Graph 7 specifications

$$\sigma = 0.8$$
$$\theta = 0.15$$
$$\kappa = 0.8$$
$$q_h = 0.35$$
$$c_{\text{unscaled}} = 0.01225$$
$$c = \frac{c_{\text{unscaled}}}{q_h^2}$$
$$\eta_0 = 5$$
$$\eta_1 = 5.5$$
$$r = 0.2$$

q_h is the median level from empirical results $c_{unscaled}$ is chosen to set c = 0.1 All specifications are kept the same for plots in the appendix except η_1, which is lowered. This only shifts down π_1^f and does not affect general results.

$$v_{sat} = \frac{2\kappa}{\sigma\theta}$$

$$v_s = \left(\sqrt{\kappa\sigma} + \sqrt{\kappa\sigma + \frac{(1-\theta)^2\kappa^2}{rc}}\right)^2 /2$$

v_{sat} set as the starting v value for the plot
$v_s + 1.5$ set as the highest v value for the plot

Plot the following curves of π on v

$$\pi_0^p(v) = \left(\frac{(v - \pi_0^p(v))^2}{2\sigma v} - \kappa\theta\right)^2 \frac{1}{2rc} \quad \text{for} \quad v_{sat} \leq v < v_s$$

$$\pi_0^f(v) = \left(\frac{(v - \pi_0^f(v))^2}{2\sigma v} - \kappa\theta\right)^2 \frac{1}{2rc} + \frac{\eta_0}{r}\left(\frac{(v - \pi_0^f(v))^2}{2\sigma v} - \kappa\theta\right) - \frac{\eta_0}{r}(1-\theta)\kappa \quad \text{for} \quad v_s \leq v \leq v_s + 1.5$$

$$\pi_1^f(v) = \left(\frac{(v - \pi_1^f(v))^2}{2\sigma v} - \kappa\theta\right)^2 \frac{1}{2rc} + \frac{\eta_1}{r}\left(\frac{(v - \pi_1^f(v))^2}{2\sigma v} - \kappa\theta\right) \quad \text{for} \quad v_{sat} \leq v \leq v_s + 1.5$$

Graph 8 specifications

In addition to the curves plotted in graph 7, we now add a plot for each of the 3 curves with a lower q: $q_l = 0.346 < q_h$, which represents a tighter labour market, leading to a higher cost of recruitment c.

$$
\begin{aligned}
\sigma &= 0.8 \\
\theta &= 0.15 \\
\kappa &= 0.8 \\
q_l &= 0.346 \\
c_{\text{unscaled}} &= 0.01225 \\
c &= \frac{c_{\text{unscaled}}}{q_l^2} \\
\eta_0 &= 5 \\
\eta_1 &= 5.5 \\
r &= 0.2
\end{aligned}
$$

The curves at q_{low} are plotted in dashed lines to compare with the curves at q_{high} in solid lines. With q_{low}, the curves are shifted to the left and down.

q_{low} curves are shifted down by 0.4 units to make the plots visually readable. To verify the general effect of setting a lower q, find `offset_value` in the script `Fig_8.jl` and set it to 0 to obtain the original plots.

B2(a) specifications

$$\sigma = 0.8$$
$$\theta = 0.15$$
$$\kappa = 0.8$$
$$c = 0.1$$
$$\eta_0 = 1.5$$
$$\eta_1 = 3$$
$$r = 0.2$$
$$v_{sat} = \frac{2\kappa}{\sigma\theta}$$
$$v_s = \left(\sqrt{\kappa\sigma} + \sqrt{\kappa\sigma + \frac{(1-\theta)^2\kappa^2}{rc}}\right)^2 /2$$

checked that $v_{sat} < v_s$

setting v such that $v_{sat} < v < v_s$

$$v = 1.2 * v_{sat}$$

checked that v satisfies $v_{sat} < v < v_s$

Plot the following curves

Curve 1:

$$r\pi$$

Curve 2:

$$y_0^p(\pi) = \left(\frac{(v-\pi)^2}{2\sigma v} - \kappa\theta\right)^2 \frac{1}{2c}$$

Curve 3:

$$y_0^f(\pi) = \left(\frac{(v-\pi)^2}{2\sigma v} - \kappa\theta\right)^2 \frac{1}{2c} + \eta_0 \left(\frac{(v-\pi)^2}{2\sigma v} - \kappa\theta\right) - \eta_0(1-\theta)\kappa$$

Curve 4:

$$y_1^f(\pi) = \left(\frac{(v-\pi)^2}{2\sigma v} - \kappa\theta\right)^2 \frac{1}{2c} + \eta_1 \left(\frac{(v-\pi)^2}{2\sigma v} - \kappa\theta\right)$$

where $\pi \in [\pi_{min}, \pi_{max}]$ with

$$\pi_{\min} = v - \sqrt{2\sigma\kappa v} \quad \text{where} \quad y_0^p(\pi) = y_0^f(\pi)$$
$$\pi_{\max} = v - \sqrt{2\sigma\kappa v\theta} \quad \text{where} \quad y_0^p(\pi) = 0$$

x-axis range $[\pi_{\min}-0.3 : \pi_{\max}+0.2]$ and curve 1 shifted downward by $r\cdot(\pi_{\min}-0.3)$ for readability.

$\pi_{\min}$ takes $v - \sqrt{2\sigma\kappa v}$ for $v < v_s$, and $\pi_{\min}$ is where $y_0^p = 0$.

B2(b) specifications

Same values chosen for all parameters except r = 0.7 for better visual representation

$$v_{sat} = \frac{2\kappa}{\sigma\theta}$$

$$v_s = \left(\sqrt{\kappa\sigma} + \sqrt{\kappa\sigma + \frac{(1-\theta)^2\kappa^2}{rc}}\right)^2 /2$$

checked that $v_{sat} < v_s$

setting v such that $v_{sat} < v < v_s$

$$v = 2.5 * v_{sat}$$

checked that v satisfies $v_{sat} < v < v_s$

Plot the following curves

Curve 1:

$$r\pi$$

Curve 2: Output value scaled by $\gamma = 0.6$ for readability

$$y_0^p(\pi) = \left(\frac{(v-\pi)^2}{2\sigma v} - \kappa\theta\right)^2 \frac{1}{2c}$$

Curve 3:

$$y_0^f(\pi) = \left(\frac{(v-\pi)^2}{2\sigma v} - \kappa\theta\right)^2 \frac{1}{2c} + \eta_0 \left(\frac{(v-\pi)^2}{2\sigma v} - \kappa\theta\right) - \eta_0(1-\theta)\kappa$$

Curve 4: Output value shifted up by 0.03 for readability

$$y_1^f(\pi) = \left(\frac{(v-\pi)^2}{2\sigma v} - \kappa\theta\right)^2 \frac{1}{2c} + \eta_1 \left(\frac{(v-\pi)^2}{2\sigma v} - \kappa\theta\right)$$

where $\pi \in [\pi_{min}, \pi_{max}]$ with the range of the

$$\pi_{\min} = v - \sqrt{2\sigma\kappa v} \quad \text{where} \quad y_0^p(\pi) = y_0^f(\pi)$$

$$\pi_{\max} = v - \sqrt{2\sigma\kappa v\theta} \quad \text{where} \quad y_0^p(\pi) = 0$$

x axis is adjusted to zoom in on where the curves intersect each other: $x_{min} = \pi_0^p - 0.5$, $x_{max} = \pi_{max} + 0.1$, where π_0^p is where y_0^p crosses r*π, and π_{max} is where $\pi_0^p = 0$