ECON 815

Interest Rate Rules

Winter 2014

Monetary Policy

A monetary authority controls the short-term nominal interest rate.

A rule is formalized as the nominal interest rate i_t reacting to some relevant variables such as π_t or x_t.

$$i_t = \bar{\iota} + f(\pi_t, x_t, \dots)$$

We will ask three questions.

- Does the interest rule lead to a determinate equilibrium?
- How does the economy react to a shocks given the rule?
- What is the optimal monetary policy rule?

The Classical Model

Under separable preferences, the monetary and the real side are separated.

Monetary policy follows an interest rate rule of the form

$$i_t = \bar{\iota} + \phi_\pi \pi_t + v_t$$

where for $\bar{\pi} = 0$, we get that $\bar{\iota} = \bar{r} = \frac{1}{\beta} - 1 \simeq -\log(\beta)$.
For determinacy/stability, we need that $\phi_\pi > 1$ (see previous lecture).

Money demand is given by

$$m_t - p_t = y_t - \nu i_t$$

so that changes in the money supply are inversely related to changes in the nominal interest rate.

The monetary policy shock v_t follows an AR(1) process, or $v_t = \rho_v v_{t-1} + \epsilon_t^v$.

Response to a MP Shock

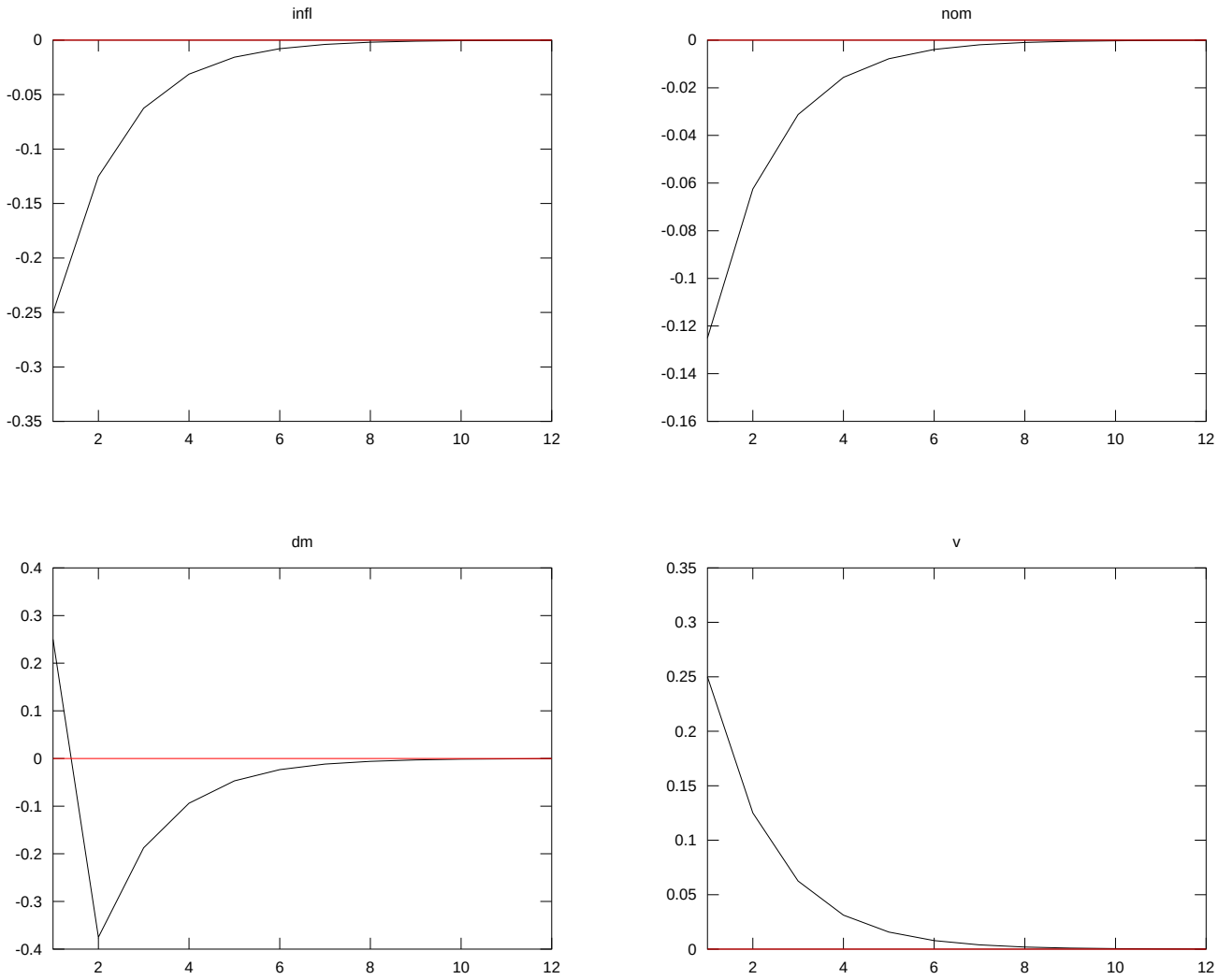

Figure: 25 bps increase in v_t

Response to a Technology Shock

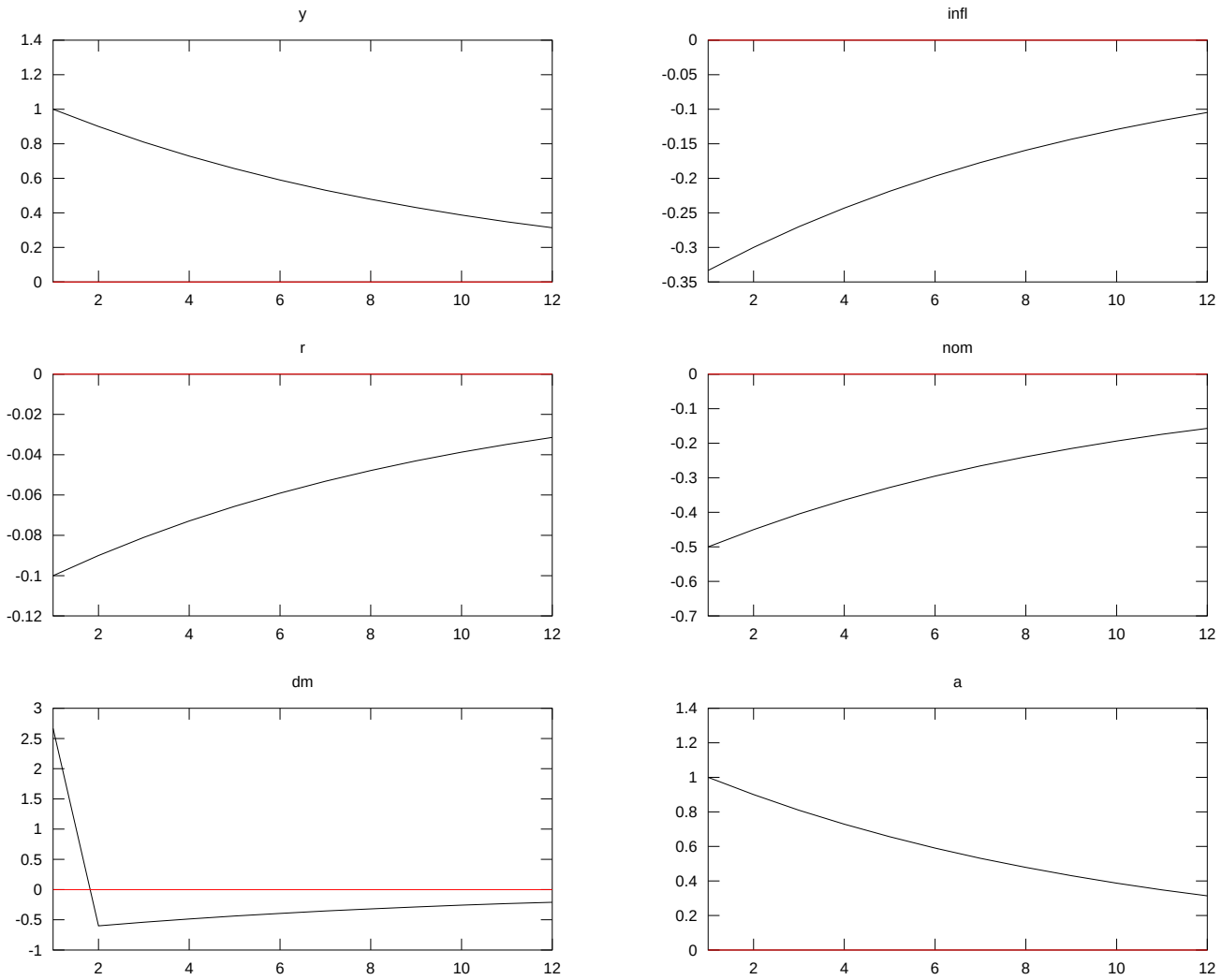

Figure: 1% increase in a

The NK Model

We assume a *Taylor-rule* of the form

$$i_t = \bar{\iota} + \phi_\pi \pi_t + \phi_x x_t + v_t$$

where x_t is the output gap.

The model can then be rewritten as

$$\begin{pmatrix} x_t \\ \pi_t \end{pmatrix} = \mathbf{A} \begin{pmatrix} E_t[x_{t+1}] \\ E_t[\pi_{t+1}] \end{pmatrix} + \mathbf{B}(r_t^n - \bar{r}_t^n - v_t)$$

where $\mathbf{A}$ and $\mathbf{B}$ are functions of parameters.

For determinacy/stability, we need to have eigenvalues of $\mathbf{A}$ to be less than 1 in modulus. This is the case if and only if

$$\kappa(\phi_\pi - 1) + (1 - \beta)\phi_y > 0.$$

We assume $\phi_\pi = 1.5$ and $\phi_y = 0.5/4$.

Response to a MP Shock

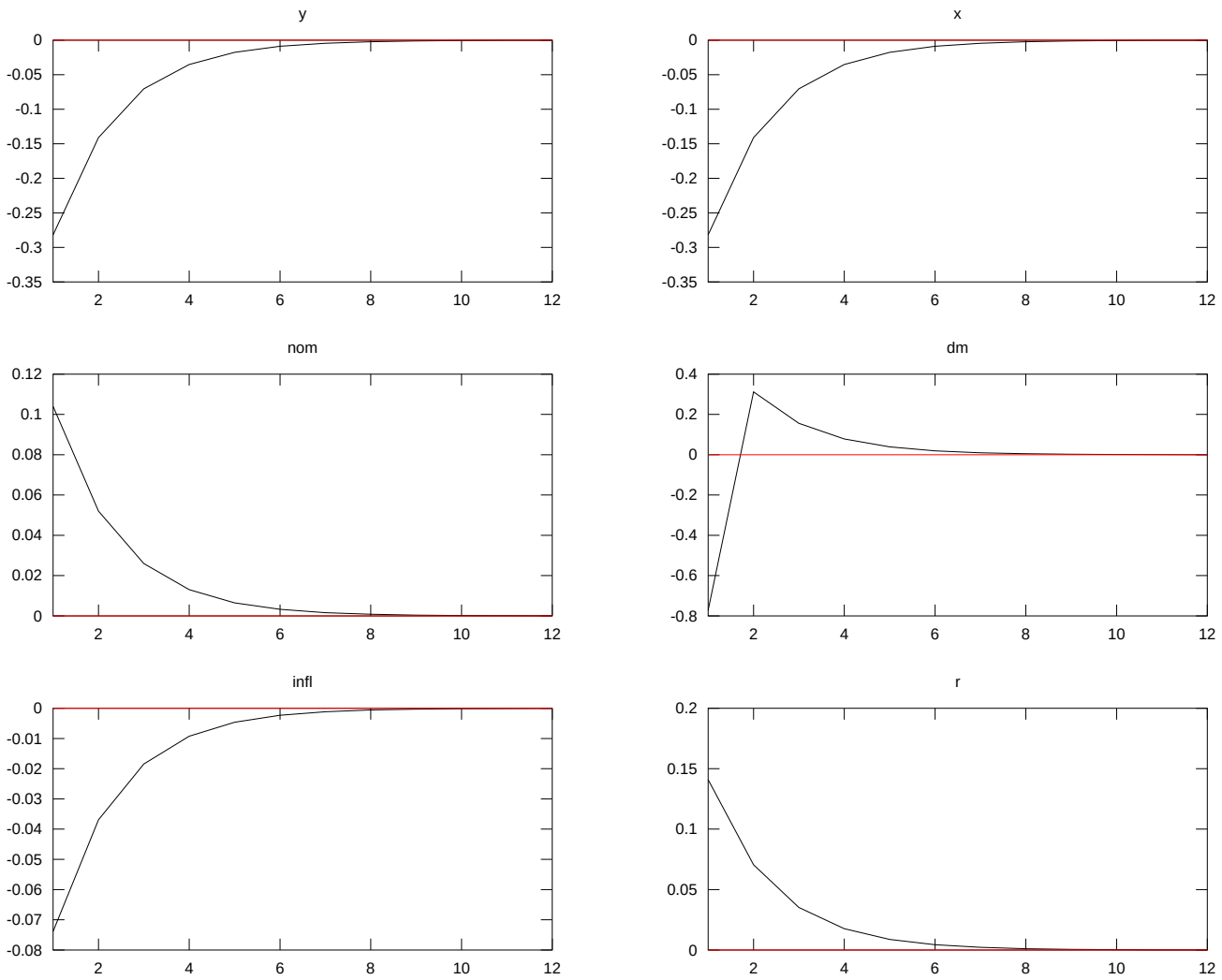

Figure: 25 bps increase in $v_t - \theta = 0.66$

Think about the MP shock as a *tightening* bias – a (imperfectly) persistent shock to $\bar{\iota}$.

There is an increase in the nominal interest rate that brings down inflation and output.

However: the interest rate rule moderates the MP shock.

This is the so-called *liquidity effect*.

- tightening implies an increase in the nominal interest rate
- this must be accompanied by a change in the money supply in the opposite direction

Money supply rules in the classic model cannot deliver the effect (see above).

But is this a success story for the NK model?

Sticky Prices Matter

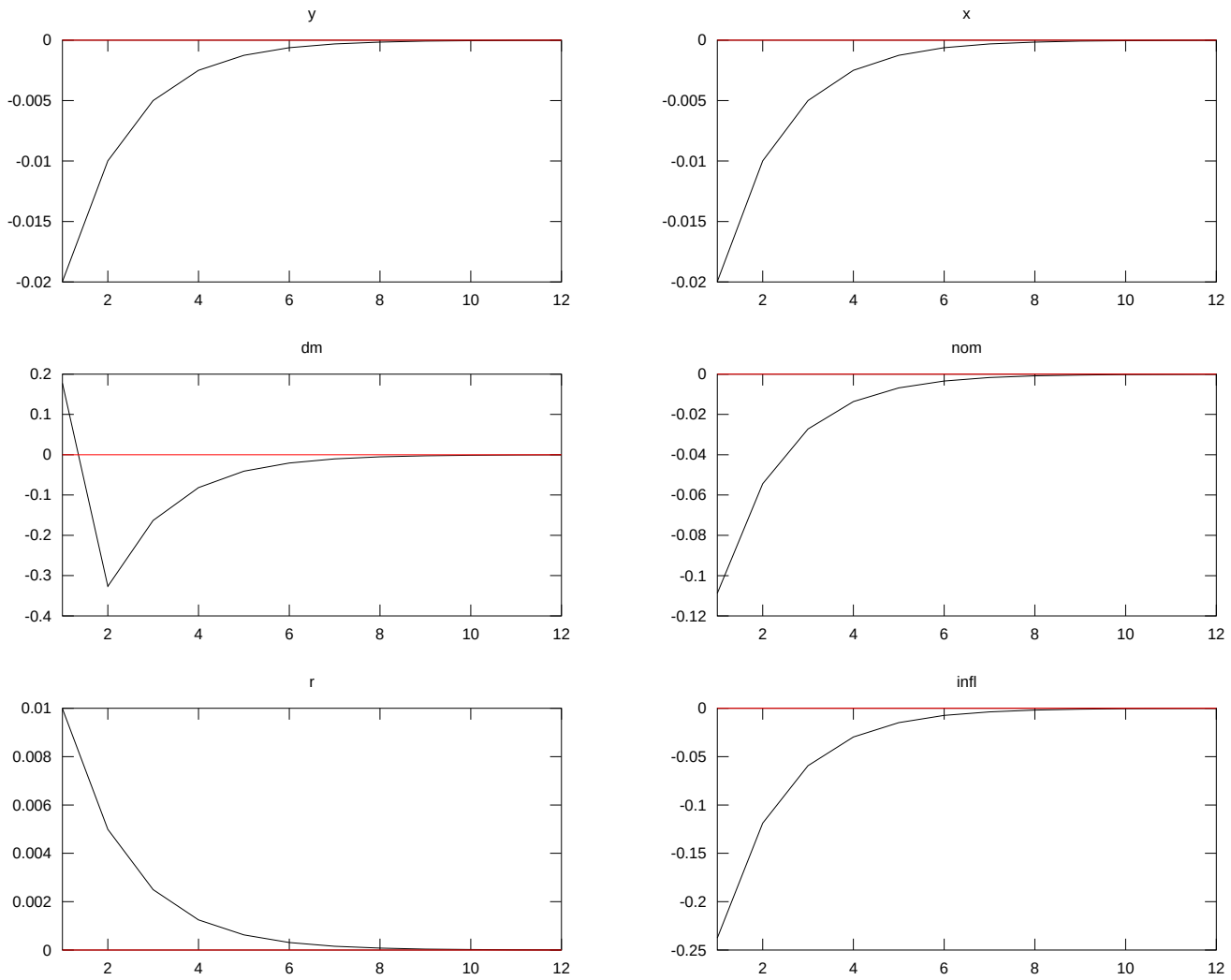

Figure: 25 bps increase in $v_t - \theta = 0.1$

Response to a Technology Shock

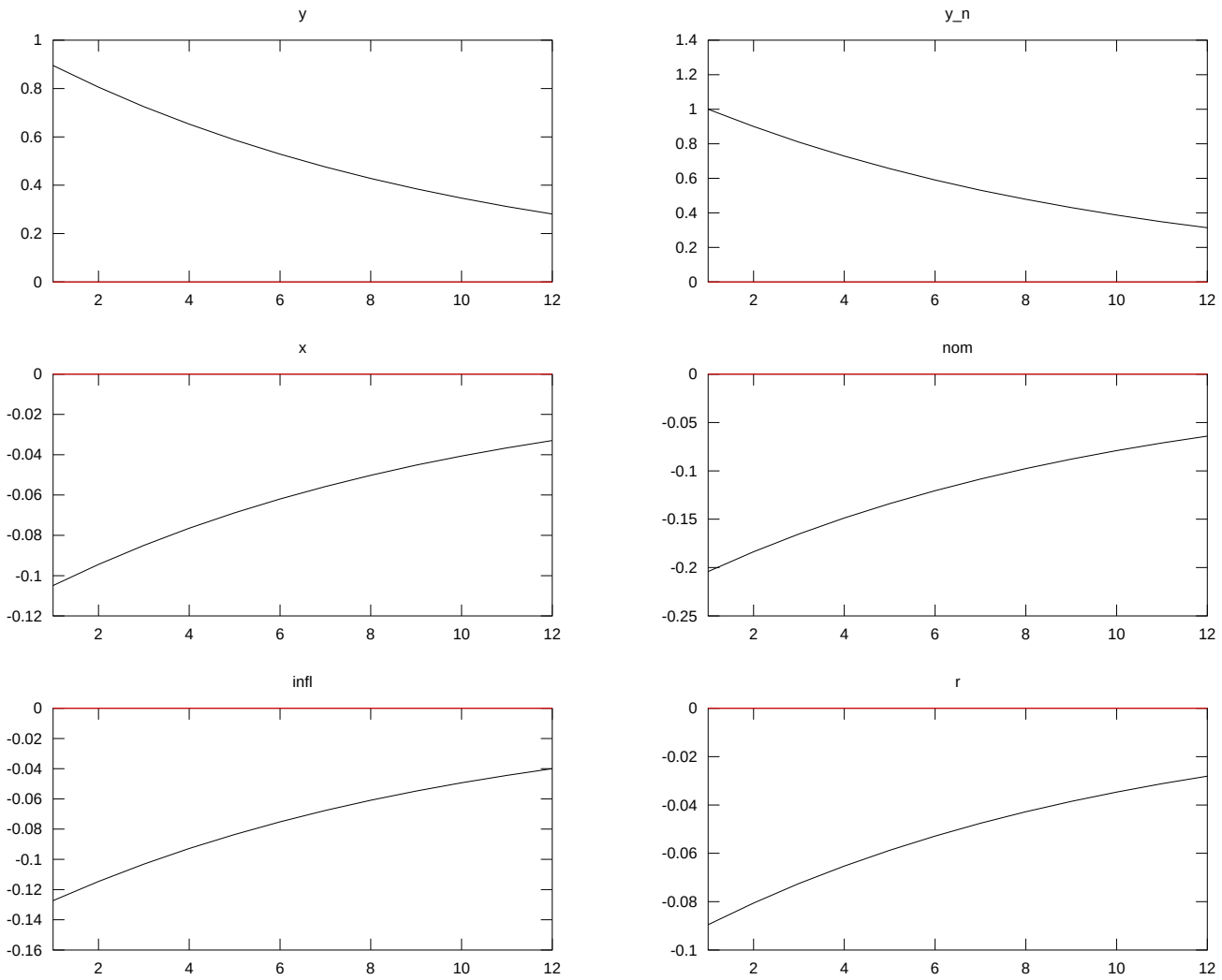

Figure: 1 % increase in a

The response to a technology shock (supply shock) is counterintuitive.

Both, natural output and actual output go up. But there is a *negative* output gap.

This requires a *decrease* in the nominal interest rate; the MP accommodates the positive shock.

The reason is that there is too little demand as not all firms can react to the technology shock by decreasing their prices and hiring more people.