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*Stagflation, New Products, and Speculation**

The paper looks at the macroeconomic implications of some recent developments in the theory of industrial organization. In a Kaleckian model, firms are assumed to invest heavily early in the product life cycle, thus creating effective demand. Conversely, it is assumed that late in the product life cycle firms hoard, waiting for new products in which to invest. Under reasonable conditions, the rates of growth, unemployment, and inflation can be related to the fraction of new products in the economy.

1. Introduction

During the past twenty years, an increasing number of firms have adopted pricing and investment policies which differ substantially from those ordinarily assumed in economic theory. Briefly, the idea is to let prices fall and invest a lot early in the product life cycle and to let prices grow and invest less later. Multiproduct firms can then balance supply and demand in their internal capital market by having a constant ratio of "young" to "old" products.

The purpose of this paper is to investigate the macroeconomic implications of the assumptions which led to these pricing and investment policies. In the simplest possible model, young products will be seen as associated with effective demand, whereas old products will be seen as inflationary. The economy wide capital market will be in equilibrium for a constant age distribution of products. Also the rates of growth, inflation, and unemployment can be related directly to the age distribution of products.

The BCG Theory

Since their introduction some twenty years ago, the ideas of the Boston Consulting Group (BCG), has had a spectacular influence on management practice. Haspeslagh (1981) estimates that the majority of the Fortune 500 use the BCG framework or a spin-off

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from it. Since, in 1981, the Fortune 500 controlled assets corresponding to more than 80 percent of all productive assets in the U.S., we are talking about a very substantial part of the economy.

The reasoning behind the BCG theory is simple and intuitively appealing. Assume the following four premises to be true:

1. All costs follow "experience curve" reductions, where experience is a measure of accumulated, firm-specific sales.
2. In order to grow, a firm must, even in a friendly capital market, be able to retain some earnings.
3. Market shares exhibit declining price sensitivity over time.
4. The growth in demand for individual products eventually tapers off and may go negative.

[Points 1, 2, and 4 can be found in a slightly less precise form on p. 164 in Henderson (1979), whereas point 3 appears on p. 163. Henderson is the founder and CEO of BCG.]

BCG draws the following practical conclusions from the above four points:

1. If you have a big market share and have moved far down the experience curve, you will have lower unit costs than your competition.
2. This condition can be reached by an all-out effort in the early stages of the life cycle [see Spence (1981) for a reconstruction].
3. In the late stages, market shares stabilize and total market growth slows down; investments are thus nonrewarding and you should channel funds to younger industries.

So the implied scenario is, that firms invest a lot early in the product life cycle in order to gain advantages in terms of cost and market positions. These cost and brand-loyalty advantages will be harder and harder to attack as demand growth slows down. Consequently, one would expect the industry to become more and more concentrated and firms should find it optimal to increase prices towards the (increasing) monopoly price, as they take home profits.

This inspires the below intuition, which will be investigated in this paper. If BCG is followed, many "young" products in the economy should generate a lot of investment/effective demand, whereas many "old" products should lead to rising prices. So it might be possible to relate the age distribution of industries in the economy to the rates of unemployment, inflation and growth. Before we check this intuition in a formal model, it is useful to investigate the theoretical antecedents of BCG.

What is New?

Neither of the two key consequences of the BCG theory, the association of new products with bursts of investment and the claim that industries concentrate over time, is new. They have, however, not been combined before.

The investment driving effect of new products ("combinations"), is first and foremost associated with Schumpeter's name [(1961), Chapter 4], although it has been taken up by, e.g., Spence (1979) and others.

The tendency to gradual concentration as an industry matures is a cornerstone of the Marxian tradition, [see, e.g., Kalecki (1971)] and, perhaps therefore, in grave conflict with the neoclassical tradition, which claim that the exact opposite—deconcentration—should occur. While it is well known that several different mechanisms, such as economies of scale, learning curves, brand loyalties, etc., can lead to first mover advantages and consequent "shake-outs," the debate centers around the actual incidence of these effects. In this context it is interesting to note the very strong relationship between profitability and market share found in several studies [e.g., Buzzell et al. (1975)].

An Alternative Explanation

An argument recently forwarded by Stigler and Becker (1977) can be used to rationalize both the investment effect of new products and the inflationary pressure of old products. The following can thus be seen as an alternative micro foundation for the macro theory forwarded in this paper. (So we need not base ourselves on BCG.) According to the habit formation and ingraining theory of Stigler and Becker, it is rational to operate in habits because it takes time to dig up alternatives. It is furthermore likely that one will learn to execute a given habit better as it grows older, such that the "incumbent" habit is at an advantage vis-a-vis alternatives. If we apply this to consumption habits, there will be growing and endogenous brand loyalty effects over the product life cycle. So all firms should try to get a big market share early and capitalize on this learning by doing on the part of consumers. As the product matures, one should expect this to result in a substantial concentration and associated increase in profit margins. This increase will furthermore be helped by the fact that market shares and thus firm specific demand curves become less and less price sensitive. So the simultaneous development of increasing concentration and decreasing price sensitivity over the product life cycle can be rationalized on more than one theoretical basis.

Related Literature

In terms of Malinvaud's (1977, 1980) typology, the disequilibria described in this paper will be Keynesian or classical depending on whether we have "too many" old or young products in the economy. What differentiates this paper from the above or other microbased macro theories [e.g., Nikaido (1975) or Negishi (1979)], is that we here use continuous inflationary pressures to create demand insufficiencies. So if our economy is not stimulated by new products, it will, by itself, move towards a stagflationary situation.

2. The Model

The below model will mainly be based on the third and fourth BCG premises, that price sensitivities and demand growth decline over the product life cycle. Although we will assume increasing monopolization, this could be derived from the third as well as from the first premise, so the latter is not necessary and costs will be assumed constant. The second premise of nonzero equity to debt ratios will be used in that we, for analytical convenience, will assume all firms to be fully self-financing. The assumption is, however, not necessary for the argument. Again, as indicated above, we could have nested the model in Stigler and Becker's ingraining-habit argument as well as in the BCG ideas.

Notation

We will here present a simple $n + 3$ sector model of economic growth. The model assumes $n(t)$ consumer good industries, which at time t may be at different stages of the product life cycle. As a product matures, several things happen: first, the industry is gradually monopolized; second, the initial growth in demand tapers off; and third, consumers become less and less price-sensitive. All of this, of course, is consistent with the BCG assertions. In addition to the $n(t)$ consumer goods, there is one capital good which is assumed to be produced in a profitless sector. Furthermore, there is a firm or capitalist consumption good, also produced without profit. In these $n(t) + 2$ sectors, production is set to meet net demand.

The last good is nonproducible, but available in a certain fixed amount. It is storable and liquid, so it can be used for value storage by firms and speculation by consumers. One could consider land or gold as examples.

All production functions are assumed to be linear and limitational with respect to capital and labor, although the capital good and the firm consumption good are produced from labor only. Capital has an infinite lifetime and unused capital is sold at full price.

We will use the following notation (dropping time subscripts for convenience):

X_i = production and sales level of consumer good i, $i \in N(t)$;
$N(t) = \{1, 2, \ldots, n(t)\}$ = set of consumer goods;
X_o = production and sales level of capital good;
X_s = production and sales level of firm consumption good;
$\dot{y}$ = net consumer demand for the nonproducible good;
$\dot{z}_i$ = net industry $i \in N(t)$ supply of the nonproducible good;
L = labor employed, assumed feasible;
P_i, P_o, P_s, q = prices of X_i, X_o, X_s, $(\dot{y}, \dot{z}_i)$;
w = wage, used as numeraire, written for clarity;
a_i = labor coefficient of good i, $i \in N(t)$;
b_i = capital coefficient of good i, $i \in N(t)$;
a_o, a_s = labor coefficients of capital and firm consumption goods;
$m_i(t)$ = variable going from close to 0 (but above) towards 1 as industry $i \in N(t)$ is monopolized;
$1 - c$ = firm consumption as share of profits, $0 < c \leq 1$.

All variables, save $\dot{y}$ and $\dot{z}_i$ are positive, and the $m_i(\cdot)$ are differentiable.

The endogenous variables are $\dot{X}_i$, X_o, X_s, L, P_i, $\dot{y}$, $\dot{z}_i$, and q as functions of time. The exogenous or constant variables are $N(t)$, a_i, b_i, a_o, a_s, c, and $m_i(t)$.

Consumers

Consumers are assumed to split their income between consumer goods and the nonproducible good. The latter will be used for speculative purposes, such that net demand from all consumers is positive when the price of the nonproducible good rises slower than the steady state growth rate of the economy, r. So

$$\dot{y}\,(\dot{q}/q) \gtreqless 0 \text{ as } \dot{q}/q \lesseqgtr r\,; \tag{1}$$

where $\dot{y}(\cdot)$ is differentiable and declining.

After correction for speculative actions, consumers are assumed to allocate their income over the $n(t)$ goods as

$$X_i = (wL - q\dot{y})F_i(P_1, P_2, \ldots, P_{n(t)}, t),\ i \in N(t)\,. \tag{2}$$

Note that reallocations in the holdings of the nonproducible good inside the consumer sector are assumed to be immaterial to the sector consumption pattern. The $F_i(\cdot)$'s are positive C^2 functions which are declining in P_i and have the property that $\Sigma_{i=1}^{n(t)} F_iP_i = 1$. So the budget constraint of consumers is implicit in (2). In addition we will assume that

$$F_i \frac{\partial^2 F_i}{\partial P_i \partial P_j} \geq \frac{\partial F_i}{\partial P_i}\frac{\partial F_i}{\partial P_j}, \quad \text{for } i, j \in N(t)\,; \tag{F1}$$

$$-2\frac{\partial F_i}{\partial P_i} > \sum_{j=1}^{n(t)} \frac{\partial^2 F_i}{\partial P_i \partial P_j} P_j\,, \quad \text{for } i \in N(t)\,. \tag{F2}$$

These conditions apply, for example, if $\partial^2 F_i/\partial P_i \partial P_j$ is "small" and positive and $\partial F_i/\partial P_j$ is positive. The third and fourth BCG premise will be modeled as

$$\partial^2 F/(\partial P_i \partial t) \geq 0, \quad \text{for } i \in N(t)\,; \tag{F3}$$

$$\partial F_i/\partial t \to 0\,,\ \text{for } t \to \infty\,, \quad \text{for } i \in N(t)\,. \tag{F4}$$

Firms

The model of firm behavior is based on the following equation:

$$P_i = wa_i + rP_ob_i - m_i(t)\frac{F_i}{\partial F_i/\partial P_i}\,,\ i \in N(t)\,. \tag{3}$$

This is intended to mimic the pricing pattern suggested by BCG, such that the growth of $m_i(t)$ reflects increasing monopolization, and decreasing attempts to gain market share, the price being at cost for $m_i(t) = 0$ and at the monopoly level for $m(t) = 1$. (Note that the partial derivative of the demand curve is used as a basis for the monopoly price. Except in very special cases, no firm will speculate in terms of dF_i/dP_i, nor have an idea of its value.)

It is assumed in (3), that firms evaluate their cost of capital to be equal to r, the steady state growth rate of the economy and, as we shall see, the corresponding equilibrium yield on investment in the nonproducible good. At any given point in time, different disequilibrium conditions may make investments in the nonproducible good yield more or less than r, but we will assume that firms take a long run equilibrium view of things.

Firms are assumed to finance the initially low prices and heavy plant and equipment investments by selling of their stocks of the nonproducible good. Conversely, these will be replenished when prices go up and investment needs decline. So net supply of the nonproducible good, from a given industry is given by

$$\dot{z}_i q = P_o b_i \dot{X}_i - (P_i - wa_i)x_i c\ , \ \ i \in N(t)\ . \tag{4}$$

Logic of course demands that the stock of the nonproducible good held by each industry, z, and indeed by each firm in that industry, should stay nonnegative during the process (4). We will here assume, that the concentration process, represented by $m_i(t)$, operates on these stocks. The idea being, that the initially less wealthy firms drop out when or before the price dictated by (3) cause them to eat up all their financial resources. This again means that a firm before going into a new industry will want to have "enough" financial reserves to have a good chance of making it through the shake-out. (In this context it is institutionally important that the nonproducible good is liquid, such that firms can react quickly to new attractive industries. Relative to a less liquid, alternative form of values storage, the more liquid asset should pay a liquidity premium. See Keynes [(1969), Chapter 13] on the "speculation motive".)

Proceeding further, we can find employment by

$$L = \sum_{i=1}^{n(t)} a_i X_i + a_o \sum_{i=1}^{n(t)} b_i \dot{X}_i + a_s X_s\ , \tag{5}$$

which is assumed feasible, whereas firm consumption is given by

$$P_s X_s = (1 - c) \sum_{i=1}^{n(t)} (P_i - wa_i) X_i \,, \tag{6}$$

as defined, and where X_s must be thought of as slack, R&D, artificial product differentiation, and the like.

Existence of Instantaneous Equilibrium

To prove the existence of a solution to (1)–(6), note first that (3) alone determines P_i (and $\dot{P}_i$) and that it has a feasible solution.

A solution to (3) is a fixed point for the continuous vector function $\phi(P) : R^{n+} \to R^{n+}$, where

$$\phi_i(P) \equiv wa_i + rP_o b_i - m_i(t) \frac{F_i}{\partial F_i / \partial P_i} \,, \quad i \in N(t) \,.$$

Existence of such a point could be guaranteed by Brouwer's familiar fixed-point theorem, if we could use reasonable maximum prices to restrict the domain of ϕ to some box $C \subset R^{n+}$, such that the image of C (called D) is contained in C. For any value of P_j, $i \neq j \in N(t)$, it is clear that ϕ remains positive for $P_i \to 0$. By its continuity, ϕ is furthermore bounded in any closed interval. All we need to find $D \subset C$ is that $\phi_i < P_i$ for $P_i \to \infty$, regardless of P_j, $i \neq j \in N(t)$. This is the case if for all P_j, $j \neq i$.

$$-\frac{F_i / P_i}{\partial F_i / \partial P_i} < \frac{1}{m_i(t)} \,, \quad \text{for } P_i \to \infty \,, \quad i \in N(t) \,. \tag{F5}$$

For $m_i(t) = 1$, we thus get the ordinary condition that the elasticity should be greater than 1.

Given P and $\dot{P}$ vectors from (3) and capital stocks, can we determine a set of consistent paths for $\dot{X}_i$, X_o, X_s, L, $\dot{y}$, $\dot{z}$, and q?

Note first that equilibrium in the market for the nonproducible good demands that

$$q\dot{y}\left(\frac{\dot{q}}{q}\right) = \sum_{i=1}^{n(t)} [P_o b_i \dot{X}_i - (P_i - wa_i) X_i c] \,. \tag{7}$$

If we insert (7), (6), and (5) into (2), we get

$$X_i = \left[\sum_{i=1}^{n(t)} P_i X_i\right] F_i(\cdot) \,. \tag{8}$$

Since the maximum X_i is determined by the corresponding capital stock (divided by b_i), the time differential of (8) will give the maximum feasible $\dot{X}_i$ as a function of P_i and $\dot{P}_i$. This in turn gives X_o, X_s, and L from (5) and (6), whereas (7) gives $q\dot{y}$ such that a $\dot{q}$ and thus a path for q can be determined given an initial condition on q. (Gold is only worth what you decide it is worth.) This, in turn, gives $\dot{y}$ and $\dot{z}$.

3. Results

In this Section we will first look at the properties of the steady states of our model, then at disequilibria in general and finally at the extreme case where no new goods enter the economy for a long time.

Steady State Growth

We will first look at the steady state growth or equilibrium situation, in which $\dot{y} = 0$.

Assume that the new goods, whose arrival is marked by increases in $n(t)$, come from the same (a, b, m, F) distribution as the existing goods. Aggregate (4), and write it as

$$\frac{P_o(\Sigma\, b_i\dot{X}_i)}{c\sum_{i=1}^{n(t)} (P_i - wa_i)X_i} = 1\,, \tag{4a}$$

Goods whose sales are growing "more" will be called "young" and goods whose sales are growing "less" will be called "old." With many goods, which "on the average" are "alike," Equation (4a) shows that there must be *a constant fraction of young goods in the economy.* Accordingly, if no goods "die," *the arrival rate of young goods must grow exponentially with time,* such that *the number of goods also grows exponentially with time.* Note that this means that the number of new markets (in which initial competition for dominance has to be financed by sales of the nonproducible good) will grow at a constant exponential rate. This rate will be the steady state growth rate of the economy and, by assumption, identical to the rate r. The expectation on the part of consumers and firms that q normally should grow at the rate r is thus rational, in the sense that it will grow at this rate for stable competitive relationships in steady-state growth.

Note that in the steady state, $n(t)$ and q both grow at r.

Disequilibrium

We would now like to discuss briefly the general effects of greater or lower values of $\dot{y}$. Differentiating (2) with respect to time, we get

$$\dot{X}_i = (w\dot{L} - \dot{q}\dot{y} - q\ddot{y})F_i + (wL - q\dot{y})\dot{F}_i\,, \tag{9}$$

which inserted into (2) gives

$$\frac{\dot{L}}{L} = \frac{C(\pi + r)\sum_{i=1}^{n} b_i X_i}{wL\sum_{i=1}^{n} b_i F_i} + \frac{q\dot{y}}{wLP_o\sum_{i=1}^{n} b_i F_i}$$

$$- \left(1 - \frac{q\dot{y}}{wL}\right)\frac{\sum_{i=1}^{n} b_i \dot{F}_i}{\sum_{i=1}^{n} b_i F_i} + \frac{\dot{q}\dot{y} + q\ddot{y}}{wL}\,; \tag{10}$$

where $\pi \equiv [\Sigma_{i=1}^{n} (P_i - wa_i)X_i]/[P_o\,\Sigma_{i=1}^{n} b_i X_i] - r$ is the average rate of surplus profit. Note how (10) is a "*dynamic Philips curve,*" since for $q\dot{y} < wL$, *rising prices,* resulting in negative $\Sigma_{i=1}^{n(t)} b_i\dot{F}_i$, *allow greater expansion rates of employment such that unemployment may fall,* depending on the growth of the total labor force. The reason for this, of course, is that total surplus, $\Sigma_{i=1}^{n(t)} (P_i - wa_i)X_i$, will go up for growing P_i. Note also, however, that *the growth rate in employment will be smaller if growing amounts of surplus are used for nonproducible goods,* such that $\dot{q}\dot{y} + q\ddot{y} < 0$. As could be expected, higher c, r, and π allow higher growth through higher investment.

No New Goods

A particularly interesting situation is that in which the flow of new products falls short of the need and perhaps even stops. As is well known from ordinary Keynesian growth models, this causes no problems as long as capitalists keep investing. The issue here, however, is that investment has to be shifted to old sectors whose growth has tapered off. Assume an equilibrium situation; here, firms in old industries use their surplus on loans and the nonproducible good. If they do not find a new product into which they can channel their funds, they continue to accumulate in the manner described above. Eventually this happens in more and more industries, and the aging is further speeded up by the fact that surplus now exceeds investment. Eventually all products stop growing and all investment stops, so all loan demand stops and the entire surplus is hoarded.

The point in this process is that total $\dot{y}$ is outside the control of any individual firm, and firms have no way of agreeing to change it. As long as no new products turn up, no firm has an incentive to lower $\dot{y}$.

A further complicating factor will be the rise in q following increased demand. For longer or shorter periods, $\dot{q}/q$ may exceed $r + \pi$, jeopardizing even new product investment. The assumption that a sudden stop in the supply of new products will lead to a total halt in investment is therefore defensible. Furthermore, as we shall now see, this situation is inflationary.

In order to look at the conditions under which (3) has the property that prices increase if no new products arrive, we differentiate (3) with respect to time and get

$$[I - M(F_{pd}^{-2}F_dF_{pp} - F_{pd}^{-1}F_p)]\dot{P} = -\dot{M}F_{pd}^{-1}F + M(F_{pd}^{-2}F_dF_{pt} - F_{pd}^{-1}F_t)\,; \qquad (11)$$

where F_{pp} and F_p are $n \times n$ matrices with (row i, column j)-elements $\delta^2F_i/(\delta P_i\delta P_j)$ and $\delta F_i/\delta P_j$, respectively, while I, M, F_{pd}, F_d are diagonal $n \times n$ matrices with typical elements 1, $m_i(t)$, $\delta F_i/\delta P_i$, and F_i. Finally $\dot{P}$, F, F_{pt}, F_t, and P will denote n vectors with typical elements $\dot{P}_i$, F_i, $\delta^2F_i/(\delta P_i\delta t)$, $\delta F_i/\delta t$, and P_i. Let us now look at the RHS of (11) and use (F3) and (F4), so, as $t \rightarrow \infty$ and no new goods arrive, $M \rightarrow 0$ and the RHS of (11) goes positive.

As for the LHS, we can apply a theorem by which $(I - E)^{-1}$ is nonnegative, if E is a nonnegative $n \times n$ matrix and there exists a positive n vector called $\mathbf{e}$ such that $\mathbf{e} > E\mathbf{e}$. [The theorem follows immediately from the Corollary on p. 58 in McKenzie (1960) and Theorem 4 and Remark 2 in Appendix A of Arrow and Hahn (1971).] Note first that $M(F_{pd}^{-2}F_dF_{pp} - F_{pd}^{-1}F_p)$ is nonnegative by (F1). Using P as the $\mathbf{e}$ vector, we find the condition $P > EP$ as $P > M(F_{pd}^{-2}F_dF_{pp} - F_{pd}^{-1}F_p)P$. Using that $\Sigma_{i=1}^{n(t)} F_iP_i = 1$ such that $F_pP = -F$, and that, by (3) $-MF_{pd}^{-1}F < P$, the condition above at least holds if (F2) holds. So, under (F1)–(F4), $[I - M(F_{pd}^{-1}F_dF_{pp} - F_{pd}^{-1}F_p)]^{-1}$ is therefore nonnegative, and as $t \rightarrow \infty$, we will eventually get $\dot{P} \geq 0$, since the RHS of (11) goes positive. So, *unless new* *products enter the economy, real prices* (or profit rates) *eventually rise,* since we end in a situation which essentially amounts to monopoly inflation.

In order to investigate the employment properties of this situation, we differentiate (4) with respect to time under the assumption that all surplus is hoarded so $\Sigma_{i=1}^{n(t)} b_i \dot{X}_i = 0$. In aggregated form this gives

$$-(\dot{q}\dot{y} + q\ddot{y}) = c \sum_{i=1}^{n(t)} (P_i - wa_i)\dot{X}_i + c \sum_{i=1}^{n(t)} \dot{P}_i X_i \approx c \sum_{i=1}^{n(t)} \dot{P}_i X_i \,. \quad (12)$$

(If all products are "similar," the first part on the RHS will be approximately 0.)

If we now use (2), we get

$$\sum_{i=1}^{n(t)} P_i X_i = wL - q\dot{y} \,,$$

which differentiated with respect to time and inserted in (12) gives

$$w\dot{L} \approx (1 - c) \sum_{i=1}^{n(t)} \dot{P}_i X_i > 0 \,.$$

Thus, *employment still grows as long as $c < 1$*. In most cases, however, unemployment will grow, since the growth of the labor force is likely to be higher than $\dot{L}$ above. This is especially the case if the labor force grows fast enough to allow the much faster growth in L found in the equilibrium situation. So at the limit, you would like the product "population" to grow as fast as the labor population. Although the argument will not be presented formally, it should be intuitively clear that a recovery will be helped by positive $\dot{y}$, in the same way the slump is deepened by negative $\dot{y}$ [use (9) and (10)].

Technical Progress

Employment can decrease if we introduce capital-using, labor-saving technical progress, partly corresponding to the first BCG premise. An extension of the above model, which could incorporate this, would have time-varying labor and capital coefficients $a_i(t)$, $b_i(t)$. These time-varying production coefficients would give the following dynamic Philips curve:

$$\frac{\dot{L}}{L} = \frac{c(r+\pi)\sum_{i=1}^{n(t)} b_i X_i}{wL\sum_{i=1}^{n(t)} b_i F_i} + \frac{q\dot{y}}{wLP_o\sum_{i=1}^{n(t)} b_i F_i}$$

$$- \left(1 - \frac{q\dot{y}}{wL}\right)\frac{\sum_{i=1}^{n(t)} (\dot{b}_i F_i + b_i \dot{F}_i)}{\sum_{i=1}^{n(t)} b_i F_i} + \frac{\dot{q}y + q\dot{y}}{wL}; \qquad (10a)$$

where $\dot{b}_i$ is new. So technical progress of the capital-using type may lower $\dot{L}$. If we assume $a_i w + b_i r P_o \to 0$ for $t \to \infty$, the inflation proof is left unchanged. In the unemployment proof, if all surplus is hoarded and all product are "alike," such that all weighted sums of the $\dot{X}_i$'s are close to 0, then $w\dot{L} \simeq (1 - c)\ \Sigma_{i=1}^{n(t)}\ P_i X_i + cw\ \Sigma_{i=1}^{n(t)}\ a_i X_i + \Sigma_{i=1}^{n(t)}\ b_i X_i$, which may be negative for labor-saving technical progress. So continuing capital-using, labor-saving technical progress can lead to genuine stagflationary pressures, or even "depreflation," if no new goods appear.

4. Conclusion

The aim of this paper was to find a macroeconomic analogy to BCG's concept of a balanced portfolio of businesses and to extend the analysis to disequilibrium situations. The mechanics of the model are extremely simple. Young products boost investment and thus effective demand (in the Keynesian sense), whereas old products supply savings, but also exert inflationary pressures. The model is constructed to exhibit these mechanics in the simplest possible way; no attempt is made at any degree of generality.

If one compares the crisis-and-growth explanation in the preceding model to that in other models, the emphasis is laid, in a traditional manner, on effective demand. The analysis is different in two ways, however: first, it explains investment as a function of the share of new products in the economy; and second, the monopolistic pricing models can characterize the crisis by either inflation or unemployment. The increased depth and width are obtained through the product life cycle concept and its derivative characteristics, rather than from, e.g., a monetary sector.

It is interesting to see how the economic policies employed today are evaluated by the model above. Countries of the industrialized capitalist world define their current economic problems as having to do with the balance-of-payments deficit, unemployment, and/or inflation. The means used to handle these problems are either Keynesian demand stimulation or Classical regulation of relative prices through changes in interest rates, wages, and/or exchange rates.

A balance-of-payment deficit is handled today by attempts to make exports cheaper. Following the model above, such a crisis is due to the country's failure to hold its share of new products in the world market, so exports are mainly old products with low price elasticity. *Thus, exactly when you need the policy, it works less efficiently than otherwise.* Furthermore, the often-seen companion policy of cutting domestic consumption will place domestic firms in young industries at a disadvantage on the world market, and thus prevent solution of the original problem.

If an unemployment crisis is perceived in Keynesian terms, the traditional policy is demand stimulation. Following the above model, the economy has too many old goods. Reasoning informally from a somewhat more general model than that in Section 2, it becomes clear that increased income in a society with unemployment benefits is not likely to increase sales of old products as much as sales of young products, because of the differences in price elasticities. Thus, the multiplier will be small, since most of the government spending will go to imports. And again, exactly when the policy is most needed, it works least well.

Finally, the model indicates that some inflationary situations could be reversed through the introduction of more new products—a remedy directly counteracted by the current practices of monetary restraint.

All in all, the model shows the limitations of the currently used short- and medium-term policies and points to a specific long-term alternative, at least for some types of crises.

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