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VAKGROEP ARBEIDSECONOMIE

MARKET LABOR SUPPLY, INFORMAL WORK AND THE BASIC INCOME PROPOSAL

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Abstract

In this paper, we argue that there is more than just the disincentive to work and the decline in economic welfare in the discussion about the economic applications of the basic income proposal, which shows a formal similarity with the negative income tax system.

A simple time allocation model, that allows the substitution between market labor and informal work, as well as the factor substitution between time and goods in the household technology, offers some insight into the consumption and labor supply decisions, in consequence of the introduction of such a tax-transfer program.

1. Introduction

One of the major objections to a unconditionally guaranteed basic income, as proposed by " Le Collectif Charles Fourier " (1985) and the " Basic Income Research Group " (1984) is that such a system would kill the incentive to work, which , as a result, would make the program unpayable and decrease total welfare. Although the so-called unemployment trap of a make-up guaranteed income, which is characteristic of the actual social security systems, is avoided, supply economics force economists to worry about the labor supply effects of a basic income.[1]

In this paper, we argue that this concern results, to a large extent, from both theory and empirical research based on labor supply models, that are unable to grasp people's time allocation behavior and the labor supply effects of a basic income, though the analytical framework to do so is available.

In the conventional model, market goods and leisure both enter the utility function with a positive marginal utility. The shadow-price of consumption time is the wage rate, that is paid for the time spent on market labor. This paid labor is necessary to earn the money to buy consumption goods. The implicit assumption, made in these models, is that the marginal utility of time devoted to market labor is zero[2], which means that the consumer-employee is totally indifferent as to whether he is working or not working, apart from his concern to earn an income by working. This view is characteristic for the neo-classical consumer theory, where labor is seen as a mere means to earn money and not as a valuable good or a meaningful human activity.[3]

By introducing only unattractive market labor in their analyses, these models fail to consider informal work or any other kind of work which does not leave the worker indifferent.

A second shortcoming of these models is that the

restrictions imposed by an appropriate consumption or household technology in a Becker-Lancaster approach are not taken into account, although the supply of labor is clearly affected by the factor substitution in household technology.

In the following paragraphs, we propose a macro-economic time allocation model, that allows the substitution between market labor and informal work, as well as the factor-substitution between time and goods in a simple Cobb-Douglas linear homogeneous household technology. We study the impact of a basic income grant, which is fully financed by an additional income tax. We also try to take account of some of the dynamic effects on the economy, that are often negnected in costings of basic income. We assume labor demand to be perfectly elastic, in order to concentrate only on the labor supply effects.

2. A Time Allocation Model

If some people like their job and others do not, one could reasonably assume, as is done in the conventional model, that the marginal utility of market

labor, for the representative citizen, equals zero in the neighbourhood of the equilibrium position. In our model, however, we also consider another type of work, which is not the formal job on the labor market, chosen mainly for the money that is paid for it. One of the merits of a basic income is that it allows people to allocate their time between market labor and non-market labor, i.e. a more informal kind of work, which they always wanted to do, but did not pay enough to make a living. Total labor supply then consists of market labor and informal work. Only the products of the former are measured in the National Accounts, which does not mean that the latter do not exist or do not add to national welfare.

We start from a well-behaved utility function u^*, where consumption activity a_1, and informal work activity a_k both enter with a positive marginal utility, i.e.:

$$u^*(a_1, a_k) \qquad (1)$$

The labor market activity a_n does not appear in this

utility function as its marginal utility is assumed to be zero. We now introduce a Becker-type (1965) of household technology, which relates activities as outputs of household production functions to market goods and time as factor inputs. We distinguish between the consumption activity and the informal work activity. In order to simplify the analysis, we assume that both follow a linear homogeneous Cobb-Douglas structure, which implies the factor elasticity of substitution between time and goods to equal one, i.e.:

$$a_1 = q_1^{\alpha} \, l^{1-\alpha} \qquad (2)$$

$$a_K = q_K^{\gamma} \, k^{1-\gamma} \qquad (3)$$

In these production functions, q_1 is a composite of consumption goods, bought on the market or produced by informal work; l is consumption or leisure time; q_K is a composite of household capital goods (such as a hammer or a washing machine), that are used as inputs to produce consumption goods; k is the time devoted to informal work, as opposed to the time spent on market labor h.

Informal work can be partly paid for, f.i. by selling some of its products, but presumably mainly saves money, because the products of informal work, goods as well as services, need not to be bought on the market. This money saved per unit of time, devoted to informal work, can be introduced in this model as a form of income, paid for the informal work done. Let us indicate this form of pay by v, which is the informal wage rate, as opposed to the market wage rate w.* The informal wage rate v is assumed to be smaller than the market wage rate w; otherwise nobody would ever supply any market labor. The income restriction can then be written as:

$$p_1 q_1 + p_K q_K = wh + vk + y \qquad (4)$$

The time restriction is:

$$h + l + k = T \qquad (5)$$

Since market labor h does not appear in the utility function, we can substitute time restriction (5) into income restriction (4) to find the budget constraint:

$$p_1 q_1 + p_K q_K + wl + (w-v)k = wT + y \qquad (6)$$

On the right-hand side of this equation, the so-called full income appears, being the sum of the unearned income (y) and the potential labor income, (total available time (T) is spent on market labor). The left-hand side shows the shadow price (or opportunity cost) of consumption time to be the wage rate. The shadow price of time, devoted to informal work, equals the difference between the wage rate and the money saved by working informally, i.e. (w-v).

The time allocation model, described by the equations (1), (2), (3) and (6) can easily be reduced to a simple Slutsky model, which allows to derive some of its proporties. In order to do so, we first substitute the household technology into the utility function. Then we use the cost minimization conditions in household technology:

$$(1-\alpha)q_l/\alpha l = w/p_l \qquad (7)$$

$$(1-\beta)q_k/\beta k = (w-v)/p_k \qquad (8)$$

to rewrite the model only in terms of time categories, i.e.

$$\max \quad u(l,k) \qquad (9)$$

$$\text{sub} \quad (1/1-\alpha)\ l + (1/1-\beta)(w-v)/w\ k = T + y/w \qquad (10)$$

where u is a function, that combines preferences and household technology, and still has the properties of a well-behaved utility function (see Késenne, 1979).

The first-order conditions for an optimum can now be written as:

$$u_l/u_y = (1/1-\alpha)w \qquad (11)$$

$$u_k/u_y = (1/1-\beta)(w-v) \qquad (12)$$

Equation (12) reveals that the amount of time spent on informal work depends on the difference between the market wage and the money saved by informal work on the one hand, and on the monetary value of the utility this kind of work offers on the other hand.

It is obvious that increasing the unearned income will cause more time spent on consumption and on informal work, as long as these are " normal " goods. The supply of market labor then will decrease.

It is also easily understood that a rise in the wage rate will decrease the time spent on informal work. Indeed a higher wage rate decreases the right-hand side of budget equation (10), and increases the relative price of informal work time, the latter causing a negative substitution effect, the former causing a positive income effect.

How the market labor supply is affected by an increased wage rate is still theoretically undetermined. This can be derived from the Slutsky model by looking at the wage effect on consumption time, which is undetermined. By

the time restriction (5), it follows that also the wage effect on market labor supply is undetermined.

3. Introducing a Basic Income

The basic income system, we introduce in this model, consists of a universal, unconditional and taxfree grant G, that is financed by an additional flat tax rate t on total income. Several other scenario's are possible and have been proposed in the literature. In this macro-approach, we do not consider income redistribution effects, nor do we investigate the welfare implications of alternative ways to finance the system.

In the model developed above, this basic income scheme will raise full income (wT+y) to:

$$(1-t)wT+(1-t)y+G \qquad (13)$$

The system implies a decrease in the market wage rate of (tw) and a change in the unearned income of (G-ty), which is, at the average, positive.

In the time allocation model above, such a basic income system not only affects the ratio y/w on the right-hand side of budget equation (10), which increases to:

$$\frac{(1-t)y+G}{(1-t)w} \qquad (14)$$

but also diminishes the relative price of informal work time on the left-hand side of budget equation (10), since only the market wage rate (w) is taxed and not the money saved by working informally (v) so that:

$$\frac{(1-t)w - v}{(1-t)w} < \frac{w - v}{v} \qquad (15)$$

In the Slutsky model, these changes clearly have a positive effect on the amount of time spent on informal work. This basic income scheme, however, does not necessarily have a negative effect on the supply of market labor, which is a somewhat unexpected result.

The effect is theoretically undetermined, be it that, empirically, it will probably turn out to be negative.

What we observe in this model is a more complex time reallocation process, because the factor price ratio in consumption and informal work technology is affected by the basic income program.
The relative price of time decreases by raising the tax rate on market wages so that the shadow price of consumption activities will be lowered, leading to a higher demand for consumption goods and time. More consumption goods have to paid for by a higher labor income and will raise the supply of market labor.
But at the same time consumption will become more time-intensive by the factor substitution in consumption technology. Less consumption goods will be used per unit of time, or more time will be spent on the consumption of some goods and services. (See S. Linder, 1970 for a elaborate analysis of this issue)

A similar story can be told concerning the informal work process. The demand for household capital goods (sales of the do-it-self sector) will tend to rise by the increase of informal work activities, but will be discouraged by the factor substitution in the household production activities.

In any case, by a basic income program, the ratio of goods over time in consumption and informal work activities will decrease, which might lead to a less materialistic and hectic consumption and household pattern.

4. A Numerical Exercise

In order to show some of the features of the above model, we can start from a simple Cobb-Douglas specification for utility function (1), i.e.:

$$u^*(a_k, a_l) = a_k^{\beta}\, a_l^{1-\beta} \qquad (16)$$

Maximizing this function, subject to the household technology (2) and (3) and the budget equation (6), yields the following demand system:

$$k = \beta(1-\delta)w/(w-v)\ (T + y/w) \qquad (17)$$

$$l = (1-\beta)(1-\alpha)\ (T + y/w) \qquad (18)$$

In order to determine the additional tax rate, that is needed to finance the system, the dynamic relationship between the labor supply and the tax rate is an important but often neglected element in basic income costings. If labor supply and national product are affected by the tax increase, the tax base will diminish, so that the tax rate has to be increased again to pay for the same grant. A simultaneous model is one way to find the outcome of this dynamic process.
If the grant G is to be fully financed by the additional tax rate t, we must have that:

$$G = t(wh+y) = t(wT-wl-wk+y) \qquad (19)$$

Introducing the basic income scheme into the demand system (17-18), we end up with the following non-linear simultaneous model, that is used to simulate some basic income effects.

$$l = (1-\beta)(1-\alpha)\ (T+(G+(1-t)y)/(1-t)w) \qquad (20)$$

$$k = \beta(1-t)w(1-\gamma)/((1-t)w-v)\ (T+(G+(1-t)y)/(1-t)w) \qquad (21)$$

$$t = G/(y+wT-wl-wk) \qquad (22)$$

The parameters in this model are given the following prior values: $\alpha = .25$; $\beta = .20$; $\gamma = .30$.
The ratio $v/w = .25$ and $y/wT = .08$.

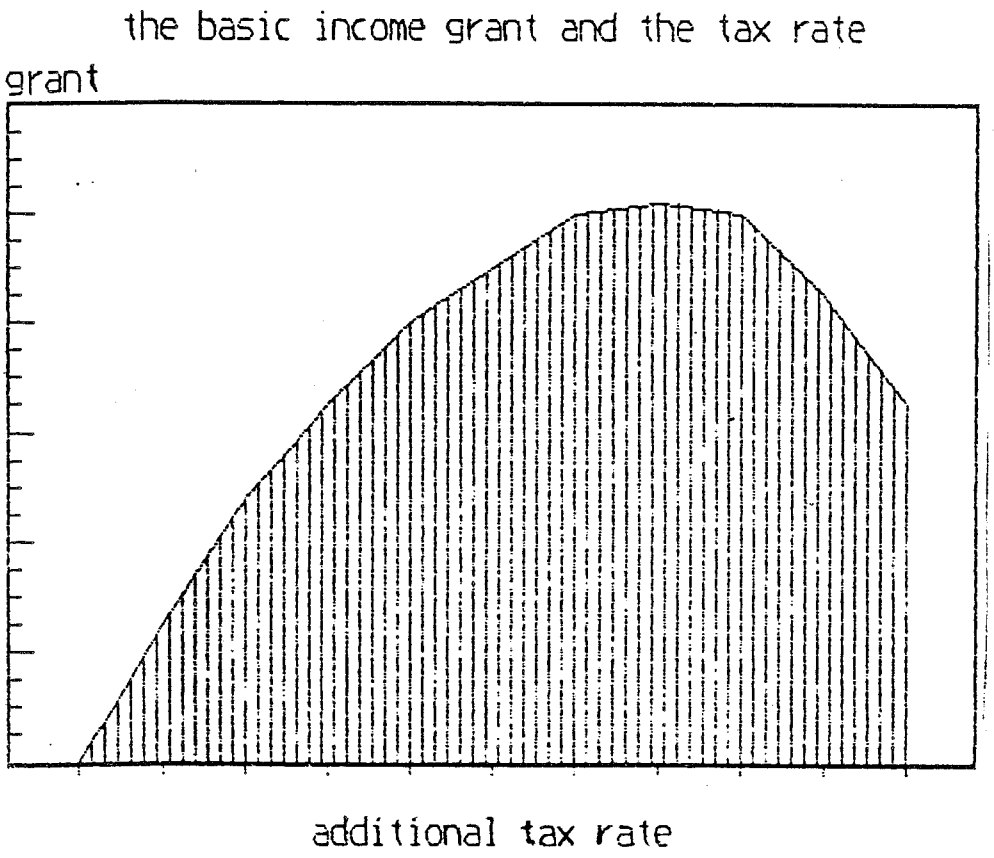
The figures 1 to 5 below show the results of the simulations done with this model.

We first look at the relationship between the amount of the grant (G) and the additional tax rate (t), needed to finance the transfer. (figure 1)

Figure 1.

As could be expected, a variant of the well-known Laffer curve appears. The model shows that there is a maximum amount of the transfer, that can be paid for by a higher

Figure 1.


the basic income grant and the tax rate
grant
additional tax rate

tax rate. A further tax increase will diminish the tax base in such a way that the tax revenue will decrease.

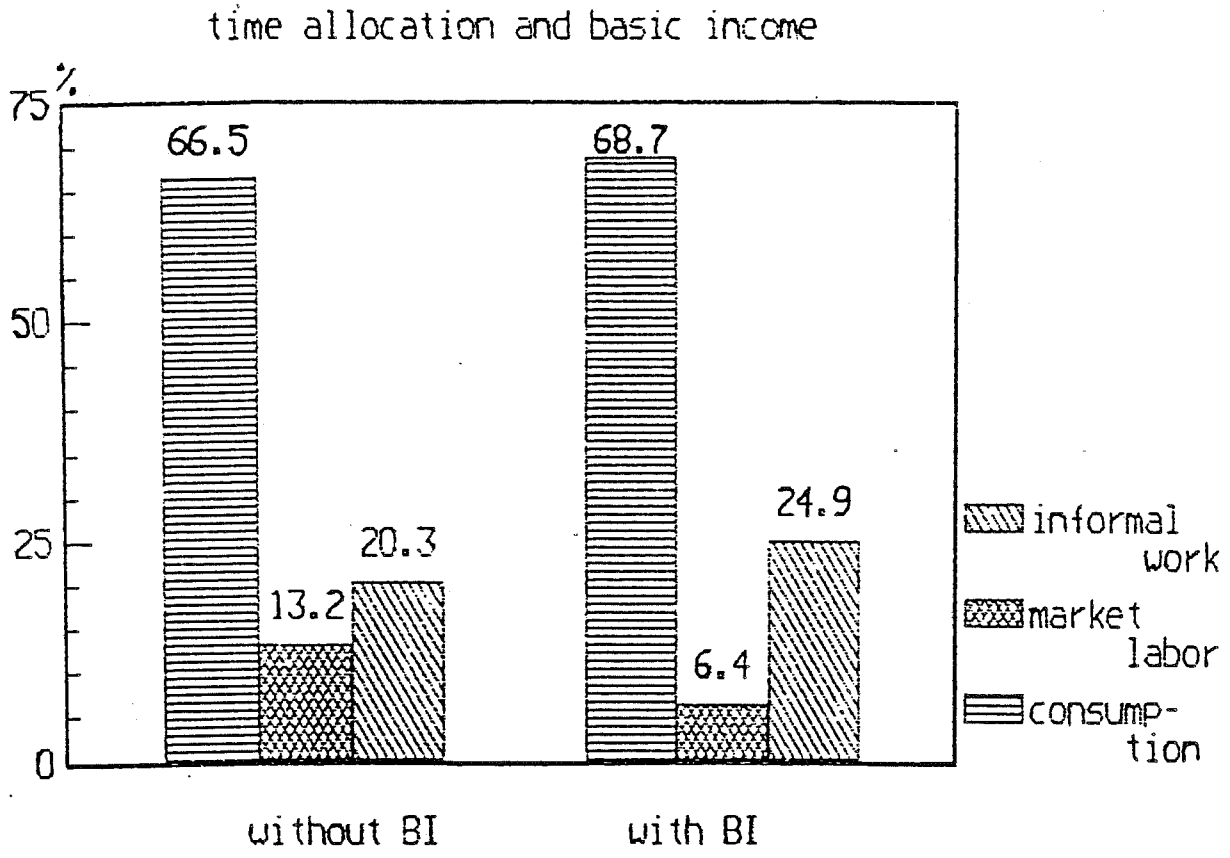
Figure 2 depicts the change in the allocation of time, caused by the introduction of a basic income program, where the grant equals the maximum amount found in figure 1.

Figure 2.

As found out in the theoretical analysis, more time is devoted to informal work. In the special case of a Cobb-Douglas utility function, the supply of market labor is going down. The total supply of formal and informal labor is decreased by only a small amount.

A straightforward extension to the model is to distinguish a second type of market labor, being a composite of the more attractive jobs. This type of market labor enters the Cobb-Douglas utility function with a positive factor coefficient of .01 , but it is paid only 75% of the wage rate for the unattractive jobs. This slightly modified model then predicts a

Figure 2.


time allocation and basic income
%
75
50
25
0
66.5
13.2
20.3
68.7
6.4
24.9
informal work
market labor
consump-tion
without BI
with BI

shift on the labor market from the unattractive jobs to the more attractive ones, caused by the basic income program. This shift is shown in figure 3.

Figure 3.

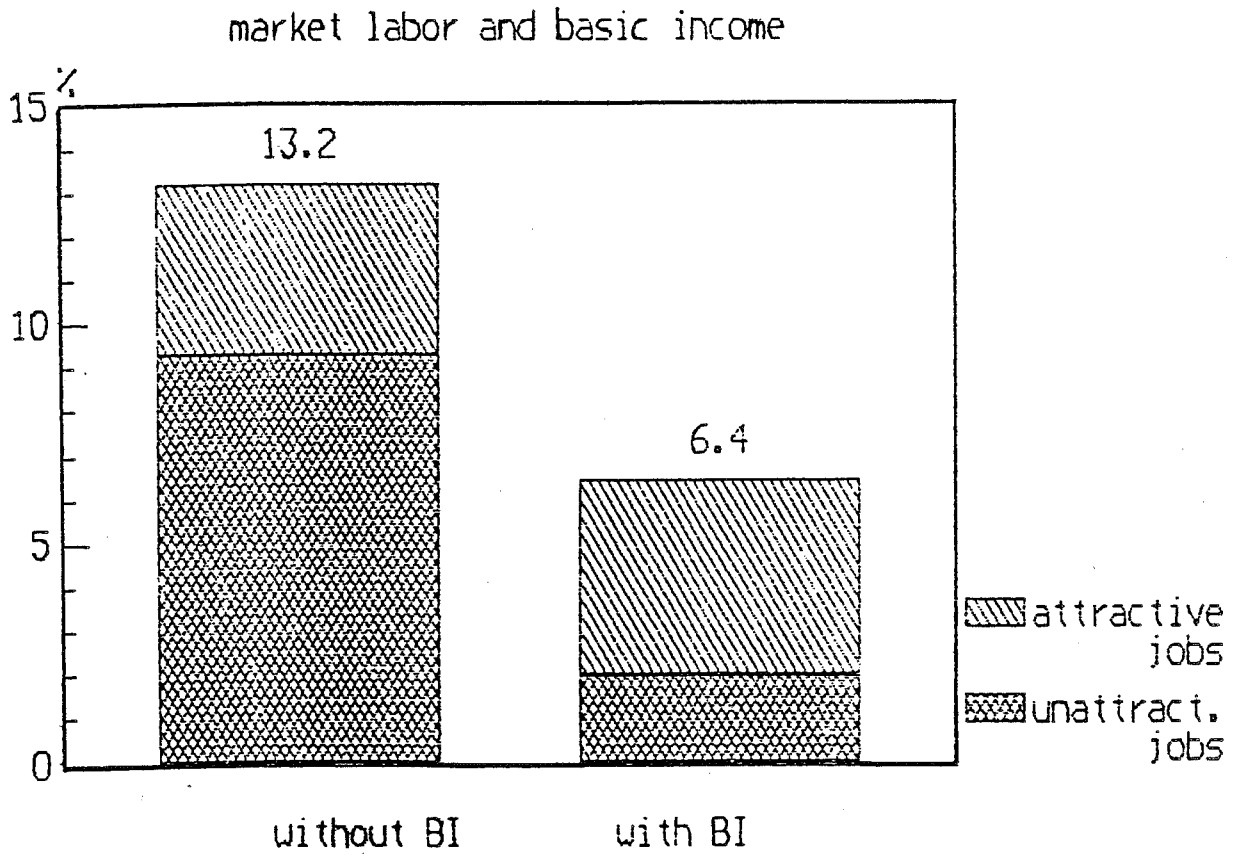
What are the consequences of this reallocation for national product and welfare ? We should distinguish between three possible measures to see what happens.

The national product or income (NI), as measured in the national accounts, is sometimes taken as a welfare indicator. This is the sum of all final goods and services, produced in the formal sector of the economy. In the framework of our model this form of GNP can be calculated as:

$$NI = (1-t)wh+(1-t)y+G = wh+y \qquad (23)$$

However, one of the major drawbacks of this measure is the neglect of the products of the informal sector, that also add to national welfare (NWF). In our approach,

Figure 3.


market labor and basic income
%
15
10
5
0
13.2
6.4
attractive jobs
unattract. jobs
without BI
with BI

this value for national welfare can be obtained by adding the informal work income to national income, i.e.

$$NWF = NI+vk = wh+y+vk \qquad (24)$$

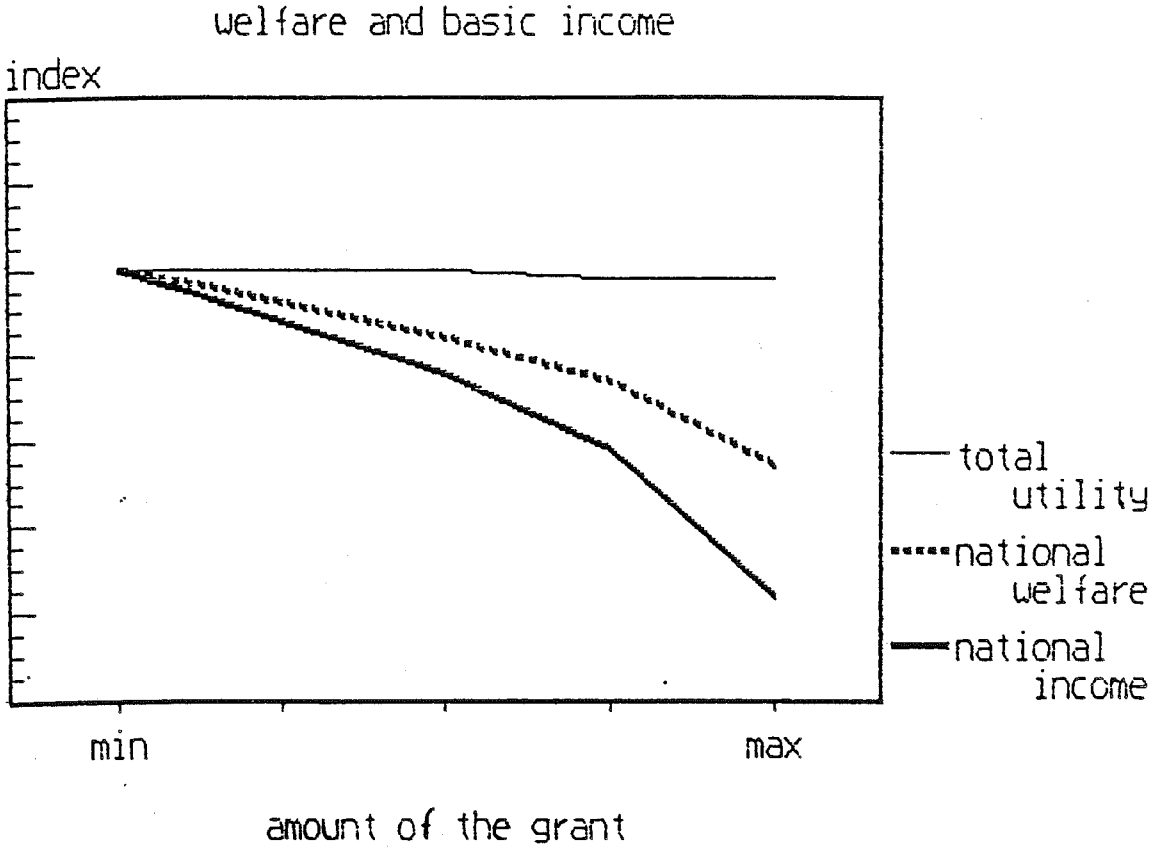
Figure 4.

Still another measure is offered by the (cardinal) notion of total utility, which is maximized in this model and can be seen as a standard for the quality of life. Figure 4 shows the relationship between these three measures and the amount of the grant, up to its maximum value in the basic income program.

One can see from the figure 4 that national welfare is reduced far less than national income, due to the increased importance of informal work production. Both standards, though, are only based on the quantity of goods and services. The quality of life, measured by total utility, stays more or less constant, despite the lower level of production.

This result has to do with the assumption in the model that the level of the consumption activity, and not the

Figure 4.


welfare and basic income
index
total utility
national welfare
national income
min
max
amount of the grant

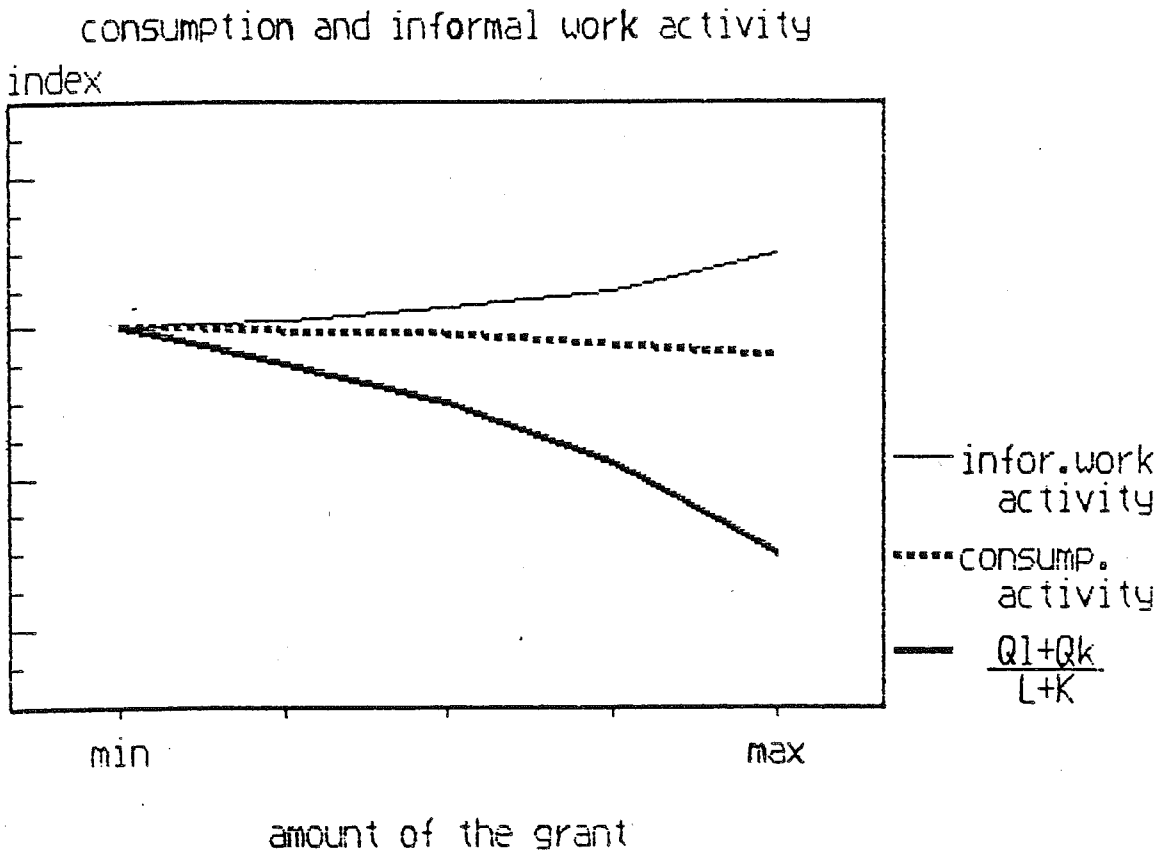
number of consumption goods, increases total utility, as well as the level of the informal work activity. Also the time, spent on these activities, is an important element. The factor ratio in consumption and household activities $(q_1+q_k)/(1+k)$, which can be seen as a measure of the degree of materialism in consumption and/or the hectic pace of life, is considerably lowered by the basic income program. (See figure 5)

Figure 5.

5. Conclusion

We have tried to show that the conventional labor supply approach to a tax-transfer program, such as a basic income scheme, can be improved by dropping the unshaded labor-leisure trade-off and by introducing the consumption technology and positive-valued work activities in the model. It turns out that there is more than just the disincentive to work and the decrease in welfare in the discussion about the economic implications of the basic income proposal. A simple extension to the traditional model shows some

Figure 5.


consumption and informal work activity
index
infor.work activity
consump. activity
Q1+Qk / L+K
min
max
amount of the grant

positive effects of a basic income program, such as a well-balanced distribution of time between market labor and informal work, a shift from unattractive jobs to more attractive jobs, even if they are less productive, a slow-down in the hectic pace of life in modern society and all of this without a reduction in the quality of life.

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NOTES

1. A basic income proposal shows a formal similarity with a negative income tax, though both systems differ in other respects. See H. Parker (1989). In this strictly formal analysis, the economic effects of a basic income also show up after the introduction of a negative income tax.

2. Sometimes the erroneous conclusion is drawn that the marginal utility of labor time is negative, because the marginal utility of leisure is positive and both add up to a constant.

3. If this zero-marginal-utility assumption is dropped, the first order condition for an optimal allocation becomes: $(u_l - u_h)/u_q = w/p$, where u_i indicates the marginal utility of consumption time (l), labor time (h), and consumption good (q), and where w/p is the real wage rate.

4. This exogenously determined informal wage rate implies that the marginal productivity of informal work is assumed to be constant, as opposed to the models imposing a decreasing marginal productivity.
See R. Gronau (1986).
Due to the heterogeneous and fragmentary nature of the informal household work, we prefer to keep its marginal productivity constant. Instead of a zero marginal utility, however, we attach a positive and non-increasing marginal utility to informal work.