Incomplete Markets, Price Regulation, and Welfare

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The normative appeal of the market mechanism rests on the equivalence between competitive equilibria and Pareto optimal allocations. This equivalence in turn depends on the existence of a complete system of markets; that is, on the possibility of trade in all commodities indexed by qualitative as well as temporal, locational, and contingent characteristics. On the other hand, problems of moral hazard and adverse selection, of incomplete and differential information, of transaction costs, and of aggregate, as opposed to individual, risk render the assumption of universality of markets empirically unjustified.

The question that follows is that of the characterization of situations where the allocations attained as price equilibria are dominated. In particular, I want to compare the price equilibrium allocations with the allocations attainable through the imposition of quantity constraints (i.e., rationing) in some of the markets. I shall demonstrate that in simple situations involving trade under uncertainty it may be preferable, in the absence of markets in contingent commodities, for prices to be regulated and for markets to be cleared through quantity rationing, as opposed to prices being allowed to fluctuate in response to the contingency realized.

The question of desirability of price stabilization has been a recurrent theme in economic theory. Leander Howell, Gertrud Lovasy, Walter Oi (1961, 1963, 1972), Clem Tisdell, and Frederick Waugh (1944a,b, 1966) posed the problem in a partial equilibrium context, while Paul Samuelson (1972a, b) raised the objection of feasibility in a general equilibrium framework and emphasized that interference with prices can only be beneficial in the absence of a complete system of markets.[1] In a different context, Martin Weitzman (1974) addressed the question of the optimal instruments of planning under uncertainty and compared quantity targets with profit maximization at appropriately chosen prices; he concluded that quantities dominate prices if the cost and benefit functions are sharply curved.

I address the problem in a general equilibrium framework. Further, since one of the alternatives considered involves trade at non-market-clearing prices, I employ the formalization developed by Jacques Dreze for market clearing through quantity constraints. I consider a consumption loan economy where differences in productivity (or, equivalently, initial endowments) among generations lead to price variability across time periods. As a result, when young, agents have to take an allocation decision under uncertainty; the prices they will have to face when old depend on the productivity of the generation then at the first period of its life. The question that arises is whether it is desirable to eliminate the future price uncertainty at the expense of constraining some agents below their desired level of transaction. The answer depends on the welfare criterion adopted and on the degree of risk aversion of the agents. I show that, under an expected utility criterion, the regime of price regulation and rationing dominates the regime of flexible prices, provided the agents are sufficiently risk averse concerning future consumption. On the other hand, individuals with the lowest productivity always prefer the flexible price equilibrium, while individuals whose productivity exceeds this minimum level prefer the regime of fixed prices if they happen to be sufficiently risk averse.

The intuition behind these results is clear. The higher the degree of risk aversion, the greater the losses that individuals suffer from their inability—due to the incompleteness of markets—to insure against future price fluctuations caused by fluctuations in productiv-

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[1]See Giora Hanoch for a survey and synthesis of this literature.

ity. That insurance markets—or markets in contingent commodities—are absent is to be expected as long as it is aggregate fluctuations that affect the economy. Furthermore, one would guess that the higher the degree of diversity in the economy the more attractive regulation becomes. I demonstrate that this is indeed the case. Observe, finally, that the positive relation in my model between the desirability of regulation and the degree of diversity goes contrary to the results derived by Weitzman (1977). In his case the price mechanism succeeded to the extent that it managed to take into account differences among individuals in allocating a scarce resource; it failed according to some other criterion—equity for example. In my argument it is precisely differences among individuals (or generations) that, due to the incompleteness of markets, accentuate price fluctuation and, hence, render the price mechanism undesirable.

I. Variable Prices vs. Quantity Rationing

Consider an economy extending over time. During each time period, two generations are alive—one young and one old. A generation consists of one aggregate unit of identical agents, and there is no growth in population. Agents live for two periods, their endowment is their labor when young, and their intertemporal von Neumann-Morgenstern utility function has the form[2,3]

$$(1) \qquad u(l,c) = -l + \frac{1}{\alpha} c^{\alpha} \qquad \alpha < 0$$

where l is the labor supplied when young and c is the consumption when old. Young agents work so as to produce the consumption good according to the production function

$$(2) \qquad c = \gamma l \qquad \gamma > 0$$

which they sell to the old in exchange for fiat money. Old agents spend the money they earned when young so as to purchase the consumption good. The total stock of money is an exogenous constant[4] $M > 0$.

Uncertainty is introduced as follows: There are n types of generations, indexed by a subscript k, (i), $k = 1, \ldots, n$, $(i = 1, \ldots, n)$, and distinguished by the productivity of their labor; that is, by the parameter γ of the production function (2). There are no intragenerational differences. Consequently, the random variable $\tilde{\gamma}$ takes on the value γ_k with probability π_k. I shall assume that $\tilde{\gamma}$ is distributed independently over time.[5]

A price system for this economy takes the form $(p, w) = ((p_k, w_k),\ k = 1, \ldots, n)$ where p_k and w_k are the money price of the consumption good and the money wage rate, respectively, when the young generation is of type $k = 1, \ldots, n$. Given a price system, a young agent decides on how much labor to supply, $l_k^s(p, w)$, by solving the following maximization problem:

$$(3) \qquad \text{Max } -l + \frac{1}{\alpha} \sum_i \pi_i (w_k l / p_i)^{\alpha}$$

subject to $0 \leq l \leq 1$

Consequently, the supply of labor function is

$$(4) \qquad l_k^s(p, w) = \left[\sum_i \pi_i (w_k/p_i)^{\alpha}\right]^{(1/1-\alpha)}$$

A *flexible price equilibrium* can now be defined as a price system (p^*, w^*) such that both the good and the money markets clear, i.e.,

$$(5a) \qquad w_k^* \, l_k^s(p^*, w^*) = M \qquad k = 1, \ldots, n$$

$$(5b) \qquad \gamma_k l_k^s(p^*, w^*) = M/p_k^* \qquad k = 1, \ldots, n$$

The unique flexible price equilibrium can be computed as follows:

$$(6) \qquad p_k^* = M/(s\gamma_k)$$
$$w_k^* = M/s \quad k = 1, \ldots, n$$

[2]The linearity of the utility function with respect to labor is not important for the argument to follow. One can use $u(l,c) = -(1/\beta)l^{\beta} + (1/\alpha)c^{\alpha}$ and derive the same conclusions, only with more complicated algebra.

[3]It is necessary only that $\alpha < 1$. It is computationally convenient to assume that $\alpha < 0$.

[4]I am ignoring the possibility of active monetary policy. See Robert Lucas (1972) and the paper by Lawrence Weiss and myself for a discussion of the possibility of effective monetary policy in a similar model.

[5]The assumption of independence is not important. It is made so as to simplify definitions and computations, since it is not directly related to the points I want to demonstrate.

where s is defined in (7):

$$s = [\sum_i \pi_i \gamma_i^\alpha]^{(1/1-\alpha)} \tag{7}$$

At equilibrium, the amount of labor supplied and the level of expected utility derived are independent of k, and they take on the following values:

$$l^* = [\sum_i \pi_i \gamma_i^\alpha]^{(1/(1-\alpha))} \tag{8}$$

$$u^* = ((1-\alpha)/\alpha)[\sum_i \pi_i \gamma_i^\alpha]^{(1/(1-\alpha))} \tag{9}$$

Observe that, as expected, the level of the money stock M is neutral. Neither the equilibrium supply of labor nor the equilibrium consumption level are affected by changes in M. As a consequence, the flexible price equilibrium is essentially unique. This is important since I want to compare the utility level attained at a flexible price equilibrium with the alternative considered below.

I now want to look into the possible fixed-price equilibria for the economy; that is, equilibria characterized by $p_k = p'_k$, for any k and k'. Clearly, a quantity constraint must be imposed on some market. Furthermore, one would like to consider only "rational expectations equilibria": agents must not only know the prices that will prevail in the future; they must be able to indeed carry out, during the second period of their life, the plans they had formulated when they were young. Consequently, I shall analyze the case where only the supply of the consumption good is constrained.[6]

A fixed-price system has the form $(\bar{p}, w) = ((\bar{p}, w_k),\ k = 1, \ldots, n)$, where w_k is the money wage rate when the young generation is of type k, $k = 1, \ldots, n$, and p is the money price of the consumption good independently of k. In addition, an upper bound b is imposed on the amount of the consumption good that can be supplied in the market. Given a fixed-price system $(\bar{p}, w)$ and a constraint level b, a young agent decides on how much labor to supply, $\bar{l}_k^s(\bar{p}, w, b)$, by solving the following maximization problem:

$$\text{Max } -l + \frac{1}{\alpha}[w_k l/p]^\alpha \tag{10}$$

subject to $\quad \gamma_k l \leq b \qquad 0 \leq l \leq 1$

Consequently,

$$\bar{l}_k^s(\bar{p}, w, b) = \min[b/\gamma_k, (w_k/p)^{(\alpha/(1-\alpha))}] \tag{11}$$

A *fixed-price equilibrium* can now be defined as a fixed-price system $(\bar{p}^*, w^*)$, and an upper bound on the supply of the consumption good b^*, such that both the good and money markets clear, i.e.,

$$\text{(12a)} \quad w_k^* \bar{l}_k^s(\bar{p}^*, w^*, b^*) = M \qquad k = 1, \ldots, n$$

$$\text{(12b)} \quad \gamma_k \bar{l}_k^s(\bar{p}^*, w^*, b^*) = M/p^* \qquad k = 1, \ldots, n$$

A generation k is said to be constrained at an equilibrium $(\bar{p}^*, w^*, b^*)$ if and only if

$$(b^*/\gamma_k) < (w_k^*/\bar{p}^*)^{(\alpha/(1-\alpha))}$$

It is said to be unconstrained if and only if

$$(b^*/\gamma_k) \geq (w_k^*/\bar{p}^*)^{(\alpha/(1-\alpha))}$$

The fixed-price equilibrium is not unique. The following proposition, however, demonstrates that the problem of nonuniqueness can be circumvented.

PROPOSITION 1: (a) *There exists a continuum of constrained price equilibria indexed by the price* $\bar{p}$. (b) *There exists a unique constrained price equilibrium* $(\bar{p}^0, w^0, b^0)$ *where at least one generation is unconstrained.* (c) *The constrained price equilibrium* $(\bar{p}^0, w^0, b^0)$ *is preferred by every generation to any other constrained price equilibrium.*

PROOF:

Without loss of generality, we may suppose that

$$\gamma_n > \gamma_{n-1} > \ldots > \gamma_2 > \gamma_1 \tag{13}$$

The case where $\gamma_k = \gamma_{k'}$, for some $k \neq k'$ can be reduced to the one considered here by collapsing the generations k and k' into one

[6]It may appear as if an alternative way to the elimination of future price uncertainty exists. Namely, an upper bound is imposed on the demand of the consumption good by the old agents. This case is, however, equivalent to the one analyzed.

generation occurring with probability $\pi_k + \pi_{k'}$. Under this assumption the following is a fixed-price equilibrium:

$$(14) \qquad \bar{p}^0 = M(\gamma_1)^{(-1/(1-\alpha))}$$
$$w_k^{\,0} = \bar{p}^0\gamma_k$$
$$b^0 = (\gamma_1)^{(1/(1-\alpha))}$$

The system of equations (12) is clearly satisfied since

$$(15) \qquad \bar{l}_1^s = \min\left[\frac{(\gamma_1)^{(1/(1-\alpha))}}{\gamma_1},\quad (\gamma_1)^{(\alpha/(1-\alpha))}\right] = (\gamma_1)^{(\alpha/(1-\alpha))}$$

$$(16) \qquad \bar{l}_k^s = \min\left[\frac{(\gamma_1)^{(1/(1-\alpha))}}{\gamma_k},\quad (\gamma_k)^{(\alpha/(1-\alpha))}\right] = \frac{(\gamma_1)^{(\alpha/(1-\alpha))}}{\gamma_k}, \qquad k = 2, \ldots, n$$

I now want to demonstrate that the fixed-price equilibrium $(\bar{p}^0, w^0, b^0)$ is preferred by every generation to any other fixed-price equilibrium. Consider the utility function $u(l, c) = -l + (1/\alpha)c^\alpha$. Since, from the equilibrium conditions, $w_k = \bar{p}\gamma_k$, $k = 1, \ldots, n$, the utility function of generation k can be written as $u_k = -l + (1/\alpha)(\gamma_k l)^\alpha$. Observe that $(\partial^2 u_k/\partial l^2) < 0$ for all l. Furthermore, at the equilibrium$(\bar{p}^0, w^0, b^0)$ considered here, $(\partial u_1/\partial l) = 0$ while $(\partial u_k/\partial l) > 0$ for $k = 2, \ldots, n$. Consequently, generation 1 cannot improve its situation, while generation k $(k \geq 2)$ can only improve its position by an increase in b above b^0. But this is not feasible. Given $b > b^0$, the labor supplied by generation 1 will not change, while the labor supplied by generation k, $k \geq 2$, will increase. Hence no fixed market-clearing prices will exist. Equivalently, the fixed-price equilibrium defined in (14) Pareto dominates any other fixed-price equilibrium. For any $b^* < b^0$ setting $\bar{p}^* = M/b^*$ and $\bar{w}_k = \bar{p}^*\gamma_k$, $k = 1, \ldots, n$, we see that $\bar{l}_k^s = b^*/\gamma_k$, $k = 1, \ldots, n$, and hence an equilibrium ensues. Consequently, there exists a continuum of equilibria indexed by b^* or $\bar{p}^* = M/b^*$. Finally, it is clear from (15) that at the fixed-price equilibrium $(\bar{p}^0, w^0, b^0)$ generation 1 is not constrained and from (16) that all others are. At any other fixed-price equilibrium, $b^* < b^0$ and hence all generations are constrained.

We now have a well-defined fixed-price equilibrium to compare, from a welfare point of view, with the flexible price equilibrium. It is not evident, however, what the appropriate welfare criterion is. In particular, is one to look for dominance in the expected utility (or *ex ante*) sense, or for dominance in the unanimity (or *ex post*) sense? I believe that expected utility is the appropriate criterion in situations involving risk. *Ex post* criteria may lead to absurd conclusions. On the other hand, a case for the unanimity criterion can be made in the context of the model at hand since every agent knows without ambiguity which type he belongs to. I shall consequently consider both criteria.

Before stating the results, let me give an intuitive argument. Under flexible prices, the supply of labor depends only on agents' expectations about the future, and hence, is independent of the type of generation they themselves belong to. This is clear from (8) where l^* is independent of k. But if labor supplied is independent of k, future consumption is a random variable whose distribution is nondegenerate as long as the productivity parameter has a nonzero variance. Furthermore, since people are risk averse concerning future consumption $(\alpha < 1)$, this uncertainty entails a loss in utility and consequently it may be better to stabilize future consumption at the expense of variability of labor supplied. If the utility function were not linear in labor but had the form $u(l, c) = -(1/\beta)l^\beta + (1/\alpha)c^\alpha$, the profitability of stabilization would depend not on α alone but on $(\alpha - \beta)$. Finally, it is clear that the only generation which is certain to lose from stabilization is the generation with the lowest productivity: It can no longer take advantage of the higher productivity of its descendents. I shall now formalize these arguments in the two propositions to follow.

PROPOSITION 2: (a) *For any level of risk aversion* (*i.e., for any* $\alpha < 1$), *an unconstrained generation prefers the flexible price equilibrium to the fixed-price equilibrium* $(\bar{p}^0, w^0, b^0)$. (b) *For a high level of risk* *aversion (i.e., for $\alpha << 0$),*[7] *a constrained generation prefers the fixed-price equilibrium ($\bar{p}^0, w^0, b^0$) to the flexible price equilibrium.*

PROOF:

From (15), (16), and (1), it can be computed that the level of utility, $\bar{u}_k$, attained by generation k at the fixed-price equilibrium ($\bar{p}^0, w^0, b^0$) is as follows:

$$(17)\quad \bar{u}_1 = ((1-\alpha)/\alpha)(\gamma_1)^{(\alpha/(1-\alpha))}$$

$$(18)\quad \bar{u}_k = ((\gamma_k - \alpha\gamma_1)/\alpha\gamma_k)(\gamma_1)^{(\alpha/(1-\alpha))}, \quad k = 2, \ldots, n$$

From (9), (17) and (18) we get that

$$(19)\quad u^*/\bar{u}_1 = \left[\pi_1 + \sum_{k=2}^{n} \pi_k(\gamma_k/\gamma_1)^{\alpha}\right]^{(1/(1-\alpha))}$$

$$(20)\quad u^*/\bar{u}_k = ((\gamma_k - \alpha\gamma_k)/(\gamma_k - \alpha\gamma_1)) \cdot \left[\pi_1 + \sum_{k=2}^{n} \pi_k(\gamma_k/\gamma_1)^{\alpha}\right]^{(1/(1-\alpha))}, \quad k = 2, \ldots, n$$

Since u^* and $\bar{u}_k$, $k = 1, \ldots, n$, are always negative, $(u^* > \bar{u}_1)$ if and only if $((u^*/\bar{u}_1) < 1)$, and $(\bar{u}^* < \bar{u}_k)$ if and only if $((u^*/\bar{u}_k) > 1)$, $k = 2, \ldots, n$. From (19), $((u^*/\bar{u}_1) < 1)$ if $((\gamma_k/\gamma_1)^{\alpha} < 1)$ for $k = 2, \ldots, n$, which holds for all $\alpha < 0$ since, by assumption, $((\gamma_k/\gamma_1) > 1)$ for $k = 2, \ldots, n$. Consequently, the generation which is unconstrained at the fixed-price equilibrium prefers the flexible price equilibrium independently of its degree of risk aversion. On the other hand, as α tends to $-\infty$, the term $((\gamma_k - \alpha\gamma_k)/(\gamma_k - \alpha\gamma_1))$ of (20) tends to $(\gamma_k/\gamma_1) > 1$, while the term

$$\left[\pi_1 + \sum_{k=2}^{n} \pi_k(\gamma_k/\gamma_1)^{\alpha}\right]^{(1/(1-\alpha))}$$

tends to 1 for all $k = 2, \ldots, n$. Consequently, there exists $\bar{\alpha}_k < 0$ such that $((u^*/\bar{u}_k) > 1)$ for $\alpha < \bar{\alpha}_k$. A generation which is constrained at the fixed-price equilibrium prefers that to the flexible price equilibrium, provided it is highly risk averse.

[7]Relative risk aversion is defined as $-u''y/u'$. Hence, if $u(l, c) = -l + (1/\alpha)c^{\alpha}$, risk aversion concerning future consumption is $(1-\alpha)$. Consequently, as α tends to $-\infty$, relative risk aversion tends to $+\infty$.

PROPOSITION 3: *If the risk aversion of agents is high (i.e., for $\alpha << 0$), the regime of fixed prices and rationing dominates the regime of flexible prices.*

PROOF:

Given the results of the previous propositions, the argument is now immediate. As α tends to $-\infty$, $(u^*/\bar{u}_1)$ tends to 1, while $(u^*/\bar{u}_k)$ tends to (γ_k/γ_1) which is greater than 1, for $k = 2, \ldots, n$. Equivalently, there exists $\bar{\alpha} < 0$ such that if $\alpha < \bar{\alpha}$, $(\sum_{k=1}^{n} \pi_k \bar{u}_k) > u^*$. Consequently, for $\alpha < \bar{\alpha}$, the level of expected utility attained under a regime of fixed prices and rationing exceed the level of expected utility attained under a regime of flexible prices.

II. Diversity and the Desirability of Regulation

The standard argument in favor of the price mechanism as opposed to quantity rationing in the allocation of resources goes somewhat as follows: The price system allocates a scarce resource differentially among agents giving more of the commodity to those who demand it most. Rationing on the other hand cannot take into account differences among individuals. This argument is, of course, misleading. It presupposes that it is easier to compute equilibrium prices than equilibrium quantities, even though, as is well known, the information required is the same for both. Differently put, it contrasts not the price mechanism with the rationing mechanism but a sophisticated price mechanism with a naive rationing mechanism. All that can be justifiably argued on a priori grounds is that the price system is not inferior to a rationing mechanism.

Weitzman (1977) looks into the choice between prices and quantity rationing from a different perspective. He draws a distinction unfamiliar to standard consumer theory between "needing" a commodity and "being willing to pay a high price" for it. He argues that the latter can be the outcome either of need or of high nominal income. If the second is the case, and if society has decided to try to approximate the allocation that would result from the competitive mechanism under a uniform distribution of income, the price system may be inappropriate. In more general terms, if society has chosen a particular allocation as its objective, even if the latter is Pareto efficient, the price system cannot always be relied upon to attain it. On the other hand, given this objective function, the higher the variation in the distribution of needs in the population the more attractive does the price mechanism become. Peter Stan deals with the same problem in a more economic framework. He postulates a market with costly transactions and compares it with a rationing mechanism. As expected, he shows that the more diverse the preferences and endowments of agents, the greater the relative merit of the price mechanism.

The model presented in the previous section offers an alternative framework within which to raise the same question: How does the desirability of the price system depend on the degree of diversity in the economy? Observe now that the intuition behind my argument is the reverse of that behind the argument of Weitzman and Stan. In their case, prices are successful in so far as they take diversity among agents into account, but they fail according to some other criterion—for example, equity or transaction costs. As a consequence, the desirability of prices depends positively on the degree of diversity in the economy. It is precisely, however, the diversity among agents (generations) that renders—in my model—the price mechanism undesirable. The more diverse generations in their productivity, the higher the fluctuations in prices needed to clear the markets; and the more pronounced the fluctuations, the higher the welfare losses due to the absence of markets in contingent commodities. As a consequence, one expects that the larger the variation in productivity among generations, the more desirable price regulation becomes. I shall conclude by formalizing this claim.

Two problems arise in giving a precise statement of the positive relation between diversity and the desirability of regulation. First, how is diversity to be measured? As A. B. Atkinson has argued, the measure that is appropriate depends on the utility function of individuals and the production technologies of firms. The only structure that can be imposed without loss of generality is that there exists an increasing and concave function $U(y)$, and that distributions $f(y)$ are ranked according to the diversity measure

$$D = \int U(y) f(y) dy \tag{21}$$

I shall say a measure of diversity is well defined if it is of the form (21) with the function $U(y)$ increasing and concave.

The second problem that arises is that of the distinction between a difference in the level of diversity between two economies and a difference in the general level of productivity.[8] An economy ϵ in my framework is characterized by the degree of risk aversion of the agents, α, the possible values of the productivity parameter γ_k, $k = 1, \ldots, n$, and by the probability of occurrence of each type of generation π_k, $k = 1, \ldots, n$. To compare the effects of different degrees of diversity between two economies, we must hold constant the average level of productivity—measured in utility terms—as well as the degree of productivity of the least productive generation. Consequently, I shall say that two economies $\epsilon = (\alpha, (\gamma_k, \pi_k), k = 1, \ldots, n)$ and $\epsilon' = (\alpha', (\gamma'_k, \pi'_k), k = 1, \ldots, n)$ are similar if and only if

$$\alpha = \alpha' \tag{22a}$$

$$\min_k (\gamma_k) = \min_k (\gamma'_k) \tag{22b}$$

$$u^*(\epsilon) = u^*(\epsilon') \tag{22c}$$

The following proposition relates the degree of diversity in an economy with the desirability of price regulation.

PROPOSITION 4: *There exists a well-defined measure of diversity, D, with the following properties:* (a) *Given two economies, ϵ and ϵ', which are similar, if the degree of diversity in ϵ, $D(\epsilon)$, is at least as high as the degree of diversity in ϵ', $D(\epsilon')$, dominance, in the expected utility sense, of the fixed-price mechanism over the flexible price mechanism in ϵ' implies dominance of the fixed-price mechanism in ϵ as well.* (b) *Given*

[8]The same holds for the argument of Weitzman (1977).

two economies, ϵ and ϵ', with the same minimum productivity level, if the degree of diversity in ϵ, $D(\epsilon)$, exceeds the degree of diversity in ϵ', $D(\epsilon')$, there exists a finite constant $\bar{\alpha}$ such that, if $\alpha < \bar{\alpha}$ and $\alpha' < \bar{\alpha}$, the gains from price regulation in the economy ϵ exceed the gains from price regulation in the economy ϵ'.

PROOF:

Consider the measure of diversity defined by

$$(23) \qquad D(f(y)) = \int -(1/y)f(y)dy$$

Since the function $U(y) = -1/y$ is increasing and concave for $y > 0$, we may define the degree of diversity in an economy ϵ by

$$(24) \qquad D(\epsilon) = -\sum_{k=1}^{n} (\pi_k/\gamma_k)$$

The level of expected utility attained at economy ϵ under a regime of fixed prices $\bar{u}(\epsilon)$ can be written as

$$(25) \qquad \bar{u}(\epsilon) = (\gamma_1)^{(\alpha/(1-\alpha))}[1/\alpha + \gamma_1 D(\epsilon)]$$

while the gains from price regulation, $-\bar{u}(\epsilon)/u^*(\epsilon)$, can be written as

$$(26) \qquad -\bar{u}(\epsilon)/u^*(\epsilon) = \left(\frac{\alpha}{\alpha - 1}\right)\gamma_1^{(\alpha/(1-\alpha))} \cdot [1/\alpha + \gamma_1 D(\epsilon)]\left[\sum_{k=1}^{n} \pi_k \gamma_k^{\alpha}\right]^{1/(\alpha-1)}$$

From (26), as $\alpha \rightarrow -\infty$, $-\bar{u}(\epsilon)/u^*(\epsilon)$ tends to $[D(\epsilon)/\gamma_1]$ and hence part (b) of the proposition follows. Part (a) is clear from (25).

III. Conclusion

Two major objections can be raised against the arguments presented in this paper. First, it may be argued that the model considered is so simplistic that any extrapolation to "real" economic situations is suspect. Second, it may be argued that the implementation of the fixed-price equilibrium requires a larger amount of information than that of the flexible price equilibrium. As far as the first objection is concerned, it is clear that one can use general utility and production functions and derive the same results by taking Taylor's approximations. What can not be dispensed with is the highly aggregated structure of the economy. It is not even clear how the problem is to be posed in a more disaggregated model. Concerning the informational requirements of regulation, it suffices to point out that knowledge of the flexible price equilibrium is sufficient for the computation of the fixed-price equilibrium, as well as of the prevailing degree of risk aversion.

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