Lecture 8: Intermediate macroeconomics, autumn 2008

Lars Calmfors

- **Inflation and unemployment**

  - **Degree of activism of monetary policy**
  - **The credibility problem of monetary policy**
  - **Degree of independence of central banks**

- **Intertemporal consumption theory and the effects of fiscal policy**

- **Fiscal policy and budget deficits**
  - **The stability pact**
  - **Fiscal policy institutions**

Models of the relationship between the price level and output (surprise supply function)

- **Sticky-price model**
- **Sticky-wage model**
- **Imperfect-information model**

$$Y = \overline{Y} + \alpha(P - P^e)$$

Output deviates from its equilibrium level (natural rate) if the actual price level deviates from the expected price level (surprise inflation). The deviation of output from its equilibrium level is proportional to the expectational error.

Sticky-price model

Two types of firms

- **Flexible-price firms**
- **Rigid-price firms**

Flexible-price firms

$$p = P + a(Y - \overline{Y})$$

Rigid-price firms

$$p = P^e + a(Y^e - \overline{Y}^e)$$

Assume $Y^e = \overline{Y}^e$. Then $p = P^e$

s = share of firms with rigid prices

$1 - s$ = share of firms with flexible prices

$$P = sP^e + (1 - s)[P + a(Y - \overline{Y})]$$

$$P = P^e + [(1 - s)\,a/s]\,(Y - \overline{Y})$$

$$Y - \overline{Y} = s(P - P^e)\,/\,(1 - s)a$$

$$Y - \overline{Y} = \alpha(P - P^e) \qquad\qquad \alpha = s/[(1 - s)\,a]$$

Sticky-wage model

$\omega = W/P^e$ **Real wage target**

$W = \omega \cdot P^e$ **Nominal wage**

$W/P = \omega \cdot P^e/P$ **Actual real wage**

Actual real wage = Real wage target · Expected price level / Current priced level

$P > P^e \Rightarrow W/P < \omega$ **Unanticipated inflation**

$P < P^e \Rightarrow W/P > \omega$ **Unanticipated deflation**

$L = L^d(W/P)$ **Labour demand**

$Y = F(L)$ **Production function**

$Y = \overline{Y} + \alpha(P - P^e)$ **Surprise supply function**

$\overline{Y}$ = **Equilibrium output**

$\overline{L}$ = **Equilibrium employment**

$\overline{L} = L(\omega)$ **Employment when** $W/P = \omega$

$\overline{Y} = F(\overline{L})$ **Production when** $\overline{L} = L$

$L > \overline{L}$ **when** $W/P < \omega \Leftrightarrow P > P^e \Leftrightarrow Y > \overline{Y}$

$L < \overline{L}$ **when** $W/P > \omega \Leftrightarrow P < P^e \Leftrightarrow Y < \overline{Y}$

5

(a) Labor Demand

Real wage, W/P

W/P_1

W/P_2

$L = L^d(W/P)$

$L_1 \rightarrow L_2$ Labor, L

2. ... reduces the real wage for a given nominal wage, ...

(b) Production Function

Income, output, Y

Y_2

Y_1

$Y = F(L)$

$L_1 \rightarrow L_2$ Labor, L

4. ... output, ...

3. ...which raises employment, ...

(c) Aggregate Supply

Price level, P

$Y = \bar{Y} + \alpha(P - P^e)$

P_2

P_1

6. The aggregate supply curve summarizes these changes.

1. An increase in the price level ...

$Y_1 \rightarrow Y_2$ Income, output, Y

5. ... and income.
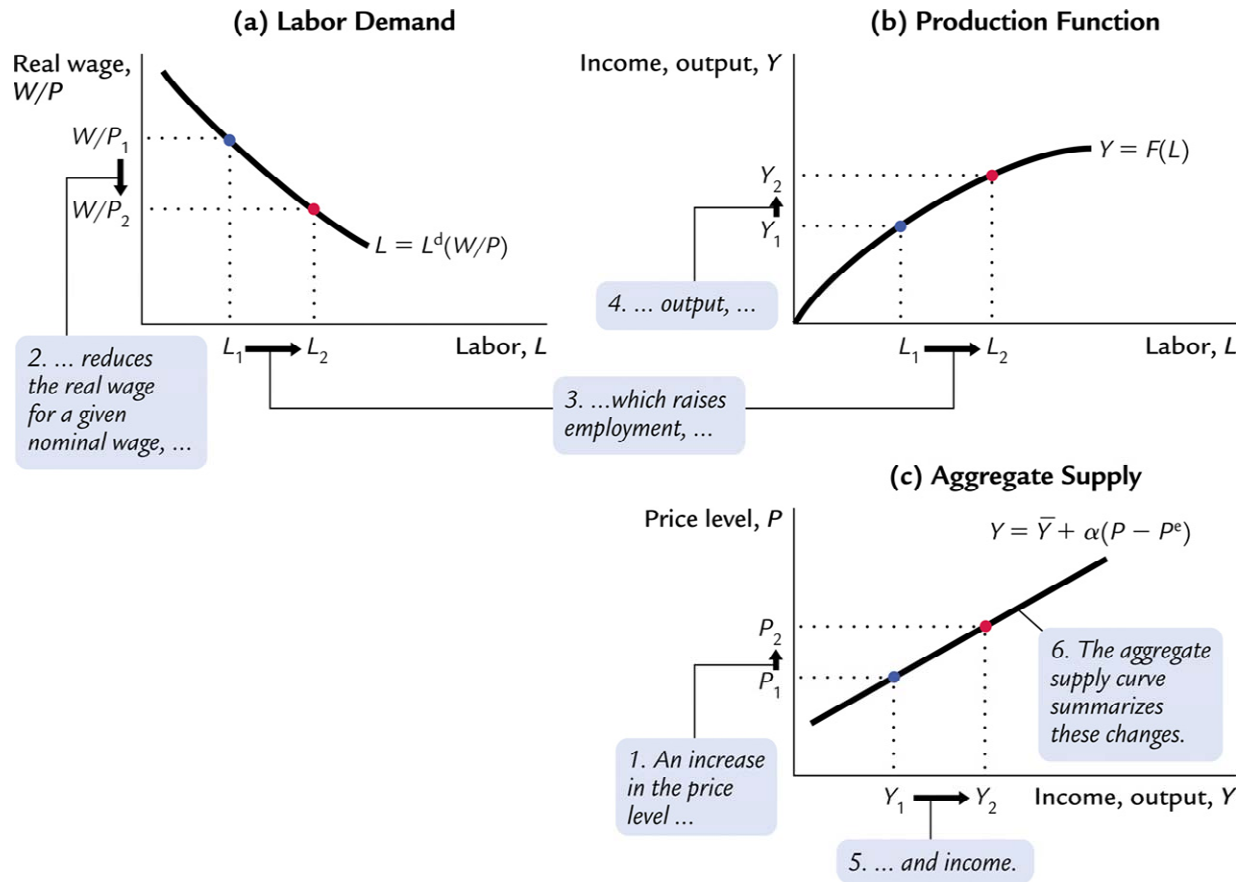
Figure 13.1 The Sticky-Wage Model
Mankiw: Macroeconomics, Sixth Edition
Copyright © 2007 by Worth Publishers
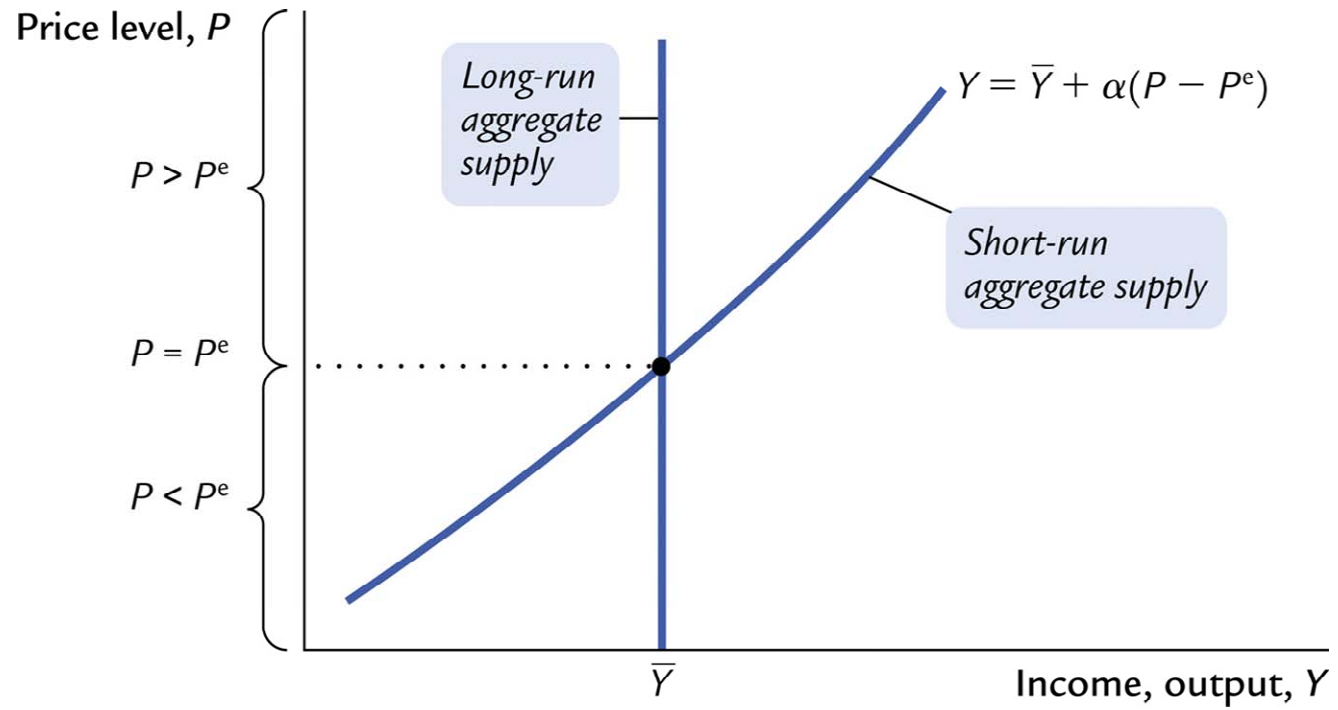
Figure 13.3 The Short-Run Aggregate Supply Curve
Mankiw: Macroeconomics, Sixth Edition
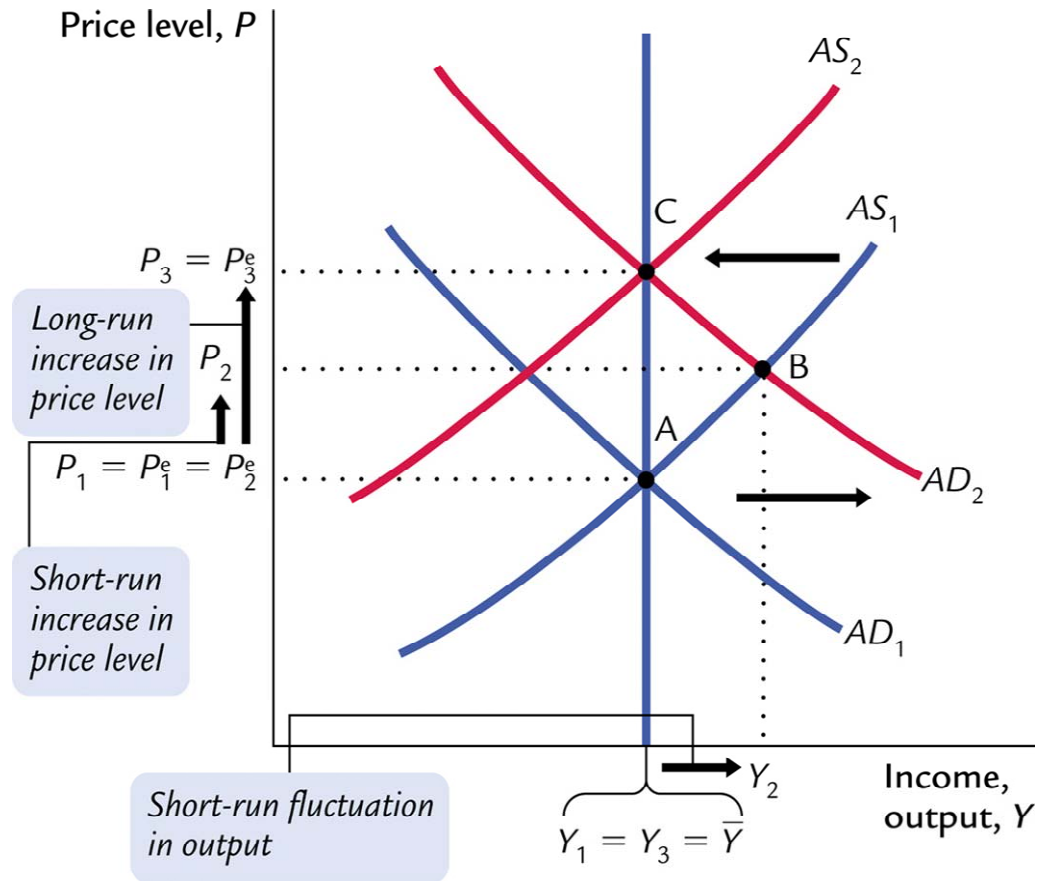Copyright © 2007 by Worth Publishers

Figure 13.4 How Shifts in Aggregate Demand Lead to Short-Run Fluctuations
Mankiw: Macroeconomics, Sixth Edition
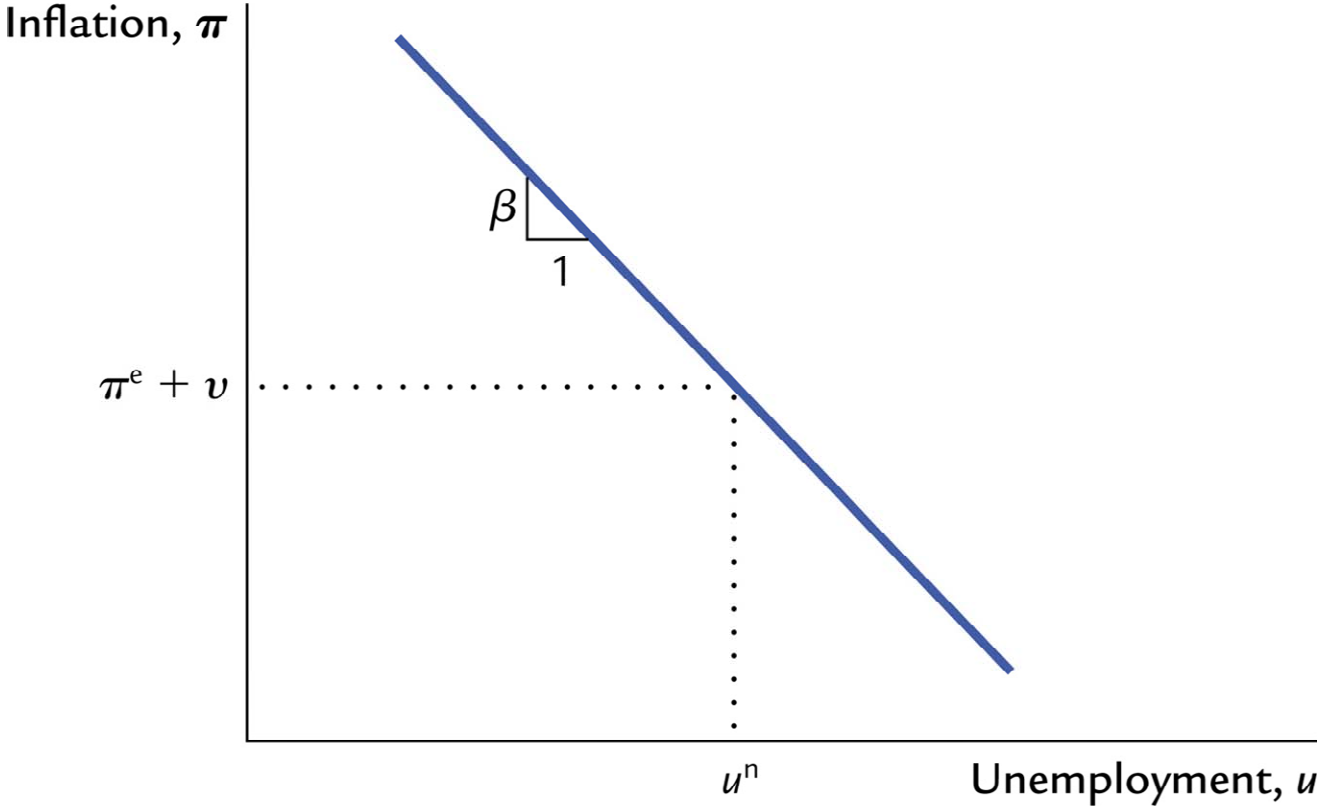Copyright © 2007 by Worth Publishers

Figure 13.6 The Short-Run Tradeoff Between Inflation and Unemployment
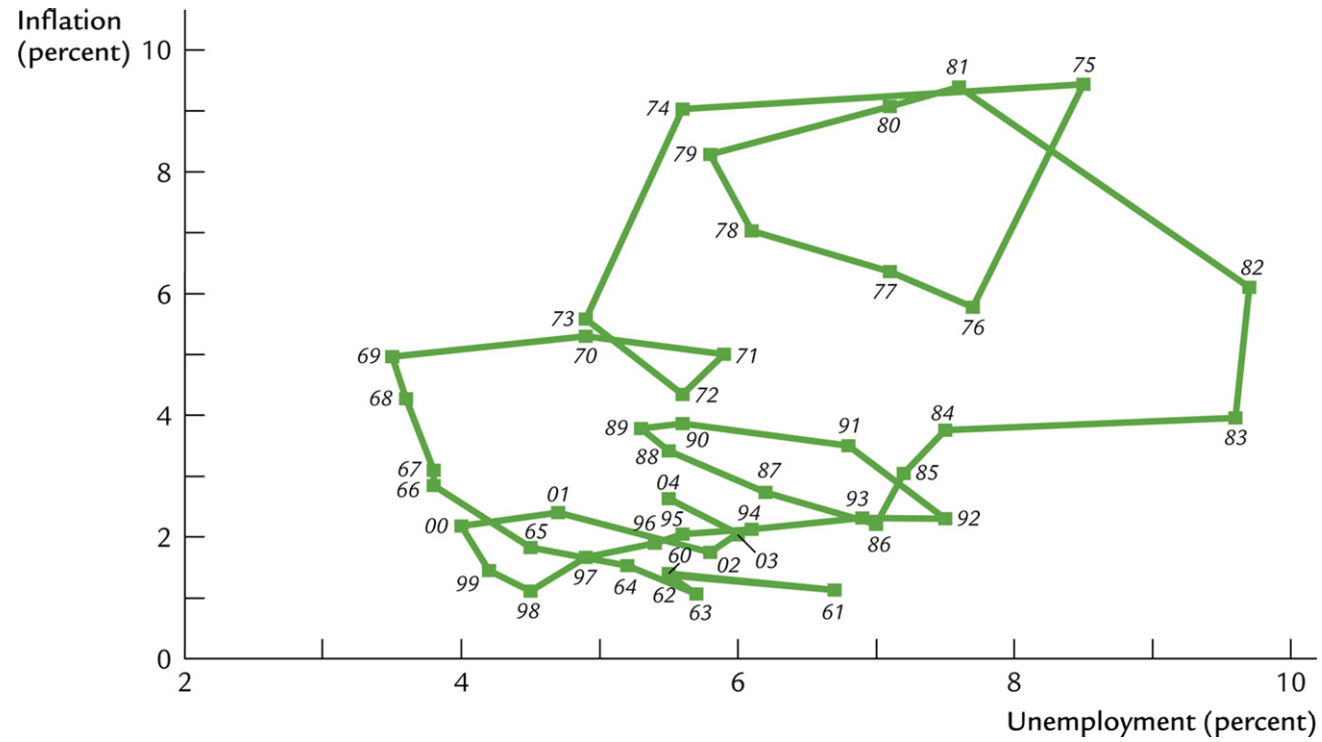Mankiw: Macroeconomics, Sixth Edition
Copyright © 2007 by Worth Publishers

Figure 13.5 Inflation and Unemployment in the United States Since 1960
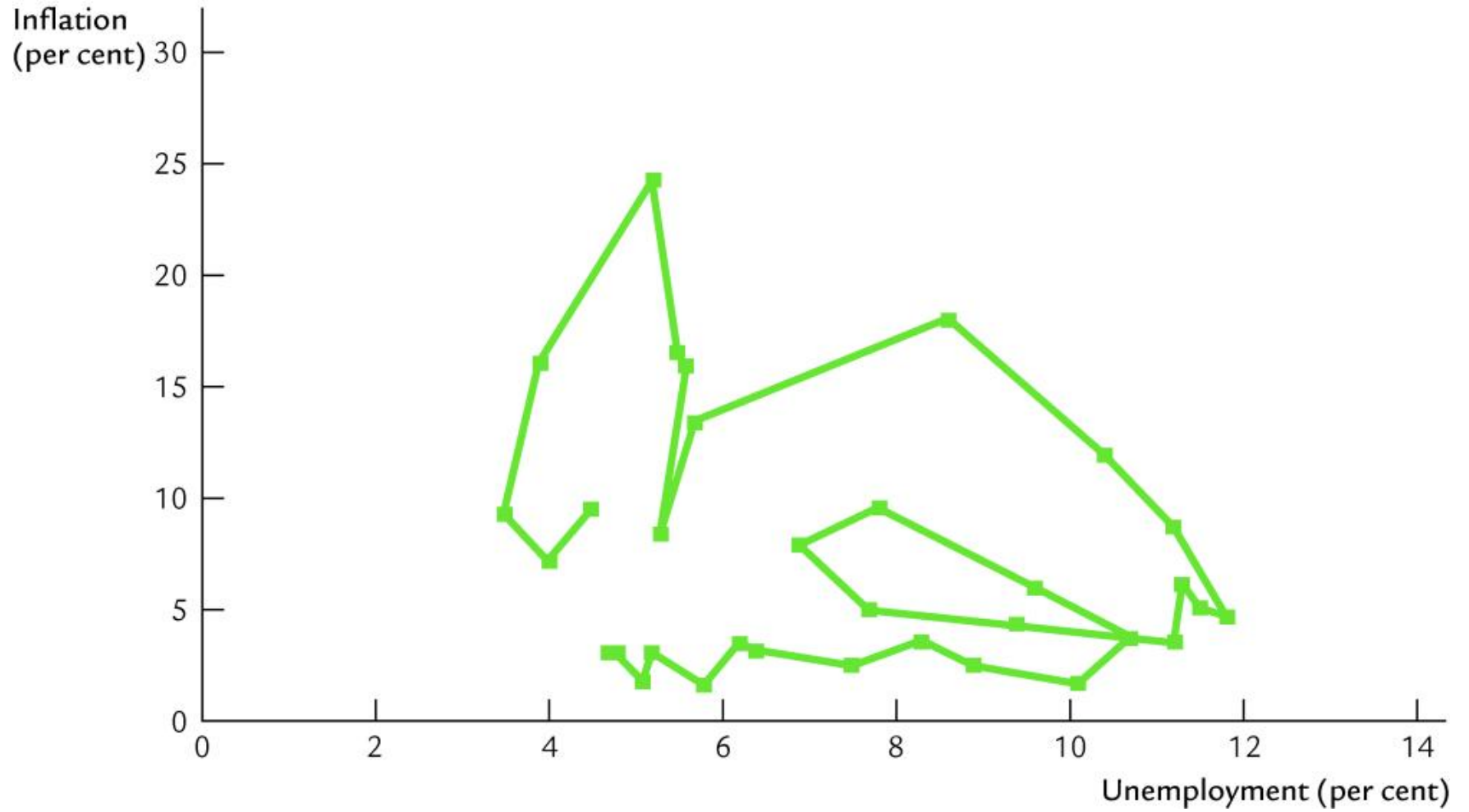Mankiw: Macroeconomics, Sixth Edition
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Figure 13.5 Inflation and unemployment in the United Kingdom since 1971

Expectations-augmented Phillips curve

$$\pi = \pi^{e} - \beta(u - u_n) + v$$

- **Inflation expectations**

- **Cyclical unemployment**

- **Supply shock**

$$v = 0 \Rightarrow \pi = \pi^e - \beta(u - u_n)$$
$$\pi = \pi^e \Rightarrow -\beta(u - u_n) = 0$$
$$u = u_n$$

Interpretation: if no supply shock and perfect foresight unemployment is at its equilibrium (natural) level.

Alternative interpretation: if unemployment is at its equilibrium (natural) level and there is no supply shock, then actual inflation = expected inflation.
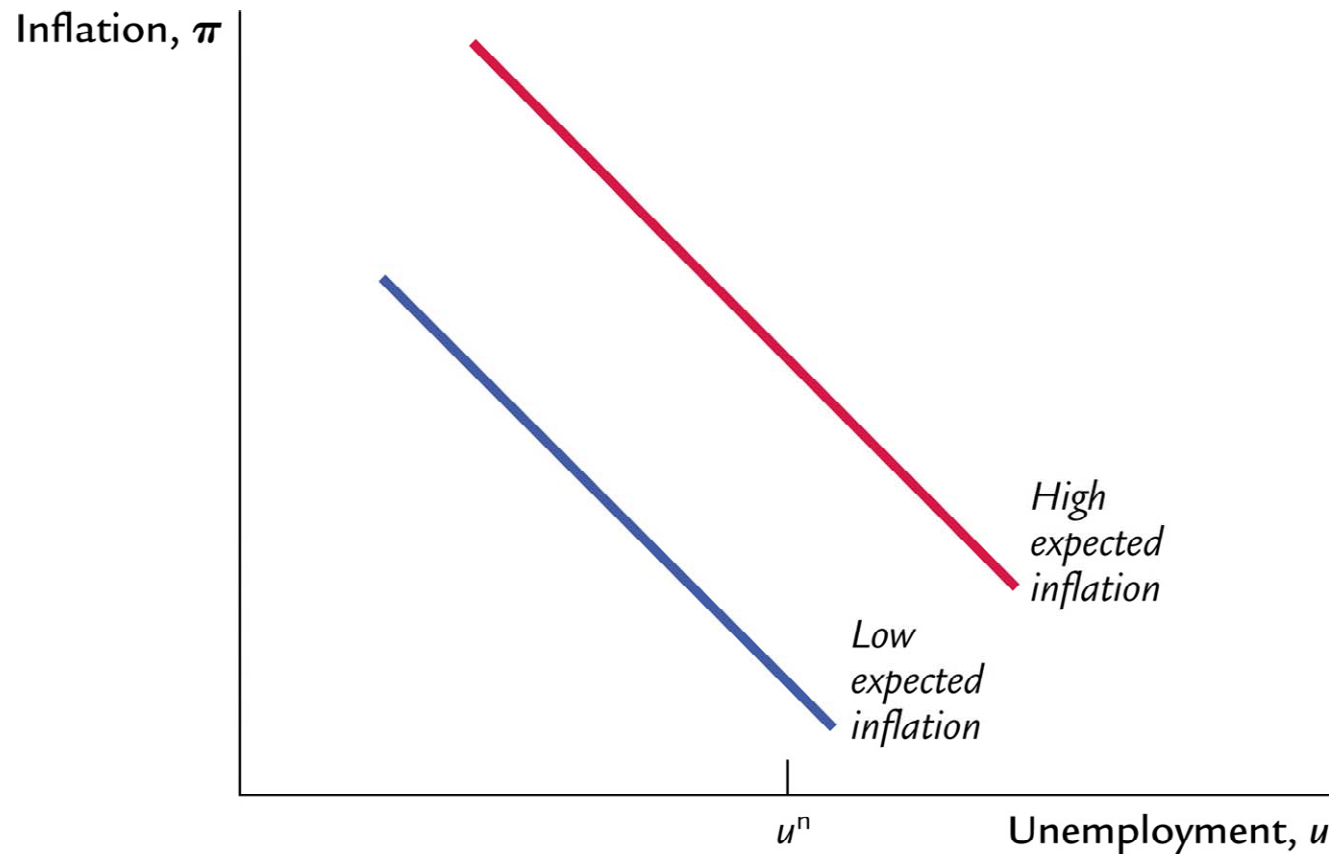
Figure 13.7 Shifts in the Short-Run Tradeoff
Mankiw: Macroeconomics, Sixth Edition
Copyright © 2007 by Worth Publishers

The Phillips curve and the surprise supply function

- **The expectations-augmented Phillips curve and the surprise supply function can be seen as two sides of the same coin.**

$$Y - \overline{Y} = \alpha(P - P^e)$$

$$P - P^e = \frac{1}{\alpha}(Y - \overline{Y})$$

$$\pi - \pi^e = \frac{1}{\alpha}(Y - \overline{Y})$$

- **According to Okun's law the output gap is related to the deviation of unemployment from its equilibrium (natural rate).**

$$u - u_n = \gamma(Y - \overline{Y})$$

$$Y - \overline{Y} = \frac{1}{\gamma}(u - u_n)$$

- **Hence:**

$$\pi - \pi^e = \frac{1}{\alpha} \cdot \frac{1}{\gamma}(u - u_n) = \beta(u - u_n)$$

$$\text{if } \beta = \frac{1}{\alpha} \cdot \frac{1}{\gamma}$$

Diagram 138 Arbetsmarknadsgap

Procent av potentiellt arbetade timmar,
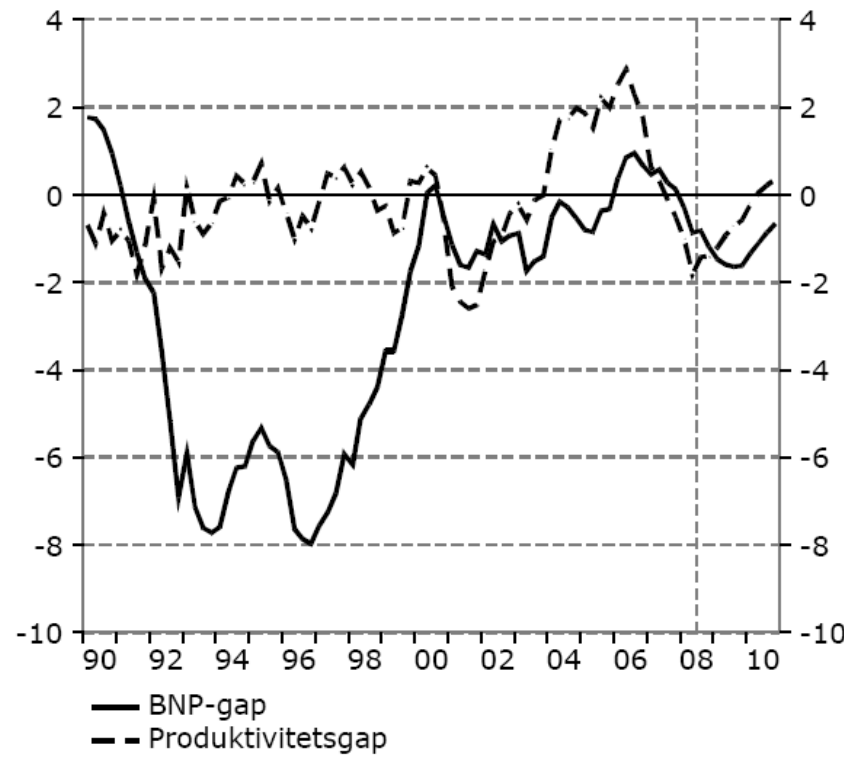säsongrensade kvartalsvärden

Anm. Arbetsmarknadsgapet är beräknat som
arbetade timmars avvikelse från sin potentiella
nivå.

Källa: Konjunkturinstitutet.
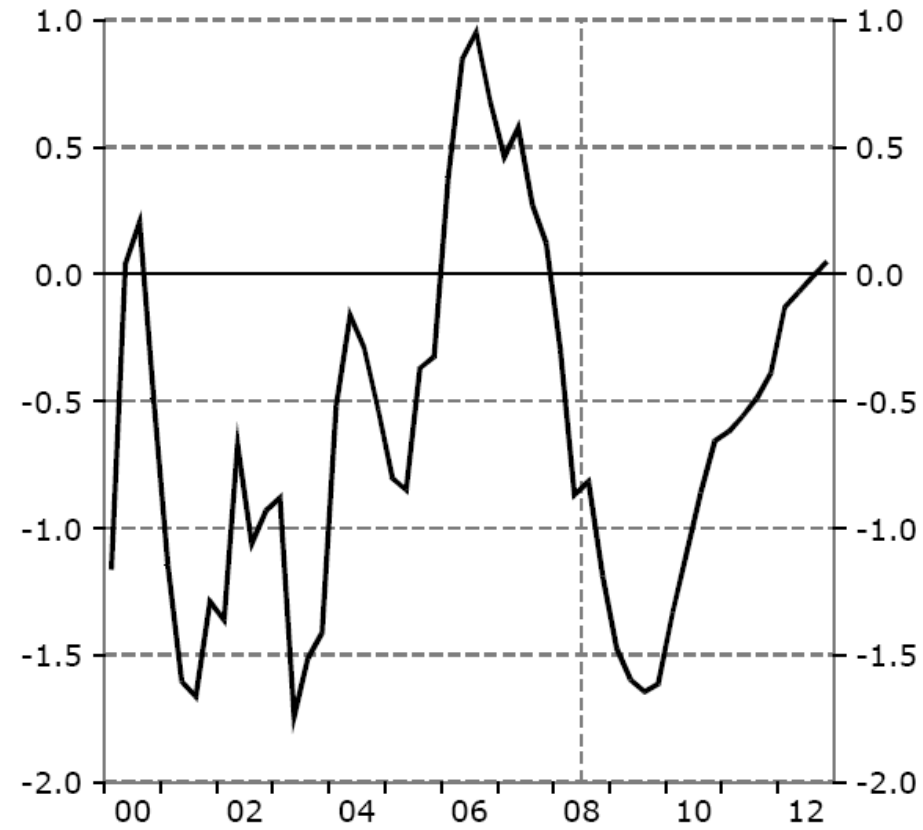
Diagram 139 BNP-gap och produktivitetsgap

Procent av potentiell BNP respektive potentiell produktivitet, säsongrensade kvartalsvärden

Källa: Konjunkturinstitutet.

Diagram 8 BNP-gap

Procent, kvartalsvärden

Källa: Konjunkturinstitutet.

$$\pi = \pi^e - \beta(u - u^n)$$

Adaptive expectations: $\pi^e = \pi_{-1}$

Expected inflation = inflation in the previous year

$$\pi = \pi_{-1} - \beta(u - u^n)$$

$$\pi - \pi_{-1} = -\beta(u - u^n)$$

The rate of change of inflation is proportional to the deviation from equilibrium unemployment. $u = u^n \Rightarrow \pi = \pi_{-1}$. Actual unemployment = equilibrium unemployment implies a constant rate of inflation. $u < u_n \Rightarrow \pi > \pi_{-1}$. This is the reason why the equilibrium rate of unemployment is sometimes labelled the NAIRU (Non-accelerating inflation rate of unemployment).

<u>Alternative hypothesis</u>: rational inflation expectations that are formed on the basis of all available information.

Since it takes time for monetary policy to influence inflation, the central bank finds it important to influence inflation expectations.

Diagram 161 Inflationsförväntningar
Procent, kvartalsvärden

Hushåll, om ett år
Hushåll, upplevd
KPI
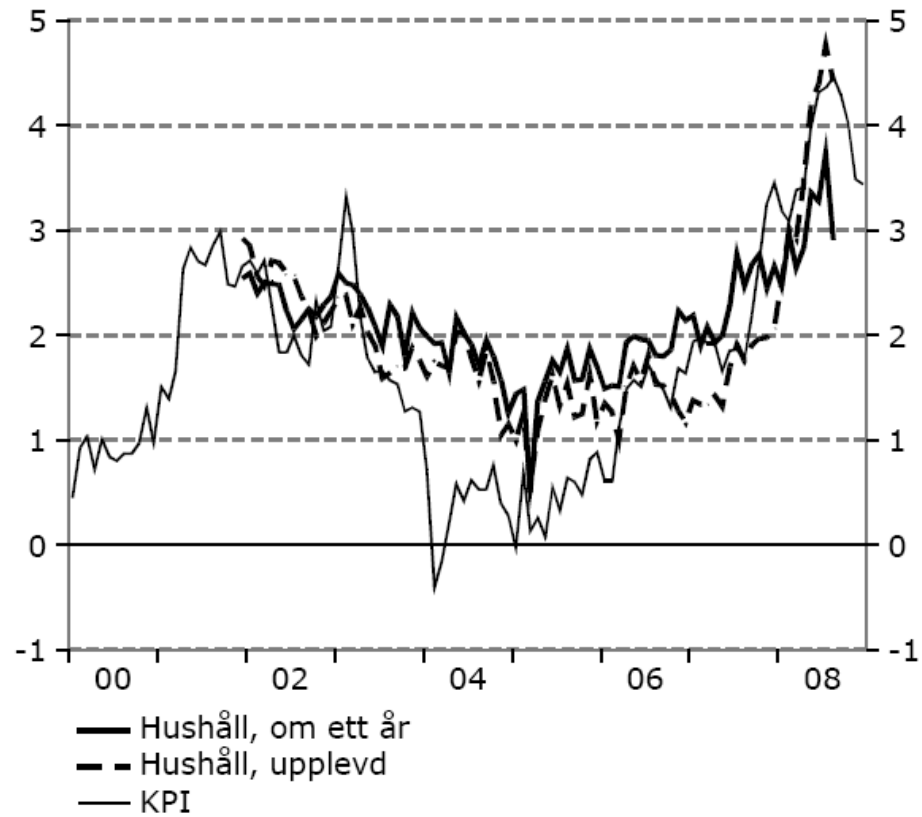
Källa: Konjunkturinstitutet.

Practical problems with stabilisation policy

1. **Time lags**

   - **Inside lags: recognition lag and decision lag**

   - **Outside lags: effect lag**

   - **Longer decision lag for fiscal policy than for monetary policy (parliamentary process where also other considerations than stabilisation aspects are bound to enter)**

   - **The effect lag of monetary policy (until it affects the inflation rate) is often assessed to be around two years**

2. **Difficulties of economic forecasting**

3. **Economic relationships are often unstable**

   - **The Lucas critique**

   - **Examples: the Phillips curves, exchange rate pass-throughs and wage effects of labour market reforms (lower unemployment benefits and tax cuts)**

4. **Because of political-economy reasons wrong measures from the point of view of stabilisation policy are often taken**

   - **Political business cycles: expansionary policy before an election (tax cuts and expenditure increases)**

   - **It is more popular to stimulate aggregate demand in a downturn than it is to stimulate it in a boom: the result is likely to be a *deficit bias* of fiscal policy (or an *inflation bias* of monetary policy)**

   - **Time inconsistency problem: a certain policy may be optimal *ex ante* (in advance) but not *ex post* (afterwards). Then the policy is time inconsistent.**

Economic policy paradigms

The post-war period up to the mid 1970s

- **An activist (Keynesian) view dominated**

- **Full-employment goal**

- **The economy is fundamentally unstable and needs to be stabilised through policy**

- **Discretionary policy: at any point of time one should choose the policy that is viewed as the best**

1980s

- **An activist stabilisation policy with a full-employment goal is perceived to create an inflation bias**

- **The economy is fundamentally stable; shocks originate instead to a large extent from overambitious, but failed, attempts to stabilise the economy**

- **Inflation and high wage increases should not be accommodated (non-accommodation policy)**

- **Rules-based policy instead of discretionary policy**

- **Fight unemployment with structural labour market reforms!**

Today

- **Compromise between earlier paradigms**

- **Monetary policy has become more discretionary and activist again**

- **The price stability objective (an inflation target) is seen as the primary objective for monetary policy**

- **Other institutions (independent central banks)**

- **Discretionary monetary policy with other institutions and other objectives**

- **Rules-based fiscal policy**
  - **budget objective over the business cycle**
    Sweden: budget surplus of 1 percent of GDP over the cycle; EU: structural (cyclically adjusted) budget outcome should be in surplus or close to balance and deficit as well as debt ceilings for the government
  - **government expenditure ceiling (Sweden)**
  - **decision of overall government expenditures taken before decisions on individual expenditures (so if one wants to increase one type of expenditure, one must reduce another once the overall decision has been taken)**
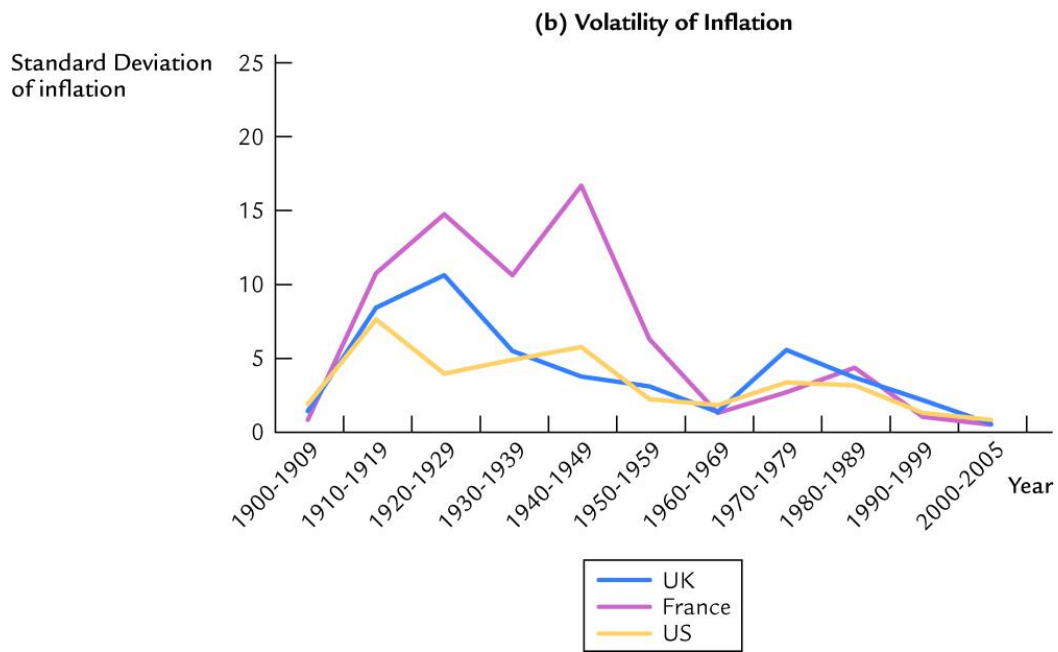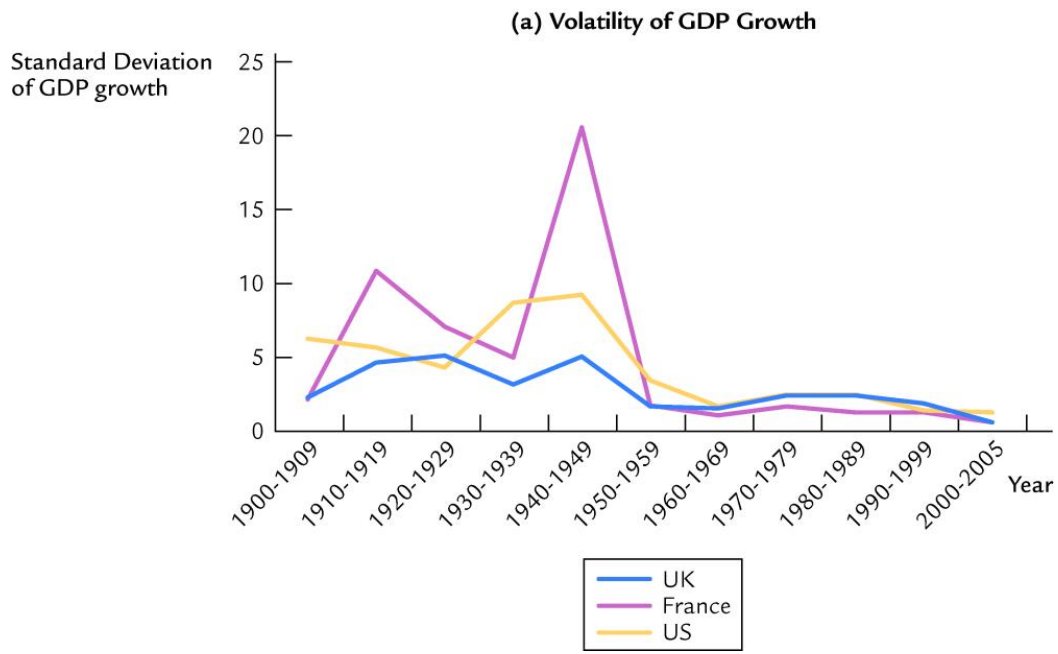
(a) Volatility of GDP Growth

Standard Deviation of GDP growth

(b) Volatility of Inflation

Standard Deviation of inflation

Figure 14.1 Macroeconomic volatility in the UK, France and the US since 1900.

The Great Moderation

- **Larger importance for less volatile service sectors**

- **Good luck – absence of shocks**

- **Better macroeconomic management (because of better institutions?)**

- **Has the great moderation now come to an end? Financial crisis and world depression?**

The time inconsistency (credibility) problem of monetary policy

- **Policy makers strive for both low inflation and low unemployment**

- **It is optimal to announce a low-inflation policy *ex ante*: if credible, anticipated inflation is reduced and low nominal wage increases are agreed**

- **But once wage agreements have been concluded, it is tempting for monetary policy makers to let inflation increase, because this reduces real wages and thus raises employment**

- **Hence the optimal monetary policy is time inconsistent**

- **But such policy cannot work in the long run: both wage earners and employers learn to anticipate policy**

- **The economy gets stuck in an inflation equilibrium with high inflation without reaching lower unemployment (actual unemployment = equilibrium unemployment when actual inflation is anticipated)**

Surprise supply function

$$u = u^n - \alpha(\pi - \pi^e)$$

Loss function

$$L = u + \gamma\pi^2$$

Substitution of supply function into loss function:

$$L = u^n - \alpha(\pi - \pi^e) + \gamma\pi^2$$

Policy makers choose π so as to minimise L:

$$\frac{\partial L}{\partial \pi} = -\alpha + 2\gamma\pi = 0$$

$$\pi = \frac{\alpha}{2\gamma}$$

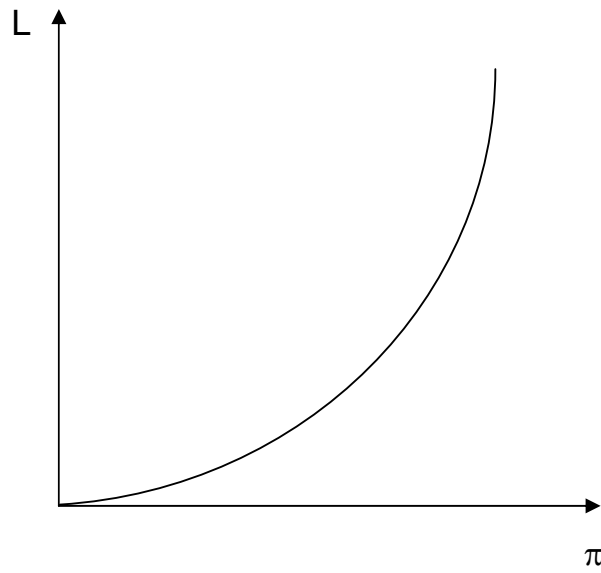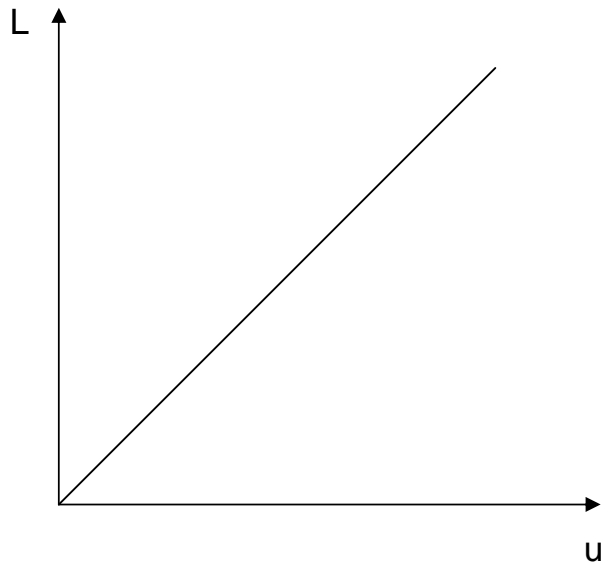$$\alpha = 1 \text{ och } \gamma = 10 \Rightarrow \pi = \frac{1}{20} = 0{,}05$$

$$\pi = \pi^e = \alpha/2\gamma \Rightarrow u = u^n \text{ och } L^D = u^n + \gamma\left(\frac{\alpha}{2\gamma}\right)^2 = u^n + \frac{\alpha^2}{4\gamma}$$

$$\pi = \pi^e = 0 \Rightarrow u = u^n \text{ och } L^C = u^n$$

$$L^C < L^D \therefore \text{ Rules are better than discretion}$$

Loss function

Assume that policy makers announce a policy of zero inflation and that the announcement is believed!

$$\pi^e = 0$$

Hence:

$$u = u^n - \alpha(\pi - \pi^e) = u^n - \alpha\pi$$

$$L = u + \gamma\pi^2 = u^n - \alpha\pi + \gamma\pi^2$$

$$\frac{\partial L}{\partial \pi} = -\alpha + 2\pi\gamma = 0$$

$$\pi = \alpha / 2\gamma$$

Ex post **the government thus chooses to inflate all the same.**

Methods of commitment

1) **Gold standard**

2) **Bretton Woods**

3) **Currency board**

4) **Constitutional stipulations**

5) **Common currency (Italy, Finland)**

6) **Independent central bank**
   - **conservative governor(s)**
   - **inflation target**

Aspects of central bank independence

- **Long periods of office**

- **Governors cannot be fired during period of office**

- **Prohibitions both for governments to give instructions and for central bankers to receive them**

- **Governors should have professional competence (this potentially rules out politicians)**

- **Freedom to use monetary policy instruments**

- **Ban on government borrowing in the central bank**

- **Transparent objective (inflation target)**

Conflict of goals: accountability (democratic control) versus efficiency of monetary policy (low inflation and effective stabilisation)

- **New Zealand: the minister for finance can fire the Governor of the central bank after recommendation by the board of the central bank**

- **UK: deviations from the inflation target must be explained publicly (formal letter to the Chancellor of the Exchequers)**

- **Public hearings (Riksbanken: the Finance Committee of the Swedish Parliament; ECB: the Committee for Monetary Affairs in the European Parliament)**
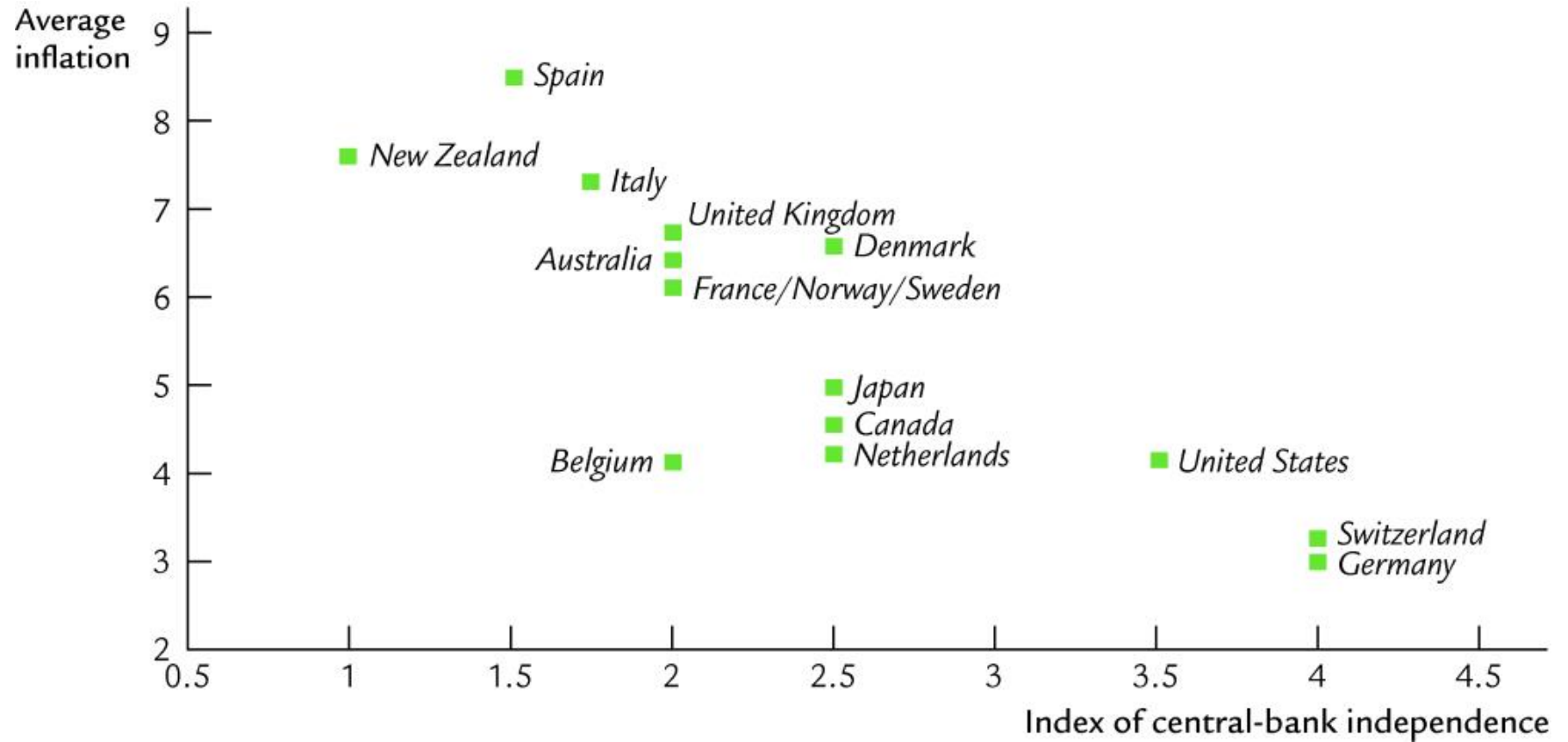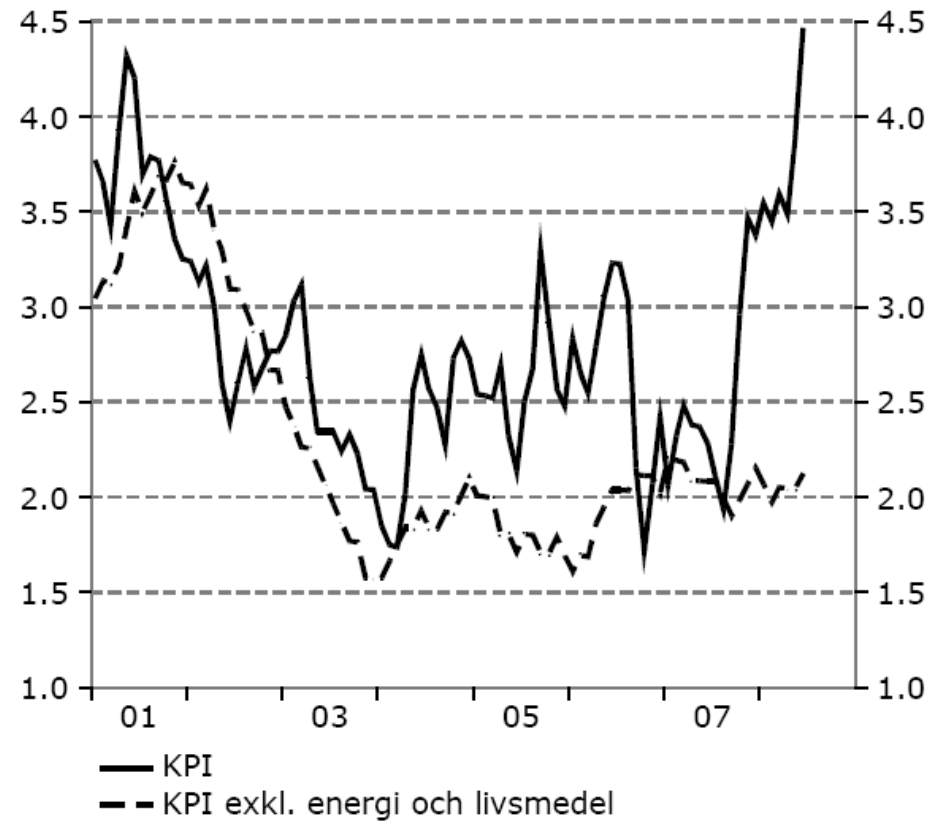
Figure 14.2 Inflation and central bank independence

Diagram 28 Inflation i OECD-området
Procent, månadsvärden

KPI

- - KPI exkl. energi och livsmedel

Källa: OECD.

## Principles of monetary policy

- **The Taylor rule (John Taylor)**
- **Federal Reserve but also other central banks**

Nominal Official Interest Rate = Current inflation + Equilibrium real interest rate + 0,5 · (Medium-term inflation forecast – Inflation target) – 0,5 · Output gap

- **Equilibrium real interest rate = 2 percent**
- **Inflation target = 2 percent**
- **The output gap here shows how much lower output is than the equilibrium rate in percent of the equilibrium level**
- **With inflation = 2 percent and the output gap = 0 (actual output = equilibrium output) the repo rate becomes 4 percent**
- **4 percent inflation and 2 percent higher output than the equilibrium level gives a nominal interest rate of 4 + 2 + 0,5 · (4 – 2) – 0,5 · (-2) = 8 percent**
- **To dampen inflation, the nominal interest rate must be raised more than inflation such that the *real* interest rate goes up.**
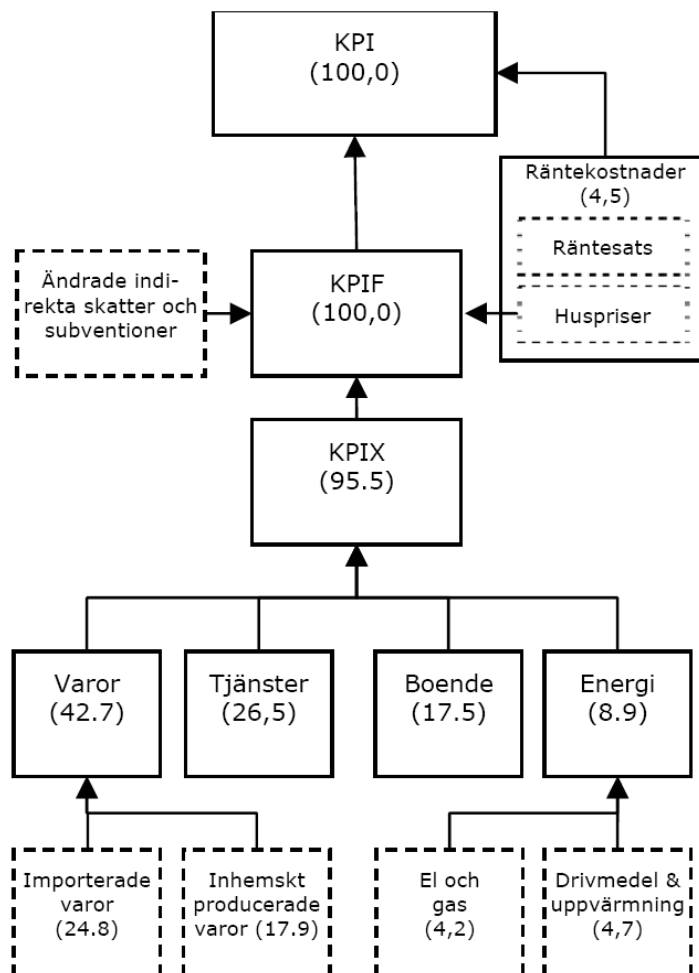
Taylor rule estimates for the euro area

%
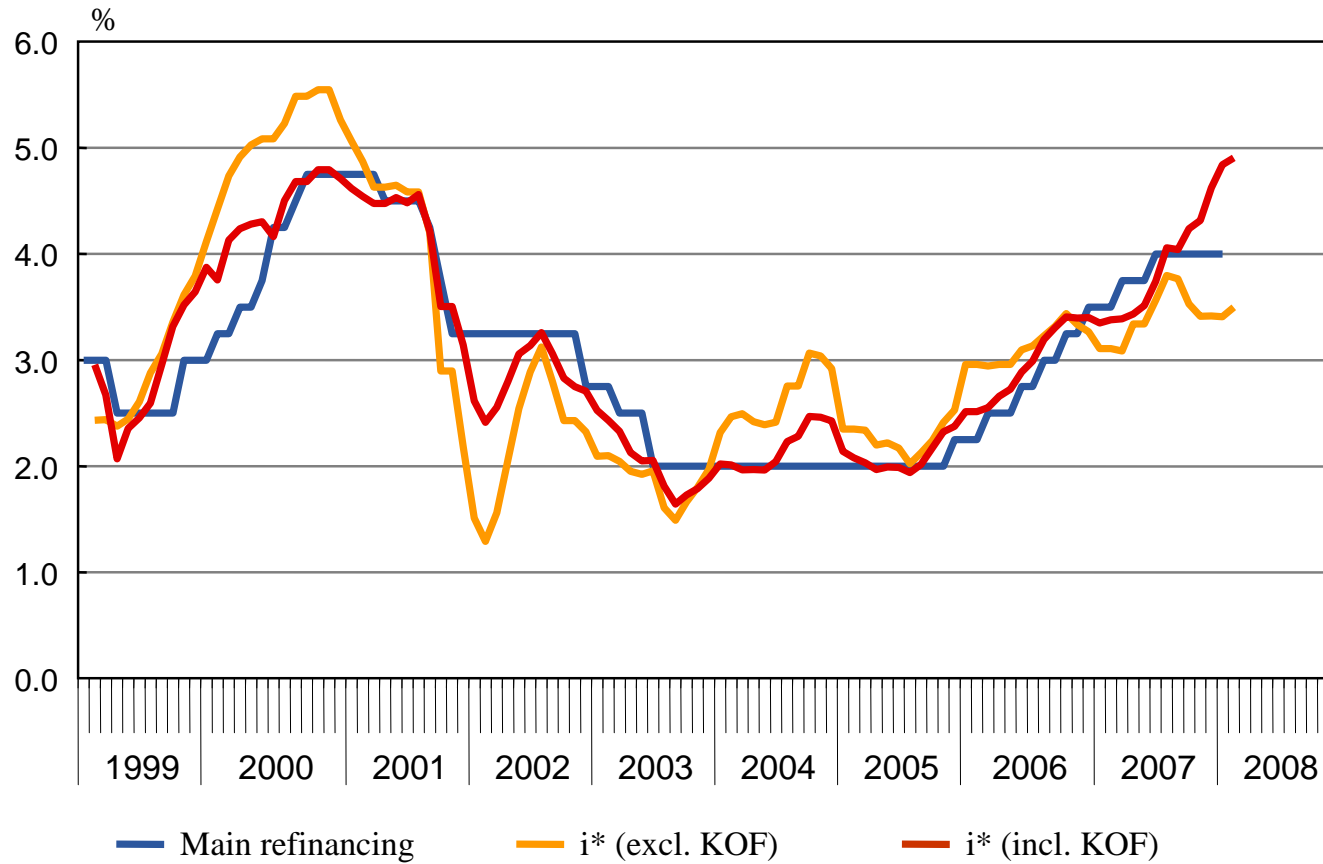
Sources: European Central Bank; KOF; Consensus Economics; calculations by the EEAG.

Figur 3 Inflationsmått

Anm. Parentes anger procentuell vikt I KPI 2008.
Ändrade indirekta skatter och subventioner har ingen
explicit vikt. Boende avser boende exkl. ränte- och
energikostnader.

Källa: SCB.

Tabell 29 Konsumentpriser

Årlig procentuell förändring

|	Vikt	2008	2009	2010	2010 dec
Varor	42,7	1,9	1,5	0,9	1,0
Tjänster	26,5	2,0	1,5	2,2	2,2
Boende exkl. räntor och energi	17,5	2,5	3,1	3,2	3,3
KPIX exkl. energi	*86,6*	*2,0*	*1,8*	*1,8*	*1,9*
Energi	8,9	10,7	3,0	-0,1	0,2
KPIX	**95,5**	**2,8**	**2,0**	**1,6**	**1,7**
Räntekostnader, huspriser[1,2]		0,1	0,2	0,2	0,1
Skatter och subventioner[1]		0,1	0,2	0,1	0,1
KPI med fast ränta	**100,0**	**3,0**	**2,4**	**1,9**	**1,9**
Räntekostnader, räntesats[1,2]		0,8	0,1	−0,3	−0,1
KPI	**100,0**	**3,8**	**2,5**	**1,6**	**1,8**
HIKP		3,7	2,2	1,7	1,8

[1] Bidrag till KPI-inflationen. [2] Räntekostnader har en viktpå 4,5 procentenheter och utgör produkten av huspriser och räntesats (se fakta "KPI med fast ränta" i *Konjunkturäget*, juni 2008).

Anm. Alla priser förutom KPI och HIKP är beräknade exkl. direkta effekter av förändrade skatter och subventioner.

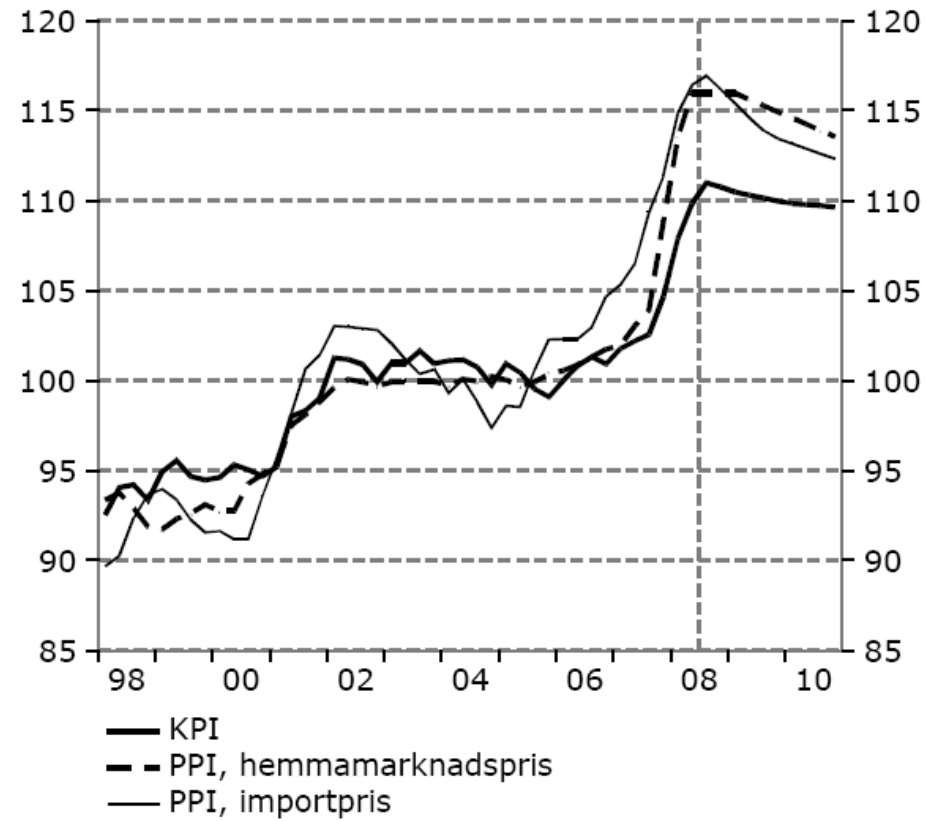Källor: SCB och Konjunkturinstitutet.

Diagram 159 Konsumentpriser
Årlig procentuell förändring, kvartalsvärden

KPI
KPIX
KPIX exkl. energi och livsmedel
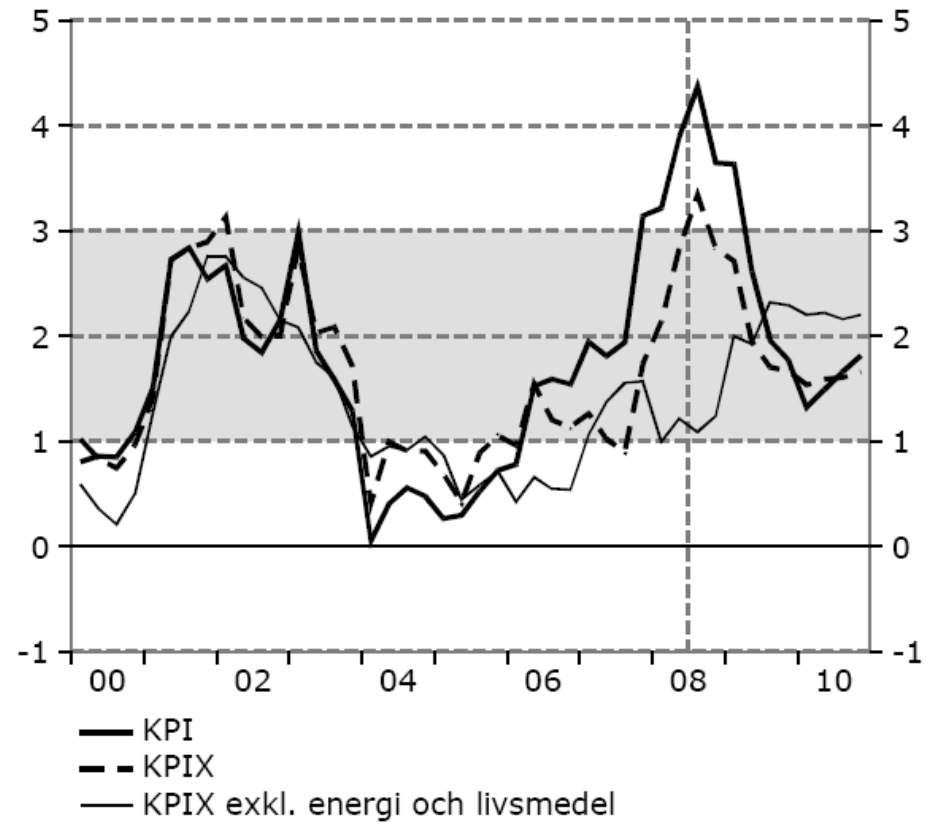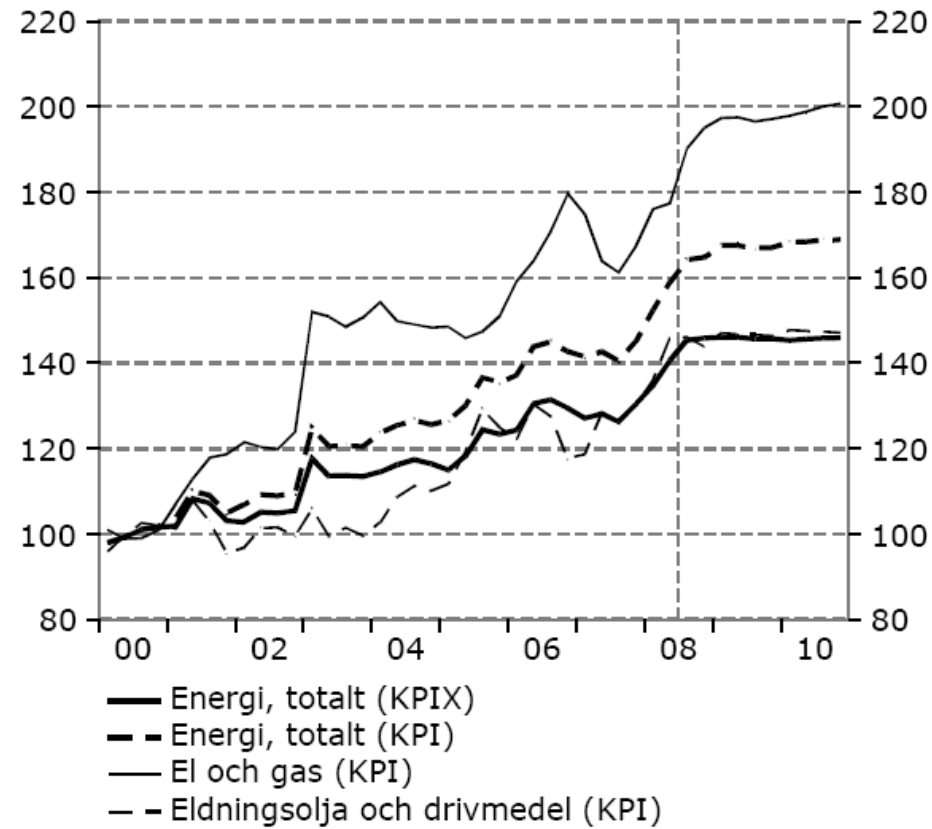
Källor: SCB och Konjunkturinstitutet.

Diagram 163 Livsmedel
Index 2005=100, kvartalsvärden

Källor: SCB och Konjunkturinstitutet.
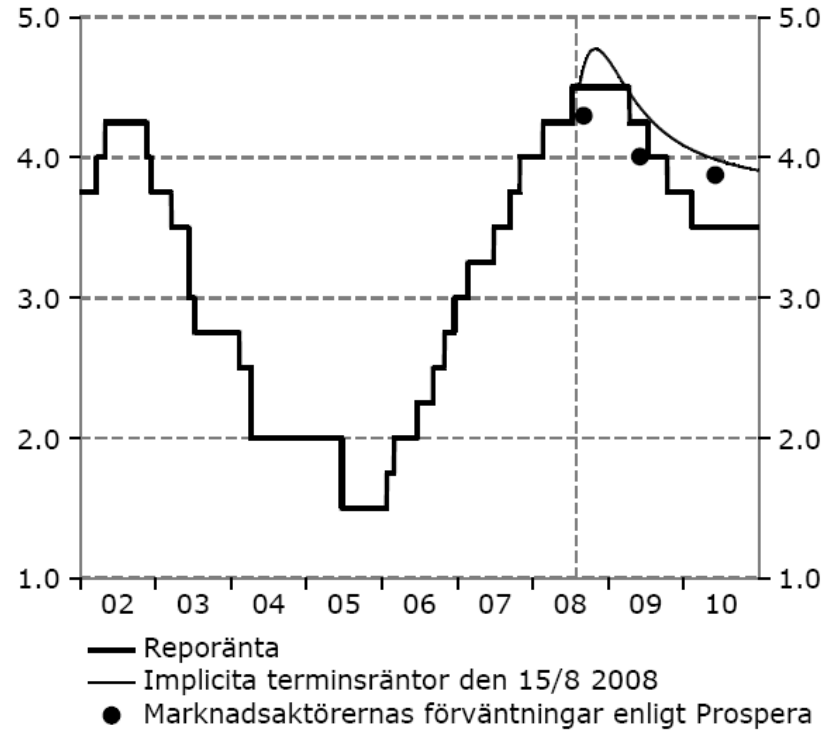
Diagram 165 Energipriser

Index 2000=100, kvartalsvärden

- Energi, totalt (KPIX)
- Energi, totalt (KPI)
- El och gas (KPI)
- Eldningsolja och drivmedel (KPI)

Källor: SCB och Konjunkturinstitutet.

Diagram 59 Reporäntan i Sverige
Procent, dagsvärden

Reporänta
Implicita terminsräntor den 15/8 2008
● Marknadsaktörernas förväntningar enligt Prospera

Anm. Enligt avkastningskurvan den 15/8 2008 och Prosperas mätning den 4/6 2008.

Källor: Reuters EcoWin, Prospera och Konjunktur-institutet.

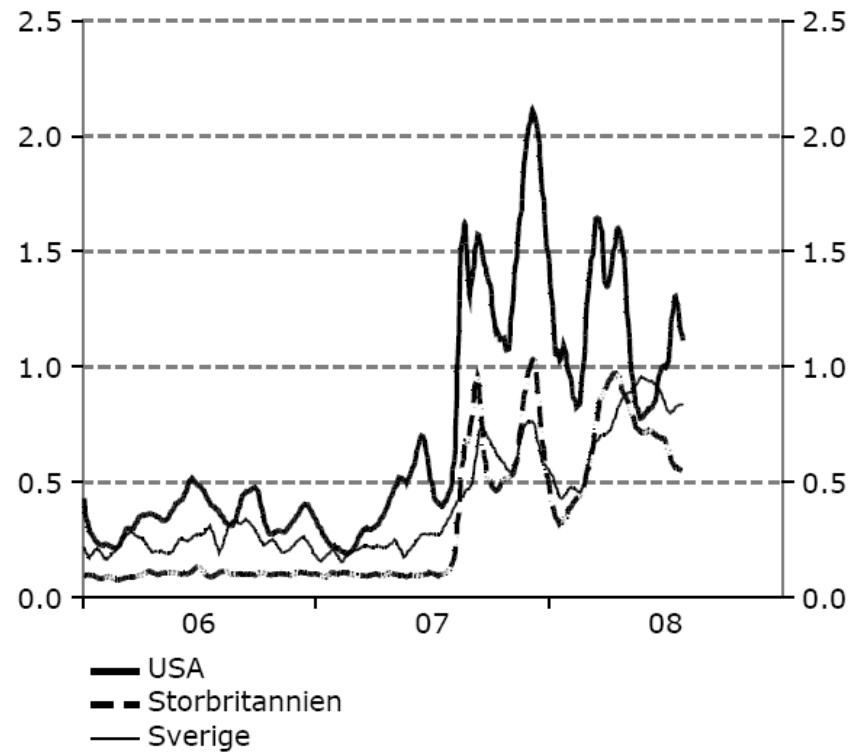# Diagram 57 Förväntad reporänta i Sverige enligt avkastningskurvan

Procent, månadsvärden
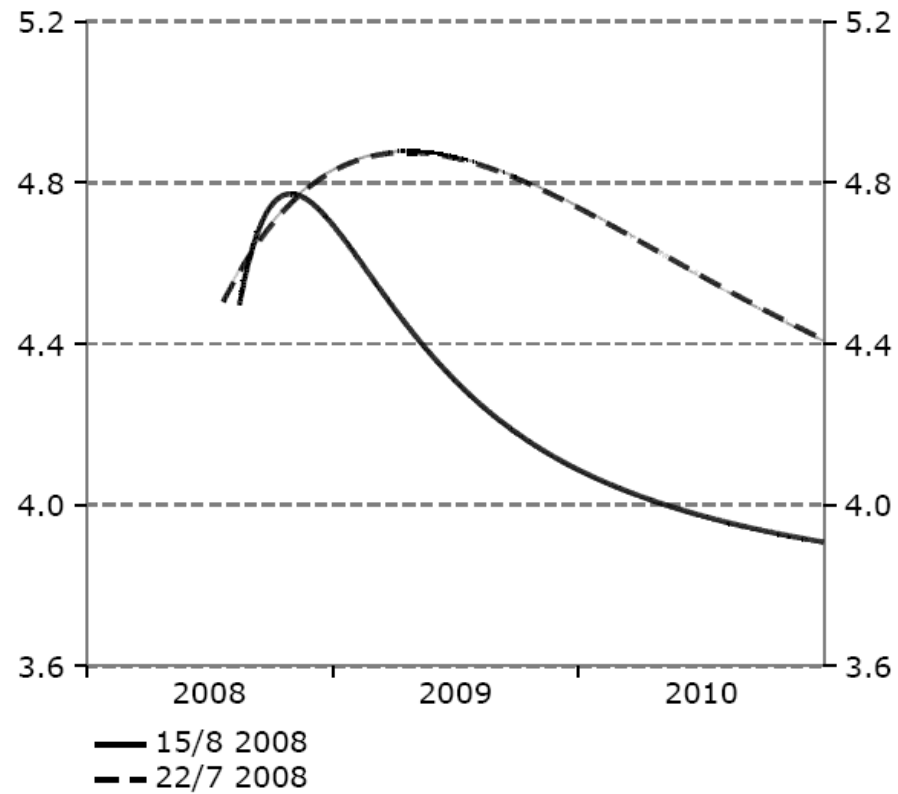
Källor: Reuters och Konjunkturinstitutet.

Diagram 50 TED-spread

Procentenheter, dagsvärden, 10-dagars glidande medelvärde.

Legend:
- USA
- Storbritannien
- Sverige

Källor: Reuters och Bank of England.

Diagram 53 Företagsobligationer, differens mot statsobligationsräntan i USA

Procentenheter, dagsvärden

Företagsobligationer med låg risk
Företagsobligationer med hög risk
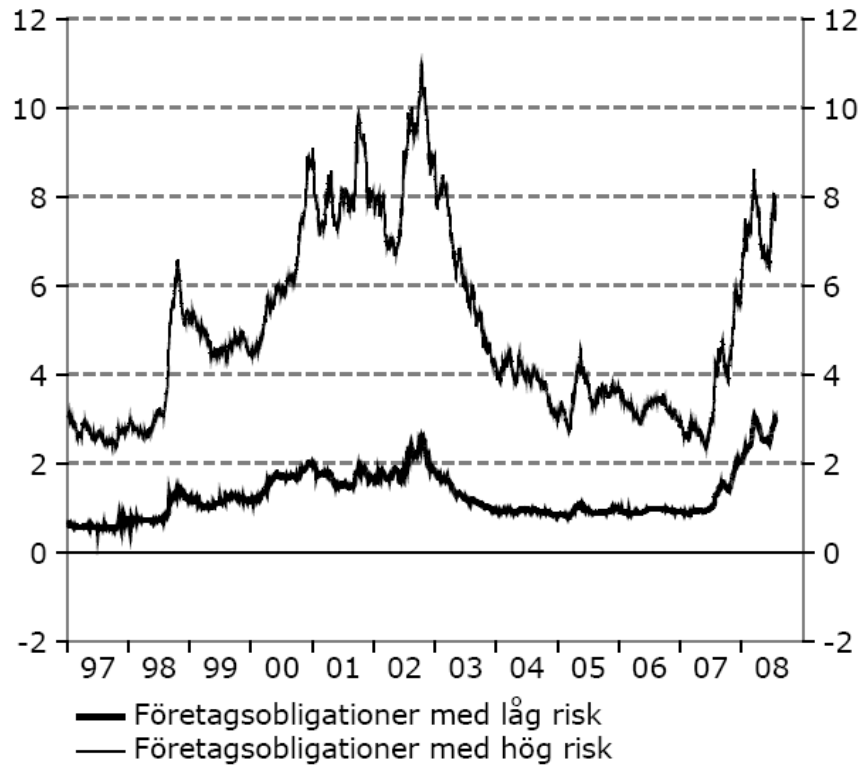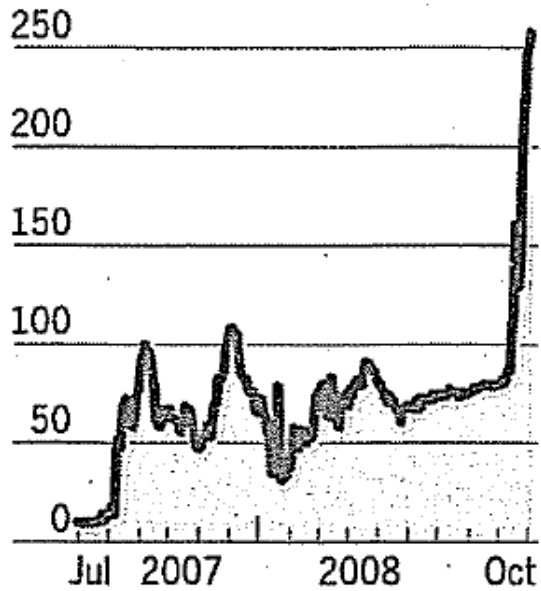
Källa: Merrill Lynch.
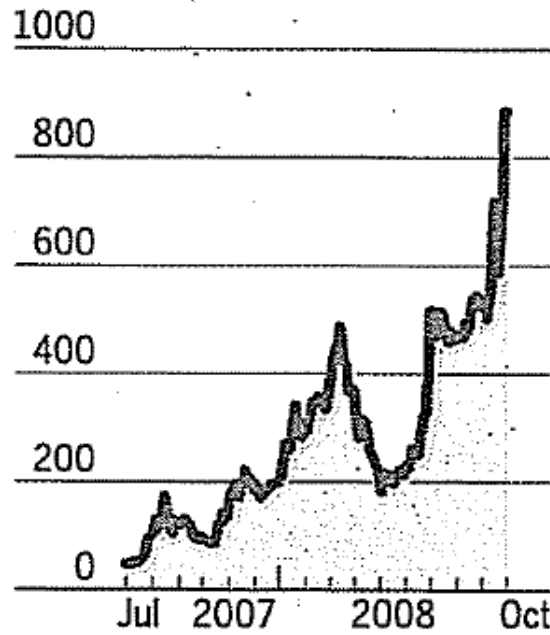
US Libor-OIS spreads
Three-month Libor less three-month overnight index swaps (basis points)
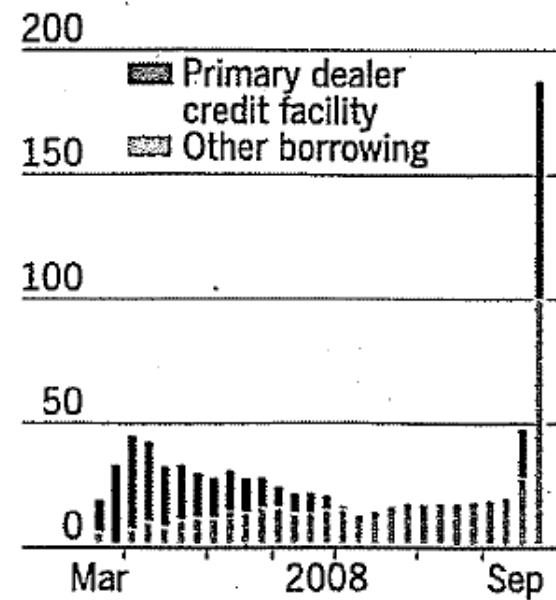

Source: Thomson Reuters

US Financials CDS
Index (spread basis points)

Source: Thomson Datastream

Emergency lending under discount window
$bn
(weekly averages of daily figures)

Primary dealer credit facility
Other borrowing

Source: Federal Reserve

Financial Times, October 2, 2008

<u>Current situation</u>

- **Interbank interest rates above central bank key interest rates**

- **High interest rate spreads**

- **Bank do not lend to each other**

- **Central banks have expanded their lending facilities**
  - **flight to treasury bills ("statsskuldväxlar")**
  - **massive injections of liquidity**

- **But financial crisis is more of a solvency than liquidity problem**
  - **banks have "toxic" assets**
  - **subprime loans and mortgage-backed securities**
  - **losses on these assets**
  - **uncertain values**
  - **difficult to know who is holding the most toxic assets**

- **Bankruptcies**
  - **Lehman Brothers**
  - **contagion effects**

- **Government interventions**
  - **government support to bank take-overs**
  - **government take-overs**
  - **government guarantees (Ireland)**

- **Rescue plan**
  - **government purchases of toxic assets**
  - **above market value but below nominal value**
  - **moral hazard problem**
  - **cost to the tax payer?**
  - **gross cost 6 percent of US GDP**

- **Form of government intervention**
  - **general support for financial sector (general purchases of toxic assets)**
  - **capital injections of ownership capital (preferred shares, convertibles)**