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Exchange Rate Policy When The Labour Market Exhibits Hysteresis

by

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WP94/14

August 1994

DEPARTMENT OF ECONOMICS

UNIVERSITY COLLEGE DUBLIN

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## Exchange Rate Policy When The Labour Market Exhibits Hysteresis

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September 1994

### Abstract

✓ This paper analyses the effects of exchange rate shocks in a small open economy whose labour market exhibits hysteresis. The model is used to highlight deficiencies in the response of the Irish authorities to the exchange rate crisis of 1992/93. A secondary purpose of the paper, though, is to induce those who accept that the Irish labour market is characterised by hysteresis but who reject the argument made here that a more aggressive devaluation should have been pursued, to spell out the labour-market model upon which their policy prescriptions are based.

\*This paper formalises a model I sketched out privately to Brendan Walsh in October 1992 during the currency crisis and publicly, from the floor, to the Annual Conference of the Dublin Economics Workshop in Kenmare in October 1993. I would like to thank - without implicating - Brendan Walsh, Jorge Braga de Macedo, Peter Neary, Kieran Kennedy and Tony Leddin for stimulating discussions (and debates) on these issues.

## 1. Introduction

Hysteresis means that temporary shocks can have permanent effects. In the context of the labour market, hysteresis is present if workers after some period of unemployment lose their ability to influence wage settlements; they may then become permanently unemployed. If the labour market operates in this way the possibility arises that temporary over- or undervaluation of the exchange rate can have permanent effects on unemployment.

[There is widespread agreement that the Irish labour market exhibits strong hysteresis effects. This hypothesis was originally proposed by Lee (1987, publ.1989). His methodology was to identify two components in the relationship between changes in present and in past unemployment, one of which represented serial correlation and the other hysteresis. He concluded that 46% of any increase in measured unemployment would become permanent in the absence of new positive shocks to the labour market.

While the extent of this effect is disputed, many other studies have identified aspects of labour market behaviour consistent with the hypothesis. Walsh (1987), for example, lists three. First, he finds the influence of the short-term unemployed on wage inflation to be much greater than that of the long-term unemployed. Second, the long-term unemployed are found to be much less responsive to increases in employment than the short-term unemployed, and, third, the long-term unemployed are found to be less likely to emigrate than other labour-market participants, indicating that they have effectively withdrawn from the market<sup>1</sup>.

*dwe*

Studies by Barry and Bradley (1991) and Browne and McGettigan (1993) have provided further evidence for the presence of hysteresis. [In the traditional Phillips Curve process it is the level of unemployment that influences the rate of increase of wages; each of the above authors found instead, for the Irish case, that it is the change in unemployment that exerts an influence rather than its level. This confirms the notion that the short-term unemployed exert an influence on wage settlements that the long-term unemployed do not.] Further evidence strongly supportive of the hysteresis hypothesis is provided in a recent paper by Whelan

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<sup>1</sup> His attempt to identify hysteresis directly through estimating a NAIRU equation failed, perhaps due to the extent to which Irish inflation is exogenously determined.

(1994)<sup>2</sup>.

<sup>exam</sup>  
In the present paper I take the simple hysteresis model of Blanchard and Summers (1987) and use it to analyse the impact of exchange rate movements. A related study is Risager (1987) who presents simulations of the impact of devaluation on an economy calibrated to Danish data. Although he imposes long-run neutrality (i.e. the possibility of hysteresis is not considered) his results show a 10 percent increase in investment and a 5 percent increase in employment in the first two to three years in response to a 10 percent devaluation. If hysteresis were present some of these employment gains would be permanent.

The situation I wish to analyse is the impact on an SOE such as Ireland of Sterling's sharp depreciation against the DM and the Irish pound when the UK withdrew from the ERM in September 1992. For this reason some brief institutional background on the Irish experience is warranted.

An agreement on wages had been signed in February 1991 which set the general rate of pay increases for the next three years. Despite this, and despite an unemployment rate of 17%, the Central Bank defended the Irish currency against massive speculative attack after the depreciation of sterling. Meanwhile, the Irish government announced a programme of temporary subsidies for smaller firms vulnerable to competition from British companies. A devaluation was finally announced at the end of January 1993 as the speculative attack continued unabated. This returned the trade-weighted value of the currency to the level which had prevailed one year earlier<sup>3</sup>.

The paper concludes with a critique of these policies based on the model developed here.

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<sup>2</sup> See also Layard, Nickell and Jackman (1991, p.436), who find that the countries in their sample with the highest increases in unemployment between the 1960s and the 1980s, Ireland and Spain, also had the largest increases in equilibrium unemployment.

<sup>3</sup> For more detail on the currency crisis and the institutional background see Walsh (1993).

## 2. Exchange Rate Effects in a Fully-Employed Economy

Assume the economy produces two tradeable goods that are not perfect substitutes for each other, and let it be a price-taker in the market for both commodities.

The two goods are subscripted B and G. Good B competes with British produced goods, or with other similar goods whose prices are determined on the British market<sup>4</sup>. The Irish price of these goods is determined by the sterling price,  $p_B$ , multiplied by the Irish pound price of sterling,  $e_B$ :

exam ✓(1)

$$p_B = e_B p_{B^*}$$

↓

Good G bears the same relationship to goods denominated in German prices, mediated through the Irish pound price of the DM:

✓(2)

$$p_G = e_G p_{G^*}$$

There is no law-of-one-price relationship between these sterling-denominated and DM-denominated goods, so  $p_B$  and  $p_G$  are not equalised.

We will first explore the consequences of a depreciation of sterling relative to the DM and the Irish pound in the context of a full employment model. This model is presented in Figure 1 below.

**\*\*FIGURE 1 HERE\*\***

The length of the block in Figure 1 represents the economy's fixed labour supply. The functions labelled DLB and DLG represent the value of the marginal products of labour (MPL) in each sector, as viewed from the respective origins. Under perfect competition these represent sectoral labour demands:

(3)

$$w = p_B \text{MPL}_B$$

$$w_G = \text{VMPL}_G$$

and

<sup>4</sup> Bartolini (1993) estimates that B goods comprise around 30 per cent of Irish GDP, while Baker (1993) estimates that some 40 per cent of industrial employment could be exposed to major sterling fluctuations.

(4)

$$w = p_G \text{MPL}_G$$

The assumption that workers (or at least "insiders") are homogenous ensures that the same wage is paid in the two sectors.<sup>5</sup> If the wage is perfectly flexible then the equilibrium achieved is at the intersection of the two labour-demand functions. The horizontal distance from either origin to the equilibrium point represents the sectoral distribution of the labour force. Thus the distance  $OB-L1$  measures initial employment in the B sector and the distance  $OG-L1$  measures sector G's initial employment level. The fact that these employment levels sum to the fixed level of labour supply reveals, of course, that the economy is at full employment.

Now consider the impact of a depreciation of sterling relative to the Irish pound and the DM.  $e_B$  falls, so by equation (1)  $p_B$  falls also. By equation (3) the demand for labour in the B sector falls to  $DLB'$ , this sector contracts to an employment level  $OB-L2$ , the equilibrium wage falls to  $w'$ , and the G sector expands to a level of employment  $OG-L2$ .

The real product wage faced by the G sector declines, while that faced by the B sector rises. Clearly the G sector expands at the expense of the sector that competes with British goods. What happens workers' welfare? This may go either way, depending on their consumption bundle. For example, if they consume only G goods they are made worse off, while if they consume only B goods they gain.

The main point that this model demonstrates is perhaps obvious: even with a perfectly flexible labour market an appreciation against sterling will hurt the sector that competes directly with British-made products, or with other homogenous products sold on the British market. If the

<sup>5</sup> It is sometimes assumed in Ireland that wages in the B sector are below wages in the G sector. This does not appear to be the case, however, for manufacturing at least. Baker (1988) divides manufacturing into traditional and modern sectors and finds, surprisingly, that in 1984 a premium of 7% was paid on wages in the former. Barry (1994) updates this and finds the same premium prevailing in 1992. Baker (1993) in turn finds that two-thirds of UK-dependent manufacturing employment is in the traditional sector. Of course some elements of the service sector (e.g. tourism) will also be in competition with the UK, modifying or perhaps removing this wage gap. Such a small gap in any case would hardly justify introducing two groups of insiders into the model.



Irish government at the time of the currency crisis felt that a revaluation of the Irish pound against sterling would not have affected aggregate unemployment, there would be no efficiency gain from compensating the sector that would be hurt by this development<sup>6</sup>. That sector should decline in full general equilibrium.

### 3. The Model with Hysteresis

Blanchard and Summers (1987) assume that wages are set in advance by labour-market insiders at as high a level as possible consistent with all insiders being employed. Lindbeck and Snower (1986) present reasons why insiders might have such market power to exclude outsiders. The model is consistent not just with such exclusive behaviour by insiders, however, but also with human-capital and other explanations of hysteresis<sup>7</sup>.

In the basic Blanchard-Summers model the group of insiders consists of those currently in employment. In the absence of unexpected shocks then, unemployment remains constant. If an adverse shock hits unexpectedly however, the predetermined wage proves too high to maintain full employment of all insiders, some jobs are lost, these workers lose their insider status and are then permanently excluded from employment unless an unexpected beneficial shock occurs.

Given the prices expected to prevail in period  $t+1$ ,  $E p_B(t+1)$  and  $E p_G(t+1)$ , the  $t+1$  wage is set such that

$$(5) \quad w(t+1) = E p_B(t+1) \text{MPL}[EL_B(t+1)] = E p_G(t+1) \text{MPL}[EL_G(t+1)]$$

where

$$(6) \quad EL_B(t+1) + EL_G(t+1) = L_B(t) + L_G(t)$$

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<sup>6</sup> The presence of adjustment costs per se does not provide an efficiency basis for intervention [Mussa (1978)]. Intervention may be justified to overcome adjustment problems, however, if wages are sticky [see e.g. Neary (1982)]. This is the case considered in the next section of the paper.

<sup>7</sup> For example, if workers lose their skills rapidly when unemployed or if a lengthy period of unemployment is read by potential employers as a signal of poor quality then wage offers may lie below the job seeker's reservation wage. The discouraged-worker effect would also reduce effective labour supply, increasing the market power of insiders. A deflation of the economy of the type considered here would expand the number of insiders under any of these circumstances.

This situation is depicted in Figure 2 where the number of insiders is  $[0B-LB(t)]$  plus  $[OG-LG(t)]$ , and the remainder of the labour force (the outsiders) are unemployed.

**\*\*FIGURE 2 HERE\*\***

Now let an unexpected adverse shock hit in period  $t+1$ , specifically let sterling depreciate against the DM and the Irish pound. As before this shifts the labour demand curve for B goods downwards, and reduces employment in that sector to  $0B-LB(t+1)$ .

By the time the next wage bargains are struck the group of workers who have lost their jobs,  $LB(t)-LB(t+1)$ , are no longer insiders. If sterling is expected to stay at its new lower level then the period  $t+2$  wage will remain at the  $t+1$  level (which is sufficient to guarantee employment to the new smaller pool of insiders).

If sterling, on the other hand, is expected to return to its initial (time  $t$ ) value the wage demanded in period  $t+2$  will be:

$$(7) \quad w(t+2) = E_{p_B}(t+2)MPL[EL_B(t+2)] = E_{p_G}(t+2)MPL[EL_G(t+2)]$$

where

$$(8) \quad EL_B(t+2)+EL_G(t+2) = L_B(t+1)+L_G(t+1)$$

Comparing equations (7) and (5) we see that since the level of employment in (8) is below that in (6), and since the marginal product of labour is declining in employment, the wage demanded in period  $t+2$  is greater than that demanded in period  $t+1$ , even though the same external environment has been expected in each case.

This demonstrates that even a temporary revaluation of the Irish pound, if it lasts long enough to cause some workers to lose their jobs, may permanently increase the level of unemployment.

Faced with a labour market that operates in this way what should government policy be? Clearly, if unemployment is a major concern, a devaluation of the Irish pound relative to the DM is called for. This pushes out the labour-demand curve in the G sector and offsets the

inward shift in the labour-demand function in the B sector that sterling's original devaluation gave rise to.

Should the aim, however, just be to offset sterling's movement against the DM (the action eventually taken by the Irish government)? According to the logic of the present model a greater devaluation is warranted since, with wages set in advance, further jobs can be created. By expanding the pool of insiders these gains can become permanent<sup>8)</sup>

Now let us look at some of the factors that our simple model ignores: interest rates, and the burden of the economy's foreign debt. (X)

The real interest rate is defined as follows:

$$(9) \quad r_r = r_n - \text{expected inflation}$$

where  $r_r$  is the real rate and  $r_n$  the nominal rate.

Let the nominal interest rate be determined by uncovered interest parity plus a risk premium<sup>9)</sup>:

$$(10) \quad r_n = r_n^* + \text{expected currency depreciation} + \mu$$

where  $r_n^*$  is the foreign nominal interest rate and  $\mu$  is a risk premium. An undervaluation policy of the type suggested here (undervaluation relative to financial market variables such as the rate of inflation, the budget deficit, etc) should reduce real interest rates in two ways. Firstly, if financial markets feel the currency is undervalued then by equation (10) there should be a discount on the domestic nominal rate. Secondly, an undervaluation will raise expected inflation. Against these beneficial effects on the real interest rate must be raised the issue of a risk premium. In the case of the currency crisis the Irish government was clearly reacting to a strong speculative attack and no increase in the risk premium imposed by

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<sup>8</sup> Barry and Bradley (1991) and Browne and McGettigan (1993) both find that a 1% rise in prices is reflected in a 1% rise in wages. This might be thought to mean that wages are homogeneous of degree one in prices, in which case a reflation would leave the real wage unchanged. This interpretation would not be correct however, because these findings on the wage equation are ceteris paribus results. The real wage will be affected if the reflation impacts on unemployment.

<sup>9</sup> This is equivalent to covered interest parity on the assumption that the forward rate differs from the expected future spot rate by a risk factor.

financial markets is obvious in the wake of the devaluation. This may or may not have held true if the government had seized this most unusual opportunity to effect a more substantial devaluation; the data in Kouri (1979), however, clearly show real gross profits and gross investment rising substantially in the wake of Scandinavian devaluations, suggesting that real interest rates must have come down.

On the issue of whether a devaluation increases the burden of an economy's foreign debt, economic theory suggests not. Certainly for the model outlined above a devaluation increases the country's ability to earn foreign exchange while leaving the foreign-denominated debt (and debt service payments) constant. To see this, note that both sectors' output prices are denominated in foreign currency while output is constrained by the sectoral real wage. A devaluation reduces the real wage in each sector, stimulates output, and thereby raises foreign currency earnings. If the marginal propensity to consume is less than one, consumption of tradeables will rise by less than this increase in output, and so the country's foreign exchange resources increase. This reduces the burden of the foreign debt<sup>10</sup>.

A similar result applies in the Mundell-Fleming model (in which the domestic currency price of exportables is constant): for a debtor economy, a devaluation raises the debt servicing requirement in terms of domestic goods; this along with the trade balance and other service items comprises the overall current account. Could the increase in the debt-service deficit dominate the improvement in the other components of the current account? A model by Rodriguez (1979), which extends the Mundell-Fleming model to include debt service, and also corrects the flaw whereby a capital inflow is modelled as continuous rather than as a stock adjustment, shows that this possibility is ruled out by the stability condition for the system<sup>11</sup>. There are more units of domestic currency left over after interest payments than before the devaluation, therefore, even though these might translate into less units of foreign currency.

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<sup>10</sup> The presence of a non-tradeable sector would not affect this conclusion.

<sup>11</sup> The logic of appealing to the stability condition is of course firstly that the real economy seems to be reasonably stable and secondly that comparative static results are meaningless if the system is unstable.



#### 4. Conclusions

The argument of this paper is as follows: if the Irish government did not believe that an overvalued currency would worsen overall unemployment, there was no efficiency basis to their offer of temporary subsidies to small firms producing sterling-denominated goods. The sterling-denominated sector should have shrunk in general equilibrium.

If we accept, on the other hand, that short-term unemployment would have risen as a result of the currency's overvaluation, then, on the basis of the strong evidence for hysteresis in the Irish labour market, the distinct possibility arises that some proportion of this increase would have become permanent. This was the fear of those who advocated a devaluation of the Irish pound in response to sterling's departure from the ERM. If the hysteresis hypothesis is correct, however, it implies that a substantially greater devaluation than that actually undertaken, which simply restored the country's trade-weighted exchange rate to the level prevailing one year previously, would have been warranted<sup>12</sup>. The trade-off faced was the old one of unanticipated inflation versus unemployment.

Given the requirements of the Maastricht treaty, the opportunity for such a devaluation to rectify, at least partially, the disequilibrium in the labour market is unlikely to arise again. If the present model is realistic, it is to be regretted that the government did not make a bolder move at the time.

The purpose of the present paper, however, is not just to criticise government policy. It is also offered as a challenge to those who accept that the Irish labour market is characterised by hysteresis but who reject the argument made here that a more aggressive devaluation should have been pursued, to spell out the labour-market model upon which their policy prescriptions are based.

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<sup>12</sup> On the basis of the Bertola and Svensson (1991) methodology, Bartolini (1993) estimates that financial markets expected a devaluation of around 5 per cent while the effect of the eventual exchange rate realignment was to devalue the Irish pound by about 7.5 per cent. This "excess devaluation", he concludes, had positive consequences including the avoidance of new speculative pressures, a rapid return of financial capital and the fall of interest differentials (with Germany) to below pre-crisis levels.

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Figure 1  
The Full Employment Model

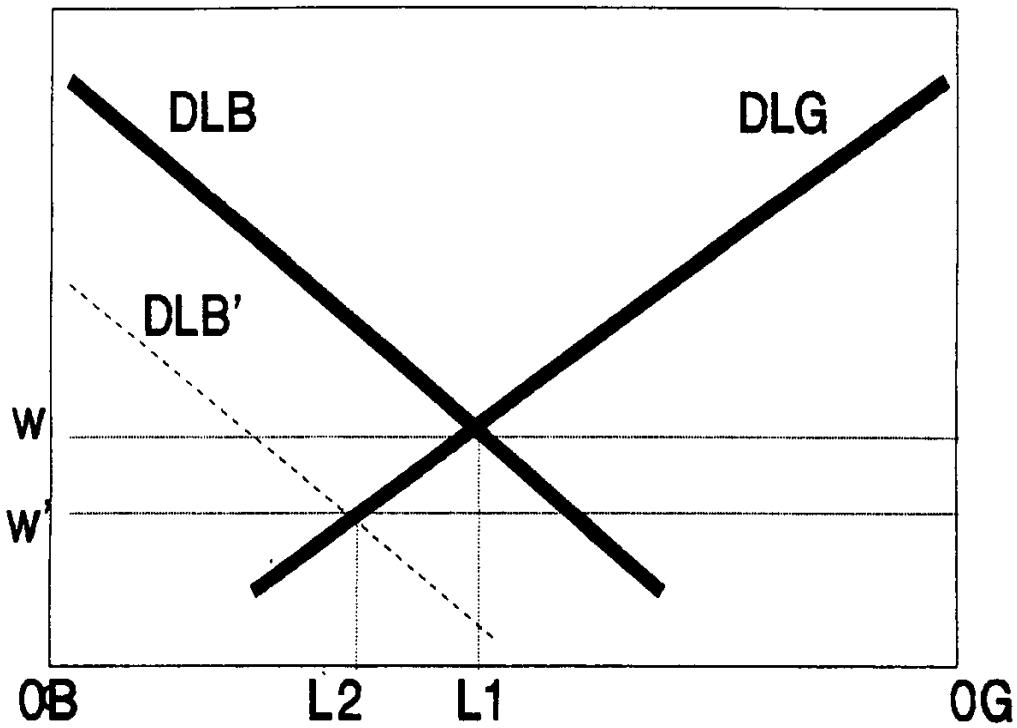
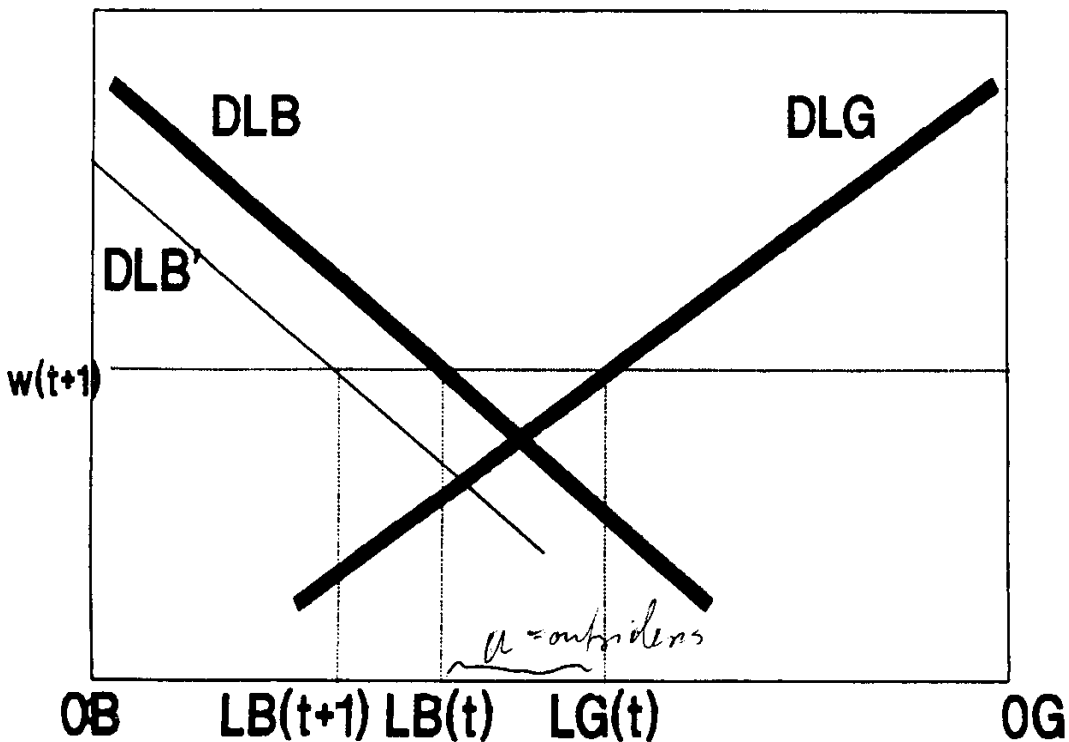


Figure 2  
The Model with Hysteresis





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- 1 **Scope and Methodology of Subject**
  - (a) Devine, Lee, Jones and Tyson, Chapter 1.
  - (b) Martin, Chapter 1.
  
- 2 **Investment Decision of the Firm under Uncertainty and Risk**
  - (a) Koutsoyiannis, Chapters 11 and 12.
  - (b) Devine, Lee, Jones and Tyson, Chapter 7.
  - (c) "Investor Preference for Large Firms: New Evidence On Economies of Scale," *Journal of Industrial Economics*, December 1983.
  - (d) *The Evolution of Market Risk in the US Steel Industry and Implications for Required Rate of Return*, Baldwin, Tribendis & Clark, *Journal of Industrial Economics*, September 1984.
  
- 3 **Cost concepts for Decision Making.**
  - (a) Douglas Chapter 7.
  - (b) Tirole, Chapter 8.
  
- 4 **Price/Output Decision**

In relation to Market Structure/Characteristics of Goods/Transfer Pricing

  - (a) Henderson and Quandt - Chapter 8.
  - (b) Douglas, Chapters 9/10/11.  
Tirole. Chapters 3 and 4.
  
- 5 **Information and Strategic Behaviour / Game Theoretic Models / Lagged Adjustment**
  - (a) Tirole, Chapter 9.
  - (b) Philips, Chapters 2, 3, 4 and 5.
  - (c) Henderson & Quandt, Chapters 6, 7 and 8.
  - (d) Fudenberg and Tirole, Chapters 1, 3, 4 and 5.
  - (e) Dixit and Nalebuff, Chapters 4, 5 and 6.
  - (f) Price Mark-ups, Market Structure and Business Fluctuations in Japanese Manufacturing Industries, *Journal of Industrial Economics*, March 1987.
  - (g) The Nature of Competition and The Scope of the Firm, *Journal of Industrial Economics*, March 1986.
  
- 6 **Performance Measurement / Optimisation over Time / Pricing Strategies / Dynamic Games**
  - (a) Tirole, Chapters 5, 6 and 8.
  - (b) Philips, Chapters 6, 7 and 8.
  - (c) Davies, Lyons, Dixon and Geroski, Chapter 4.
  - (d) Martin, Chapter 4.
  - (e) Fudenberg and Tirole, Chapters 6, 7, 8 and 9