On the Welfare Costs of Monopolistic Pricing

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1. Introduction

Several authors have recently attempted to assess the welfare costs of monopolistic pricing. Of interest to us here is the model of Bergson (1973). He assumes a specific community indifference map, a particular production possibility frontier and different values of price markups over marginal costs in monopoly sectors. Bergson determines the equilibria with monopoly and without monopoly. His objective is to measure the welfare loss from monopoly within a general equilibrium framework. For this purpose he introduces the concept of a hypothetical level of income, defined as the level of income that households would require if, at the prices prevailing under monopoly, the households are to enjoy the same level of real income as they would, when commodities sell at the prices prevailing under marginal cost pricing and the corresponding level of income equals that of marginal cost pricing. The welfare loss from monopoly is then measured by the percentage difference between this income and the level of income that is attained under monopolistic pricing.

The purpose of this paper is not to deny the validity of Bergson's approach, but rather to analyze similar problems, in particular: Is the welfare loss from monopoly mainly an efficiency loss resulting from tendencies of imperfectly competitive firms to set prices above marginal costs? Is it appropriate to neglect the important questions related to income distribution? How can welfare losses from monopoly be measured when monopoly leads to losses in efficiency as well as to changes in income distribution?

In section 2 we set forth the basic model. In section 3 we study the determination of welfare maximum, and in section 4 the determination of monopolistic equilibrium. Section 5 contains the study of welfare losses from monopoly and a numerical example. The paper concludes with a summary of results.

2. The Model

To study the welfare losses from monopoly arising from losses in efficiency and from possible adverse changes in income distribution, we consider a growing economy, and concentrate on the study of steady states. We determine long-run equilibria under monopolistic pricing, as well as the equilibrium at the welfare maximum. We then compare the long run equilibrium values of important economic variables attained under monopoly with those attained at the welfare maximum, and trace the effects of monopoly.

The basic framework of our analysis is the circulating capital model of Sraffa (1960). Let $A = (a_{ij})$ be the $n \times n$ matrix of intermediate input requirements, $a_0 = (a_{01}, \ldots, a_{0n}) > 0$ the vector of n sectoral labor input requirements, $L > 0$ the labor force, $g > 0$ the rate of balanced or steady state growth, $x = (x_1, \ldots, x_n)$ the vector of n sectoral gross output levels, $J = (J_1, \ldots, J_n)$ the vector of n sectoral demands for investment for new capital formation by sector of origin, $D^w = (D_1^w, \ldots, D_n^w)$ the vector of n sectoral consumption levels of workers, and $D^c = (D_1^c, \ldots, D_n^c)$ the vector of n sectoral consumption levels of capitalists.

Consumption demand for commodities by workers and capitalists is assumed to be represented by the linear expenditure system:

$$D_i^k = v_i^k + b_i^k \left[M^k - \sum_{j=1}^{n} p_j v_j^k \right] / p_i \; (i = 1, \ldots, n;\; k = W, C), \tag{1}$$

where D_i^k and p_i denote the quantity demanded and the price of the i^{th} commodity, M^w the consumption expenditures of workers, and M^c the consumption expenditures of capitalists. The vector $v^k = (v_1^k, \ldots, v_n^k)$ and $b^k = (b_1^k, \ldots, b_n^k)$ are the constant parameters of the demand functions satisfying the restrictions: $b_i^k \geqq 0$ and $\sum_{i=1}^{n} b_i^k = 1$ $(k = W, C)$. Lastly we notice that the linear expenditure system is based on a utility function of the form

$$u^k(D^k) = (D_1^k - v_1^k)^{b_1^k} (D_2^k - v_2^k)^{b_2^k} \times \ldots \times (D_n^k - v_n^k)^{b_n^k} \qquad (k = W, C) \tag{2}$$

3. Welfare Maximum

To study the properties of welfare maximum we introduce the concept of a social welfare function, which we assume to be a weighted average of the utility of workers and that of capitalists. The government in this economy is supposed to weight each of the utility functions given by (2) according to its political colour, and use an index $\alpha \varepsilon [0, 1]$ such that $\alpha = 1$ when workers' consumption is important and capitalists' consumption is of no importance. If the converse is true then $\alpha = 0$. Thus the social welfare function is

$$u(D^w, D^c) = \alpha u^w(D^w) + (1 - \alpha) u^c(D^c). \tag{3}$$

Let $(x, J, D^w, D^c) \varepsilon R^{4n}$ be a steady state resource allocation. We say the allocation is feasible if it satisfies the following inequalities:

$$Ax + J + D^w + D^c \leqq x \tag{4a}$$

$$J \geqq g\, Ax \tag{4b}$$

$$a_0 x \leqq L \tag{4c}$$

$$x \geqq 0,\ J \geqq 0,\ D^w \geqq 0,\ D^c \geqq 0. \tag{4d}$$

Hence, (4a) is the usual feasibility condition of no excess demand over supply for the n commodities; (4b) indicates the lower bound on capital formation by sector of origin required for balanced or steady state growth; (4c) is the feasibility condition of no excess demand over supply for labor. Lastly, (4d) is the non-negativity condition on sectoral gross outputs, on investment for capital formation by sector of origin, and on sectoral consumption levels by workers and capitalists. Welfare maximum can now be defined as the feasible steady state allocation that maximizes the social welfare function (3).

To study the properties of welfare maximum, assume that the system is productive, i.e., $[I-(1+g)A]^{-1} > 0$. Then at the optimum we have $x > 0$ and hence $J > 0$, as long as $D = D^w + D^c > 0$. The constraints (4a)–(4d) reduce now to

$$a_0 [I-(1+g)A]^{-1} (D^w + D^c) \leqq L$$

$$D^w \geqq 0,\ D^c \geqq 0.$$

Since $L > 0$ and $a_0 > 0$ the constraint set is non-empty and compact. Since the social welfare function (3) is continuous, there exist a welfare maximum. At the welfare maximum the above constraint turns into an equality. Let $\beta = a_0 [I-(1+g)A]^{-1}$, $\beta \in R^n_+$ be the vector of n coefficients. The equation of the consumption possibility frontier can now be expressed as

$$\beta D^w + \beta D^c = \sum_{i=1}^{n} \beta_i D_i^w + \sum_{i=1}^{n} \beta_i D_i^c = L. \tag{5}$$

To interpret the vector $\beta \in R^n_+$ consider our problem of maximizing (3) subject to (4). Let $p \in R^n_+$ be the vector of Lagrange multipliers associated with the constraints (4a), and let $w \in R_+$ be the Lagrange multiplier associated with the constraint (4c). Then for $D = D^w + D^c > 0$ at the optimum we derive the following price equation:

$$p = pA + pgA + wa_0.$$

Hence the price vector at the optimum is obtained as $p = wa_0 [I-(1+g)A]^{-1} = w\beta$. Choose the first commodity as the numeraire, and denote the equilibrium price vector at the welfare maximum by $(p^*, w^*) \in R^{n+1}_+$, where $p^* = (1, p_2^*, \ldots, p_n^*)$. The price of commodity j can now be interpreted as the slope of the consumption possibility frontier, i.e., $p_j^* = \beta_j/\beta_1$ $(j = 2, \ldots, n)$.

Given $p^* \in R^n_+$ the problem of welfare maximum can be formulated as follows

$$\max\, u(D^w, D^c) \tag{6a}$$

s.t. $p^* D^w + p^* D^c = L/\beta_1$. (6b)

$D^w \geqq 0,\ D^c \geqq 0.$ (6c)

Let D^w_* and D^c_* be the optimal solution of problem (6). Then at the optimum the value of consumption of workers equal $M^w_* = p^* D^w_*$, and that of capitalists $M^c_* = p^* M^c_*$. Notice that total consumption expenditure in the economy satisfies the relation $M^* = M^w_* + M^c_* = L/\beta_1$. Given $D^* = D^w_* + D^c_*$ the gross output vector is obtained from

$$x = [I - (1+g)A]^{-1} D$$

as x^*; and given x^* the net investment, the profits, and the net national product at welfare maximum will be determined from

$$N = gAx,\ \Pi = pgAx,\ Y = M + N = \Pi + wL$$

as N^*, Π^* and Y^*. Since pAx is nothing but the value of capital, K, it follows that at the optimum the rate of profit, Π/K, equals g, the rate of balanced growth; and that the rate of profit at the optimum is independent of the value of α, the weight of labor in the social welfare function.

4. Monopolistic Equilibrium

To study the properties of monopolistic equilibrium within the context of a growing economy we first introduce the concept of price markups, defined in sector j as

$$\lambda_j = \left(p_j - \sum_{i=1}^{n} p_i a_{ij} - w a_{0j}\right) \Big/ \left(\sum_{i=1}^{n} p_i a_{ij} + w a_{0j}\right),$$

where $p_j (j = 1, \ldots, n)$ denotes the price of commodity j and w the wage rate. We assume that price markups are exogeneously specified, and that they are identical between the sectors[1]. Given the exogeneously specified uniform markup rate λ, the above price equations can be written in matrix form as

$$p = (1+\lambda)[pA + wa_0]. \tag{7}$$

In the following we examine first the properties of the system of price equations given by (7). For this purpose we assume that the money wage rate initially equals zero. Then (7) reduces to an eigenvalue equation

$$\gamma p = pA$$

[1] If the equilibrium under monopoly is determined as a Cournot-Nash equilibrium, then the sectoral markup rates will in general be different between the sectors. For a discussion of Cournot-Nash equilibrium within a similar model see Nikaido (1975).

where $\gamma = 1/(1+\lambda)$. Assume that A is indecomposable. Then from Frobenius theorem it follows that there exists a positive eigenvalue $\tilde{\gamma}$ and an associated positive eigenvector $\tilde{p}$, which will solve the equation.[2] Suppose now that the money wage is positive. Divide each price p_j by the wage rate w. Then (7) can be written as

$$\frac{p}{w}[\gamma I - A] = a_0. \tag{8}$$

From Frobenius theorem it follows that for any real number γ such that $\gamma > \tilde{\gamma}$ the inverse of $[\gamma I - A]$ exist and that this inverse is positive. Given $\tilde{\gamma}$ let $\tilde{\lambda} = [(1/\tilde{\gamma}) - 1]$ be defined as the maximal permissable value of the markup rate. Then as long as the exogeneously determined markup rate falls in the open interval $(-1, \tilde{\lambda})$, the price equations can be solved as:

$$(p/w) = a_0\left[\left(\frac{1}{1+\lambda}\right)I - A\right]^{-1}. \tag{9}$$

Since $a_0 > 0$ by hypothesis, equation (9) implies that each p_j is positive. Lastly, we notice from Frobenius theorem that for any $\lambda \in (-1, \tilde{\lambda})$ we have

$$\left[\left(\frac{1}{1+\lambda}\right)I - A\right]^{-1} = (1+\lambda)[I + (1+\lambda)A + (1+\lambda)^2A^2 + \ldots + (1+\lambda)^tA^t + \ldots].$$

Hence (9) can be written as:

$$\frac{p}{w} = a_0[(1+\lambda)I + (1+\lambda)^2A + \ldots + (1+\lambda)^{t+1}A^t + \ldots]. \tag{10}$$

This equation indicates that for each commodity the price in terms of labor is an increasing function of the markup rate, i.e., $d(p_j/w)/d\lambda > 0 (j = 1, \ldots, n)$. Choose as before the first commodity as the numeraire, and denote the equilibrium price vector by $(p(\lambda), w(\lambda)) \in R^{n+1}_+$, where $p(\lambda) = (1, p_2(\lambda), \ldots, p_n(\lambda))$. Since from (10) we have $d(p_j/w)/d\lambda > 0$ for all j it follows that the equilibrium price vector, when the first commodity is the numeraire satisfies

$$dw/d\lambda < 0 \quad \text{and} \quad dp_j/d\lambda > 0 \quad (j = 2, \ldots, n).$$

To discuss the properties of monopolistic equilibrium we introduce the following assumptions: Workers consume all of their income, and capitalists their income net of savings. Given $\lambda \in [0, \tilde{\lambda})$, the equilibrium price vector under monopolistic pricing will be determined from (9). We assume full employment of labor at the steady state. Then workers' income is given by

$$Y^w = w(\lambda)L. \tag{11}$$

[2] For a discussion of Frobenius theorem see e.g. Nikaido (1968). For an application of Frobenius theorem to Sraffa's model, see e.g. Newman (1979).

Since by hypothesis workers consume all of their income, we have $M^w = Y^w$. Hence M^w can be expressed as a function of λ, where $dM^w/d\lambda = (dw/d\lambda)L < 0$. Given $M^w(\lambda)$ and $p(\lambda)$ we assume that the equilibrium consumption demand for commodities by workers is determined from (1) as

$$D^w = D^w(p(\lambda), M^w(\lambda)).$$

Since

$$dD_i^w/d\lambda = \sum_{j=2}^{n} \left(\frac{\partial D_i^w}{\partial p_j}\right)\left(\frac{dp_j}{d\lambda}\right) + \left(\frac{\partial D_i^w}{\partial M^w}\right)\left(\frac{dM^w}{d\lambda}\right),$$

consumption demand for each commodity by workers will be a decreasing function of λ as long as the vector of constant coefficient $v^w = (v_1^w, \ldots, v_n^w) \in R^n$ in the demand function is positive[3]. Now this condition on $v^w \in R^n$ can be explained as follows: If v_j^w are all positive and expenditure M^w is greater than $\sum_{j=1}^{n} p_j v_j^w$, we can think of workers as purchasing necessary quantities of the goods $(v_1^w, \ldots, v_n^w)$, and then dividing the remaining income $(M^w - \sum_{j=1}^{n} p_j v_j^w)$ among the n goods in fixed proportions $(b_1^w, \ldots, b_n^w)$. If v_j^w is negative (positive) the demand for the j^{th} commodity is elastic (inelastic) with respect to its own price. If $v^w = (v_1^w, \ldots, v_n^w)$ is positive, all cross price elasticities are negative. Hence we have $dD_i^w/d\lambda < 0$ as long as the demand for each good is inelastic with respect to its own price.

Consider now the behavior of capitalists. They receive profits amounting to

$$\Pi = \lambda[p(\lambda)A + w(\lambda)a_0]x,$$

which determines their income Y^c. Given $Y^c = \Pi$ capitalists save part of this income and consume the rest. But notice that capitalists are not free to choose the value of λ as well as that of their savings rate, if the system is to remain in a steady state equilibrium. In fact for every $\lambda \in [0, \tilde{\lambda})$ there exists a unique value of capitalists consumption M^c, which will be consistent with the two requirements of long-run equilibrium under monopolistic pricing. The first of these requirements is that capitalists' savings equal the net investment expenditures amounting to $gp(\lambda)Ax$, the amount of investment required for steady state growth. The second requirement

[3] The elasticity formulae for the linear expenditure system are given by

$$\eta_{ii} = [(1 - b_i)v_i/D_i] - 1, \quad \eta_{ij} = -b_i v_j p_j/p_i D_i,$$

and $\eta_{im} = b_i M/P_i D_i$,

where η_{ii} denotes the own price elasticity, η_{ij} the cross price elasticity, and η_{im} the expenditure elasticity. Notice that $-1 < \eta_{ij} < 0$ and $\eta_{ij} < 0$ whenever $v = (v_1, \ldots, v_n) > 0$.

is that in steady state there is sufficient aggregate demand for labor to be fully employed.

As long as capitalists' savings equal the investment expenditures required for steady state growth we can study the determination of monopolistic equilibrium using the consumption possibility frontier. Given $\lambda \in [0, \tilde{\lambda})$ let $p(\lambda)$ be the equilibrium price vectors, $D^w(\lambda)$ the consumption demand function for commodities by workers, and $D^c(p(\lambda), M^c)$ the consumption demand function for commodities by capitalists, determined from (1). Then the equation of the consumption possibility frontier given by (5) can be written as

$$\beta D^w(\lambda) + \beta D^c(p(\lambda), M^c) = L. \tag{12}$$

Since $dD_j^w/d\lambda < 0$ and $\partial D_j^c/\partial\lambda < 0 (j = 1, \ldots, n)$, whenever the constant parameters $v^k = (v_1^k, \ldots, v_n^k) > 0 (k = W, C)$ of the demand functions are positive, which we shall assume in the rest of the analysis, and since $\partial D_j^c/\partial M^c > 0 (j = 1, \ldots, n)$ it follows from (12) that $dM^c/d\lambda > 0$. Hence for each value of $\lambda \in [0, \tilde{\lambda})$ there exists a unique value of M^c, which is consistent with the requirements of steady-state equilibrium, and which will be denoted by $M^c(\lambda)$. Given $\lambda \in [0, \tilde{\lambda})$, if consumption expenditures of capitalists are less than $M^c(\lambda)$, there will be unemployment of labor; and positive excess demand for labor if $M^c > M^c(\lambda)$. Hence for any $\lambda \in [0, \lambda)$ the only value of M^c consistent with full employment of labor is $M^c(\lambda)$.

Given $\lambda \in [0, \tilde{\lambda})$ we derive the equilibrium price vector from (9), the equilibrium income of workers and their consumption expenditures from (11), the equilibrium consumption expenditures of capitalists from (12), and the consumption demand for commodities by workers and capitalists from (1). Let

$$D(\lambda) = D^w(\lambda) + D^c(p(\lambda), M^c(\lambda))$$

be the total consumption demand for commodities in the economy, expressed as a function of λ, then the long run equilibrium values of the gross output vector, profits, new capital formation by sector of origin, and of value of investment will be determined as:

$$x(\lambda) = [I - (1 + g)A]^{-1} D(\lambda),$$

$$\Pi(\lambda) = \lambda [p(\lambda)A + w(\lambda)a_0] x(\lambda),$$

$$J(\lambda) = gAx(\lambda) \quad \text{and}$$

$$N(\lambda) = gp(\lambda)Ax(\lambda).$$

Hence, the above discussion reveals that long-run equilibrium values of all important economic variables at the monopolistic equilibrium will be determined once the exogeneously determined markup rate falls in the interval $[0, \tilde{\lambda})$.

5. Welfare Costs from Monopoly

The analysis presented above was confined to the study of determination of long-run equilibria under monopolistic pricing and of the equilibrium at the welfare maximum. We now turn to the study of the effects of monopoly. The objective is to compare long-run equilibrium values of important economic variables attained under monopoly with those attained at the welfare maximum.

To assess the welfare cost of monopolistic pricing we follow the approach of Bergson (1973). For this purpose we introduce the concept of a hypothetical level of expenditures $\bar{M}^w(\bar{M}^c)$ for workers (capitalists), defined as the level of expenditures that workers (capitalists) would require if, at the prices prevailing under monopoly, the workers (capitalists) are to enjoy the same level of real income as they would, when commodities sell at the prices prevailing under welfare maximum and the corresponding level of expenditures equals that of welfare maximum. Let $u^k(D^k_*) = u^k(p^*, M^k_*)$ be the level of utility at the welfare maximum, and $u^k(D^k(\lambda)) = u^k(p(\lambda), M^k(\lambda))$ be the level of utility of income group $k\,(k=W,C)$ attained under monopolistic competition for a given value of $\lambda \in [0, \tilde{\lambda})$. Now $\bar{M}^k$ can be defined as the level of expenditure for which the following equality holds: $u^k(p(\lambda), \bar{M}^k) = u^k(p^*, M^k_*)$ $(k=W,C)$. Hence the welfare cost of monopolistic pricing on the income group $k\,(k=W,C)$ can be evaluated by the coefficient of net compensating variation, $CNCV^k$, defined by

$$CNCV^k = [\bar{M}^k - M^k(\lambda)]/M^k(\lambda) \quad (k=W,C).$$

To obtain a measure of the welfare loss from monopoly for the economy as a whole we make use of the weights in the social welfare function given by (3), and define the economy wide measure of welfare loss from monopoly as

$$CNCV = \alpha CNCV^w + (1-\alpha) CNCV^c. \tag{13}$$

Consider now, for purposes of exposition a three sector economy characterized by the following parameters and coefficients:

$$A = \begin{pmatrix} 0 & 0 & 5/2 \\ 5/24 & 0 & 5/6 \\ 5/144 & 5/36 & 0 \end{pmatrix}; \quad \begin{array}{l} a_0 = (2,\ 3,\ 5) \\ b^k = (1/5,\ 1/2,\ 3/10) \end{array} \tag{14}$$

$v^k = (5,\ 10,\ 2)$; $g = 0{,}05$ and $L = 1000$

for $k = W, C$. Since we are interested in the comparisons of long-run equilibrium values of important economic variables under monopoly with those under welfare maximum, we determine first the welfare maxima with different values of α, and the equilibria under monopoly with different values of λ. Then, the coefficients of net

Table 1
The Effects of Monopolistic Pricing on Workers: $CNCV^w$

	$\lambda=0.1$	$\lambda=0.2$	$\lambda=0.3$
$\alpha=1$	0.18476	0.52846	1.02674
$\alpha=3/4$	0.00956	0.0836	0.43693
$\alpha=1/2$	−0.40742	−0.23553	0.01398

Table 2
The Effects of Monopolistic Pricing on Capitalists: $CNCV^c$

	$\lambda=0.1$	$\lambda=0.2$	$\lambda=0.3$
$\alpha=3/4$	0.77431	−0.19903	−0.45289
$\alpha=1/2$	2.20549	0.44610	−0.01243

Table 3
The Economy Wide Effects of Monopolistic Pricing: CNCV

	$\lambda=0.1$	$\lambda=0.2$	$\lambda=0.3$
$\alpha=1$	0.18476	0.52846	1.02674
$\alpha=3/4$	0.20075	0.01294	0.21448
$\alpha=1/2$	1.30646	0.34082	0.01321

compensating variation, CNCV, were obtained for these values of α and λ. The results are shown in Tables 1, 2 and 3.

From Table 1 it follows that monopolistic pricing leads to substantial misallocation of resources when considered from the point of view of workers. The coefficient measuring the welfare loss of workers $CNCV^w$, is sensitive to changes in the markup rate λ as well as to changes in α, the weight of labor in the social welfare function. As λ increases from 0.1 to 0.3 the welfare loss increases from 18.5% to 102.7% (case $\alpha=1$) of the income of workers. When $\alpha=1/2$ and $\lambda=0.1$ workers are better off under monopoly compared to their situation at the welfare maximum. There is a welfare gain amounting to 40.7% of the income of workers ($\alpha=1/2$, $\lambda=0.1$). But, this welfare gain decreases as λ increases and turns into a welfare loss of 1.4% of income, when $\lambda=0.3$. Furthermore, notice that $CNCV^w$ decreases, as expected, as the weight of labor in the social welfare function, α, decreases.

From Table 2 it follows that monopolistic pricing leads to substantial improvement in the allocation of resources when considered from the point of view of the capitalists. Since for $\alpha = 1$ capitalists' consumption at the welfare maximum equals zero, we have calculated the $CNCV^c$ values for only $\alpha = 3/4$ and $\alpha = 1/2$, and not for $\alpha = 1$. The study of $CNCV^c$ values reveals that $CNCV^c$ is sensitive to changes in λ and α. As λ increases from 0.1 to 0.3, $CNCV^c$ decreases from 77.4% to -45% (case $\alpha = 3/4$). Hence when $\alpha = 3/4$ and $\lambda = 0.3$, capitalists are 45% better off under monopoly compared to their situation at the welfare maximum. Notice also that $CNCV^c$ increases as expected, as the weight of labor in the social welfare function, α, decreases.

Table 3 summarizes the economy wide effects of monopolistic pricing. In this table we have $CNCV = CNCV^w$ for $\alpha = 1$, as in this case workers' consumption is of importance and capitalists' consumption of no importance. A comparison of $CNCV^w$ with $CNCV^c$ in tables 1 and 2 for $\alpha \neq 1$ reveals that except for one case ($\alpha = 3/4, \lambda = 0.1$) we have welfare losses for one income group and welfare gains for the other. Hence in all those cases calculation of CNCV requires a weighting of the gains and losses of different income groups. For this purpose we use the weights in the social welfare function. The results are summarized in Table 3.

From Table 3 it follows that CNCV is sensitive to changes in λ and α. For $\alpha = 1$ CNCV increases as λ increases from 0.1 to 0.3. But the same conclusion cannot be ascertained for $\alpha \neq 1$. When $\alpha = 3/4$ CNCV decreases and then increases as λ increases from 0.1 to 0.3. This in turn indicates that there is a relation between markup rates and the weight of labor in the social welfare function, given by the condition that for each $\alpha \in [0, 1]$ the respective value of λ minimizes the CNCV over all $\lambda \in [0, \tilde{\lambda})$.

Lastly we shall concentrate on the efficiency aspects of monopolistic pricing, and neglect the questions of income distribution. For this purpose we assume that households under monopoly obtain all of the monopoly profits, and that the income of households equals the sum of total wage income and profit income. Given this income, households are assumed to save a fraction of it in order to finance the net investment expenditures amounting to gpAx, the amount required for steady-state growth. Consumption demand for commodities is represented by the linear expenditure system (1), and the social welfare function by (2), but with no superscript k, as we have by hypothesis a one household Hicksian economy.

Suppose now that this Hicksian economy is characterized by the coefficients given by (14). To study the efficiency losses due to monopoly we compare again the long-run equilibrium values of important economic variables under monopoly with those under welfare maximum. We then determine the coefficient of net compensating variation for alternative values of λ. The results are shown in Table 4.

From Table 4 it follows that monopolistic pricing in the one household Hicksian economy does not lead to any significant misallocation of resources. As λ increases

Table 4
The Effects of Monopolistic Pricing in a One Household Hicksian Economy

	$\lambda=0.1$	$\lambda=0.2$	$\lambda=0.3$
CNCV	0.00003	0.00029	0.00733

from 0.1 to 0.3 CNCV increases from 0.003 % to 0.73 %. Hence, under the cases considered the maximal value of the welfare loss amounts to only 0.73 % of real income. Using table 4 one could easily conclude that welfare costs of monopolistic pricing are almost insignificant. But this conclusion will be true, if monopoly profits are equally distributed amount the households. If not, then the effect of monopoly on the distribution of income has to be studied. A comparison of CNCV values in Table 3 with those in Table 4 reveals how important it is not to abstract from problems of income distribution, when one tries to measure the welfare costs of monopoly pricing.

6. Conclusion

Using the simple circulating capital model of Sraffa (1960) within the context of a growing economy, we have shown that in assessing the welfare costs of monopolistic pricing, concentration on the efficiency losses alone may lead to underestimation of the welfare losses from monopoly. The measurement of the welfare losses from monopoly requires in general assessment of the losses in efficiency, as well as those arising from changes in income distribution.

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Summary

On the Welfare Costs of Monopolistic Pricing

Using the simple circulating capital model of Sraffa within the context of a growing economy, it is shown that in assessing the welfare costs of monopolistic pricing, concentration on the efficiency losses alone may lead to underestimation of the welfare losses from monopoly. The measurement of the welfare losses from monopoly requires in general assessment of the losses in efficiency, as well as those arising from changes in income distribution.

Zusammenfassung

Über die Wohlfahrtsverluste bei Monopolpreisen

Unter Benutzung des einfachen Kapitalmodells von Sraffa in einer wachsenden Wirtschaft wird gezeigt, dass die Beschränkung auf Effizienzverluste beim Bewerten der Wohlfahrtsverluste monopolistisch festgesetzter Preise dazu führt, dass die monopolbedingten Kosten unterschätzt werden. Die Messung dieser Kosten verlangt im allgemeinen sowohl eine Schätzung der Effiziensverluste als auch der Kosten, die aus Änderungen der Einkommensverteilung entstehen.

Résumé

A propos des coûts sociaux d'une détermination monopolistique des prix

En utilisant le modèle de la circulation du capital de Sraffa dans une économie en croissance, il est montré que, dans l'évaluation des coûts sociaux d'une détermination monopolistique des prix, à elle seule la concentration sur les pertes d'efficacité est susceptible de mener à une sous-estimation des préjudices causés par le monopole. La calculation des coûts sociaux résultant du monopole requiert en général une estimation des pertes en efficacité, de même que de celles provenant de modifications dans la distribution des revenus.