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INSTABILITY AND INDEXATION IN A LABOUR-MANAGED ECONOMY - A GENERAL EQUILIBRIUM QUANTITY RATIONING APPROACH

by

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Abstract

The paper presents a macroeconomic analysis of a labour-managed economy based upon the general equilibrium quantity rationing paradigm. It is shown that such an economy in which firms seek to maximize value added per working hour, and households seek to maximize utility in consumption and leisure may lead to highly perverse and unstable price dynamics, as endogenous features of the system. An easily implemented indexation scheme is presented which would reverse the direction of the dynamics and guide the labour-managed economy to an efficient level of activity.

1. Introduction

After several years of galloping inflation, the International Monetary Fund has persuaded the Yugoslav government to peg the interest rate charged to labour-managed firms in the country's industrial sector to one percent above the rate of inflation.[1] In this paper we present a macrodynamic analysis of a labour-managed economy which illustrates, within the confines of a relatively simple model, the significance and drawbacks of this measure.

The model applies the method of quantity rationing (see Grandmont, 1982) to the problem of a labour-managed economy in which firms attempt to maximize income per working hour, and households (hereafter "consumers") attempt to maximize a utility function with arguments consumption and leisure. The agents who, as workers, manage firms, supply goods and demand labour, are of course the same agents who in another guise act as consumers and demand goods and supply labour; but in their various roles they react to different sets of signals. This feature of the labour-managed economy enables us to provide a particularly clear analysis of both quantity and price dynamics.

This dual role of the worker-managers, as producers and at the same time consumers, has been implicitly recognized in several models of the labour-managed firms such as Sen (1966) where the firm attempts to directly maximize the utility of the members in consumption and leisure, and Domar (1966) where an income-per-member-maximizing cooperative faces an internal labour supply constraint. However, on account of the partial equilibrium nature of these analyses, the significance and implications of the interaction of these two facets of worker behaviour have not been fully appreciated.

Our model, therefore, adopts an explicit general equilibrium framework, in which we allow non-Walrasian trades to be conducted. In section 2 we assume, in keeping with the quantity-rationing paradigm, that quantities adjust faster than prices. This reflects the stylized fact that in the short run, in most industries, firms react to changes in demand by initially adjusting quantities (i.e. production), but adjust prices only infrequently in response to changes in demand perceived to be of a permanent nature. In section 3 we proceed to develop the analysis of the existence of equilibrium, and in section 4 we demonstrate its "temporary" stability, by considering a quantity tâtonnement mechanism. In section 5 we show that the long-run price dynamics imply that the equilibrium so established is unstable as soon as prices become free to adjust. This leads in one case to an inflation-spiral, in another case to a deflation-collapse of the economy. In the sixth section it is shown how the "simple" indexation of fixed costs (rents, or interest payments for example) to the rate of inflation eliminates this instability but does not, by itself, result in efficiency. Finally, a proposal which we refer to as "progressive rent indexation" is presented which will guide our labour-managed economy towards full employment and price stability.

2. The Model

We assume that the economy consists of one firm and one consumer-worker. This is not a restriction of generality since the analysis could easily be extended to the case of having m identical firms and n identical consumers. However, setting m = n = 1 avoids an otherwise more complicated notation and allows us to represent the whole analysis graphically which will be very instructive.

2.1 Firm's Behaviour

The firm produces a composite consumption good using labour by means of a differentiable production technology $c = f(l)$ with $f' > 0$, $f'' < 0$, $f(0) = 0$ and $f'(0) = \infty$. It has to pay a fixed rent r for the use of other inputs the level of which is fixed throughout the period under consideration. For given output price p, the firm may observe constraints on consumer goods demand, $\bar{c}$, and on labour supply, $\bar{l}$. The firm's objective is to maximize value-added per working hour, i.e. $V = [pf(l) - r]/l$. Since p cannot be influenced by the firm, this amounts to the same as maximizing real value-added per hour, i.e.

$$\max \frac{f(l) - \frac{r}{p}}{l} =: \frac{V}{p}\left(\frac{r}{p}, l\right)$$

$$\text{s.t.} \quad \text{(i)} \quad l \geq 0$$

$$\text{(ii)} \quad l \leq \bar{l}$$

$$\text{(iii)} \quad f(l) \leq \bar{c}$$

The solution to the program yields the firm's effective labour demand $l^d(\frac{r}{p},\bar{c},\bar{l})$ and its effective goods supply $c^s(\frac{r}{p},\bar{c},\bar{l}) = f(l^d(\frac{r}{p},\bar{c},\bar{l}))$. Denoting with $l^{d*}(\frac{r}{p})$ and $c^{s*}(\frac{r}{p})$ the firm's unconstrained transaction offers (i.e. when (ii) and (iii) of the above problem are deleted) and setting $\bar{\bar{l}} := \min\{\bar{l}, f^{-1}(\bar{c})\}$, the firm's effective labour demand is evidently

$$l^d(\frac{r}{p},\bar{\bar{l}}) = \begin{cases} \min\{l^{d*}(\frac{r}{p}),\bar{\bar{l}}\}, & \text{if } \bar{\bar{l}} \geq f^{-1}(\frac{r}{p}) \\ 0, & \text{if } \bar{\bar{l}} < f^{-1}(\frac{r}{p}) \end{cases}$$

Figure 1 illustrates the firm's decision problem.

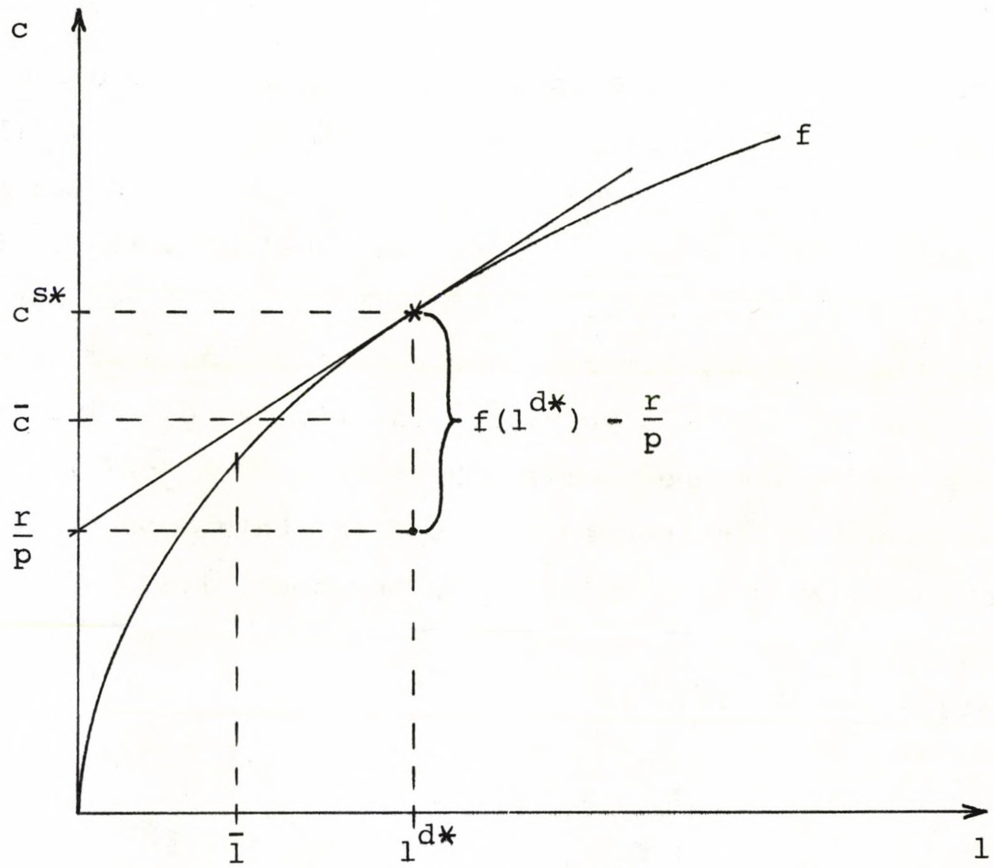

Figure 1

The real value-added associated with the firm's unconstrained decision is obviously

$$\frac{V}{p}\left(\frac{r}{p}\right) = \frac{f\left(l^{d*}\left(\frac{r}{p}\right)\right) - \frac{r}{p}}{l^{d*}\left(\frac{r}{p}\right)}$$

It is immediate to see that

$$\frac{dl^{d*}}{d\left(\frac{r}{p}\right)} > 0 \ , \quad \frac{d\left(\frac{V}{p}\right)}{d\left(\frac{r}{p}\right)} < 0$$

2.2 Consumer's Behaviour

The consumer receives a fixed rent income r and he can engage to work a number of hours l for which he then receives the labour income Vl, for given value-added per hour V. This means that, to the consumer, V is an exogenously given datum. Possibly observing constraints on consumer goods supply, $\bar{c}$, and on labour demand, $\bar{l}$, the consumer then has to solve the problem:

$$\begin{aligned}
&\max\ u(c,l) \\
&\text{s.t.} \quad \text{(i)} \quad c \geq 0 \\
&\qquad \text{(ii)} \quad 0 \leq l \leq L \\
&\qquad \text{(iii)} \quad pc \leq Vl + r \\
&\qquad \text{(iv)} \quad c \leq \bar{c} \\
&\qquad \text{(v)} \quad l \leq \bar{l}
\end{aligned}$$

where $u(c,l) = U(c, L - l)$ is a utility function which is increasing in c, decreasing in l, and U is strictly quasi-concave; L denotes the upper bound of hours the consumer can physically work.

The solution to the above problem yields the consumer's effective labour supply $l^s\left(\frac{V}{p},\frac{r}{p},\bar{c},\bar{l}\right)$ and his effective consumption goods demand $c^d\left(\frac{V}{p},\frac{r}{p},\bar{c},\bar{l}\right)$, the latter being equal to $\frac{V}{p}\, l^s\left(\frac{V}{p},\frac{r}{p},\bar{c},\bar{l}\right) + \frac{r}{p}$, by the assumptions on the consumer's utility function. If $l^{s*}(\frac{V}{p},\frac{r}{p})$ and $c^{d*}(\frac{V}{p},\frac{r}{p})$ denote the consumer's unconstrained labour supply and goods demand (i.e. when (iv) and (v) in the above problem are deleted), then quasi-concavity of U implies

$$l^s(\frac{V}{p},\frac{r}{p},\bar{c},\bar{l}) = \min \{l^{s*}(\frac{V}{p},\frac{r}{p}),\ \bar{l},\ \max \{0, \frac{\bar{c} - \frac{r}{p}}{\frac{V}{p}}\}$$

and $c^{d*}(\frac{V}{p},\frac{r}{p}) = \frac{V}{p}\ l^{d*}(\frac{V}{p},\frac{r}{p}) + \frac{r}{p}$.

The consumer's decision problem is shown in Figure 2.

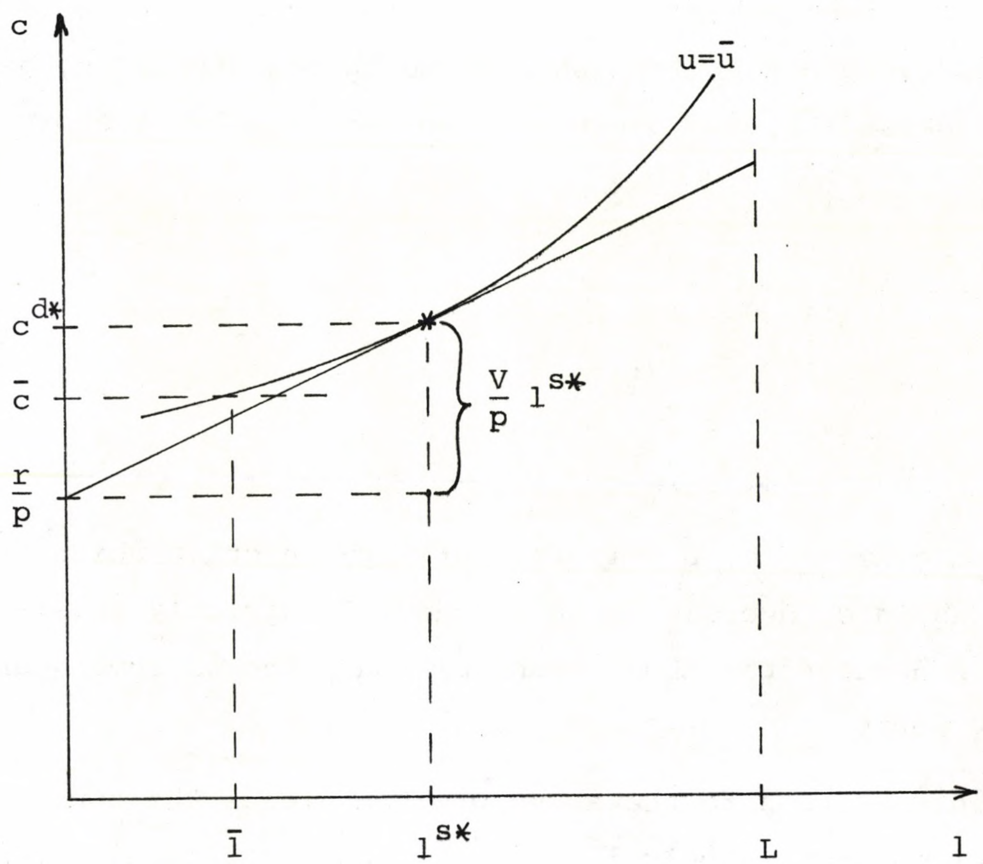

Figure 2

It will prove very useful below to work with the consumer's offer curve for given $\frac{r}{p}$, which shows how households' labour supply and consumer goods demand is varied as $\frac{V}{p}$ is varied, i.e.

$$H(\frac{r}{p}) := \{(l^{s*}(\frac{V}{p},\frac{r}{p}),\ c^{d*}(\frac{V}{p},\frac{r}{p})) \mid \frac{V}{p} \geq 0\}$$

Two possible shapes of $H(\frac{r}{p})$ are shown in Figure 3.

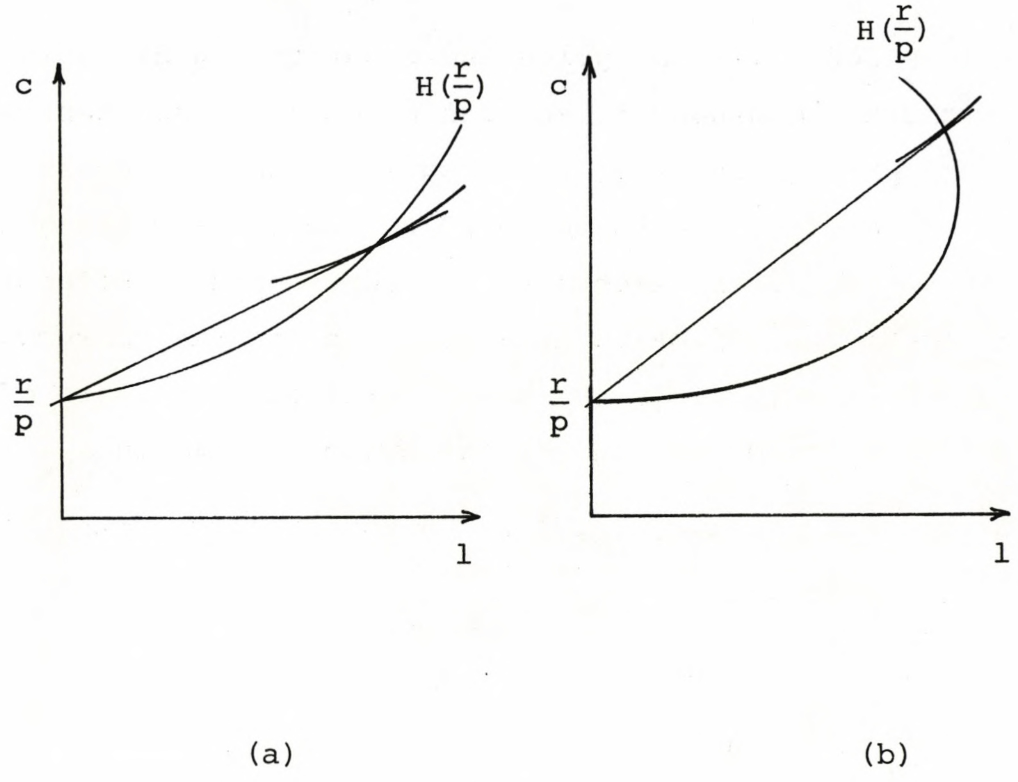

Figure 3

Assuming furthermore that $u(0,0) < u(c,l)$ whenever $c > 0$ and $0 \leq l < L$, one gets that $l^{s*}(\frac{V}{p},0) > 0$ and $c^{d*}(\frac{V}{p},0) > 0$ whenever

$\frac{V}{p} > r$. This implies in particular that the slope of the offer curve H(0) in (l,c) = (0,0) is finite (more precisely: zero). We will use this fact below.

3. Equilibrium

We look for a list of price and quantity signals which lead the firm and the consumer to actions which are consistent with each other. More precisely, this requires that the goods price p, the rent level r, the value-added per hour V and the quantity constraints $\bar{c}$ and $\bar{l}$ are such that the corresponding effective supplies equal the effective demands, both for the consumption good and for labour. This is indeed verified in a state of equilibrium as introduced in the following definition.

Definition. A list $(\bar{l},\bar{c},p,r,V)$ is an equilibrium if the following conditions hold.

(i) $l^{s*}(\frac{V}{p},\frac{r}{p}) - \bar{l} \geq 0$

(ii) $l^{d*}(\frac{r}{p}) - \bar{l} \geq 0$

(iii) $[\bar{l}^{s*}(\frac{V}{p},\frac{r}{p}) - \bar{l}][\bar{l}^{d*}(\frac{r}{p}) - \bar{l}] = 0$

(iv) $\frac{V}{p} = \max\{0, \frac{\bar{c} - \frac{r}{p}}{\bar{l}}\}$

(v) $\bar{c} = f(\bar{l})$

An equilibrium is called <u>unconstrained</u> if conditions (i) and (ii) are fulfilled with equality. Otherwise it is an <u>equilibrium with rationing</u>.

In an equilibrium, the quantity constraints $\bar{l}$ and $\bar{c}$ are also the quantities transacted between the firm and the consumer. Conditions (i) and (ii) ensure that these quantities are consistent with the principle of voluntariness of trade. (iii) is an efficiency requirement and states that at most one market side is rationed. (iv) and (v) ensure the consistency of the equilibrium allocation.

We next illustrate the notion of equilibrium in distinguishing four different cases.

(1) <u>Unconstrained equilibrium</u>

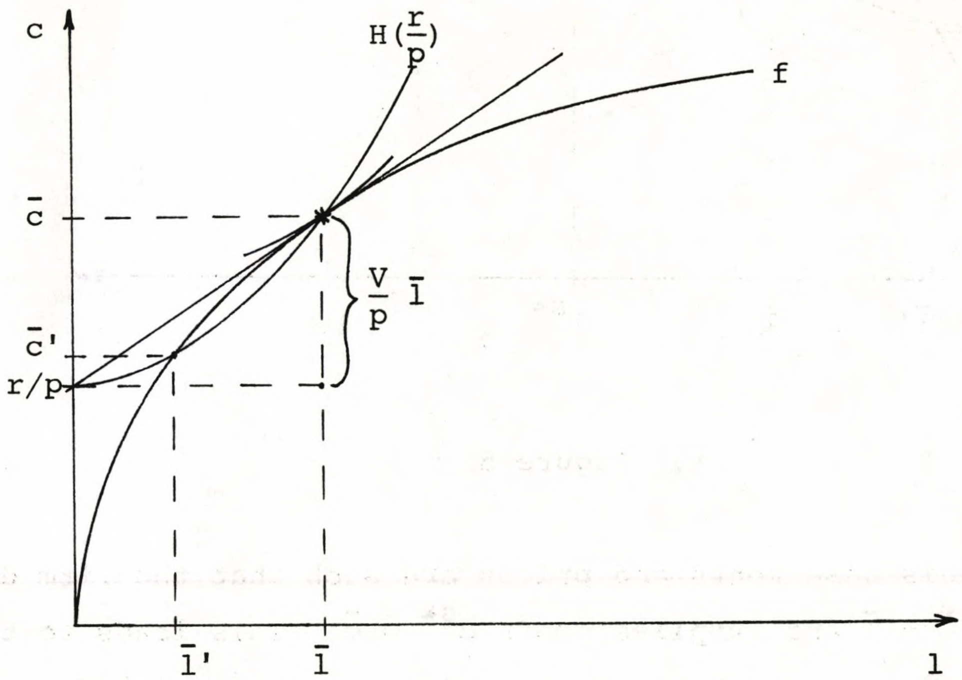

Figure 4

In Fig. 4 $(\bar{l},\bar{c})$ represents an unconstrained equilibrium. Indeed, $\bar{l} = l^{d*}(\frac{r}{p}) = l^{s*}(\frac{V}{p},\frac{r}{p})$. Note, however, that $(\bar{l}',\bar{c}')$ is an equilibrium (with rationing), too.

(2) Equilibrium with consumer's rationing

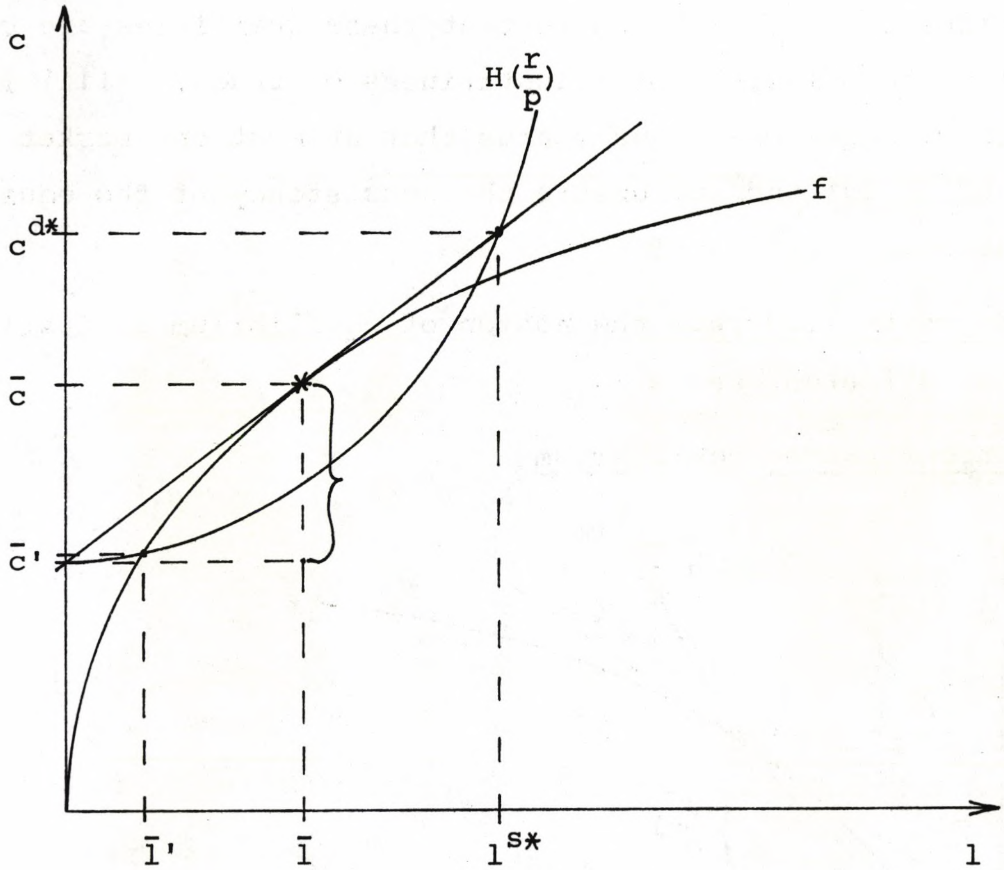

Figure 5

In this case rents and prices are such that the firm demands labour $l^{d*} = \bar{l}$ and supplies goods $c^{s*} = \bar{c}$. This leads to the real value-added $\frac{V}{p}$ at which the consumer's unconstrained labour supply is $l^{s*} > \bar{l}$, and unconstrained goods demand is $c^{d*} > \bar{c}$.

(3) Equilibrium with firm's rationing

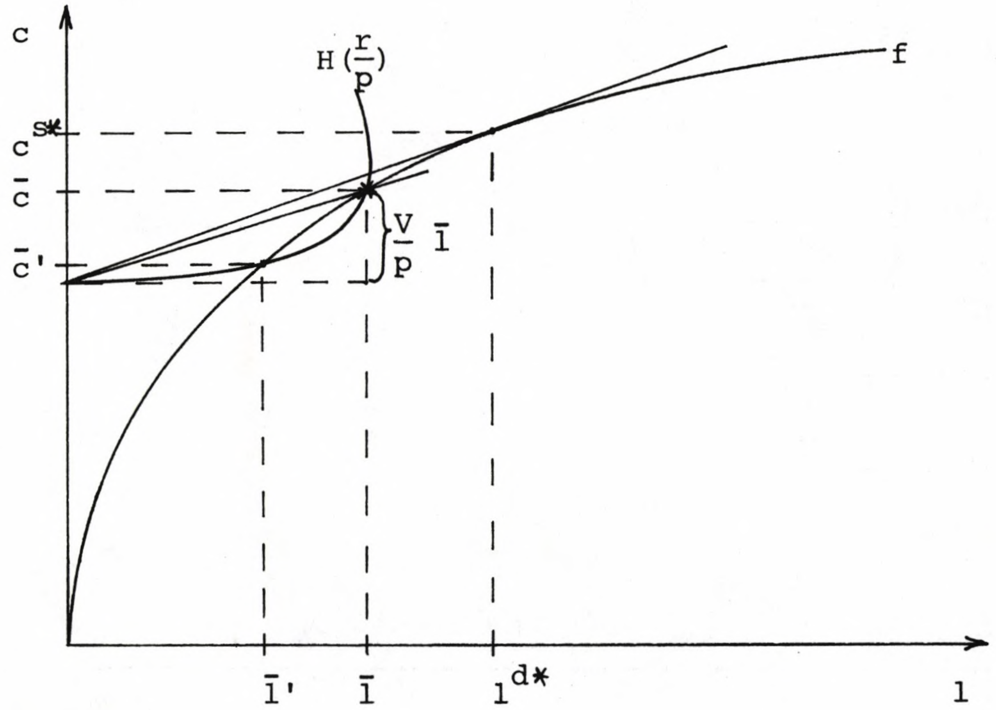

Figure 6

In $(\bar{l},\bar{c})$ the consumer supplies $l^{s*} = \bar{l}$ and demands $c^{d*} = \bar{c}$ whereas the firm's unconstrained labour demand is $l^{d*} > \bar{l}$ and its unconstrained goods supply is $c^{s*} > \bar{c}$. Note that in contrast to the previous case, real rents are now "too high" relative to their level in the unconstrained equilibrium of case (1).

(4) Trivial equilibrium

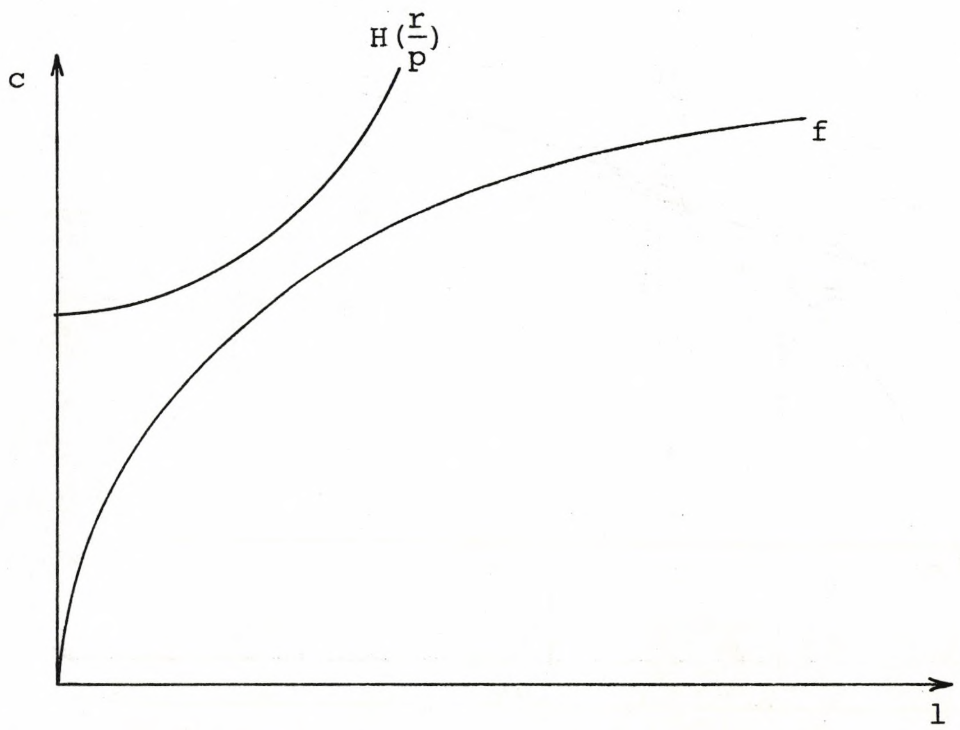

Figure 7

In this case the only equilibrium is the trivial equilibrium $(\bar{l},\bar{c}) = (0,0)$.

In each of the situations (1) - (3) there exist two non-trivial equilibria (other than the trivial equilibrium at (0,0)), namely $(\bar{l},\bar{c})$ and $(\bar{l}',\bar{c}')$. However, as we will show below, only the equilibria $(\bar{l},\bar{c})$ are (locally) stable in the sense that they can be obtained as limit points of a suitable quantity tâtonnement process. Therefore, we concentrate in the following on the (welfare superior) equilibria $(\bar{l},\bar{c})$.

From Figures 4-7 it is evident that a non-trivial equilibrium exists if and only if

(1) $H(\frac{r}{p}) \cap f \neq \emptyset$

where we have written f instead of graph (f) by a slight abuse of notation. Since $H(0) \cap f \neq \emptyset$ and since the slope of $H(0)$ in $(l,c) = (0,0)$ is finite as we established in the discussion of the consumer's behaviour, a continuity argument ensures the existence of $\frac{r}{p} > 0$ such that (1) holds. More precisely, the relation between the level of the real rent and the associated equilibrium employment is shown in Fig. 8, where l^* and $(\frac{r}{p})^*$ denote the values belonging to an unconstrained equilibrium. From this it is obvious that employment is highest if the equilibrium is unconstrained. For $\frac{r}{p} > (\overline{\frac{r}{p}})$ on the other hand, economic activity collapses and employment is zero.

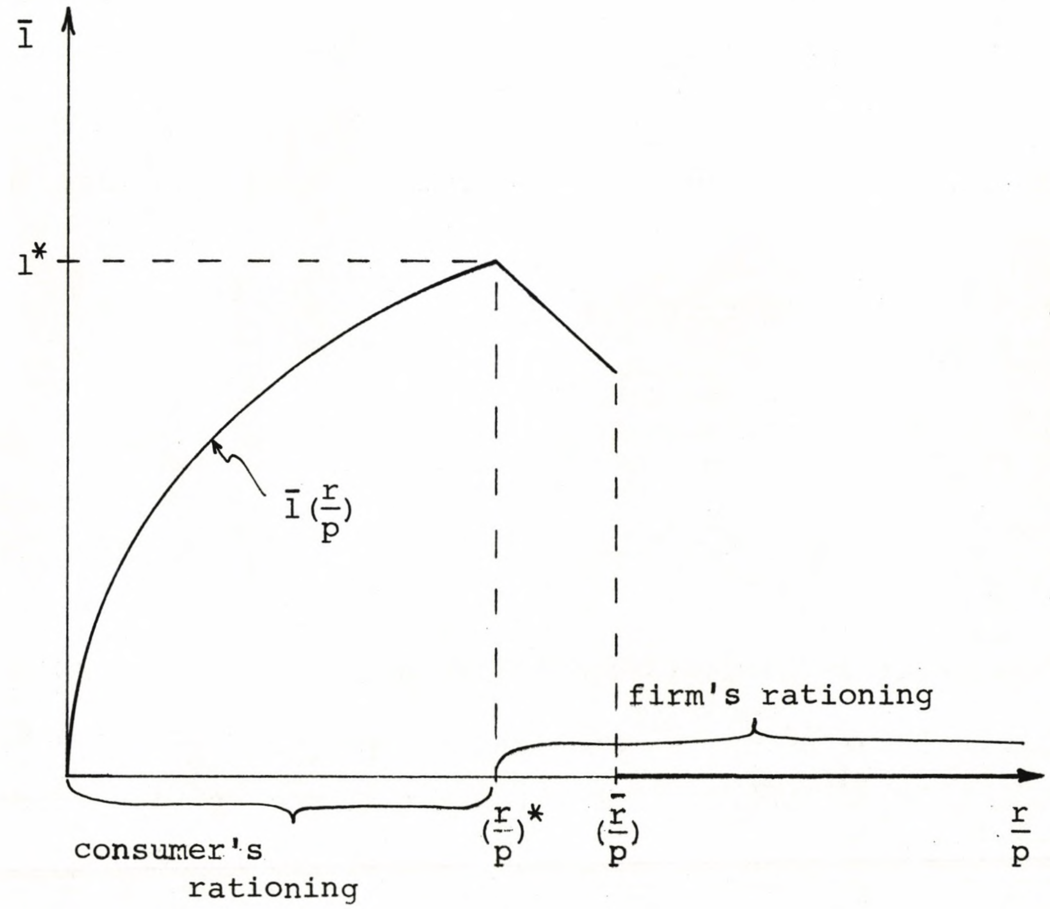

Figure 8

4. Quantity Tâtonnement

The equilibrium notion introduced above describes consistent allocations but we have not said so far how such an allocation can actually be reached. To fill this gap, we now distinguish the signals $\bar{l}$, $\bar{c}$, p, r and V so that we keep p and r fixed (as before) but we now start with some (any) $\bar{l}_o \geq 0$ and with associated $\bar{c}_o$ and V_o. If $(\bar{l}_o, \bar{c}_o, p, r, V_o)$ is not an equilibrium, we want to find $(\bar{l}_1, \bar{c}_1 V_1)$, $(\bar{l}_2, \bar{c}_2, V_2)$, . . ., $(\bar{l}_n, \bar{c}_n, V_n)$, . . . such that $(\bar{l}_n, \bar{c}_n, V_n)$ arises as an economically meaningful reaction of economic agents from the previously quoted signal $(\bar{l}_{n-1}, \bar{c}_{n-1}, p, r, V_{n-1})$ and such that $(\bar{l}_n, \bar{c}_n, V_n) \to (\bar{l}, \bar{c}, V)$ where $(\bar{l}, \bar{c}, p, r, V)$ is an equilibrium. In other words, we will define a quantity tâtonnement process which converges to some equilibrium.

Suppose the firm receives the signal $l_o \geq 0$ as an upper bound for contracting labour services. Its effective labour demand then is

$$l_1^d = \begin{cases} \min \{l_o, \ l^{d*}(\frac{r}{p}) & , \text{ if } l_o^d \geq f^{-1}(\frac{r}{p}) \\ 0 & , \text{ if } l_o^d < f^{-1}(\frac{r}{p}) \end{cases}$$

which gives rise to the real value-added per hour

$$\frac{V_1}{p} = \max \{\frac{f(l_1^d) - \frac{r}{p}}{l^d}, 0\}$$

This value is communicated to the consumer who accordingly determines his unconstrained labour supply $l^{s*}(\frac{V_1}{p}, \frac{r}{p})$. The resulting new upper bound for contracting labour services then is

$$l_1 = \min \{l^{d*}(\frac{r}{p}), \ l^{s*}(\frac{V_1}{p}, \frac{r}{p})\}$$

Replacing now l_o by l_1 and repeating the same process, a value

l_2 is obtained, which in turn yields l_3 and so on. Altogether, this defines a sequence $\{l_n, c_n, r, p, V_n\}_n$ with $c_n = f(l_n)$ and $V_n = \max\{[f(l_n^d) - \frac{r}{p}]/l_n^d, 0\}$

In order to illustrate the process just described, consider Figure 9. There, $l^{d*}(\frac{r}{p}) > \bar{l}$ and $\bar{l}' < l_o < \bar{l}$. Thus $l_1^d = l_o < l^{s*}(\frac{V_1}{p}, \frac{r}{p})$ and hence $l_1 = \min\{l^{d*}(\frac{r}{p}), l^{s*}(\frac{V_1}{p}, \frac{r}{p})\} = l^{s*}(\frac{V_1}{p}, \frac{r}{p}) > l_o$. On the other hand, $l_1 < \bar{l}$ since $l^{s*}(\frac{V_1}{p}, \frac{r}{p}) < l^{s*}(\frac{\bar{c} - \frac{r}{p}}{\bar{l}}, \frac{r}{p})$. It is thus easy to see that $l_o, l_1, \ldots, l_n, \ldots \to \bar{l}$.

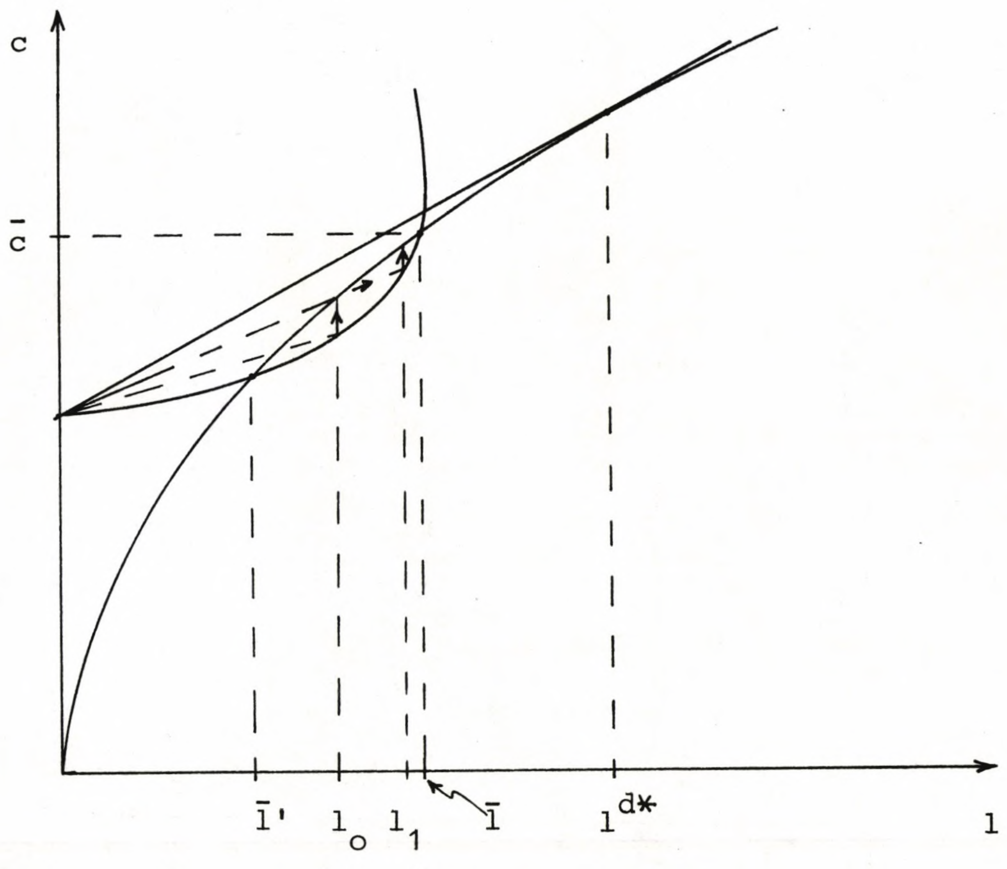

Figure 9

Next, if $0 \leq l_o < \bar{l}'$, then $l^{s*}(\frac{V_1}{p},\frac{r}{p}) < l^{d*}(\frac{r}{p})$ and hence $l_1 < l_o$. It follows easily that $l_n \to 0$.

Finally, if $l_o > \bar{l}$, then again $l^{s*}(\frac{V_1}{p},\frac{r}{p}) < l^{d*}(\frac{r}{p})$ and hence $l_1 < l_o$ but $l_1 > \bar{l}$. Thus in this case one has $l_n \to \bar{l}$.

In Figure 9 the offer curve $H(\frac{r}{p})$ was positively sloped in the point $(\bar{l},\bar{c})$. However, a situation with a backward bending offer curve is shown in Figure 10. There the sequence $\{l_n\}$ is not monotone but it oscillates around the equilibrium. However, also in this case, $\{l_n\}$ is convergent.

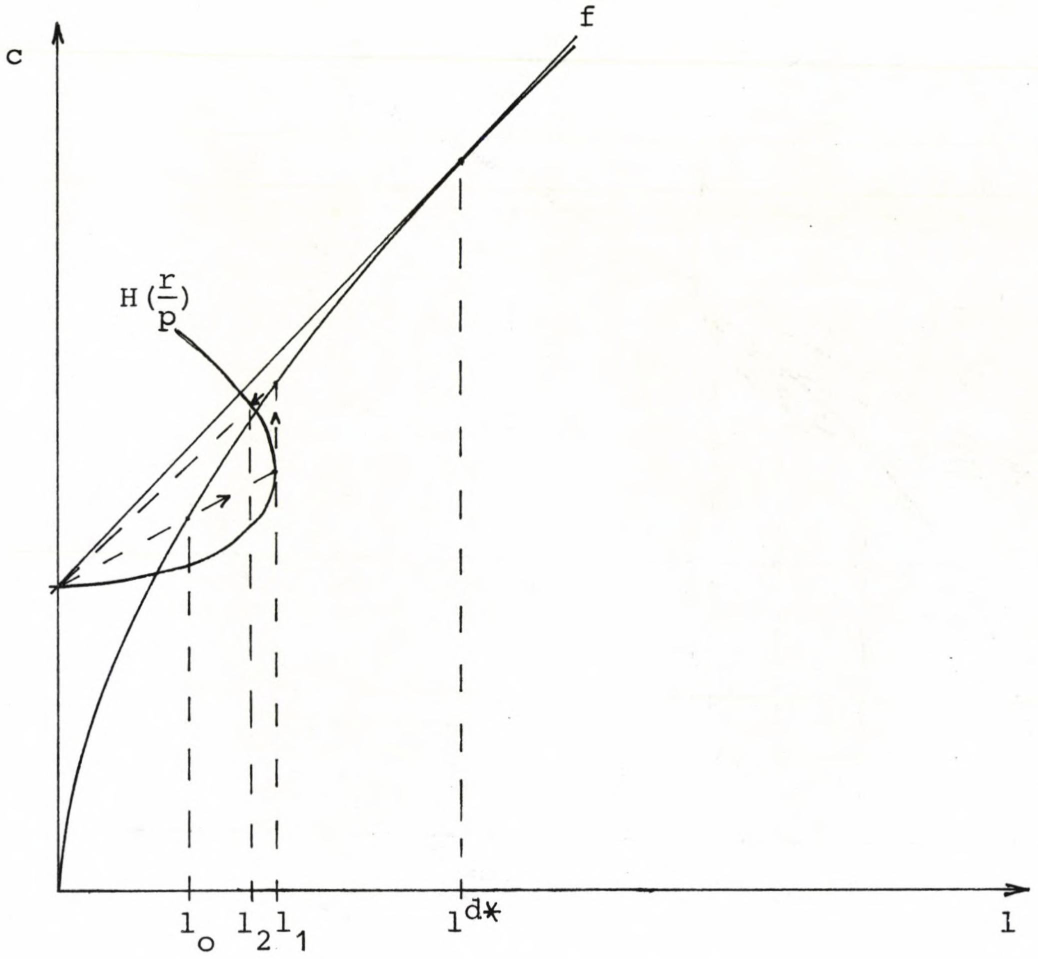

Figure 10

Summarizing the dynamics in the case of equilibrium with firm's rationing (Figs. 9, 10) one has that $(\bar{l},\bar{c})$ is (locally) stable, i.e. for $l_o > \bar{l}'$, whereas $(\bar{l}',\bar{c}')$ is unstable and $(l,c) = (0,0)$ is again locally stable (for $l_o < \bar{l}'$). The same kind of analysis just performed shows that this result holds for the other types of equilibria as well. Whenever $\frac{r}{p}$ is such that there exists a non-trivial equilibrium, then $l_n \to \bar{l}$ if $l_o > \bar{l}'$ and $l_n \to 0$ if $l_o < \bar{l}'$. If there exists no non-trivial equilibrium, then $l_n \to 0$ whatever is the value l_o.

Thus in order that our labour-managed economy works at all, its activity must be pushed to a sufficiently high level, i.e. in our model to an initiating value l_o beyond the critical value $\bar{l}'$.

5. Price Adjustment

So far our analysis has been performed as if the goods price p and the rent level r were exogenously fixed parameters. We described allocations consistent with the values of these parameters. This led us to the notion of equilibrium (with rationing). Now, if p and r are such that they are not compatible with unconstrained equilibrium, then either the firm or the consumer would like to trade in excess of what it or he (or she) actually transacts. But this fact is likely to induce price changes. A firm that perceives a permanent excess demand for its output is tempted to increase the price for its good, thus increasing real value-added per hour. A lack of demand on the other hand is likely to induce the firm to reduce the price.

In order to embody this phenomenon in our analysis, we now think in the following time structure. Time is divided into periods of equal length such that in each period t the goods price remains fixed at value p_t. For this price and a time-independent rent level r, the economy reaches an equilibrium by means of a quantity tâtonnement process as described in the previous section. We assume that $l_o > \bar{l}'$ so that always the stable non-trivial equilibrium occurs whenever p_t and r are such that it exists. At the equilibrium, trades take place. If unconstrained demand and supply for the consumption good do not match, then the price is revised at the end of the old or the beginning of the new period. The revised price p_{t+1} remains fixed in period t+1, trades take place, and so on. In this way a sequence of prices and associated allocations is formed the properties of which can be studied.

As to the price adjustment rule, we follow the traditional assumption that p increases whenever there is excess demand and p decreases in the case of excess supply. Formally,

$$p_{t+1} = p_t + \psi(c_t^{d*} - c_t^{s*})$$

with ψ: $R \to R$ monotone increasing, and $\psi(x) \neq 0$ if and only if $x \neq 0$.[2] In order to see the consequences of these assumptions, we consider again Figure 8. There, for each real rent level $\frac{r}{p}$ is shown the associated employment level $\bar{l}$. Suppose now that in period t p_t is such that $\frac{r}{p_t} < (\frac{r}{p})^*$. Then there is excess demand for the consumption good and hence $p_{t+1} > p_t$. But then $\frac{r}{p_{t+1}} < \frac{r}{p_t}$, and since $\psi(.)$ is increasing, we get galloping inflation. On the other hand, if $\frac{r}{p_t} > (\frac{r}{p})^*$, then $p_{t+1} < p_t$ and $\frac{r}{p_{t+1}} > \frac{r}{p_t}$. Again since $\psi(.)$ is increasing, the real rent crosses the "collapse" level $(\frac{\bar{r}}{p})$ in a finite number of periods and economic activity breaks down. Thus, with price adjustment, our labour-managed economy is highly unstable. This is summarized in Figure 11.

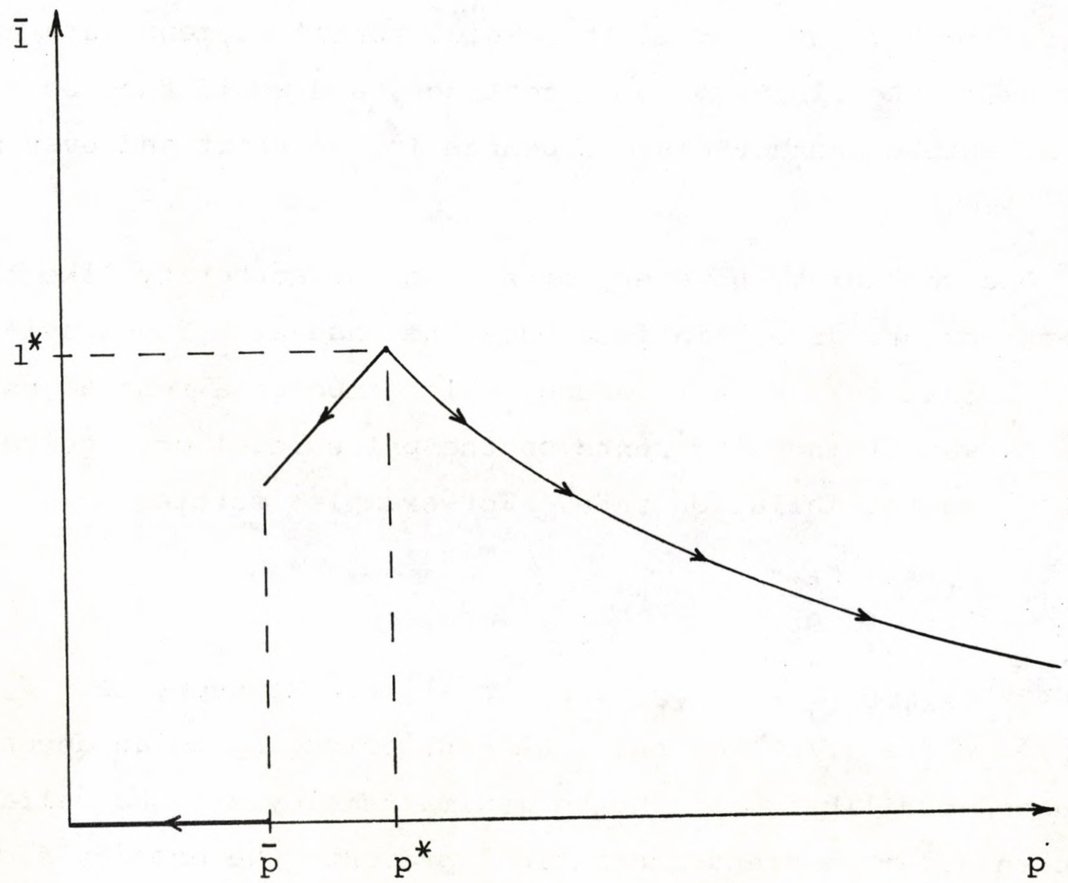

Figure 11

6. Rent Indexation

The result of the foregoing analysis of price adjustment is alarming, indeed. If prices are free to vary but rents are kept fixed, then the economy cannot escape a disastrous end. Of course, the assumption of rents remaining unchanged is unnecessarily restrictive and in fact we will give it up now; but one should keep in mind that rent adjustment seems to arise in a far less natural way than price adjustment. The reason is that excess demands or supplies are easily to be observed on the goods market, giving a guide to price adjustment. For the rents however there does not necessarily exist something like "the" market for rents, and even if there did, rental payments are usually stipulated in terms of a contract, and would thus be rather inflexible and not easy to change in the short and even medium term.

One can think, however, of a superior authority like the government or, as has in fact been the case with Yugoslavia, the International Monetary Fund, which imposes a rent adjustment by way of indexing rents on the price level or, equivalently, on the inflation rate. For example, setting

$$r_{t+1} := r_t \cdot \frac{p_{t+1}}{p_t}$$

ensures $r_{t+1}/p_{t+1} = r_t/p_t =: \tilde{r}$ for all t. However, if $\tilde{r} \neq (r/p)^*$, where $(r/p)^*$ is the real rent belonging to an unconstrained equilibrium and hence maximal employment and welfare, then this "simple rent indexation" prevents the economy from achieving its efficient level of operation. In order to avoid this, a "progressive rent indexation" to be explained below has to be implemented.

Denote with

$$i_t := \frac{p_t}{p_{t-1}} - 1$$

the inflation rate in period t. Then we set

(2) $r_t := \phi(i_t) r_{t-1}$

where $\phi: [-1, \infty[\rightarrow [0, \infty[$ is a continuous function with

$$\phi(i_t) \begin{cases} = 1 & , \text{ if } i_t = 0 \\ > 1 + i_t & , \text{ if } i_t > 0 \\ < 1 + i_t & , \text{ if } i_t < 0 \end{cases}$$

For example consider r_{t-1} and p_{t-1} such that $(r_{t-1}/p_{t-1}) < (r/p)^*$. Then $p_t > p_{t-1}$ and hence $i_t > 0$. Furthermore,

$$\frac{r_t}{p_t} > \frac{(1 + i_t)r_{t-1}}{p_t} = \frac{r_{t-1}}{p_{t-1}}$$

Hence the too low real rent (r_{t-1}/p_{t-1}) becomes increased in spite of the fact that p_t is bigger than p_{t-1}. As an example, consider

$$\phi(i_t) = (1 + i_t)^\alpha$$

For $\alpha > 1$ rent indexation is "progressive" whereas for $\alpha = 1$ it is "simple". For $\alpha = 0$ there is no rent adjustment at all.

Finally consider

(3) $\quad r_t = i_t + c$

where c is some positive constant. This is the IMF inspired scheme referred to in the introduction. (Evidently it is not of the shape suggested by (2)). The IMF scheme is intended to increase the rent level if the price level is too high and, as a consequence, the level of real rent is too low. Though this intention is fulfilled in a first shot sense, it is easy to see that this initial effect is soon reversed and that the underlying instability of the system will reemerge. Indeed, rewrite (3) as

$$\frac{r_t}{p_t} = \frac{1 - \frac{p_{t-1}}{p_t}}{p_{t-1}} + \frac{c}{p_t}$$

If prices are steadily increasing, it is clear that both terms on the right-hand side must fall, and hence the same holds for $\frac{r_t}{p_t}$. Thus, since in the case for which the IMF scheme is designed, the real rent level is smaller than the value $\left(\frac{r}{p}\right)^*$ associated with unconstrained equilibrium, the real rents diverge from $\left(\frac{r}{p}\right)^*$ instead of approaching it. Thus the IMF scheme fails to lead the economy to the efficient level of operation.

Conclusion

In this paper we have considered a simple macroeconomic model of a labour-managed economy basing our approach on the general equilibrium quantity rationing paradigm. Most previous analysis of labour-managed systems have been based upon a partial equilibrium methodology (with some notable exceptions),[3] and, although some of those studies have touched on the issues addressed in this paper, it has required a general equilibrium framework to tease out the full implications of the systemic features of labour-management for such macroeconomic variables as inflation and employment.

Using this approach we have been able to demonstrate the existence of various types of temporary equilibria with rationing. Those, for example, where firms are rationed in their ability to hire as much labour as they would wish since, in the fix-price short run, real rents are "too high", and, being distributed as income, reduce the incentive for workers, as members of households, to supply the labour which, as enterprise managers, they seek to engage. In another case, real rents are too low with consequent rationing of consumers, rather than firms, for analogous reasons. Once a short-run equilibrium is established firms are then free to consider the divergence of their actual transactions with notional market supplies and demands and adjust prices accordingly in preparation for the next period's quantity tâtonnement under the newly established prices. The resulting price dynamics are shown to be perverse and highly unstable, giving rise to either inflation, a persistent reduction in real rents and in employment, or conversely in deflation, and a persistent increase in real rents which threatens economic collapse.

However, by adopting a suitable "progressive rent indexation" scheme, these perverse price dynamics can be turned around so as to guide the economy to its full employment equilibrium and eliminate both inflationary and deflationary tendencies.

Finally, we have shown that the particular indexation scheme suggested by the IMF for Yugoslavia is unable to achieve these effects and would therefore require a modification; for example along the lines that we have suggested in this paper.

Footnotes

1. Currently (1st quarter, 1985) around 60%. For more details of the Yugoslav stabilization programme see OECD (1984).

2. Note that $\psi(c_t^{d*} - c_t^{s*}) = \psi\{(c_t^{d*} - \bar{c}_t) - (c_t^{s*} - \bar{c}_t)\}$ and that by the short-sided rule implicit in the definition of equilibrium at least one of the terms $(c_t^{d*} - \bar{c}_t)$ and $(c_t^{s*} - \bar{c}_t)$ is zero. Thus it is always clear to firms whether they should raise or lower the price.

3. See e.g. Drèze (1976, 1983), and also Vanek (1970).

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