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THE RIGHT COMBINATION OF DEMAND AND SUPPLY POLICIES: THE CASE FOR A TWO-HANDED APPROACH

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ABSTRACT

The paper considers the analytical underpinnings of the scope for and limits of demand and supply management. After restating a general policy effectiveness result for New-Classical macroeconomic models, several non-Walrasan equilibrium models are considered. These use the efficiency wage hypothesis to generate equilibrium unemployment in the labor market and imperfect competition in the goods market to generate scope for demand management. Hysteresis models of the natural rate are also reviewed briefly. Tentative implications are drawn for the contributions of demand and supply management to the resolution of the European unemployment problem.

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1. Introduction

The title of this paper was chosen for me, not by me. Its ring of openmindedness, evenhandedness and balance all but compells an author to parade as a man of the extreme centre, a fanatical moderate in analysis and policy prescription. I identify with such a characterization only reluctantly.

My uneasiness with the title of this paper is, however, due to something more fundamental than an innate inability to try and please both sides of an argument. The usefulness of the very concepts of "demand-side" and "supply-side" should be questioned for a number of reasons.

First, even where in individual markets demand and supply can be distinguished conceptually (i.e. in traditional competitive analysis), the uses of these concepts are at times confused and confusing. The demand for labor is part of the aggregate supply side. The supply of credit is part of aggregate demand. However, in working capital models of production (or in any model involving input-output lags) interest rates and/or the availability of credit affect aggregate supply (see e.g. Blinder [1987]). In any model with endogenous capital formation, financial market conditions affect aggregate supply in the long run.

Second, every non-trivial policy action (monetary, fiscal, financial, regulatory, incomes-policy etc.) influences both aggregate demand and aggregate supply (whenever these concepts are well-defined). We therefore cannot speak of demand policies and supply policies but only of the demand effects and the supply effects of given policies, which will always have both kinds of effects.

Third, and most fundamently, modern theoretical developments which are only just entering the stage of being the subject of systematic econometric testing, suggest that demand and supply may not even conceptually be separated. The best-known of these developments are those concerning the efficiency wage and those related to hysteresis or path-dependence.

While I believe it to be important and even essential for progress in our understanding of how mature industrial economies work and how to improve their performance, to escape from the clutches of an intellectually moribund conventional competitive analysis,[1] I cannot offer an integrated, coherent alternative "Weltanschauung". I shall however list a few of the many

promising developments that may become the bricks and mortar of the economics of the 21st century. Enough has been achieved already to suggest the need for major changes in our view of how modern mixed economies work and in our appreciation of the scope for and limits to what policy can achieve.

If the demand-side vs. supply-side dichotomy is no longer very useful, the distinction between stabilization policy and structural or allocative policy may still have some limited taxonomic usefulness. Stabilization policy aims to influence (and, one hopes, to minimize) deviations of the actual equilibrium (in general a non-Walrasian and possibly quantity-constrained, rationing equilibrium), which will in general not be (constrained) Pareto-efficient, from the (or a) (constrained) Pareto-efficient equilibrium. In the context of the aggregate labor market, stabilization policy aims at deviations of actual employment from full employment or from a (presumed stabilization policy-invariant) "natural" level of employment. As regards aggregate output, stabilization policy is concerned with the gap between actual output and its full employment capacity value or some other appropriate notion of the "natural" level of output. Sometimes stabilization policy is defined more broadly to include the stability of the internal and external values of the currency and the achievement of "sustainable" financial deficits and surpluses for the public and private sectors (and by implication for the external sector).

Structural or allocative policy aims to influence the nature of (constrained) Pareto-efficient equilibria in labor, product and financial markets. In the labor market, such policies aim to influence the (presumed stabilization policy-invariant) natural rate of unemployment. In the aggregate product market it seeks to modify the capacity or full-employment level of output.

The dichotomy is not neat but can be helpful in focussing policy debate. It is again true, however, that any non-trivial monetary, financial, fiscal, regulatory, etc. policy action will almost always have both allocative and stabilization consequences (see Buiter [1984]).

The plan of the paper is as follows. In section 2, I review the role of stabilization policy in New Classical Macroeconomic models. I reproduce a result of Marini [1985] that in all New Classical models which have a) signal extraction and b) a non-predetermined intertemporal speculation term

(somewhere in the model), monetary policy (and by direct extension fiscal policy) is very effective as a stabilization instrument in the sense that it can eliminate entirely the gap between actual and "full information" output or employment even when the policy authority is no better (or even less) informed than the private sector.

In section 3 the efficiency wage hypothesis and the hysteresis or path-dependence hypothesis are shown to blur or eliminate entirely the distinction between demand-side and supply-side. The far-reaching implications for policy are sketched briefly. Section 4 sums up and touches briefly on some other important policy issues that could not be addressed in the body of the paper for reasons of space. It also contains some forthright policy recommendations aimed at challenging prevalent Euro-pessimist complacency.

2. The role of stabilization policy in New Classical Macroeconomic models

New Classical macroeconomic models are sequential competitive equilibrium models where market participants have symmetric information and (Muth)-rational expectations. This discussion relates only to the monetary variant of the New Classical School, associated with the names of Lucas, Sargent and Wallace and Barro. It ignores the real business cycle models developed by Kydland and Prescott [1982], Long and Plosser [1983] and others.

Since markets clear continuously, with equilibrium prices determined by the equality of competitive supply and demand, stabilization policy in New Classical models has a much more restricted meaning than in Keynesian or Neo-Keynesian models.

Because of incomplete (albeit symmetric) information, markets may clear at the "wrong" prices and quantities: actual prices and quantities may differ from what they would be under full current or contemporaneous information. Policy rules might therefore influence (and indeed eliminate) the gap between the actual competitive equilibrium and the "full information" competitive equilibrium.

On reading recent contributions to this literature, the conclusion is inescapable that Marini's [1985] powerful and general result about policy effectiveness in New Classical macromodels has not yet permeated a large

part of the professional economic awareness. I shall therefore reproduce it very briefly, using Marini's example of Barro's well-known [1976] model.

Leaving out some unimportant intercept terms, Barro's model is given in equations (1)-(7). Equation (8) is a generalization of his policy rule. The (self-explanatory) notation is as in Barro [1976].

(1) $y_t^s(z) = \alpha_s(P_t(z) - E(P_{t+1}/\Omega_t(z)) + \beta_s(M_t + E(\Delta M_{t+1}/\Omega_t(z))$

(2) $y_t^d(z) = -\alpha_d(P_t(z) - E(P_{t+1}/\Omega_t(z))) + \beta_d(M_t + E(\Delta M_{t+1}/\Omega_t(z)) - E(P_{t+1}/\Omega_t(z)))$

(3) $y_t^s(z) = y_t^d(z) = y_t(z)$ for all z,t

(4a) $\alpha \equiv \alpha_d + \alpha_s$

(4b) $\beta \equiv \beta_d + \beta_s$

(4c) $\varepsilon_t(z) \equiv \varepsilon_t^d(z) - \varepsilon_t^s(z)$

(4d) $u_t \equiv u_t^d - u_t^s$

(4e) $P_t \equiv \sum_z P_t(z)$

(4f) $y_t \equiv \sum_z y_t(z)$

(5) $\sum_z \varepsilon_t(z) = 0$

(6) $u_t = u_{t-1} + v_t$

(7a) $E(\varepsilon_t, v_t, m_t) = 0$

(7b) $E\left[\begin{pmatrix}\varepsilon_t \\ v_t \\ m_t\end{pmatrix} (\varepsilon_s \; v_s \; m_s)\right] = 0 \qquad t \neq s$

$$= \begin{bmatrix} \sigma_\varepsilon^2 & 0 & 0 \\ 0 & \sigma_v^2 & 0 \\ 0 & 0 & \sigma_m^2 \end{bmatrix} \qquad t = s$$

(8) $\Delta M_t \equiv M_t - M_{t-1} = m_t + \sum_{j=1}^{\infty} \gamma_j v_{t-j} + \sum_{j=1}^{\infty} \delta_j m_{t-j}$

$\Omega_t(z)$ contains the model [equations (1) - (8)], lagged values of all exogenous and endogenous aggregate variables $\{P_{t-1}, P_{t-2} \ldots; M_{t-1}, M_{t-2}, \ldots; v_{t-1}, v_{t-2}, \ldots; m_{t-1}, m_{t-2}, \ldots\}$ and $P_t(z)$, the local price. It does not contain $\varepsilon_t(z)$, m_t, M_t or P_t. v_t is the aggregate real shock, $\varepsilon_t(z)$ the local real shock and m_t the monetary shock. Note that the policy feedback rule contains past (white noise) monetary shocks, m_{t-j}. The past shocks are all white noise and are in the information set of the private sector.

The actual solution values $P_t(z)$, P_t and y_t will in general be different from the full information solution values $P_t^*(z)$, P_t^* and y_t^*. These are the solution values that would prevail if there were full contemporaneous information; i.e. with information set $\Omega_t^* = \Omega_t(z) \cup \{m_t, M_t, \varepsilon_t(z), P_t\}$.[2]

Using e.g. the method of undetermined coefficients, it is easily checked that the difference between the actual intertemporal substitution term $P_t(z) - E(P_{t+1}/\Omega_t(z))$ and the "full information" intertemporal substitution term $P_t^*(z) - E(P_{t+1}/\Omega_t^*)$ can be written as.[3]

(9) $D_t \equiv P_t(z) - E(P_{t+1}/\Omega_t(z)) - [P_t^*(z) - E(P_{t+1}^*/\Omega_t)] = \frac{\beta}{\alpha}[m_t - E(m_t/\Omega_t(z))] + \frac{1}{\alpha}[v_t - E(v_t/\Omega_t(z))]$

$$-\frac{\beta}{\alpha} \sum_{i=1}^{\infty} \left(\frac{\alpha - \beta}{\alpha}\right)^{i-1} [E(\Delta M_{t+1+i}/\Omega_t(z) - E(\Delta M_{t+1+i}/\Omega_t)]$$

D_t therefore depends on the "inference errors" concerning the current monetary shock $(m_t - E(m_t/\Omega_t(z)))$ and the current aggregate shock $(v_t - E(v_t/\Omega_t(z)))$, and on the differences between current estimates of future monetary growth based on actual information and estimates based on full current information:

$$E(\Delta M_{t+1+i}/\Omega_t(z)) - E(\Delta M_{t+1+i}/\Omega_t) \qquad i = 1,2,....$$

Note that, through some idiosyncrasy of the (ad-hoc) model, only monetary growth estimates for periods t+2 and beyond (i.e. not for period t+1) matter. This is the source of Barro's erroneous generalization (Barro [1976, p. 20]) from his policy rule $\Delta M_t = m_t + \gamma_1 v_{t-1}$, a special case of our general rule. For the general rule, (9) becomes:

$$(9') \quad D_t = \frac{\beta}{\alpha}\left(1 + \sum_{i=1}^{\infty}\left(\frac{\alpha-\beta}{\alpha}\right)^{i-1}\delta_{i+1}\right)(m_t - E(m_t/\Omega_t(z))) + \frac{1}{\alpha}\left(1 + \beta\sum_{i=1}^{\infty}\left(\frac{\alpha-\beta}{\alpha}\right)^{i-1}\gamma_{i+1}\right)(v_t - E(v_t/\Omega_t(z)))$$

The δ_{i+1} and γ_{i+1} are policy choice parameters. Clearly we can set $D_t \equiv 0$ by choosing any values of δ_{i+1} and γ_{i+1} such that $1 + \sum_{i=1}^{\infty}\left(\frac{\alpha-\beta}{\alpha}\right)^{i-1}\delta_{i+1} = 0$ and $1 + \beta\sum_{i=1}^{\infty}\left(\frac{\alpha-\beta}{\alpha}\right)^{i-1}\gamma_{i+1} = 0$.

With $D_t \equiv 0$, it follows immediately that actual output y_t is also equal to full information output y_t^*. Three points should be noted.

First, Barro's rule $\Delta M_t = m_t + \gamma_1 v_{t-1}$ is indeed ineffective. While he deserves credit for having found the only lagged feedback rule to yield ineffectiveness, that result clearly lacks any generality. Feeding back in a deterministic manner (i.e. with known δ_{i+1} and γ_{i+1}) from aggregate information arbitrarily far in the past, monetary policy can eliminate the gap between actual and full information output.

Second, this perfect stabilization can be achieved even when the monetary authorities have an informational disadvantage vis-à-vis the private sector, in the sense that the authorities could use, in period t, only information older than the most recent information available to the

private sector. E.g. with $\Delta M_t = m_t + \gamma_{375} v_{t-375} + \delta_{375} m_{t-375}$, the authorities can achieve $D_t \equiv 0$, provided $1 + (\frac{\alpha - \beta}{\alpha})^{373} \delta_{375} = 1 + \beta (\frac{\alpha - \beta}{\alpha})^{373} \gamma_{375} = 0$. This contradicts e.g. King [1983].

Third, it doesn't matter if the monetary authority randomizes its policy ($\sigma_m^2 > 0$), as long as it responds appropriately to one or more past monetary shocks (through the δ_j) so as to undo the effects of its own unpredictability!

Intuitively, what makes for effectiveness, is that the lagged feedback rules act like contingent forward contracts by the policy authority, which complete the incomplete set of contingent private markets implicit in this model. Private agents at time t are (implicitly) prevented from making future actions contingent on the future revelation of the as yet unknown realizations of m_t and v_t. The policy maker, through its lagged rule, can do this, because the presence of a non-predetermined intertemporal) substitution term means that current endogenous variables are functions of current expectations of all future values of the policy instrument(s). Through the lagged feedback rule, these <u>future</u> instrument values can be made functions of the (currently unknown) <u>current</u> realizations of the exogenous variables. By adopting such a rule and, with rational expectations, by being known to be doing so, the policy maker can change the information content of the currently observed local price and indeed make it fully revealing. In the ad-hoc models of Barro [1976, 1980, 1981] and others, the reason for this asymmetry in private and public <u>opportunity sets</u> isn't clear. In optimizing models, a finite-horizon OLG structure might explain the asymmetry (e.g. Lucas [1972]).

It is easily checked (but left as an exercise for the reader) that policy effectiveness remains if we replace the intertemporal substitution term in the supply and demand functions (1) and (2) by a real interest rate term such as $i_t + (P_t(z) - E(P_{t+1}/\Omega_t(z))$ where i_t is the nominal interest rate. (We must of course ensure that if i_t belongs to $\Omega_t(z)$, say because it is set in an economy-wide capital market, a signal extraction problem remains. This will require adding an other independent source of noise to the system). Replacing the intertemporal substitution term in the supply function by a "surprise" term such as $P_t(z) - E(P_t/\Omega_t(z))$ also does not affect Marini's policy effectiveness result. Only if there is no signal

extraction problem, i.e. either because P_t is known or because there is no current (period t) information in $\Omega_t(z)$, will there be policy ineffectiveness. Sargent and Wallace [1975] fall in this category with a model that can be summarized as follows:

$$Y_t = \alpha(P_t - E(P_t/\Omega_{t-1})) + u_t^y \qquad \text{(Aggregate supply)}$$

$$Y_t = -\beta(i_t - E(P_{t+1} - P_t)/\Omega_{t-1})) + u_t^d \qquad \text{(IS)}$$

$$M_t - P_t = -\lambda i_t + ky_t + u_t^m \qquad \text{(LM)}$$

u_t^y, u_t^d and u_t^m are white noise. Ω_{t-1} contains the model and aggregate information dated period t-1 and earlier. The intertemporal substitution term is predetermined and there is no policy effectiveness. Policy effectiveness is restored if, as in Sargent [1973] the term $E((P_{t+1}-P_t)/\Omega_t)$ in the IS curve is replaced by $E((P_{t+1}-P_t)/\Omega_t)$. . This makes the intertemporal substitution term non-predetermined. Marini's result can be summarized as follows:

Proposition

Signal extraction + (non-predetermined) intertemporal substitution (somewhere in the model)
=> policy effectiveness.

Marini's result about stabilization policy effectiveness in New Classical Macromodels is important from the perspective of the intellectual developments in our discipline. It corrected a pervasive logical error in a wide range of policy analyses. I do not consider it equally important for practical policy design, because the object of New Classical stabilization policy (the gap between symmetric actual and full-information equilibria) is, practically, a side-show. If markets do indeed clear in traditional competitive fashion, stabilisation policy based on signal extraction problems is a second-order affair. With efficient competitive markets (conditional on the symmetric information held by the private agents), the gains in welfare to be gained by informing private agents more promptly of the current value of the aggregate money stock (or by pursuing feedback policies

that have the same effect) are bound to be trivial. This literature also has the information problem exactly backwards: private agents are assumed to know (or to act as if they know) the true structure of the model (the values of all the parameters of the model, the behavioral parameters of the government included) but to be badly informed about the current realization of the money stock. In practice the money stock can be known very quickly and at very little cost, while neither the private agents nor the policy authorities have much of a clue about the true structure of the model.

To have non-trivial scope for stabilization policy, the actual equilibrium must be a non-Walrasian one. Marini's policy effectiveness result has very little to do therefore, with Keynesian or Neo-Keynesian stabilization policy concerns, which are motivated (even if only informally) by non-Walrasian equilibria.

One point of practical importance brought out by Marini's analysis is the distinction between asymmetries in information sets between the public and the private sectors and asymmetries in opportunity sets, as a source of policy effectiveness. Even with equal or inferior public sector information, policy effectiveness will emerge because there are things the authorities can and will do that the private sector either cannot do or chooses not to do. The power to tax and to regulate, the monopoly of legal tender and the longevity of the institutions of government (even if not of individual administrations) are some of the obvious "deep" sources of such asymmetries between public and private opportunity sets.

Finally, as shown by Marini [1985], it is easily checked for Barro's model and similar ones, that the feedback rules that influence (and possibly eliminate) the gap between the actual and the full information equilibrium also affect the full information equilibrium itself.[4] Stabilization policy and structural or allocative policy in this model are inextricably intertwined.

3. The dependence of demand on supply (and vice-versa): efficiency wages and hysteresis

To conduct one's analysis and to specify one's policy recommendations in terms of demand and supply betrays old-fashioned competitive thinking. The crucial issue is whether this represents a robust, felicitous shortcut

or a misleading or indeed dangerous focus on a rather uninteresting special case.

It may no longer be correct that the way to make a good economist is to teach a parrot the two words "supply" and "demand". This possibility is apparent even in conventional non-competitive analysis where we teach our first-year students that there is no monopolist's supply schedule. Recent developments have undermined the primacy of the law of supply and demand from at least two different perspectives. The efficiency wage hypothesis with its new asymmetric information microfoundations destroys the conventional distinction between demand and supply even in competitive markets. It has implications for labor markets, insurance markets, credit markets and heterogeneous product markets in general. The "hysteresis" or "path-dependence" hypothesis, based on human capital or insider-outsider micro-foundations suggests that today's actual unemployment rate may be tomorrow's "natural" unemployment rate. It destroys the distinction between aggregate demand and aggregate supply outside the very short run.

I now turn to these two developments in turn.

Efficiency wages and the death of the law of demand and supply.

In a conventional competitive market, equilibrium price and quantity are determined by the intersection of competitive demand and supply schedules derived from the utility maximizing behavior of price-taking households and the profit maximizing behavior of price-taking firms. Both parties to a transaction have identical (symmetric) information.

In order not to be unnecessarily awkward, it will be assumed in what follows that the (uncompensated) competitive demand schedule is downward-sloping, that the competitive supply schedule is upward-sloping and that a unique equilibrium exists.

Consider e.g. the familiair competitive aggregate labor market. The representative firm, i, maximizes profits

$$(10)\quad \pi_i = PY_i - W(1+\tau_p)L_i$$

P is the parametric price of output, W the parametric money wage paid to workers, τ_p the proportional payroll tax rate, Y_i output (and sales) of firm i and L_i the employment of homogeneous labor by firm i. The production function is given by

(11) $Y_i = f(QL_i)$ $\qquad f' > 0,\ f'' < 0,\ Q > 0.$

Q is the quality, efficiency or productivity of labor, assumed to be exogenous to the firm.
Taking p, W, τ_p and Q as given, the firm optimally chooses its level of employment L_i^d according to

(12) $Qf'(QL_i^d) = \frac{W}{P}(1+\tau_p)$

Competitive supply of homogeneous labor is assumed to be an increasing function of the after-tax real wage, $w(1-\tau_w)$, where τ_w is the proportional labor income tax rate and $w \equiv \frac{W}{P}$

(13) $L_i^s = s(w(1-\tau_w))$ $\qquad s' > 0.$

Competitive equilibrium prevails when

(14) $L_i^d = L_i^s = L$

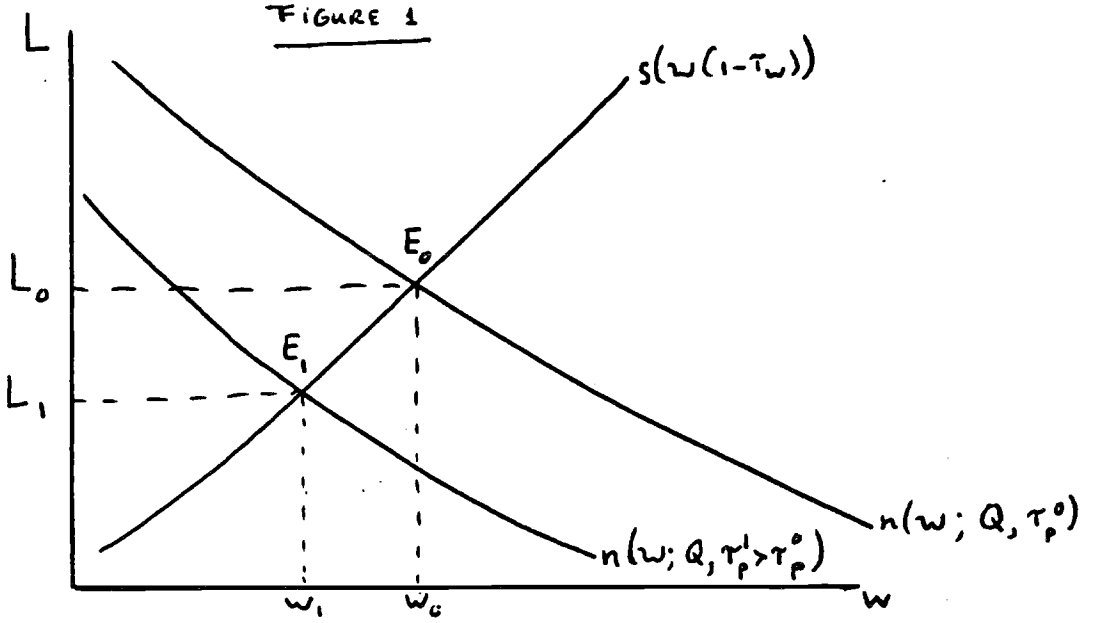
Policy analysis in this simple static model is the comparative static analysis of the effects of changes in the two tax rates on the equilibrium real wage and level of employment. This amounts to determining the "reduced form multipliers", i.e. the partial derivatives of equations (15) and (16) below, which are obtained by solving equations (12), (13) and (14) for w and L.

(15) $w = h(Q;\ \tau_p,\ \tau_w)$ $\qquad h_Q > 0;\ h_{\tau_p} < 0;\ h_{\tau_w} > 0$

(16) $L = j(Q;\ \tau_p,\ \tau_w)$ $\qquad j_Q > 0;\ j_{\tau_p} < 0;\ j_{\tau_w} < 0.$

This comparative static analysis can always, and often in an illuminating way, be decomposed in terms of the shifts in the demand schedule and/or the supply schedule, drawn in w-L space, as one or more parameters change. Figure 1 shows as an example the effect of a higher payroll tax rate on real wages and employment.

FIGURE 1



This analysis can be fancied up considerably, e.g. by introducing labor adjustment costs, many factors of production and rational expectations. Comparative statics become comparative dynamics. The actual and anticipated nature of the policy changes becomes important. (when were changes first anticipated? How permanent, transitory or reversible are they perceived to be? How confidently are these expectations held etc.?), but this is not important for our purposes. What matters here is that demand functions and demand shocks are conceptually and (subject to the standard identification caveats) also operationally distinct from supply functions and supply shocks. The intersection of the two schedules determines the Walrasian, competitive, market-clearing price and quantity.

This picture changes dramatically when efficiency-wage considerations are permitted. In the context of our simple example this means that labor is no longer viewed as homogeneous. Different workers have different levels of productivity or efficiency, but employers cannot (perfectly) discriminate between workers of different qualities. The average quality (or efficiency level) of the workforce is, however,

an increasing function of the real wage (other versions make it an increasing function of the firm's wage relative to the wage of its competitors). The literature suggest a whole range of possible mechanisms for this positive dependence of Q on w (for recent surveys see Katz [1986] and Stiglitz [1987]). Most of those that are relevant to a mature industrial economy rely on asymmetric information between workers and employers and resulting adverse selection or moral hazard problems. In the adverse selection model of Weiss [1980] e.g. employers do not know the quality of the individual worker and a worker's reservation wage is an increasing function of her quality (a more efficient worker is also better at painting her home). In other models with imperfect monitoring of workers by employers and consequent incentives to shirk, a higher wage increases the worker's opportunity cost of being found shirking. Other models rely on labor turnover costs or on morale effects.

For the efficiency wage hypothesis to bite, Q should be an increasing function of w_i and there should be initially a region of "increasing returns" in which a higher wage induces a more than proportionate increase in labor quality. η denotes the elasticity of quality with respect to the real wage, i.e. $\eta \equiv \frac{\partial Q}{\partial w_i} \cdot \frac{w_i}{Q}$. For simplicity I assume that for any given value of the parameter vector θ, which contains all exogenous factors and policy instruments affecting the price-quality relationship, there exists a unique $\bar{w}_i(\theta)$ such that for all $w_i \leq \bar{w}_i$ we have $\eta > 1$ and for all $w_i > \bar{w}_i$ we have $\eta < 1$.

Thus

$$(17)\quad Q = Q(w_i,\theta);\ Q_{w_i} > 0;\ \eta(w_i,\theta) \gtrless 1 \Leftrightarrow w_i \lessgtr \bar{w}_i$$

It is easy to generate reasonable models with this property (see e.g. Stiglitz [1987] and the references contained therein).

The representative firm now maximizes (10) with respect to L_i and W_i, subject to both (11) and (17). For the moment the "availability constraint", i.e. the ability of the firm to obtain the labor it

demands, is ignored. The first-order conditions can be written as in (12) and (19).

(18) $\eta(w_i,\theta) = 1$

or

$$w_i = \bar{w}_i(\theta)$$

$\bar{w}_i$ is called the efficiency wage. It minimizes the cost of employing an effective (quality-adjusted) unit of labor w_i/Q. The quantity of labor demanded $\tilde{L}^d_i$ is solved for from

(19) $Q(\bar{w}_i(\theta), \theta)\, f'(Q(\bar{w}_i(\theta), \theta)\, \tilde{L}^d_i) = \bar{w}_i(\theta)(1+\tau_p)$.

The availability constraint for the firm (often called the individual rationality constraint) is that V, the utility of the representative worker selling to the firm an amount of labor L_i of quality Q at a wage w_i should be at least as high as the utility obtainable in the next best alternative use V*, i.e.

(20) $V(w_i, L_i, Q(w,\theta), \theta') \geq V^*(\theta'')$

θ' and θ'' are vectors of parameters. Reasonable restrictions on V would be $V_w > 0$, $V_L < 0$, $V_Q < 0$. When (20) holds with equality we can solve for the labor supply schedule

(21) $\tilde{L}^s_i = \tilde{s}(w_i, Q(w,\theta), \theta', V^*(\theta'')); \; \tilde{s}_w > 0; \; \tilde{s}_Q < 0, \; \tilde{s}_{V^*} < 0.$

Note that it is possible (though not necessary) that at the efficiency wage $w_i = \bar{w}_i(\theta)$, $\tilde{L}^d_i < \tilde{L}^s_i$. The firm's optimizing demand for labor can be met without the constraint (20) being binding. If at the efficiency wage there is excess supply of labor, there is no "disequilibrium" downward pressure on wages. Labor costs per efficiency unit of labor are minimized at a real wage in excess of the marktet-clearing wage. Note also that the demand function and the quantity of labor demanded by the firm $\tilde{L}^d_i$ are crucially dependent on supply

parameters. Q is part of the "supply side" of the labor market. We can see this clearly by considering the case where θ contains the wage income tax rate, i.e. by assuming, in the spirit of the model of Weiss [1980], that average quality depends on the after-tax wage $Q = Q(w_i(1-\tau_w))$. In that case the efficiency wage increases and the quantity of labor demanded decreases as the tax on labor income increases. A supply-side parameter shifts labor demand! The old language clearly is less than helpful here.

The possibility (not the inevitability) of quantity-constrained, rationing equilibra and other non-Walrasian equilibria is complemented by comparative statics that may be very different from those of traditional symmetric information competitive analysis. Apart from explaining real wage rigidity in the face of persistent (equilibrium!) excess supply, these models can generate, in rationing equilibra, quantity responses with multiplier properties in response to exogenous shocks, with little or no (or even perverse) adjustment in the real wage.

It can similarly explain persistent excess demand in credit markets and the "non-Walrasian" response of credit and interest rates to changes in monetary and fiscal policy. It cannot, however, motivate any form of nominal rigidity in wages, prices or interest rates. "Rigid" real wages and real interest rates can be equilibrium outcomes in the efficiency wage universe. Nominal inertia of any kind still awaits another explanation.

When the efficiency wage model of the labor market is combined with imperfect competition in the product market, the scope for demand management becomes more transparent. I first summarize an interesting model of Akerlof and Yellen [1985]. Blanchard and Kiyotaki [1985] and Ball and Romer [1987] are in the same spirit as Akerlof and Yellen. They rationalize nominal inertia through the rather arbitrary device of assigning a lumpy cost to nominal price adjustment. The availability constraint is assumed non-binding. Let there be $N > 1$ firms selling similar but non-identical products. Each firm i faces the following demand curve for its product:

$$(22) \qquad Y_i^d = \frac{Y}{N}\left(\frac{P_i}{P}\right)^{-\varepsilon} \qquad \varepsilon > 1 \quad [5]$$

Y is aggregate demand and P the general price level, defined as the geometric mean of the P_i

$$(23) \qquad P = \left(\prod_{j=1}^{N} P_j \right)^{\frac{1}{N}}$$

Each firm has the identical production function $Y_i = f(Q(\frac{W_i}{P})L_i)$ and maximizes profits $\pi_i = P_i Y_i - W_i L_i$ by optimally choosing W_i and P_i, taking as given P and Y. The first order conditions are:

$$(24) \qquad \eta(\frac{W_i}{P}) \equiv \frac{Q'(W_i/P)}{Q(W_i/P)} \; W_i/P = 1$$

$$(25) \qquad Q(W_i/P)\, f'(Q(W_i/P)L_i)\, (1-\frac{1}{\epsilon}) = \frac{W_i}{P}$$

Equation (24) reproduces the fixed efficiency wage.

In a symmetric equilibrium, $P_i = P$ and $W_i = W$ for all i. The real wage and aggregate employment are therefore given by:

$$(26a) \qquad \eta(w) = 1$$

$$(26b) \qquad Q(w)f'(Q(w)\,\frac{L}{N})\,(1-\frac{1}{\epsilon}) = w$$

$$(26c) \qquad L \leq L^*$$

L^* is the aggregate supply of (physical) units of labor, assumed to be independent of the real wage for simplicity.

Akerlof-Yellen "near-rationality"

As in Akerlof and Yellen [1985], aggregate demand is given by the constant velocity quantity equation (27), the production function is Cobb-Douglas as in (28) and Q takes the form given in (29).

(27) $$Y = \frac{M}{P}$$

(28) $$Y_i = (QL_i)^{\alpha} \qquad o< \alpha <1$$

(29) $$Q(w_i) = -a + bw_i^{\gamma} \qquad o<\gamma<1 \quad ;a>o; \quad b>o$$

It follows that, for an initial money stock M_o, the general price level P_o is given by:

(30) $$Po = kMo$$

(31) $$k = \left(\frac{\varepsilon w_o}{\alpha(\varepsilon-1)Q(w_o)} \right)^{\frac{\alpha}{1-\alpha}}$$

w_o is the initial (real) efficiency wage.

Equations (26)-(31) characterize a full, long-run, optimizing equilibrium in which all firms are Bertrand maximizers. Assume that, at this long-run equilibrium, a perturbation in the form of an increase in the nominal money stock from M_o to $M_o(1+\nu)$ leads to a short-run optimizing response by only a fraction $1-\beta$ of the total number of firms. The remaining fraction of firms β, keeps its money wage and nominal output price unchanged. For small shocks, this suboptimal behavior is near-rational, in the sense that the profit loss resulting from the suboptimal behavior is an order of magnitude smaller than the shock. The reason for the second-order nature of the profit loss is that the imperfectly competitive firm's profit function is differentiable in its two controls: own price and own wage. As regards own price, this follows immediately from the monopolistically competitive Betrand behavior. As regards own wage, the efficiency wage hypothesis does the work. In other words, at a full, long-run equilibrium, a failure optimally to adjust the own price and wage has no first-order effect on profits because the envelope theorem strikes for the individual firm. When the initial

equilibrium is one with unemployment, however, the effect of the nominal money shock on real demand and employment has the same order of magnitude as the shock.

Let the superscript n denote variables pertaining to near-maximizing firms and the superscript m variables pertaining to maximizing firms. It is easily shown (see Akerlof and Yellen [1985]) that

(32a) $p^n = p_o$

(32b) $p^m = p_o(1+\nu)^{\lambda}$

(32c) $P = P_o(1+\nu)^{(1-\beta)\lambda}$

(32d) $w^n = w_o(1+\nu)^{-(1-\beta)\lambda}$

(32e) $w^m = w_o$

Where

(33) $\lambda = (1-\alpha)\alpha^{-1}[\beta(\varepsilon\alpha^{-1}-\varepsilon+1)+ (1-\beta)(1-\alpha)\alpha^{-1}]^{-1}$; $0<\lambda\leq 1$

The near-maximizing firms increase their demand for labor because the relative price of their output has declined and because real money balances have increased. Their reduction in profits as a result of their failure to optimize fully in response to the shock is simply the difference between the profit of a fully optimizing firm Π^m and that of a near-optimizing firm Π^n. Some arithmetic shows that:

(34) $$\left.\frac{d(\Pi^m - \Pi^n)}{d\nu}\right|_{\nu=o} = o$$

The response of aggregate employment is given by:

$$\left.\frac{d(N/No)}{d\nu}\right|_{\nu=o} = \frac{1}{\alpha}(1-(1-\beta)\lambda) + \beta(1-\beta)\lambda$$

Only when $\beta = o$ (which implies $\lambda=1$) is the employment effect zero. For For $\beta>o$ there is a first-order employment effect.

A kinked demand curve

With the demand function (22), the price elasticity $-\varepsilon$ is independent of aggregate demand. In general, however, the price elasticity will depend both on Y and on P_i/P, i.e.

$$\varepsilon = \varepsilon(Y, P_i/P) \tag{36}$$

In a fully optimizing symmetric equilibrium, $P_i = P$ and real aggregate demand will have a positive (negative) effect on the employment of an individual firm if ε_Y is positive (negative). Note however, that since aggregate demand, Y, must equal aggregate supply, the equilibrium conditions will still generate unique equilibrium values for L and Y as long as there is a unique value of ε for any given Y (and for any given P_i/P). This is obvious from equations (37) and (38) below.

$$Q(w)f'\left(Q(w)\frac{L}{N}\right)\left(1 - \frac{1}{\varepsilon(Y,1)}\right) = w \tag{37}$$

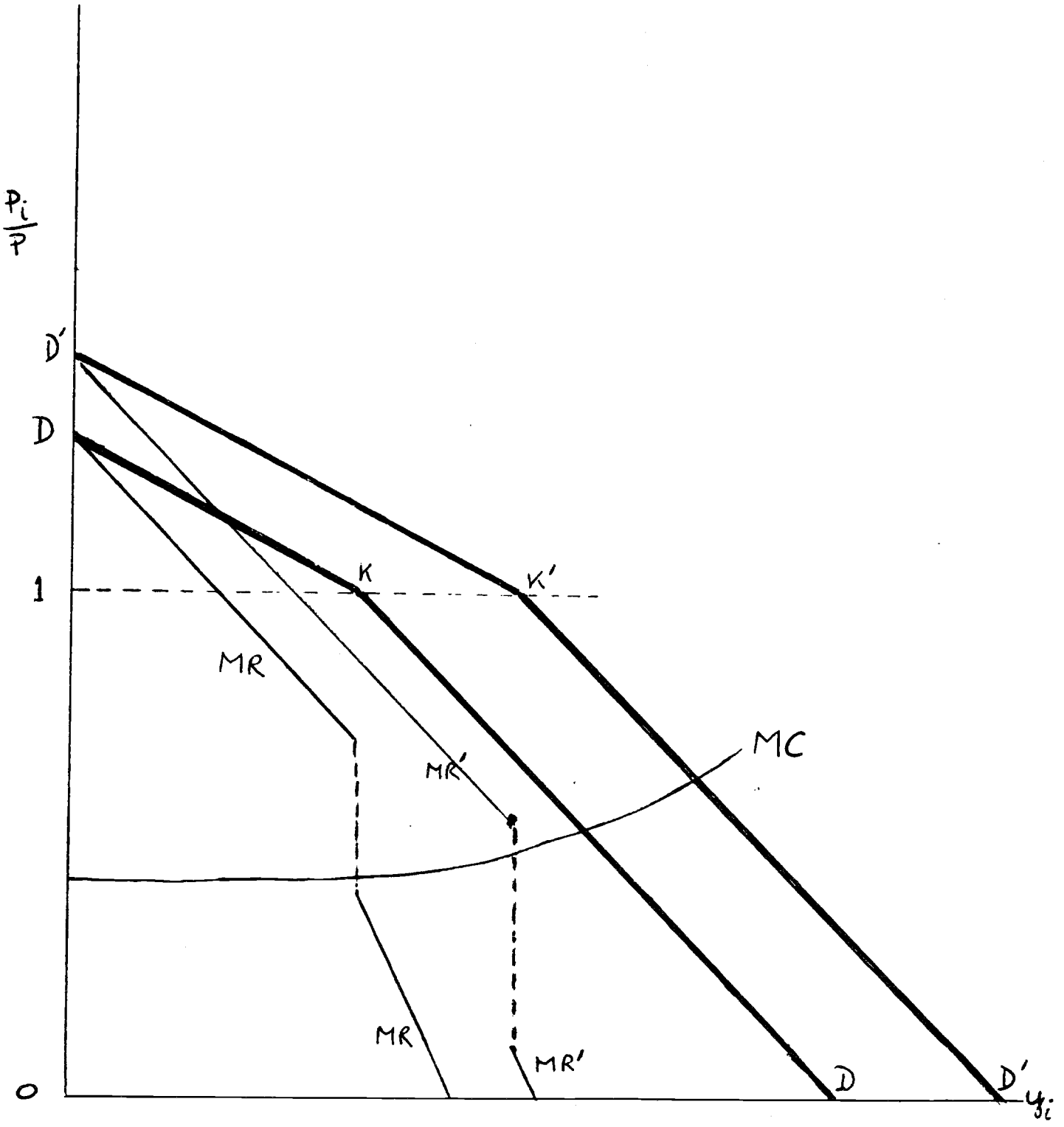
$$Y = Nf\left(Q(w)\frac{L}{N}\right) \tag{38}$$

An interesting model that permits one to escape from this box (effectively by making equation (37) non-binding for a range of Y values) is the piecewise-linear kinked demand curve given in (39) and shown in Figure 2.

$$Y_i^d = \min\left(\frac{1}{N}Y - \alpha\left(\frac{P_i}{P} - 1\right), \frac{1}{N}Y - \beta\left(\frac{P_i}{P} - 1\right)\right) \qquad \alpha>\beta>o \tag{39}$$

The greater responsiveness of sales to increases in P_i relative to P compared to decreases can be rationalized using search-theoretic "shopping models". An increase in P_i relative to P discourages potential new customers that visit the firm in the same way that a decrease P_i-P attracts potential new customers. An increase in P_i-P causes the existing clientele of the firm

FIGURE 2



to leave in order to search for a lower price elsewhere. A reduction in P_i-P does not have a corresponding sales-boosting effect on the firm's current customers.

In Figure 2, an increase in real aggregate demand shifts the demand schedule from DKD to D'K'D'. The firm's marginal cost curve is given by

$MC\left(\frac{W_i}{P}, Y_i\right) = \frac{W_i}{P} \frac{1}{Q\left(\frac{Wi}{P}\right) f'\left(Q\left(\frac{Wi}{P}\right) L_i\right)}$ where L_i is, given Q, an increasing function of Y_i through the production function given in (11) or (28). Figure 2 shows the case where the upward-sloping marginal cost-curve MC intersects the marginal revenue correspondences **MR** and **MR'** of both demand curves in their vertical segments. A higher level of real aggregate demand in this case generates a higher level of supply and employment. Each firm sets P_i=P (even before the assumption of a symmetric equilibrium is imposed). "At the kink", output demanded and supplied is therefore given by $Y_i = Y_i^d = \frac{1}{N} Y$.

The real wage, output and employment are therefore given as functions of real aggregate demand by:

(39) $\eta(w) = 1$

(40) $f\left(Q(w) \frac{L}{N}\right) = \frac{Y}{N}$

A symmetric equilibrium exists in this model for real demand values in the range $\underline{Y} \leq Y \leq \bar{Y}$. $\underline{Y}$ is the level of real demand for which marginal cost (MC) equals $-\frac{1}{\beta} \frac{Y}{N} + 1$, the lowest value of marginal revenue "at the kink." $\bar{Y}$ the level of real demand for which MC equals $-\frac{1}{\alpha} \frac{Y}{N} + 1$, the highest value of marginal revenue "at the kink." Note that at the kink, $MC(Y_i) = MC\left(\frac{Y}{N}\right)$. $\bar{Y}$ can be below the level of output corresponding to full employment of the labor force.

An ad-hoc model of real demand and nominal prices

Can the authorities influence real aggregate demand and if so, can they do this systematically or only through policy surprises? Consider the following standard ad-hoc model of aggregate demand and of the determination of nominal prices and wages. **M** is the nominal money stock, **B** the stock of

government bonds, G exhaustive public spending, T taxes net of transfers. The aggregate demand schedule is given in equation (40). Two alternative nominal wage-price blocks are given. The first, represented in equations (42), (45), and (46) has a sticky general price level and a flexible money wage. The second, represented in equations (43), (44), (45) and (46) has a sticky money wage and a flexible general price level. Following McCallum (1980) P_t^* is the general price level that would prevail at full employment, W_t^* the money wage that would prevail at full employment and w^* is the labor market-clearing real wage.

(40) $$Y = y\left(G,T,\frac{M}{P},\frac{B}{P}\right) \qquad y_G>o;\ y_T\leq o;\ y_m>o;\ y_b\geq o$$

(41) $$w \equiv W/P$$

(42) $$P_t \equiv \delta p_t^* + (1-\delta)p_{t-1} \qquad 0\leq\delta\leq 1$$

or

(43) $$W_t^* = w^* P_t^*$$

and

(44) $$W_t = \delta' W_t^* + (1-\delta')W_{t-1} \qquad 0\leq\delta'\leq 1$$

where p_t^* is defined by:

(45) $$Y^* = y\left(G_t,\ T_t,\ \frac{M_t}{P_t^*},\ \frac{B_t}{P_t^*}\right)$$

(46) $$Y^* = f\left(Q(w^*)L^*\right)$$

With the addition of the government budget identity given in (47), where i is the nominal interest rate, we now have a sample of a wider class of dynamic macromodels with the potential for persistent equilibrium unemployment.

$$(47) \qquad \frac{\Delta M+\Delta B}{P} \equiv G+i\frac{B}{P} - T$$

The scope for demand management to influence Y is transitory in these models unless there is complete nominal rigidity, i.e. $\delta = o$ in the version with equation (42) or $\delta'=o$ in the version with equations (43) and (44). I consider an exogenously given money wage or nominal price level to be quite acceptable in a model such as this. There seems to be no good reason for the money wage (nominal price level) to be driven towards the full employment equilibrium money wage (nominal price level) when that full employment equilibrium need never be reached. The further analysis of the determination of the exogenous nominal anchor by history, convention, habit or accident is beyond the scope of this paper. What matters for our purposes is that there are no obvious disequilibrium forces within the model, no perceived free lunches, that will tend to move the nominal anchor from any arbitrarily assigned value.

This model and many like it suggest that aggregate demand expansion can expand employment without the need for a reduction in real wages (or more generally in real marginal labor costs). The conventional competitive model rules out this possibility. If, as I believe, the imperfect competition-efficiency wage model is a better parable for Europe today than the conventional competitive parable or other real wage-constrained employment parables, the case against a demand stimulus is weakened considerably. The authorities must of course be able to influence real aggregate demand. In a monetary model, this ability hinges on the behavior of money wages and prices, something about which the real efficiency wage-imperfect competition model has nothing to say.

Hysteresis and the footloose NAIRU

Hysteresis is a property of dynamic systems. If it is present, the steady-state or long-run equilibrium position of the system will not be a function only of the long-run values of the exogenous variables but also of the initial condition of the state variables and of the values assumed by the exogenous variables outside the steady state. Hysteretic or path-dependent systems are therefore "historical" systems: how you get there determines where you get to. In discrete time linear systems hysteresis is present when there are one or more unit roots in the characteristic equation of the state matrix.

Hysteresis in the natural rate of unemployment is present when today's natural rate of unemployment is a function of past actual unemployment rates. Consider e.g. the simple first-order partial adjustment mechanism used in Buiter and Gersovitz [1981], Hargreaves-Heap [1980] and Buiter and Miller [1985]. u is the actual unemployment rate. u* the natural rate;

$$u^*_t = \alpha u^*_{t-1} + (1-\alpha)u_{t-1} \qquad 0 \leq \alpha \leq 1;\ 0 \leq u \leq 1 \tag{48}$$

Equation (48) specifies the natural rate as moving average of past actual unemployment rates with geometrically declining weights, since

$$(49) \qquad u_t^* = (1-\alpha) \sum_{i=0}^{\infty} \alpha^i u_{t-1-i}$$

The idea of hysteresis in the natural rate is not a new one (see e.g. Phelps [1972] and Tobin [1980]). The two most popular economic mechanisms for generating hysteresis are the "human capital" hypothesis and the "insider-outsider" hypothesis. According to the human capital hypothesis the experience of unemployment destroys the human capital of the unemployed by having a negative effect both on their attitudes towards working (the "culture of unemployment and dependence" etc.) and on their aptitudes (skills, knowledge etc.) for work.

The effective labor supply respresented by a given number of unemployed workers therefore declines over time with the duration of the unemployment spell. Empirical evidence that the long-term unemployed do not have any explanatory power in Phillips-curve type equations when the shorter-term unemployed are also included as an argument (see e.g. Layard and Nickell [1986] is consistent with this view. Insider-outsider theory (see e.g. Gregory [1982, 1983, 1986], Lindbeck and Snower [1984, 1986, 1987], Solow [1985] and Blanchard and Summers [1986]) attributes very different influences on the firm's wage bargain to those currently employed (the 'insiders') and to the unemployed, both previous employees of the firm and new job candidates (the 'outsiders'). In the limit, the unemployed are disenfranchised completely and the wage bargain is conducted solely in the interests of the firm and those currently employed. A range of explanations of varying degrees of plausibility is offered for the inability of the outsiders to undercut the insiders either by offering to work for less than the insiders in the existing firm or by seeking employment in new firms that might be able to undercut the insider-controlled firm. In this model too, the unemployed are, gradually or immediately, effectively excluded from the bargaining process in the labor market.

As it stands, equation (48) is clearly too strong. The notion that the natural rate can be anywhere between zero and one hundred percent is most implausible. The concept of <u>local</u> hysteresis, as opposed to the <u>local</u> hysteresis of equation (48), would be much more acceptable.

The kinked demand curve model just analyzed has such local hysteresis properties.

Equation (48) suggests that by keeping u at any given level for long enough, the natural rate u^* can be made to approach that level and reach it (assymptotically). Physical capital formation theories of prolongued and persistent unemployment don't quite generate that very strong property (see e.g. Modigliani et al. [1986]). These theories suggest that the kinds of shocks that produce unemployment also produce low physical capital formation. Either because of real wage rigidity and real wage-constrained employment or because of strong physical complementarity and limited substitutality between physical capital and labor (fixed coefficients are the extreme example), employment will fall or rise with the physical capital stock. Declining rates of capital formation will therefore have a long-lasting effect on unemployment. Unless there is hysteresis in the capital stock itself, however, this mechanism will not generate hysteresis in unemployment. The roots may be close to but not, will not be, equal to unity. For practical purposes it may of course not matter very much whether we have unit roots or merely roots close to unity, hysteresis or near-hysteresis. If the natural rate returns to its invariant long-run equilibrium level only very slowly after it gets perturbed by a movement in the actual rate, the economy will exhibit near-hysteretic behavior for long periods of time.

To obtain the implications of hysteresis for the existence of an unemployment-inflation trade-off, we must consider the remainder of the wage-price mechanism. I will short-cut most of this mechanism and consider the simple augmented price Phillips curve given in (50). P is the logarithm of the price level, π the augmentation term.

$$\Delta P_t \equiv P_t - P_{t-1}.$$

$$\Delta P_{t+1} = -\beta(u_t - u_t^*) + \pi_{t+1} \qquad \beta > 0 \tag{50}$$

Equations (48) and (50) imply that

$$u_t^* = u_{t-1}^* + (1-\alpha)\beta^{-1}(\pi_t - \Delta P_t) \tag{51a}$$

$$u_t = u_{t-1} - \beta^{-1}(\Delta P_{t+1} - \pi_{t+1}) + \alpha\beta^{-1}(\Delta P_t - \pi_t) \tag{51b}$$

It should be noted that, hysteresis or not, the old debate about the presence and nature of nominal inertia or stickiness in wage and price formation and about the backward-looking or forward-looking nature of the augmentation term π is still relevant if we are to evaluate policy options (see e.g. Taylor [1980], Buiter and Jewitt [1981] and Buiter and Miller [1985]). In other words, equation (48) tells us that, depending on the behavior of the actual unemployment rate, the natural rate can assume any value. The remainder of the wage-price mechanism (i.e. equations such as (50) and (51a) or (52b)) determines whether actual unemployment (or real demand) can be influenced systematically through policy or only through policy surprises. Blanchard and Summers [1985], perhaps surprisingly, choose what translates into a "surprise supply function" specification of π_{t+1}, i.e. in their model.

$$\pi_{t+1} = E_t(P_{t+1} - P_t) \tag{52a}$$

E_t is the expectation operator conditional on information in period t. If only unanticipated inflation can drive a wedge between the natural and the actual rate, the natural rate becomes a random walk, since $\pi_t - \Delta P_t = E_{t-1}(P_t) - P_t$ which is white noise when expectations are rational. The change in the actual unemployment rate will be an MA1 process. With (52a), only <u>unanticipated</u> expansionary (contractionary) shocks can lower (increase) the natural rate. Bad luck (OPEC) or bad management (unexpected contractionary fiscal or monetary policy) caused the rise in unemployment since the late seventies. Only good luck or expansionary policy surprises will get it back down.

Neither the theoretical nor the empirical foundations of the "surprise supply function" are terribly robust, however. With some inertia in the inflation process, anticipated, systematic policy too can drive the natural and actual unemployment rate to more desirable

levels. Buiter and Miller [1985] consider the familiar partly backward-looking adaptive process for core inflation π, given in (52b).

$$\pi_{t=1} = \gamma\pi_t + (1-\gamma)E_t\Delta P_{t+1} \qquad 0 \leq \gamma \leq 1. \tag{52b}$$

With this specification we have

$$u_t^* = u_{t-1}^* + (1-\alpha)\beta^{-1}[E_{t-1}(\Delta P_t) - P_t] - (1-\alpha)\beta^{-1}\gamma\,(E_{t-1}\Delta P_t - \pi_{t-1}).$$

Systematic policy keeping expected (and actual) inflation ahead of core inflation will lower the natural rate. With rational expectations and any constant rate of inflation, actual unemployment will, in the long run, equal the natural rate. The "long run" Phillips curve is vertical but it can be located at any unemployment rate. Similar results can be derived using staggered, overlapping nominal contracting models as in Taylor [1980], Buiter and Jewitt [1981] or Buiter and Miller [1985]. Nominal inertia of the kind considered by McCallum [1977, 1980] does not permit systematic policy to influence the mean level of unemployment or real demand.

With hysteresis, the case for a boost to demand in current economic conditions is irrestible. With core inflation given by (51b) and $\gamma > 0$, the sacrifice ratio is infinite; i.e. the cumulative undiscounted unemployment cost of achieving a 1 percentage point sustained and sustainable reduction in the rate of inflation is infinite. That also means that the permanent inflation cost of achieving any lasting reduction in unemployment is zero. In the "surprise supply function" case, we can only hope that the authorities will succeed in surprising us. Even in economies that are merely near-hysteretic, the case for expansionary demand policy is overwhelming. We would be as far removed as we could possibly be from the prevailing Euro-pessimist perception that the supply side constrains everything.

I believe that the case for the existence of a high degree of hysteresis in Europe is strong enough and that the European unemployment situation is desperate enough for us to "have a go" at a significant (supply-side-friendly) hoost to aggregate demand. The risk

exists that the situation has been diagnosed wrongly, but it is dwarfed by the cost of not seizing the opportunity that may be there.

4. Conclusion

Unemployment in Europe is very high and shows no signs of coming down significantly in the next few years. Under current policies the growth of real demand is barely sufficient to keep pace with the trend growth rate of productive potential, leaving the existing reservoir of unused and underutilized labor power untouched. Three kinds of responses to this situation are possible. The first response (or non-response) is to accept the situation, if not as a God-given punishment for our past sins, in any case as beyond the scope of the existing policy instruments and/or beyond the existing capacities and institutions for formulating and implementing policy. This, by revealed preference, seems to be the approach of many European governments, including those of the U.K., the B.R.D., France, Belgium and the Netherlands.

The second response blames policy-induced "supply-side" failures for much of the deterioration of the employment situation and recommends "supply-side" measures to remedy the situation. Among the past policy measures that are in the dock are the following: so-called employment protection policies that raise the cost of hiring and firing; policies providing rights, privileges and immunities for organized labor; minimum wage laws; laws and regulations limiting relative wage flexibility; laws and regulations limiting regional, occupational and industrial mobility of labor; taxes that raise the non-wage component of marginal labor costs, such as employers' social security contributions; high marginal income tax rates on wage income; high marginal benefit rates for the unemployed and lax administration of eligibility requirements for unemployment benefits and medical disability payments. Growth of the public sector in any of its dimensions ("exhaustive" public spending, employment, total spending, total revenue, scope of regulatory interventions in the market sector, public sector production of marketable commodities etc.) is viewed as synonymous with waste and inefficiency. In the short run such expansion of public sector activity may appear to improve the employment picture (in terms of a simple "body count"), but ultimately the "real"-jobs that finance and

sustain these unproductive public sector activities will suffer, the "wealth-creating" sector will shrink and with it, in due course, the public sector activities and employment it can no longer support.

Large public sector deficits, probably causally connected with the growing scope of public sector activities (because of a tendency for the political mechanism to try and avoid paying with current taxes for current outlays) are either monetized, causing high inflation, or financed by borrowing, thus crowding out interest-sensitive private spending. Both the inflation tax and borrowing are viewed as inimical to private capital formation, which further weakens the supply side.

This explanation is at best incomplete and exaggerated and at worst simply wrong. While many intelligent "supply-side" measures can be implemented to improve both efficiency and equity in the European economies, a good case can be made that adverse policy-induced supply-side developments did not cause the bulk of the deterioration of the European employment performance, and that "supply-side" measures will not be sufficient even or necessary, it the hysteresis view is valid, for removing most of the existing labor slack.

Most of the increase in European unemployment since the mid-Seventies can reasonably be attributed to the two massive adverse supply shocks of OPEC I and II and to the deliberate global demand deflation, never reversed in Europe, of the early Eighties. With the recent decline in the real price of oil and related energy products, the adverse supply shocks are being reversed. It will take years for this to take its full effect, however, because the scrapping of productive capacity and low rates of capital formation following OPEC I and II have resulted in a secularly low path of the physical capital stock.

In view of this, consider the following policy experiment: a significant, supply-side-friendly, co-ordinated expansion of aggregate demand through monetary and fiscal stimuli. Both the efficiency wage view and the Blanchard-Summers version of the insider-outsider model suggest that an expansion of demand can result in a sustainable increase in employment and production without significant upward pressure on real wages. The near-hysteretic behavior of the unemployment rate in Europe also suggest that any adverse inflationary consequences of a demand stimulus will be

temporary, while the output and employment effects will be lasting. The parallel with the rapid, non-inflationary recovery of employment and output in Britain and other European countries in the late Thirties, under the impetus of rearmament spending, comes to mind.

Even if it were agreed that a boost to demand could solve many of the European problems, it wouldn't follow automatically that the authorities can actually engineer such a stimulus.[6] I will consider briefly the following obstacles to expansionary monetary and fiscal policy. As regards monetary policy, first the absence of nominal inertia and second the threat of inflation. As regards fiscal policy the threats of financial crowding out and of government insolvency. As regards both, the threats of adverse exchange rate or current account consequences. The issue of government credibility will be seen to be central in determining the ability of the government to stimulate aggregate demand. In what follows I shall concentrate on anticipated or perceived government policy since, except in the hysteresis-cum-"surprise"-supply-function view of the world (given in equations (48), (50) and (52a)), unanticipated or unperceived policy actions are unlikely to be welfare-increasing, even if they were feasible in a systematic manner.

As stated in section 2, the effectiveness of anticipated or perceived policy requires either superior public sector information or a public sector opportunity set that is superior to the private sector's opportunity set in at least one dimension. While some of those responsible for the design and implementation of economic policy may have a (temporary) information advantage over at least some private sector agents, e.g. as regards the behavior of the monetary aggregates, international reserves and - most importantly - as regards the future intentions of the policy authorities, it would seem unwise to base the case for stabilization policy on that slim foundation. Pace Fischer's "benevolent dissembling government" (Fischer [1980] it is hard to see how in practice a government could do better as a rule than by devulging both its priviliged information and its future intentions.[7]

The existence of a public sector opportunity set which in some ways dominates that of the private sector is very plausible indeed. The proximate reason for stabilization policy effectiveness is the government's superior access to the capital markets. Government's can borrow on terms not

generally available to private agents (at any rate in the main industrial countries). This is reflected both in lower required rates of return on government debt compared with private debt of the same maturity, currency denomination etc., and in the ability of governments to continue borrowing when private agents encounter credit rationing. The fundamental reason for this public sector financial clout is that the government's collateral consists of the maximal stream of current and future resources it can appropriate through taxation and seigniorage. (The binding constraints that define the maximum tax revenue are likely to be political rather than narrowly economic or administrative in character.) The government's monopoly of the power to exact legitimate unrequited transfers of purchasing power both at a point in time and over time may also account for the private sector's willingness to hold non-interest-bearing nominal government debt (high-powered money). In addition, restrictions on what constitutes legal tender and reserve requirements may generate a private sector demand for base money. The absence of perfect private sector substitutes for base money, for whatever reasons, creates the tax base for the seigniorage tax.

The asymmetry between public and private opportunity sets in financial markets is sometimes formalized by attributing finite horizons (in OLG models without operative intergenerational gift and bequest motives) or uncertain lifetimes to households, while governments are treated as having effectively infinite lifetimes. Note that it is not the lifetime of individual administrations that matters here, but the lifetime of the institution of government. More precisely what matters is that successive governments are expected to assume the debt they inherit from their predecessors or, as in the case of balanced-budget intergenerational redistributions, that they are expected to implement the schemes initiated by their predecessors. The implication is that debt neutrality is absent: given the exhaustive spending program, the substitution of current borrowing for current lump-sum taxes by a solvent government will not leave the path of private consumption unchanged. The substitution of seigniorage revenue for either explicit lump-sum taxes or borrowing will also in general have real effects.[8] Given these basic considerations, I now turn to the main instruments of stabilization policy.

As a revenue raiser, seigniorage is now of very limited actual and potential importance in most industrial countries.[9] For monetary policy to

be an effective stabilisation instrument, other channels of influence must therefore be present.

Ignoring as empirically unimportant the ability of the authorities to influence the inflation rate and through it the real interest rate (via the Tobin effect) even in an economy with flexible money wages and prices, and ignoring for the same reason the ability of systematic monetary feedback rules to influence the variance of real output and employment (even in flex-price "surprise" supply models (see section 2 of this paper and Buiter [1981]), monetary policy can only be an effective instrument for aggregate demand management if there is some form of nominal inertia or stickiness: money wages and/or prices must be predetermined.[10] Recent empirical evidence suggesting that the degree of nominal inertia is low in Europe (in contrast to the USA) (see e.g. Bruno and Sachs [1985]) would therefore put into question the ability of monetary policy in Europe to be an important instrument of demand expansion. The empirical evidence on this issue is, however by no means clear-cut[11], and as long as there is some nominal inertia, monetary policy can play a supporting role in a co-ordinated expansion of demand.

The monetary expansion required for a demand stimulus is of the nature of a once-off increase in the level of the path of the nominal money stock, not a sustained increase in the rate of growth of the nominal money stock. In due course such a level shift will only raise the level of the price path without any long-run effect on the inflation rate. In "real time" the process of moving from a lower to a higher price level path will in practice involve a temporary increase in the inflation rate.[13] With imperfect information, non-rational expectations or mechnical indexation procedures, this temporary increase in the inflation rate may trigger a wage-price spiral that will prolong the bout of higher inflation. Provided the money stock is not permitted to respond endogenously to this further inflationary twist, the process will be damped and the long-run rate of inflation will not be affected.

Convincing the private players in the labor markets, the product markets and the financial markets that the increase in the money stock they are witnessing is a once-off level shift rather than the first step in a repeated process of ever increasing monetary injections, requires a credible

government[13], i.e. a government with a strong, proven record, of anti-inflationary preferences and actions. The three conservative administrations in London, Bonn and Paris have such credibility as does the Japanese and, to a lesser extent, the U.S. government. For most of the important players, the desirable monetary policy is actually likely to be time-consistent.

Even absent debt neutrality, fiscal policy may fail to stimulate aggregate demand because of complete financial crowding out. A variable velocity of circulation of money and/or accommodating monetary policy will prevent full crowding-out (in the presence of idle real resources) unless current fiscal expansion creates expectations of continued future expansion leading to an ever-increasing debt burden and, ultimately, the threat of de jure or de facto partial or complete repudiation of the public debt. Again the credibility of the temporary nature of the fiscal stimulus and the limited increase in the debt-GDP ratio it entails is crucial for the success of expansionary fiscal measures. If the financial markets panic, complete crowding out is likely.[14]

The current conservative adminstrations in the larger OECD countries (with the exception of Italy) are uniquely well-placed to provide a credible temporary fiscal stimulus. Their reputations for fiscal prudence again make the right policy time-consistent. Table 1 gives the general government financial balances for some of the OECD countries.

Table 1

General Government Financial Deficit as a Percentage of Nominal GNP/GDP

	1984	1985	1986[a]
USA	2.7	3.4	3.4
Japan	2.2	1.4	1.5
Germany	1.9	1.1	1.0
France	2.9	2.6	2.9
UK	3.9	2.6	3.1
Italy	13.0	14.0	12.5
Total OECD	3.4	3.5	3.4

Source: OECD Economic Outlook, Dec. 1986, Table 4.

a: OECD estimates and forecasts.

Combined with the public debt figures of Table 2, these figures suggest that, with the exception of Italy, the debt-deficit situation in the major European countries is well under control. Even the much-maligned U.S. budgetary deficit is much less dramatic than has been suggested. With the U.S. (Federal) public debt at 42 percent of GNP and a modest seven percent growth of nominal GNP, the public sector deficit could be almost 3 percent of GNP without this adding to the debt-GNP ratio. The actual U.S. general government deficit of 3.4 percent of GNP in 1986 is only slightly higher than the deficit that would stabilize the debt-GNP ratio. A U.S. fiscal correction is required in due course, but there is no need to be panicked into one right now.

A fiscal stimulus in an economy with idle resources need not crowd out private investment even if interest rates rise. The positive response of investment to the higher future profits stream permitted by higher demand will mitigate and may even overcome the negative effect of higher interest rates. Such a positive response is even more likely if the composition of the fiscal stiumulus is investment- and supply-side-friendly.

Table 2

Public Debt as a Percentage of GDP/GNP

	1974/80	1981	1982	1983	1984	1985	1986
USA**		26.0	29.4	33.5	34.9	37.8	41.5
UK***	56.6	51.1	57.8	57.5	59.2	57.8	59.0
Italy	67.7	70.2	76.6	84.3	91.1	99.5	103.1
France	25.4	26.0	29.1	30.7	32.9	35.2	36.9
Germany	27.7	36.4	39.5	41.0	41.9	42.5	41.6
EUR12		45.0	49.8	53.5	56.0	58.9	60.3

Source: Europe: European Economy, Annual Economic Report 1986-87; no. 30, nov. 1986 (Debt/GDP); USA: Economic Report of the President, 1987 (Debt/GNP).

* : European Commission Estimate.

** : Gross Federal Debt held by the Public/GNP.

*** : General Government Gross debt at market values.

This implies such actions as temporary investment tax credits and temporary investment subsidies. Reductions in marginal payroll tax rates should also be part of the package as would be increases in public sector investment in Europe's crumbling infrastructure. The stimulus should be modulated across countries to take account of their differing budgetary and debt conditions. On average for Europe, a modest proposal would be a three or four year boost equal to 2 percent of GDP per year, with sufficient monetary accomodation to prevent a significant increase in short nominal interest rates or an appreciation of the Ecu against the U.S. Dollar and the Yen.

In an open economy with a fixed exchange rate, part of any expansion of demand will "leak" abroad through increased demand for imports. With a floating exchange rate and a high degree of capital mobility, a fiscal expansion will be partly or even completely crowded out by an appreciation of the currency. Even if an accommodating monetary policy succeeds in

keeping the nominal exchange rate constant, the problem of a worsening current account still exists. This calls for a co-ordinated expansion, involving at least the major European economies and preferably also Japan. The U.S. should ensure that any attempt to restore its fiscal equilibrium does not lead to a recession (see e.g. Blanchard, Dornbusch and Layard [1986]). This would be an interesting first challenge for the new Chairman of the Federal Reserve Board.

With a modicum of common sense and a bit of luck this kind of co-ordinated, supply-side-friendly, temporary expansion, differentiated by country according to its internal and external circumstances will contribute to the resolution of the European unemployment problem and the restoration of its prosperity. Under present circumstances, "two-handed" rules out "tight-fisted".

Notes

[1] I include in this the quasi-competitive fix-price analysis of Barro and Grossmann [1971], Malinvaud [1977] and the French School. The occasional replacement of competitive agents by a conventional monopolist also does not represent a great gain in insight.

[2] Any one of the four additional bits of information with suffice.

[3] Bubble solutions are ruled out and $|\frac{\alpha - \beta}{\alpha}| < 1$.

[4] Since Barro's model does not exhibit superneutrality of money, even different constant and known proportional rates of growth of money will alter both the actual and the full information equilibrium. Models with "surprise" supply functions won't have this property.

[5] ϵ could be a function of N.

[6] It is noteworthy, that a demand stimulus from abroad (or from a boom in private domestic capital formation) is often welcomed (or even sought) by some of the most ardent opponents of a public sector-led expansion of demand: the source of the demand stimulus determines its desirability.

[7] Note that in the "thousand islands" literature, the private sector is assumed to possess local information ($P_t(z)$) that the authorities do not possess. It is clearly realistic to assume that private agents have superior firm-specific information.

[8] Distortionary taxes will introduce a further reason for absence of debt neutrality.

[9] Note that seigniorage is defined as $\frac{\Delta H}{P}$, where H is the high-powered money stock. Unanticipated changes in the price level will of course reduce the real value of the government's nominally denominated debt and thus provide another source of revenue.

[10] McCallum [1977, 1980] shows that while this is necessary, it is not sufficient for policy effectiveness.

[11] The theoretical foundations of nominal stickiness are fortunately virtually non-existent.

[12] With a flexible price level, there could be a once-off discrete jump in the price level path.

[13] The central bank is, for our purposes, part of the government.

[14] For a more extended discussion see Buiter [1985].

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