One consumer economy – monotone, strictly convex preferences.

Nonconvex production possibility set $Y$ – fixed cost and diminishing marginal product of labor.

Two candidates for Pareto optimum: $O, A$
If $O$ is Pareto optimal, it may or may not be sustainable as a competitive equilibrium.

Figure 3A

Figure 3B

If $A$ is Pareto optimal, it may or may not be sustainable as a competitive equilibrium.

Figure 4A

Figure 4B
Assume the firm must, at least, break even and chooses the best break even point. This might be $B$ or might be the origin, depending on whether the offer curve intersects the production possibility set with positive production.

If there exists an intersection like $B$, then $A > B > O$ unless $A$ and $B$ happen to coincide, implying $A \sim B > O$.

At $B$, the indifference curve is tangent to the line $OB$.

If there does not exist an intersection like $B$, then we can have either $A > O$ or $O > A$.

If $O > A$, there does not exist an intersection like $B$.

If $A > O$, there may or may not exist an intersection like $B$. 

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**Figure 5A**

**Figure 5B**

**Figure 6**