

# Formula for Efficient Unemployment: $u^* = \sqrt{uv}$

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## Social planner's problem:

- Allocate labor across producing / recruiting / job seeking to maximize welfare.

$$\min u + v \quad \text{subject to} \quad v = v_0 / u$$

$$\min_u u + v_0 / u$$

- convex minimization problem

- FOC is necessary & sufficient for global minimum.

$$\bullet \text{ FOC: } \frac{\partial (u + v_0 / u)}{\partial u} = 0$$

$$\Leftrightarrow 1 - v_0 / u^2 = 0$$

$$\Leftrightarrow u^2 = v_0$$

$$\Leftrightarrow u^* = \sqrt{v_0}$$

location of Beveridge curve:

$$uv = v_0$$

$$\Leftrightarrow u^* = \sqrt{uv}$$

Efficient unemployment rate is the geometric  
average of unemployment rate & vacancy rate