$x_1(p, w) = \frac{w}{p_2}$ $\quad x_2(p, w) = \frac{w(p_2 - p_1)}{(p_2)^2}$ $\quad \forall p_1 < p_2 \; \forall w > 0$

$\boxed{\text{Prove That WARP is Not satisfied. W.L.G. normalize To 1 The price of commodity 2.}}$

$\boxed{p_2 = p'_2 = 1}$, show That $\nexists (p_1, w)(p'_1, w')$, $p_1 < 1$, $p'_1 < 1$

such That (A) $p \cdot x(p', w') \leq w$ and (B) $p' \cdot x(p, w) \leq w'$

(A): $p_1 w' + w'(1 - p'_1) \leq w \Leftrightarrow p_1 w' + w' - w' p'_1 \leq w$

$\Leftrightarrow w'(p_1 - p'_1) \leq w - w' \Leftrightarrow \boxed{p_1 - p'_1 \leq \frac{w - w'}{w'}}$

(B): $p'_1 w + w(1 - p_1) \leq w' \Leftrightarrow p'_1 w + w - w p_1 \leq w'$

$w p_1 - p'_1 w - w \geq -w' \Leftrightarrow w(p_1 - p'_1) \geq w - w'$

$\Leftrightarrow \boxed{(p_1 - p'_1) \geq \frac{w - w'}{w}}$

Therefore $\boxed{\frac{w - w'}{w} \leq p_1 - p'_1 \leq \frac{w - w'}{w'}}$ with $x(p, w) \neq x(p', w')$

Take for example $p_1 = p'_1 + \frac{w - w'}{w'}$ with $\boxed{p'_1 = \frac{1}{4}}$

and $\frac{w - w'}{w'} = \frac{1}{4}$ so That $\boxed{p_1 = \frac{1}{2}}$. Then $\boxed{w' = 4}$ and

$w - w' = 1 \Rightarrow \boxed{w = 4 + 1 = 5}$ Finally, notice That

$\frac{w - w'}{w} = \frac{1}{5} < p_1 - p'_1 = \frac{1}{4}$.

$\boxed{\text{15 minutes}}$