Testing Myopia in Economic Models*

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Abstract

This paper suggests a simple test of whether agents are forward-looking or myopic that can be implemented on the type of backward-looking econometric models that are usually estimated.. We argue that myopic behaviour implies a simple parametric restriction that will not hold if agents are forward-looking. We illustrate our tests by examining price adjustment in the UK using aggregate quarterly data from 1963-1997. Our evidence strongly suggests that price-setting is forward-looking and not myopic.

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1) Introduction

The issue of whether agents are forward-looking or myopic has always been a challenge to empirical modelling of economic variables. Although theory normally suggests behaviour should be forward-looking, most econometric models are backward-looking. This is a potentially serious problem: if a backward-looking model is used to represent forward-looking behaviour, the model cannot be structural, since the backward-looking element must in part capture forward-looking behaviour. This type of model will be particularly vulnerable to the Lucas Critique (Alogoskoufis and Smith, 1991).

The hypothesis that behaviour is forward-looking is easy to test using a forward-looking model. However, since most empirical models are backward-looking, it would be especially useful to have a test of forward-looking behaviour that can be implemented on a backward-looking model. Hendry (1988) and Favero and Hendry (1992) provide such a test. They exploit the Lucas Critique, arguing that if the parameters of a backward-looking econometric model are stable when there are structural breaks in the marginal processes for the explanatory variables, then the econometric model cannot be consistent with forward-looking behaviour. This insight has lead to empirical tests of myopia in areas such as money demand, consumption and wage formation (eg Hendry, 1988, Cuthbertson and Taylor, 1990, Favero, 1993 and Mogahdam and Wren-Lewis, 1995). Although important, this test is less useful if there are no structural breaks in the explanatory variables.

This paper suggests a simple alternative test that can also be used on a backward-looking model. Consider the behaviour of the variable x. We assume the current value of x depends on previous values of x (because of adjustment costs or some other source of inertia) as well as past and current values of the steady-state value of x, denoted x*. If x is also affected by expected future values of x*, then the variable is forward-looking. If it is not, then x is myopic. To implement the test, one estimates a backward-looking error-correction model, relating x to lagged values of x and current and lagged values of x*. We argue that if behaviour is myopic, then a simple parametric restriction will hold in the error-correction model: the coefficients on Δx^*_t, (the current value of the change in x*) and the error-correction term will sum to zero. If behaviour is forward-looking, by contrast, this restriction will not hold. We can therefore test the null hypothesis that behaviour is myopic against the alternative hypothesis that it is not.

The intuition behind the test is straightforward. Suppose that behaviour is forward-looking, so expected future values of x* do affect x. We can express expected future values of x* in terms of current and lagged values of x*. These variables therefore play a dual role in our backward-looking error correction model: they capture both their own direct effect on x *and* the effect of expected future values of x*. If behaviour is backward-looking, then estimates on these variables will only capture their own direct effect on x. Our test exploits this difference.

We present an application of our test to the case of price adjustment of the aggregate price level in the UK. We obtain a measure of the steady-state price using cointegration techniques. We then estimate a backward-looking dynamic model of price adjustment and test whether behaviour is myopic or forward-looking. We find clear evidence that price-setting is indeed forward-looking.

The remainder of the paper is structured as follows. Section 2 outlines our test using a very simple dynamic model. Section 3 considers a more general model. In section 4, we apply our test to price adjustment in the UK. Section 5 summarises, concludes and suggests directions for further work.

2) Testing myopia using a simple dynamic model

Suppose we have the model

1) $x_t = \alpha_{F0} x_t^* + \alpha_{F1} E_t x_{t+1}^* + \alpha_{B1} x_{t-1} + u_t$

Here x is the actual value of the variable and x* is its desired or steady-state value, that which would be observed if x were to adjust fully and instantaneously and u is a white-noise error term. The adjustment of x is less than instantaneous and the current value of x is related to its own first lag and the current and expected future value of x*. We assume homogeneity by imposing the restriction $\alpha_{Fo}+ \alpha_{F1}+ \alpha_{B1}=1$, thus ensuring x=x* in a static equilibrium[1]. If $\alpha_{F1}\neq 0$, then the behaviour of x is forward-looking, whereas if $\alpha_{F1}=0$, then x is myopic[2].

We can reparameterise (1) in error-correction form as

2) $\Delta x_t = (\alpha_{F0}+\alpha_{F1})\, \Delta x^*_t - (\alpha_{F0}+\alpha_{F1})\, (x-x^*)_{t-1} + \alpha_{F1}\, \Delta x^*_{t+1} + u_t$

The first two coefficients in (2) sum to zero because of the homogeneity requirement.

In order to construct our test, we must express our model in backward-looking form. To do this, we therefore follow the existing literature (Rotemberg, 1982, Nickell, 1985, Alogoskoufis and Smith, 1991) and use a time-series model to express $E_t\Delta x_{t+1}*$ in terms of

1)We do not necessarily assume there is a static equilibrium, since x may grow over time.

2) We should note that the dynamic model has been expressed in a particular and possibly restrictive way. Suppose for simplicity that x* is a function of two other variables, Z_1 and Z_2 and we can write $x^*=\gamma_1 Z_1+\gamma_2 Z_2$. Then we can substitute x* out of (1), giving

1') $x_t = \alpha'_{11} Z_{1\,t} + \alpha'_{12} Z_{2\,t} + \alpha'_{21} E_t Z_{1\,t+1} + \alpha'_{22} E_t Z_{2\,t+1} + \alpha_{B1} x_{t-1}$

where $\alpha'_{11} = \alpha_{F0}\gamma_1$, $\alpha'_{12} = \alpha_{F0}\gamma_2$, $\alpha'_{21} = \alpha_{F1}\gamma_1$ and $\alpha'_{22} = \alpha_{F1}\gamma_2$. Equation (1) implicitly assumes $\alpha'_{11}/ \alpha'_{12} = \alpha'_{21}/ \alpha'_{22}$. This restriction is testable.

variables observable at time t. Assuming for simplicity that x is I(1) and that Δx^* follows an AR(1) process, we can write $E_t\Delta x_{t+1}^* = \theta_0 + \theta_1 \Delta x_t^*$ where θ_0 and θ_1 are constants. Substituting this into (2) we obtain

$$(3)\ \Delta x_t = \theta_0\alpha_{F1} + (\alpha_{F0}+\alpha_{F1}(1+\theta_1))\, \Delta x^*_t - (\alpha_{F0}+\alpha_{F1})\,(x-x^*)_{t-1} + u_t$$

If x is forward-looking ($\alpha_{F1}\neq 0$), then the coefficient on Δx_t^* in (3) captures the effects of both current *and* future values of Δx^*. It is thus different in absolute value from the coefficient on the error-correction term, so the sum of the coefficients on Δx^*_t and the error-correction term in (3) will be different from zero. If x is myopic ($\alpha_{F1}=0$), by contrast, then the coefficient on Δx^* only captures the effect of the current value of Δx^*, so the sum of the coefficients on Δx^*_t and the error-correction term in (3) is zero. The constant term ($\theta_0\alpha_{F1}$) will also equal zero. This observation allows us to construct a simple test of myopia.

To construct the test we estimate the error-correction model

$$(4)\ \Delta x_t = \beta_{20} + \beta_{21}\, \Delta x^*_t + \beta_{22}\,(x-x^*)_{t-1} + \varepsilon_t$$

where ε is an error-term, and test the null hypothesis $H_0{:}\beta_{21}+\beta_{22}=0$[3]. Comparing (4) with (3), we see that rejection of this hypothesis suggests that x is a forward-looking variable while non-rejection suggests myopia[4]. This discussion shows how we can construct a simple test of myopia that only requires testing a simple parametric restriction in a backward-looking model.

3) Testing myopia using a more general dynamic model

We now consider a more general model and show that the basic features of our test carry over to this case. Suppose the variable x is generated by

$$(5)\quad x_t = \alpha_{Fo}x_t^* + \alpha_{F1}E_t x_{t+1}^* + \alpha_{F2}E_t x_{t+2}^* + \ldots + \alpha_{Fk}E_t x_{t+k}^* + \alpha_{B1}x_{t-1} + \ldots + \alpha_{Bm}x_{t-m} + u_t$$

where $E_t x^*_{t+i}$ is the expected value of x^*_{t+i} based on information available at time t. In this generalisation of equation (1), the current value of variable x is related to its current period optimal value, values of x^* up to k periods into the future and previous values of x, lagged up to m periods into the past. Lags of x^* are omitted from (5) in order to simplify the exposition. If any one of the α_{Fi} parameters, i=1..k, is not zero, then x is forward-looking. If $\alpha_{F1}=\alpha_{F2}=..=\alpha_{Fk}=0$, then x is myopic. Homogeneity implies the restriction

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[3] If $\theta_0\neq 0$, then $\beta_{20}=0$ under myopia. We explain in section 4) why we do not exploit this in our main test.

[4] If we assume $\theta_1>0$, then we can amend the alternative hypothesis to be $H_1{:}\beta_{21}+\beta_{22}>0$ and use a one-tailed test.

$$(6) \quad \sum_{i=0}^{k} \alpha_{Fi} + \sum_{j=1}^{m} \alpha_{Bi} = 1$$

We can reparamaterise (5) in error-correction form as

$$(7)\ \Delta x_t = \beta_{F0}\Delta x^*_t - \beta_{F0}(x-x^*)_{t-m} + \beta_{F1}E_t\Delta x^*_{t+1} + \ldots + \beta_{Fk}E_t\Delta x^*_{t+k} + \beta_{B'1}\Delta x_{t-1} + \ldots + \beta_{B'm}\Delta x_{t-m-1} + \beta_{F0}\Delta x^*_{t-1} + \ldots + \beta_{F0}\Delta x^*_{t-m} + u_t$$

where $\beta_{Fj} = \sum_{l=j}^{k} \alpha_{Fl}$ for j=0,..,k, $\beta_{Bj} = \sum_{l=j+1}^{m} \alpha_{Bl}$ for l=1,..,m and $\beta_{B'j} = \sum_{l=1}^{j} \alpha_{Bl}$ for l=1,..,m.

This is a generalisation of (2); in particular we note that the sum of the coefficients on Δx^* and the error-correction term is again zero.

To express the model in backward-looking form, we assume that Δx^* is an autoregressive process, and write $E_t\Delta x^*_{t+i} = \theta_{00i} + \theta_{0i}\Delta x^*_t + \theta_{1i}\Delta x^*_{t-1} + \theta_{2i}\Delta x^*_{t-2} + .. + \theta_{mi}\Delta x^*_{t-m}$. Substituting this into (7), we obtain a regression equation of the form

$$(8)\ \Delta x_t = \beta_{30} + \beta_{31}\Delta x^*_t + \beta_{32}(x-x^*)_{t-m} + \beta_{331}\Delta x_{t-1} + \ldots + \beta_{33m}\Delta x_{t-m-1} + \beta_{341}\Delta x^*_{t-1} + \ldots + \beta_{34m}\Delta x^*_{t-m} + u_t$$

where $\beta_{30} = \sum_{q=1}^{k} \beta_{Fq}\theta_{00q}$, $\beta_{31} = (\beta_{F0} + \sum_{q=1}^{k} \beta_{Fq}\theta_{0q})$, $\beta_{32} = -\beta_{F0}$, $\beta_{33j} = \beta_{B'j}$, for j=1,..,m and $\beta_{34j} = (\beta_{F0} + \sum_{q=1}^{k} \beta_{Fq}\theta_{jq})$, for j=1,..,m.

This equation is an extension of (4). If x is forward-looking, so at least one of the α_{Fi} parameters is not zero, then the sum of the coefficients on Δx^*_t and the error-correction term will differ from zero. If x is myopic, the each of the α_{Fi} parameters will be zero, in which case the sum of the coefficients on Δx^*_t and the error-correction term will be zero. The constant term ($\sum_{q=1}^{k} \beta_{Fq}\theta_{00q}$) will also equal zero. We can therefore test the null hypothesis that x is myopic against the alternative that x is forward-looking by testing the null hypothesis $H_0{:}\beta_{31}+\beta_{32}=0$ against the alternative $H_1{:}\ \beta_{31}+\beta_{32}\neq 0$. If each of the θ_{00I} parameters are zero, the constant in (8) is automatically zero, so in this case we test the null $H_0{:}\beta_{31}+\beta_{32}=0$ against the alternative $H_1{:}\ \beta_{31}+\beta_{32}\neq 0$.

4) Discussion

This analysis can be extended in several ways. First, we could allow the autoregression used to forecast future values of Δx^* to have more than m lags. In that case, further lags of Δx^* will be introduced into (8). Second, as we discussed above, there might be lags of Δx^* in (5). This would complicate the expressions for the β_{34j} parameters but would not affect the test.

More significantly, there might be structural breaks in the process that generates Δx^*. If these are anticipated, there will be shifts in θ_0, leading to instability in β_{20} in (4) or in β_{30} in (8) and possibly requiring the use of time dummies. This uncertainty about the role and stability of the constant term leads us to recommend that the test for myopia should not take account of the this term[5] (in our empirical results below, we show that our test statistics are little affected by the inclusion or exclusion of the constant). This discussion can also be used to illustrate the test for myopia proposed in Hendry (1988) and Hendry and Favero (1992): if there are structural breaks in x*, then θ_0 and/or θ_1 will not be stable, so the first two parameters in (4) will also be unstable. Hence if we find structural breaks in x* but there is no evidence of instability in (4), then behaviour cannot be forward-looking.

Thus far the paper has assumed x* is an I(1) process. Although the test is applicable for other orders of integration, there may be difficulties in these cases. If x* is stationary, the autoregression for Δx^* will have a non-invertible MA(1) error, so there may be objections to the use of simple linear forecasts to generate $E_t\Delta x^*_{t+i}$. More pragmatically, estimation of the model is less straightforward in this case: if x* is stationary, we cannot use cointegration techniques to estimate the process generating x*, separating this from estimation of the model for price adjustment. If x* is I(2), then (4) and (8) contain terms of differing orders of integration and further differencing may be required to produce a balanced equation. The simplicity of the test may be lost in this case.

Is the test likely to be reliable? There are several ways in which we might draw an incorrect inference. First, the assumption of homogeneity might fail. If so, there will, in the simple example, be a term involving $(1-\alpha_{F0}-\alpha_{F1}-\alpha_{B1})$ in (3). However, this can be checked. We could also make a false inference if (8) were not well specified, in which case Δx^*_t or the error-correction term might proxy for omitted variables. For that reason it is important to ensure that the backward-looking model is not mispecified. We would also risk false inference if Δx^* is not an autoregressive process, so the θ parameters are zero. This can be checked empirically. It is also conceivable that $\sum_{q=1}^{k} \beta_{Fq}\theta_{0q}=0$ although some of the β_{Fq} parameters are non-zero. In that case we would wrongly accept the null of myopia. This seems unlikely.

We can also comment briefly on the likely power of the test. It is intuitive that the power of the test will be greater when the future has a stronger affect on the present; therefore the test will have greater power when the α_{Fi} parameters are larger. Power will also be higher when the present has a stronger impact of the future; thus power will also be greater when the θ_i parameters are large.

5) An application to price adjustment in the UK

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[5] although this issue clearly deserves further investigation.

In this section we use our test to consider whether price adjustment in the UK is forward-looking or myopic. To do this, we first estimate a model for p*, the steady-state of desired price level. We then use this to estimate a dynamic model for p, the price level. We then apply the test.

There is a large existing literature on price adjustment. A small part of this literature (Rotemberg, 1982, Alogoskoufis et al, 1990, Alogoskoufis and Smith, 1991 and Price, 1992) estimates forward-looking models. Where tested (Price, 1992), the hypothesis of myopia is rejected. Although useful, the main drawback of these structural models is that closed form solutions only exist where there are no more than two lags in adjustment. As we shall see, this is insufficient to capture the complexity of the dynamics of price adjustment.

Most empirical models of price adjustment are purely backward looking. Some estimate a simple partial adjustment process (eg Gordon, 1990, Neudorfer et al, 1990, Gagey et al, 1990, Entorf et al, 1990, Padoa Schioppa, 1990, Andres et al, 1990, Franz and Gordon, 1993, Weiss, 1993 and Downward, 1995). Other models have a richer structure, allowing for error-correction mechanisms or a more complex lag structure (eg Bean and Gavosto, 1990, Burda, 1990, and de Brouwer and Ericsson, 1995). This latter type of model typically detects quite complex patterns of price dynamics.

5i) Estimating the steady-state price

In order to estimate a model of price adjustment we clearly need a measure of the steady-state price. We model the steady-state price as a homogenous function of domestic marginal cost and world prices and lower case variables denote logs:

$$^{(9)} \quad p^* = \mu + \tau\, mc + (1-\tau)\, p^w$$

where p* is the steady-state price, mc is domestic marginal cost, p^w is the world price level in terms of domestic currency, μ is the mark-up and lower case variables denote logs. This formulation has the advantage of subsuming most other models considered in the literature as special cases (Martin, 1997). We further assume that firms produce output (Y) using labour (L) and capital (K) inputs using the CES production function $Y=\{\gamma L^{(\sigma-1)/\sigma}+(1-\gamma)K^{(\sigma-1)/\sigma}\}^{\sigma/(\sigma-1)}$ and that capital is fixed in the short-run. We can then define marginal cost as mc=w-mpl, where w is the log wage and mpl is the log of the marginal product of labour. Using the production function, marginal cost is $mc=w - (1/\sigma)(y-l) - \log\gamma$, where (y-l) is the log output-labour ratio. Substituting this into (9) and exploiting homogeneity, we can write our model of the steady-state price as

$$(10) \quad w-p^* = \alpha_0 + \alpha_1 (y-1) + \alpha_2 (w-p^w)$$

where $\alpha_1=\tau/\sigma$, $\alpha_2=(1-\tau)$ and α_0 contains the mark-up and other constants.

To estimate (10) we exploit the non-stationary nature of the data by using cointegrating techniques. We use the estimation procedure of Johansen (1988, 1991), estimating a VAR model for (w-p), (y-l) and ($w-p^w$) and associating a cointegrating relationship with each significant eigenvalue of the system. In this way we obtain superconsistent estimates of all equilibrium relationships in the system. We also simplify the estimation problem by separating estimation of the steady–state and dynamic equations[6].

We use aggregate quarterly data for the period 1964:1-1996:1. The price level is measured using the GDP deflator; w is measured as the total hourly cost of labour; y is GDP; l are total hours of work. We measure p^w using an index of import prices. All variables are measured in terms of domestic currency. The Data Appendix gives full definitions and sources. ADF tests show that (y-l), (w-p) and ($w-p^w$) are clearly I(1).

We find a complex dynamic structure, one that requires a 12-th order VAR to adequately model the data. We also included several time dummies, as is normal is this type of model. Our estimated cointegrating relationships are reported in column (i) of table 1. Our estimated eigenvalues were 0.21, 0.11 and 0.01. Of these, only the first is significantly different from zero. We conclude that there is a unique cointegrating relationship.

Our estimates of the parameters of (10) are α_1=0.71 and α_2=0.17; thus the weight on world prices is 17%. These are comparable to other estimates. Martin (1997), using annual data for 1950-87, also finds a unique cointegrating relationship, whose parameters are similar to those found here[7]; studies that do not use cointegration analysis (Artus and McGuirk, 1981, Dornbusch and Krugman, 1986, and Spitaeller, 1980) also find similar results. The remainder of table 1 demonstrates that our estimates are robust. Column (ii) presents estimates using the smaller sample 1970:1-1996:1, while column (iii) uses the sample 1966:1-1993:4. The eigenvalues and estimated parameters are similar in every case.

We use these estimates to generate a measure of the steady-state price p*. To illustrate the properties of our measure, Δp^* and Δp are plotted in the upper panel of figure 1, while the lower panel shows the gap between the actual and steady-state price (p-p*). We see that prices were within 2% of their desired level for most of this period; also, prices were up to 10% below their equilibrium values during the high inflation period of the mid 1970s and were up to 4% above equilibrium in the deflationary episode of the early 1980s. Overall, this pattern seems quite plausible. Estimates of an autoregressive model for the steady-state price, mimicking the type of forecasting rule assumed above, are presented Table 2). The dynamics of Δp^* are complex: we require a 13^{th} order autoregressive process and several time dummies. The significance of the time dummies indicates there have been breaks in the θ_{ji} parameters.

5ii) Estimating a dynamic model of prices

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[6] The alternative would be to substitute (10) into (8) and estimate the steady-state price and price dynamic simultaneously, imposing the implied cross-equation restrictions.

[7] Martin (1997) considers the identification problem in this context and argues that the estimates should be interpreted as coming from a price setting rather than a wage-setting relationship.

We next use our measure of p* to estimate a backward-looking model of price adjustment. Our estimates are presented in table 3. We again find that price dynamics are complex: our specification includes the current value and one- and two-year lags of Δp^*, seven lags of Δp and the error-correction term; we also include several time dummies to allow for the shifts in the mean of Δp^* apparent from table 2. Column (1) presents estimates for the period 1966Q2 to 1993Q4, includes the error-correction term at the fifth lag and uses the period 1994Q1 to 1996Q4 for forecasting. Column (2) estimates the model over the full sample, 1966Q2 to 1996Q4; column (3) repeats the specification of column (1) except that the error-correction term is included at the fourth lag. Column (4) investigate the effects of time dummies by repeating the specification of column (1) but omitting the time dummies. Our estimates are generally robust. Estimates in columns (1)-(3) pass all mispecification tests. Comparing columns (1) and (4), it is apparent that omitting time dummies induces non-normality, but otherwise has little effect. The ability of our estimates to pass forecasting tests is noteworthy since many other models of price adjustment are unable to forecast adequately (Smith, 1995).

5iii) Testing myopia

We can now test myopia. Taking the estimates of column (1) of table 3, the estimate on Δp^*_t is 0.22, with a standard error of 0.04, while that on the error-correction term is –0.04 (0.03). If the null of myopia is correct, the sum of these coefficients would be zero. In fact, the sum of the estimates is 0.18 with a standard error of 0.06. As the final row of table 3 shows, the F-statistic of the hypothesis that the sum of the coefficients is zero is 18.96. This has a p-value of 0.0001. As a result, we can decisively reject the null hypothesis that price adjustment is myopic, in favour of the alternative hypothesis that it is forward-looking. The pattern of estimates is the same in the other estimates in table 3; applying the test, we find that the null of myopia is strongly rejected in every case. This evidence suggests that price adjustment in the UK is forward-looking rather than myopic.

We also present test statistics that take account of the constant and time dummies. Our second test for myopia tests the joint hypotheses that the sum of the estimate on Δp^* and the error-correction term is zero *and* that the constant is also zero (this corresponds to testing $\beta_{21}+\beta_{22}=0$ and $\beta_{20}=0$ in (4)). Rejection of myopia is just as decisive with this form of the test. Finally, we also use a test of the joint hypotheses that the sum of the estimate on Δp^* and the error-correction term is zero, that the constant is also zero *and* that all time dummies are zero. Rejection of myopia is again strong.

6) Conclusion

This paper has developed a test of whether a backward-looking econometric model is consistent with forward-looking or myopic behaviour. The test is easy to apply since it requires a simple test of equality between two parameters in an estimated backward-looking model. We then estimated a model of price adjustment in the UK and applied our test. The results clearly suggest that price adjustment is forward-looking rather than myopic.

These results highlight a difficulty with econometric models of price formation and any other economic variables that may be found to be forward-looking. If a variable is forward-looking, the obvious response is to estimate a forward-looking model. However, forward-looking models have proved difficult to estimate. Existing forward-looking models are almost exclusively structural, derived from an underlying optimisation problem that provides non-linear restrictions that link the forward-looking and backward-looking components of the model and allow the forward-looking element to be estimated. However closed-form solutions are only available at present for rather simple models (typically containing no more than 2 adjustment lags). As we have seen, adjustment dynamics may well be complex than this, suggesting that these structural models may find it difficulty to capture dynamic adjustment with any adequacy.

The alternative to using forward-looking models is to continue to use backward-looking models in the knowledge that this type of model will contain a mixture of backward-looking and forward-looking components. Estimates of this type of model must be treated with great caution since they are difficult to relate to any underlying economic structure. They will also be especially vulnerable to instability and the Lucas Critique.

Table 1: Estimated Cointegrating Vectors

estimates of (10)

	(1)	(2)	(3)	
sample	1966:1-1996:1	1970:1-1996:1	1966:1-1993:4	
Var length	12	12	12	
eigenvalues	0.21(*), 0.11, 0.01	0.22(*),0.09, 0.02	0.23(*), 0.09, 0.03	
# cointegrating vectors (r)	1	1	1	
time dummies	Yes	yes	yes	
β_1	0.71	0.71	0.73	
β_2	0.17	0.16	0.13	

notes:

1) cointegrating vectors computed using method of Johansen (1988, 1991) as implemented on PCFIML 8.0 (Doornik and Hendry, 1994).
2) (*) denotes a test significant at the 95% level.
3) time dummies for 1973Q2, 1974Q1, 1974Q2 and 1979Q3 are included in the VAR.

Table 2: Estimates of a Tme-Series Model for Δp*

	(1)	(4)
Sample	1966:2-1993:4	1966:2-1996:1
Δp_{t-1}*	1.20 (0.10)	1.21 (0.09)
Δp_{t-2}*	-0.34 (0.14)	-0.35 (0.14)
Δp_{t-3}*	0.16 (0.14)	0.16 (0.14)
Δp^*_{t-4}	-0.81 (0.14)	-0.84 (0.13)
Δp^*_{t-5}	0.89 (0.15)	0.87 (0.15)
Δp^*_{t-6}	-0.19 (0.15)	-0.17 (0.15)
Δp^*_{t-7}	0.31 (0.15)	0.31 (0.14)
Δp^*_{t-8}	-0.92 (0.15)	-0.93 (0.14)
Δp^*_{t-9}	0.67 (0.14)	0.68 (0.14)
Δp^*_{t-10}	-0.17 (0.15)	-0.17 (0.15)
Δp^*_{t-11}	0.39 (0.14)	0.38 (0.14)
Δp^*_{t-12}	-0.63 (0.14)	-0.63 (0.14)
Δp^*_{t-13}	0.30 (0.14)	0.31 (0.14)
time dummies	Yes	Yes
σ	0.0136	0.0132
Forecast	4.37 [0.80]	
Serial correlation	1.36 [0.25]	0.49 [0.78]
ARCH	1.02 [0.40]	1.43 [0.23]
Normalisty	4.08 [0.12]	4.33 [0.11]
Heteroskedasticity	0.80 [0.76]	0.93 [0.59]

notes:

1) The table presents OLS estimates, computed using PCGIVE 8.0 (Doornik and Hendry, 1994).

2) (*) denotes a test significant at the 95% level; numbers in square brackets [.] are p-values of corresponding tests.

3) p* computed using estimates reported in column (1) of Table 1.

4) σ is the equation standard error.

5) forecast is a test of forecasting performance over 1994:1-1996:1; Serial correlation is a test of up to 4^{th} order serial correlation; ARCH is a test for up to 4^{th} order ARCH effects; Normality is a test for normality; Heteroskedasticity is a from of the White test against heteroskedasticity.

Table 3: Tests of Myopia

Estimates of (8)

Dependent variable is Δp_t				
	(1)	(2)	(3)	(4)
Sample	1966:2-1993:4	1966:2-1996:1	1966:2-1993:4	1966:2-1993:4
Δp_t*	0.22 (0.04)	0.22 (0.03)	0.22 (0.04)	0.23 (0.04)
Δp_{t-4}*	0.05 (0.04)	0.04 (0.03)	0.03 (0.04)	0.06 (0.05)
Δp_{t-8}*	0.04 (0.04)	0.04 (0.03)	0.02 (0.03)	0.01 (0.04)
$(p-p^*)_{t-5}$	-0.04 (0.03)	-0.05 (0.02)		-0.06 (0.03)
$(p-p^*)_{t-4}$			-0.07 (0.03)	
Δp_{t-1}	0.95 (0.05)	0.95 (0.05)	0.94 (0.06)	0.95 (0.07)
Δp_{t-4}	-0.78 (0.09)	-0.76 (0.09)	-0.72 (0.09)	-0.86 (0.11)
Δp_{t-5}	0.60 (0.10)	0.60 (0.09)	0.57 (0.09)	0.69 (0.12)
Δp_{t-8}	-0.49 (0.10)	-0.49 (0.10)	-0.46 (0.10)	-0.54 (0.13)
Δp_{t-9}	0.51 (0.10)	0.51 (0.09)	0.49 (0.09)	0.59 (0.12)
Δp_{t-12}	-0.29 (0.08)	-0.30 (0.08)	-0.28 (0.08)	-0.39 (0.10)
Δp_{t-13}	0.20 (0.06)	0.20 (0.06)	0.19 (0.06)	0.29 (0.08)
Time dummies	Yes	Yes	Yes	No
σ	0.0074	0.0074	0.0073	0.0094
Forecast	3.71 [0.93]		3.32 [0.95]	3.71 [0.93]
Serial correlation	0.59 [0.71]	0.75 [0.59]	0.60 [0.69]	0.10 [0.99]
ARCH	2.29 [0.07]	2.61 [0.04]	2.25 [0.07]	0.08 [0.99]
Normality	4.96 [0.08]	4.93 [0.09]	4.42 [0.11]	40.43 [0.00]
Heteroskedasticity	1.22 [0.26]	1.27 [0.21]	1.37 [0.15]	0.96 [0.52]
Myopia	**18.96 [0.0001]**	**22.79 [0.0000]**	**14.43 [0.0003]**	**14.00 [0.0003]**
Myopia (with constant)	18.06 [0.0001]	12.66 [0.0000]	9.80 [0.0001]	7.26 [0.0011]
Myopia (with constant and time dummies)	15.46 [0.000]	16.85 [0.0000]	14.82 [0.000]	

notes:1)The table presents IV estimates, computed using PCGIVE 8.0 (Doornik and Hendry, 1994); (*) denotes a test significant at the 95% level; numbers in square brackets [.] are p-values of corresponding tests.

2) p* computed using estimates reported in column (1) of Table 1; dummies for 1973Q2, 1974Q1, 1974Q2, and 1979Q3 are included, except in column (4).

3) myopia is an F-test of the hypothesis that the sum of the coefficients on ?p_t* and the error-correction term is zero.

4) σ is the equation standard error; forecast is a test of forecasting performance over 1994:1-1996:1; Serial correlation is a test of up to 4^{th} order serial correlation; ARCH is a test for up to 4^{th} order ARCH effects; Normality is a test for normality; Heteroskedasticity is a from of the White test against heteroskedasticity.

5) Δp_t^* is treated as endogenous; as suggested by table 1, we use up to 9 lags of growth in wages, productivity and import prices as instruments

6) The row headed "myopia" presents test statistics for the null hypothesis that the sum of the coefficients on Δp^*_t and the error-correction term sum to zero; it is distributed as a $\chi(1)$ under the null. The row headed "myopia (with constant)" presents test statistics for the null hypotheses that (i) the sum of the coefficients on Δp^*_t and the error-correction term sum to zero and (ii) the constant equals zero; it is distributed as a $\chi(2)$ under the null. The row headed "myopia (with constant and time dummies)" presents test statistics for the null hypotheses that (i) the sum of the coefficients on Δp^*_t and the error-correction term sum to zero, (ii) the constant equals zero and (iii) the time dummies equals zero; it is distributed as a $\chi(6)$ under the null;.

Data Appendix

We use the following variables for 1964Q1-96Q1

p:	the GDP deflator; source: Economic Trends Annual Supplement
w:	average hourly earnings; source: Economic Trends Annual Supplement
y:	GDP; source: Economic Trends Annual Supplement
l:	Total hours of work; source: Economic Trends Annual Supplement
p_{oecd},	the price index for OECD exports; source: International Financial Statistics

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Figure 1 plots of Δp^*_t and Δp_t and of $(p-p^*)_t$