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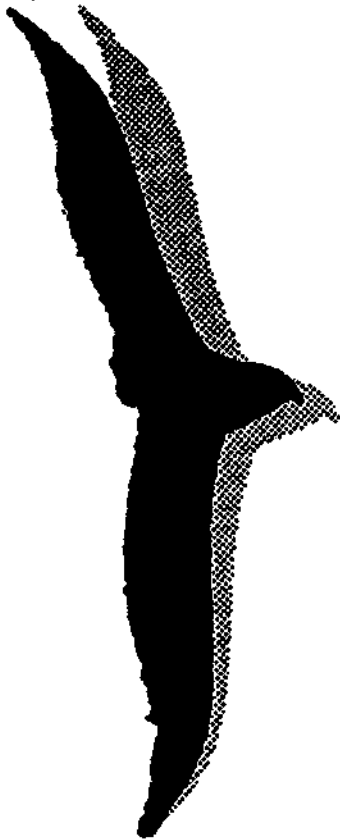## Labour market and social security:
a minfordian model for the Netherlands

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LABOUR MARKET AND SOCIAL SECURITY:
A MINFORDIAN MODEL FOR THE NETHERLANDS

by B. Compaijen and J.A. Vijlbrief[*]

Abstract

This paper examines the relation between unemployment compensation and unemployment in The Netherlands. This relation is studied by means of a small macroeconomic model for an open economy, that assumes equilibrium on the labour market and the current account. The model yields an elasticity of unemployment to benefits of 1.0, which is high compared to microeconomic research and the outcomes of disequilibrium models for The Netherlands. According to the model, a rise in the wedge (i.e. the difference between real labour cost and real net wages) leads to an increase in unemployment, while shifting this wedge from employers to employees induces a fall in unemployment.

1. INTRODUCTION

How do unemployment benefits affect unemployment? This is the major problem our paper addresses. Indeed, in Western European countries unemployment benefits and, as a corollary, unemployment insurance premiums or taxes are high, which may have considerable effects on employment and, hence, on unemployment. For high tax and premium deductions are expected to reduce both the willingness to employ and to get employed, while high benefits constitute an additional reason to withdraw labour supply.

Having put forward the theoretical case we examine the size of the effects. In order to gain insight into this question, we develop an equilibrium model for an open economy. To be more specific, we assume the labour market and the trade balance (or the foreign exchange market for that matter) to be in equilibrium. Our use of an equilibrium analysis does not imply that we take a stand in the equilibrium-disequilibrium debate between new classicals and new keynesians. Our choice of an equilibrium model is inspired by our desire to emphasize long-run impacts. For it is commonly understood that equilibrium forces are stronger in the long run than in the short run, although this is not an undisputed vision. However, in short- and medium-run analysis the choice between an equilibrium model and a disequilibrium model is even less made on the basis of empirical observation and more on the basis of a priori reasoning. For an exposition of this view and a juxtaposition of equilibrium models vis-à-vis disequilibrium models as to the labour market effects of social security (with special reference to The Netherlands) we refer to Den Butter and Compaijen (1991).

The model set out in this paper owes its origin to Minford (1983). Although our model retains its Minfordian flavour, it differs in a number of respects. Firstly, we neglect the distinction between a union and a non-union sector of the labour market. This distinction, to which Minford is attached in view of the unionization that is so characteristic for British labour relations, seems less evident in continental European countries.

Secondly, our specification of labour demand differs from Minford's insofar we use a different framework of analysis. We choose for rather simplistic assumptions to attain as much rigour as possible in the derivations. In doing so we remain rather close to regular model building practice which facilitates a comparison of the results of different types of models (Den Butter and Compaijen, 1991).

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Thirdly, we estimate the model with empirical data for The Netherlands. Our model turns out to be quite different from Minford's model for the British economy and the outcomes of the models preclude easy generalizations on the relation between unemployment benefits and unemployment.

In the next section we give an account of the theoretical model. Our point of departure is labour market equilibrium in a closed economy without unemployment insurance. Its graphical expression is formed by the well-known 'wedge' in the labour market. Hereafter we look into the consequences of introducing unemployment benefits into the model. Then we add the foreign sector to the model and amend the labour market relation. Finally, the section is concluded with a graphical exposition.

The aim of section three is to specify the model equations. The coefficients of the model variables will be determined by estimation supplemented by a priori knowledge.

Section 4 describes a number of simulation exercises that shed light on the relation between benefits and unemployment in the Dutch context. The final section is of a conclusive nature.

2. THE THEORETICAL MODEL

We will be rather brief about the 'wedge' consisting of taxes and social premiums. Without levy of taxes and social premiums labour market equilibrium settles in the intersection of the labour demand (DD) and labour supply (SS) curves, see Figure 1. In this case labour demand and supply both depend on the equilibrating variable w, the real wage rate.

Taxes and social premiums drive a wedge between labour demand and labour supply. Now DD represents the amount of labour employers are willing to demand in view of *real labour cost*. The SS curve pictures the labour supply of employees dependent upon the *real net wage*. Because real labour cost equals $w(1 + T_F)$, with w being the real wage (earnings) and T_F the employers' social premium rate, the labour demand schedule in terms of w shifts, from DD to $D'D'$. Equal labour demand is exercised at a lower real wage that, together with social premiums, adds up to equal real labour cost. Employees' taxes and social premiums are treated in an analogous way; they make SS shift to $S'S'$. In order to induce the same labour supply, net real wages should remain the same, which necessitates

a rise in the real wage rate. The labour supply schedule shifts upwards to ensure the correspondence between the real net wage (equals $w(1 - T_L)$) in the pre- and post-tax situations. The effect of these shifts is, of course, that imposing taxes and social premiums on a given wage reduces both labour demand and labour supply.
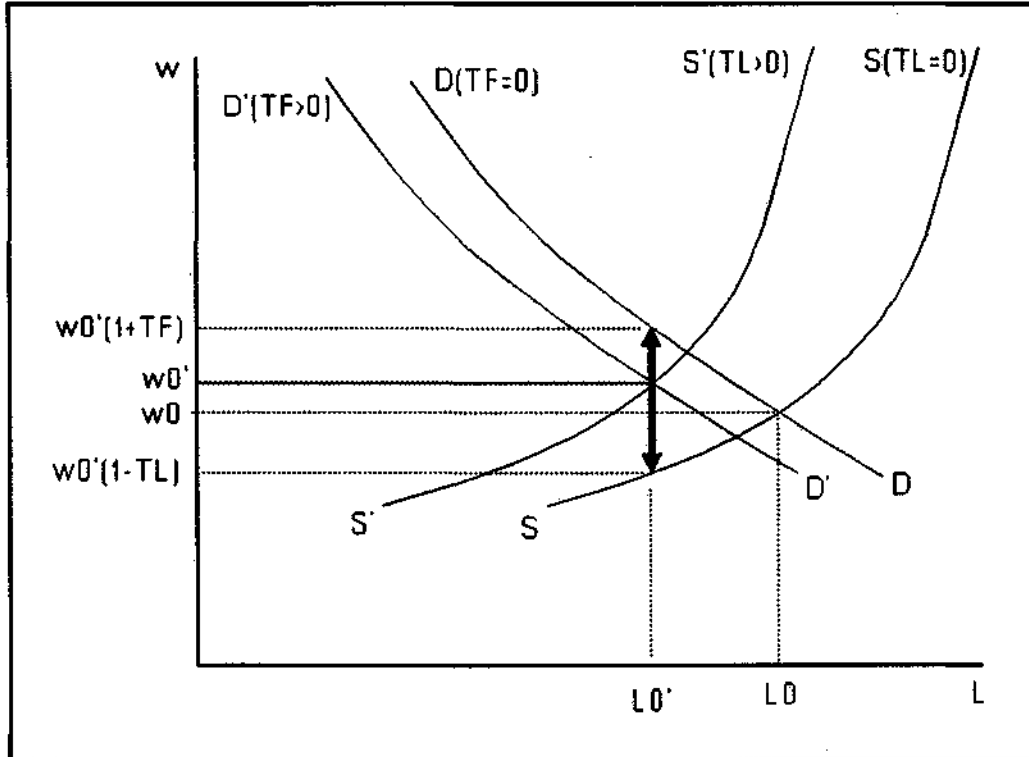

Figure 1. The wedge on the labour market

After the introduction of taxes and social premiums the real gross wage rate has to attain a new equilibrium value for which net real wage and labour cost are such that labour demand and labour supply are equal. It depends on the elasticity of labour demand vis-à-vis labour supply whether or not the post-tax wage rate differs from the pre-tax wage rate. A change in the equilibrium wage rate of course means that a part of the tax and premium burden is passed on to the other party in the labour market. This is more formally expressed in Dalton's law. Except in the case of zero elasticity of one of the two curves, after-tax employment is below pre-tax employment ($L'_0 < L_0$).

Until now we have been focusing on the cost side of unemployment insurance. Now we switch attention to the benefits side. Unemployment benefits influence the shape of the supply curve of labour. Labour supply

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is expected to be low for wages hardly exceeding benefits but rising fast when the gap between wages and benefits increases. For high wages, labour supply approaches the working age population and hardly responds to any further wage rise.

In Minford's vision high unemployment benefits relative to wages discourage workers to effectively supply labour because a relatively high unemployment benefit reduces the cost of 'leisure' to a minimum. For high wages labour supply is rather insensitive to an increase in wages which amounts to the assumption that the substitution effect and income effect of a wage rise approximately balance. Summing up, the elasticity of labour supply ranges from very high (for low wages) until zero (for high wages).
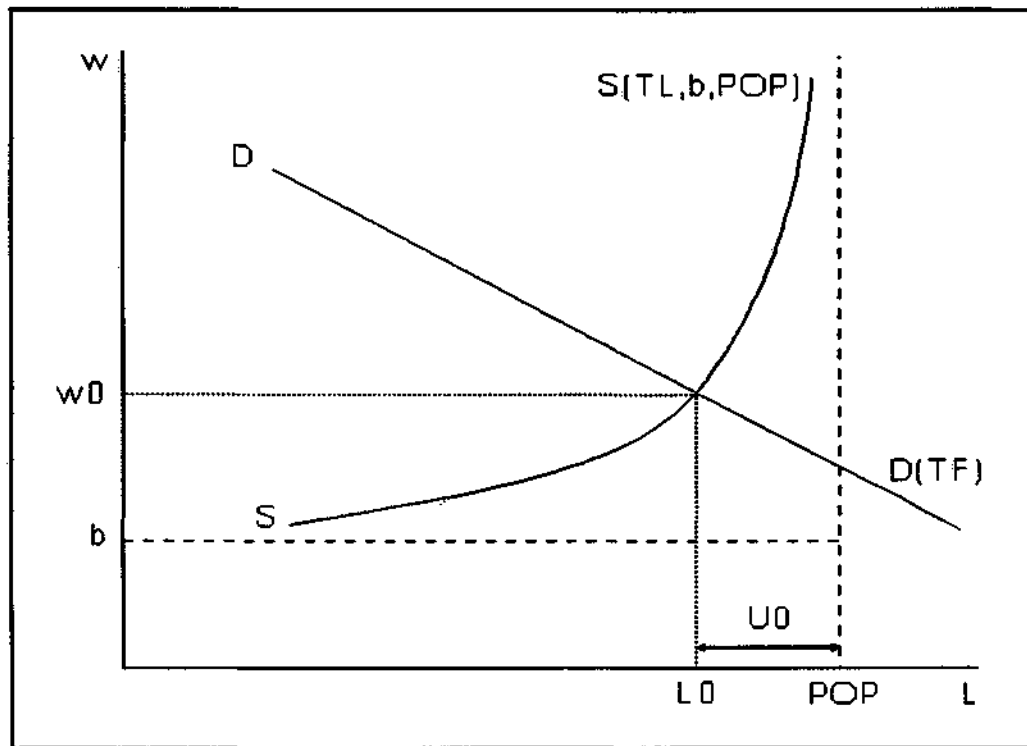
Figure 2. Unemployment benefits and the labour market

A graphical exposition of this line of reasoning is given in Figure 2. In this figure we assume a 'flat rate benefit' (b), i.e., a fixed amount independent of the wage. Of course, this is a simplification when benefits have also an earnings related component. However, it should be remarked that the effects of a proportional benefit system are weakened by the existence of benefit ceilings.

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Figure 2 shows labour market equilibrium, taking the effects of unemployment insurance into account. Assuming that the labour demand curve cuts the labour supply curve in its elastic part, we notice that employment is below the level that would be attained in the absence of unemployment insurance. Linking production to employment through the production function we can make a similar remark about production. Unemployment (U_0) is defined as the difference between the registered working age population (POP) and employment (L_0). In accordance with the equilibrium character of the model this unemployment can be viewed as voluntary unemployment. Assumedly, voluntary unemployment is increased by the social security system in two ways, its generosity on the one hand and its accompanying expenses on the other hand.

In an open economy things are more complicated. In this type of economy long run equilibrium is required in order to prevent foreign currency shortage. For that reason we impose the condition of balance of payments equilibrium in addition to equilibrium on the labour market and the goods market[1]. Neglecting capital flows we demand the current account to be in equilibrium with the real exchange rate as equilibrating variable.

The three markets we distinguish in the open economy are interconnected. The current account or the foreign exchange market and the product market are tied to each other through the volume of production because imports are more or less proportional to production, apart from limited substitution possibilities.

The foreign exchange market and the labour market are also intertwined. The real exchange rate is capable of driving consumption prices and production prices apart, creating a wedge between the real product wage and the real consumption wage. Consequently, a change in the terms-of-trade may enhance or diminish the tax and premium wedge on the labour market. Hereafter we present the model in full.

We start with the labour market and the product market. Labour demand L^d is a function of the real product wage (to be defined hereafter), capital K, and a time trend t that represents technological progress etc.. The real

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[1] In the model goods market equilibrium is implicit by the assumption that production is related to the equilibrium volume of labour by means of the production function. Because the volumes of exports and imports are determined within the model, consumption and investment expenditure act as balancing items.

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product wage is made up of gross wages (earnings) and taxes and social premiums on labour paid by employers, this sum being deflated by the production price index. Thus, with W representing the nominal wage rate, T_F the employers' social premium rate on wages and P_y the production price index, labour demand is described by

$$L^d = f_1(\frac{W(1+T_F)}{P_y}, K, t) \qquad (1)$$

Labour supply is dependent upon the real consumption wage which we obtain by subtracting employees' taxes and social premiums from gross wages and deflating the remainder with the consumption price index. Moreover, real benefits b influence labour supply. Our provisional labour supply equation is given by:

$$L^s = f_2(\frac{W(1-T_L)}{P_d}, b) \qquad (2)$$

In this equation L^s represents labour supply, T_L the employees' tax and social premium rate on gross wages and P_d the domestic price level. A divergence of the variables P_y and P_d causing a gap between the real product wage and the real consumption wage may arise as a consequence of terms-of-trade changes. Define the real exchange rate e as:

$$e = \frac{rP_d}{P_f} = \frac{P_d}{P_m} \qquad (3)$$

Here r represents the nominal exchange rate (of the own currency vis-à-vis foreign currencies), P_f the price index of foreign prices (in foreign currency) and P_m ($= P_f/r$) the price index of imports (in the own currency). A decline of the real exchange rate is equivalent to a rise of competitiveness vis-à-vis foreign countries.

Assuming that the import share (or import coefficient M/Y) does not fluctuate very much we can make profitable use of an approximation for the production price index:

$$P_y = \frac{P_d^{(1+\mu)}}{P_m^{\mu}} = P_d e^{\mu} \qquad (4)$$

In this equation μ denotes the average import share. When the real exchange rate does not change, production prices and selling prices (the

domestic price level concerns consumption, investment and exports) move parallel. A rise in the real exchange rate makes production prices rise faster than selling prices. Substituting equation (4) into equation (1) and defining the real wage rate w as W/P_d we can simplify equations (1) and (2) into

$$L^d = f_1(w(1+T_F)e^{-r}, K, t) \tag{5}$$

$$L^s = f_2(w(1-T_L), b) \tag{6}$$

To these two equations we add the condition for labour market equilibrium

$$L^d = L^s \tag{7}$$

and next we let the volume of production Q be determined by the production function:

$$Q = f_3(L^d, K, t) \tag{8}$$

The system of four equations (5) through (8) contains five unknown variables (L^d, L^s, w, Q, e) which means that it is not determined. The solution that comes into mind is to let the real exchange rate be determined by equilibrium in the foreign exchange market, taking into account export opportunities and import needs. Let us note that there is no equation for the absolute level of prices, although this could easily be brought into the model. Apparently, in this model goods market equilibrium is assured without explicitly relying on the clearing function of prices.

We now move on to the foreign exchange market. The volume of exports and the volume of imports both are related to a scale variable, world trade WT and production Q respectively, and a relative price variable, the real exchange rate e. The higher the real exchange rate, the lower exports and the higher imports. However, the price sensitivity of exports may exceed that of imports. For the volume of exports x and the volume of imports m we write down:

$$x = f_4(WT, e) \tag{9}$$

and

$$m = f_5(Q,e) \tag{10}$$

The two equations can be combined into one by using the condition for current account equilibrium:

$$P_d.x = P_m.m \tag{11}$$

or, in view of equation (3),

$$e.x = m \tag{11a}$$

Substitution of equation (9) and equation (10) into equation (11a) gives a relation between the endogenous variables e and Q, via

$$e = f_6(Q,WT) \tag{12}$$

In order to maintain current account equilibrium a higher production, which requires extra imports, should be accompanied with a lower value of the real exchange rate to encourage exports and reduce imports.

The five equations (5), (6), (7), (8) and (12) constitute the complete model which can be solved for the five unknowns L^d, L^s, Q, w and e. Following Minford we present a graphical solution in Figure 3. We start with the labour market. Labour demand is a function of the endogenous variables w and e. For any value of e labour demand is considered a declining function of w. This is in line with the closed-economy demand curve shown in the Figures 1 and 2. A rise of e brings about an outward shift of this labour demand curve. With a higher value of e more labour is demanded at the same wage because of increased profitability. Labour supply, on the other hand, is a rising function of w and depends upon no other endogenous variables. For the moment we can leave aside changes in the exogenous variables among which the instrument variables T_P, T_L and b. The condition for labour market equilibrium does not give us the equilibrium value of the wage rate. As yet we cannot get any further than determining the EW relation, combinations of e and w for which the labour market clears. This is shown in quadrant II. Let us suppose EW is linear. This EW line expresses a positive correlation between w and e. A higher value of e entails a higher demand of labour which necessitates a higher wage rate.
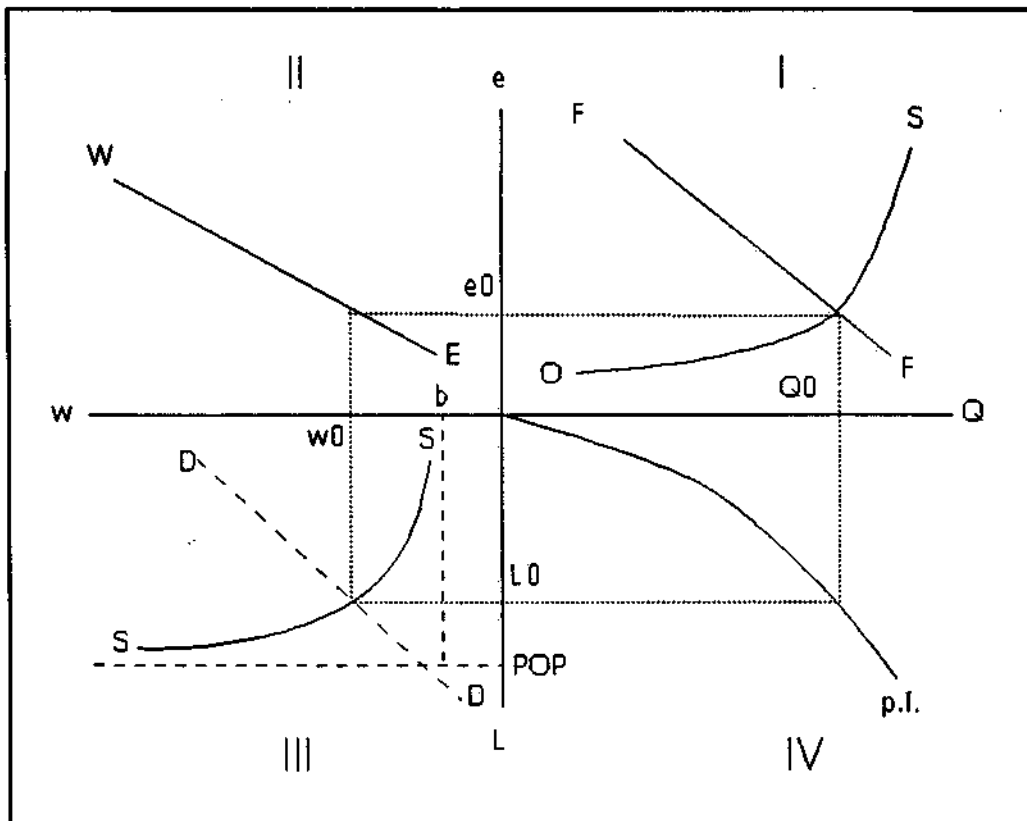
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Figure 3. Internal and external equilibrium

We continue with the determination of production Q. Any value of e corresponds with a value of Q. The graphical derivation is shown in Figure 3. Choose a value of e. According to the EW relation, for this value of e there is only one value of w that guarantees labour market equilibrium. Once we know the equilibrium wage, we have an easy job in determining employment via the labour supply function and hence production by means of the production function. The resulting OS curve in quadrant I is a kind of supply curve and pictures the supply of goods for the collection of possible labour market equilibria.

The supply curve OS is matched with the demand curve FF. This demand curve represents pairs of (Q, e) belonging to current account equilibrium. The FF curve is the graphical counterpart of equation (12) which we discussed before.

General equilibrium (in the limited sense of this macroeconomic model) occurs in the intersection of the FF curve and the OS curve. In Figure 3 the equilibrium values of the endogenous variables, which can now be determined, are represented by a subscript 0. It is not until now that we know the location of the labour market equilibrium in quadrant II. The

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figure is completed by drawing the labour demand curve for the equilibrium value of e (dashed line). Finally, note that a change of the instruments influencing the position of the L^d or L^s curve causes a shift of the EW curve and hence of the OS curve.

3. SPECIFICATION AND ESTIMATION OF THE MODEL

This section aims at specifying the model discussed in the previous section in such a way that we can obtain estimates for The Netherlands. In doing so we make some departures from the theoretical model. We start with labour demand. Assuming a Cobb-Douglas technology and profit-maximizing behaviour of entrepreneurs we can specify labour demand to be a loglinear relation of the real product wage and the capital stock to which relation a time trend is added (see Appendix 1). Because of lack of data of the capital stock we suppose it grows exponentially. We let the time trend capture the effects of capital growth besides technological progress. We add production as an explanatory variable. The theoretical justification in the context of the equilibrium model is that the real exchange rate (being a constituent of the real product wage) may be replaced by production as a consequence of the OS curve. The production variable also takes account of output constraints on labour demand. In doing so we follow the practice of empirical research on labour demand (cf. Springer, Vijlbrief and Compaijen, 1988, and Den Butter, 1991).

In labour market equilibrium we can interpret the labour demand equation as an unemployment equation. For, in equilibrium:

$$L^d = L^s = POP - U \tag{13}$$

POP denoting the labour force and U equilibrium unemployment. The unemployment rate is now approximated by the equation:

$$\frac{U}{POP} = -\ln\left(\frac{L^d}{POP}\right) \tag{14}$$

The unemployment equation then reads:

$$\frac{U}{POP} = \alpha_0 + \alpha_1 \ln[w(1 + T_F)] - \alpha_2 \ln Q + \alpha_3 t \tag{15}$$

Apart from the sign, the coefficients α_1 and α_2 correspond respectively to the wage elasticity and production elasticity of labour demand[2]. The coefficient α_3 includes the effects of technological progress, capital growth and labour force growth. The estimation on yearly data over the period 1961-1988 results in (see Appendix 2 for more information on the estimations):

$$\frac{U}{POP} = const + 0.44\ln[w(1+T_F)]_{-1} - 0.48Q_{-1} + 0.004t + 0.03duml \tag{16}$$

The implied elasticities of labour demand to real wage costs and production are in line with other empirical research for The Netherlands (see Den Butter, 1991). In order to get usable estimation results, a dummy for the restructuring of the Dutch industry during the eighties was added to the unemployment equation (see Appendix 2, and Springer, Vijlbrief and Compaijen, 1988).

Next we turn to labour supply. Using the assumption of equilibrium on the labour market, labour supply equation (6) can be transformed to a loglinear relation between the unemployment rate on the one hand and wages and benefits on the other[3]. In order to obtain a normalized model, the (gross) wage rate is used as the dependent variable. The estimated wage equation becomes:

$$\ln w = const - 0.05\ln\frac{U}{POP} + 0.28\ln b_{-1} \tag{17}$$

This equation enables us to calculate the elasticities of labour supply with respect to the level of wages and benefits. The former elasticity can be approximated by the reciprocal of the coefficient of the unemployment rate in the wage equation times the unemployment rate. The implied average wage elasticity of labour supply for The Netherlands during the period 1960-1988 is 1.30, which is quite high compared with other empirical findings (see for example Theeuwes, 1988). According to equation (17)

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[2] In order to calculate the real wage we used the consumption price index as deflator in equation (15) and elsewhere.

[3] If labour supply is derived from the maximization of a CES utility function in income and leisure, this also yields a loglinear equation for the unemployment rate including wages and the (relative) level of benefits (see Vijlbrief, 1992, pp. 171-172).

the average elasticity of labour supply to the level of unemployment benefits is -0.36 over the period 1960-1988. Estimates of a roughly similar wage equation for the United Kingdom by Minford (1983) give a higher elasticity of labour supply to the level of benefits (-0.6). In Section 4 the importance of this elasticity for the relation between unemployment and benefits will be further examined.

In the foregoing we departed from the theoretical model by including production in the labour demand function and dropping the production function. In order to retain a complete model we need a replacing equation. We follow Minford and introduce an independent EW relation by referring to pricing behaviour[4].

We start from the price (= marginal cost) equation:

$$\ln P_d = \lambda [\ln(W(1+T_F)) - \ln x] + (1-\lambda)\ln P_m \tag{18}$$

in which λ is the share of labour cost in total cost and x is labour productivity (the variable $W(1 + T_F)/x$ represents labour cost per unit of output). Remembering the definition of the real exchange rate, we write it in logarithmic form as:

$$\ln e = \ln P_d - \ln P_m \tag{19}$$

After some manipulation we obtain:

$$\ln e = \phi_0 + \phi_1 \ln[w(1+T_F)] - \phi_2 t \tag{20}$$

For further details we refer to Appendix 1. The estimation equation reads:

$$\ln e = const + 0.65\ln[w(1+T_F)] - 0.02t + 0.27 dum2 \tag{21}$$

The elasticity of the real exchange rate to real wage costs is rather small, compared to the estimations of the Minford-model for the United Kingdom but is close to the comparable elasticity for Germany (see Minford, 1983, and Minford and Davis, 1989). The dummy reflects the strong rise in the Dutch real exchange rate since 1986 (for further details, see Appendix 2).

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[4] Note, that the EW relation in the theoretical model is a derived one and not independent of the structural equations forming the model.

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The equations for labour demand (equation (16)) and labour supply (equation (17)) determine together with the relation between real exchange rate and real wage rate (equation (21)) the supply curve labelled OS in Figure 3. To be able to determine the open economy's equilibrium position we have to close the model by deriving the equation for the demand curve FF, i.e. the curve entailing a balanced current account. To this we turn now.

For exports and imports we use loglinear specifications, implying constant elasticities. The exports equation reads:

$$\ln x = \gamma_0 + \gamma_1 \ln WT - \gamma_2 \ln e \qquad (22)$$

whilst the imports equation is in the same vein:

$$\ln m = \delta_0 + \delta_1 \ln Q + \delta_2 \ln e \qquad (23)$$

The condition for equilibrium on current account (equation (11)) reads logarithmically:

$$\ln e + \ln x = \ln m \qquad (24)$$

Substitution of equation (22) and equation (23) into equation (24) gives a relation between the endogenous variables e and Q. We rewrite this equation to let Q be the dependent variable:

$$\ln Q = \frac{\gamma_0 - \delta_0}{\delta_1} + \frac{\gamma_1}{\delta_1} \ln WT - \frac{\gamma_2 + \delta_2 - 1}{\delta_1} \ln e \qquad (25)$$

If the sum of the price elasticities of exports and imports exceeds one (i.e. $\gamma_2 + \delta_2 > 1$) the Marshall-Lerner condition is satisfied. We then have an inverse relationship between Q and e. The higher the real exchange rate, the lower is the level of income which maintains equilibrium on current account. The estimation results are discussed next.

For exports we find[5]:

$$\ln x = const + 1.08 \ln WT - 0.84 \ln e_{-\frac{1}{2}} \qquad (26)$$

and for imports:

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[5] In the estimated export equation, the real exchange rate is defined as the price level of exports divided by the price level of competitors.

$$\ln m = const + 1.52 \ln Q + 0.27 \ln e_{-1} \qquad (27)$$

The elasticities of exports and imports to the scale variables, world trade and production respectively, are in agreement with or somewhat larger than the values usually found for The Netherlands. This does not apply to the elasticities to the relative price variable, the real exchange rate. They are both much smaller than the elasticities which are used in the large, macroeconomic policy models for The Netherlands, such as Freia-Kompas of the Central Planning Bureau. On the basis of the estimation results the equation of the *FF* curve reads:

$$\ln Q = const + 0.71 \ln WT - 0.07 \ln e \qquad (28)$$

Compared with the estimations by Minford (1983) and Minford and Davis (1989) for the United Kingdom and Germany, the elasticity of the production to the real exchange rate is indeed very small in The Netherlands. We return to the implications of this in Section 4.

4. BENEFITS AND UNEMPLOYMENT: SOME SIMULATION RESULTS

A dynamic simulation of the four endogenous variables in the model - the unemployment rate, wages, the real exchange rate and production - over the period 1962-1988 shows that the equilibrium model is quite capable to describe the past adequately. Figure 4 shows realized and simulated unemployment in The Netherlands between 1962 and 1988. Dutch unemployment is overestimated by the model during the sixties and the beginning of the seventies. After 1973 the sharp increase in unemployment until 1984 is reasonably described by the model.

Although our principal interest concerns the relation between unemployment and the benefit level in The Netherlands, we first shortly examine the impact of a change in external demand conditions by an impulse simulation. The impulse simulations of this section are carried out by giving a permanent and autonomous shock in an exogenous variable over the period 1982-1988, after which the effect of the impulse is measured as the difference from the baseline projection by the model over that period. According to the model, a rise in world trade by 10 percent has considerable long-run effects on unemployment (-129,000), wages (+1.3 percent),
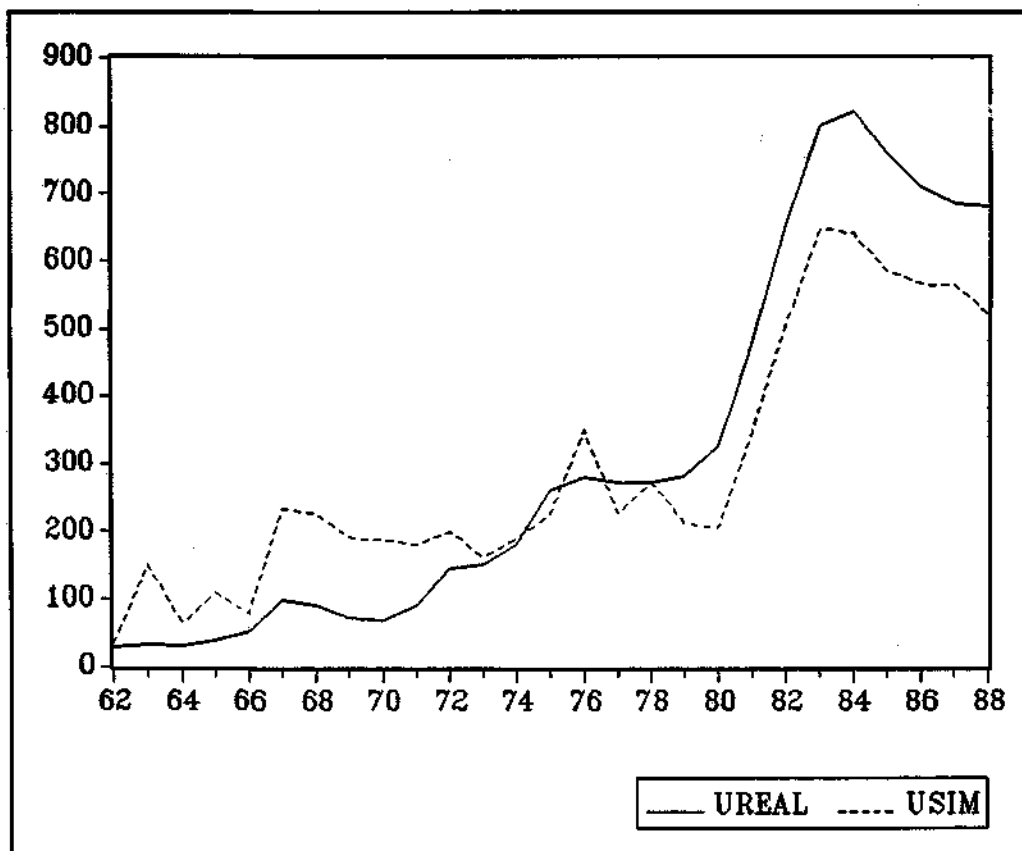
Figure 4. Realized and simulated unemployment (in 1000 persons) in the Netherlands between 1962 and 1988

the real exchange rate (+0.9 percent) and production (+7.0 percent)[6]. There is a striking difference between the impact on unemployment and production of a rise in world trade, according to the current 'Minfordian' equilibrium model and other examples of equilibrium models for The Netherlands. For example, Vijlbrief (1992, pp. 130-131) finds almost negligible effects of a rise in world trade, which can be explained by goods supply being rather insensitive to changes in the real exchange rate in that equilibrium model.

We now turn to impulse simulations to shed some light on the central problem of this paper, i.e., the effect of unemployment benefits and their financing on unemployment. Table 1 shows the long-run impact of four policy variants. A permanent reduction in unemployment benefits by 10 percent leads to an increase in economic activity and a fall in unemploy-

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[6] When discussing the results of the impulse simulations, we will only give attention to the long-run effects (after 7 years). The short-run impact does not differ much from this long-run impact.

ment, wages and the real exchange rate. The cut in benefits raises labour supply, which leads to a fall in wages to secure labour market equilibrium. Employment is increased, which leads to a rise in production[7]. To maintain equilibrium on the current account, the real exchange rate has to fall. A reduction by 5 percent points in the burden of taxes and social premiums for employees also has favourable, though smaller, effects which work through the same mechanisms as described above. A cut in the social security burden for employers by 5 percent points reduces labour costs, which induces an upward shift in labour demand. This leads to more employment and higher wages. The accompanying rise in production makes a fall in the real exchange rate necessary again.

Table 1 : Long-run effects of four policy variants (in % of the baseline projection, except unemployment (in 1000 persons))

	unemploy-ment (U)	real wages (w)	real exchange rate (e)	produc-tion (Q)
reduction by 10 % in unem-ployment benefits	-54	-2.4	-1.5	0.1
reduction by 5 %-points in employees' burden	-18	-0.8	-0.5	0.0
reduction by 5 %-points in employers' burden	-75	0.7	-2.1	0.1
shift in burden by 5 %-points in burden from employers to employees	-57	1.5	-1.7	0.1

The two tax policies which we discussed above suffer from a lack of realism because the financing is not considered explicitly. The bottom row of Table 1 gives the results of a policy variant which is, approximately, balanced-budget. According to our model, a shift in the burden of taxes and social security premiums from employers to employees by 5 percent points has favourable effects on employment in The Netherlands. As the

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[7] One result of this impulse simulation which is both surprising and hard to explain is the difference between the effect of the cut in benefits on employment ($\pm$ 1 percent) and production (only 0.1 percent). One possible explanation is the very small elasticity of production to the real exchange rate in equation (28). In a sensitivity analysis we further examine this point.

model is symmetrical with regard to an increase or decrease in tax rates, the effect of the shift in the burden is equal to the results of row 2 subtracted from row 3.

From these impulse simulations we may conclude that both the level of unemployment benefits and their financing influence unemployment and economic activity in The Netherlands. According to the model, the long-run elasticity of unemployment to the level of benefits is 1.0 (see also row 1 in Table 2). Microeconomic studies for The Netherlands and other countries (see for example Van den Berg (1990), Nickell (1979) and Solon (1985)) usually find a smaller elasticity of approximately 0.5. The elasticity in the current model is of the same order of magnitude as Vijlbrief (1992, p. 159) finds in another equilibrium model for The Netherlands, but it is much smaller than the elasticity of 2.8, found by Minford (1983) for the United Kingdom. As we argue in Section 3, this difference may be (partly) due to the smaller benefit elasticity of labour supply as implied by our wage equation for The Netherlands. Therefore we examine the effect of doubling the coefficient of the unemployment benefit level in wage equation (17), which implies that the elasticity of labour supply to the level of benefits becomes -0.72. Row 2 of Table 2 shows the outcome of this sensitivity analysis.

Table 2 : Long-run model elasticities of unemployment to the level of benefits, according to the central variant and two alternative versions

	Model elasticity of unemployment to the level of benefits
Central variant (wage equation (17))	1.0
Alternative wage equation (doubled benefit elasticity of labour supply)	1.7
Alternative production equation (elasticity of production to real exchange rate is -0.25)	1.2

A comparison of row 1 and 2 clearly shows that the benefit elasticity of labour supply is crucial for the relation between benefits and unemployment in The Netherlands. The impact on unemployment of a change in the benefit level may also be affected by the sensitivity of goods demand to changes in the real exchange rate. To understand this, we must return to the graphical analysis of the model in Section 2. When the demand curve FF is inelastic, production and employment are largely determined

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by external conditions. In such a situation, a shift in the supply curve OS (for example caused by a change in benefits) will not have much effect on unemployment. In our equilibrium model, the elasticity of production to the real exchange rate is indeed very small, as indicated by equation (28). Therefore, we consider the effect of increasing this elasticity from -0.07 in the central variant to -0.25 in an alternative equation for production. The bottom row of Table 2 confirms that the relation between benefits and unemployment is affected by the change in the production equation[8].

We briefly return to our results on the unemployment effects of the financing of unemployment benefits. The effects on economic activity and unemployment of a reduction in the tax and social security burden for employees are much smaller than in other equilibrium models for The Netherlands (compare Van Sinderen, 1990, Den Butter and Compaijen, 1991, and Vijlbrief, 1992). Minford (1983, p. 237) finds an elasticity of unemployment to a 1 percent point change in the employees' burden of 2.8 for the United Kingdom, while the current model for The Netherlands yields an elasticity of 0.7. With regard to a reduction in the employers' burden of social security premiums, the elasticity of unemployment is 2.9 for The Netherlands, whereas the elasticity for the United Kingdom is 5.9 (see Minford, 1983, p. 237).

This section closes with a cliometric simulation, in which we investigate what would have happened if the Dutch government had not made some severe cuts in unemployment benefits in the eighties. Between 1983 and 1988, the replacement ratio (the ratio between net unemployment insurance benefits and net wages) was reduced from 85.7 to 78.6 percent. Table 3 shows the difference between the baseline projection and the model solution, fixing the replacement ratio at its 1983 level[9]. According to our model, Dutch unemployment would have been higher in the eighties if (relative) benefit levels had not been reduced. Real wages and the real exchange rate would have been higher too in the absence of the benefit reduction, whereas production would have been smaller.

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[8] When this alternative production equation is used, the difference between the effect of a change in benefits on employment vs. production, as described in an earlier footnote, is somewhat reduced: in the alternative version of the model a 10 percent cut in benefits increases employment by 1.3 and production by 0.4 percent.

[9] We report the results from 1985 since the benefit level influences the rest of the economy with a one year lag (see equation (17)).

Table 3 : The impact of fixing the replacement ratio at its 1983 level (in % of the baseline projection, except unemployment (in 1000))

	unemploy-ment (U)	real wages (w)	real exchange rate (e)	produc-tion (Q)
1985	0	0.6	0.4	0.0
1986	13	2.2	1.4	-0.1
1987	47	2.0	1.3	-0.1
1988	44	2.0	1.3	-0.1

5. CONCLUSION

The aim of this paper is to measure the effect of unemployment benefits and their financing on unemployment in The Netherlands. Although much research has been done on the relation between the benefit level and individual durations of unemployment, the macroeconomic impact of unemployment compensation has received less attention. This paper uses a rather specific equilibrium framework to examine the unemployment effect of benefits. A 'Minfordian' model, that assumes equilibrium on the labour market and on the current account, is estimated for The Netherlands. Estimation of the wage equation for The Netherlands, which is in fact a rewritten labour supply equation, yields a quite modest elasticity of labour supply to the level of benefits. This stands in contrast with the results for such an equation for the United Kingdom (see Minford, 1983). The major part of the estimated coefficients is in agreement with earlier empirical research for The Netherlands. There are, however, some exceptions: the wage elasticity of labour supply seems to be unrealistically high, and exports and imports are not sensitive enough with regard to the real exchange rate.

The relation between benefits and unemployment in The Netherlands is investigated by means of impulse simulations. In general, equilibrium models yield larger effects of unemployment benefits on economic activity than models which assume a non-clearing labour market (see Den Butter and Compaijen, 1991, and Vijlbrief, 1992). The current equilibrium model is no exception to this general rule, although the benefit elasticity of unemployment of 1.0 for The Netherlands is much smaller than the elasticity of 2.8 found for the United Kingdom by Minford (1983). How-

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ever, compared to the microeconomic research and macroeconomic disequilibrium models for The Netherlands, the current model gives relatively large effects of benefits on unemployment. According to the model, the financing of the benefits by employers' and employees' social security contributions also increases unemployment in The Netherlands. The impact of employers' premiums is much larger than that of the burden for employees, which implies that shifting the 'wedge' from employers to employees has favourable effects on employment in The Netherlands.

A sensitivity analysis indicates that the relation between benefits and unemployment in The Netherlands is quite dependent on some of the parameters of the model. For example, the benefit elasticity of labour supply is a crucial determinant of the impact of benefits on unemployment. We have also shown that the elasticity of production to the real exchange rate is important for the size of the effect of unemployment benefits. Where does this leave us with regard to the central question of this paper? First, not surprisingly, the model confirms that the unemployment compensation system does influence unemployment in The Netherlands. Secondly, it can be doubted whether the current equilibrium model is most suited to give reliable estimates of the size of this impact. In the present labour market situation in The Netherlands, the equilibrium assumption may not be realistic and, consequently, the elasticity of unemployment to benefits may be smaller than indicated in this paper. However, if the Dutch labour market shows a long-run tendency to more flexibility, the relevance of the current model for measuring the impact of benefits on unemployment will increase.

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APPENDIX 1 : THE DERIVATION OF LABOUR DEMAND AND THE EW-RELATION

Labour demand

Take as a starting point the Cobb-Douglas production function:

$$Q = c(e^{\lambda t}L)^{\alpha}K^{1-\alpha} \qquad (a)$$

α = labour elasticity of production

λ = rade of Harrod-neutral tecnical progress

In an equilibrium model profit maximization requires equality of the real product wage and the marginal product of labour, or:

$$w(1+T_F)e^{-\varkappa} = \frac{\partial Q}{\partial L} = \alpha c e^{\alpha\lambda t}L^{\alpha-1}K^{1-\alpha} \qquad (b)$$

Rewriting and taking logarithms of equation (b) yields the labour demand equation:

$$\ln L^d = C - \frac{1}{1-\alpha}\ln[w(1+T_F)e^{-\varkappa}] + \ln K + \frac{\alpha}{1-\alpha}\lambda t \qquad (c)$$

The EW-relation

The price of output is an average of labour cost per unit of product and import cost, so:

$$\ln P_d = c + \lambda[\ln(W(1+T_F)) - \ln x] + (1-\lambda)\ln P_m \qquad (d)$$

λ = share of labour cost in price

$(1-\lambda)$ = share of import cost in price

x = labour productivity

From the definition of $e = P_d/P_m$:

$$\ln e = \ln P_d - \ln P_m \tag{e}$$

Substitute equation (d) into equation (e):

$$\ln e = c + \lambda \ln(W(1+T_F)) - \lambda \ln P_m - \lambda \ln x \tag{f}$$

or, substituting P_d/e for P_m:

$$\ln e = c + \lambda \ln(W(1+T_F)) - \lambda \ln P_d + \lambda \ln e - \lambda \ln x \tag{g}$$

$$(1-\lambda)\ln e = c + \lambda[\ln(W(1+T_F)) - \ln P_d] - \lambda \ln x \tag{h}$$

or:

$$\ln e = \frac{c}{1-\lambda} + \frac{\lambda}{1-\lambda}\ln(w(1+T_F)) - \frac{\lambda}{1-\lambda}\ln x \tag{i}$$

w being defined as W/P_d.
Assuming that labour productivity is steadily growing, we obtain as relation to be estimated:

$$\ln e = \phi_0 + \phi_1 \ln[w(1+T_F)] - \phi_2 t \tag{j}$$

APPENDIX 2 : ESTIMATES

The equations are estimated by two-stage-least-squares, using the exogenous and predetermined variables as instruments. The ar(1)- and ma(1)-values represent a first-order autoregressive or moving average process in the disturbances. T-values are given between parentheses. Q_5 is the Ljung-Box statistic for autocorrelation up to order 5, which has a χ^2 distribution. Dum1 is a dummy that reflects the extraordinary loss in employment during 1981-1983, caused by the restructuring of Dutch industry (dum1 is zero between 1960 and 1980, one in 1981, 2 in 1982, and 3 during 1983-1988). Dum2 is a dummy to represent the high level of the real exchange rate since 1986, which cannot be explained by the development in real wage costs, nor by the time trend (dum2 is 1 during 1986-1988).

$$\frac{U}{POP} = 0.16 + 0.44\ln[w(1+T_F)]_{-1} - 0.48Q_{-1} + 0.004t + 0.03dum1$$
$$\quad\;\; (1.36)\;\; (8.81) \qquad\qquad\quad (-7.39)\quad\;\; (2.91)\quad\;\; (9.77)$$

estimation period : 1961 – 1988
$\bar{R}^2 = 0.989$ $SEE = 0.006$ $DW = 1.65$ $Q_5 = 2.04$

$$\ln w = 3.30 - 0.05\ln\frac{U}{POP} + 0.28\ln b_{-1}$$
$$\quad\;\; (6.79)\;\; (-2.26) \qquad\quad (2.61)$$

estimation period : 1962 – 1988
$\bar{R}^2 = 0.996$ $SEE = 0.016$ $ar(1) = 0.94$ $DW = 1.78$ $Q_5 = 6.11$

$$\ln e = -2.60 + 0.65\ln[w(1+T_F)] - 0.02t + 0.27dum2$$
$$\quad\;\; (-6.03)\;\; (5.82) \qquad\qquad (-4.07)\quad (5.84)$$

estimation period : 1961 – 1988
$\bar{R}^2 = 0.811$ $SEE = 0.053$ $ma(1) = 0.64$ $DW = 2.12$ $Q_5 = 1.70$

$$\ln x = -0.30 + 1.08\ln WT - 0.84\ln e_{-\frac{1}{2}}$$
$$(-1.13) \quad (19.07) \quad (-3.09)$$

estimation period : 1962 – 1988
$\bar{R}^2 = 0.999$ $SEE = 0.020$ $ar(1) = 0.80$ $DW = 1.92$ $Q_5 = 4.36$

$$\ln m = -2.37 + 1.52\ln Q + 0.27\ln e_{-\frac{1}{2}}$$
$$(-8.37) \quad (23.63) \quad (2.43)$$

estimationperiod : 1962 – 1988
$\bar{R}^2 = 0.997$ $SEE = 0.023$ $ar(1) = 0.61$ $DW = 1.95$ $Q_5 = 7.21$