

Konverzijom US\$ 600.000.— u devizu n/Stockhom (Skr) i US\$ 300.000.— u devizu n/Frankfurt (DM) iscrpit ćemo sredstva raspoloživa u Amsterdamu. Na tim konverzijama ostvarit ćemo dobit od 1,04% i 0,2%, respektivno.

Preglednosti radi sačinjena je prethodna tabela na osnovici elemenata optimalnog rješenja.

Realizacijom svih valutnih transakcija predviđenim optimalnim rješenjem za raspoloživih US\$ 2,100.000.— kupit ćemo više vrsta valuta (Skr, Bfrs, Lit, DM) i tim kupovinama ostvarit dobit u vrijednosti od US\$ 57.800.— To predstavlja 2,71/21% od angažiranih sredstava i svaka druga kombinacija valutnih transakcija dala bi manji postotak dobiti.

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THE PATTERN OF INFLATION UNDER PRICE CONTROLS

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1. The Problem

In their recent book (2) Dirlam and Plummer advanced an extremely interesting hypothesis purporting to explain the seemingly paradoxical relationship between the rate of growth of the social product and the rate of price increase in the Yugoslav economy. It has been empirically established that an increase in the rate of growth of the social product had been systematically accompanied by a decline in the rate of inflation and vice versa, contrary to what one might expect on the basis of both macroeconomic and microeconomic considerations. Other attempts to explain this unexpected

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relationship (3) have relied on the more conventional arguments based on the behavior of average cost and resulting economies of scale. It has been argued that in the stage of cyclical upswing enterprises move down the declining portion of the average cost curve; this, of course, implies a reduction of average cost and the economy enjoys a tapering off of the rate of inflation as a result. The argument depends on the crucial assumption that the degree of capacity utilization is so low as to place the majority of enterprises on the declining portion of the average cost curve. Another equally important and somewhat less credible assumption is that it is the cost structure which determines the rhythm of the price movements even in the periods of cyclical booms characterized by rapidly rising aggregate demand.

The hypothesis relying exclusively on the behavior of average cost has another drawback because it does not take into account price controls, which are probably one of the essential determinants of changes in both relative prices and the general price level. This factor also divorces, at least in the short run, the observed price behavior from the underlying economic forces. An explanatory hypothesis taking an explicit account of the price controls is therefore more than welcome. The Dirlam-Plummer argument relies heavily on this hypothesis. The purpose of this article is to extend their analysis, to make more precise some of their statements and to draw some new conclusions.

2. The Dirlam — Plummer Analysis

I will follow Dirlam and Plummer in assuming an inelastic supply curve of a given product; as they rightly point out, the introduction of an elastic supply curve would add to the complexities of the analysis without adding to a more thorough understanding of the problem. The Dirlam — Plummer argument is clearly stated by means of a diagram which is, for convenience, reproduced here as Diagram 1.

Suppose, to begin with, that the demand curve is given by the downward sloping solid line in Diagram 1; its intersection with the vertical supply curve determines the equilibrium price P_1^* . Because of the price controls the actual and observed price is $P_1 < P_1^*$. At the price P_1 demand exceeds supply and a part of demand, equal to AB, remains unsatisfied. Suppose now that general economic growth causes an increase of demand for that particular product so that the demand curve shifts upward as shown by the dashed line. The unsatisfied demand increases from AB to AF, and a high pressure towards increase of the controlled price, P_1 , develops. Supposing the price authority behaves in such a way as to increase the controlled price by an amount necessary to keep the unsatisfied demand at the old level (AB), the new controlled (and observed) price will be P_2 . Indeed, geometrical considerations make it clear that AB is equal to DC, and this was precisely the condition on the basis of which the price P_2 was determined. It should be emphasized that the way the diagram is drawn implies that the increase in the observed price is exactly equal (in absolute terms) to the increase in the equilibrium price ($AD = BC = GE$). The equality results

from the assumption that the price authority keeps the amount of shortage at the same level ($AB = DC$). Since $P_1 < P_1^*$, the percentage rate of increase in the observed price *always exceeds* that of the equilibrium price. Therefore, the Dirlam — Plummer conclusion that »... the *percentage rate* of increase

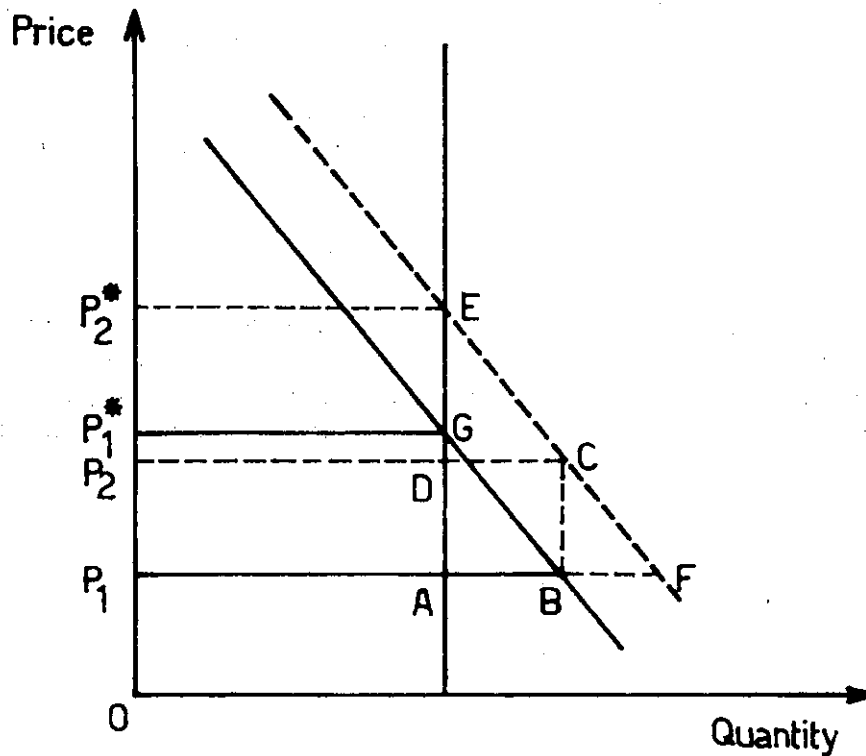


Diagram 1

in the controlled price could be greater than, equal to or less than the *percentage rate* of increase in the equilibrium price« (2, p. 215) (italics theirs) is somewhat misleading because it does not correspond to the way the diagram was drawn. If one takes into account that Dirlam and Plummer actually assume that the price authority raises »... the price only by the amount necessary to insure that shortages do not get any worse than they already are« (2, p. 215) then the above argument is even more strengthened. For, whenever the new shortage is actually less than the old one ($DC < AB$), the increase in the observed price is actually greater in absolute terms than the increase in the equilibrium price and this, of course, can only increase the differences in the respective percentage rates of change.

This conclusion has a disturbing feature. Increases in demand and correspondings shifts in the demand schedule are presumably connected with an acceleration of growth of the economy. If, as shown above, this leads to an increase in the observed prices which exceeds both in absolute and in relative terms the corresponding increase in equilibrium prices, then we have not explained the Yugoslav paradox at all; instead we have developed an argument showing, perhaps in an elegant way, that in periods of high

rates of growth and rapidly rising demand we should expect an acceleration — and not a deceleration — of prices. In other words, we have explained a phenomenon which is typical of most market economies, and not a peculiarity of Yugoslavia.

The reason for this conclusion lies in the fact that Dirlan and Plummer introduced the increase in demand in the form of a parallel shift of the demand schedule. However, it is only through simultaneous change in the slope of the demand curve that one can obtain an increase in the observed price which is lower than the corresponding increase in the equilibrium price, so that a decline in the rate of inflation in periods of rapid growth could partly be explained. The problem is taken up in the next section.

3. Modification of the Dirlan — Plummer Analysis

The above problem is easily resolved once we introduce not simply a parallel shift of the demand curve, but a shift accompanied by a simultaneous change in the slope. The corresponding situation is depicted in Diagram 2. Because of a decline in the slope of the demand schedule, there is

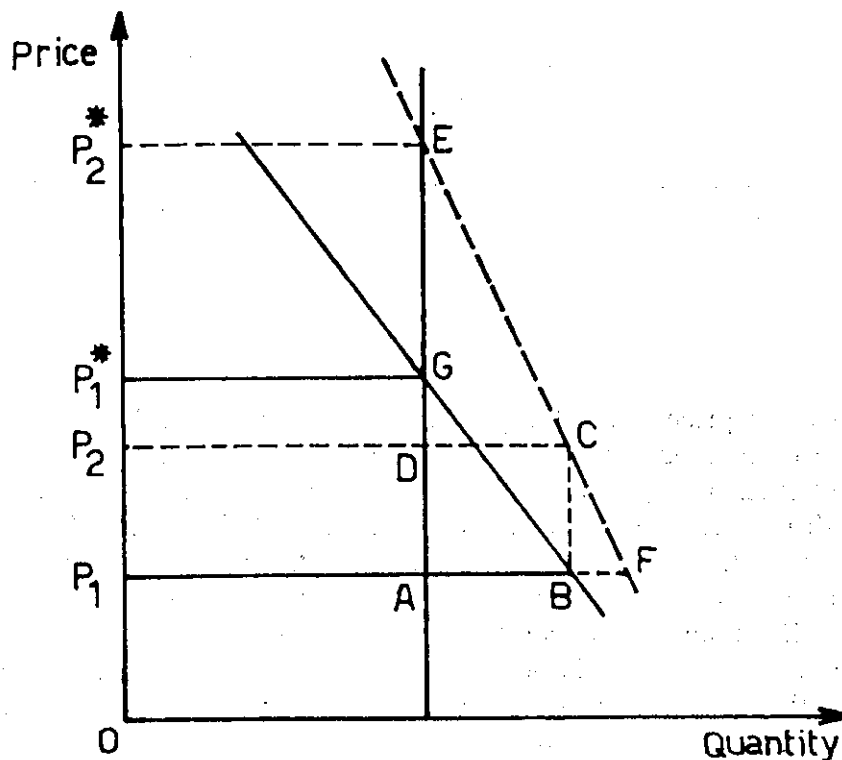


Diagram 2

a large increase in the equilibrium price. At the same time the quantity demanded becomes less sensitive to price changes, so that the amount of unsatisfied demand does not increase too much (from AB to AF), and it only takes a small increase in the controlled price ($P_2 - P_1$) to reduce it to the

old level ($AB = DC$). In this way we get the constellation we have been looking for: in the periods of rising demand, caused by an acceleration of economic growth, we obtain a relatively small increase in observed prices, and, therefore, an outcome which is at least consistent with the observed empirical relationship between the rate of growth and the rate of inflation. The outcome is decisively dependent upon the increase in the absolute value of the slope of the demand curve, i.e. upon its becoming less elastic in the neighbourhood of the old equilibrium point.

The problem examined here lends itself to a simple algebraic treatment. Let the supply and demand curves be represented by the following equations:

$$q = \bar{q} \quad (1)$$

$$p = a_1 - b_1 q, \quad b_1 > 0 \quad (2)$$

$$p = a_2 - b_2 q, \quad b_2 > 0 \quad (3)$$

where (1) represents the equation of the supply curve, \bar{q} being a fixed number, (2) represents the initial demand curve (represented in Diagram 2 by the solid line), and (3) represents the shifted demand curve (the dashed line in the diagram). The equilibrium prices are easily obtained by replacing (1) into (2), vs. (3):

$$P_1^* = a_1 - b_1 \bar{q} \quad (4a)$$

$$P_2^* = a_2 - b_2 \bar{q} \quad (4b)$$

The absolute increase in the equilibrium price is simply:

$$P_2^* - P_1^* = a_2 - a_1 - (b_2 - b_1) \bar{q} \quad (5)$$

On the other hand, it is easy to find the change in the observed price subject to the constraint that the unsatisfied demand should remain at the previous level. The amounts of the unsatisfied demands in the initial and in the subsequent situation are respectively (see Diagram 2):

$$AB = \frac{P_1^* - P_1}{b_1}, \quad DC = \frac{P_2^* - P_2}{b_2} \quad (6)$$

Setting $AB = DC$ one obtains

$$P_2 = P_2^* - \frac{b_2}{b_1} (P_1^* - P_1) \quad (7)$$

so that the subsequent observed price is expressed as a function of equilibrium prices and of the initial observed price (P_1).

On the basis of (7) one could answer the following question, directly related to the problem of an inverse relationship between the rate of inflation and the rate of growth: when will the difference between observed

prices be smaller than the difference between equilibrium prices? The question boils down to the conditions under which the following relation will be satisfied:

$$P_2^* - \frac{b_2}{b_1} (P_1^* - P_1) - P_1 < P_2^* - P_1^*$$

After simple manipulations one obtains

$$(P_1^* - P_1) \left(1 - \frac{b_2}{b_1}\right) < 0 \quad (8)$$

An algebraic proof of the previous statement (which was geometrically derived) is now obtained: the difference in observed prices will be less than the difference in equilibrium prices if inequality (8) is satisfied. Since $P_1^* - P_1 > 0$ and $b_1 > 0$, $b_2 > 0$, (8) reduces to

$$b_2 > b_1 \quad (8a)$$

The observed price will change by less than the equilibrium price if the absolute value of the slope of the shifted demand curve exceeds the absolute value of the slope of the initial demand curve. As indicated in section 2, the two changes will be equal if and only if $b_2 = b_1$, i. e. if the demand curve shifts in a parallel way.

5. Conclusions

An interesting and somewhat unexpected implication is contained in the Dirlam — Plummer hypothesis about changes in controlled prices. A deceleration of the rate of price increase in periods of business booms should be accompanied by a decline in the slope of the demand schedule if the observed prices are to change less than the equilibrium ones. Such a decline implies a reduction of the elasticity of demand in the neighbourhood of point G. The concomitant increase of monopoly could be explained in several ways. If a given increment of demand is unevenly distributed with big firms getting a proportionally higher share — a not too unrealistic assumption — the elements of monopoly in the system will become more pronounced. Another, and perhaps more appealing, explanation could be derived on the basis of a theoretical result obtained long ago by Arrow (1). In periods of rapidly increasing demand in a market the prerequisites of perfect competition cannot be met, even if they were completely fulfilled prior to the assumed demand increase. Since the supply cannot instantaneously adjust to an increase in demand, every firm acquires a sort of monopolistic position since nobody else will take over its share of demand even if it decides to raise the price somewhat.

Irrespective of the slight modifications introduced here, it should again be emphasized that the Dirlam — Plummer hypothesis is a fruitful one and that it contributes a good deal to a more thorough understanding of the price changes in a controlled market. It has given additional insight

into the workings of an economy in which institutional resistance prevents a free interplay of the forces of demand and supply.

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