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IS OPTIMISM GOOD IN A KEYNESIAN ECONOMY?

Torsten Persson

Lars E.O. Svensson

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Cambridge MA 02138

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ABSTRACT

Assume that an economy is in a state of Keynesian unemployment. Since production is demand-determined there are bootstraps (multiple) equilibria. Then, the more optimistic agents are about the future the higher will be their demand today and hence current production. In that limited sense optimism is good. But assume that when the future arrives the optimism turns out to be unwarranted, which forces a downward adjustment. Is this unwarranted optimism still good?

We analyze this question by help of a general equilibrium model of a small open economy where the sequence of adjustment and readjustment is modeled as two successive temporary equilibria. The question whether optimism is good is posed in terms of an explicit (ex post) welfare evaluation.

We find that if the future is Walrasian, the future multiplier is unity, whereas the present multiplier is larger than unity. Then optimism increases ex post welfare. If the future has Keynesian unemployment, optimism still increases ex post welfare, as long as the present multiplier is larger than the future one. A necessary and sufficient condition for this is presented.

Torsten Persson
Institute for International
Economic Studies
S-106 91 STOCKHOLM, SWEDEN
(8)16 30 66, 16 30 75

Lars E.O. Svensson
Institute for International
Economic Studies
S-106 91 STOCKHOLM, SWEDEN
(8)16 30 70, 16 30 75
and
NBER (Visitor 1982-83)
1050 Massachusetts Ave.
CAMBRIDGE, MA 02138
(617)868-3940, 868-3900

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by
Torsten Persson and Lars E.O. Svensson*

1. INTRODUCTION

It is often claimed that expectations are crucial for Keynesian economics which we here identify as dealing with equilibria with general excess supply. Expectations have, however, been conspicuous by their absence from the analysis of such equilibria, at least when it comes to formal treatment. Only in recent work has the role of expectations been taken seriously. One example is the paper by Neary and Stiglitz (1983). A typical feature in the fix-price model presented by Neary and Stiglitz is that is has "bootstraps equilibria". Current production and income is demand determined and therefore positively (negatively) related to optimistic (pessimistic) expectations about future income. Therefore optimism is good in the limited sense that it increases current production.

In this paper we propose to go further than that and approach the following problem. Consider an economy which suffers from Keynesian unemployment. That is, there is excess supply of both goods and labor at the prevailing fixed prices, as in the now classic paper by Barro and Grossman (1971). Suppose that agents would be more optimistic about the future. Current spending would then adjust upwards and increase current production. However, when the future arrives, suppose that the earlier optimism turns out to be unwarranted. That would trigger off a necessary downward adjustment. Would agents then be better off ex post after this sequence of adjustment and readjustment?

We shall formulate the optimistic, or more precisely, the over-optimistic, expectations as a perception of future productivity increases. We treat this case since it is simple to analyze, but our argument is general enough to be valid also for other sources of optimism; see the final section for a further discussion.

Our argument will be valid also for the opposite case of pessimism, so the reader who finds that more interesting should read pessimism and worse off instead of optimism and better off everywhere in the paper.

Our framework of analysis is a two-period general equilibrium model of a small open economy. It incorporates optimizing households and firms, so the question about whether agents are better off can be posed in terms of an explicit welfare evaluation. In this economy labor is used to produce two goods, tradeables and nontradeables.[1] We assume that the wage and the price of non-tradeables in the first period are fixed at such levels that there is excess supply of labor and nontradeables. The situation at this date is thus reminiscent of the Keynesian unemployment regime treated in Neary (1980) and other consecutive work, which applies the theory of temporary equilibrium with rationing to open economies. The explicitly specified inter-temporal two-sector structure also makes our model related to Razin (1980).[2] Agents in our model have a form of weak rational expectations. Although their expectations about exogenous variables in the future are not necessarily correct, given any set of these variables, their expectations about the endogenous variables of the model are consistent with future equilibrium.[3]

The paper is organized in the following manner. In Section 2 we present the structure of our model. There we assume that expectations are correct. This gives us the Perfect Foresight Economy, which will be used as a benchmark in the remainder of the paper. Section 3 analyzes the Optimistic Economy, where agents' expectations about future income are over-optimistic, and turn out to be false ex post. The resulting process of expansion and contraction is studied as a sequence of two temporary equilibria. In this section the future is characterized by Walrasian market clearing. We show that under these circumstances optimism is unambiguously welfare increasing. When instead the future, like the present, is a Keynesian underemployment situation, optimism may or may not increase welfare. We treat that case in Section 4 and derive the appropriate conditions. In Section 5 the main arguments are summarized. We also discuss limitations of the analysis and some extensions.

2. THE PERFECT FORESIGHT ECONOMY

We consider a small open economy. There are two dates, $t = 1$ and 2. At each date there are traded and nontraded goods. The economy faces a perfect world credit market with a given rate of interest. In this section we study a Perfect Foresight Economy, for which we assume that there is perfect foresight at date 1 about all variables at date 2. The economy is Keynesian at date 1 and Walrasian at date 2, in the sense that prices and wages are rigid and output of nontraded goods is demand determined at date 1, whereas prices and wages are flexible and there is full employment at date 2.

Let us first look at the production side at date 1. There is no capital and no investment. Labor is used to produce traded and non-traded goods according to the well behaved production functions $x = f(\ell)$ and $z = g(n)$, where x and z denote production of traded and nontraded goods, respectively, and ℓ and n denote employment in the traded and nontraded goods sectors. We define the date 1 profit functions for traded and nontraded goods as $\Pi^1(P,W) = \max\{Pf(\ell) - W\ell\}$ and $\psi^1(Q,W) = \max\{Qg(n) - Wn\}$, where P, Q and W are the nominal prices of traded and nontraded goods, and the nominal wage, measured in some arbitrary unit of account. Let $q = Q/P$ and $w = W/P$ denote the price of nontraded goods (relative to traded goods) and the wage (relative to traded goods), respectively.

At date 1, the price of traded goods and the wage, q^1 and w^1, are assumed to be exogenously given. By standard properties of the profit function, the <u>notional</u> supply of traded and nontraded goods at date 1 are given by $\Pi_p^1(1,w^1)$ and $\psi_q^1(q^1,w^1)$, where Π_p^1 and ψ_q^1 denote the partials $\partial\Pi^1/\partial P$ and $\partial\psi^1/\partial Q$. (Subindices will denote partials throughout the paper.)

For traded goods, <u>actual</u> supply, x^1, will equal notional supply. However, we shall assume that, at the given wage and price of nontraded goods, demand for nontraded goods, d^1, is less than the notional supply. That is, we assume firms are rationed and that actual supply of nontraded goods at date 1, z^1, is demand determined. Thus, the actual supplies at date 1 are given by

$$x^1 = \Pi_p^1(1,w^1), \quad \text{and}$$

(2.1)

$$z^1 = d^1 < \psi_q^1(q^1,w^1) \ .$$

The associated employment levels are $\ell^1 = -\Pi_w^1(1,w^1)$ and $n^1 = g^{-1}(z^1)$. We assume that the sum $(\ell^1 + n^1)$ is less than the given amount of labor L^1, so households are rationed in the labor market.

For date 2, we introduce a productivity parameter α in the traded goods sector, such that the production function is $x = \alpha f(\ell)$. Date 2 wages are flexible and all labor, L^2, is fully employed. We define the Gross Domestic Product function at date 2 as $Y^2(P^2,Q^2,L^2,\alpha) = \max \{P^2 f(\ell) + Q^2 g(n^2) : \ell^2 + n^2 = L^2\}$, where P^2 and Q^2 are the nominal prices of traded and nontraded goods at date 2. The GDP function gives the maximum value of output, at given prices and level of employment, which is equivalent to GDP under competitive conditions. Introduce $q^2 = Q^2/P^2$, the price (relative to traded goods) of nontraded goods at date 2. By standard properties of the GDP function the competitive (notional and actual) supplies of traded and nontraded goods at date 2 are given by

$$x^2 = Y_p^2(1,q^2,L^2,\alpha) \quad \text{and} \tag{2.2}$$

$$z^2 = Y_q^2(1,q^2,L^2,\alpha) .$$

Let us next look at the demand side. With regard to welfare and demand, we assume that the economy can be adequately represented by a well behaved utility function $U(c^1,d^1,c^2,d^2)$ where c^1,d^1,c^2 and d^2 denote consumption of traded and nontraded goods at the two dates. We disregard any direct influence of leisure on welfare. (See the final section for a discussion of that case.) We define the corresponding (present value) expenditure function as $E(P^1,Q^1,DP^2,DQ^2,u) = \min \{P^1c^1 + Q^1d^1 + DP^2c^2 + DQ^2d^2 : U(c^1,d^1,c^2,d^2) \geq u\}$, where $D = 1/(1 + R)$ denotes the nominal discount factor which equals one over one plus the nominal rate of interest, R. The expenditure function gives the minimum present value of expenditure required to reach a given welfare level. By standard properties of the expenditure function, consumption of traded and nontraded goods at the two dates are

$$c^1 = E_1,\ d^1 = E_2,\ c^2 = E_3 \text{ and } d^2 = E_4\ , \tag{2.3}$$

where E_1, E_2, E_3 and E_4 denote $\partial E/\partial P^1$, $\partial E/\partial Q^1$, etc.

Let us so look at an equilibrium of the Perfect Foresight Economy. Let $\delta = dP^2/P^1$ denote the given world traded-goods discount factor, and let α^o denote date 2 productivity. Then, we can represent an equilibrium by the equations

$$E(1,q^1,\delta,\delta q^2,u^o) = x^1 + q^1 z^1 + \delta Y^2(1,q^2,L^2,\alpha^o) \equiv y\ , \tag{2.4}$$

$$x^1 = \Pi_p^1(1,w^1)\ , \tag{2.5}$$

$$z^1 = E_2(1,q^1,\delta,\delta q^2,u^o)\ , \text{ and} \tag{2.6}$$

$$Y_q^2(1,q^2,L^2,\alpha^o) = E_4(1,q^1,\delta,\delta q^2,u^o)\ . \tag{2.7}$$

Equation (2.4), the intertemporal budget constraint, states that the present value of expenditure on consumption equals the sum of the value of production at date 1, i.e. GDP at date 1, and the present value of GDP at date 2. The sum of these two is national wealth, denoted by y. Equation (2.6) follows from (2.1) and (2.3), and states that production of nontraded goods at date 1 equals demand. Similarly, by (2.7) supply of nontraded goods at date 2 equals demand.

For a given price of nontraded goods and a given wage at date 1, q^1 and w^1, production of traded goods at date 1, x^1, is given by (2.5) (cf. (2.1)). The world discount factor, δ, the full employment level at date 2, L^2, and the productivity level, α^o are also given. Then the equations (2.4)-(2.7) determine the endogenous production of nontraded goods at date 1, z^1, the price of nontraded goods at date 2, q^2, and the welfare level, u^o. Production of traded and nontraded goods at date 2 is then given by (2.2), and consumption of traded goods by (2.3). Hence, the whole equilibrium is determined.

The productivity level α^o thus gives rise to a welfare level u^o in the Perfect Foresight Economy. We can interpret this welfare level as referring both to the ex ante welfare evaluation at date 1 of the economy's present and future consumption, and to the ex post welfare evaluation at date 2 of the economy's past and present consumption. In the following, ex post welfare u^o resulting from the (true) productivity α^o in the Perfect Foresight Economy will be our reference welfare level.

3. THE OPTIMISTIC ECONOMY

In this section we analyze the Optimistic Economy, where agents' expectations about date 2 are not necessarily correct, but which in all other respects is identical to the Perfect Foresight Economy. Consider a temporary equilibrium at date 1 in that economy. Such an equilibrium can be represented by

$$E(1,q^1,\delta,\delta\tilde{q}^2,\tilde{u}) = \tilde{x}^1 + q^1\tilde{z}^1 + \delta Y^2(1,\tilde{q}^2,L^2,\tilde{\alpha}) \quad , \tag{3.1}$$

$$\tilde{x}^1 = \Pi_p^1(1,w^1) \quad , \tag{3.2}$$

$$\tilde{z}^1 = E_2(1,q^1,\delta,\delta\tilde{q}^2,\tilde{u}) \quad , \text{ and} \tag{3.3}$$

$$Y_q^2(1,\tilde{q}^2,L^2,\tilde{\alpha}) = E_4(1,q^1,\delta,\delta\tilde{q}^2,\tilde{u}) \quad , \tag{3.4}$$

where all date 2 variables are subjectively certain (point) expectations. As mentioned in the introduction we shall assume that agents' expectations about the endogenous date 2 variables are consistent with future market clearing. Accordingly, (3.4) defines the expected price of nontradeables $\tilde{q}^2$, given the exogenous variables, in particular the expected productivity level $\tilde{\alpha}$. Given this assumption, the system (3.1)-(3.4) can be solved in the same way as the equilibrium system in the Perfect Foresight Economy. It is then clear that for each expected productivity level $\tilde{\alpha}$, there is an associated ex ante welfare level $\tilde{u}$. If $\tilde{\alpha} = \alpha^o$, that is expectations are correct, then, of course, $\tilde{u} = u^o$. But consider instead the situation when agents are (over) optimistic, so that $\tilde{\alpha} = \alpha^o + d\tilde{\alpha}$, where $d\tilde{\alpha} > 0$. This leads to ex ante welfare $\tilde{u} = u^o + d\tilde{u}$. Let us derive an expression for $d\tilde{u}$.

From (3.1) and (3.3), we get

$$E_u d\tilde{u} = q^1 d\tilde{z}^1 + \delta Y_\alpha^2 d\tilde{\alpha} \quad \text{and} \tag{3.5}$$

$$d\tilde{z}^1 = E_{24}\,\delta d\tilde{q}^2 + E_{2u} d\tilde{u} = E_{24}\,\delta d\tilde{q}^2 + d_y^1 E_u d\tilde{u}\ , \tag{3.6}$$

where $d_y^1 \equiv E_{2u}/E_u$ is the marginal propensity to consume nontradeables at date 1 out of wealth y, and where Y_α^2 denotes the derivative $\partial Y^2/\partial\alpha$. ($Y^2 = f(\ell^2) = x^2/\alpha$.) Next, we determine $d\tilde{q}^2$ from (3.4). Differentiating and re-arranging, we obtain

$$d\tilde{q}^2 = (Y_{qq}^2 - E_{44}\delta)^{-1} d_y^2 E_u d\tilde{u}\ , \tag{3.7}$$

where the definition of d_y^2 is analogous to that of d_y^1. It is now straightforward to substitute (3.7) into (3.6) and the resulting expression into (3.5) to finally derive

$$E_u d\tilde{u} = \tilde{m}\ \delta Y_\alpha^2 d\tilde{\alpha} > 0\ , \tag{3.8}$$

where

$$\tilde{m} = 1/(1 - q^1 d_y^1 - q^1 E_{24}\delta(Y_{qq}^2 - E_{44}\delta)^{-1} d_y^2) > 1\ .$$

This result can be easily interpreted. The difference between ex ante utility in the Optimistic and Perfect Foresight Economy, $d\tilde{u}$, is proportional to the RHS of (3.8), (E_u is the inverse of the marginal utility of wealth), which in turn is the future (impact) income difference, generated by the expected higher productivity, times a multiplier. The (ex ante) multiplier $\tilde{m}$ arises since the demand determined production of nontraded goods $\tilde{z}^1$ is higher in the Optimistic Economy for two reasons. One is a positive wealth (or more precisely welfare) effect on demand; this is the second term in the denominator of $\tilde{m}$. The other is a substitution effect in response to the higher price of nontradeables at date 2 (to see this, insert (3.8) into (3.7)); this is the third term in the denominator of $\tilde{m}$. This effect is also positive if non-traded goods at the two dates are Hicksian (net) substitutes, which we assume (this assumption is equivalent to $E_{24} > 0$).

Now, let date 2 arrive. We can then establish a new temporary equilibrium, conditional on what has already happened at date 1 and the actual date 2 productivity level, $\bar{\alpha}$, as distinct from the one expected at date 1, $\tilde{\alpha}$. With regard to demand the choices of the representative consumer are conditional on $\tilde{c}^1$ and $\tilde{d}^1$, his consumption of the two goods at date 1. To represent these choices, we define the conditional (current value) expenditure function $\bar{E}(1,q^2,\tilde{c}^1\tilde{d}^1,u) = \min\{\tilde{c}^2 + q^2d^2 : U(\tilde{c}^1,\tilde{d}^1,c^2,d^2) \geq u\}$. When it comes to production, however, we can represent it in the same way as before, since there is neither investment nor any other intertemporal links that condition date 2 production possibilities upon choices made at date 1. A temporary equilibrium at date 2 may then be described by:

$$\bar{E}(1,\bar{q}^2,\tilde{c}^1,\tilde{d}^1,\bar{u}) = Y^2(1,\bar{q}^2,L^2,\bar{\alpha}) - (\tilde{c}^1 - \tilde{x}^1)/\delta \tag{3.9}$$

$$Y_q^2(1,\bar{q}^2,L^2,\bar{\alpha}) = \bar{E}_q(1,\bar{q}^2,\tilde{c}^1,\tilde{d}^1,\bar{u}) \tag{3.10}$$

The second term on the RHS of the budget constraint (3.9) is the repayment plus interest of the economy's net borrowing from abroad at date 1.

If the expectations held at date 1 would materialize, that is when $\bar{\alpha} = \tilde{\alpha}$, the solution of (3.9) and (3.10) would yield $\bar{u} = \tilde{u}$ (and $\bar{q}^2 = \tilde{q}^2$). The ex post outcome would be exactly what was expected ex ante.

However, in the Optimistic Economy, expectations are not fulfilled, and the actual productivity level is indeed lower than expected. In other words, we assume $\bar{\alpha} = \tilde{\alpha} + d\bar{\alpha} = \alpha^o + d\tilde{\alpha} + d\bar{\alpha} = \alpha^o$ or $d\bar{\alpha} = -d\tilde{\alpha}$. From (3.9) we can derive

$$\bar{E}_q d\bar{q}^2 + \bar{E}_u d\bar{u} = Y^2_q d\bar{q}^2 - Y^2_\alpha d\tilde{\alpha} \ ,$$

but since market clearing in the market for nontradeables implies $\bar{E}_q = Y^2_q$, this simplifies to

$$(3.11) \qquad \bar{E}_u d\bar{u} = - Y^2_\alpha d\tilde{\alpha} \ .$$

However, one can show that $\bar{E}_u = E_u/\delta$.[4] Therefore, (3.11) can be rewritten as

$$(3.12) \qquad E_u d\bar{u} = - \delta Y^2_\alpha d\tilde{\alpha} \ ;$$

the date 2 multiplier on the (impact) fall in income is equal to one.

We can now compare the welfare outcome ex post in the Optimistic Economy with that in the Perfect Foresight Economy. The two are related in the following way

$$\bar{u} = \tilde{u} + d\bar{u} = u^o + d\tilde{u} + d\bar{u} \ .$$

Using our intermediate results (3.8) and (3.12), we have the result

$$(3.13) \qquad d\tilde{u} + d\bar{u} = (\tilde{m} - 1)\delta Y^2 d\tilde{\alpha}/E_u > 0 \ ,$$

so $\bar{u} > u^o$. Indeed, consumers are better off ex post in the Optimistic Economy than in the Perfect Foresight Economy.

The intuition behind this result is quite simple. We noted that the ex ante welfare multiplier $\tilde{m}$ is larger than unity because demand for, and thereby production of, nontradeables at date 1 is higher, as a result of the expectations of higher income. However, the date 2 multiplier is equal to unity since all markets clear via price adjustment. The net effect on welfare depends on the difference between the two and is hence positive.

4. A KEYNESIAN FUTURE

The previous two sections have considered the Perfect Foresight Economy and the Optimistic Economy with a Keynesian date 1 and a Walrasian date 2. In this section we shall analyze the case when both dates are Keynesian, in the sense that the prices of nontraded goods and wages are rigid, output of nontraded goods is demand determined, and there is excess supply of labor at both dates.[5]

The equilibrium in the Perfect Foresight Economy is then given by the equations

$$E(1,q^1,\delta,\delta q^2,u^o) = x^1 + q^1 z^1 + \delta(x^2 + q^2 z^2) \tag{4.1}$$

$$x^1 = \Pi_p^1(1,w^1) \tag{4.2}$$

$$z^1 = E_2(1,q^1,\delta,\delta q^2,u^o) \tag{4.3}$$

$$x^2 = \Pi_p^2(1,w^2,\alpha^o) \text{ , and} \tag{4.4}$$

$$z^2 = E_4(1,q^1,\delta,\delta q^2,u^o) \tag{4.5}$$

where the date 2 profit function for the traded goods sector is defined as $\Pi^2(P,W,\alpha) = \max\{P\alpha f(\ell) - W\ell\}$. The equilibrium condition (2.7) for nontraded goods at date 2 for the Walrasian case is here replaced by equations (4.4), giving the supply determined output of traded goods, and (4.5), giving the demand determined output of nontraded goods. For exogenous productivity level, α^o, prices of nontraded goods, q^1 and q^2, wage rates, w^1 and w^2, and discount factor, δ, the five equations can be solved for the endogenous production of traded goods, x^1 and x^2, production and consumption of nontraded goods, z^1 and z^2, and the welfare level, u^o.

In the Optimistic Economy, in analogy with Section 3, the temporary equilibrium is given by equations (4.1)-(4.5), but with the expected productivity level $\tilde{\alpha}$ ($= \alpha^o + d\tilde{\alpha} > \alpha^o$) and ex ante welfare $\tilde{u}$ ($= u^o + d\tilde{u}$). Differentiating for $d\tilde{\alpha} > 0$ and solving for $d\tilde{u}$ gives

(4.6) $$E_u d\tilde{u} = \tilde{m}\delta\Pi^2_{p\alpha}\,\tilde{\alpha} > 0 ,$$

where the ex ante multiplier is

$$\tilde{m} = 1/(1 - q^1 d^1_y - \delta q^2 d^2_y) > 1 .$$

The excess $d\tilde{\alpha}$ of the Optimistic Economy's expected productivity level over the (true) productivity level in the Perfect Foresight Economy implies that the expected date 2 production of traded goods exceeds that of the Perfect Foresight Economy by $d\tilde{x}^2 = \Pi^2_{p\alpha} d\tilde{\alpha} > 0$. This leads to higher demand and production of nontraded goods at both dates, and the ex ante multiplier depends consequently on the propensities to consume nontraded goods at both dates. It is larger than unity (if nontraded goods are normal). Since prices of nontraded goods are unchanged, there are no substitution effects as in the previous case.

The temporary equilibrium at date 2 is given by the equations

$$\bar{E}(1,q^2,\tilde{c}^1,\tilde{d}^1,\bar{u}) = x^2 + \delta z^2 - (\tilde{c}^1 - \tilde{x}^1)/\delta \tag{4.7}$$

$$x^2 = \Pi_p^2(1,w^2,\bar{\alpha}) \text{ , and} \tag{4.8}$$

$$z^2 = \bar{E}_2(1,q^2,\tilde{c}^1\tilde{d}^1,\bar{u}) \text{ .} \tag{4.9}$$

Differentiating for the difference $d\bar{\alpha} = - d\tilde{\alpha} < 0$ between the actual productivity and the expected productivity, gives the difference between ex post and ex ante welfare, $d\bar{u}$; as

$$E_u d\bar{u} = - \bar{m}\delta\Pi_{p\alpha}^2 d < 0 \text{ ,}$$

where the date 2 multiplier is given by

$$\bar{m} = 1/(1 - q^2\bar{d}_y^2) > 1 \text{ ,}$$

where $\bar{d}_y^2 = \bar{E}_{2u}/\bar{E}_u$ is the conditional marginal propensity to consume nontraded goods at date 2 out of income at date 2, conditional upon given consumption of traded and nontraded goods at date 1, and where we have used the relation $\bar{E}_u = E_u/\delta$.

The difference between ex post welfare in the Optimistic Economy and in the Perfect Foresight Economy is then

$$d\tilde{u} + d\bar{u} = (\tilde{m} - \bar{m})\delta\Pi_{p\alpha}^2 d\tilde{\alpha}/E_u \gtrless 0 \text{ ,} \tag{4.10}$$

the sign of which depends on the relative size of the multipliers. We realize that the smaller the conditional marginal propensity to consume nontraded goods at date 2, the smaller is the date 2 multiplier, and the more likely is it that ex post welfare is higher in the Optimistic Economy.

If we assume that preferences are weakly homothetically separable between the two dates, we can express the necessary and sufficient condition in terms of relative marginal propensities to consume, $q^t d_y^t / c_y^t$, where c_y^t is the marginal propensity to consume traded goods at date t out of wealth. (We recall that $q^2 d_y^2 / c_y^2 = q^2 \bar{d}_y^2 / \bar{c}_y^2$ for weak homothetic separability.) Then we have[6]

$$(4.11) \qquad \bar{u} \gtrless u^o \quad \text{if and only if} \quad (q^1 d_y^1 / c_y^1) \gtrless (q^2 \bar{d}_y^2 / \bar{c}_y^2) \ .$$

That is, ex post welfare is higher in the Optimistic Economy if and only if the relative propensity to consume nontraded goods at date 2 is smaller than that at date 1.

5. CONCLUDING REMARKS

We have shown that expected future productivity increases lead to a multiplicative effect on ex ante welfare, with an ex ante multiplier larger than one. When the expected productivity increase does not occur, i.e. expectations were over-optimistic, there is a negative multiplicative effect on ex post welfare relative to ex ante welfare. If the second period is Walrasian, this second period multiplier is equal to one. Thus, the net effect on ex post welfare of over-optimistic expectations is positive.

If the second period is instead Keynesian both multipliers are larger than one, and the net effect on ex post welfare is in general ambiguous. The smaller the marginal propensity to consume nontraded goods in period 2, given period 1 consumption, the smaller is the period 2 multiplier, and the more likely is it that over-optimism increases ex post welfare.

To the extent that over-optimism increases ex post welfare it follows, of course, that over-pessimism decreases ex post welfare.

What is going on here is, of course, a second-best result. In the presence of rigid prices and wages that make the equilibrium in our Perfect Foresight Economy inefficient, the introduction of a "distortion" in the form of incorrect expectations may actually increase welfare.

Actually, the analogy with other distortions carries further. Obviously, the expectational errors introduce a misallocation of consumption over time; agents save too little. But since our reference case is one with perfect foresight, the welfare cost of this misallocation is of second order, in the same way as the distortion caused by the introduction of a small tariff or tax.[7]

Hence, we realize that it is important that our Optimistic Economy is only marginally over-optimistic. If instead an expected increase in income would occur at a point where agents were already more optimistic than in the Perfect Foresight Economy, there would be a first-order effect on welfare of the distortion. Welfare is thus not monotonically increasing; there is rather a maximum for some degree of optimism (cf. the optimal tariff).

On a related point, one may also note that excessive optimism of a finite extent could bring the economy from its state of Keynesian unemployment into a state of so-called repressed inflation. In that case optimism could well decrease welfare even with a Walrasian future.

We have chosen to deal with the effects of over-optimistic expectations about future productivity levels to generate the sequence of expansion and contraction. One could easily extend our model to incorporate government expenditures, and a government (present value) budget constraint. Then, if the over-optimistic expectations (of the private sector) would be an underestimation of the future tax burden implied by a current government deficit, the results would be exactly the same as those that we have derived here.

The inclusion of direct welfare effects of leisure would modify our analysis but lead to similar results. Then the welfare effect of an expansion is not the full value of the output increase, but the difference between this and the value of the decreased leisure, the latter evaluated with the supply price of labor.[8]

We have worked with rigid prices of nontraded goods. The analysis could alternatively be done with rigid wages in terms of traded goods but flexible prices of nontraded goods. This would give a somewhat different form of the multipliers, and more complicated analyses.

Capital goods and investment can be introduced as in Razin (1980). If investment consists of nontraded goods, this adds to the demand of nontraded goods in period 1. Then there will be extra multiplier-accelerator effects via changes in investment. Whether these extra effects will increase or diminish the overall ex ante multiplier will depend on the relative capital intensity of the nontraded goods sector in period 2.

Finally, we do not think that our analysis lends itself to any immediate policy conclusions at this stage. Nevertheless, we believe that our method of incorporating both incorrect expectations and some aspects of a demand determined output in a rigorous intertemporal framework may have much wider applications than the particular problem we have dealt with here.

FOOTNOTES

*An early version of this paper was written when we were visiting the Department of Economics, Tel Aviv University. We wish to thank participants in Seminars there and at the Institute for International Economic Studies, as well as in the Stockholm Theory Workshop.
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1. It is well known that in order to study a situation of excess supply of both goods and labor one needs at least three markets. An alternative to the framework used here is the closed economy model with one aggregate good, labor and money. This is the set-up used by Barro and Grossman (1971) and also by Neary and Stiglitz (1983). Some comment on the absence of money in our model should be made: in the light of this, the equilibrium is not quite Keynesian in the usual sense. In our case, it is not the money price of goods that does not immediately adjust, but the price of nontraded goods in terms of traded goods.

2. Razin (1980) examines the effect of capital mobility and various policies on the current account and on production, investment and consumption of traded and nontraded goods in an explicitly intertemporal model with flexible prices and full employment. Recently, several other papers dealing with macroeconomic issues in an explicitly intertemporal framework have appeared.

3. We could also have dealt with errors in expectation about endogenous variables given the exogenous variables. For a formal treatment of such "biased" expectations, see Persson (1982).

4. We know that $\bar{E}(1,q^2,E_1(,u), E_2(,u)) \equiv E_3(1,q^2,\delta,\delta q^2,u) + q^2E_4(1,q^2,\delta,\delta q^2,u)$. Therefore $\bar{E}_3E_{1u} + \bar{E}_4E_{2u} + \bar{E}_u = E_{3u} + q^2E_{4u}$, or $\bar{E}_u = - \bar{E}_3E_{1u} - \bar{E}_4E_{2u} + E_{3u} + q^2E_{4u}$. But since $\bar{E}_3 = - 1/\delta$ and $\bar{E}_4 = - q^1/\delta$, we can write $\bar{E}_u = [E_{1u} + q^1E_{2u} + \delta E_{3u} + \delta q^2E_{4u}]/\delta$. From the homogeneity of $E(\cdot)$, the expression within square brackets is equal to E_u and we have $\bar{E}_u = E_u/\delta$.

To be precise, we actually evaluate E_u and $\bar{E}_u$ at two different points; E_u at the perfect foresight equilibrium and $\bar{E}_u$ at the date 1 temporary equilibrium. However, the difference between $\bar{E}_u(\cdot,u^o + d\tilde{u})$ and $E_u(\cdot,u^o)/\delta$ consists of second-order terms, which we disregard.

5. We note that one can interpret the date 2 wage and nontraded goods price to be predetermined at date 1, for instance at levels corresponding to market clearing at date 2 given the (erroneous) expectations about future productivity. Such a formulation is used in Persson and Svensson (1982).

6. With weak homothetical separability, the utility function can be written as $\bar{U}(U^1(c^1,d^1), U^2(c^2,d^2))$, where the subutility functions are homothetic. Then the propensities to consume fulfill $\delta d_y^2 = (1 - C_y^1)\bar{d}_y^2$ and $\delta c_y^2 = (1 - C_y^1)\bar{c}_y^2$, where $C_y^1 = c_y^1 + q^1d_y^1$, the total propensity to consume at date 1. We have $\bar{u} \gtrless u^o \Leftrightarrow \tilde{m} \gtrless \bar{m} \Leftrightarrow q^1d_y^1 + \delta q^2d_y^2 \gtrless q^2\bar{d}_y^2$. But $q^1d_y^1 + \delta q^2d_y^2 = q^1d_y^1 + (1 - C_y^1)q^2\bar{d}_y^2$. It follows that the condition can be written $q^1d_y^1/C_y^1 \gtrless q^2\bar{d}_y^2$. Since $c_y^1/C_y^1 = 1 - q^1d_y^1/C_y^1$ and $\bar{c}_y^2 = 1 - q^2\bar{d}_y^2$, we finally get $q^1d_y^1/c_y^1 \gtrless q^2\bar{d}_y^2/\bar{c}_y^2$.

7. For a formal treatment of this and related points, the reader is referred to Persson and Svensson (1982).

8. Let the utility function be $U(c^1,d^1,L^1,c^2,d^2,L^2)$ where $L^t = \ell^t + n^t$. Since only n^t will change, suppress ℓ^t and write the expenditure function as $E(1,q^1,\delta,\delta q^2,n^1,n^2,u)$. With the Walrasian future, differentiating the budget constraint will modify (3.5) into $E_u d\tilde{u} = q^1 d\tilde{z}^1 - E_5 d\tilde{n}^1 + \delta Y^2_\alpha d\tilde{\alpha}$, where $E_5 = \partial E/\partial n^1$ is the supply price of labor. Letting g_n denote $\partial g/\partial n^1$, we have $E_u d\tilde{u} = (q^1 g_n - E_5)d\tilde{n}^1 + \delta Y^2_\alpha d\tilde{n}^1$, where $q^1 g_n - E_5$ is the positive difference between the demand and supply prices of labor, ($q^1 g_n > w^1 > E_5$, since firms are rationed in the goods market and households in the labor market). There will also be direct substitution effects from changes in leisure in the expression for $d\tilde{z}^1$ in (3.6).

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