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This paper is part of my thesis and was written during a much enjoyed stay as Research Fellow at the Catholic University of Louvain. I am most grateful to my tutors Charles Bean and Frédérick Van der Ploeg. All remaining errors are of course mine.

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INTRODUCTION

Indexation is a wage-fixing rule that gives nominal wages as functions of various price indices or indeed any other variable. In practice indexation has been largely used by politicians to elude the social conflict over the distribution of income (cf. Braum 1976) and this may perhaps explain why wages have often been linked to the consumer price index rather than to any other variable. Its use has traditionally been advocated by Monetarist theorists to accompany a reduction in the rate of growth of money. For instance Friedman (1974) writes "the side effects of changes in the rate of inflation can be substantially reduced by encouraging the widespread use of escalator clauses in private and governmental contracts" (Friedman 1974, p. 25). Friedman (1974) lists several of these "side effects": because expectations are slow to change producers will accumulate inventories rather than decrease their price and workers will be laid off rather than moderate their wage claims. Borrowers who have to pay a fixed nominal interest rate will be in serious difficulties too. "The reason for the side effects is the time delay between a decreased rate of growth of total money spendings and the full adjustment of output and prices to that changed rate of growth of total money spendings" (Friedman 1974, p. 31). That is, the rate of growth of money has real effects because some trade is taking place at non market clearing prices¹.

Indexation can ease these real "side effects" but is not a substitute for a policy of a constant, low rate of growth of the money stock: "escalator clauses are simply a lesser evil than a badly managed money" (Friedman 1974 p. 26). If the rate of growth of the money supply is kept constant there are no adjustment errors and markets clear, there is no need for indexation. Indexation cannot be as good a price fixing rule as competitive pricing because, in the absence of externalities, a competitive equilibrium is Pareto efficient and in general indexation does not produce a competitive equilibrium. However, an economy where nominal wages are generally at non-market clearing levels may perform better if they respond to

movements in other economic variables. That is, the performance of an indexed economy should be compared with that of the same economy where nominal wages are fixed and to do this one needs a "disequilibrium" framework that takes into account spill-overs between markets and the existence of different régimes.

Previous contributions on wage indexing (Fischer, 1977; Gray, 1976; Cukierman, 1980) have acknowledged the existence of labour market imbalance, but have taken real aggregate demand to be exogenous. As a consequence they ignore the spill-over from labour market imbalance to the demand for goods. In this paper we intend to generalize these results by the use of a general equilibrium framework that will allow us to capture the effects of employment on real aggregate demand. The paper is organized as follows: section I presents the model and briefly discusses ex-ante wage determination; section II compares the fluctuations of output employment and prices in an indexed and a non indexed economy. Section III discusses the optimal degree of indexing; the results and their implications are summarized in the concluding section.

SECTION I: THE MODEL

1.1 Motivations

In our model, the nominal wage is fixed or given by the indexing rule so that the labour market does not in general clear. We will assume that the goods market always clears. Market clearing means that no transactions take place before the equilibrium price is reached. There are very few markets with institutions such that this is likely to happen: these are mainly markets for agricultural commodities or raw materials. Manufactured output however, is not traded on auction markets. In modern manufacturing, industry prices are generally determined in the short run according to a mark-up system rather than in relation to the scarcity of goods (cf. Keynes 1939, Malinvaud 1977, Morishima 1984; for econometric evidence cf. e.g. Nordhaus 1972, Godley and Nordhaus 1972).

As the agricultural and mining sectors account for less than 10% of GDP in OECD economies, the assumption of goods market clearing may not be a totally realistic assumption. However, the assumption keeps the analysis within a simple static framework and allows straightforward comparison with previous work.

The consequence of this assumption is that firms and households are not rationed on the goods market so there can be no Keynesian unemployment - excess supply of goods and labour - in the sense of Malinvaud (1978). Rather one is on the boundary between Classical and Keynesian regimes. Employment does not depend directly on the level of aggregate demand. However, as long as there is some nominal wage rigidity, the dichotomy and neutrality properties of flex-price models do not hold. Aggregate demand determines output and employment through changes in the real wage.

Moreover, the imbalance spills over from the labour market to the goods market because household consumption becomes a function of the actual quantity of labour traded. This is a simple application of the dual decision hypothesis first formalized by Clower (1965): if actual income is less than notional income then consumers' demand becomes a function of actual income as well as prices, and Walras' law is no longer valid because an excess of notional supply (e.g. of labour) is not compensated by an excess demand for money.

1.2 The Model

There are three commodities in the model: labour; goods; and money.

The supply of output is given by a neo-classical aggregate production function. The aggregate capital stock is assumed fixed, so aggregate output can be written as a function of total labour input, L , and a productivity factor, α ,

$$(1) \quad Y = \alpha G(L), \quad \alpha = 1+u, \quad Eu = 0, \quad Eu^2 = \sigma_u^2$$

where $G(L)$ is homogeneous of degree n less than one and u is a random term with zero mean and variance σ_u^2 .

Aggregate demand is a function of labour income as well as initial wealth

$$(2) \quad Y^D = C(wL + \frac{M}{P} \gamma) \beta, \quad \beta = 1 + a, E(a) = 0, E a^2 = \sigma_a^2$$

$$\gamma = 1 + z, \quad E z = 0, E z^2 = \sigma_z^2 \quad C' > 0,$$

where z and a are random terms with 0 mean, and variances σ_a^2 and σ_z^2 w is the real wage, M the money supply and P the price level. We assume that profits are paid with a lag so that aggregate demand is a function of labour income only.

As money is the only asset available, fiscal and monetary policy have similar effects and government expenditures were not therefore entered as a separate argument. We consider real demand shocks a e.g. a change in tastes, as well as monetary shocks z . Households are assumed risk neutral and ex-post transactions consistent with the realized budget constraint.

Labour demand is given by

$$(3) \quad L^D = G'^{-1} \left[\frac{W}{\alpha} \right],$$

where G'^{-1} is homogeneous of degree $\frac{1}{n-1}$.

Labour supply is a non negative function of the real wage³

$$(4) \quad L^S = h(w), \quad h'(w) \geq 0,$$

where h is homogeneous of degree m .

The case of an inelastic labour supply is accommodated by setting $m = 0$.

Equations (1) and (2) describe the goods market, (3) and (4) the labour market. By Walras' law goods and labour market clearing imply that the money market clears so equations (1), (2), (3), (4) describe a flexprice model.

1.3 Wage determination

In an indexed economy, the nominal wage W is not obtained from the equality of labour demand and labour supply but from the wage fixing rule,

$$(5) \quad W = \bar{W} p^\epsilon \quad 0 \leq \epsilon \leq 1.$$

In equation (5) $\bar{W}$ and ϵ are set before the shocks a , u and z are known. The indexation parameter ϵ measures the sensitivity of the nominal wage to the price level: with ϵ equal to 0 the nominal wage is rigid, with ϵ equal to 1 the real wage is rigid. With real wage rigidity the nominal wage $\bar{W} p^\epsilon$ varies with the price level but is not flexible in the sense of being at the market clearing level. Moreover the ex-ante nominal wage may not be at its market clearing level, so that ex ante labour could be on the supply well as the demand curve.

We share Solow's view that "among the reasons why market clearing wage rates do not establish themselves easily and adjust quickly to changing conditions are some that could be described as social conventions, or principles of appropriate behaviour, whose source is not entirely individualistic". (Solow, 1980) No theory of wage rigidity can therefore account on its own for labour market failure, but each of them one contributes to the explanation of labour market failure. We do not therefore provide microeconomic foundations for (5) or use any specific model of ex-ante wage determination.

We will rather use "regimes", with the nominal wage set at any level within the range corresponding to each regime. The ex ante market clearing real wage is

$$(6) \quad w^* = G[h(1)]^{1/(1+(1-n)m)},$$

therefore the economy is ex-ante in a regime of excess demand (excess supply)⁴ for labour if

$$(7) \quad W \underset{>}{<} (G[h(1)])^{1/(1+(1-n)m)} E(P).$$

In the real world an equilibrium with excess demand for labour is unlikely. However we will analyze this regime for two reasons. First, in a series of widely publicized articles and a book, Weitzman (1983, 1984, 1985, 1987) has argued that if workers are paid a significant part of their income as a share of profits the economy will be ex-ante in a state of excess demand for labour. Second, we did not use any model of ex ante wage determination and for the sake of generality we want to accomodate the case of efficient bargains where employment is controlled by unions and may therefore be on the supply curve.

SECTION II. INDEXATION AND ECONOMIC FLUCTUATIONS

In this section we compare the proportional deviations of each of the endogeneous variables from a no shock equilibrium in an indexed and a non indexed economy.

2.1 Wage indexation and output and employment fluctuations

Proposition 1. Wage indexation suppresses output and employment fluctuation in response to real and nominal demand shocks.

Proof follows trivially from comparing the multipliers in Table 1.

The intuitive reason for the neutralization of demand shocks is that in this model the goods market clears, therefore employment and output are determined by the real wage. With full indexation the real wage is exogeneous, i.e. the supply curve is vertical and therefore the levels of employment and output are not

Table 1. Percentage changes in output employment and price for various shocks with and without wage indexation

$d \log Y$	Indexed	Non indexed
Monetary shocks (z)	0	$-V_{YL} \eta_{LW} V_{CM} [V_{CL} (1 + \eta_{LW}) + V_{CM} - V_{YL} \eta_{LW}]^{-1}$
Real demand shocks (s)	0	$-V_{YL} \eta_{LW} [V_{CL} (1 + \eta_{LW}) + V_{CM} - V_{YL} \eta_{LW}]^{-1}$
Supply shocks (u)	$1 + \theta V_{YL} \eta_{LW}$	$1 + \theta V_{YL} \eta_{LW}$ $- V_{YL} \eta_{LW} [\theta (V_{YL} - V_{CL}) \eta_{LW} - 1] [V_{CL} (1 + \eta_{LW}) + V_{CM} - V_{YL} \eta_{LW}]^{-1}$
$d \log L$		
Monetary shocks (z)	0	$-\eta_{LW} V_{CM} [V_{CL} (1 + \eta_{LW}) + V_{CM} - V_{YL} \eta_{LW}]^{-1}$
Real demand shocks (s)	0	$-\eta_{LW} [V_{CL} (1 + \eta_{LW}) + V_{CM} - V_{YL} \eta_{LW}]^{-1}$
Supply shocks (u)	$\theta \eta_{LW}$	$\theta \eta_{LW} - \eta_{LW} [\theta (V_{YL} - V_{CL}) \eta_{LW} - 1] [V_{CL} (1 + \eta_{LW}) + V_{CM} - V_{YL} \eta_{LW}]^{-1}$
$d \log P$		
Monetary shocks (z)	1	$V_{CM} [V_{CL} (1 + \eta_{LW}) + V_{CM} - V_{YL} \eta_{LW}]^{-1}$
Real demand shocks (s)	V_{CM}^{-1}	$[V_{CL} (1 + \eta_{LW}) + V_{CM} - V_{YL} \eta_{LW}]^{-1}$
Supply shocks (u)	$V_{CM}^{-1} [\theta (V_{YL} - V_{CL}) \eta_{LW} - 1]$	$[\theta (V_{YL} - V_{CL}) \eta_{LW} - 1] [V_{CL} (1 + \eta_{LW}) + V_{CM} - V_{YL} \eta_{LW}]^{-1}$

V_{YL} is the output elasticity of labour

η_{LW} is the wage elasticity of employment

V_{CM} is the elasticity of consumption with respect to initial money holdings

V_{CL} is the elasticity of consumption with respect to labour income

$$\theta = 1, \quad L = L^D,$$

$$0, \quad L = L^S,$$

For derivation see Appendix 1

results obtained by Gray (1976) and Fisher (1977), who showed that indexation decreases output fluctuations caused by monetary shocks but increases output fluctuations caused by real shocks. It shows that their result holds when one uses a disequilibrium framework where the imbalance on the labour market spills-over to the goods market. Moreover the result holds independently of the regime the economy is in and applies to real as well as nominal demand shocks.

Proposition 2. Wage indexation always decreases output and employment fluctuations in response to supply shocks in the vacancy regime and decreases output and employment fluctuations in the unemployment regime iff the following condition holds

$$(i) \quad (V_{YL} - V_{CL}) \eta_{LW} > 1.$$

Proof follows trivially from comparing the multipliers in table 1.

Nominal wage rigidity allows some feedback from the goods market to the labour market. If this feedback leads to a real wage move in the same direction as the supply shock it is stabilizing in the unemployment regime and destabilizing in the vacancy regime.

In the unemployment regime, aggregate demand as well as aggregate supply is affected on impact, as employment and therefore labour income are a function of productivity shocks. The price level may rise in response to a positive shock if the variation of aggregate demand is larger than that of aggregate supply.

If the economy is not indexed, (nominal rigidity), this leads to a fall in the real wage and a further rise in output and employment. Condition (i) merely says that the price level rises in response to a positive supply shock when the elasticity of aggregate demand with respect to supply shocks is larger than that of aggregate

supply. However with a production function homogeneous of degree n condition (i) is equivalent to

$$(ia) \quad V_{CL} > 1,$$

which implies a convex consumption function.

In the vacancy regime employment and labour income are independent of productivity shocks and the price level therefore always falls in response to a positive supply shock. As employment is positively related to the real wage, nominal wage rigidity leads to a further rise in output and employment.⁵

This qualifies Gray's (1976) and Fisher's (1977) results. Gray and Fischer found that indexation increases output and employment fluctuations in responses to real shocks because they considered only the unemployment regime and ignored the effect of employment on aggregate demand ($V_{CL} = 0, V_{CM} = 1$).

2.2. Indexing and inflation

Proposition 3. Indexation increases price variability iff the following condition holds:

$$(ii) \quad V_{CL} (1 + \eta_{LW}) > V_{YL} \eta_{LW}.$$

Proof follows trivially from comparing the multipliers in table 1.

The intuition is again that indexation suppresses any feedback from the goods market on employment and labour income. This feedback reduces price fluctuations if its overall effect reduces the discrepancy between aggregate supply and aggregate demand caused by the shock. This happens when the wage elasticity of aggregate demand is larger than that of aggregate supply. The price level has then to rise (fall) by less in response to an inflationary (deflationary) shock. If condition (ii) holds indexation is inflationary in the sense that the impact on the price level of any inflationary disturbance is larger in an indexed than in a

non indexed economy⁵. Condition (ii) always holds in the unemployment regime if $V_{CL} < 1$, and holds in the vacancy regime if $V_{CL} > \frac{nm}{1+m}$. This result is a generalization of Fischer (1983) who found that the impact of an inflationary shock is always larger in an indexed economy. Fischer considered only the unemployment regime and ignored the effect of labour market balance on imbalance aggregate demand ($\eta_{LW} < 0$, $V_{CL} = 0$).

SECTION 3. OPTIMAL INDEXATION

As we want to compare the macroeconomic performance of an indexed economy with that of the same economy with rigid nominal wages, we need to define a criterion of optimality. With our assumption of goods market clearing, employment and output are determined by the real wage. We therefore choose the natural objective of minimizing the variance of the real wage about its Walrasian equilibrium level:

$$E [d \log w - d \log w^*]^2$$

We do not consider deviations of the price level from its Walrasian level although with labour market imbalance, the quantity traded on the goods market is not the Walrasian quantity. However output deviations are a log linear function of real wage deviations and the real wage is therefore a sufficient statistic for both labour market and goods market deviations from the Walrasian equilibrium.

It is obvious from the wage rule (5) that an increase in the degree of indexing decreases the variance of the real wage. However, a change in the real wage may be desirable: in the flexprice economy the real wage varies in response to real shocks. This is why we are not minimizing the variance of the real wage but the deviations from some benchmark that is chosen for its efficiency property⁶. Thus we allow for changes in the efficient level of employment: with a positive

productivity shock, output and employment expand in the Walrasian economy and should expand as well in an indexed economy.

Proposition 4. The optimal degree of indexation is a positive function of real and nominal demand shocks and a negative function of supply shocks iff the following condition holds

$$\text{iii) } \theta \eta_{LW} (V_{YL} - V_{CL}) < 1.$$

Proof follows trivially from derivation of the optimal degree of indexating (cf. Appendix 2).

The intuition behind this result is that in a Walrasian economy the real wage is positively related to supply shocks but does not respond to demand shocks. If the economy was subjected to demand shocks only, real wage rigidity would be optimal. If on the other hand the economy is subjected to supply as well as demand shocks, some nominal rigidity is optimal, as long as the real wage responds in the same direction as the Walrasian real wage. This happens when a positive supply shock leads to a fall in the price level, i.e. when condition iii) is fulfilled. This is a generalization on Gray who found the optimal degree of indexation a positive function of nominal shocks and a decreasing function of real shocks because she considered only nominal demand shocks, did not model demand derived from labour income, and considered labour to be always on the demand curve.

Proposition 5. The optima indexation coefficient is smaller than unity iff condition iii) holds.

Proof follows trivially from the derivation of the optimal degree of indexation (cf. Appendix 2).

If the economy was subjected to supply shocks only, nominal wage rigidity should be such that real wage variations equal Walrasian real wage variations. The Walrasian real wage rises in response to a positive supply shock and the real

wage should therefore rise. This happens when condition iii) holds and the degree of indexation is less than unity. Condition iii) says that the price level falls in response to a positive supply shock. If the nominal wage falls by less, the real wage rises, which is optimal. If on the other hand condition iii) does not hold and the price level rises, then the nominal wage should rise by more than the price level to obtain an increase in the real wage. This is again a generalization of previous literature where the choice of optimal indexation is confined between the two polar cases of nominal (no indexation) and real wage rigidity (full indexation). It shows that even if the price level reacts "perversely" to supply shocks, it is possible to compensate by having an "overindexed" wage.

CONCLUSION

This paper investigates the effects of wage indexation on employment, output and price fluctuations. It discusses optimal indexation in an economy exposed to supply as well as real and nominal demand shocks. It also checks the robustness of previous results on indexation by use of a general equilibrium framework where aggregate demand varies with labour market imbalance.

It is shown that Gray's (1976) and Fisher's (1977) result, indexation irons out output fluctuations caused by nominal shocks, holds for real as well as nominal demand shocks. Moreover, when labour market imbalance affects aggregate demand, an other traditional result on wage indexation, indexation increases output fluctuations in the face of supply shocks, holds under fairly general assumptions about aggregate demand behaviour (concave aggregate consumption function).

Wage indexation increases price level fluctuations in the unemployment régime but may decrease price fluctuations in the vacancy régime. Thus Fisher's (1983) result, inflation is inflationary in the sense that amplifies inflationary shocks, holds only if employment is on the demand curve.

Lastly an optimal degree of wage indexation is derived and it is shown that contrarily to Gray's results, larger demand variability may require less indexation and larger supply variability may require more indexation. In this case, the optimal indexation coefficient is larger than one, that is wages overreact to the price level.

For the sake of generality we have not used a specific model of ex ante wage determination, nor have we, for clarity of exposition, made any assumption about the likelihood of being in either régime. This model could be extended by use of a

specific model of wage determination that would endogeneize the régime the economy is in.

APPENDIX 1: DERIVATION OF TABLE 1

From (1) and (2) equilibrium on the goods market implies

$$(A.1.1) \quad \log \alpha + \log G(L) = \log C(wL + \gamma \frac{M}{P}) + \log \beta$$

By taking the no shocks equilibrium as a point of departure and by introducing non-zero shocks it is possible to compute the resulting proportional deviations of each of the endogenous variables from this equilibrium by performing a standard comparative statics experiment.

For given non zero values of the random shocks a , u and z logarithmic differentiation of (A.1.1) gives

$$(A.1.2) \quad a + V_{CM} z - ((1-\epsilon) V_{CL} (1 + \eta_{LW}) + V_{CM}) d \log P - \theta V_{CL} \eta_{LW} \\ = u + V_{YL} \eta_{LW} [-(1-\epsilon) d \log P - \theta u],$$

where V_{YL} is the labour elasticity of the production function, V_{CM} the elasticity of consumption with respect to initial money holdings, V_{CL} the elasticity of consumption with respect to labour income, and η_{LW} the wage elasticity of employment. All elasticities are evaluated at the no shock equilibrium. The degree of indexation is ϵ and $\theta = 1$ if $L = L^D$ and $\theta = 0$ if $L = L^S$.

From (1), (3), (4) we have

$$(A.1.3) \quad d \log Y = u + V_{YL} \eta_{LW} \theta u + (1-\epsilon) \sigma_{yL} \eta_{LW} d \log P$$

$$(A.1.4) \quad d \log L = -\eta_{LW} (1-\epsilon) d \log P + \theta \eta_{LW} u$$

Setting alternatively each of the shocks a , u and z to be non zero while the other two are set equal to zero, it is possible to obtain all the multipliers in Table 1. The multipliers in the non indexed case are obtained by setting $\epsilon = 0$ and in the indexed case by setting $\epsilon = 1$.

APPENDIX 2: DERIVATION OF THE OPTIMAL DEGREE OF INDEXATION

From (A.1.1) - (A.1.4) (6) is equivalent to

$$\text{Min}_{\epsilon} \left[\frac{(1-\epsilon)}{(1-\epsilon)[V_{CL}(1+\eta_{LW}) - V_{YL} \eta_{LW}] + V_{CM}} \right]^2 [\sigma_a^2 + V_{CM}^2 \sigma_z^2] +$$

$$\sigma_u^2 \left[\frac{V_{CM} + (1-\epsilon) \{ [\theta \eta_{LW}(V_{YL} - V_{CL}) - 1] (1+m(1-n)) + V_{CL}(1+\eta_{LW}) - V_{YL} \eta_{LW} \}}{(1-\epsilon)[V_{CL}(1+\eta_{LW}) - V_{YL} \eta_{LW}] + V_{CM}} [1 + m(1-n)] \right]^2$$

The first-order condition gives

$$\epsilon^* = 1 + \{ \theta \eta_{LW}(V_{YL} - V_{CL}) - 1 \} V_{CM} \sigma_u^2 + \{ [\theta \eta_{LW}(V_{YL} - V_{CL}) - 1] \\ \{ [\theta \eta_{LW}(V_{YL} - V_{CL}) - 1] (1+m(1-n)) + V_{CL}(1+\eta_{LW}) - V_{YL} \eta_{LW} \} \sigma_u^2 + \\ (1+m(1-n)) [\sigma_a^2 + V_{CM}^2 \sigma_z^2] \}^{-1}$$

It can be checked that the second order condition is full filled.

REFERENCES

- Bean, C., (1983b), "Targetting Nominal Income: An Appraisal", **Economic Journal**, Vol. 93, pp. 806-819.
- Benassy, J.P., (1977), "A Neo-Keynesian Model of Price and Quantity Determination in Disequilibrium", in G. Schwodiauer, (ed.) **Equilibrium and Disequilibrium in Economic Theory**, pp. 511-544, Reidel Holland.
- Benassy, J.P., (1985), "A Non-Walrasian Model of Employment with Partial Price Flexibility and Indexation", in G. Feirvel, (ed.) *Trends in Contemporary Macroeconomics and Distribution*, Macmillan.
- Benassy, J.P., (1986), **Macroeconomics: An Introduction to the Non-Walrasian Approach**, Academic Press.
- Blanchard, O.J., (1979), "Wage Indexing Rules and the Behaviour of the Economy", **Journal of political Economy**, Vol. 87, No 1, pp. 798-815.
- Branson, W.H. and Rotemberg, J.J., (1980), "International Adjustment with Wage Rigidity", **European Economic Review**, Vol. 13, pp. 309-332.
- Braun, A.R., (1976), "Indexation of Wages and Salaries in Developed Economies", **International Monetary Fund Staff Papers**, Vol. 23, No 1, pp. 226-271.
- Bruno, M., (1985), "Aggregate Supply and Demand Factors in OECD Countries: An Update", Falk Institute Jerusalem, Discussion Paper.
- Clower, R., (1965), "The Keynesian Counter Revolution: A Theoretical Appraisal", in F.H. Hahn and F. Brechling, (eds.), **The Theory of Interest Rates**, Macmillan, London.

- Cuckierman, A., (1980), "The Effects of Wage Indexation on Macroeconomic Fluctuations: A Generalisation", **Journal of Monetary Economics**, Vol. 6, pp. 1457-170.
- Fisher, S., (1977), "Wage Indexation and Macroeconomic Stability", in K. Brummer and A. Meltzer, (eds.), **Stabilisation of the Domestic and International Economy**, Carnegie Rochester Conference Series, Vol. 5, North Holland, Amsterdam.
- Fischer, S., (1983), "Indexing and Inflation", **Journal of Monetary Economics**, Vol. 12, pp. 519-541.
- Friedman, M., (1974), "Monetary Correction", in H. Giersch, (ed.) **Essays on Indexation and Inflation**, American Enterprise Institute for Public Policy Research, Washington DC.
- Godley, W. and Nordhaus, W.D., (1972), "Pricing in the Trade Cycle", **Economic Journal**, Vol. 82, pp. 853-882.
- Gray, J.A., (1976), "Wage Indexation: A Macroeconomic Approach", **Journal of Monetary Economics**, Vol. 6, pp. 221-235.
- Gray, J.A., (1978), "On Indexation and Contract Length", **Journal of Political Economy**, Vol. 86, No 1, pp. 1-18.
- Keynes, J.M., (1939), "Relative Movements of Real Wages and Output", **Economic Journal**, Vol. 49, pp. 34-51.
- Layard, R. and Nickell, S., (1986), "Unemployment in Britain", **Economica**, Vol. 53, Supplement.
- Malinvaud, E., (1977), **The Theory of Unemployment Reconsidered**, Cambridge University Press.

Malinvaud, E., (1982), "Wages and Unemployment", **Economic Journal**, Vol. 92, pp.1-12.

Sachs, J., (1980), "Wages, Flexible Exchange Rates and Macroeconomic Policy", **Quarterly Journal of Economics**, pp. 731-747.

Solow, R.M., (1986a), "On Theories of unemployment, *American Economic Review*, Vol. 70, No 1, pp. 1-11.

Solow, R.M., (1986b), "Unemployment: Getting the Questions Right", **Economica**, Vol. 53, Supplement, pp. S23-S34.

Stiglitz, J.A., (1984), "Theories of Wage Rigidity", Paper presented to Conference on Keynes Economics Legacy, Delaware.

Weitzman, M.L., (1983), "Some Macroeconomic Implications of Alternative Compensation Systems", **Economic Journal**, Vol. 93, pp. 762-783.

Weitzman, M.L., (1984), *The Share Economy*, Harvard University Press.

Weitzman, M.L., (1985a), "The Simple Macroeconomics of Profit Sharing", **American Economic Review**, Vol. 76, p. 937-953.

Weitzman, M.L., (1985b), "Insiders Versus Outsiders: A Macroeconomic Externality and the NAIRU Under Profit Sharing", Massachusetts Institute of Technology, mimeo.

Weitzman, M.L., (1986), "The Case for Profit Sharing", Employment Institute, London.

Weitzman, M.L., (1987), "Steady State Unemployment Under Profit Sharing", **Economic Journal**, pp. 86-105.

Yellen, J. (1984), "Efficiency Wage Models of Unemployment", **American Economic Review**, Papers and Proceedings, Vol. 74, pp. 200-205.

FOOTNOTES

¹ I suppose most Keynesian Economists would agree with Friedman. They would probably disagree on the duration and importance of the "side effects".

² For consistency labour supply should be a function of initial wealth as well. This would however only affect the results quantitatively.

³ We will use "unemployment régime" for the regime with excess supply of labour and "vacancy régime" for the régime with excess demand for labour.

⁴ In this regime both aggregate demand and aggregate supply are a positive function of price. Stability on the goods market requires.

$$V_{CL}(1 + h_{LW}) + V_{CM} - V_{YL}h_{LW} > 0 ,$$

that is the slope of the aggregate demand schedule in $p - y$ space is larger than that of the aggregate supply schedule.

⁵ With the assumption that the expectation of the disturbances is 0, indexation has no impact on the mean of the price level or on the inflation rate.

⁶ If labour supply is inelastic this is equivalent to minimizing the variance of the real wage.

