8. The Simple Macroeconomics of Profit-Sharing*

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This paper is in the spirit of the 'temporary equilibrium' approach to macroeconomics. It basically extends that framework to cover a profit-sharing system and then compares the macroeconomic characteristics with those of the more familiar wage system. A first, preliminary step is to demonstrate how a microeconomic model of monopolistic competition can be built up into a junior member of the Keynesian macro family. The methodology is to create from first principles – including a careful formulation of a monopolistically competitive product market structure – a natural underpinning for the standard aggregate demand specification.[1]

The primary goal of the paper is to apply the integrated monopolistic-competition-Keynesian type apparatus described above to investigate the macroeconomic properties of a profit-sharing economy. The existence of a consistent general framework covering both cases invites meaningful comparisons that indicate clearly why an economy based on profit-sharing principles possesses natural immunity to stagflation. By contrast, the wage economy – a system we have largely accepted

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[1] This may be a useful exercise by itself because, in my opinion, any macroeconomic framework is misleading without an underlying model of the firm based upon imperfect competition. For an elaboration of this view, see Weitzman (1982 and 1985), Solow (1985) or Meade (1984). While some contributors to the important market-disequilibrium school have attempted to cope with imperfect competition in the product market, I think it is fair to say that the issue has not been addressed directly and developed from first principles in the spirit of the present paper – using the 'actual', rather than 'perceived' or 'conjectural', demand curves. For an admirable survey of the temporary fixed price approach, see Benassy (1982) and the references cited there. Aside from the emphasis on dealing with monopolistic competition from first principles, the rest of this paper's framework is similar to what is adopted in much of the fixed-price literature, although that approach, so far as I know, has never been used to analyse profit-sharing.

without critically examining its macroeconomic consequences – is more prone to suffer from unemployment and inflation. The policy implications for aggregate demand management in wage and share systems are analysed and contrasted.

In writing this paper, my philosophy has been not to shirk from using those reasonable parameterisations and functional forms which yield nice crisp results and permit me to focus sharply on the essential logic of basic issues. It is certainly possible to present the main results in a somewhat more general formulation (as the astute reader will appreciate), but, I fear, only at some cost of distracting attention from those central features I wish to highlight.

1. *The demand side*

The stylised economy under consideration consists of three types of representative agent. The first type of agent is a producer or firm. There are n firms, each of which produces a different good, indexed $i = 1, 2 \ldots, n$, where n is taken to be a given large number.[2] A second class of agents is the households, of which there are a gigantic number, indexed $h = 1,2, \ldots, H$, where $H \gg n \gg 0$. An autonomous government sector, the third agent, makes purchases, taxes households, and has an exclusive franchise on the creation of money.

There are three categories of commodities in the prototype economy. The first category consists of the n goods produced by the n firms. Goods are considered to be highly perishable, so that inventories are negligible and sales are always very nearly equal to production. Labour, the second category, is a homogeneous commodity inelastically supplied by the households. Money, the third kind of commodity, is storable, not producible by private agents, and can be costlessly created by the government. Money serves as the exclusive unit of account, medium of exchange, and store of value in the economy.

The production of good i, denoted Y_i, and its price, P_i, are of course chosen by firm i. The eventual analysis of that choice will constitute an ultimate aim of the paper. But, for the time being, suppose that prices are viewed parametrically by buyers, who act as if they can purchase

[2] Behind the fixed number of firms are suppressed or suspended some interesting and important issues regarding barriers to entry or exit, economies of scale, sunk costs, irreversible investments and the like. Some hint of what might be appropriate to a longer-run analysis is contained in the already cited articles by Martin Weitzman (1982) and Robert Solow.

as much as they want of any good at the prevailing prices $\{P_i\}$. As might be expected under monopolistic competition, it turns out that prices will always be chosen by firms so customers can buy as much as they want, and in that sense the product market always clears.[3]

Households obtain utility from consuming goods and holding money balances. The utility of money is indirect; it serves as a proxy for the value of future consumption goods that can be purchased when money is carried over into later periods. For simplicity, each household is postulated to have the *same* utility function. When a household consumes goods $\{C_i\}$ and holds money balances M, it obtains utility according to the expression:[4]

$$(1) \qquad U\left(\{C_i\}, \frac{M}{P}\right) = \left(\left[\Sigma C_i^{\frac{E-1}{E}}\right]^{\frac{E}{E-1}}\right)^{\theta}\left(\frac{M}{P}\right)^{1-\theta}$$

The aggregate price level P in the above expression is defined by the formula:

$$(2) \qquad P \equiv \left(\frac{\Sigma P_i^{1-E}}{n}\right)^{\frac{1}{1-E}}$$

which is the appropriate goods price index, from duality theory, to use for the postulated utility function (1).[5]

Formula (1) is a compound Cobb-Douglas utility function (with parameter θ, $0 < \theta < 1$), whose two arguments are money and a *CES* composite sub-utility function of goods. The elasticity of substitution between money and the composite good is unity, whereas the elasticity of substitution among the n goods is $E > 1$.

With a current budget of B^h, household h confronts the problem

maximise:

$$(3) \qquad U\left(\{C_i\}, \frac{M}{P}\right)$$

[3] Indeed I consider it a deep-seated characteristic of capitalism that the product market is practically always in a state of excess supply. See Weitzman (1984), ch. 3.

[4] Money in the utility function (1) serves as a link between the present and an uncertain future, with θ parameterising the desire to consume now. There is an implicit presumption that the future can be collapsed into a dynamic-programming state-evaluation function like (1). On this point see Benassay (1982), 87–8, or Grandmont (1983), 17–32.

[5] See, e.g., Varian (1984), or Dixit and Stiglitz (1977).

subject to:

$$\Sigma P_i C_i + 1 \cdot \tilde{M} = B^h \tag{4}$$

For a modified Cobb-Douglas utility function of the form (1), the solution to the above problem is:

$$M = (1-\theta)B^h \tag{5}$$

$$C_i^h = \left(\frac{P_i}{P}\right)^{-\varepsilon} \frac{\theta B^h}{nP} \tag{6}$$

The total amount of good i consumed in the economy is

$$C_i \equiv \sum_h C_i^h \tag{7}$$

and aggregate consumption C may be consistently defined as

$$C \equiv \frac{\Sigma P_i C_i}{P} \tag{8}$$

The following relations then hold:

$$C = \frac{\theta B}{P} \tag{9}$$

$$M = (1-\theta)B \tag{10}$$

$$M + PC = B \tag{11}$$

$$C_i = \left(\frac{P_i}{P}\right)^{-\varepsilon} \frac{C}{n} \tag{12}$$

where

$$B = \Sigma B^h \tag{13}$$

$$M \equiv \Sigma M^h \tag{14}$$

Total government real spending on goods, denoted A, is treated as autonomously determined. The government's trade-off among goods is considered, for convenience, to be the same as the household's, given by the utility function:

$$V(\{A_i\}) = \left(\Sigma A_i^{\frac{\varepsilon-1}{\varepsilon}}\right)^{\frac{\varepsilon}{\varepsilon-1}} \tag{15}$$

The government maximises (15) subject to the budget constraint

$$\Sigma P_i A_i = PA \tag{16}$$

which yields the solution

$$A_i = \left(\frac{P_i}{P}\right)^{-\varepsilon} \frac{A}{n} \tag{17}$$

Aggregate demand for good i by the consumers and the government is

$$Y_i \equiv C_i + A_i. \tag{18}$$

With aggregate real output defined as

$$Y \equiv \frac{\Sigma P_i Y_i}{P}, \tag{19}$$

definition (18) yields

$$Y = C + A \tag{20}$$

(from combining with (8) and (16)), and

$$Y_i = \left(\frac{P_i}{P}\right)^{-\varepsilon} \frac{Y}{n} \tag{21}$$

(from combining with (12) and (17)).

The government collects the fraction s of each household's current income as taxes. National income is PY, all of which is distributed to households as wages plus profits. Aggregate disposable income is therefore

$$PY_d = (1-s)\,PY \tag{22}$$

and the total budget of all households is

$$B = (1-s)PY + M \tag{23}$$

where M represents the aggregate stock of money initially held by all households at the beginning of the period under consideration.

It follows directly from (23), (11), and (20) that

$$PA - sPY = M - M, \tag{24}$$

i.e., the government finances its deficits by inducing households to hold more money.

Using (9) and (23) to eliminate B gives

$$C = \theta(1-s)Y + \theta\left(\frac{M}{P}\right) \tag{25}$$

which is the relevant aggregate consumption function for the economy, with $\theta(1-s)$ the marginal propensity to spend out of income.

Combining (20) with (25) yields

$$Y = \alpha A + \beta\left(\frac{M}{P}\right) \tag{26}$$

where

$$\alpha \equiv \frac{1}{1-\theta(1-s)} \tag{27}$$

$$\beta \equiv \frac{\theta}{1-\theta(1-s)} \tag{28}$$

are the relevant fiscal and monetary multipliers.

Formula (26) can be interpreted as a reduced form Keynesian-type macroeconomic relation. Strictly speaking, monetary policy (as that term is usually understood) does not have an independent role to play in the current formulation because no distinction is being made between monetary and other financial assets or operations. But I feel that a simplistic association of M with the 'stock of money' (and of open market operations with 'money rain'), conveys the spirit of what a more sophisticated analysis might prove rigorously. Although I have found it valuable to think in terms of an integrated micro-macro framework developed from what I view as first principles, it is possible to treat (26) simply as a behavioural relationship having the traditional IS-LM interpretation.

Condition (26) is the fundamental macroeconomic equation of the paper, summarising all relevant information about aggregate demand given only that buyers are able to purchase whatever goods they want at prevailing prices.

2. *Prices and production*

It is important to realise that the Keynesian demand specification (26) typically forms an underdetermined system. Given A and M (and the

parameters α and β), Equation (26) describes a relation that must hold between two macroeconomic variables: Y and P. The traditional procedure for making the system determinate is to postulate a fixed price level

$$P = \bar{P} \tag{29}$$

for the short run.[6] In this paper I want to *derive* (29) as the profit-maximising response of a large number of monopolistically competitive firms constrained to pay fixed money wages. The same methodology will then be applied to the case where the fixed contract is of a profit-sharing form, which will yield quite different solution properties and macroeconomic implications from (29).

Suppose that each of the n different goods is produced by the same production technology. Firm i $(1 \leqslant i \leqslant n)$ produces Y_i units of good i from L_i employees according to the formula

$$Y_i(L_i) = \gamma(L_i - f), \tag{30}$$

where γ is the marginal productivity of an extra worker and f represents a fixed amount of overhead labour which must be employed to produce any output at all. The production function (30) can be viewed as a first order approximation in the relevant operating range.[7]

The total amount of labour employed is then

$$L \equiv \Sigma L_i \tag{31}$$

If L^* represents the total available labour, assumed to be inelastically supplied by households, then the condition

$$L \leqslant L^* \tag{32}$$

must be obeyed in the aggregate.[8]

[6] An alternative is to postulate an 'aggregate supply function' which is, I feel, a dubious macroeconomic concept at best, especially for a world where firms are price-makers in imperfectly competitive product markets.

[7] That unit variable costs are roughly constant over some range is, I think, a decent enough stylised fact to be used as a point of departure for the purposes of this paper.

[8] The reader who wants to should be able to re-do the analysis of this paper for the case where labour supply is not perfectly inelastic. Nothing of substance changes. In long-run equilibrium, wage and profit-sharing systems will continue to be identical. In the short run, when pay parameters are sticky, a profit-sharing economy effectively banishes involuntary unemployment, while a wage economy may have it, even in the presence of elastically supplied labour. The message is essentially the same as when labour is perfectly inelastic.

In any symmetric situation, aggregate output must be given by the formula

$$Y = \gamma(L-F), \tag{33}$$

where

$$F \equiv nf. \tag{34}$$

From (30), then,

$$Y \leqslant Y^* \tag{35}$$

where

$$Y^* \equiv \gamma(L^*-F) \tag{36}$$

represents potential aggregate output.

What follows in this section is an overview of the methodology to be followed in analysing the short-run price and production decisions of the firms. Suppose the cost per worker of hiring L_i workers is $W(L_i)$, where the average pay function $W(\cdot)$ is exogenously given in the short run and is identical for each firm. The relevant equilibrium concept is taken to be a symmetric Nash equilibrium in prices. Each firm charges an identical price, which is the profit-maximising price for it given that all other firms are charging that same price. The corresponding output and employment decisions are those needed to support the profit-maximising Nash equilibrium behaviour.

A short-run macroeconomic equilibrium is a price P, aggregate output level Y, and total employment L simultaneously satisfying (26), (32), (35), and the conditions

$$P\frac{Y}{n} - W\left(\frac{L}{n}\right)\cdot\frac{L}{n} = \underset{P_i, Y_i, L_i}{\text{maximum}}\{P_iY_i - W(L_i)\cdot L_i\} \tag{37}$$

subject to:

$$L_i \leqslant L^* - (n-1)\frac{L}{n} \tag{38}$$

$$Y_i \leqslant \gamma(L_i - f) \tag{39}$$

$$Y_i \leqslant \left(\frac{P_i}{P}\right)^{-E}\frac{Y}{n} \tag{40}$$

It is easy to verify that any solution of the constrained optimisation

problem (37)–(40) will satisfy (39), (40) with strict equality. Since (40) is ultimately derived from consumer-demand conditions, when it holds with full equality buyers are able to purchase whatever they want at prevailing prices and, hence, in the aggregate (26) must be satisfied.

So long as n is a large number, each firm i is justified in regarding its demand Y_i, given by (21), as a true function of only its own price P_i, with aggregate variables P and Y parametrically fixed beyond its control.[9]

3. *Short-run equilibrium in a wage economy with a parametrically given wage*

In the short run suppose each firm i pays labour an exogenously fixed money wage

$$W(L_i) = w \tag{41}$$

where w is treated as autonomously given.

The state of the macroeconomy is described by the basic aggregate demand equation (26). The extra degree of freedom in (26) between the variables Y and P is determined by firms' profit-maximising Nash equilibrium behaviour (37)–(40) given the rigid wage (41).

Let

$$\mu \equiv \frac{E}{E-1} \tag{42}$$

be the markup coefficient for each firm. The coefficient μ represents the ratio of average revenue (price) to marginal revenue.

With the production function (30) and the labour payment schedule (41), the marginal cost of an extra unit of output to firm i is w/γ. For the demand function (21), marginal revenue at a price of P_i is P_i/μ Hence, if availability of labour were not a binding constraint, each firm would choose to set a price

$$P_i = \frac{\mu w}{\gamma} \tag{43}$$

and the desired or target output of the wage system, denoted Y, would then be, from the aggregate demand condition (26):

$$Y \equiv \alpha A + \frac{\beta M\gamma}{\mu w} \tag{44}$$

[9] This statement can be rigorously defended.

Define the tautness or tension of the wage system as

$$\tau \equiv Y - Y^* \tag{45}$$

The variable τ measures the difference between desired output (what firms would like to produce in the aggregate on the given wage contract if there were no overall labour constraint) and potential output (what the system is physically capable of producing). $[\tau > 0]$ is a region of positive excess demand for labour, whereas $[\tau < 0]$ is a region of negative excess demand for labour.

The unique symmetric Nash equilibrium with each firm playing its own price as a profit-maximising strategy given the fixed wage (41) depends on the underlying configuration of parameters. Equilibrium values of the major macroeconomic variables are shown in Table 1.

Table 1. Short-run behaviour of major macroeconomic variables in a wage system

Variable	$\tau < 0$	$\tau > 0$
Y	$\alpha A + \frac{\beta M \gamma}{\mu w}$	Y^*
P	$\frac{\mu w}{\gamma}$	$\frac{\beta M}{Y^* - \alpha A}$
$\frac{W}{P}$	$\frac{\gamma}{\mu}$	$\frac{w(Y^* - \alpha A)}{\beta M}$

That Table 1 describes the unique symmetric Nash equilibrium of a fixed-wage economy should be fairly clear. Condition (43) has already been explained for the case where the firm can buy as much labour as it wants at the fixed wage (41). The corresponding value of Y in region $[\tau < 0]$ follows immediately from (26).

In the excess demand for labour region $[\tau > 0]$, aggregate output must be at its maximum feasible amount Y^*, with the corresponding value of P determined from (26). That such a configuration represents a Nash equilibrium in prices is easily verified. Since the marginal revenue product of labour exceeds the marginal cost of labour when $\tau > 0$, the firm would like to reduce its price and to produce more output, if only it could find more labour to hire. With each firm's output level effectively constrained (by (38), (39)) to be no more than Y^*/n in the case $\tau > 0$, it is unprofitable for a firm to lower price unilaterally, and it certainly is not profitable to restrain output further

by raising price. (Of course firms could also increase the money wage to attract more workers, and will do so in the long run, but this has been ruled out as short-run behaviour by assumption.)

From Table 1, the macroeconomic properties of a fixed-wage economy depend essentially on whether the system is in a state of positive or negative tension. It is important to understand fully the meaning and significance of this dichotomy, because the same logic will carry over – albeit with an important and unexpected twist – to analysing the short-run behaviour of a profit-sharing economy.

The profit-maximising response to demand changes of a monopolistically competitive firm facing an isoelastic demand curve and constant marginal cost is to charge the same price and vary production accordingly. A Nash equilibrium of such firms with fixed money wages satisfying the condition $\tau < 0$ yields the familiar fixed-price world of Keynesian 'underemployment equilibrium'.

In such a world, prices are basically set by producers as a direct markup over wages independent of the state of aggregate demand. From Formula (43), the coefficient of proportionality between P and w is μ/γ. So it is a fair approximation to treat prices as proportional to unit labour costs in under-employment states of a fixed wage economy – provided there is no systematic tendency for the markup coefficient divided by the marginal productivity of labour to vary significantly over the business cycle.[10]

A fixed-wage economy in region $[\tau < 0]$ exhibits textbook Keynesian behaviour in the short run. P cannot be directly affected by government policy, but Y and L respond via the standard Keynesian multipliers to changes in A, M, or s.

By contrast, a fixed-wage economy in the region $[\tau > 0]$ displays classical or monetarist characteristics. Government aggregate demand management has no influence on real output, already at full employment, but directly and powerfully influences the price level. Monetary policy is strictly neutral, with prices proportional to M. Expansionary fiscal policy has only an inflationary impact, since it crowds out private spending.

[10] Note that the main conclusions come from the near constancy of the ratio μ/γ, not from the separate constancies of μ and γ. The model and its basic implications would not be significantly altered if elasticities and marginal costs were allowed to vary systematically in such a way that the ratio μ/γ remained unchanged. Sidney Weintraub long ago drew attention to the important empirical regularity of a near-constant average markup of prices over unit labour costs. See, e.g., Weintraub (1981), and references to other works there cited.

Summing up, then, there is a kind of abstract symmetry in the short-run behaviour of a fixed-wage economy. With $\tau < 0$, government policy is effective at altering real economic activity, but ineffective at changing prices. When $\tau > 0$, government policy is effective in determining the price level, but ineffective at influencing real aggregate variables. While the demarcation between the two regimes is unlikely to be nearly as clear cut in practice as in theory (partly because wages are more flexible upward than downward), I nevertheless feel the distinction is conceptually useful.

4. *Long-run equilibrium in a wage economy with a competitively determined wage*

Consider a longer-run situation where everything is as described in the previous section only now the wage is endogenously determined by thorough-going competition in the labour market. Under competition, each firm is free to set its own wage rate, and will do so to maximise profits taking as given the prevailing level of pay throughout the economy. The limiting Nash equilibrium behaviour (as each firm becomes a negligible buyer of labour) yields the full employment wage at which the marginal revenue product of labour is everywhere equal to the uniform rate of pay and the sum of labour demands just equals the supply of labour. Each firm is then offering an identical wage, which is the profit-maximising wage for it to offer given that all other firms are offering that same wage.

I should point out that I view the hypothesis of a competitive equilibrium wage not as a literal description of the state of the labour market, but more as an approximation or norm which is never actually attained yet forms a useful basis for talking about possible departures from normalcy. The 'competitive wage' represents a long-term tendency which, on the one hand, cannot be indefinitely thwarted with impunity but, on the other hand, is unlikely to hold fully at any particular time or place because 'other' variables are changing too rapidly and unpredictably.

The long-run competitive equilibrium wage, taking all else about the wage system as given by last section's description, is

$$w^* = \frac{\beta M \gamma}{\mu(Y^* - \alpha A)} \tag{46}$$

When $w = w^*$, there is no unemployment, and the demand for

labour just equals the supply. Under competitive forces in the labour market, then, the wage system gravitates toward the region $[\tau = 0]$ of zero tautness which just divides the 'Keynesian' $[\tau < 0]$ and 'classical' $[\tau > 0]$ regions.

It follows that an economy whose long term wage tendencies are described by (46) will display all of the neutrality and policy-ineffectiveness results of classical macroeconomics – in the long run. For example, changes in M will 'eventually' generate equiproportionate changes in w, and hence in P, so that nothing real is altered in the economy.

While some long run competitive forces are pushing a wage economy toward $[\tau = 0]$, they are unlikely to be decisive at any given time since the whole system is precariously balanced on the output side. The boundary region $[\tau = 0]$ is a very thin set, a razor's edge of measure zero, so it is extremely improbable that a capitalist wage economy should remain there for long. In fact the *real-politik* of wage capitalism, with its less-than-perfect labour markets and downward-inflexible wages, has the system residing in region $[\tau < 0]$ most of the time, hopefully not too far from the full employment boundary $[\tau = 0]$. It seems a fair empirical generalisation to say that the relevant region for most short-term policy analysis is the Keynesian region $[\tau < 0]$ where

$$w > w^*. \tag{47}$$

5. *Short-run equilibrium in a profit-sharing economy with given pay parameters*

In the short run, suppose each firm i pays its workers by the profit-sharing formula

$$W(L_i) = \omega + \lambda\left(\frac{R_i(L_i) - \omega L_i}{L_i}\right) \tag{48}$$

where $R_i(L_i)$ stands for total revenue as a function of labour, given the demand function (21) and the production function (30). The pay parameters ω, representing the base wage, and $\lambda > 0$, representing the profit-sharing coefficient, are both treated in the short run as exogenously fixed.[11]

[11] The above formulation omits intermediate materials, mostly for the sake of simplicity. While there may be some practical problems with profit-sharing due to the

The methodology for determining a short-run equilibrium in a profit-sharing economy is exactly the same as in a wage economy. The profit-sharing firm makes its short-run pricing, output and employment decisions to maximise profits given the rigid labour payment formula (48) and given the prices that all of the other firms are charging. The economy's short-run behaviour is modelled as the Nash equilibrium outcome, (37)–(40), of this individualistic profit-maximising process which simultaneously satisfies the basic macroeconomic condition (26).

The wage bill if L_i workers are hired by firm i is, from (48),

$$W(L_i)\cdot L_i = (1-\lambda)\omega L_i + \lambda R_i(L_i) \tag{49}$$

and net profits are

$$\pi_i(L_i) \equiv R_i(L_i) - W(L_i)\cdot L_i \tag{50}$$

Combining (49) with (50), the net profits of firm i can be rewritten in the form

$$\pi_i(L_i) = (1-\lambda)\,(R_i(L_i) - \omega L_i) \tag{51}$$

If unlimited amounts of labour are available to be hired on the share contract (48), from (51), the firm will choose to hire workers to the point where

$$R_i' = \omega \tag{52}$$

But the marginal revenue product of labour with demand curve (21) and production function (30) is related to price charged, P_i, by the formula

$$R_i'(L_i) = \frac{\gamma P_i}{\mu}. \tag{53}$$

Combining (52) and (53), with unlimited supplies of labour available on the pay schedule (48), each firm i would choose to set its price at the level

$$P_i = \frac{\mu\omega}{\gamma}. \tag{54}$$

fact that, in the real world, 'profits' is a somewhat elastic concept, I do not see insurmountable difficulties arising here. In any event, treatment of such considerations (and also bankruptcy, legal issues, leverage effects, etc.) is well beyond the scope of the present paper.

The corresponding desired or target aggregate output level of the profit-sharing system with fixed pay parameters (ω, λ), denoted Υ', would then be, from (26),

$$\Upsilon' = \alpha A + \frac{\beta M\gamma}{\mu\omega}. \tag{55}$$

The hypothetical variable Υ' measures what firms would like to produce in the aggregate on the given pay contract if there were no overall labour constraint.

The tautness of the profit-sharing system is then

$$\begin{aligned}\tau' &\equiv \Upsilon' - \Upsilon^* \\ &\equiv \alpha A + \frac{\beta M\gamma}{\mu\omega} - \Upsilon^*\end{aligned} \tag{56}$$

Note that the degree of tautness varies inversely with ω, and that a 'pure' sharing system not having any base wage would possess an infinite demand for labour.

The unique symmetric Nash equilibrium with each firm setting its own price at a profit-maximising value given all other firms' prices and given the fixed profit-sharing pay formula (49), depends on the underlying configuration of parameters as shown in Table 2.

The reasoning to explain why Table 2 describes the unique symmetric Nash equilibrium of a profit-sharing economy closely parallels the reasoning behind Table 1 and is omitted here for the sake of brevity. In both cases the key insight is that actual aggregate output must be the smaller of a demand-determined target and a supply-determined capacity. The rest follows directly.

Table 2. Short-run behaviour of major macroeconomic variables in a profit-sharing system

Variable	$\tau' < 0$	$\tau' > 0$
Υ	$\dfrac{\beta M\gamma}{\mu\omega}$	Υ^*
P	$\dfrac{\mu\omega}{\gamma}$	$\dfrac{\beta M}{\Upsilon^* - \alpha A}$
$\dfrac{W}{P}$	$(1-\lambda)\dfrac{\gamma}{\mu} + \lambda\dfrac{\Upsilon}{L}$	$(1-\lambda)\dfrac{\omega(\Upsilon^* - \alpha A)}{\beta M} + \lambda\dfrac{\Upsilon^*}{L^*}$

The most immediately striking thing about Table 2 is that the first two rows are exactly the same as in Table 1 except for ω replacing w. The share parameter λ does not affect real national product or the price level.

When firms are maximising a function of the form (51), their reactions are not influenced by λ. So long as spending behaviour is postulated to depend only on the level of aggregate income, and not its distribution, the pricing and output decisions of firms in any short-run equilibrium of the system must be independent of λ. The particular case $\lambda = 0$ is just the wage economy, which accounts for the near-identity between the first two rows of Tables 1 and 2. While values of λ affect the distribution of national income, they do not influence its determination. Only the value of ω, representing to a firm the 'hard' money cost of taking on an extra worker (as opposed to the 'soft' cost of a share of incremental gross profits), influences the overall level of national income. If workers in a wage economy agree to receive 80 per cent of their pay in the form of base wages and 20 per cent in the form of a profit-sharing bonus, the effect on national product, employment, and prices is 'as if' wages had been cut by 20 per cent while aggregate demand was being maintained at the same level.

When a wage economy suffering from unemployment converts to a profit-sharing formula whose parameters are initially set so that each employed worker is at first paid the same amount, the change will make all workers better off after adjustment. From (48), the real pay in a profit-sharing system is

$$\frac{W}{P} = (1-\lambda)\frac{\omega}{P} + \lambda\frac{Y}{L} \tag{57}$$

After conversion from a wage system to an 'equivalent' profit-sharing system initially yielding the same pay, the share economy expands output and employment while lowering price. (Compare Tables 1 and 2 when $\omega < w$.) If labour productivity does not behave counter-cyclically ($F \geqslant 0$), from (57) real pay must increase.[12] In addition, new jobs have been created, so there are more employed workers, each of whom is receiving higher real pay. In this sense a move towards profit-sharing represents an unambiguous improvement for the working class.

Note that the argument applies only when all (or almost all) firms of a wage economy simultaneously convert to profit-sharing plans. If one firm alone converts, it will hire new workers, but at the expense of driving down the pay of its original workers. So coordination may be required to induce people to convert to a share system; one possibility is to have the government reward profit-sharing workers, by preferential tax treatment of share income, for their part in creating the positive externality of a tight labour market.[13]

[12] Actually, all that is needed is that $\lambda Y/L$ not decrease faster than $(1-\lambda)\omega/P$ increases.

Comparing the first two rows of Table 2 with Table 1, the short-run aggregative properties of wage and share systems appear to be very analogous, the only essential difference being in the values of the variables w and ω. That interpretation is true, but it is deceptive, as will be shown presently.

6. *Long-run equilibrium in a profit-sharing economy with competitively determined pay parameters*

Consider next a longer-run situation where the set-up is the same as in the last section, except that pay parameters are endogenously determined by thoroughgoing competition in the labour market. The basic concept of competitive equilibrium in the labour market is essentially the same for a share system as for a wage system. Given the pay parameters every other firm is selecting, each firm is free to choose its own pay parameters but must live with the consequences of labour shortage if it selects too-low values. The underlying solution concept is

[13] I do not currently have a precise formulation of the 'positive externality of a tight labour market' that could serve as an operational framework for analysis. Nevertheless, it seems intuitively clear to me that there may be a basic problem of institutional instability in a profit-sharing economy because high-λ behaviour that is socially rational may not be individually rational. Some preliminary thoughts on this point are expressed in Weitzman (1984), ch. 9. I believe the relevant externality has to do with the idea that high stable pay for 'insider' workers of the existing labour force (at the expense of 'outsider' unemployed workers and the young) suits the interest both of the high-seniority employed workers and of their satisfying employers (who are doing well enough to want to continue enjoying the benefits of a quiet life). Converting outsider non-tenured workers into permanent insiders may require institutional changes in the incentive structure going far beyond anything in current official thinking. Strong material incentives, such as favourable tax treatment of the profit-sharing component of a worker's pay will probably be needed to convince senior workers to acquiesce in a profit-sharing scheme with no restrictions on new hiring. (For a more extensive discussion of the problem of new hires, see Weitzman (1984), 108–9 and 132–4.) A formal development of such ideas is properly the subject of future research, the current paper being limited to describing the macroeconomic implications of wage and profit-sharing systems without yet attempting the grand historical synthesis of explaining how or why they actually come into being.

a symmetric Nash equilibrium in pay parameters, which means that if all firms are selecting (ω, λ) as parameter values, it is not profitable for any one firm to deviate from that pattern. This equilibrium value will be used primarily as a reference point to indicate the approximate region in pay-parameter space where a profit-sharing system is likely over time to end up.

A basic theoretical result to be proved below is that any pair $(\omega, \lambda) > 0$ constitutes a long-run competitive equilibrium in pay parameters if and only if it delivers to each worker the same pay as an equilibrium wage system $(w^*, 0)$ operating under otherwise identical circumstances. From (48), such an equivalence can be written as

$$w^* = \omega + \lambda\left(\frac{P^*Y^* - \omega L^*}{L^*}\right) \tag{58}$$

where w^* is defined by (46) and

$$P^* = \frac{\beta M}{Y^* - \alpha A} \tag{59}$$

There is thus an inverse relationship between long-run equilibrium values of λ and ω and, hence, one extra degree of freedom in determining the pay parameters of a profit-sharing system.

I do not have a formal theory that would explain: (a) why a society chooses a particular (ω, λ) configuration, or, (b) why pay parameters are sticky in the short run. I only have consistent stories about viable long-term combinations of ω with λ, and about the short-term consequences of pay parameters being temporarily frozen at various values. This partly intuitionist, partly formalistic approach strikes me as the best feasible way of addressing the important issues involved. (And, presumably, the present analysis would be needed anyway as a preliminary step toward any more ambitious formulation directly attempting to tackle (a) and (b) above.) In my story, it is perhaps conceptually useful to think of λ as a policy variable chosen by the government automatically to 'stabilise' the macroeconomy at full employment.[14] Then, over a longer term, ω can be envisioned as

[14] The fact that we generally observe $(\omega, \lambda) = (w^*, 0)$ – that is, no profit-sharing might be because $(w^*, 0)$ represents some sort of institutional Nash equilibrium, with other combinations of (ω, λ) not sustainable in the face of possible externality/free-rider problems. (On this, see the suggestive discussion of Weitzman (1984), ch. 9.) Although intuitively plausible, this interpretation remains speculative. If true, it might justify public policy to induce high values of λ. Note, however, that most private companies in the immensely successful economies of Japan, Korea, and Taiwan pay a very significant fraction of worker remuneration as a bonus which is, or so it seems in many instances, at least indirectly linked to profits per worker; and in USA, profit-sharing is not an exotic innovation but a current reality for many tens of millions of self-employed workers, professional partners and people who work on commission or tips (see Weitzman (1984), ch. 7).

adjusting to satisfy (58). Throughout the short run, in my scenario, ω and λ are both thought of as being quasi-fixed parameters.

The explanation of (58) is roughly as follows. In long-run competitive equilibrium, due to migration pressure, each worker must end up with the same pay no matter what is the ostensible form of the payment (how it is split between straight money wages and shares of profit). Given the fact that every firm must end up paying the prevailing pay whatever parameter values it selects, the profit-sharing firm can do no better in the long run than to hire labour to the point where the marginal revenue product of an extra worker is equal to the prevailing pay, then setting its pay parameters accommodatingly during contract time to yield that going compensation for its workers.

Solely to preserve neatness and to save on space, (58) will be proved here only for the case $\omega = 0$ (pure revenue-sharing). The proof for the more general case is essentially identical, although made considerably messier due to the additional notation which is required.[15]

Let $L(\lambda; \lambda^*)$ stand for the amount of labour any firm is able to attract if it pays a share λ when all other firms are paying equilibrium shares λ^*. If every other firm is paying a share λ^*, and there are a large number of firms, the prevailing level of pay must be $\lambda^* P^* Y^*/L^*$ where, because any long-run equilibrium is at full employment, P^* is given by (59). It follows that $L(\lambda; \lambda^*)$ must satisfy the condition

$$\frac{\lambda R(L(\lambda;\lambda^*))}{L(\lambda;\lambda^*)} = \frac{\lambda^* P^* Y^*}{L^*} \tag{60}$$

where $R(L)$ stands for a firm's revenue as a function of the labour

[15] An alternative approach to proving such propositions in a slightly different context is contained in Weitzman (1983). It is straightforward to generalise the present formulation to include capital, and relatively easy to verify that long-run properties are unaltered when the capital stock is treated as a choice variable. In long-run equilibrium, identical-twin wage and profit-sharing systems stimulate equal investment – to the point where the long-run marginal-revenue product of capital equals the prevailing interest rate. What happens to capital formation out of long-run equilibrium can only be conjectured; but a fair guess might be that the relatively stable environment of a share economy – whose output is permanently maintained at the full capacity level – leads to an increased, steadier volume of investment over the business cycle.

working for it. Since (60) must hold for all λ, differentiating with respect to λ and collecting terms yields

$$\frac{\partial L}{\partial \lambda} = \frac{R}{\frac{\lambda^* P^* \gamma^*}{L^*} - \lambda R'} \tag{61}$$

The long-run equilibrium problem of the firm, given λ^*, is to select λ to maximise $(1-\lambda)R(L(\lambda;\lambda^*))$, which yields the first-order condition

$$(1-\lambda)R'\frac{\partial L}{\partial \lambda} = R. \tag{62}$$

Combining (61) with (62),

$$R' = \frac{\lambda^* P^* \gamma^*}{L^*} \tag{63}$$

But from (53), the marginal revenue product of labour for a firm equals γ/μ times its optimally chosen price. Hence there will be system-wide equilibrium if and only if

$$\frac{\gamma}{\mu} P^* = \frac{\lambda^* P^* \gamma^*}{L^*} \tag{64}$$

or if and only if (from (46) and (59))

$$w^* = \frac{\lambda^* P^* \gamma^*}{L^*} \tag{65}$$

which is exactly the condition (58) to be proved for the case $\omega = 0$.

There are two major implications of what has been derived in this section. The first is that wage and profit-sharing systems are isomorphic in a long-run stationary equilibrium with competitive labour markets. I take this to mean that both systems have some long-run tendency toward similar resource-allocation patterns.

But, and this is the more important implication, the short-run properties of the two systems (when pay parameters are quasi-fixed) are quite strikingly different in the neighbourhood of a long-run equilibrium position. From (58), (46), and (56), a profit-sharing system with a good-sized share component will be operating well inside the full-employment region $[\tau' > 0]$. (In long-run equilibrium, τ' is bounded below by 0, becoming ever larger as λ is bigger and as ω

becomes smaller, approaching infinity as the pure wage component ω goes to zero and as λ approaches $w^*L^*/P^*\gamma^*$.) Even allowing for real world disturbances and *realpolitik* non-competitive labour markets, a serious profit-sharing economy should remain at full employment. So it seems a fair generalisation to say that in the real world a genuine profit-sharing system will be operating in the region $[\tau' > 0]$ whereas a wage system will be largely confined to the region $[\tau < 0]$. The wage variant of capitalism, unlike its profit-sharing cousin, cannot long be situated in a state of positive tautness because self-interested wage-economy firms will voluntarily bid up pay parameters.

There is then a marked difference in the degree of tension of the labour markets of wage and profit-sharing systems. A wage firm wants to hire as much labour as it is hiring under its current wage contract. But a profit-sharing firm wants to hire more labour than it is actually able to hire on the profit-maximising contract parameters that it has itself selected.[16] The resolution of the seeming paradox is that while the profit-sharing firm desires more labour on the *old* contract, it will be made worse off if it tries to issue a *new* contract with higher pay parameters. (Indeed, this statement was demonstrated in the course of proving (58).)

It is important to note that it is not disequilibrium *per se* which causes unemployment, but rather a particular method of labour compensation (the wage system) in combination with disequilibrium. A profit-sharing system does *not* eliminate unemployment in a contractionary state by having such a high degree of pay flexibility that, in effect, wages are lowered to the point where long run equilibrium is automatically maintained.[17] To see this point clearly, imagine a pair of 'identical twin' wage and profit-sharing economies, both in long-run stationary equilibrium with competitive labour markets, so that in both systems worker pay equals the marginal revenue product of labour. Then subject the two systems to a contractionary shock and observe what happens in the short run.

In a profit-sharing economy, the marginal revenue product of labour, from (53) and (59), is:

$$R' = \frac{\gamma \beta M}{\mu(\gamma^* - \alpha A)} \tag{66}$$

[16] This aspect is elaborated in Weitzman (1984).
[17] See Weitzman (1983) for a more rigorous discussion.

while money pay (from Table 2) is:

$$W = \frac{\beta M}{\Upsilon^* - \alpha A}\left[(1-\lambda)\frac{\omega(\Upsilon^* - \alpha A)}{\beta M} + \lambda\frac{\Upsilon^*}{L^*}\right] \tag{67}$$

Now whenever a profit-sharing economy is in long-run equilibrium, with (ω, λ) satisfying (58), then (66) and (67) must be equal, or $R' = W$. After a contractionary shock (say a decrease in A or M), it is straightforward to verify that money pay (67) declines by less than the marginal revenue product of labour (66) (provided $\omega > 0$). The marginal revenue product of labour will then be lower than pay, $R' < W$; yet all workers are retained by the firms. Thus, profit-sharing does more than simply introduce some flexibility of wages. It builds in a permanent incentive for firms to want to retain their employees, not because of low pay, but because the marginal cost of an extra worker is less than the marginal revenue product created by that worker. In a wage system, on the other hand, firms always act to equate the marginal revenue product of labour with pay, and workers are consequently laid off after a contractionary shock.

Incidentally, it is straightforward to use the same 'identical twin' thought experiment to verify that not only is aggregate output and employment higher in a profit-sharing economy than a wage economy immediately after a contractionary shock to a long-run equilibrium state, but so is each employed worker's real pay. The conclusion about comparatively higher real pay in a share system holds as well for inflationary disturbances to a long-run equilibrium position, because there is at least some protection against higher prices.

Summing up, then, it seems a fair generalisation to say that a serious profit-sharing economy will possess basically classical or monetarist macro-economic properties very different from the short-run Keynesian underemployment characteristics of a wage economy. In a share economy, money is neutral and directly affects the price level, while having no effect on real aggregate economic variables. Resources are always fully utilised in a share system. The implication would appear to be that the central bank can directly and relatively easily control prices in a profit-sharing economy by regulating the supply of money, without having to worry about possibly adverse effects on employment and output.

7. Wage and profit-sharing economies compared

It has been noted that a wage economy can plausibly be expected to function primarily in a regime where $\tau < 0$, whereas a profit-sharing economy should operate within the region $[\tau' > 0]$. The relevant conditions, I have argued, are:

$$\alpha A + \frac{\beta M \gamma}{\mu w} < \Upsilon^* < \alpha A + \frac{\beta M \gamma}{\mu \omega} \tag{68}$$

Throughout this section it is assumed that (68) describes the appropriate configuration of parameters, both initially and after unexpected displacements of the system.[18]

Table 3 compares the short-run macroeconomic properties of wage and profit-sharing systems in the regions where each is likely to be operating.

Table 3. Macroeconomic variables compared in the two systems

Variable	*Wage Economy*	*Profit-Sharing Economy*
Υ	$\alpha A + \frac{\beta M \gamma}{\mu w}$	Υ^*
P	$\frac{\mu w}{\gamma}$	$\frac{\beta M}{\Upsilon^* - \alpha A}$
$\frac{W}{P}$	$\frac{\gamma}{\mu}$	$\lambda\frac{\Upsilon^*}{L^*} + (1-\lambda)\omega\frac{\Upsilon^* - \alpha A}{\beta M}$

In order to be able to make meaningful comparisons between real pay, W/P, in both systems, some assumption of 'comparability' must be made between pay parameters of wage and profit-sharing economies. The assumption made here is that real pay in the profit-sharing system should be the same as in the wage system – under the prices prevailing in the wage system, i.e.,

$$\frac{\gamma}{\mu} = (1-\lambda)\frac{\omega\gamma}{w\mu} + \lambda\frac{\Upsilon^*}{L^*} \tag{69}$$

[18] The interested reader should be able to provide, from Tables 1 and 2, the correct analysis for those situations where (68) might not hold.

(It is not difficult to verify that (69) is merely a rewriting of the long-run competitive labour market condition (58), which allows the fictional interpretation that both systems once upon a time started from the same initial equilibrium condition before being hit by the identical contractionary shock.)

Under conditions (68) and (69), from Table 3, output Y and real pay W/P are lower, while prices P are higher in a wage economy than in a comparable profit-sharing economy. This is the sense, then, in which conversion from a wage system to an equivalent-looking profit-sharing system yields unambiguously superior macroeconomic characteristics.

The basic short-run difference between sticky-pay-parameter wage and profit-sharing systems is no doubt exaggerated in my presentation, but it would, I feel, remain in modified form even after introducing additional real-world frictions, inertias and imperfections. Perhaps the contrast can be summed up as follows. In a wage system, prices are relatively rigid while quantities are relatively flexible and able to be influenced by demand-management policies. In a share system, output prices are relatively flexible and under the control of monetary and fiscal policies, while quantities are relatively rigid at the full-employment level. Without relying on any fictitious 'aggregate supply curve', which has little meaning in an imperfectly competitive environment where firms *set* prices so that there is always an excess supply of their products, the central theoretical result can nevertheless be conveniently stated in the 'as if' language of aggregate supply familiar to conventional macroeconomics.

A wage economy behaves in the short run 'as if' aggregate supply were elastic at fixed prevailing prices (the 'as if' Keynesian case). A profit-sharing economy behaves in the short run 'as if' aggregate supply were inelastic at the full employment level (the 'as if' classical case).

Note that these statements describe the profit-maximising Nash-equilibrium behaviour of a monopolistically competitive economy in the short run, when labour-payment contract parameters are fixed. The conclusions are not limited to the long run, or restricted to a perfectly competitive world. The share system thus behaves essentially like a classical macroeconomy, even while the classical preconditions are not being met. And the wage system, of course, behaves in the short run like the Keynesian macroeconomy that it is.

There is an interesting contrast, from Table 3, between the government's ability to influence prices and quantities in the two

systems. Output in a profit-sharing economy automatically self-regulates at the full employment level, independent of government policy or lack of policy. The world of Keynesian 'underemployment equilibrium' on the other hand, with its possibility of, indeed its need for, using demand management to improve the level of aggregate output in the short run, with its attendant entourage of fiscal and monetary multipliers, rests crucially on the institutional assumption of a wage-payment system. Change that particular labour payment feature to a profit-sharing arrangement and macroeconomic properties are dramatically altered for the better.

Compare the price equation of Table 3 for the two systems. In a wage economy, government policy has no *direct* effect on prices, which are determined strictly as a markup on costs. But in a share economy, the short-run price level is a direct function of aggregate fiscal and monetary variables and it does not depend upon short-run cost considerations. Government spending in a profit-sharing system crowds out private spending, and the aggregate effects show up only on the price level. Money is neutral in a share economy – monetary policy can be used powerfully and directly to determine the price level without affecting real economic activity. If there is an inflationary shock, say due to an increase in autonomous spending, the monetary authorities can hold the price level stable – without causing unemployment – merely by contracting the money supply. The share economy is a monetarist's dream – not just in long-run equilibrium, but in the short run with rigid labour contracts and monopolistic product markets.

A good litmus test for any market system is to observe how it reacts to changes in capacity. What happens if potential output, Y^*, is suddenly made larger, say because labour supply has unexpectedly increased?

A profit-sharing economy immediately raises its output level to the new capacity ceiling. Fresh labour is immediately absorbed and put to work producing additional goods and services, without having to wait for any long-run adjustment of pay parameters. From Table 3, the short-run effect of increased capacity on a profit-sharing economy is greater output, lower prices and higher real pay. The opposite conclusions hold when there is diminished potential to produce.

By contrast, in the wage system a firm is not interested in hiring additional workers on the existing labour contract. From Table 3, an increase in Y^* has no immediate effect on output, prices, or real pay for a wage system. Only if A, M, α, or β are increased, say through

government policy, or if w is lowered, does a wage system absorb new entrants into the labour market.

The parameter μ is a measure of the degree of competitiveness of an economy. Higher values of μ mean that industry is less competitive. From Table 3, changes in μ have no short-term macroeconomic effects on a profit-sharing system, although there will be predictable long-term effects. By contrast, in a wage economy any industrial policy changing the degree of concentration will immediately move aggregate output, prices and real pay in the expected direction, with macroeconomic performance being improved by increased competitiveness.

In the model of this paper, the coefficient γ stands for the marginal product of labour; its inverse, $1/\gamma$, measures the additional labour requirement per unit increment of output. If raw materials are employed in fixed proportions with output, an exogenous hike in the relative cost of materials could be given an interpretation within the model by appropriately increasing $1/\gamma$. Generally speaking, an adverse supply shock can be captured in the present framework by an autonomous deterioration of the marginal productivity parameter γ.[19]

From Table 3, changes in γ have no short-term macroeconomic effects on a profit-sharing system. But a decline in the marginal productivity of labour has an immediate detrimental impact on output, prices and real pay in a wage economy. The long-run effects of declining marginal productivity of labour are identical in both systems, involving basic adjustments in compensation parameters and real pay. But a share system allows such changes to come about gradually, through the competitive pressures of the market, without ever interrupting the smooth flow of full-employment output. A wage system, by contrast, responds to an adverse supply shock by an abrupt increase in unemployment and inflation that can be very unsettling to society.

Wage capitalism is fundamentally a precariously balanced system. The slightest change – a momentary lowering of the desire to spend money on goods, say – can move it away from the razor-thin $[\tau = 0]$

[19] This is a standard trick, if somewhat heuristic. For some more details, see Dornbusch and Fischer (1984), 410. Changes in sales taxes, employment subsidies, and the like can be given a similar interpretation. Note that I am assuming, for convenience, that a supply shock leaves the level of potential output, Y^*, unaltered. This may or may not be an appropriate assumption, depending on the context. The interested reader should be able to trace through, e.g., what happens if γ and Y^* both change in the same proportion.

region where there is just full employment and pay is exactly competitive. A wage economy is at the mercy of any imbalances between γ, w, M, A, and the other variables or parameters of the system. A trifle more belligerence on the part of labour unions, a slight increase in the cost of imported raw materials, a bit less productivity than expected – may be enough to set off an explosive inflationary spiral, pushing up both prices and unemployment.

If productivity is less than anticipated, and yet workers seek to maintain an inappropriately high level of real wages, even a very small discrepancy between labour's aspiration level and the profit-maximising real wage

$$\frac{w}{P} = \frac{\gamma}{\mu} \tag{70}$$

may unleash an accelerating wage-price spiral, abetted by whatever indexation exists, that can ultimately be brought under control only by choking the economy, and the labour force, into submission through restrictive monetary and fiscal policies. When w is pushed up relative to γ, say because productivity has not increased as fast as expected, that just moves up prices in the same proportion, leaving the real wage intact. And unless there is accommodating policy, unemployment results and output declines. Should the monetary authorities ratify the wage hike by increasing the money supply, inflation is created without dampening labour's underlying desire for an increased real wage.

A fundamental problem of the wage system is that prices are set by producers as a markup over wages and neither the government nor anyone else has a *direct* mechanism for changing the price level in the short run. From formula (43), P can only change as w, μ, or γ are altered. And there is no reason to expect a reliable or usable tendency for 'the elasticity of demand, over the elasticity minus one, divided by the marginal product of labour', to vary systematically with business fluctuations.

So the only practical way to moderate prices in a wage economy is to moderate wage costs. Monetary or fiscal policies can slow down wage-push inflation only by throttling the economy into sufficiently low rates of employment to diminish money-wage demands: a very costly, indirect, inefficient and inhumane way of controlling the price level, but the only one available under wage capitalism.

Table 3 displays an interesting contrast that may be relevant for

issues concerning cost-push inflation. In a wage economy the pay parameter w influences aggregate output and the price level, but not the real wage. In a share economy, it is the other way round – parameters ω and λ have no effect on output or prices, but do play a role in determining real pay. A cost-push money-wage increase in a wage economy lowers output and raises prices while leaving the real wage intact. But in a profit-sharing economy any pushing up of pay parameters does nothing to aggregate output or prices, while it raises the level of real pay. If the parameters ω or λ are increased, that merely redistributes income in the short run from capital to labour without changing the overall size of the output pie.[20]

8. *Conclusion*

My own conclusion is that a profit-sharing economy has some natural tendencies towards sustained, non-inflationary, market-oriented full employment. A profit-sharing economy can avoid dreaded Keynesian unemployment, even when conducting anti-inflationary monetarist policy. The wage variant of capitalism, on the other hand, does not have built-in stability and so must rely more heavily on skilful discretionary adjustments of financial aggregates in reacting to each unforeseen event as it occurs. Such questions as why wage capitalism is so prevalent and what can be done to change an economy from a wage system to a profit-sharing system must be left for another time.[21] But I hope it is clear from the analysis of this paper why an economy based on profit-sharing principles may conceivably offer some foundation for a permanent solution to the problem of stagflation.

[20] It might be thought, then, that there is a greater temptation for the median worker to attempt to push pay parameters above competitive levels in a profit-sharing economy than in a wage economy. Somewhat paradoxically, the exact opposite is true. See Weitzman (1984), ch. 8, for the details. It turns out that while it may be collectively rational for all workers together in a profit-sharing economy to push up pay parameters above competitive levels, it is not individually rational for a particular worker or union, who will not directly benefit because on the margin the profit-sharing firm will automatically offset artificial pay-parameter increases by hiring more workers and driving down profits per worker, so pay remains at the level prevailing throughout the rest of the economy. In a wage system the opposite is true – it is individually rational for the median worker of a wage firm to push for higher wages no matter what workers in other firms are doing, but it is collectively irrational for the working class as a whole to push for higher wages.

[21] For some preliminary thoughts on these issues, see above, note 13. The welfare effects of changing from a sticky-wage economy to a sticky-share economy should be clear enough, even without a very sophisticated analysis. When outsider unemployed workers are effectively cut out of the wage economy, a significant slice of the national income pie evaporates – resulting in huge first-order Okun-gap losses of output and social welfare. A profit-sharing system stabilises aggregate output at the largest possible national income pie, while permitting only small second-order Harberger-triangle losses to arise – e.g., because a few crumbs have been randomly redistributed from workers in one firm to workers in another, or because the movement of resources in response to firm-specific shocks may be somewhat slowed.

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