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WAGE EARNERS FUNDS AND RATIONAL EXPECTATIONS

by

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The purpose of this paper is twofold. One is to show the consequenses on the stock market and on the ownership of firms of the proposed wage-earners' funds, which has been the most hotly debated issue in Sweden the last five years.[1] Another is to illustrate what we mean by rational expectations by applying a rational expectations hypothesis to get a solution to the above-mentioned problem.

The proposal by Labor's economist Rudolf Meidner

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[1] See R. Meidner et.al.

and his group in 1975 to the Swedish Labor Organization included the following. Every year all firms were obliged to issue new shares in the company and give these to the Unions. The proposed method to calculate how many new shares that should be issued was as follows: Calculate the amount that corresponds to a certain share (m) of the profit V before tax (for instance 0.2). Then look at the prevailing stock market price p and print an amount of new shares ΔN, that $p \cdot \Delta N = m \cdot V$. I.e.;

$$\Delta N = \frac{m \cdot V}{p}$$

The number of shares in every instant t can, in a continous analysis, be written:

$$N(t) = N_0 + \int_0^t \frac{m \cdot V}{p(s)} ds \qquad (1)$$

Then, what determines the stock-market price of shares p? It is universally agreed that the stock market price of shares should be equal to the present discounted value of all future dividends per share:

$$p(t) = \int_t^{\infty} e^{-r(s-t)} \cdot \frac{V(1-q)(1-m)}{N^e(s)} ds \qquad (2)$$

where q = profit tax, r = discount rate and $N^e(t)$ = expected number of shares at time t.

The critical thing is now expectations about $N^e(t)$. $N^e(t)$ could be assumed to be determined by anything, e.g., a linear function of time $N_t^e = N_0 + b \cdot t$, or some exponential function of time $N_t^e = N_0 \cdot e^{at}$.

Summing up we have the following system of equations;

$$N(t) = N_0 + \int_0^t \frac{m \cdot V}{p(s)} ds \tag{1}$$

$$p(t) = \int_t^\infty e^{-r(s-t)} \cdot \frac{V(1-q)(1-m)}{N^e(s)} ds \tag{2}$$

$$N^e(t) = \text{function of time or...?} \tag{3}$$

We see that equation (3) is critical to the solution of the system. We can imagine different alternatives. One is that stock market speculators believe that the number of shares will not change. $N^e(t) = N_0$. Another is that the number of shares will increase at a certain rate as a function of time. Assuming adaptive expectations, people then believe that new issues will be forthcoming as before.

Apparently we can solve the system (1)-(3) with any of the above assumption regarding how expectations are formed. However, we realize that all these solutions have the property that speculators in retrospect can be shown to be mistaken since the emission of new shares is actually determined by (1).

The theory of rational expectations means that individuals know the true model, in some sense, and act accordingly. If we assume rational expectations in the above model, then equation (3) becomes: $N^e(t) = N(t)$, i.e. equation (3) is replaced by equation (1).

The solution to the system (1)-(2) above is:[1]

$$p(t) = \bar{p}(0) \cdot e^{-dt} \tag{4}$$

where

$$\bar{p}(0) = \frac{V(1-q)(1-m)-Vm}{rN_0} \tag{5}$$

and

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[1] See appendix.

$$d = \frac{rm}{(1-q)(1-m)-m} \tag{6}$$

The development over time of the number of shares is then:

$$N(t) = N_0 \cdot e^{dt}. \tag{7}$$

The solution to Meidner's proposal of wage-earners' funds means that if new issues to the wage-earners' funds are set at 20 % of the profit and the profit tax is 50 % the effects on the stock-market price would be an immediate decrease of 60 %. If new issues were set at more than 33 1/3 % of the profit, then a zero price is the only fix point, meaning a complete and unmediate crash of the stock market!

SUMMARY AND CONCLUSION:

In the above analysis we have applied the theory of rational expectations to an analysis of a proposal of wage-earners' funds, suggested by Rudolf Meidner to the Swedish Labor Organization in 1975. This proposal has had a tremendous impact on he Swedish political debate since then.

We show that if speculators on the stock market believe that the issue of new shares will continue to follow a hisorical schema, these speculators will on average be wrong. Assuming a model which implies that agents have rational expectations, i.e., know the true model, means that we believe that agents "on average" are wright. The solution to such a model shows that there will be a very strong decrease in stock-market prices if a wage-earners' fund system â la Meidner were introduced.

APPENDIX

Differentiating equations (1) and (2), where $N^e(t) = N(t)$, gives:

$$\dot{N}(t) = \frac{m \cdot V}{p(t)} \quad (8)$$

$$\dot{p}(t) = r \cdot p(t) - \frac{V(1-q)(1-m)}{N(t)} \quad (9)$$

or:

$$\dot{N} \cdot p = m \cdot V \quad (10)$$

$$N \cdot \dot{p} = rNp - V(1-q)(1-m) \quad (11)$$

Substitute $z = N \cdot p$, $\dot{z} = \dot{N}p + N\dot{p}$

which gives:

$$\dot{z} - rz - V\left[m - (1-q)(1-m)\right] = 0 \quad (12)$$

The general solution to the differential equation (12) is:

$$z = Ae^{rt} - \frac{V[m - (1-q)(1-m)]}{r} \tag{13}$$

The coefficient A must be zero because otherwise the value of the firm ($z = N \cdot p$) would go to $+\infty$ or $-\infty$ when $t \to \infty$.

Solving for N(t) and p(t) we have

$$\dot{N}p = mV \tag{14}$$

$$Np = -\frac{V[m - (1-q)(1-m)]}{r} \tag{15}$$

which gives:

$$\dot{N} + N \cdot \frac{rm}{m - (1-q)(1-m)} = 0 \tag{16}$$

which has the solution

$$N(t) = N_0 e^{dt} \tag{17}$$

where

$$d = \frac{rm}{(1-q)(1-m) - m}.$$

The solution to p(t) is then [using (14)],:

$$p(t) = \bar{p}(0) \cdot e^{-dt}$$

where

$$\bar{p}(0) = \frac{V(1-q)(1-m) - Vm}{pN_0}$$

REFERENCES

Meidner, R. et.al., 1975, **Löntagarfonder**, (Wage Earners funds), Stockholm 1975.