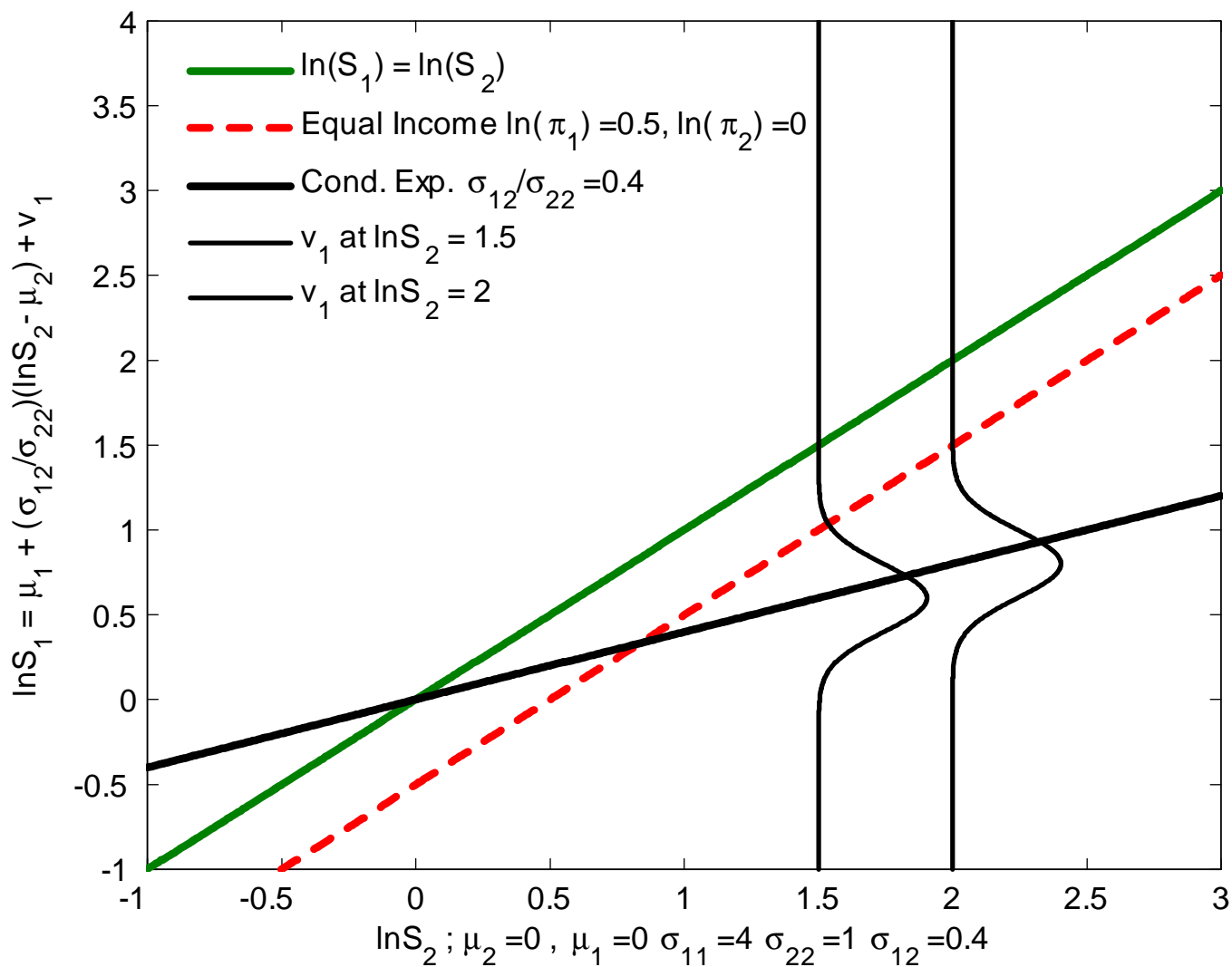$$\mu_1 = \mu_2 = 0.$$
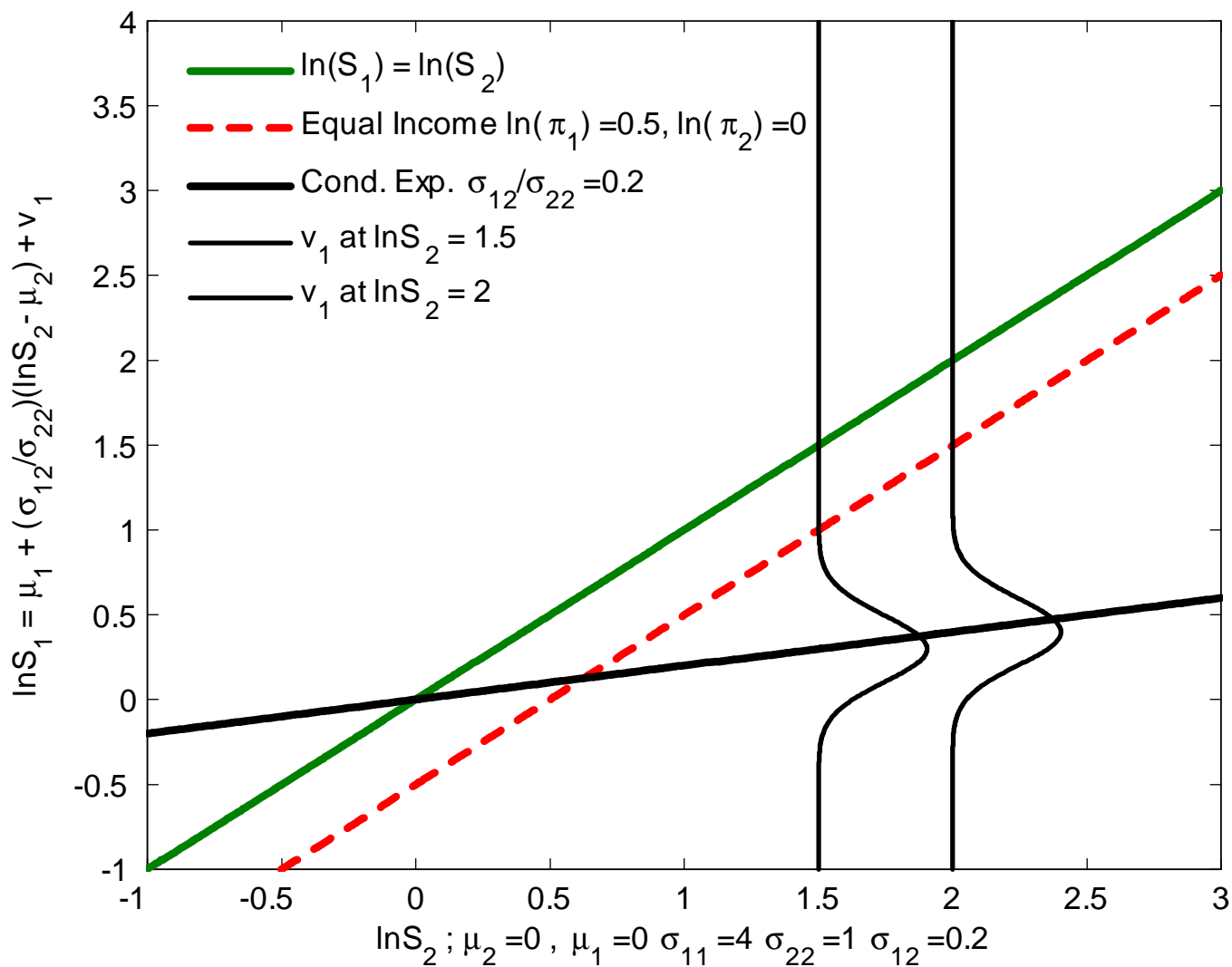
Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.8$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

x-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0.8$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\ \ 0.8 \\ 0.8\ \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0.5 \\ 0 \end{bmatrix};$$
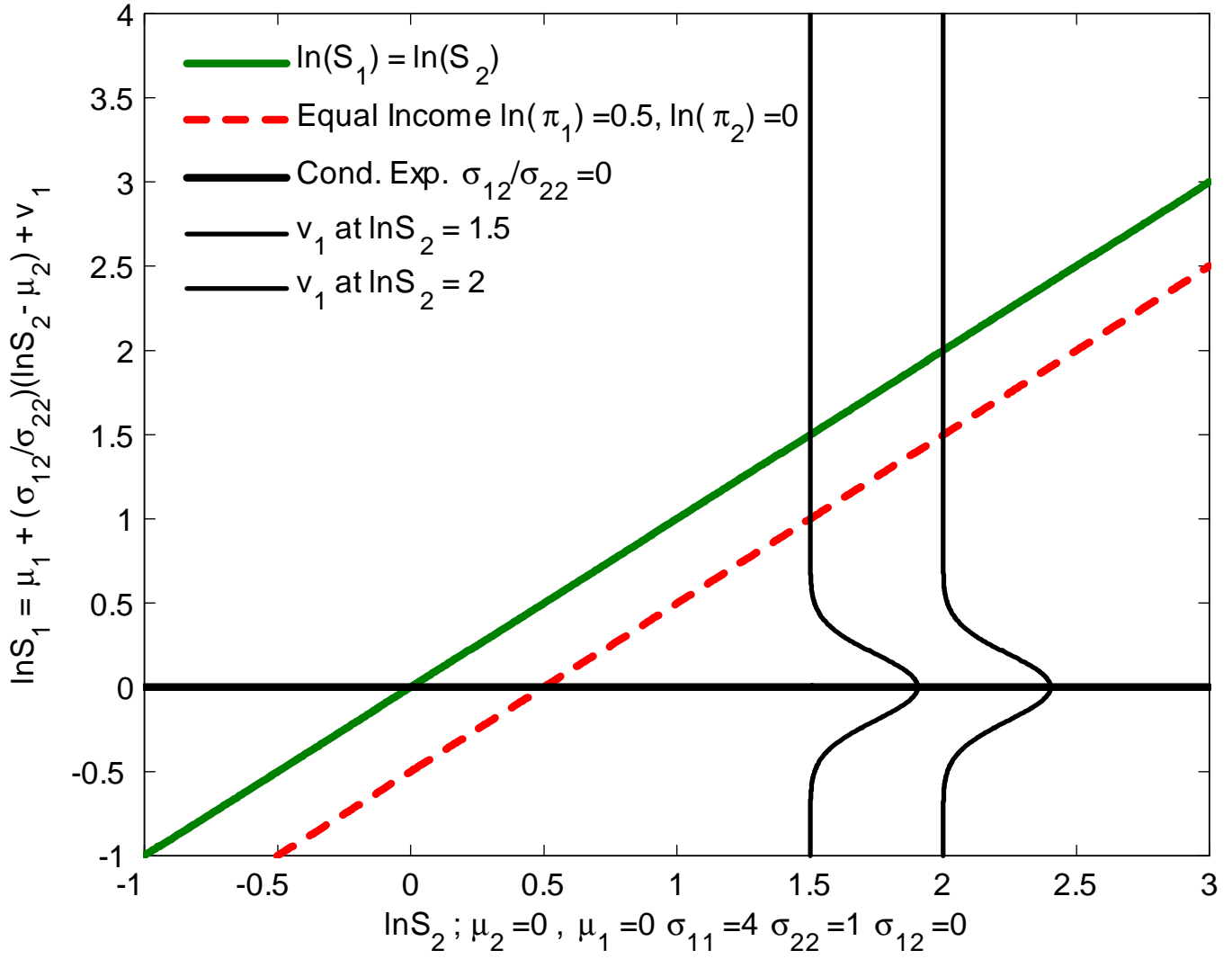
$$\mu_1 = \mu_2 = 0.$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.6$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$  $\sigma_{11} = 4$  $\sigma_{22} = 1$  $\sigma_{12} = 0.6$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\,\sigma_{12} \\ \sigma_{12}\,\sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.6 \\ 0.6 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0.5 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$
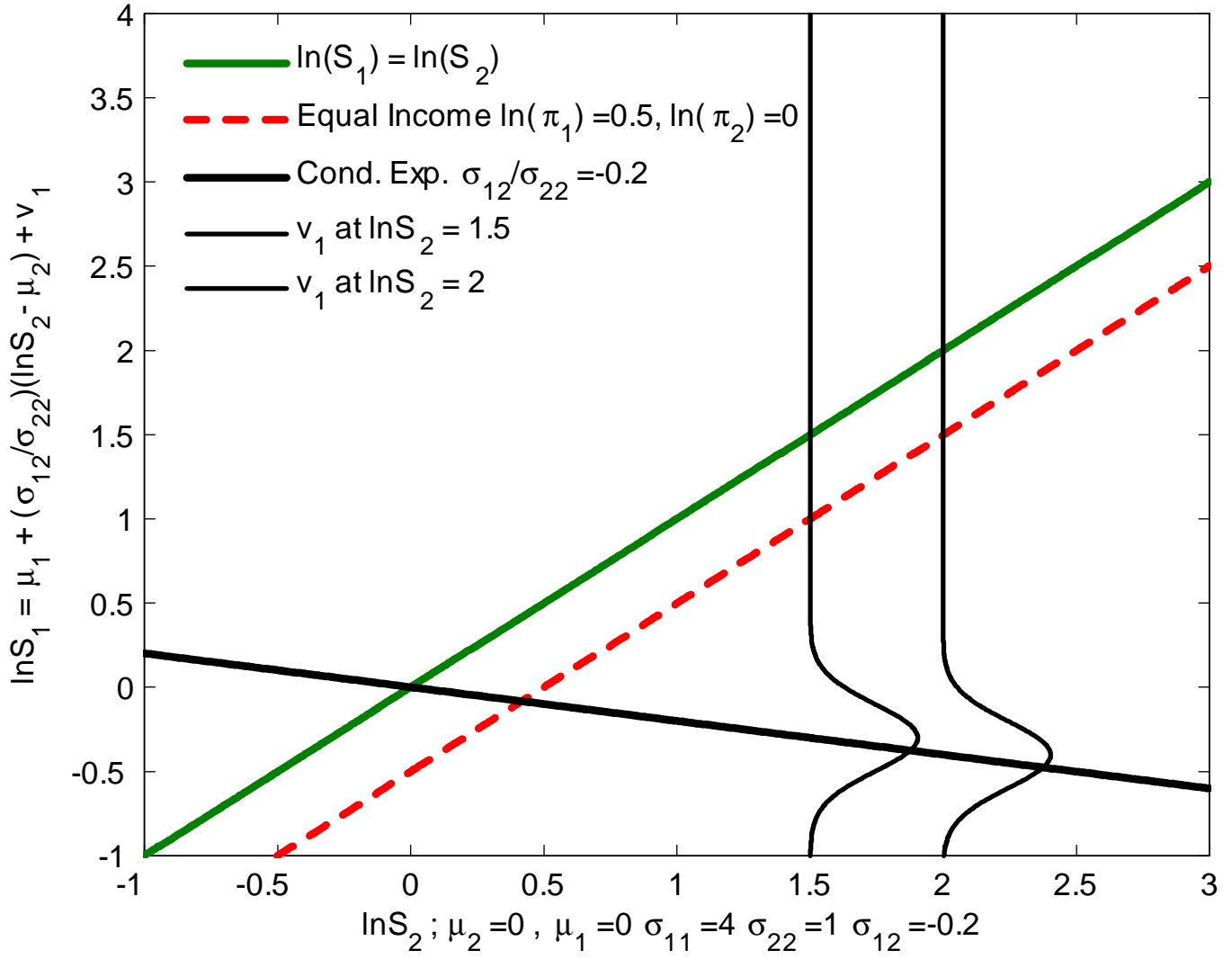
# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.4$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

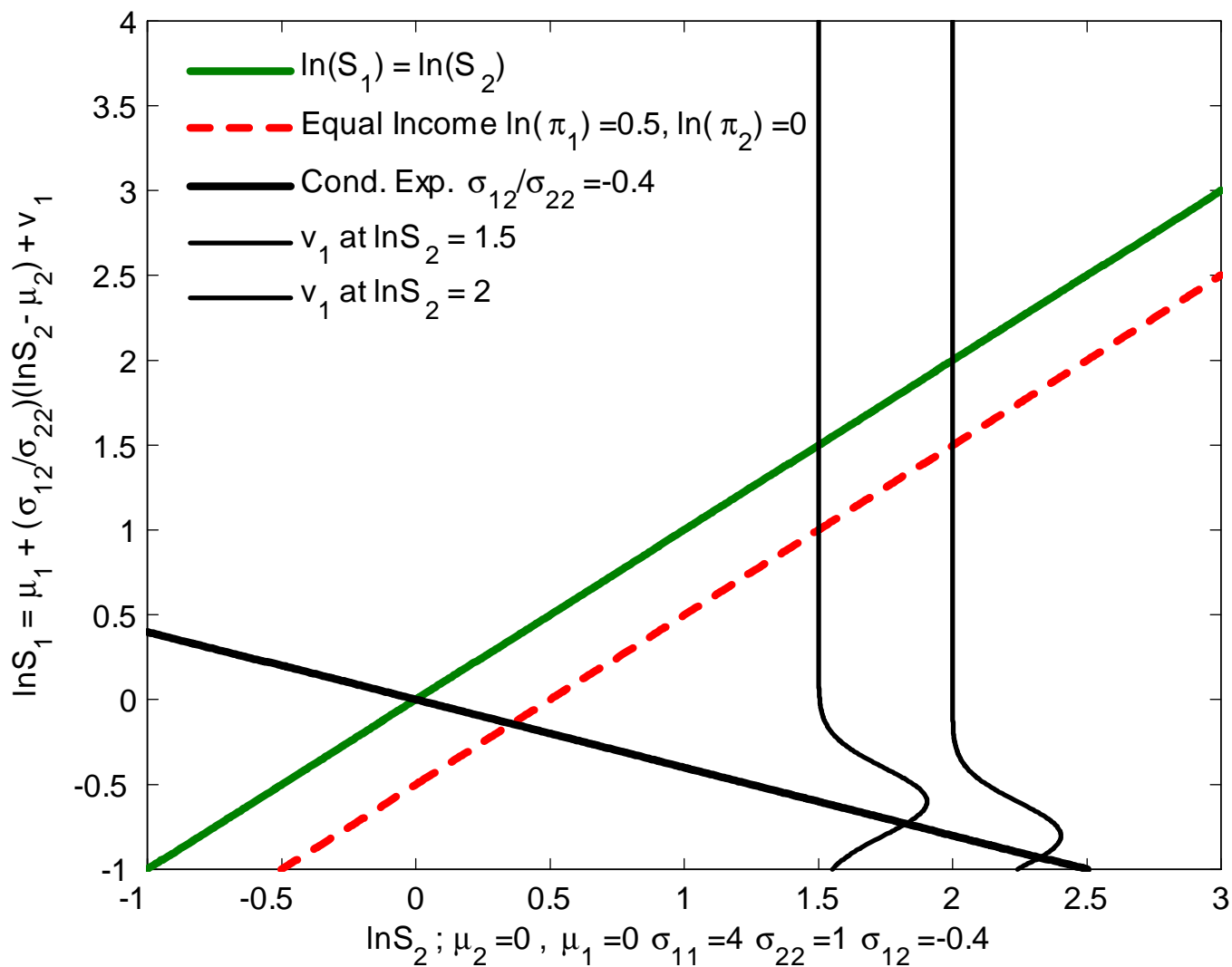X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0.4$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 0.4 \\ 0.4 \ 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$

## Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.2$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0.2$
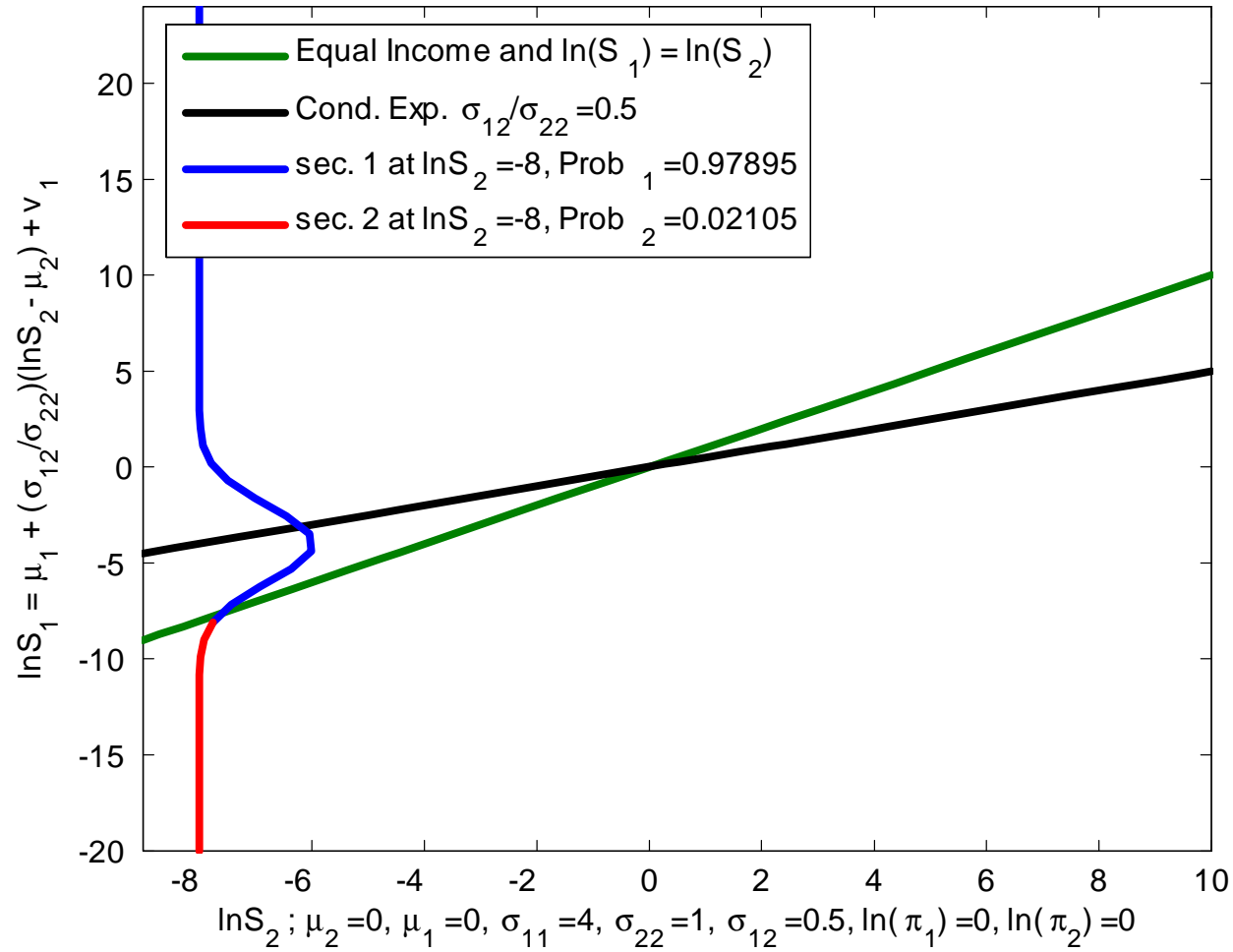
$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} (\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \, \sigma_{12} \\ \sigma_{12} \, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.2 \\ 0.2 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$
$$\mu_1 = \mu_2 = 0.$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$; $\mu_2 = 0$, $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \; \sigma_{12} \\ \sigma_{12} \; \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \; 0 \\ 0 \; 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0.5 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = -0.2$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = -0.2$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \, \sigma_{12} \\ \sigma_{12} \, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & -0.2 \\ -0.2 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} 0.5 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- $\ln(S_1) = \ln(S_2)$
- Equal Income $\ln(\pi_1) = 0.5$, $\ln(\pi_2) = 0$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = -0.4$
- $v_1$ at $\ln S_2 = 1.5$
- $v_1$ at $\ln S_2 = 2$

x-axis: $\ln S_2$ ; $\mu_2 = 0$ , $\mu_1 = 0$ $\sigma_{11} = 4$ $\sigma_{22} = 1$ $\sigma_{12} = -0.4$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\, \sigma_{12} \\ \sigma_{12}\, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & -0.4 \\ -0.4 & 1 \end{bmatrix}, \begin{bmatrix} \ln \pi_1 \\ \ln \pi_2 \end{bmatrix} = \begin{bmatrix} -0.5 \\ 0 \end{bmatrix};$$

$$\mu_1 = \mu_2 = 0.$$

# Graph of $\ln S_1 = f(\ln S_2)$



**Legend:**
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- sec. 1 at $\ln S_2 = -8$, $\text{Prob}_1 = 0.97895$
- sec. 2 at $\ln S_2 = -8$, $\text{Prob}_2 = 0.02105$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 0.5$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} (\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \vert \ln S_2 = -8\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \vert \ln S_2 = -8\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\ \ 0.5 \\ 0.5\ \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



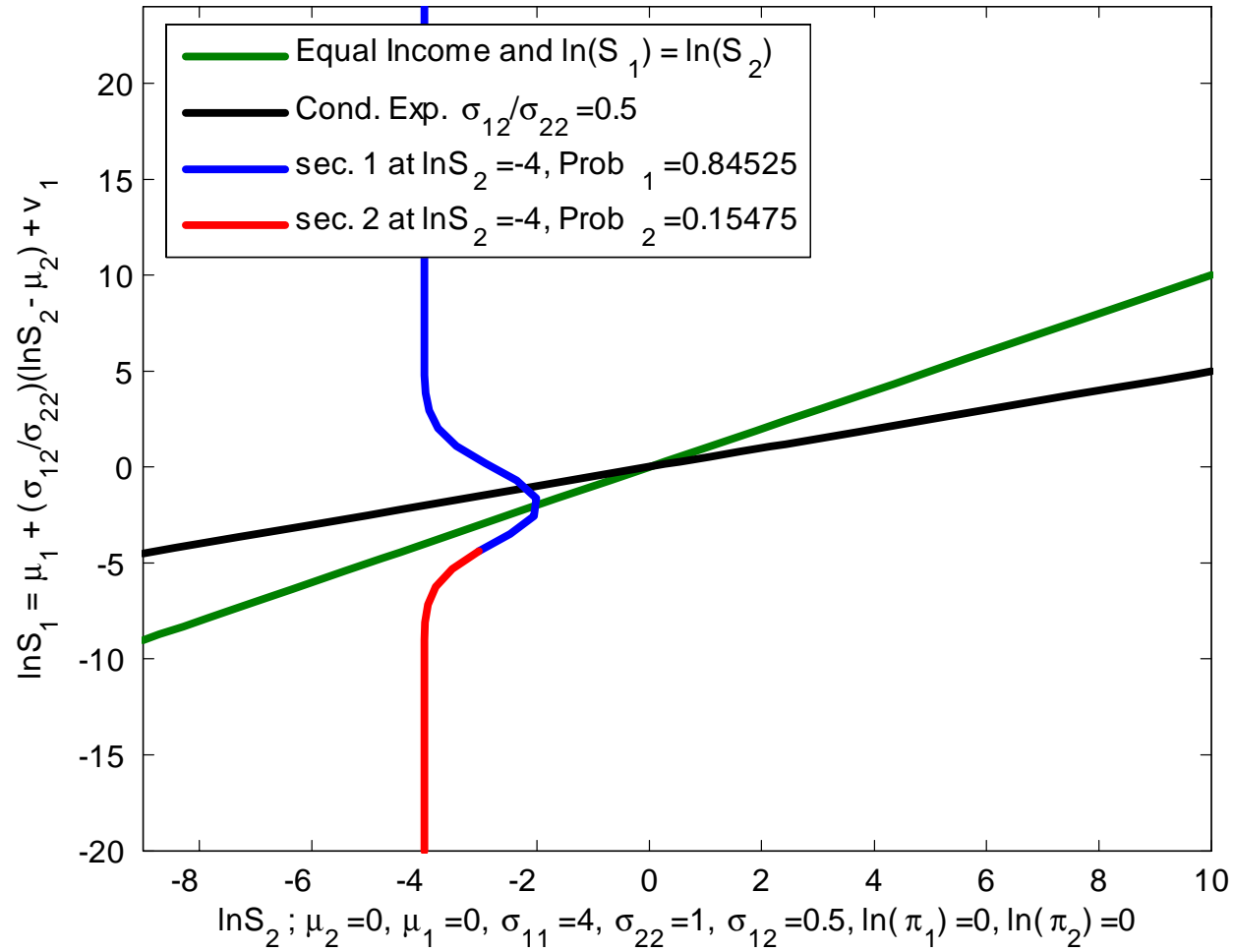$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
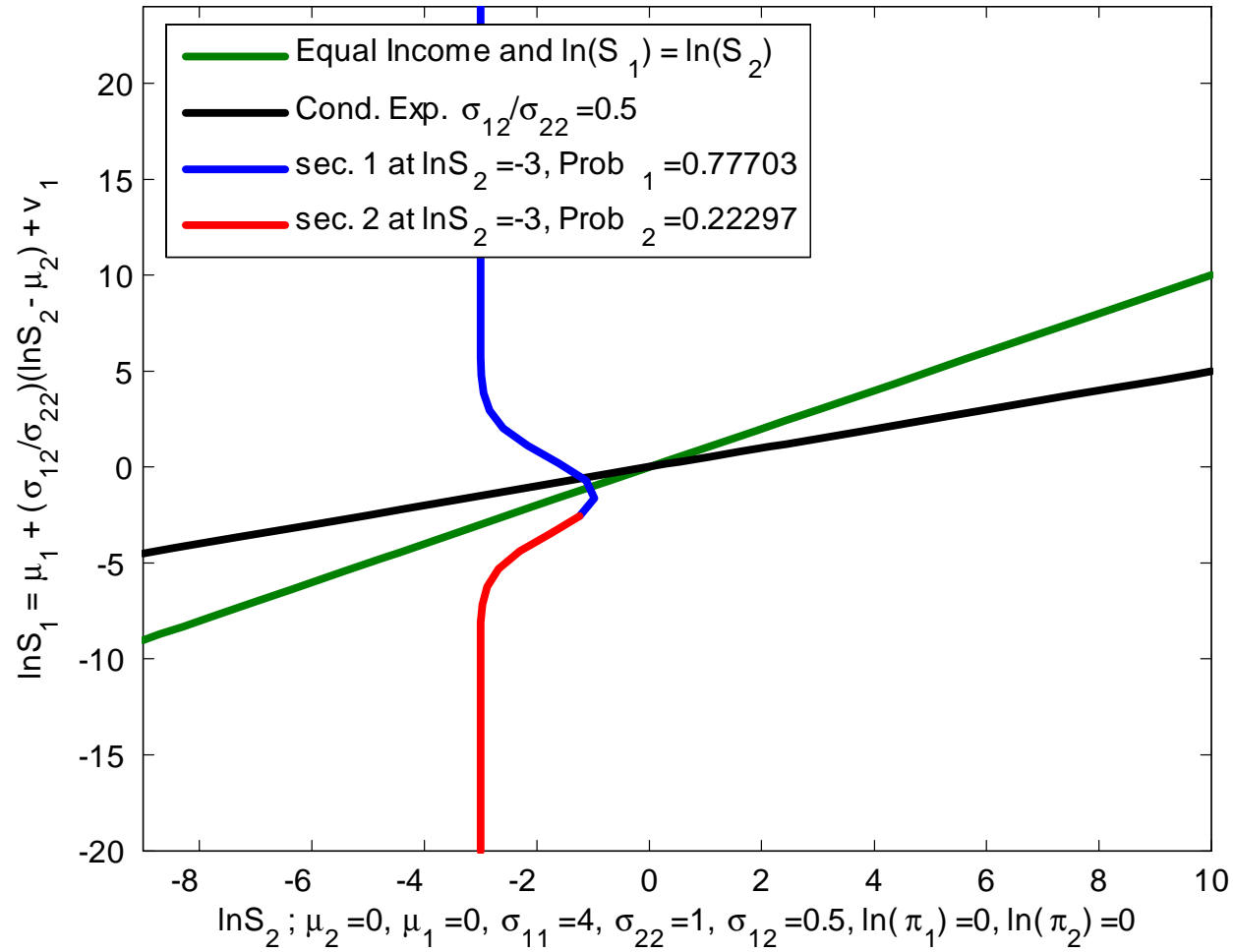
$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \middle| \ln S_2 = -7\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \middle| \ln S_2 = -7\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.5 \\ 0.5 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- sec. 1 at $\ln S_2 = -6$, Prob$_1 = 0.9363$
- sec. 2 at $\ln S_2 = -6$, Prob$_2 = 0.063705$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 0.5$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \middle| \ln S_2 = -6\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \middle| \ln S_2 = -6\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.5 \\ 0.5 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

## Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} (\ln S_2 - \mu_2) + v_1$$
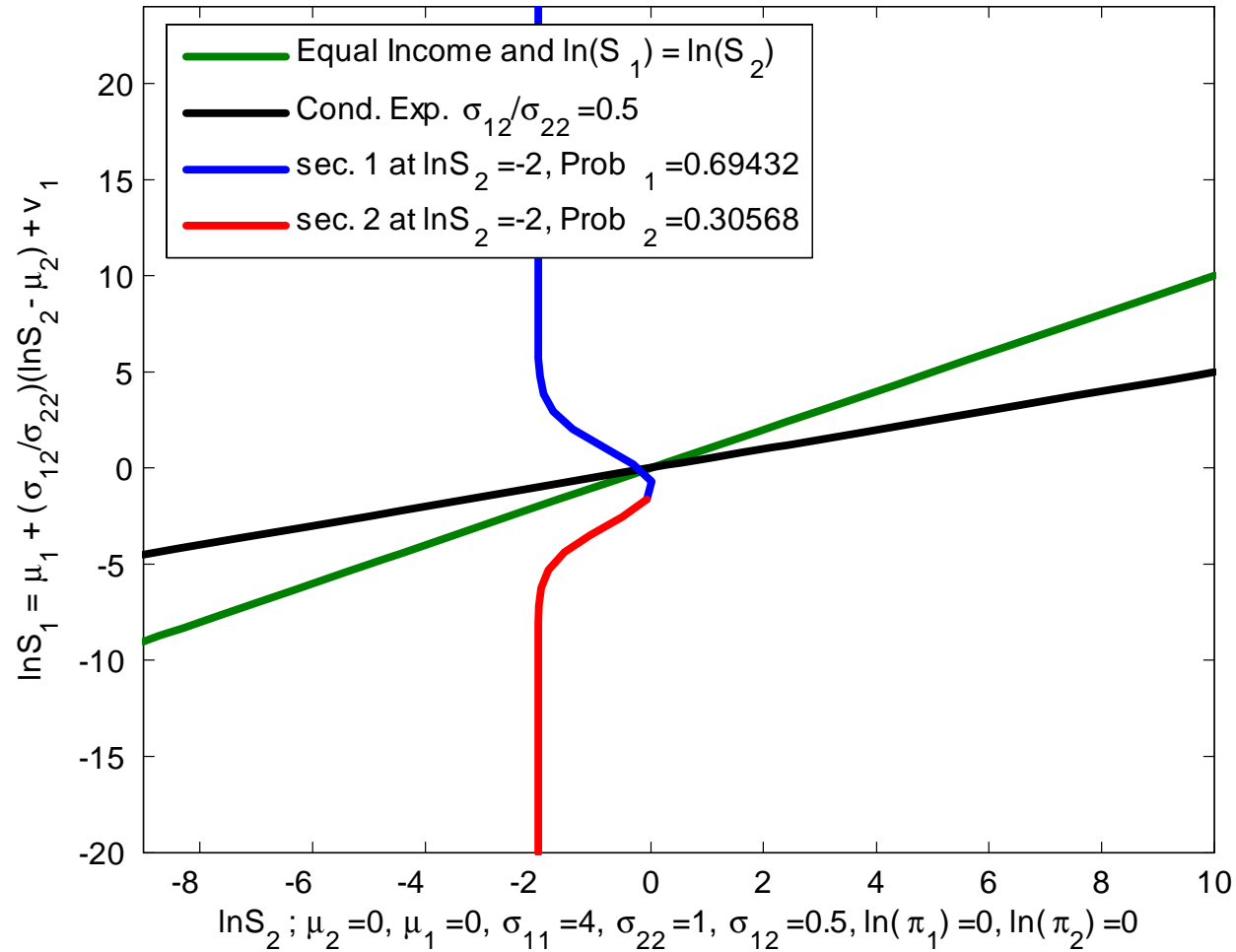
$$\text{Prob}_1 = \text{Pr} \left( W_1 > W_2 | \ln S_2 = -5 \right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \text{Pr} \left( W_1 < W_2 | \ln S_2 = -5 \right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 0.5 \\ 0.5 \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
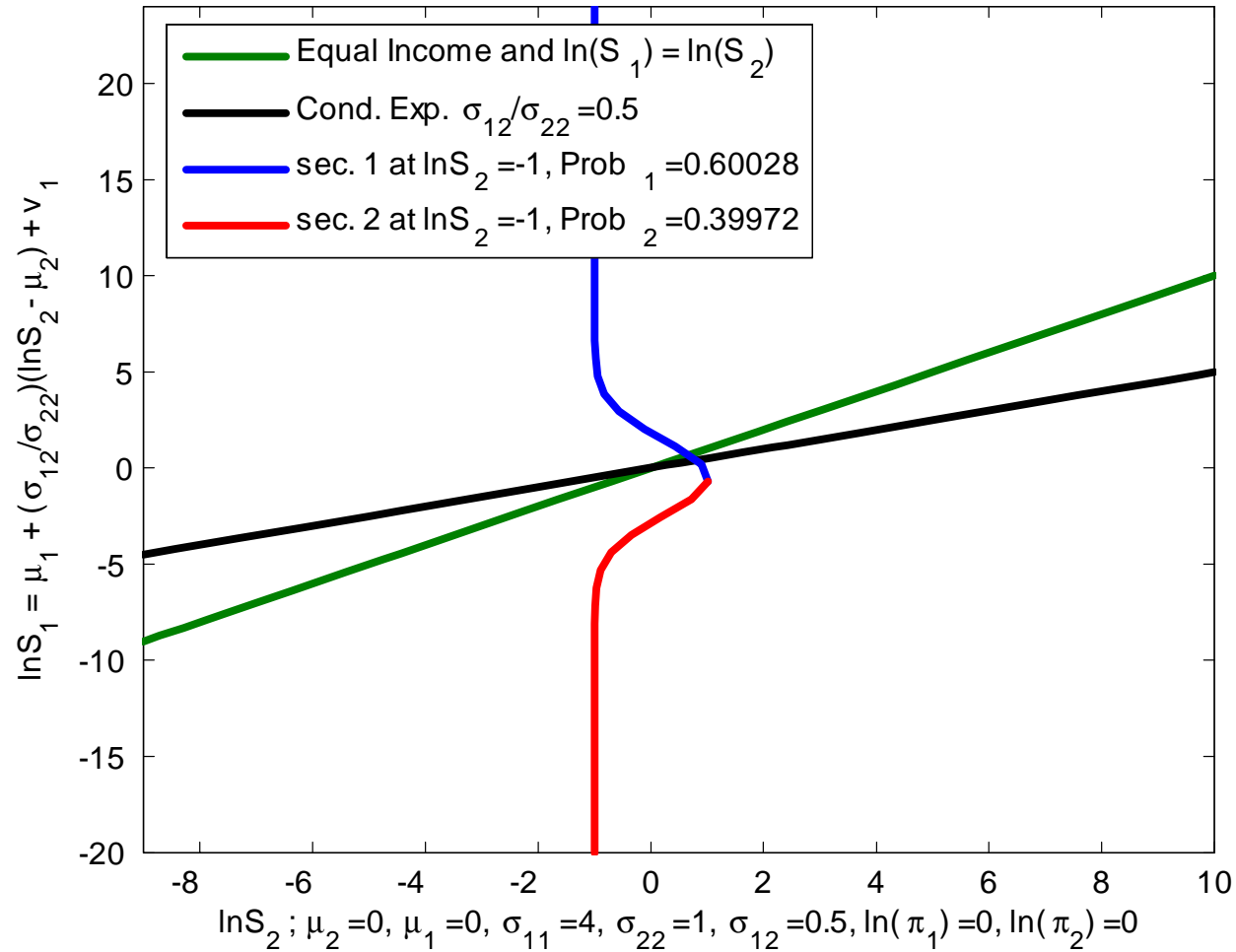
$$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = -4) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = -4) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ \ 0.5 \\ 0.5 \ \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- sec. 1 at $\ln S_2 = -3$, $\text{Prob}_1 = 0.77703$
- sec. 2 at $\ln S_2 = -3$, $\text{Prob}_2 = 0.22297$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 0.5$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
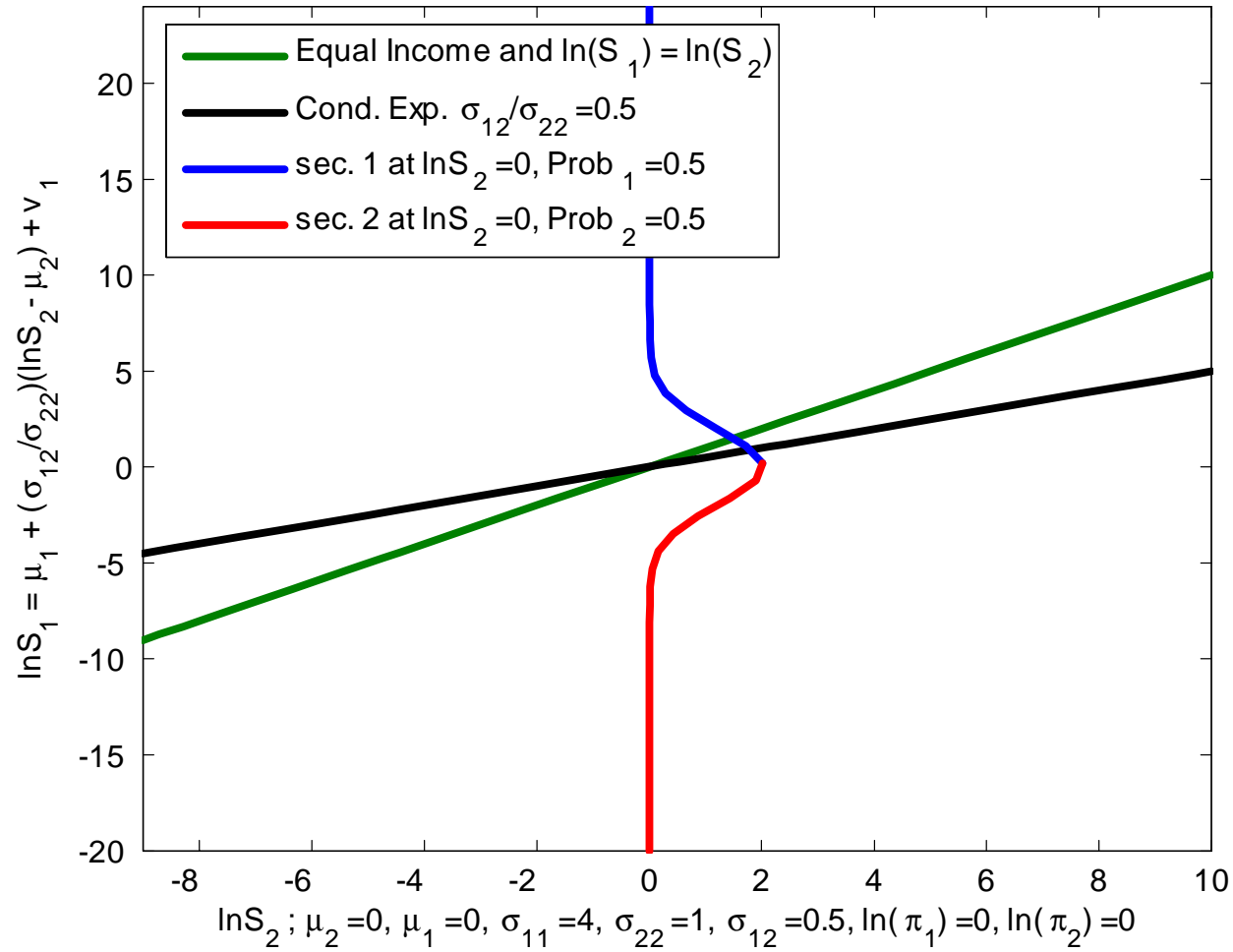
$$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = -3) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = -3) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.5 \\ 0.5 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



**Legend:**
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- sec. 1 at $\ln S_2 = -2$, $\text{Prob}_1 = 0.69432$
- sec. 2 at $\ln S_2 = -2$, $\text{Prob}_2 = 0.30568$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 0.5$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \mid \ln S_2 = -2\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \mid \ln S_2 = -2\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \; \sigma_{12} \\ \sigma_{12} \; \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \; 0.5 \\ 0.5 \; 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- sec. 1 at $\ln S_2 = -1$, $Prob_1 = 0.60028$
- sec. 2 at $\ln S_2 = -1$, $Prob_2 = 0.39972$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 0.5$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \mid \ln S_2 = -1\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \mid \ln S_2 = -1\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.5 \\ 0.5 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- sec. 1 at $\ln S_2 = 0$, $\text{Prob}_1 = 0.5$
- sec. 2 at $\ln S_2 = 0$, $\text{Prob}_2 = 0.5$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 0.5$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

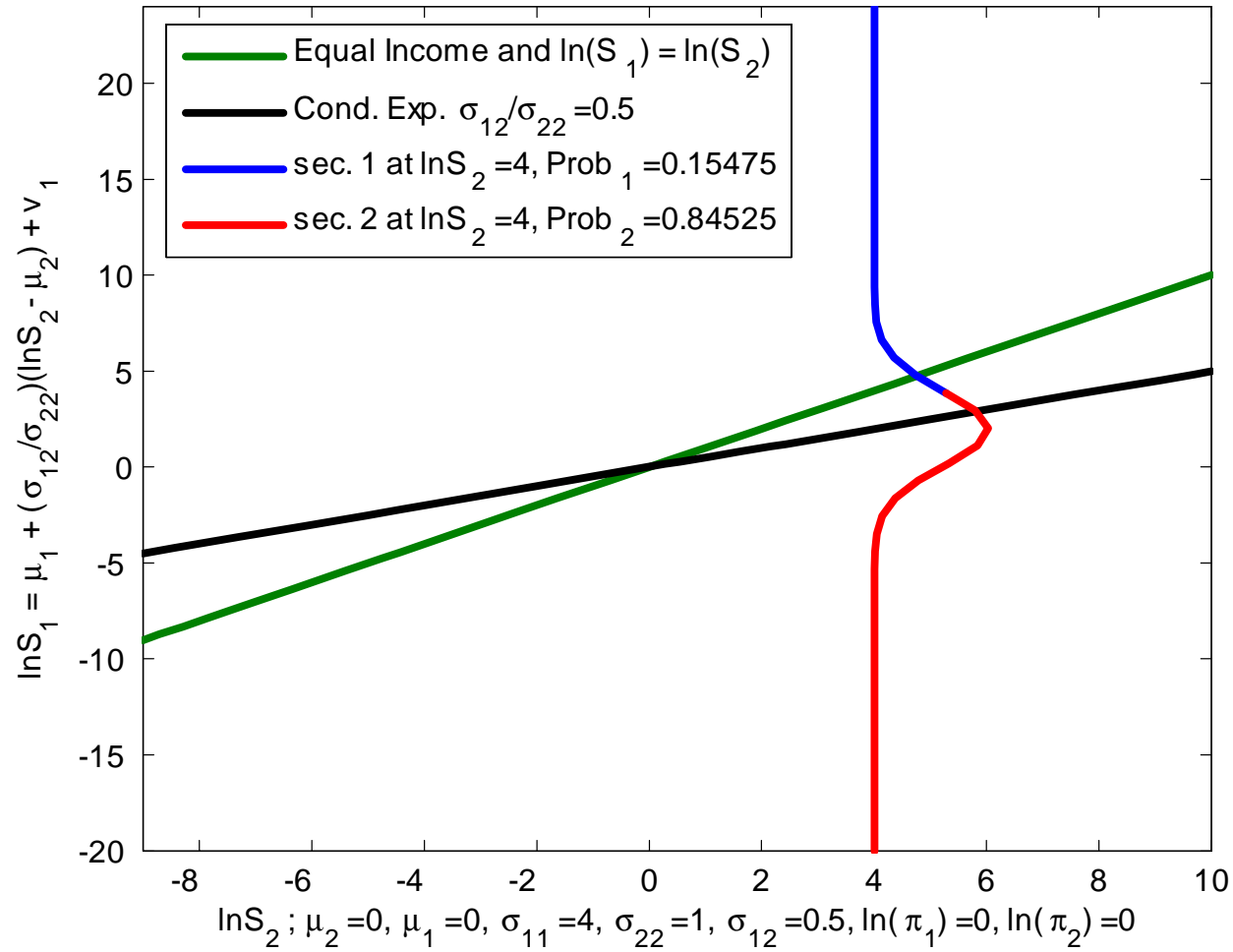$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 | \ln S_2 = 0\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 | \ln S_2 = 0\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.5 \\ 0.5 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- sec. 1 at $\ln S_2 = 1$, $\text{Prob}_1 = 0.39972$
- sec. 2 at $\ln S_2 = 1$, $\text{Prob}_2 = 0.60028$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 0.5$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
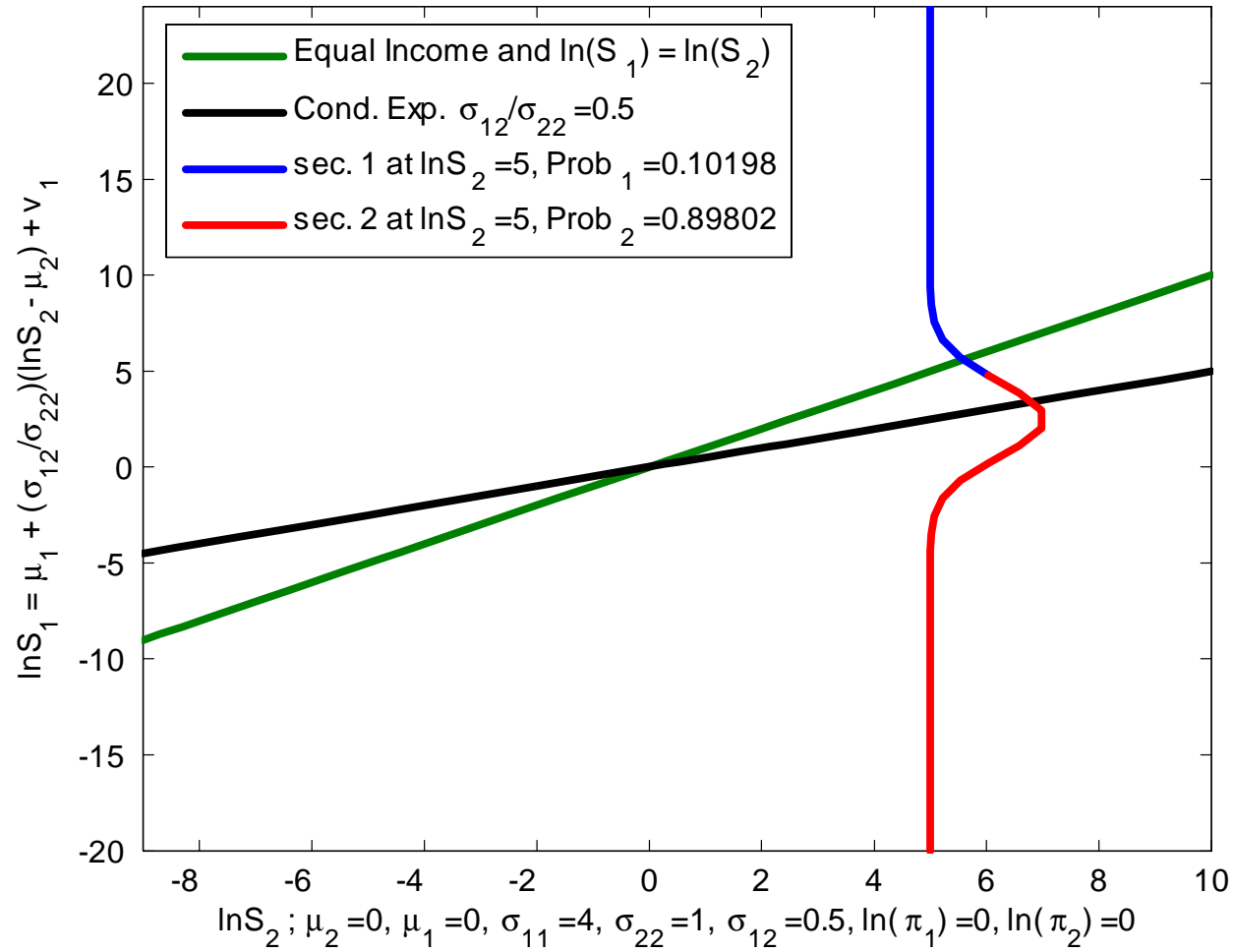
$$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = 1) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = 1) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\ \ 0.5 \\ 0.5\ \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} \left( \ln S_2 - \mu_2 \right) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \mid \ln S_2 = 2\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \mid \ln S_2 = 2\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ \ 0.5 \\ 0.5 \ \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



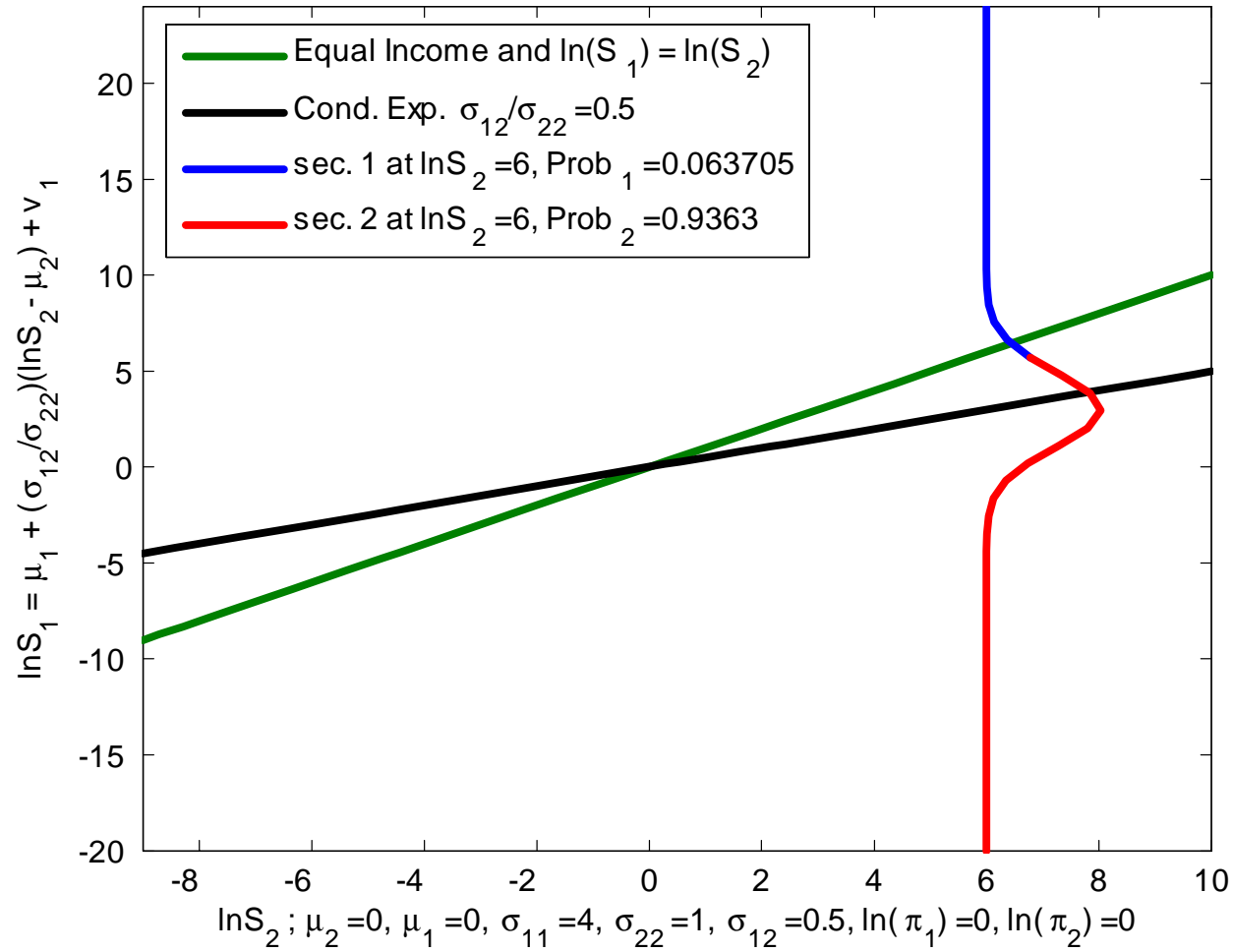$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = 3) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = 3) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.5 \\ 0.5 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



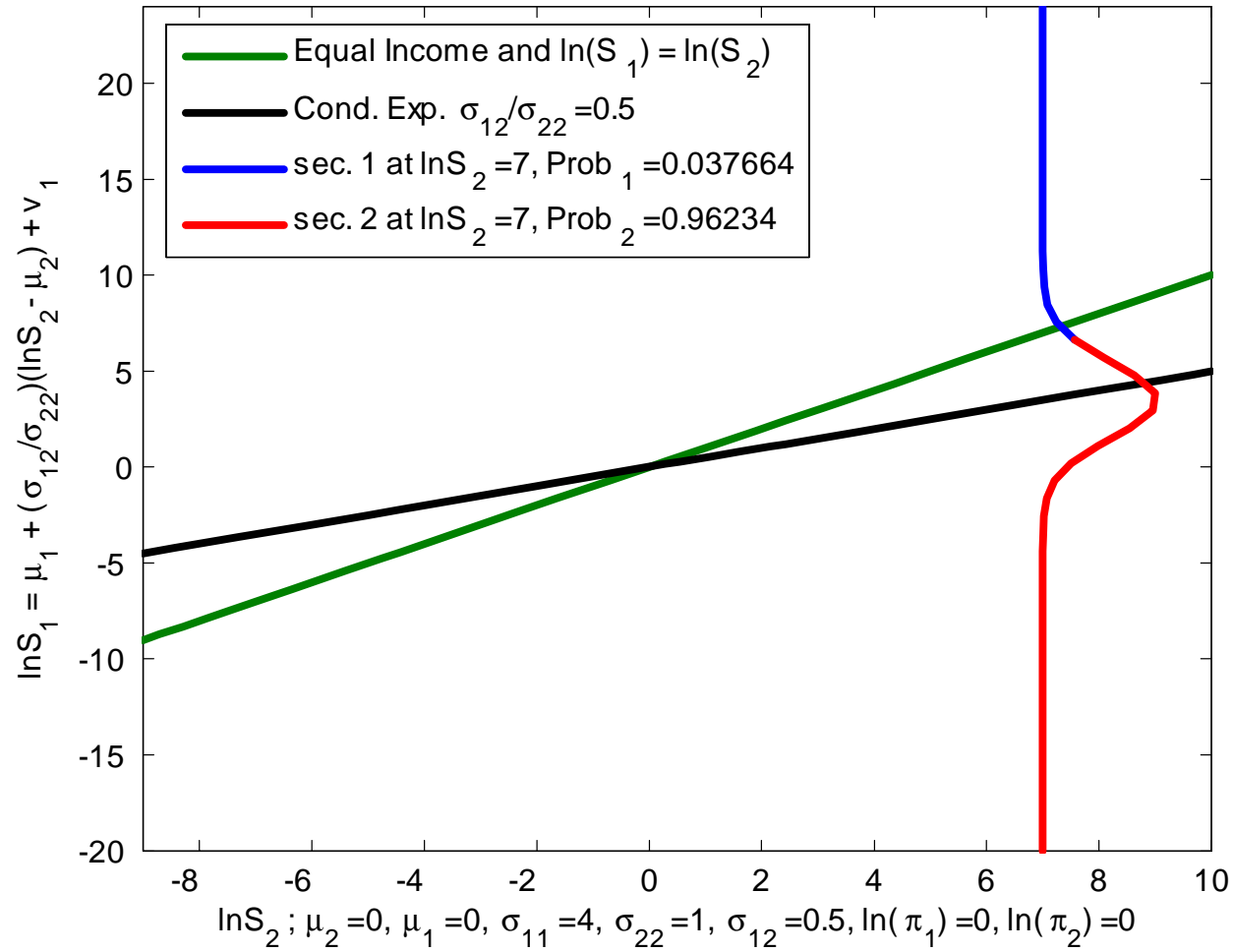$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = 4) \Rightarrow \text{Pr. of Working at Sector 1}$

$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = 4) \Rightarrow \text{Pr. of Working at Sector 2}$

Parameters:

$$\begin{bmatrix} \sigma_{11} \, \sigma_{12} \\ \sigma_{12} \, \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \;\; 0.5 \\ 0.5 \;\; 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 0.5$
- sec. 1 at $\ln S_2 = 5$, $\text{Prob}_1 = 0.10198$
- sec. 2 at $\ln S_2 = 5$, $\text{Prob}_2 = 0.89802$

Vertical axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

Horizontal axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 0.5$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \mid \ln S_2 = 5\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \mid \ln S_2 = 5\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 0.5 \\ 0.5 \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} ; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} ;$$

# Graph of $\ln S_1 = f(\ln S_2)$



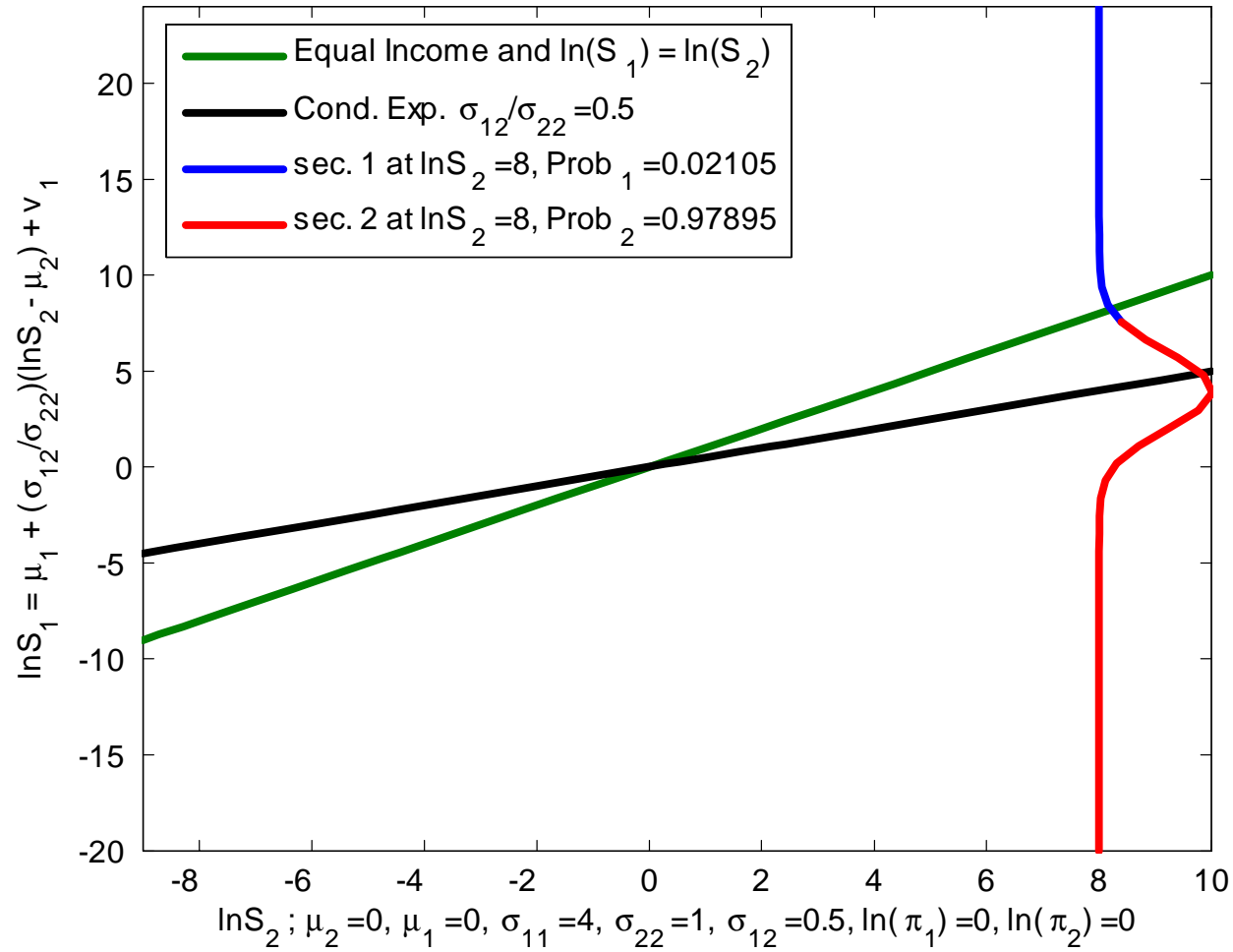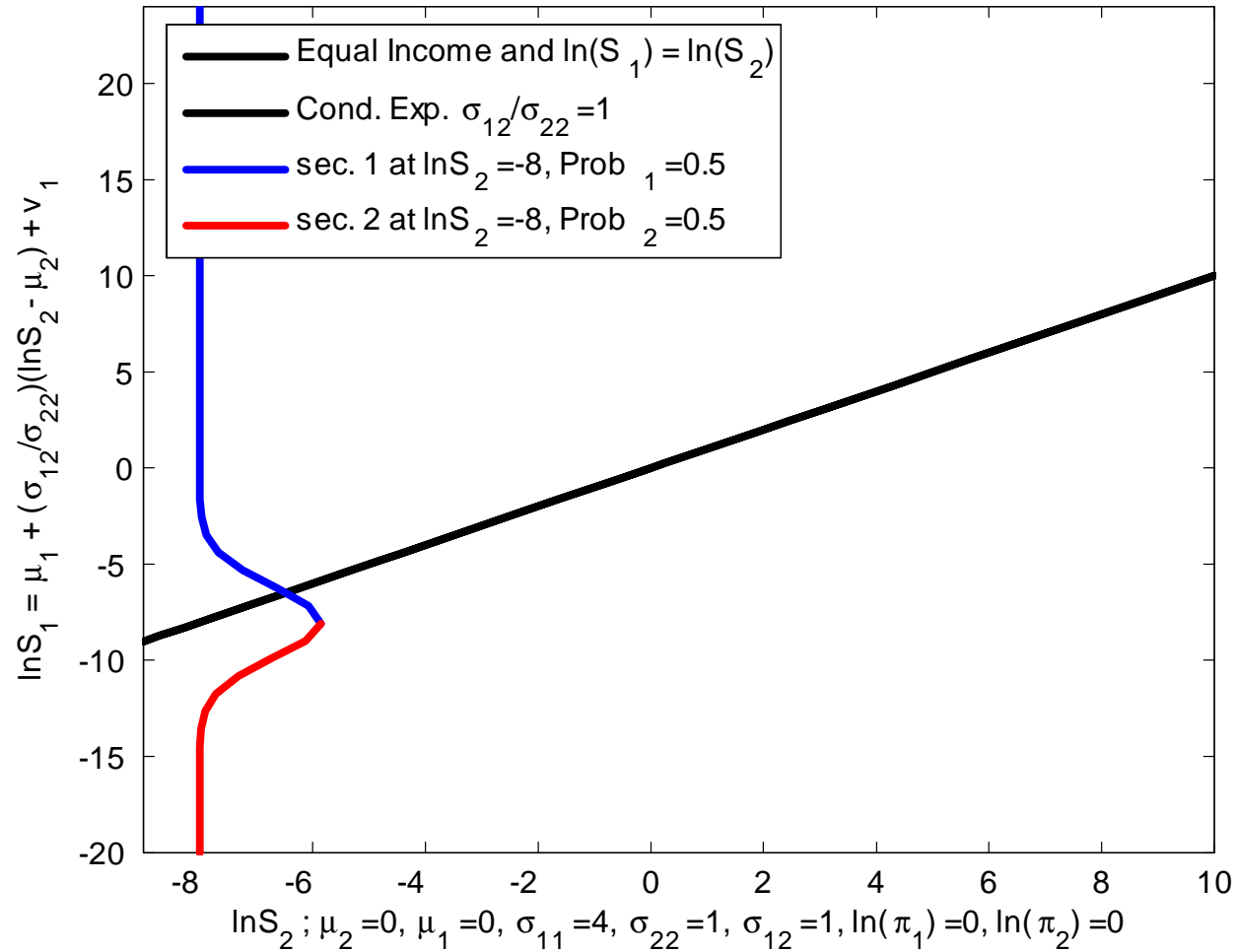$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = 6) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = 6) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.5 \\ 0.5 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

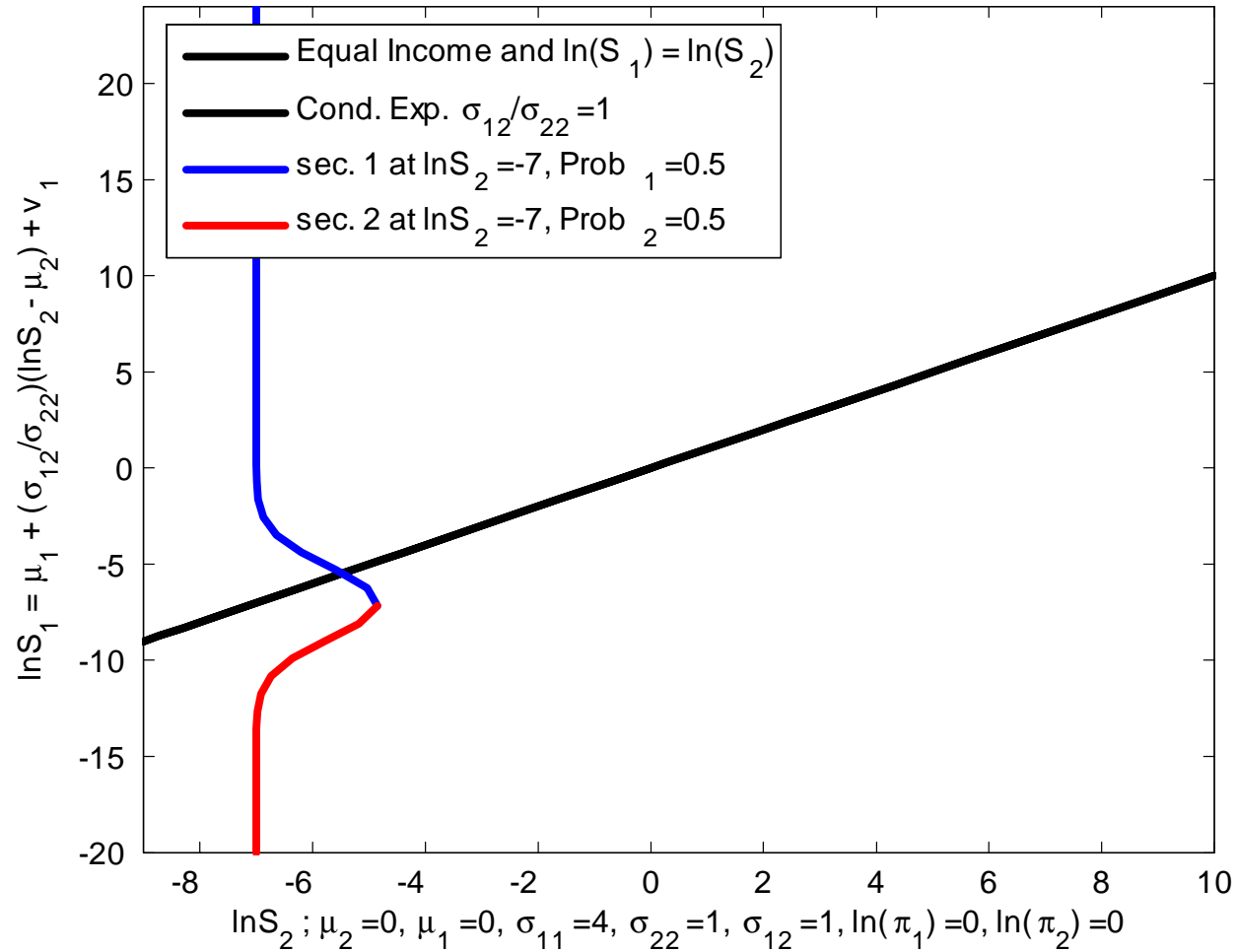$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = 7) \Rightarrow \text{Pr. of Working at Sector 1}$

$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = 7) \Rightarrow \text{Pr. of Working at Sector 2}$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 0.5 \\ 0.5 \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



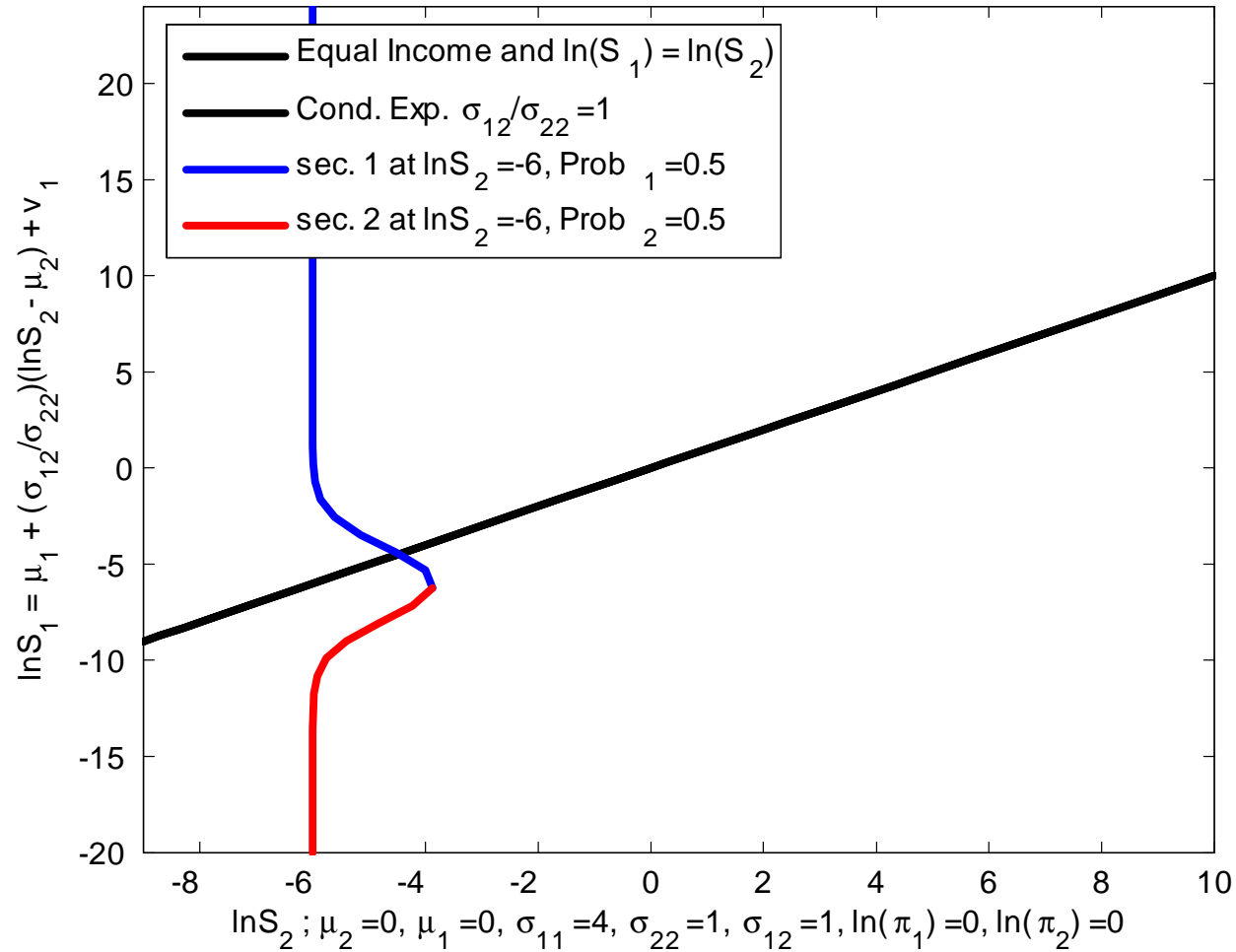$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

$$\text{Prob}_1 = \text{Pr}\left(W_1 > W_2 \middle| \ln S_2 = 8\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \text{Pr}\left(W_1 < W_2 \middle| \ln S_2 = 8\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\,\sigma_{12} \\ \sigma_{12}\,\sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0.5 \\ 0.5 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1$
- sec. 1 at $\ln S_2 = -8$, $\text{Prob}_1 = 0.5$
- sec. 2 at $\ln S_2 = -8$, $\text{Prob}_2 = 0.5$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \middle| \ln S_2 = -8\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \middle| \ln S_2 = -8\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\ 1 \\ 1\ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

## Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1$
- sec. 1 at $\ln S_2 = -7$, $\text{Prob}_1 = 0.5$
- sec. 2 at $\ln S_2 = -7$, $\text{Prob}_2 = 0.5$

Vertical axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

Horizontal axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \mid \ln S_2 = -7\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \mid \ln S_2 = -7\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1$
- sec. 1 at $\ln S_2 = -6$, $\text{Prob}_1 = 0.5$
- sec. 2 at $\ln S_2 = -6$, $\text{Prob}_2 = 0.5$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \middle| \ln S_2 = -6\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \middle| \ln S_2 = -6\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1 \\ 1 \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1$
- sec. 1 at $\ln S_2 = -5$, $\text{Prob}_1 = 0.5$
- sec. 2 at $\ln S_2 = -5$, $\text{Prob}_2 = 0.5$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \middle| \ln S_2 = -5\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \middle| \ln S_2 = -5\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1 \\ 1 \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



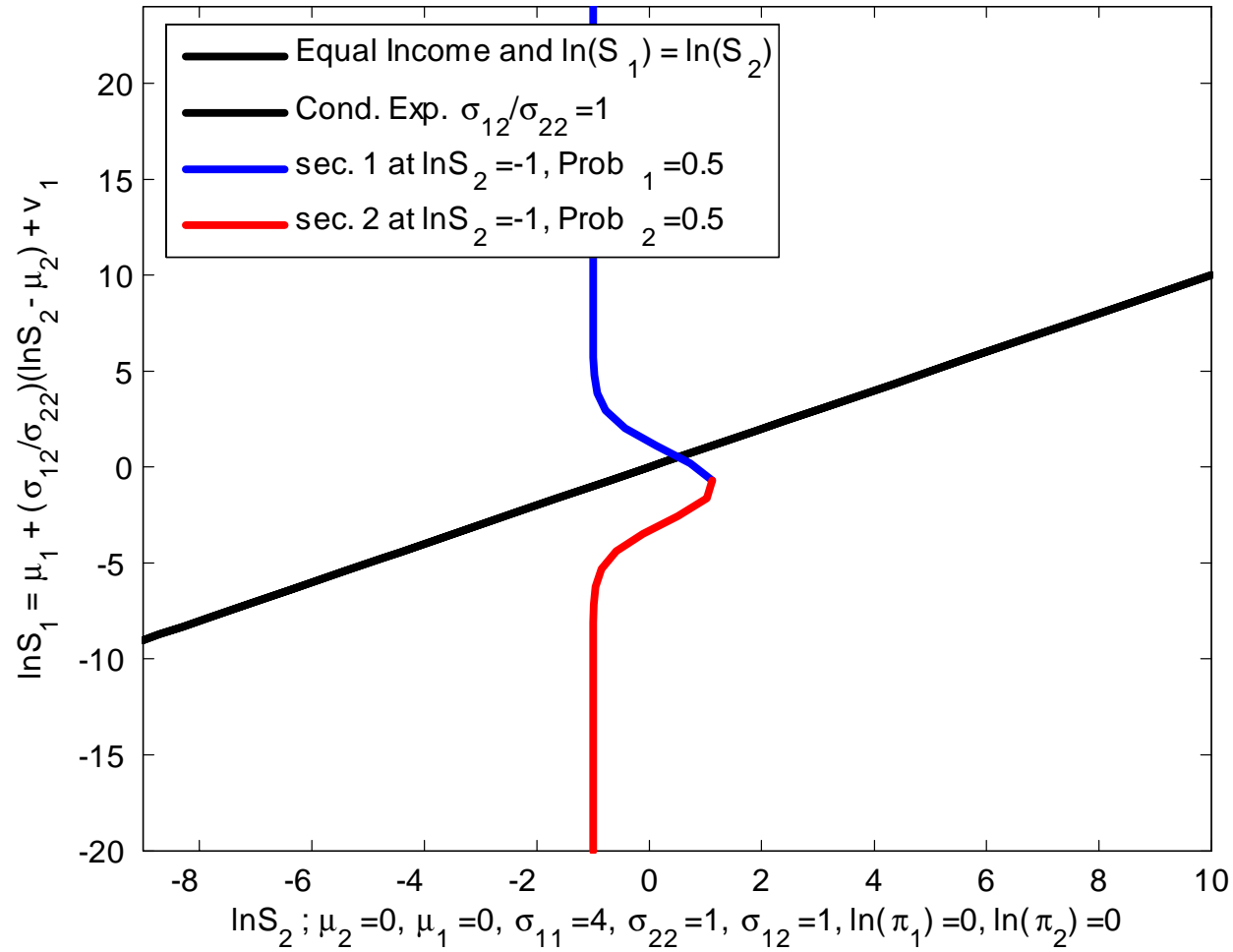$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
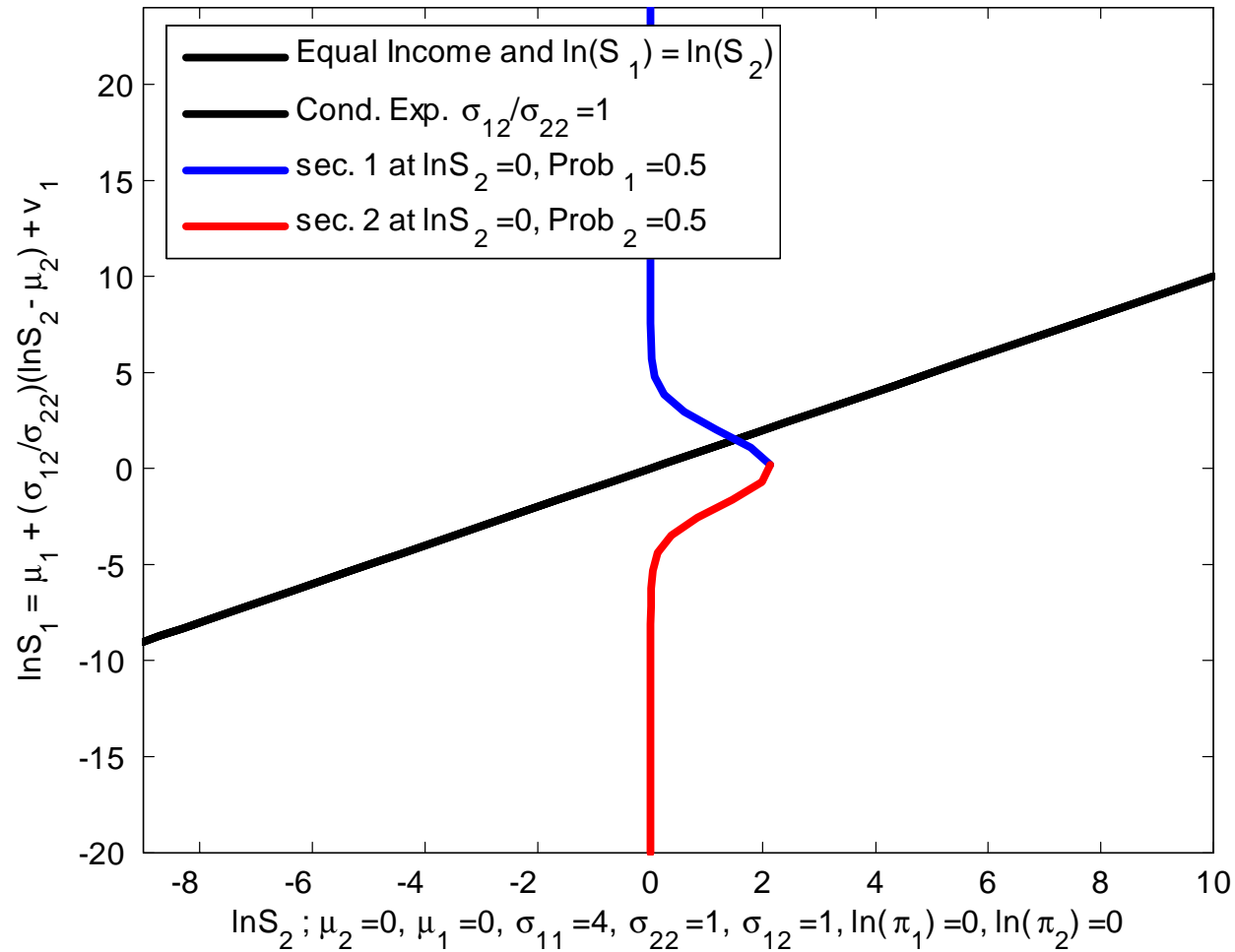
$$\text{Prob}_1 = \text{Pr}(W_1 > W_2 | \ln S_2 = -4) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \text{Pr}(W_1 < W_2 | \ln S_2 = -4) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1$
- sec. 1 at $\ln S_2 = -3$, $\text{Prob}_1 = 0.5$
- sec. 2 at $\ln S_2 = -3$, $\text{Prob}_2 = 0.5$

$y$-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

$x$-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} \left( \ln S_2 - \mu_2 \right) + v_1$$

$$\text{Prob}_1 = \Pr\left( W_1 > W_2 \middle| \ln S_2 = -3 \right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left( W_1 < W_2 \middle| \ln S_2 = -3 \right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} ; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} ;$$

# Graph of $\ln S_1 = f(\ln S_2)$



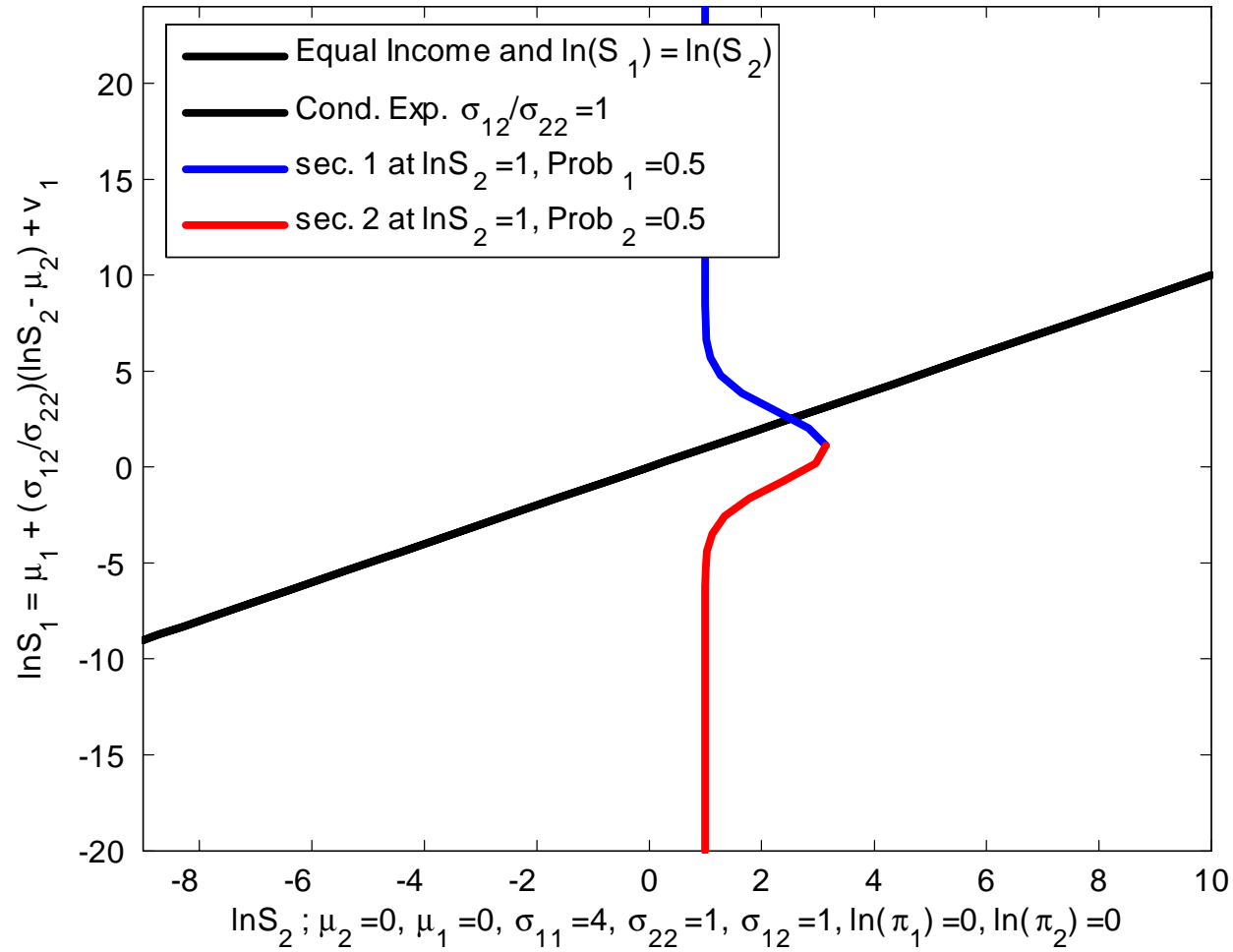$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
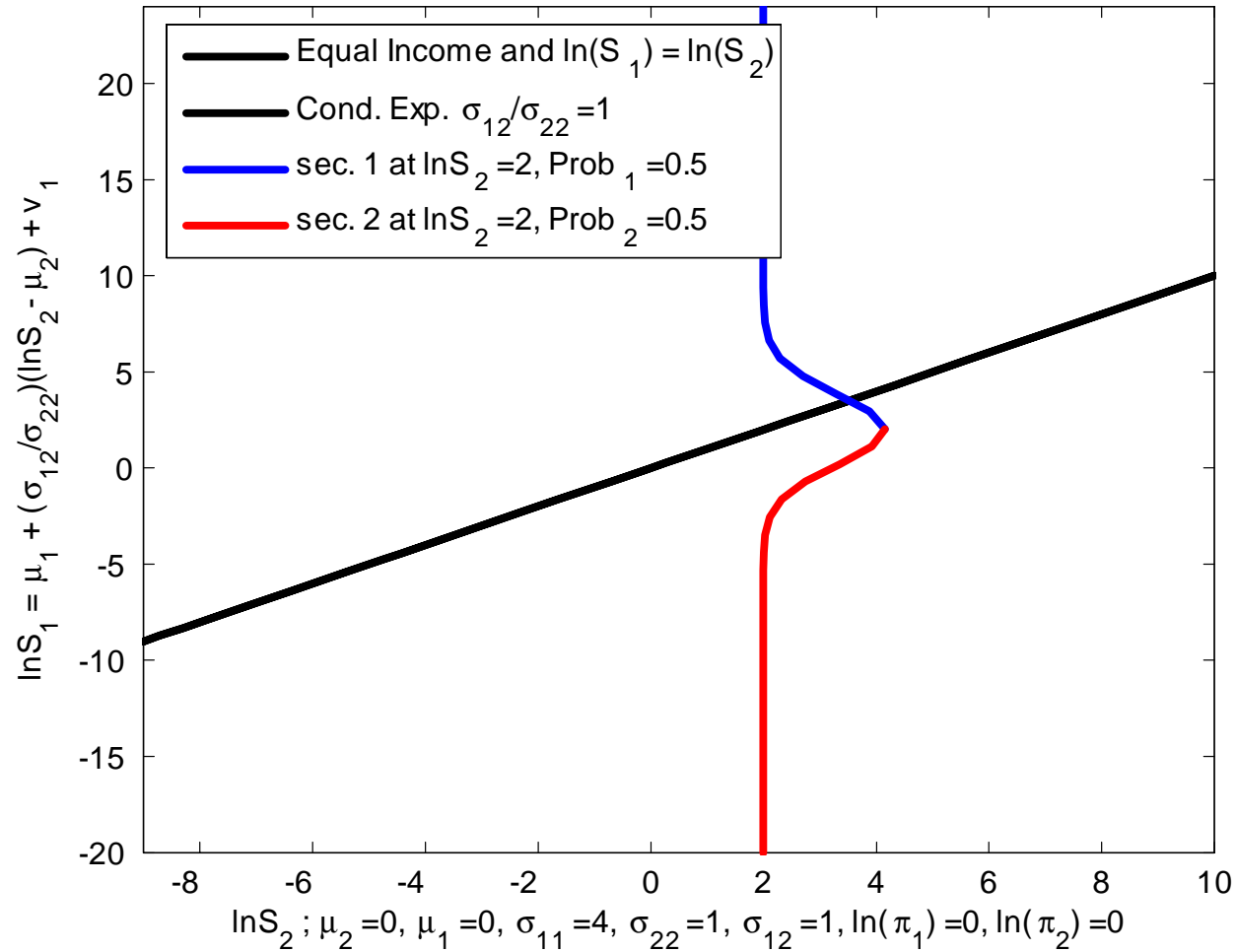
$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \mid \ln S_2 = -2\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \mid \ln S_2 = -2\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1$
- sec. 1 at $\ln S_2 = -1$, $\text{Prob}_1 = 0.5$
- sec. 2 at $\ln S_2 = -1$, $\text{Prob}_2 = 0.5$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \mid \ln S_2 = -1\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \mid \ln S_2 = -1\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



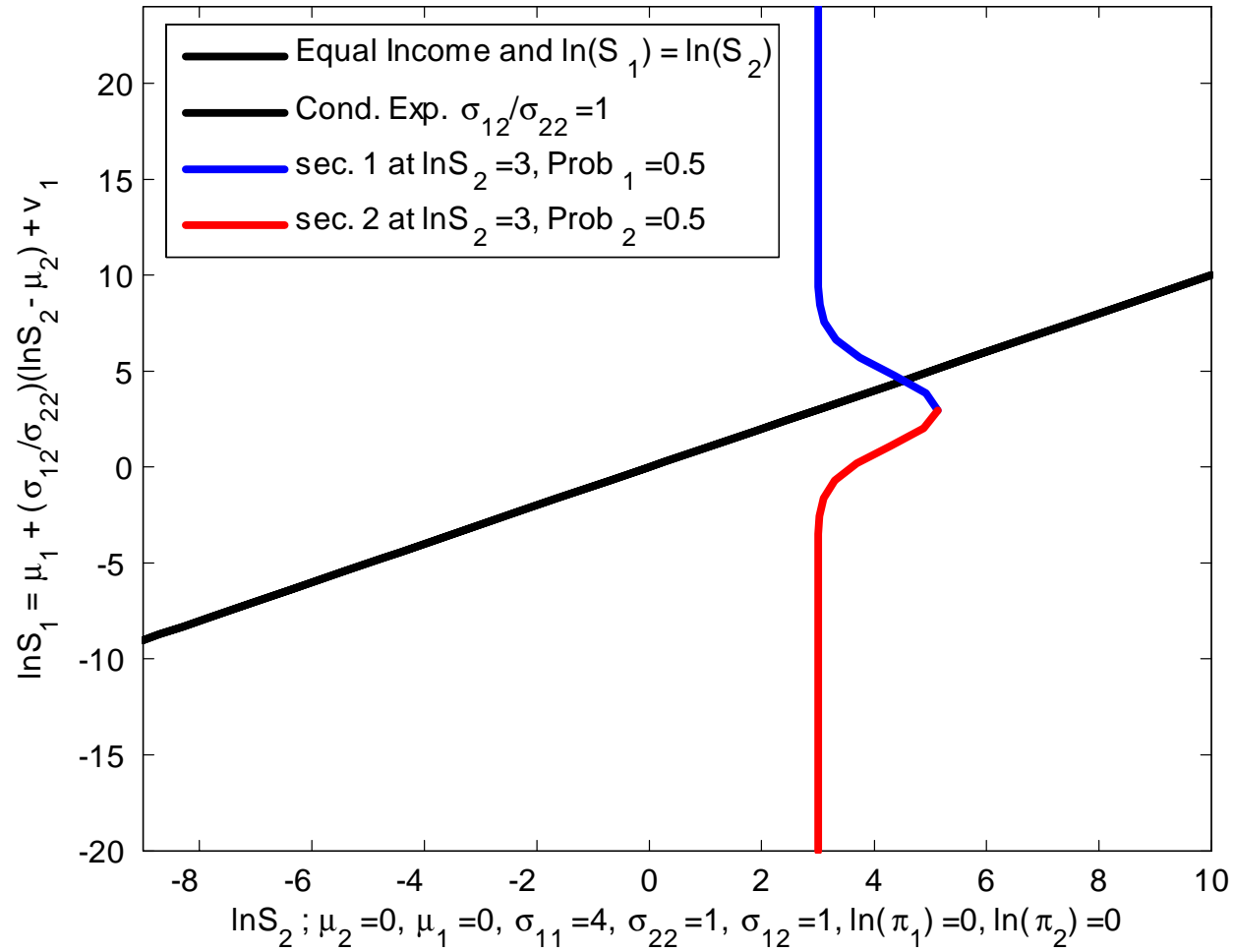$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = 0) \Rightarrow \text{Pr. of Working at Sector 1}$

$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = 0) \Rightarrow \text{Pr. of Working at Sector 2}$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1 \\ 1 \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



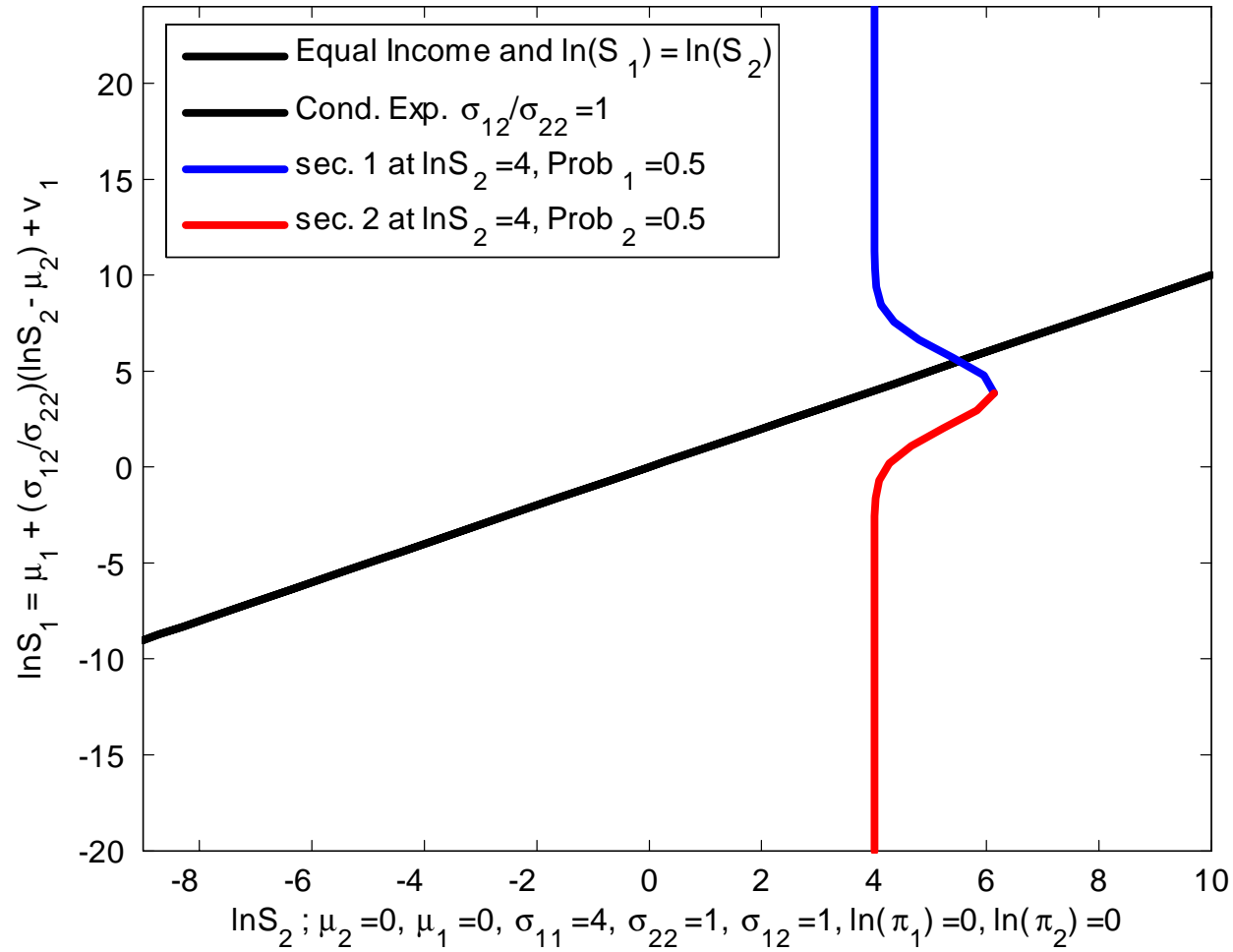$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \middle| \ln S_2 = 1\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \middle| \ln S_2 = 1\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

$\text{Prob}_1 = \Pr\left(W_1 > W_2 \mid \ln S_2 = 2\right) \Rightarrow \Pr. \text{ of Working at Sector 1}$

$\text{Prob}_2 = \Pr\left(W_1 < W_2 \mid \ln S_2 = 2\right) \Rightarrow \Pr. \text{ of Working at Sector 2}$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



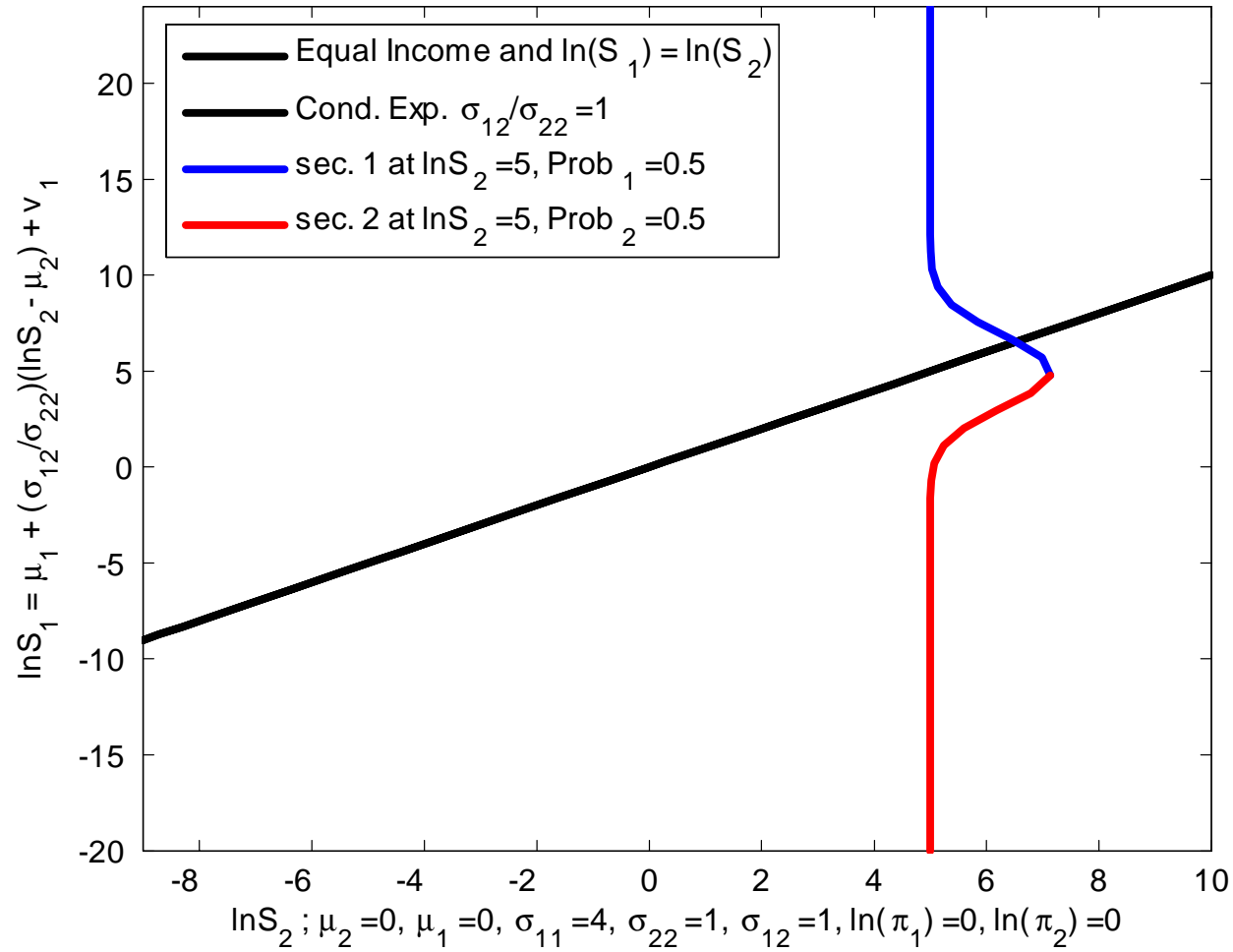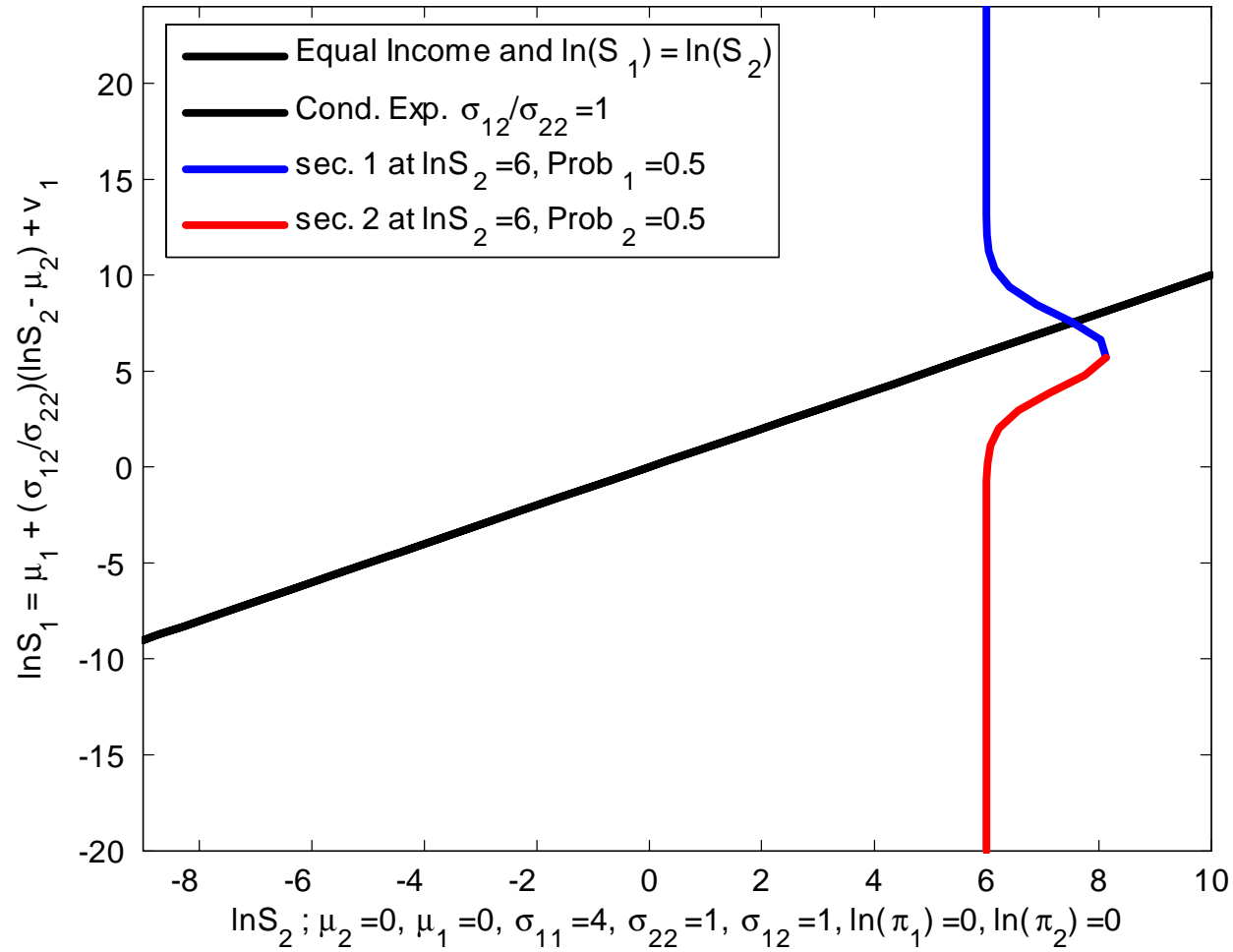$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \mid \ln S_2 = 3\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \mid \ln S_2 = 3\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \; \sigma_{12} \\ \sigma_{12} \; \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\;1 \\ 1\;1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1$
- sec. 1 at $\ln S_2 = 4$, $\text{Prob}_1 = 0.5$
- sec. 2 at $\ln S_2 = 4$, $\text{Prob}_2 = 0.5$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 | \ln S_2 = 4\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 | \ln S_2 = 4\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



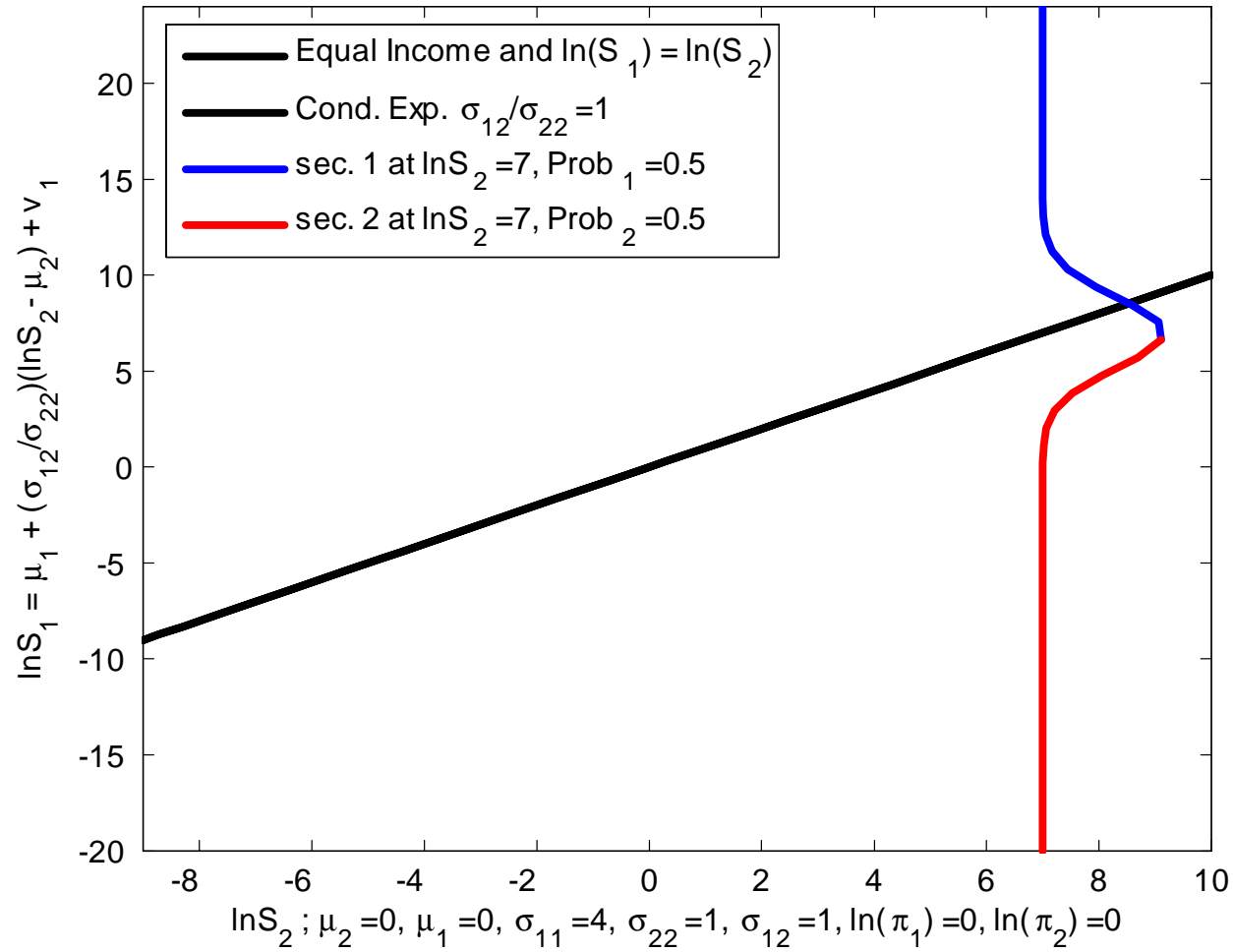$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
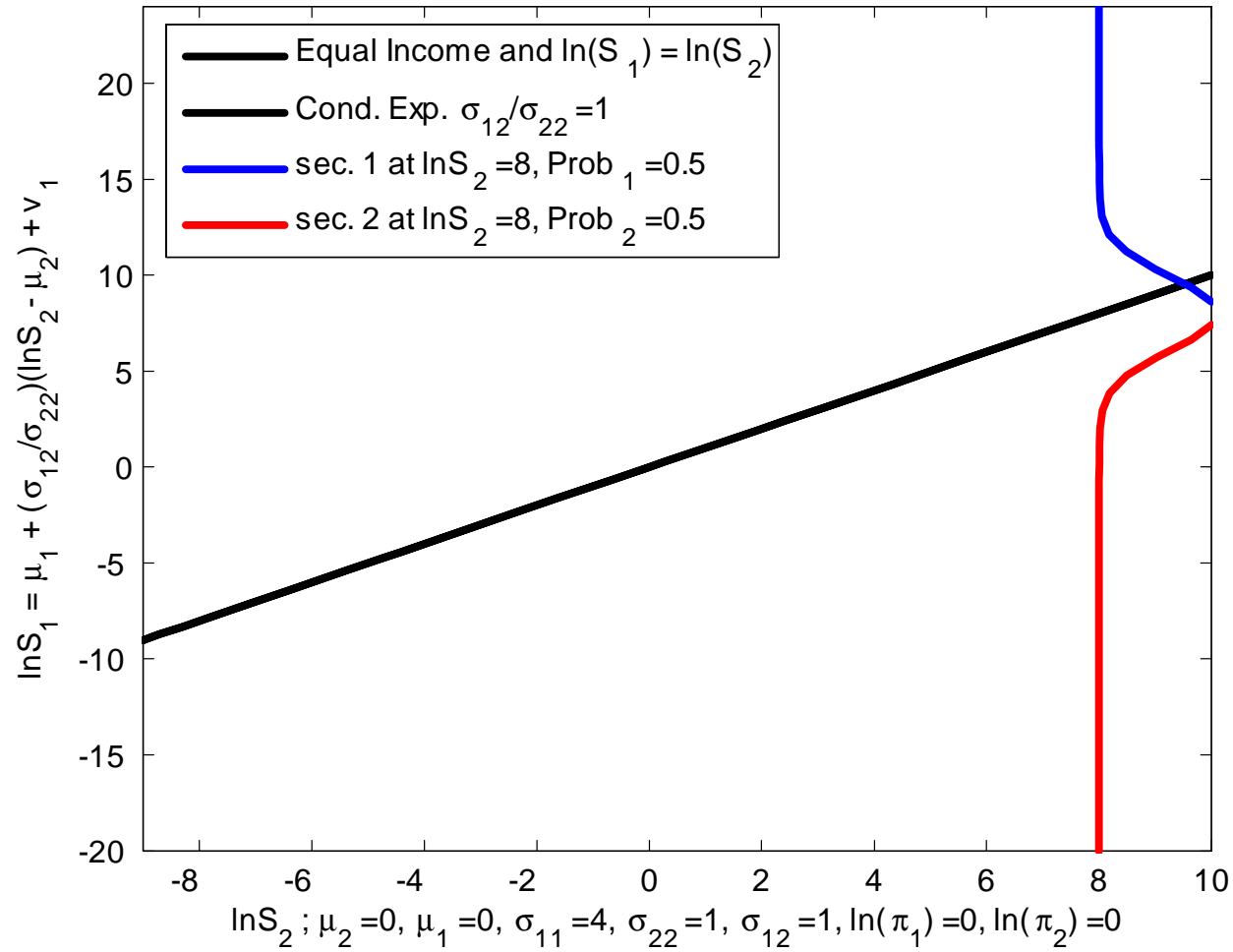
$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \mid \ln S_2 = 5\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \mid \ln S_2 = 5\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \middle| \ln S_2 = 6\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \middle| \ln S_2 = 6\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1$
- sec. 1 at $\ln S_2 = 7$, $\text{Prob}_1 = 0.5$
- sec. 2 at $\ln S_2 = 7$, $\text{Prob}_2 = 0.5$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

$\text{Prob}_1 = \Pr\left(W_1 > W_2\middle|\ln S_2 = 7\right) \Rightarrow \text{Pr. of Working at Sector 1}$

$\text{Prob}_2 = \Pr\left(W_1 < W_2\middle|\ln S_2 = 7\right) \Rightarrow \text{Pr. of Working at Sector 2}$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\ 1 \\ 1\ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
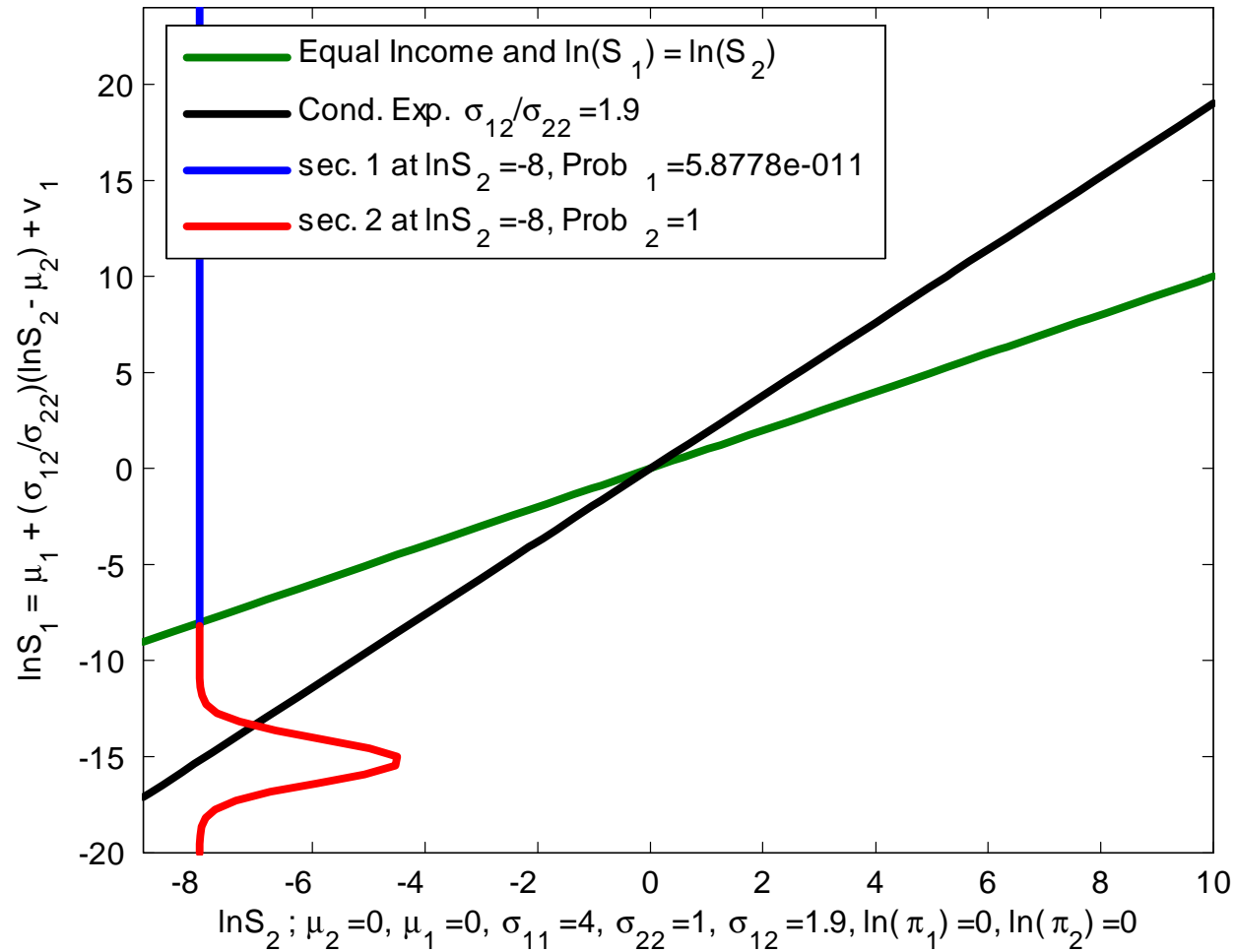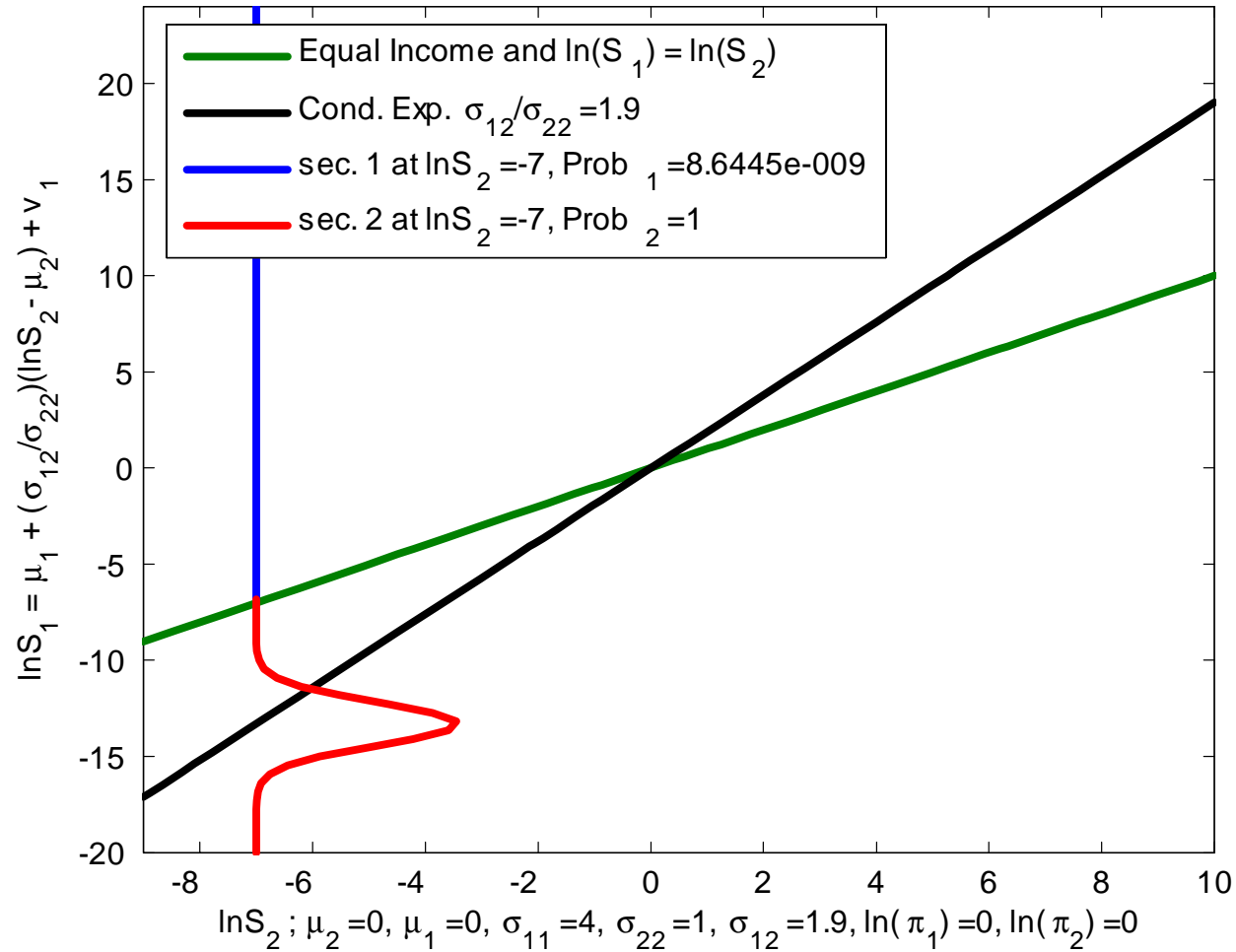
$$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = 8) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = 8) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
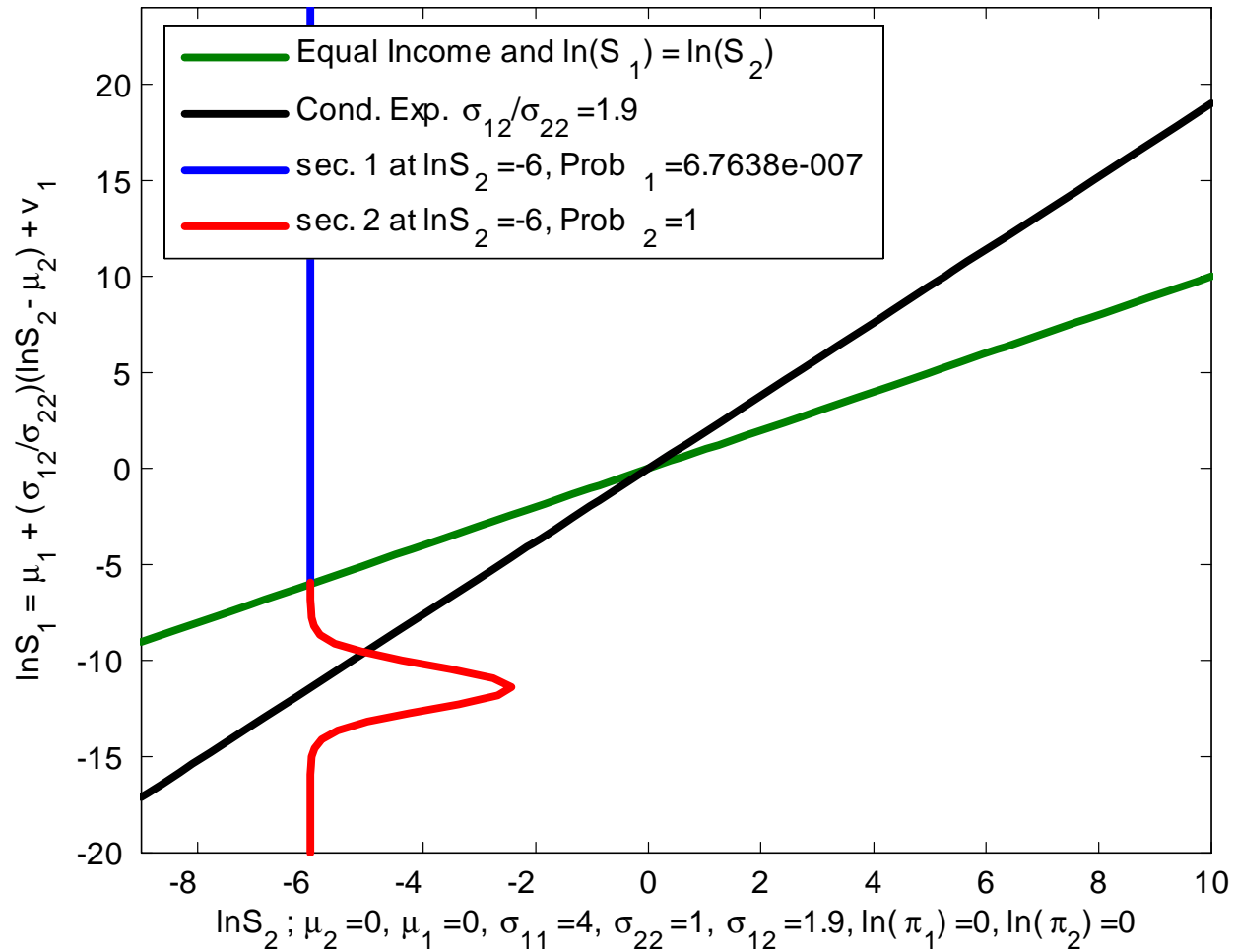
$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \middle| \ln S_2 = -8\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \middle| \ln S_2 = -8\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.9 \\ 1.9 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

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# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \middle| \ln S_2 = -7\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \middle| \ln S_2 = -7\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\ \ 1.9 \\ 1.9\ \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

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# Graph of $\ln S_1 = f(\ln S_2)$



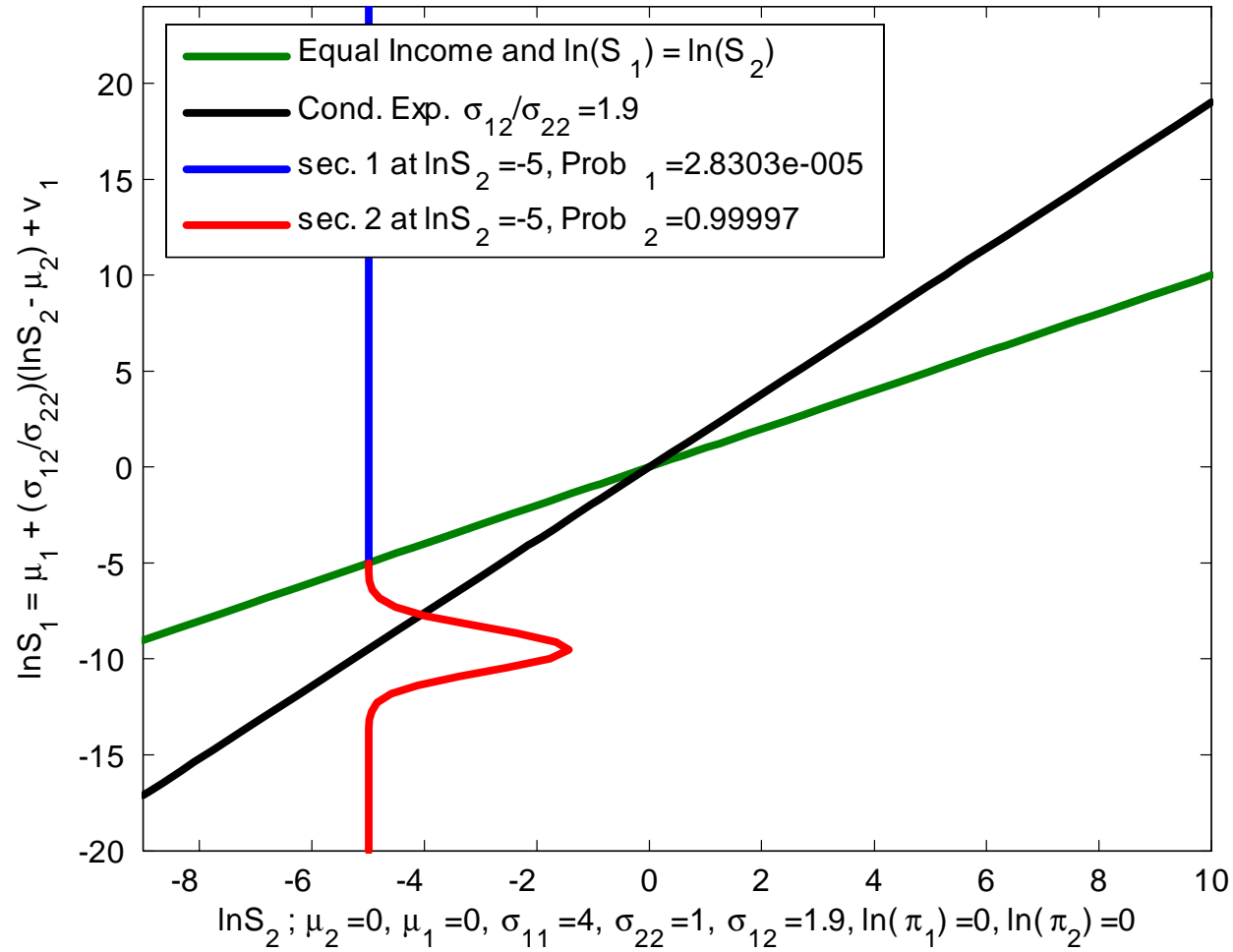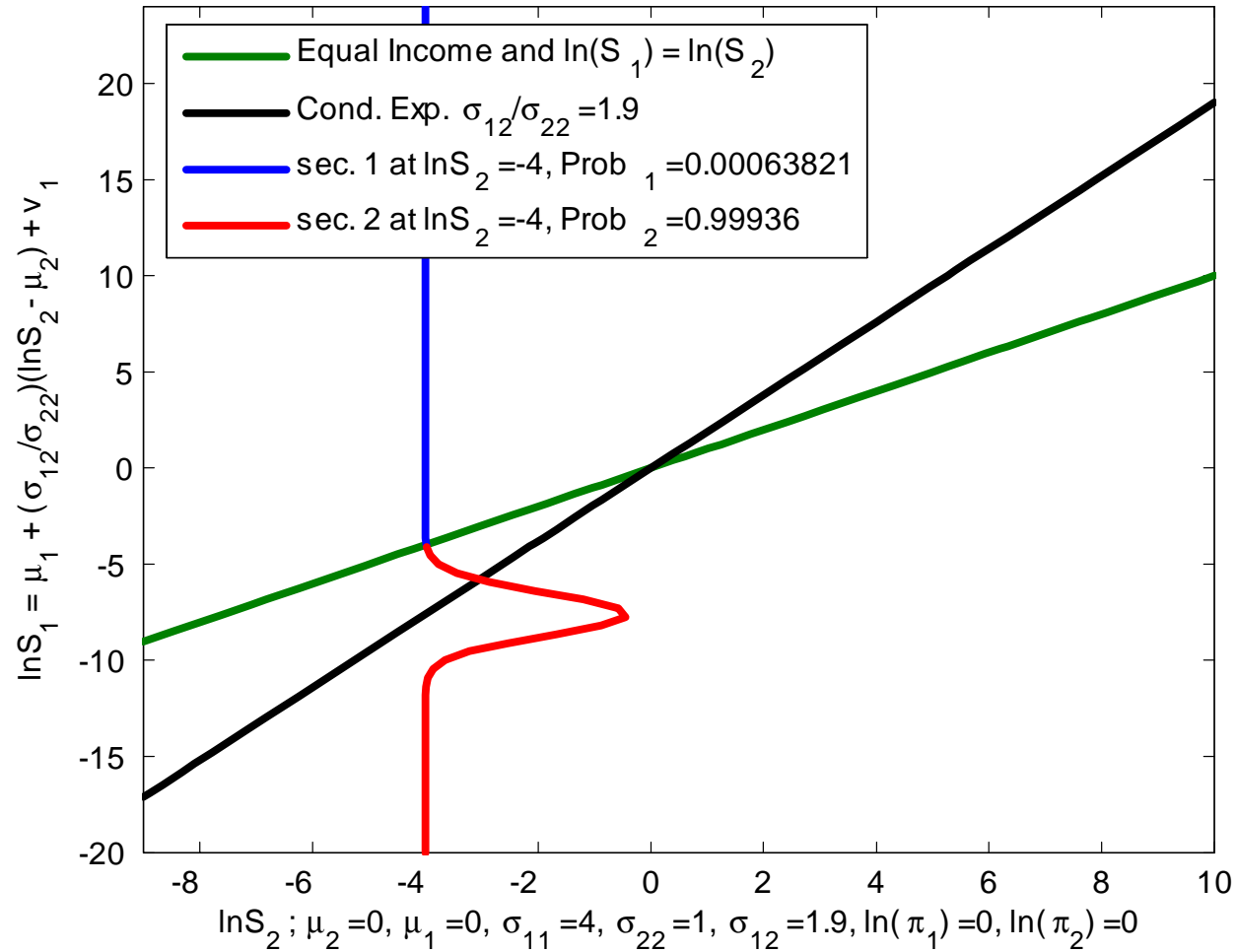$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 | \ln S_2 = -6\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 | \ln S_2 = -6\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\ \ 1.9 \\ 1.9\ \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

**Graph of $\ln S_1 = f(\ln S_2)$**

Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.9$
- sec. 1 at $\ln S_2 = -5$, $\text{Prob}_1 = 2.8303\text{e-}005$
- sec. 2 at $\ln S_2 = -5$, $\text{Prob}_2 = 0.99997$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1.9$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = -5) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = -5) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1.9 \\ 1.9 \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

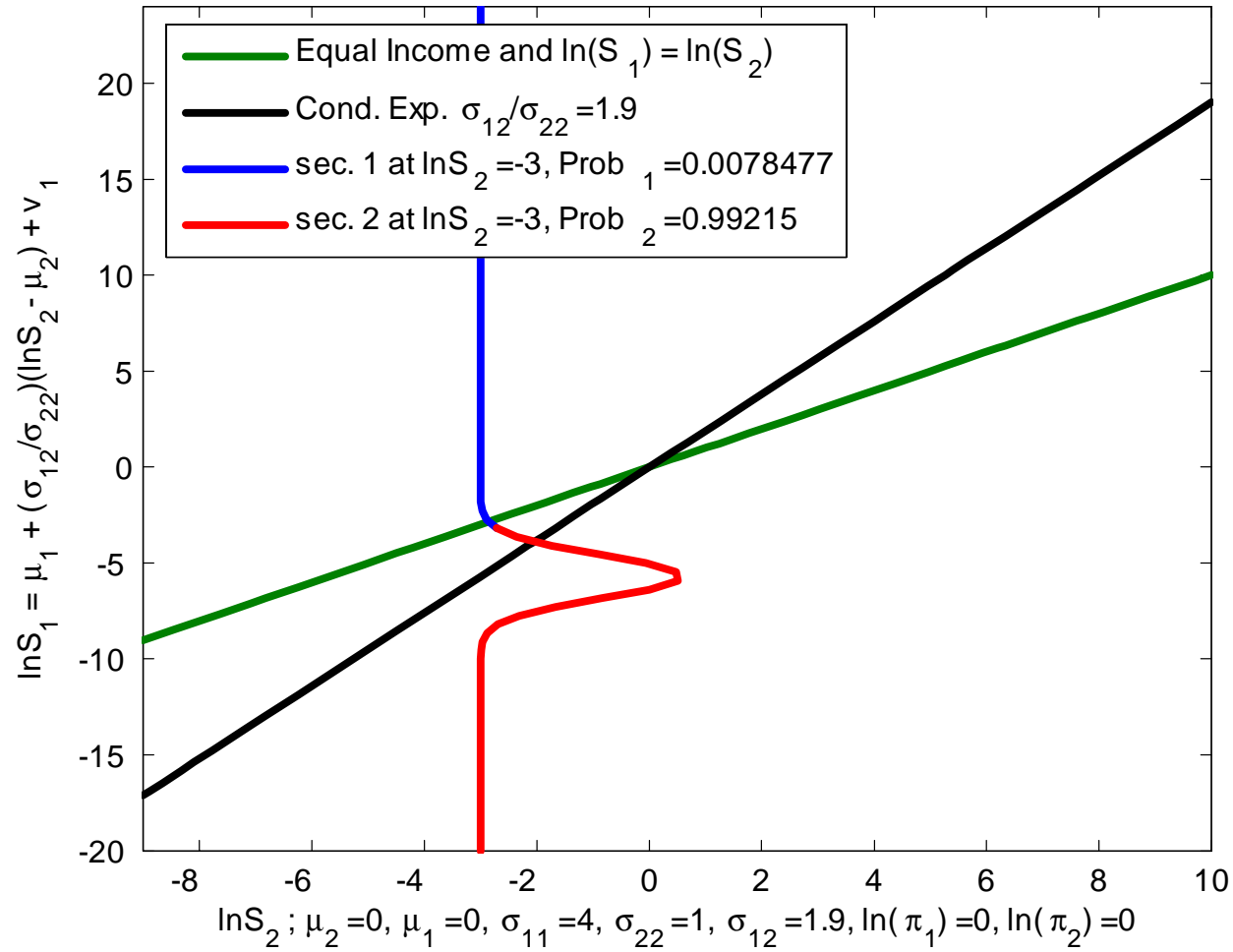$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = -4) \Rightarrow \text{Pr. of Working at Sector 1}$

$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = -4) \Rightarrow \text{Pr. of Working at Sector 2}$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1.9 \\ 1.9 \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



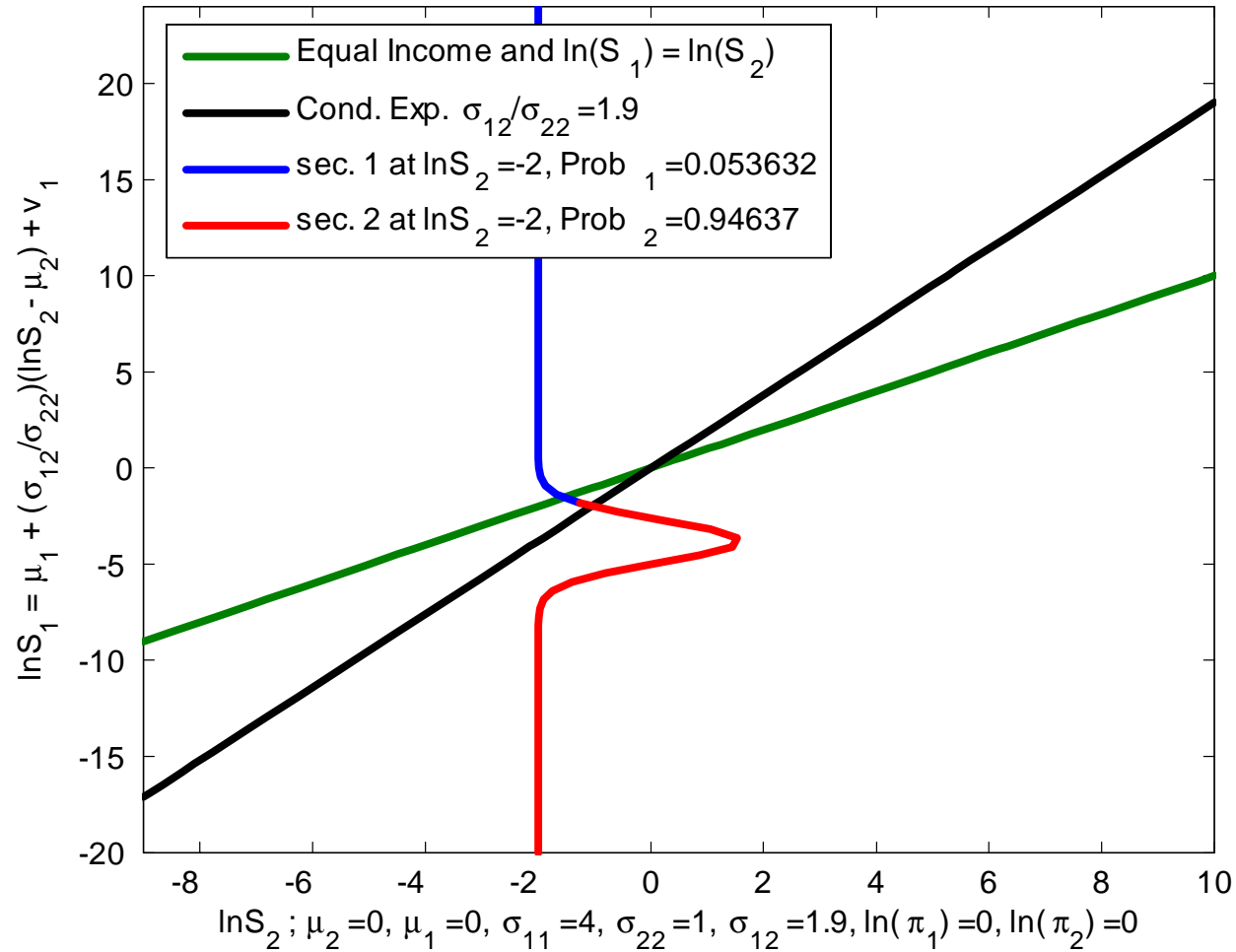$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = -3) \Rightarrow \text{Pr. of Working at Sector 1}$

$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = -3) \Rightarrow \text{Pr. of Working at Sector 2}$

Parameters:

$$\begin{bmatrix} \sigma_{11}\ \sigma_{12} \\ \sigma_{12}\ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4\ \ 1.9 \\ 1.9\ \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
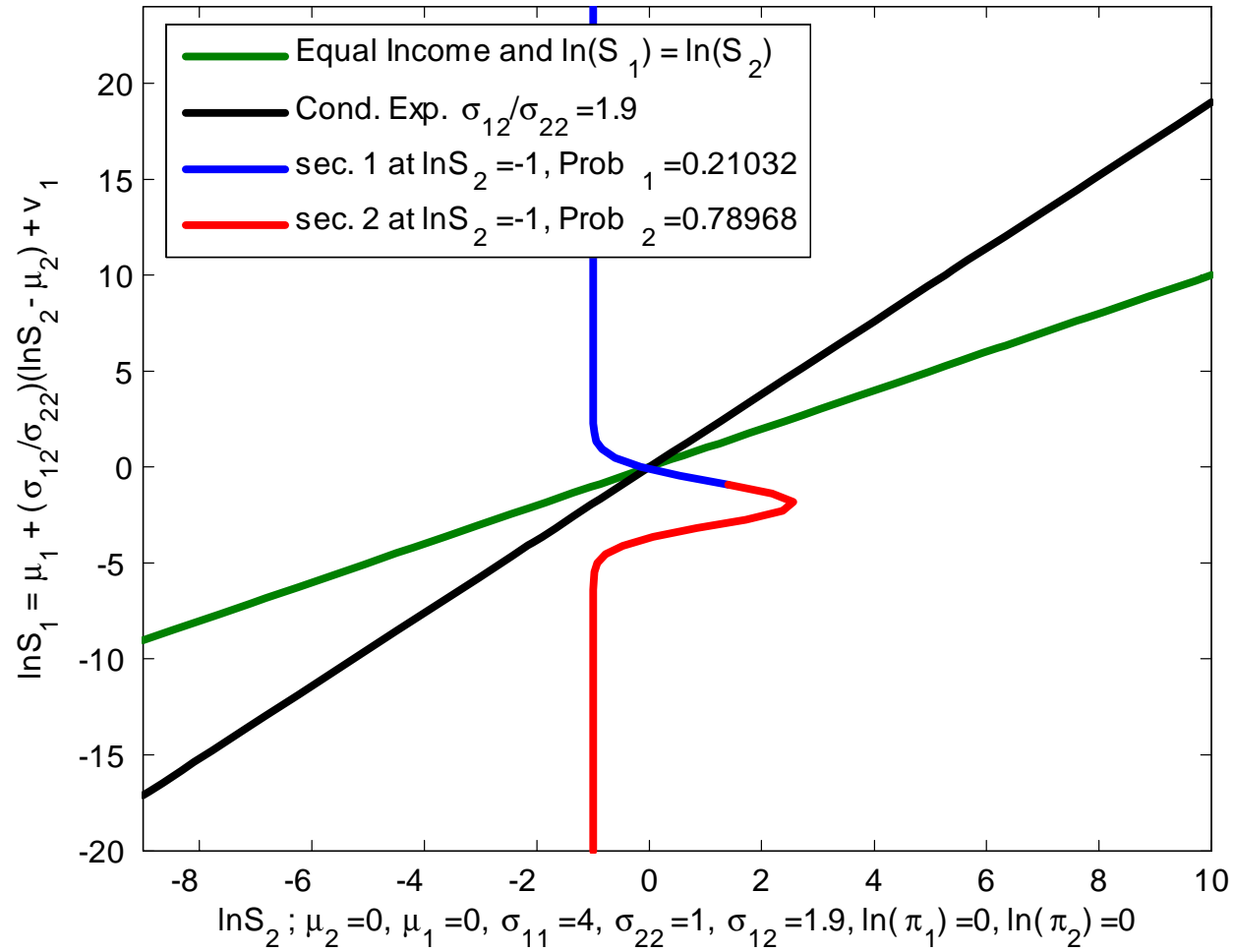
$$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = -2) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = -2) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \; \sigma_{12} \\ \sigma_{12} \; \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \; 1.9 \\ 1.9 \; 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.9$
- sec. 1 at $\ln S_2 = -1$, $\text{Prob}_1 = 0.21032$
- sec. 2 at $\ln S_2 = -1$, $\text{Prob}_2 = 0.78968$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1.9$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} (\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \middle| \ln S_2 = -1\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \middle| \ln S_2 = -1\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1.9 \\ 1.9 \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

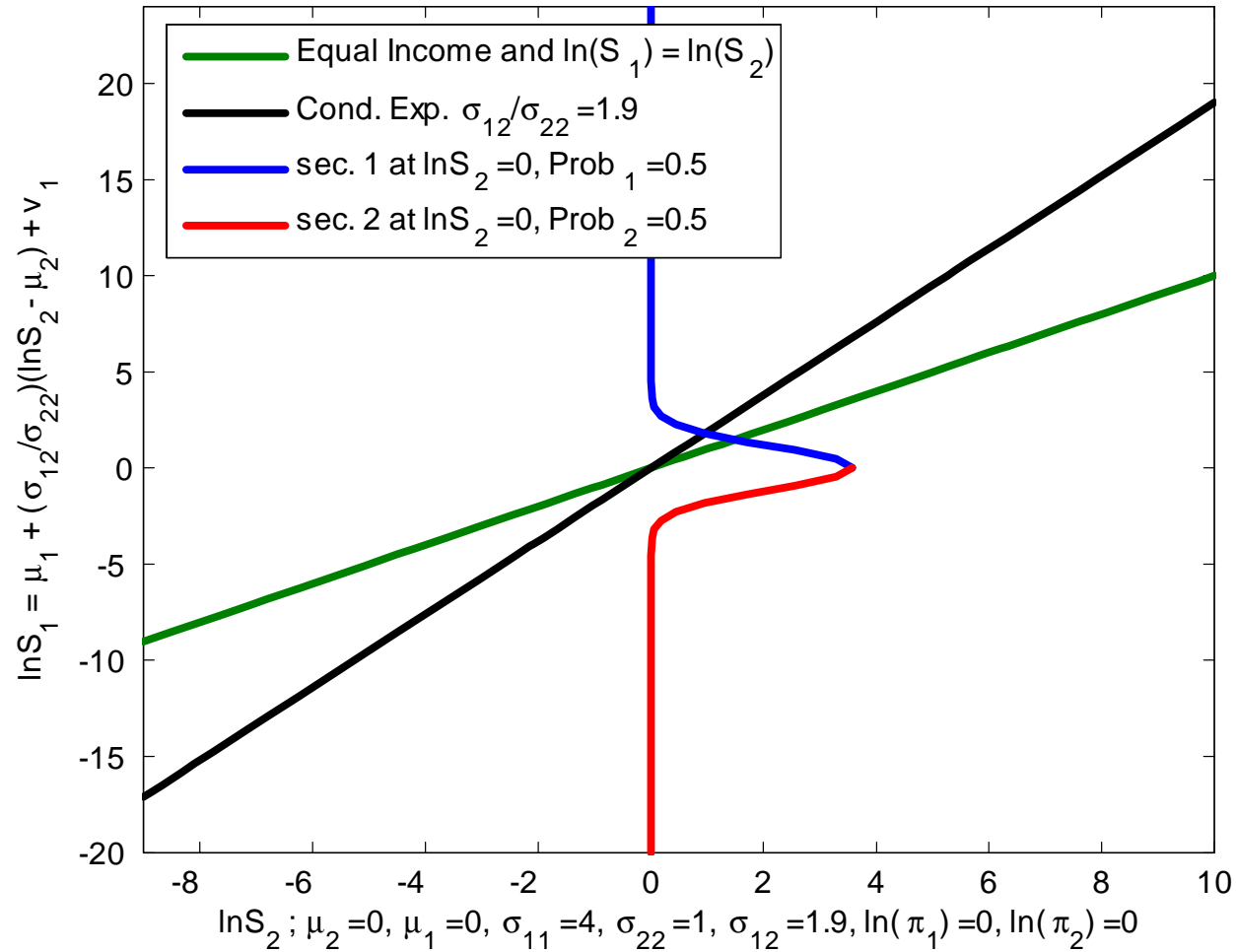$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} (\ln S_2 - \mu_2) + v_1$$
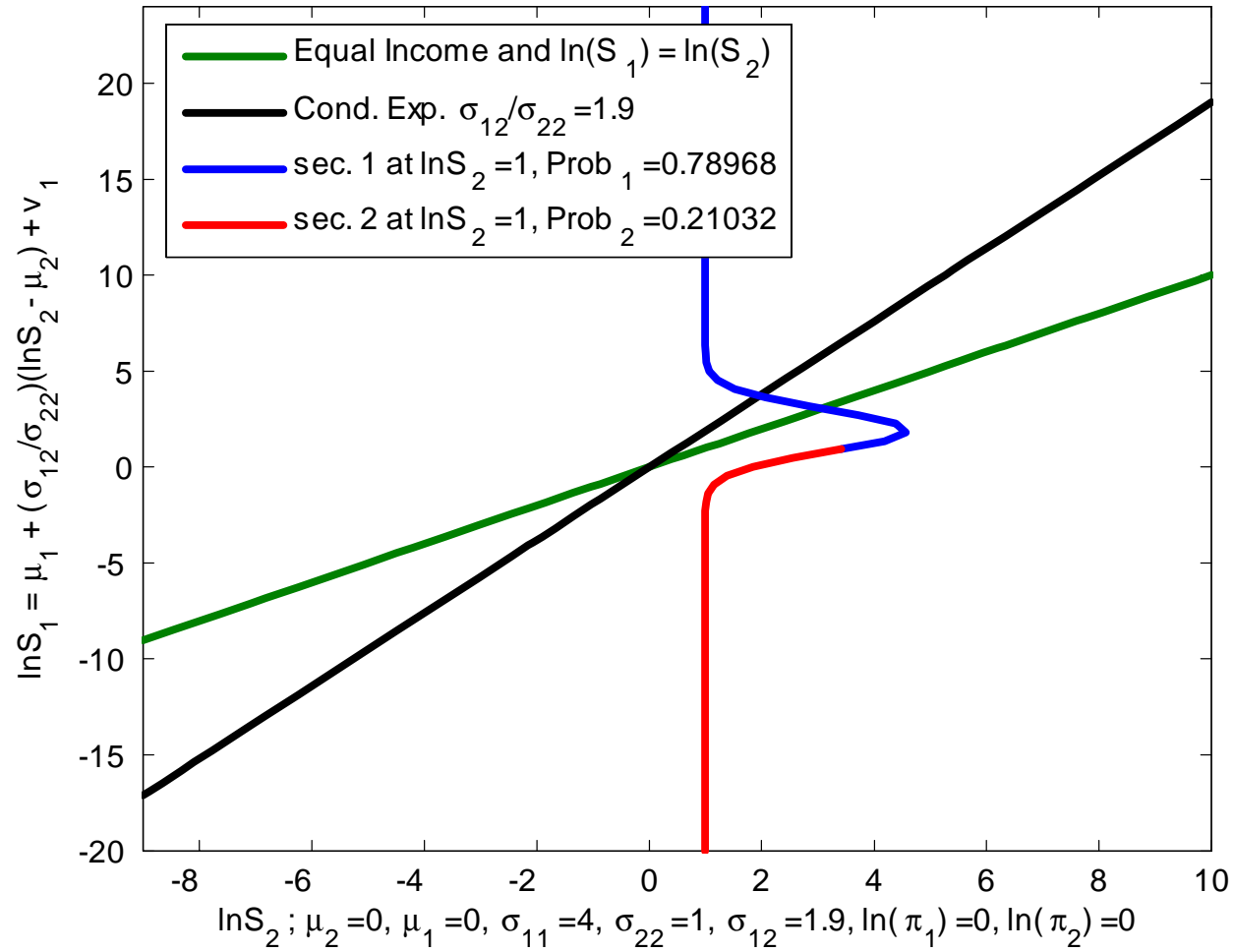
$$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = 0) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = 0) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1.9 \\ 1.9 \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.9$
- sec. 1 at $\ln S_2 = 1$, $\text{Prob}_1 = 0.78968$
- sec. 2 at $\ln S_2 = 1$, $\text{Prob}_2 = 0.21032$

y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

x-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1.9$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
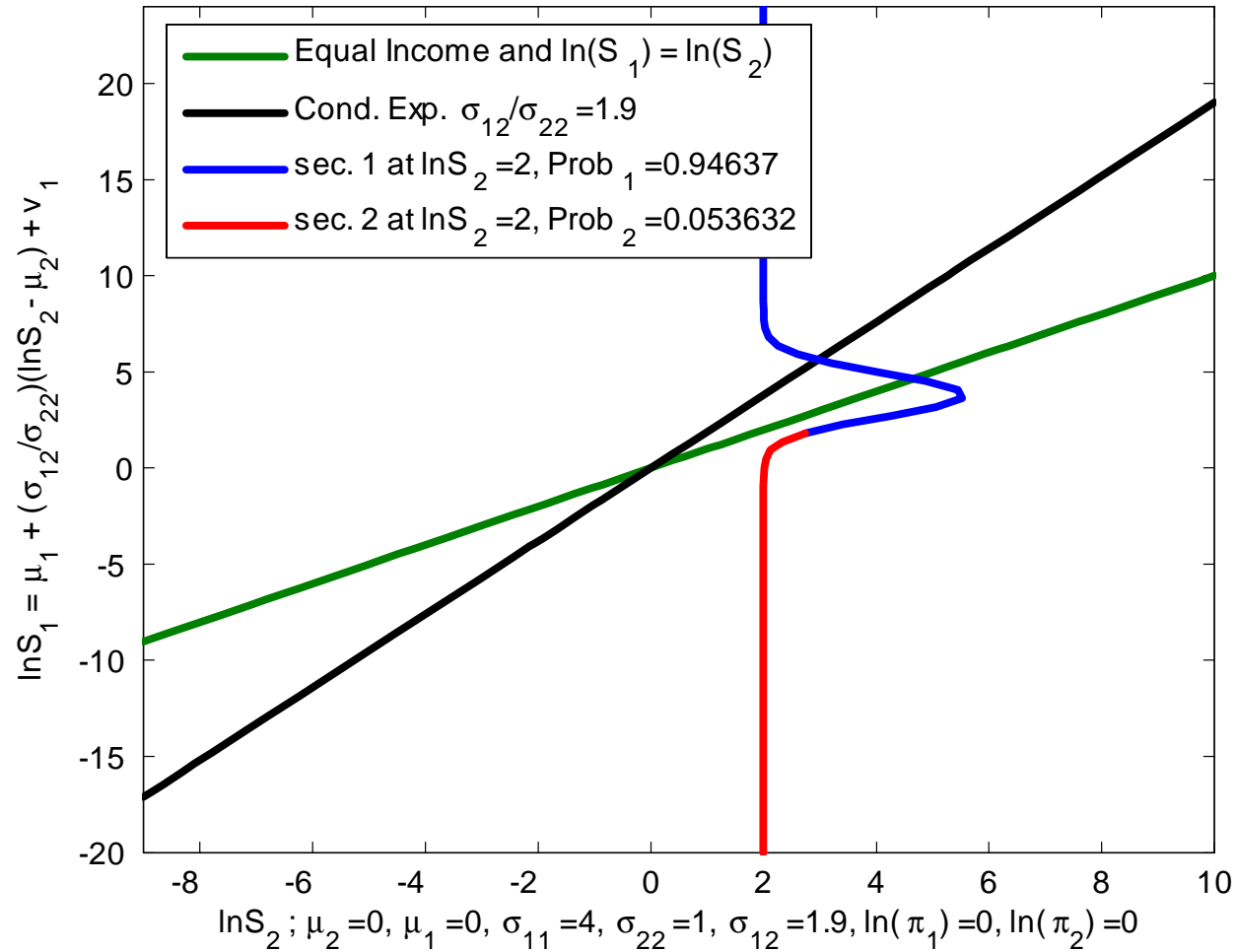
$$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = 1) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = 1) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \ \sigma_{12} \\ \sigma_{12} \ \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \ 1.9 \\ 1.9 \ 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$
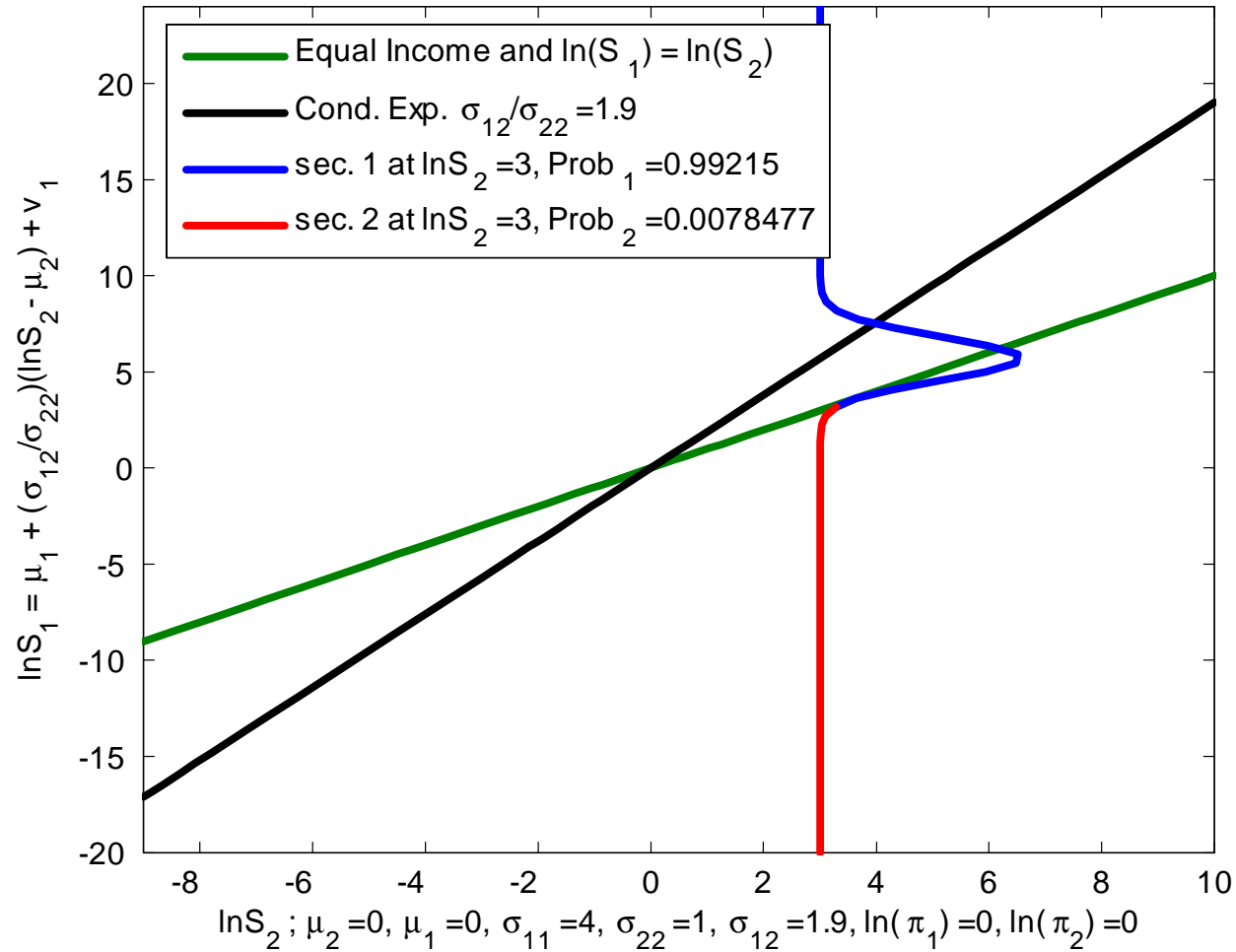
$$\text{Prob}_1 = \text{Pr}(W_1 > W_2 | \ln S_2 = 2) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \text{Pr}(W_1 < W_2 | \ln S_2 = 2) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.9 \\ 1.9 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

**Legend:**
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.9$
- sec. 1 at $\ln S_2 = 3$, $\text{Prob}_1 = 0.99215$
- sec. 2 at $\ln S_2 = 3$, $\text{Prob}_2 = 0.0078477$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1.9$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}(\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr\left(W_1 > W_2 \mid \ln S_2 = 3\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr\left(W_1 < W_2 \mid \ln S_2 = 3\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.9 \\ 1.9 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} ; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix} ;$$

# Graph of $\ln S_1 = f(\ln S_2)$



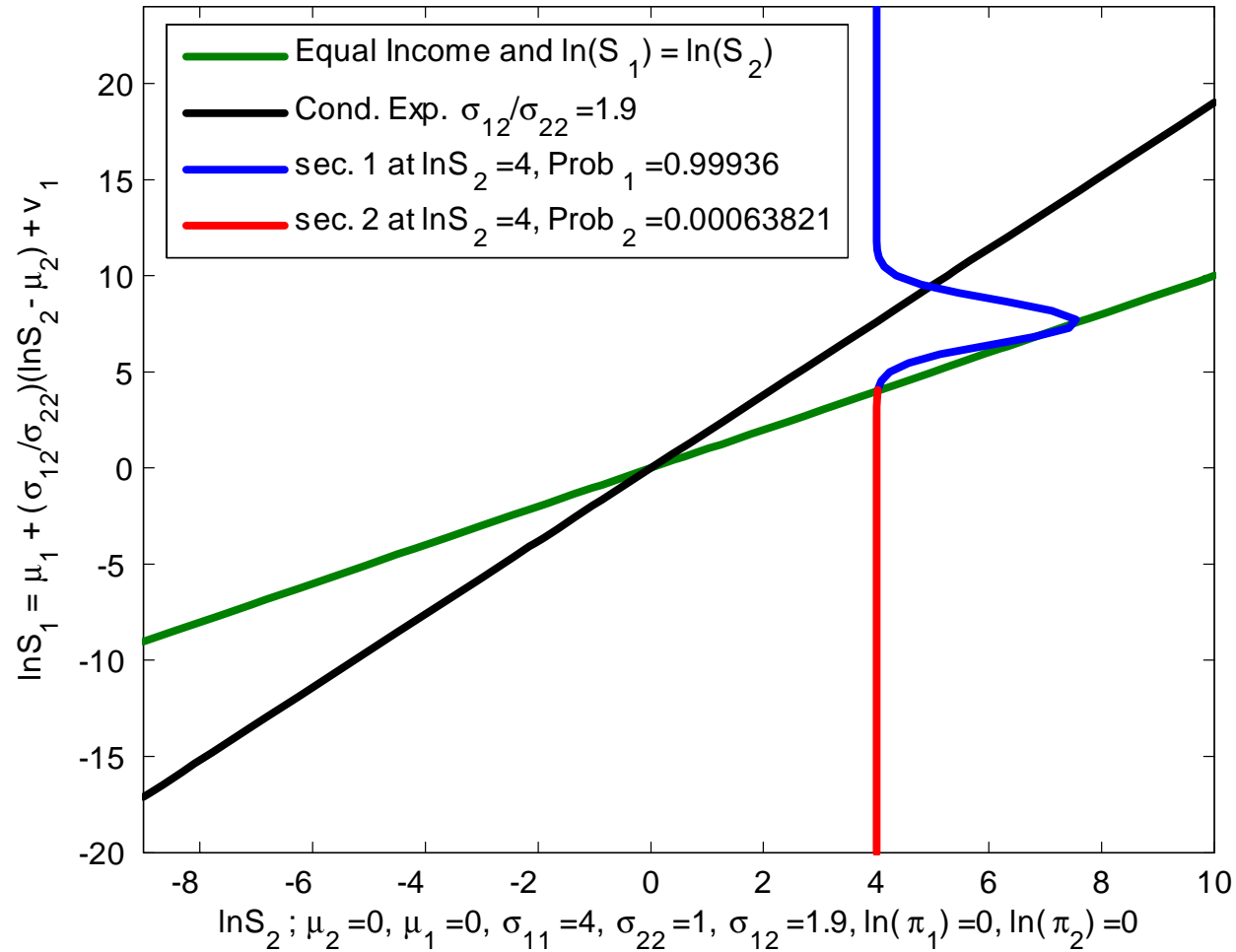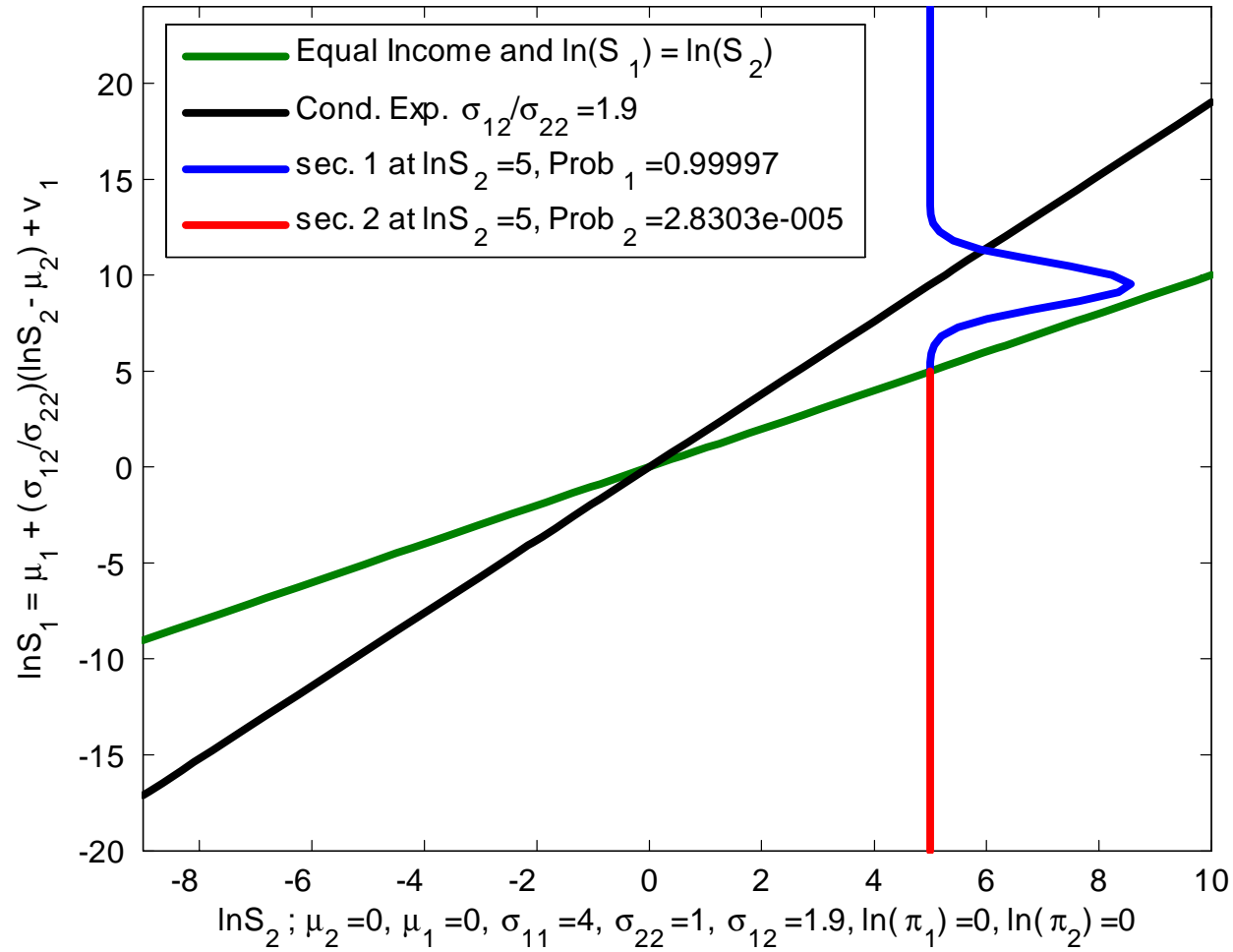$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}}\left(\ln S_2 - \mu_2\right) + v_1$$

$\mathrm{Prob}_1 = \Pr\left(W_1 > W_2 \mid \ln S_2 = 4\right) \Rightarrow \text{Pr. of Working at Sector 1}$

$\mathrm{Prob}_2 = \Pr\left(W_1 < W_2 \mid \ln S_2 = 4\right) \Rightarrow \text{Pr. of Working at Sector 2}$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.9 \\ 1.9 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

# Graph of $\ln S_1 = f(\ln S_2)$



Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.9$
- sec. 1 at $\ln S_2 = 5$, $\text{Prob}_1 = 0.99997$
- sec. 2 at $\ln S_2 = 5$, $\text{Prob}_2 = 2.8303e\text{-}005$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1.9$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

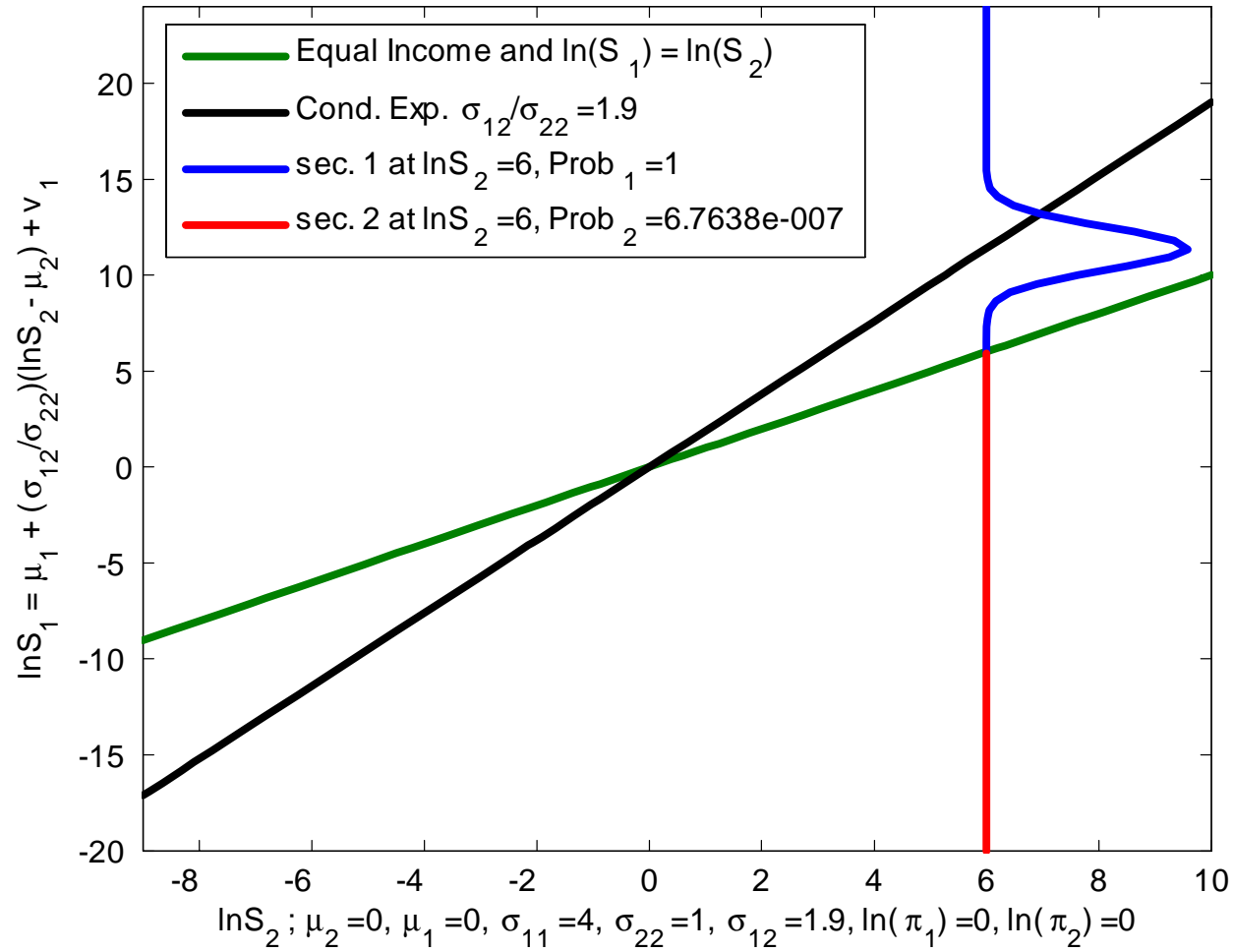$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} (\ln S_2 - \mu_2) + v_1$$

$$\text{Prob}_1 = \Pr(W_1 > W_2 | \ln S_2 = 5) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \Pr(W_1 < W_2 | \ln S_2 = 5) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} & \sigma_{12} \\ \sigma_{12} & \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 & 1.9 \\ 1.9 & 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$

Graph of $\ln S_1 = f(\ln S_2)$

Legend:
- Equal Income and $\ln(S_1) = \ln(S_2)$
- Cond. Exp. $\sigma_{12}/\sigma_{22} = 1.9$
- sec. 1 at $\ln S_2 = 6$, $\text{Prob}_1 = 1$
- sec. 2 at $\ln S_2 = 6$, $\text{Prob}_2 = 6.7638e\text{-}007$

Y-axis: $\ln S_1 = \mu_1 + (\sigma_{12}/\sigma_{22})(\ln S_2 - \mu_2) + v_1$

X-axis: $\ln S_2$ ; $\mu_2 = 0$, $\mu_1 = 0$, $\sigma_{11} = 4$, $\sigma_{22} = 1$, $\sigma_{12} = 1.9$, $\ln(\pi_1) = 0$, $\ln(\pi_2) = 0$

$$\ln S_1 = \mu_1 + \frac{\sigma_{12}}{\sigma_{22}} \left(\ln S_2 - \mu_2\right) + v_1$$

$$\text{Prob}_1 = \text{Pr}\left(W_1 > W_2 \mid \ln S_2 = 6\right) \Rightarrow \text{Pr. of Working at Sector 1}$$

$$\text{Prob}_2 = \text{Pr}\left(W_1 < W_2 \mid \ln S_2 = 6\right) \Rightarrow \text{Pr. of Working at Sector 2}$$

Parameters:

$$\begin{bmatrix} \sigma_{11} \; \sigma_{12} \\ \sigma_{12} \; \sigma_{22} \end{bmatrix} = \begin{bmatrix} 4 \; 1.9 \\ 1.9 \; 1 \end{bmatrix}, \begin{bmatrix} \mu_1 \\ \mu_2 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix}; \begin{bmatrix} \ln(\pi_1) \\ \ln(\pi_2) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \end{bmatrix};$$