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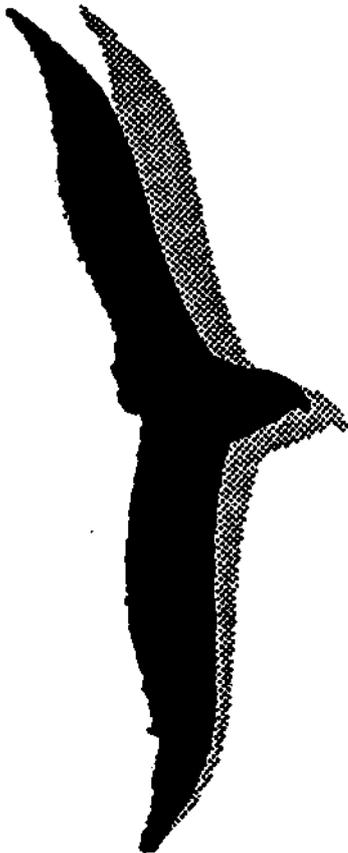**Faculteit der Economische Wetenschappen en Econometrie**

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Equity and Efficiency in Unemployment Insurance

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EQUITY AND EFFICIENCY IN UNEMPLOYMENT INSURANCE

by

J.A. Vijlbrief[*]

1   INTRODUCTION

It is often stressed that unemployment insurance may lead to less employment and output and, consequently, creates efficiency losses (see for example, Danziger *et al.*, 1981, Björklund and Holmlund, 1991 and Layard *et al.*, 1991). In Vijlbrief (1992), we focus on the discouraging effect of benefits and taxation on labour supply and demand, although other decisions, like those to save and invest, may also be influenced by unemployment insurance, or more in general, by social security[1]. The first question we want to answer in this paper is why an institution that causes efficiency losses, social security, is so widespread in developed economies. The most frequently heard explanation for the existence of social security is the combination of risk, aversion to risk, and failures of private insurance markets to cover this risk. A second reason for the existence of social security may be that people like a certain amount of income redistribution, either because of utility interdependence or because they just prefer equality to inequality. Since income redistribution is a public good, state intervention is needed to supply the optimum amount. Two additional arguments for social security are the administrative efficiency of the system (social security covers multiple risks at the same time) and paternalism (left to themselves, people may have a tendency to underinsure). Section 2 surveys the reasons for the existence of social security more extensively. Hence, this section also indicates why the adverse effects of unemployment insurance on efficiency do not necessarily imply that the optimal unemployment benefit level is smaller than the current level.

Although there are motives for state intervention, social security can only be a *second-best solution*, since it involves efficiency losses. A trade-off occurs between the most important advantages of higher unemployment benefits, more equality and more risk reduction, and the disadvantages, efficiency costs, for example measured by the loss in output (see Okun, 1975). Section 3 discusses some literature on this trade-off in social security, with special attention to the optimal unemployment insurance models by Baily (1978) and Flemming (1978). The balance between equity (equality and risk reduction) and efficiency in unemployment insurance is further elaborated in Section 4, by means of the 'output possibilities curve' (see Breit, 1974). Firstly, this curve, that gives feasible combinations of output and equity, is confronted with indifference curves that reflect typical opinions on social security. Secondly, the framework is used to identify the determinants of optimum benefit levels, like preferences regarding equality and efficiency, the degree of

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[1] See for a survey of this topic, Danziger *et al.*, 1981. Unemployment insurance may also have an efficiency-increasing effect by improving job-matches (see Albrecht and Axell, 1984).

risk aversion and conjectures about the functioning of the labour market.

The final part of section 4 is devoted to the construction of empirical output possibilities curves for the Netherlands, by means of a macroeconomic disequilibrium and equilibrium model (see Vijlbrief, 1992). These curves give an indication of the output losses, caused by unemployment insurance. Moreover, we examine whether this framework can give rationales for the popularity of the opinion (reflected by discussions about the misuse of benefits and the introduction of a 'mini-system') that the current Dutch unemployment benefit level is too high. This section closes with some calculations on the effects of replacing current Dutch unemployment insurance by a *mini-system*. Section 5 contains a summary of this paper and some concluding comments.

2   REASONS FOR THE EXISTENCE OF SOCIAL SECURITY

The social security system redistributes a considerable share of primary income in developed economies. This section focuses on the question why such redistribution is desired by economic subjects, and why state intervention is required. Turning to the question why people wish to redistribute a part of their income, a number of explanations are available. The first approach, based on an article by Hochman and Rodgers (1969), assumes interdependence between the welfare of individuals. The utility of one person is positively related to either the consumption or the utility of another person. This opens up the possibility of Pareto-improving transfers. Using an example by Douben (1986, pp. 22-24), we assume the following utility functions, in which the utility and consumption of A and B are given by U^a and C_a and U^b and C_b:

$$U^a = f^a(C_a, C_b) \tag{1}$$

$$U^b = f^b(C_b) \tag{2}$$

The utility interdependence is reflected by the presence of C_b in the utility function of A. Voluntary transfers from A to B will take place, if:

$$\frac{\partial U^a}{\partial C_b} > \frac{\partial U^a}{\partial C_a} \tag{3}$$

For both subjects the marginal utility of consumption by person B must be larger than the

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$$\frac{\partial U^b}{\partial C_b} > \frac{\partial U^b}{\partial C_a} \qquad (4)$$

marginal utility of consumption by A^2. In that case, income will be redistributed until person A's marginal utility of its own consumption equals the marginal utility of consumption by B and Pareto optimum is achieved:

$$\frac{\partial U^a}{\partial C_b} = \frac{\partial U^a}{\partial C_a} \qquad (5)$$

A second way of explaining the voluntary redistribution of income is by pointing out the direct effect on an individual's utility of charity: in this case, the utility gain is not caused by the increase of income or utility of another person, but simply by the positive effect of a gift on a person's own utility (see Thurow, 1971, p. 328). Thurow gives yet another reason for the redistribution of income (1971, p. 327). He claims that a measure of the equality of the income distribution may enter the utility functions of individuals directly. Either since a person prefers more or less equality (just as he or she has a certain preference for any other good), or since there are externalities associated with the redistribution of income, like the prevention of crime or social stability.

According to these explanations for redistribution, the transfer of income is voluntary, so they cannot be used to explain state redistribution through social security. Why is state intervention required to achieve the preferred income redistribution? A reason for this is the public good character of income redistribution in large societies: although everyone prefers a certain amount of redistribution, an individual's willingness to contribute for it depends on the assurance that everyone else also contributes (see for example Hochman and Rodgers, 1969 and Arrow, 1981). Quoting Thurow (1971, p. 329):

"Each individual has a vested interest in disguising his preferences concerning his desired income distribution to avoid paying his optimal share of the necessary transfer payments."

As it is the case with other public goods, the market will not be able to provide the Pareto-optimal amount of redistribution. Thurow (1971) and Orr (1976) developed models in which the public good character of income redistribution is stressed. The first author

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^{2} Note that this is automatically the case for person B, since C_a is absent in his utility function, so that $\delta U^b / \delta C_a$ is zero.

approaches the search for an optimum income distribution as the classical problem of supplying the optimum quantity of a public good. In the optimum, there is unanimous agreement upon the public transfer policy and there are various tax rates, dependent on preferences for redistribution. In the model by Orr, the amount of transfers is determined by simple majority rule and, hence, by the median voter. This implies that most people prefer an amount of transfers that differs from the actual level in the equilibrium situation. The marginal revenue and cost of a certain level of income redistribution (reflected by the level of the social benefit) for the median voter are shown in Figure 1. The marginal revenue for the taxpayer of an increase in benefits falls when the benefit level rises, as the taxpayer's marginal utility of the recipient's income level is decreasing. The marginal cost of an increase in benefits (and taxes) rises with the benefit level, since the taxpayer's marginal utility of own income is also decreasing. The equilibrium level of benefits, B^*, is set to equate marginal revenue and cost of a rise in benefits for the median voter.
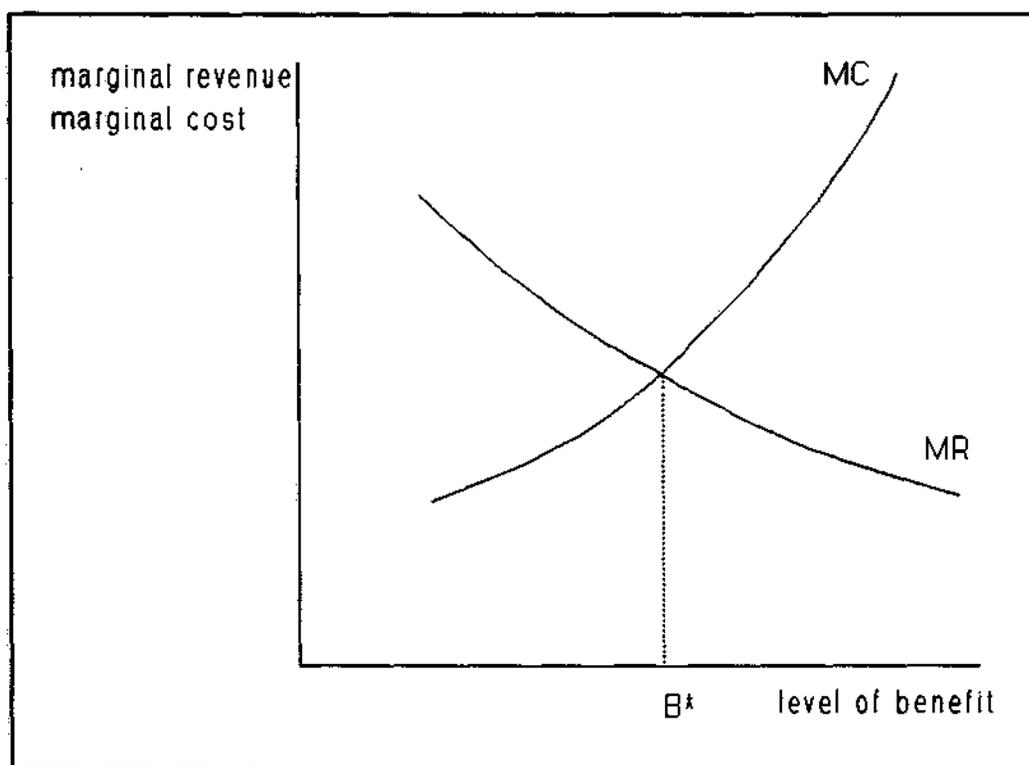

Figure 1: Marginal revenue and cost of income redistribution for the median taxpayer
Source: Douben, 1986, p. 30.

An interesting point of Orr's model is that it also gives determinants of the amount of income redistribution in societies: the income level of the taxpayers (due to the falling marginal utility of income, the marginal cost of redistribution falls when income rises, resulting in higher transfers), the ratio of the number of benefit recipients and taxpayers (a fall in this ratio reduces the marginal cost of redistribution, leading to higher

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transfers) and the number of benefit recipients (holding the ratio of benefit recipients and taxpayers constant, an increase in the number of recipients leads to a rise in the marginal revenue curve, raising the level of transfers). The relative weight of the income of benefit recipients in the utility functions of the taxpayers also influences the transfer level (more altruistic preferences by the taxpayer increase the marginal revenue of redistribution, leading to higher transfers). Empirical estimates by Orr of the determinants of the benefit level in the AFDC (Aid to Families with Dependent Children) program in the United States between 1963 and 1972 are consistent with the theoretical expectations.

Another rationale for social security, which has nothing to do with altruistic preferences, is the 'insurance motive': people are willing to help persons in distress, since there is a chance that they will find themselves in such a position in the future. If individuals are maximizers of expected utility and risk-averters, they will prefer insurance with a premium m to facing, without insurance, a probability distribution of expenditures with a mean of m (see Arrow, 1963, pp. 959-960 and Pauly, 1968, pp. 531-532). As long as the social gain of the pooling of risks by the insurance exceeds the transaction costs, there is a net social profit. However, to explain *social* security by the insurance motive, we have to point out why private insurance is not able to provide the required income protection. Several points, related to the failure of private insurance markets, are made in this respect.

First, it can be asserted that social security takes care of *uncertainties*, rather than risks. Private insurance may not be applicable to uncertainties, like economic recessions, war and epidemics, since these uncertainties are undiversifiable (see Creedy and Disney, 1985, p. 15). According to Atkinson (1987, p. 795), solidarity (*social* security) is required in such a case. This justification for social insurance is related to the 'contractarian theories' of social security and income redistribution by Harsanyi (1953 and 1955) and Rawls (1971). These authors claim that one's preference for a certain degree of redistribution should be governed by one's *ethical preferences* (Harsanyi) or by the *veil of ignorance* (Rawls), both terms indicating a situation in which nobody knows what his or her social position would be. In this situation, also called the 'original position', Rawls claims that people would opt for equality (see Rawls, 1971, p. 511). However, Okun (1975, p. 93) makes clear that this is only true when people are absolutely risk averse:

" (people prefer) a society that guaranteed every family $14,000 a year -no more and no less- over one that provided 99 percent of all families with $20,000 and 1 percent with $13,000. Put the American people in an 'original position' and I certainly would not expect them to act that way."

Hence, social security may be regarded as the equalizing mechanism, chosen by a society

which only displays *some* degree of risk aversion.

In the second place, private insurance may be impossible because of 'adverse selection' problems. These problems are caused by individuals, having different 'accident probabilities' and insurance companies, not having information on these various risks. Rothschild and Stiglitz (1976) show that in this case a 'pooling equilibrium', in which both low and high risk individuals buy the same insurance contract, is unstable, since there are profitable insurance alternatives for the low risk individuals. Since an equilibrium with separate contracts for low and high risk individuals may also be unstable (see Rothschild and Stiglitz, 1976, pp. 636-637), it is very well possible that a private insurance market cannot function in the presence of adverse selection. In practice the adverse selection problem would lead to only attracting high-risk individuals and making private insurance unprofitable. It can be shown that *social* insurance, from which low-risk persons cannot opt out, may be Pareto-improving, compared to private insurance in the case of adverse selection (see Rothschild and Stiglitz, 1976, Mortensen, 1983 and Jones, 1986). However, Spence (1978) argues that social insurance tends to 'solve' the adverse selection problem by reducing the optimum menu of insurance policies to a very small number of options (probably only one). This 'solution' could be inferior to the unregulated private insurance market, since consumer choices are severely restricted.

A third problem of private insurance markets may be that private insurance companies have large problems with 'moral hazard'. In general, moral hazard is concerned with the effects of insurance on incentives. Pauly (1968) shows that moral hazard is in fact caused by a prisoner's dilemma: the individual faces a reduced price of the insured commodity (for example medical care or unemployment) and reacts by consuming more of it; as this strategy dominates for every individual, insurance premiums will have to rise. Some people will prefer no insurance to the high premiums and private insurance may become unprofitable. Even social insurance may not be optimal in this situation, since this implies that people are forced into insurance. The moral hazard problem could be reduced by using 'deductibles' or 'coinsurance', the former being the exclusion of a certain amount of expense from coverage, the latter requiring the individual to pay a fraction of the cost. Moral hazard problems can also be reduced by careful examination by the insurer of, for example, the necessity of medical treatment or the reason for becoming unemployed. In practice, this kind of monitoring is common in the case of unemployment insurance (remember the eligibility conditions for unemployment benefits in most European countries, see OECD, 1991, for a survey). Moreover, Arrow (1968, p. 538) remarks that although economic incentives may not lead to an optimal situation because of moral hazard, society may develop other instruments, like relations of trust and confidence, to prevent people from cheating.

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Two other motives for social instead of private insurance may be mentioned. First, social insurance may be more efficient in the presence of fixed costs of administration, since it covers multiple contingencies at the same time. Second, it is sometimes asserted that, because of insufficient information, people may underinsure themselves. On these paternalist grounds, state intervention in insurance can be defended.

Summarizing this section, the existence of social security may be explained by the public good character of income redistribution, by the failures of private insurance markets, by the administrative efficiency of the system and by paternalism. However, social security is only a *second-best* solution to these problems, since it involves efficiency costs, caused by reduced incentives. This gives rise to a question of optimality, or otherwise stated, to a trade-off between equality and risk reduction on the one hand and efficiency on the other. Sections 3 and 4 deal with this subject.

3   OPTIMAL SOCIAL SECURITY: THE CASE OF UNEMPLOYMENT INSURANCE

The trade-off in social security, between income redistribution and risk reduction on the one hand and efficiency on the other, is illustrated by the extensive literature on optimal unemployment insurance. Several authors (Boadway and Oswald, 1983, Mortensen, 1983 and Shavell, 1979) have shown that in the absence of moral hazard or with perfect monitoring or experience rating, full insurance is optimal[3]. However, when moral hazard exists and behaviour cannot be perfectly monitored and fully experience-rated unemployment insurance is impossible or costly, partial coverage (coinsurance) becomes the *second-best* solution. In that case, the question what the unemployment insurance benefit should be, depends on conjectures about the efficiency loss, caused by reduced incentives to supply labour, and on the value one attaches to reduced income risk and more equality[4].

Although unemployment insurance has as its primary task the smoothing of the income stream over periods of employment and unemployment, it also has a redistributive character. If the risk of unemployment is higher among low-income groups, an unemploy-

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[3] Mortensen (1983, p. 72) defines a fully experience-rated unemployment insurance system as one in which: " ...the expected tax paid on behalf of a worker while employed is equal to the expected benefit drawn when the worker is unemployed.".

[4] Of course, the efficiency cost of unemployment insurance is not only caused by a reduction of labour supply, but may also be due to reduced labour demand (caused by employers' unemployment insurance contributions), and, as noted in Section 1, by the distortion of decisions to save, invest etc.

ment insurance system that redistributes from low-risk persons to those who are 'unemployment-prone' also redistributes income to low-income groups (assuming that premiums are not related to the unemployment risk and that unemployment insurance is compulsory, see also Disney, 1981, pp. 155-157 and Björklund and Holmlund, 1991, p. 109). We return to the trade-off between equality (redistribution) and efficiency in unemployment insurance in Section 4.

In the models by Baily (1978) and Flemming (1978) the efficiency cost of unemployment insurance, caused by moral hazard, is set against the insurance gain of reduced income risk. The optimal benefit level determines the gap between income when employed and unemployed, i.e. the optimal level of coinsurance (see Section 2). At this benefit level the marginal costs and gains are balanced. In the two-period model by Baily, workers face a probability of lay-off in the second period. The duration of unemployment then depends on the benefit, which is paid by a state-organized unemployment insurance fund. An important assumption of Baily is that workers, when unemployed, cannot borrow against future earnings[5]. The optimal benefit level in a balanced-budget framework (unemployment benefits are financed by wage taxes) is then given by equation (6) (see Baily, 1978, p. 390):

$$\frac{\Delta C}{C_e} \cdot R = E_b^u \tag{6}$$

This expression states that the optimal unemployment benefit level is set when the relative drop in consumption, caused by unemployment (ΔC is the difference between the consumption when employed, C_e, and when unemployed, C_u), times the degree of relative risk aversion (R) is equal to the (balanced-budget) elasticity of the duration of unemployment to unemployment benefits, E_b^u[6]. Baily applies the optimality condition (6) to the United States and concludes that, at a degree of risk aversion of unity and an elasticity of unemployment duration to benefits of 0.15, a replacement ratio of 50 % is about right[7]. The actual replacement ratio in the United States at that time was indeed approximately

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[5] Another assumption by Baily is the absence of leisure in the utility function. When discussing optimal benefit levels, according to the Baily-model, we should keep in mind that, if leisure is positively valued, this would reduce optimal benefit levels.

[6] The degree of relative risk aversion, evaluated at the level of consumption when unemployed, is defined as: $[-U''(C_u)/U'(C_u)].C_u$, in which U reflects utility.

[7] Note that, according to equation (6.6) and the values of the elasticity and risk aversion, a relative fall in consumption of 0.15 is optimal for the United States. This fall in annual consumption by 15 percent corresponds with a 50 percent replacement ratio at an average unemployment duration of 18 weeks (see Baily, 1978, p. 391).

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50 % (see Baily, 1978, p. 393).

Table 1 shows calculations of optimal replacement ratios for the Netherlands, at various levels of risk aversion and of the elasticity of unemployment duration with respect to unemployment benefits. The elasticity of microeconomic research is derived from a survey of the empirical literature on the relation between the duration of unemployment and the benefit level, while the macroeconomic elasticity follows from simulations with a macroeconomic model (see Vijlbrief, 1992). It is assumed that the relative drop in consumption is equal to one minus the replacement ratio[8].

Table 1 : Optimal replacement ratios for the Netherlands according to the Baily-model at various levels of risk aversion and the elasticity of unemployment duration to benefits

Elasticity E_b^u	Degree of relative risk aversion (R)		
	0.5	1.0	2.0
0.40 (microeconomic research)	20 %	60 %	80 %
0.58 (macroeconomic disequilibrium model)	0	42 %	71 %

It is difficult to determine the appropriate degree of risk aversion among Dutch workers. Baily asserts that unity is a plausible value for the United States[9]. Assuming that unity is also a correct approximation of risk aversion in the Netherlands, the optimal replacement ratios based on the elasticities according to micro-economic and macroeconomic research are both smaller than the actual Dutch replacement ratio in the second half of the eighties (the weighted average replacement ratio was about 67 percent in 1988, see Vijlbrief, 1992). Only if Dutch workers were more risk averse, this actual replacement ratio would be 'right', according to the Baily-model.

However, we should be careful in applying this model to the Netherlands, since it could be questioned whether it gives a correct description of the situation that unemployed individuals face in the Netherlands. Besides, not only the degree of risk aversion, but also

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[8] This assumption is correct when annual income is taken as the determinant of consumption and the average duration of unemployment in the Netherlands is about one year. This is in rough accordance with calculations for the second half of the eighties by Van Ours, 1991, p. 375.

[9] This value of unity is in agreement with the logarithmic utility function, that is widely used and has a constant degree of relative risk aversion of unity (see Baily, 1978, pp. 392-393).

the 'true' elasticity of unemployment duration to benefits is a controversial matter (see Atkinson and Micklewright, 1991 and Groot and Jehoel-Gijsbers, 1990). Moreover, the Baily-model is only concerned with the risk-reducing motive for unemployment insurance and it does not take equality considerations into account[10]. In this sense, the calculated optimal replacement ratios may be regarded as a minimum requirement for an unemployment insurance system, as it relates to the case where equality is no separate argument in the utility or social welfare function.

Flemming has criticized the Baily-model for not giving enough attention to the assumptions regarding the capital market. The relevance of these assumptions is easily illustrated by the fact that if individuals have infinite time horizons, the capital market is perfect (so that one can borrow against future earnings) and the interest rate is zero, the optimal replacement ratio will be zero as long as the unemployment insurance system does not aim at an explicit redistribution. In an extended version of the Baily-model, Flemming derives optimal replacement ratios under 50 percent if capital markets are indeed perfect, while, in the absence of these markets, the optimal replacement ratios rise to about 70 percent[11]. Hence, as is suggested by Flemming (1978, pp. 422-428), the current levels of the replacement ratio in European countries may be (partially) explained by capital market imperfections.

The optimal unemployment insurance models, discussed in this section, indicate that several factors are important when discussing the trade-off in social security: the effect on work incentives, the degree of risk aversion, the working of capital markets and preferences regarding equality. The next section describes a simple framework to analyze this trade-off.

4   THE TRADE-OFF BETWEEN EQUITY AND EFFICIENCY

4.1   THE FRAMEWORK

A social security system that optimizes social welfare, would redistribute income until the (social) marginal benefit and the marginal cost of redistribution are equal. The marginal cost of redistribution is caused by the reduction in labour supply and demand and the

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[10] Disney (1981, pp. 153-154) has the fundamental objection against the models by Baily and Flemming, that they assume homogeneity of the population, which is in contradiction with an important rationale (different unemployment probabilities) for state intervention in unemployment insurance.

[11] The introduction of positive utility of leisure leads to a significant reduction in the optimal replacement ratio, according to the model by Flemming (1978, pp. 417-422).

distortion of other decisions by taxes and social benefits. The marginal benefit of income redistribution consists of two parts: firstly, the increase in income equality, either directly or indirectly (through external effects) raising utility and, secondly, the reduction in income uncertainty, caused by more extensive insurance against the loss of income.

The trade-off between equality and efficiency is brilliantly clarified by Okun (1975, pp. 91-95) with his so-called 'leaky bucket experiment'. Income redistribution is regarded as transferring money from the rich to the poor in a leaky bucket: if you tax a rich family by $4000, you will have less than $4000 to give to the poor, because of efficiency losses. This experiment makes clear that one has to choose where redistribution should be stopped: when $3600 remain to be given to the poor (implying an efficiency loss of 10 percent) or when only $400 remain. This, of course, depends on your taste for equality and efficiency. To quote Okun (1975, p. 92):

"Your answer cannot be right or wrong-any more than your favourite flavour of ice cream is right or wrong."

The trade-off between equality and efficiency in income redistribution has been quantified by Van Den Broek (1988) for the Netherlands [12]. The author calculates, at various levels of the wage elasticity of labour supply, which part of a transfer from the upper 80 percent of the income distribution to the bottom 20 percent 'leaks away'. At a weighted average of the male and female labour supply elasticity in the Netherlands of 0.29 for the short-run and 0.51 for the long-run, Van Den Broek estimates that 60 to 75 percent of the transfer is lost. To use the Okun example, of the $4000 tax on the rich, only between $1000 and $1600 remain to be given to the poor. At the smaller labour supply elasticities, used in Chapters 4 and 5 of this study, the loss would be about 25 percent.

We now simplify the above mentioned trade-off between efficiency on the one hand and equality and income certainty on the other hand. The cost of redistribution is narrowed down to the loss in private production while, for the moment, the reduction in equality is regarded as the sole benefit of redistribution. In Figure 2, the 'output possibilities curve' shows different combinations of equality and efficiency (measured by real output) that are feasible (see Breit, 1974, p. 13). Point H represents the situation of maximum output, assuming the absence of income redistribution. To the left and right of this point, income is redistributed and output is, consequently, lower than in H, because the optimal allocation is distorted. The indifference curves I_1 and I_2 show the trade-offs for

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[12] The study by Van Den Broek is inspired by a similar study for the United States by Browning and Johnson (1984).
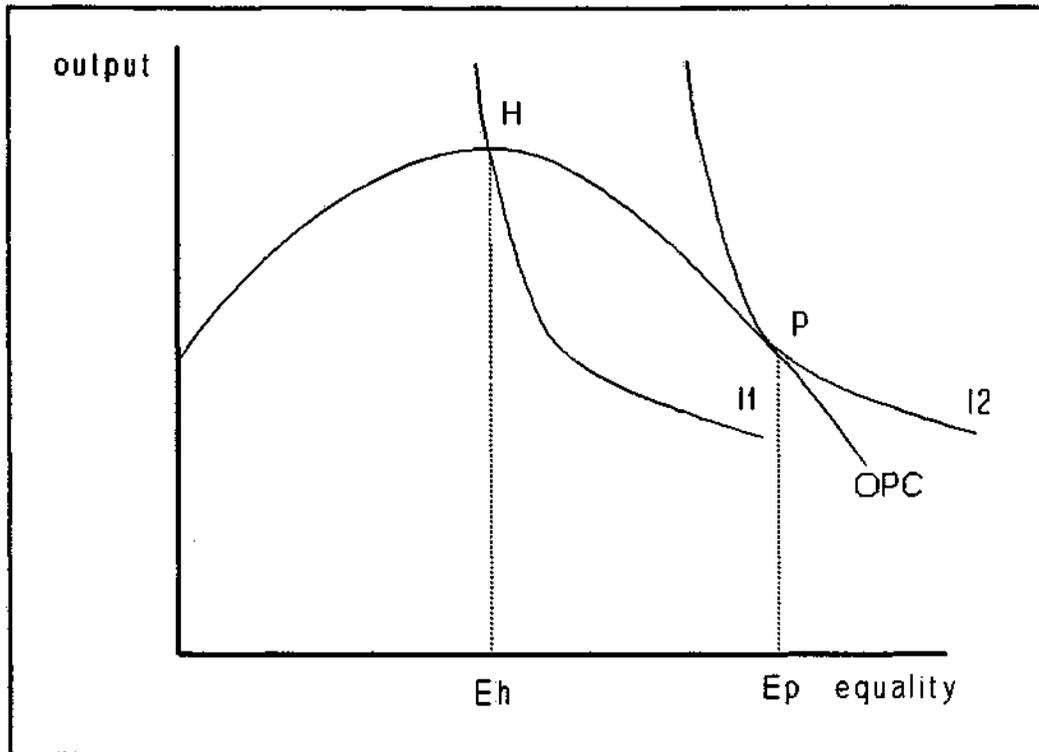
Figure 2 : The choice between equality and output

an individual between output and equality. The utility function, on which these indifference curves are based, embodies some index of equality, along the line of Thurow (1971, see also Section 2). Indifference curve I_2 is tangent to the output possibilities curve at P: here, the marginal rate of substitution between output and equality for the individual is equal to the social marginal substitution rate.

To qualify this situation as a social welfare optimum we have to assume that all individuals have preferences, as reflected by I_2, or that the political process is capable of reaching an unanimous verdict on the optimal income distribution (see Section 2 and Thurow, 1971). In a simple majority voting scheme, without unanimity, I_2 can be regarded as the representation of median preferences and P as the combination of equality and output, chosen by the median voter.

4.2   PREFERENCES, WORK INCENTIVES AND RISK AVERSION

The model can shed some light on the influence on the optimal level of social security of preferences regarding income equality, conjectures about the functioning of the labour market and the degree of risk aversion. Starting with the preferences for income equality, we distinguish three positions:

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- the 'extreme liberal view', that advocates the fairness of the income distribution without any transfers, in other words, the marginal productivity distribution of income; this view boils down the maximization of total output in H (see Figure 2); we represent this view by an utility function that consists of only one argument, real output (see U_l);

- the 'moderate liberal view', that supports redistribution until inequality is reduced to an acceptable level, implying a utility function U_m;

- the 'egalitarian view', advocating a social security system with infinite substitution possibilities between output and equality, see the utility function U_e.
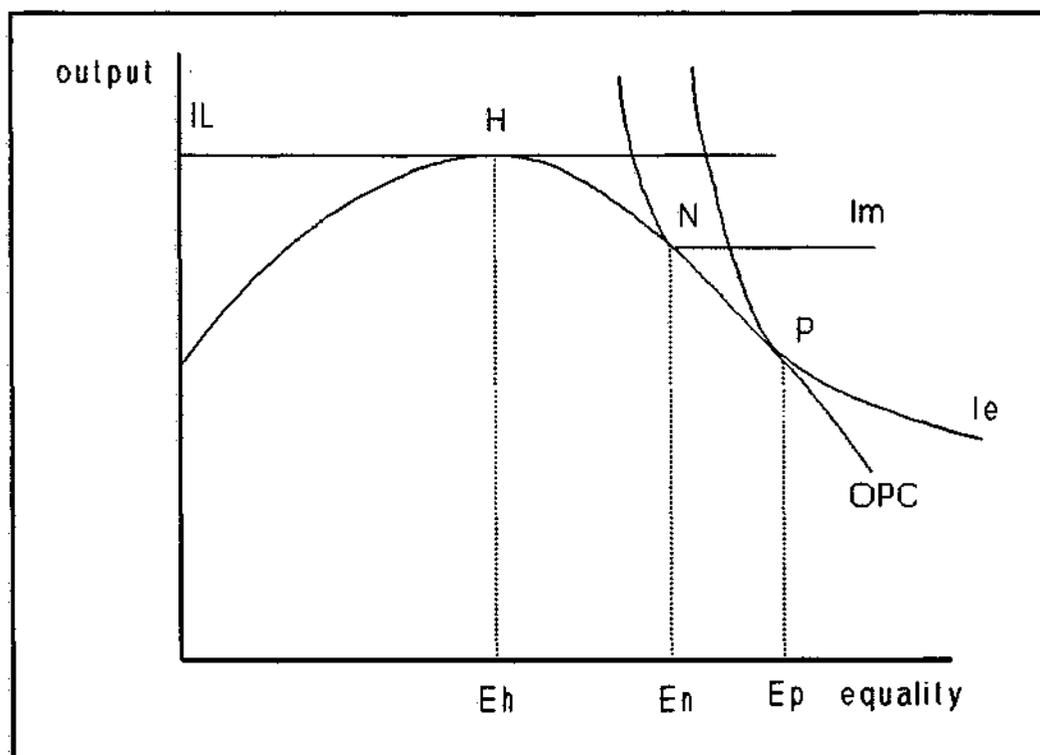

Figure 3 : Three points of view on the optimum combination of output and equality

Equation (7) gives the general form of a linear homogenous Cobb-Douglas utility function in output and equality.

$$U_g = Y^\alpha . E^\beta \qquad \alpha + \beta = 1 \tag{7}$$

The different opinions regarding output and equality can be written as:

U_l : $\alpha = 1$, $\beta = 0$; *only output matters*

U_m : $\alpha+\beta=1$; *if equality is smaller than E_n in Figure 6.3*

    : $\alpha=1$, $\beta=0$; *if equality is larger than E_n*

U_e : $\alpha+\beta=1$; *infinite substitution between output and equality*

Figure 3 shows indifference curves, reflecting the preference schedules of three individuals that have different views on the trade-off between output and equality. Indifference curve I_L belongs to the utility function U_1 of the extreme liberal: the market outcome of income distribution (E_h) is regarded as optimal and only output shows up in the utility function. At point N, the trade-off between output and equality is optimal from the moderate liberal point of view. Indifference curve I_m shows that this individual is willing to substitute equality for output until a certain amount of equality is achieved (E_n in Figure 3). Hereafter, the moderate liberal no longer attaches any value to more redistribution. Later, we show that the theoretical construct of the moderate liberal may, in practice, be identified as an advocate of a so-called *mini-system* of social security. Finally, point P shows the optimum combination of output and equality (E_p) for an egalitarian.

The slope of an indifference curve for an egalitarian, for example I_e, can be written as:

$$\frac{dY}{dE} = -\frac{\dfrac{\partial U}{\partial E}}{\dfrac{\partial U}{\partial Y}} = -\frac{Y}{E} \cdot \frac{\beta}{\alpha} \tag{6.8}$$

At the optimum P, the output possibilities curve is tangent to the indifference curve I_e,

$$\left(\frac{dY}{dE}\right)_{ppc} = -\frac{Y}{E} \cdot \frac{\beta}{\alpha} \tag{6.9}$$

which implies that in the optimum, the elasticity of output with respect to equality equates $-\beta/\alpha$

$$\frac{\dfrac{dY}{Y}}{\dfrac{dE}{E}} = -\frac{\beta}{\alpha} \tag{6.10}$$

Figure 4 shows the effect on the optimum combination of output and equality of a shift in preferences. When α rises and β falls (reflecting a shift in preferences from equality to output), the slope of the indifference curve at P is reduced (see equation (8)). The new optimum is achieved in Q, with less equality and more output.

The model can also be used to illustrate the effects on the optimum combination
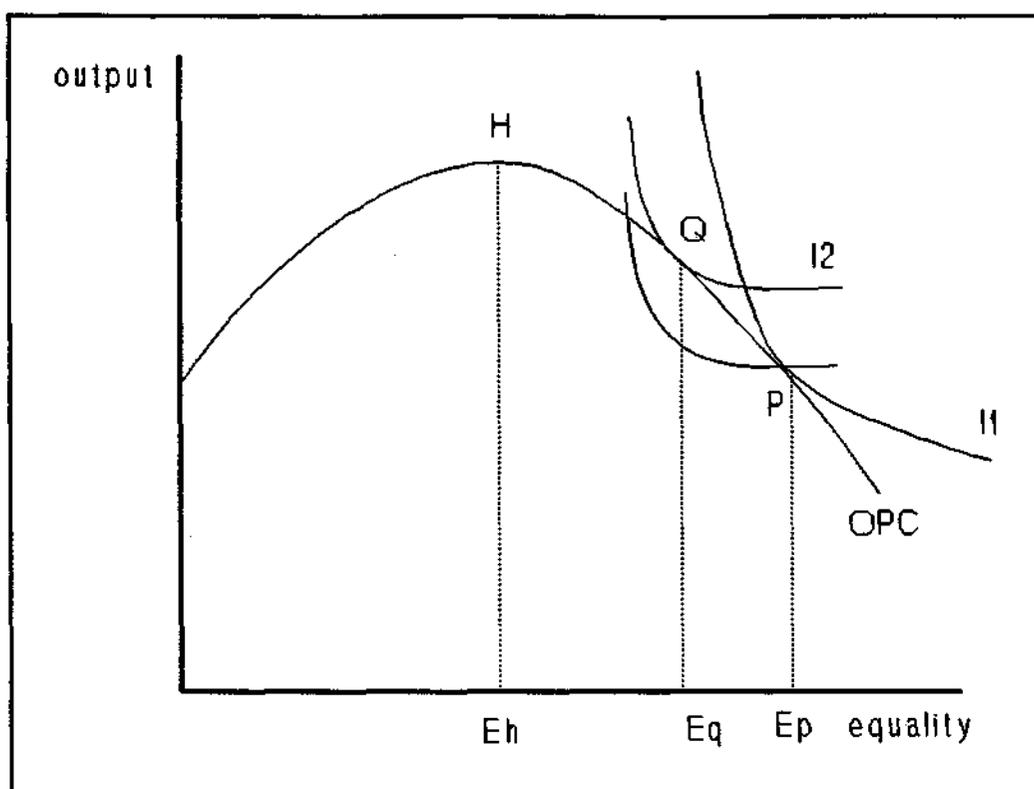
Figure 4 : A shift in preferences from equality to output

of equality and output of different opinions regarding the functioning of the labour market. The effects on output of a rise in the replacement ratio (reflecting a reduction in the incentives for labour supply and demand, and an increase in equality) are much smaller in disequilibrium models of the Dutch labour market than in equilibrium models (see Den Butter and Compaijen, 1991 and Vijlbrief, 1992). Suppose that the output possibilities curve of the Figures 2-4 reflects combinations of output and equality in the case of a labour market in disequilibrium, which is demand constrained since the wage rate is too high to clear the market. Figure 5 shows this disequilibrium output possibilities curve (OPC_{deq}), but also an output possibilities curve of an economy with a clearing labour market (OPC_{eq}). This latter curve illustrates that at each level of equality, the equilibrium labour market gives a higher output. Furthermore, when equality lies above the market outcome $(E > E_h)$, a rise in equality causes a larger reduction in output according to the equilibrium curve, compared to the disequilibrium curve. This is in agreement with the results of the above mentioned studies, that show that the effects on production and employment of a change in the replacement ratio (as a crude measure for equality) are larger in the equilibrium model than in the disequilibrium model.

Figure 5 shows the effect on the optimum level of redistribution of different opinions about the functioning of the labour market. Of the two persons, whose preferences regarding equality and output are equal, individual 1 thinks the labour market is best
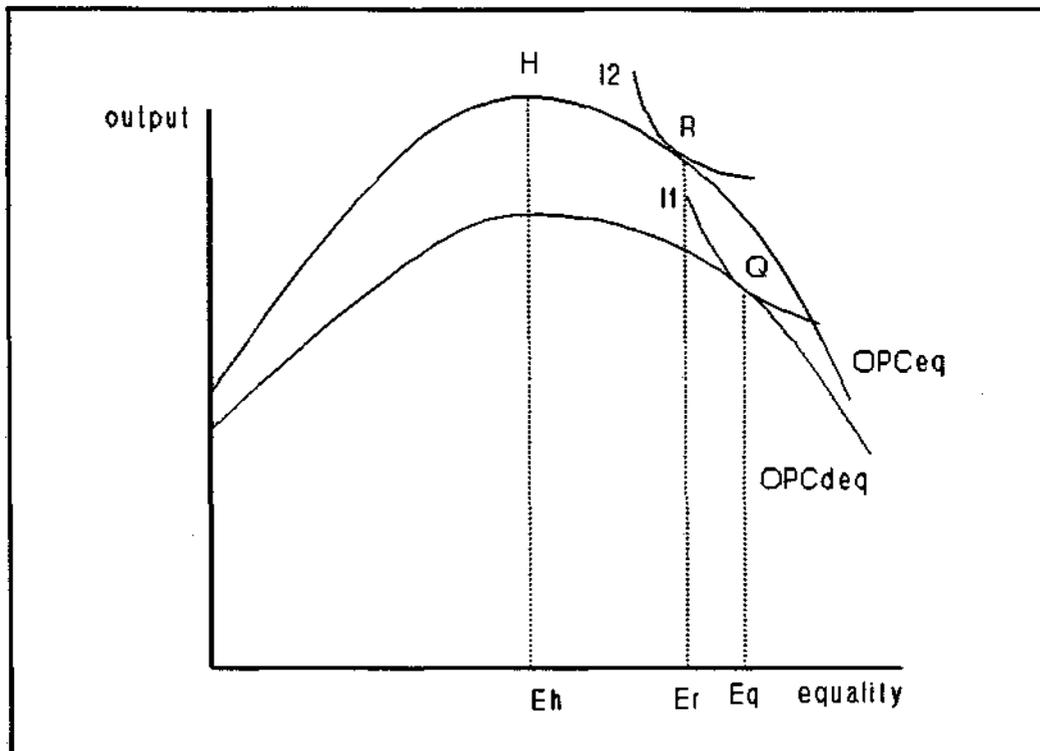
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Figure 5 : A shift in the output possibilities curve from a non-clearing to a clearing labour market

described by a disequilibrium model and he maximizes his utility at point Q, with a level of equality E_q. Individual 2 believes that the labour market is cleared by flexible wages and his optimum is point R, with less equality (E_r) and more output[13].

Until now, we focused on the trade-off between efficiency and equality. Of course, the risk-reducing effect of social security must also be taken into account. It is assumed that the measure of equality (E) also reflects the amount of risk reduction. Hence, when E increases, not only does equality rise, but risk is reduced at the same time (E is a measure of *equity* now). Note that in this simple model, a decrease in risk causes efficiency losses, as measured by real output, because incentives to supply and demand labour are reduced. Of course, more social security can actually increase *total* efficiency, when private insurance is not available because of problems like moral hazard and adverse selection (see Section 2).

Turning to the three positions on efficiency and income equality, that were distinguished earlier in this section, we speculate on how these views may be influenced by introducing risk. The 'extreme liberal' may regard social security as totally superfluous,

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[13] In Figure 6.5, moving from a disequilibrium to a clearing labour market has a larger 'substitution effect' (equality becomes more expensive in terms of output) than 'income effect' (more output and equality are possible).

since private insurance markets should be able to cover income losses, due to, for example, unemployment. The 'moderate liberal' (identified earlier as an advocate of a mini-system of social security) may take a more subtle position: social security is only necessary in those cases where private insurance markets show failures. Thus, one can advance a mini-system out of equality considerations (social security as a last resort for those who are not able to provide for themselves) or out of insurance considerations (social security as insurance when private insurance markets show failures). The 'egalitarian', finally, may insist that social security should, at least take care of risks, not covered by private insurance, but that the system should also be used for redistribution purposes.

In our simple model, a rise in risk aversion can be reflected by a shift in preferences towards E: people want to trade in output for insurance. In the utility function, α falls and β rises[14]. The effects of an increase in risk aversion are not illustrated by a figure, since they are, of course, the reverse of the shift in preferences that was shown in Figure 4. Finally, the influence of an increase in capital market imperfections is not further elaborated here, since it will be clear that this gives rise to a higher optimal value of E.

Summarizing this (sub)section, the trade-off model of social security can, firstly, be used to identify three different opinions on the optimal combination of efficiency, measured by output, and equity, consisting of equality and insurance. Secondly, in this framework we can study the effects of a change in preferences, of different opinions about the working of the labour market and of changes in the degree of risk aversion. In Section 4.3, the model is applied to the unemployment insurance system in the Netherlands.

4.3   EQUITY AND EFFICIENCY IN DUTCH UNEMPLOYMENT INSURANCE

In this section, the framework of a trade-off in social security between efficiency on the one hand, and equality and risk reduction on the other, is applied to unemployment insurance in the Netherlands. As in Section 4.2, we measure efficiency by real output, while the replacement ratio is used as a proxy for the amount of equality and risk reduction (equity)[15]. We assume that at the point of no income redistribution and maximum output (see point H in Figure 2), the replacement ratio is zero. Figure 6 shows

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[14] In the utility function (6.7), the measure of relative risk aversion, $[-U''(Y)/U'(Y)].Y$, is equal to β. Hence, a rise in risk aversion indeed implies a rise in β.

[15] Note that in reality the amount of equality and risk reduction and the effect on output are not only determined by the replacement ratio, but, for example, also by the financing system of unemployment insurance and the time path of benefits (see Björklund and Holmlund, 1991, pp. 164-172 and Vijlbrief, 1992)
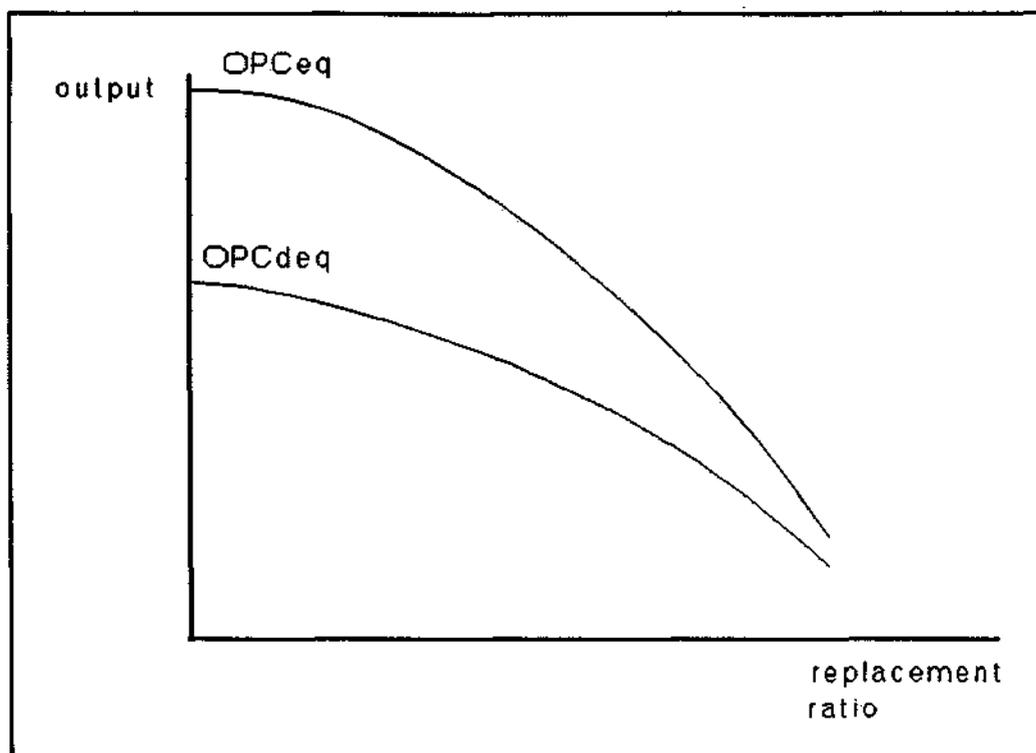
Figure 6 : The output possibilities curve's in the case of a non-clearing labour market (OPCdeq) and an equilibrium labour market (OPCeq)

the theoretically expected relation between the replacement ratio and real output, the output possibilities curve, for a non-clearing labour market (OPC_{deq}) and an equilibrium labour market (OPC_{eq}).

As a first step, the macroeconomic models of Vijlbrief (1992) are used to determine empirical output possibilities curves for the Netherlands. Secondly, the situation with regard to Dutch unemployment insurance in the eighties is evaluated: what are the efficiency costs of the achieved levels of equality and risk reduction? We then make some speculative, revealed preference, calculations of the parameters of the utility function for the median voter or the social welfare function. Fourthly, some attention is given to the question whether changes in one's opinion regarding the functioning of the Dutch labour market or changes in preferences and risk aversion may be responsible for the widely supported view that Dutch social security (of which unemployment insurance is a part) has become too large in the eighties. Finally, an alternative to the current system of unemployment insurance, a so-called mini-system, is shortly investigated with regard to its efficiency-increasing abilities.

Figure 7 shows the output possibilities curves for the disequilibrium and the equilibrium model of Vijlbrief (1992). The essential difference between the two models is the assumption of market-clearing with regard to the Dutch labour market. In the disequilibrium model, the wage rate is rigid and lies above market-clearing level, while the
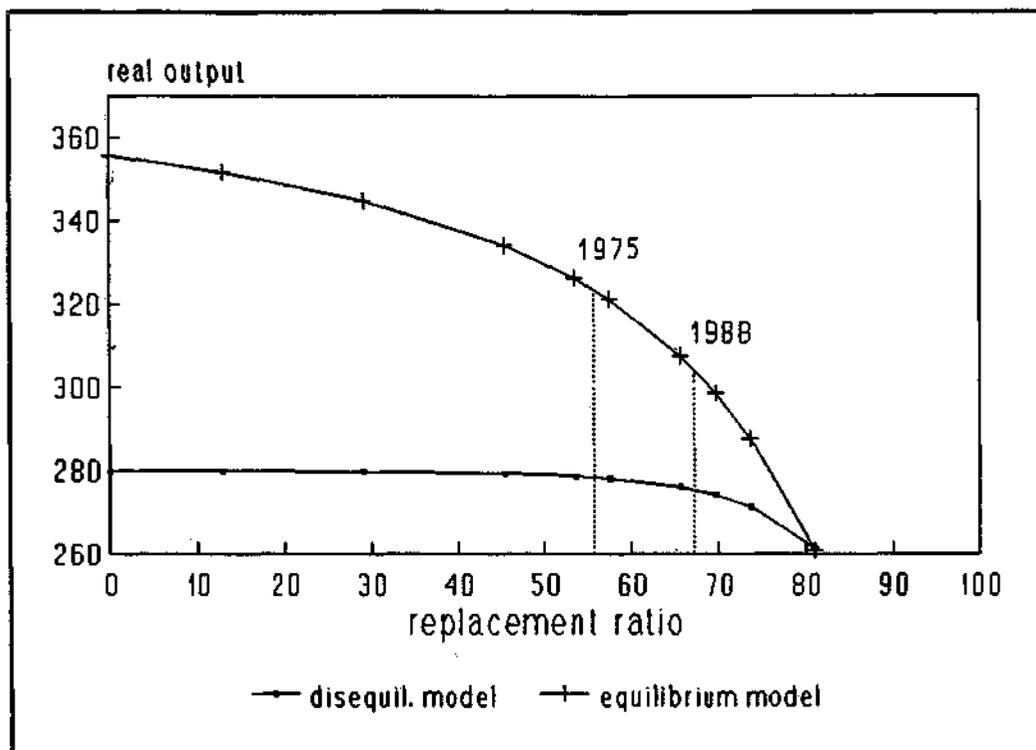
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Figure 7 : Output possibilities curve's for the Netherlands, according to the disequilibrium and the equilibrium model

labour market is instantaneously cleared by flexible wages in the equilibrium model. The output possibilities curves are obtained by taking the set of exogenous variables for a base year (in this case 1982), and varying the level of the replacement ratio[16]. Hence, these trade-offs give an indication of the efficiency costs, measured in real output, of a certain level of equity, measured by the replacement ratio. Note that on both curves the elasticity of output with respect to the replacement ratio rises with the level of the replacement ratio. This is caused by the specification of the labour supply function, in which the elasticity of labour supply to the replacement ratio also rises with the latter. Figure 7 shows that output is not very sensitive to changes in the replacement ratio, according to the disequilibrium model. This is caused by the low elasticity of labour supply with regard to the replacement ratio and by the assumption of employment (and output) being determined by labour demand in this model. The replacement ratio affects employment and output only indirectly, by influencing the excess-supply of labour and, consequently, the wage rate (see Vijlbrief, 1992). Hence, one's opinion on the functioning of the Dutch

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[16] The replacement ratio is defined as the weighted average of the replacement ratio for people on unemployment insurance, the replacement ratio for people on unemployment assistance and the zero replacement ratio for people who do not get any benefit at all. Note that this weighted average replacement ratio not only takes the (relative) benefit level into account, but also, indirectly, the duration of the benefit entitlement.

labour market, non-clearing versus clearing, is of the utmost importance for the efficiency losses, caused by the unemployment insurance system. For example, according to the output possibilities curve for the equilibrium model, the 1982-replacement ratio of 65.6 percent causes real output to be 13.5 percent smaller than it would be in the absence of unemployment insurance. For the disequilibrium model, this output loss would only be 1.4 percent. Figure 7 also shows the effects on real output of the development of the replacement ratio in the Netherlands between 1975 and 1988.

Table 2 : The elasticity of output to the replacement ratio (e_R^Y) and calculations of the parameters of the utility function (α and β)

	disequilibrium model	equilibrium model
replacement ratio at 1988-level: 66.9 %	$e_R^Y = -0.08$	$e_R^Y = -0.45$
	$\alpha = 0.93, \beta = 0.07$	$\alpha = 0.69, \beta = 0.31$
replacement ratio at 1981-level: 63.8 %	$e_R^Y = -0.03$	$e_R^Y = -0.33$
	$\alpha = 0.97, \beta = 0.03$	$\alpha = 0.75, \beta = 0.25$

We now turn to some revealed preference calculations of the parameters of the median voter utility (or social welfare) function. The Dutch median voter is supposed to be an 'egalitarian', having a linear homogeneous Cobb-Douglas utility function in output and the replacement ratio (the latter reflecting the levels of equality and risk reduction). We also assume that the actual combination of output and the replacement ratio reflects the median voter's preferences regarding equity and efficiency. Our models provide information on the elasticity of output to the replacement ratio and, hence, given a certain replacement ratio, the parameters of the utility function can be calculated, using equation (10). Table 2 shows these calculations at two levels of the replacement ratio for the disequilibrium and equilibrium model.

Given a certain replacement ratio, the median voter who thinks the Dutch labour market is instantaneously cleared by flexible wages, must have a larger preference for equity or be more risk averse (a larger β) than the median voter who thinks the Dutch labour market is better described by a disequilibrium model. The 'equilibrium thinker' considers the efficiency loss, due to a certain level of the replacement ratio, to be larger

and, hence, he has to like equity more than the 'disequilibrium thinker'[17].

According to our trade-off model of equity and efficiency, there may be various explanations for the fact that Dutch benefit levels are increasingly regarded as too generous and Dutch social security as 'too large'. First, preferences may shift from equality to efficiency or risk aversion may fall (a rise in α and a fall in β), which will lead to a lower optimum replacement ratio. A second reason may be that the equilibrium model has become more popular in the Netherlands. If a disequilibrium thinker is turned into an equilibrium thinker, the optimum replacement ratio will fall, given the preferences for efficiency and equity, reflected by β / α. In the equilibrium model, the elasticity of output to the replacement ratio is larger; to reach an optimum again, the replacement ratio must fall[18]. One (or more) of the above mentioned changes could be responsible for the change-over in opinions about social security in the Netherlands in the eighties. However, it could well be that there are other reasons, such as the high burden of taxes and premiums or the low level of (active) labour force participation for the view that Dutch social security has become too large.

This section closes with a brief look at the equity and efficiency effects of replacing the current Dutch unemployment insurance system by a so-called mini-system. In such a system, unemployment benefits above the minimum level are abolished and individuals are free to (privately) insure themselves against this risk. Proponents of a mini-system argue that this may solve the problems in Dutch social security (efficiency losses, a high burden of taxes and premiums and a low level of labour force participation), and, moreover, involves less paternalism and more individual freedom (see for example De Kam and Van Herwaarden, 1991, and Groenveld, 1991). Earlier, in section 4.1, we labelled proponents of such a system 'moderate liberals': social security should only provide for minimum standards of living[19].   Suppose, the Dutch government introdu-

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[17] If we interpret the utility function as a social welfare function, the line of reasoning stays the same: the efficiency costs of a certain replacement ratio are higher in a society with a clearing labour market and, consequently, it has to have a larger preference for equity, than a society in which the labour market has rigid wages above the market-clearing level.

[18] Take, for example, as a starting position a disequilibrium thinker at the 1988-level of the replacement ratio of 66.9 percent and with a β / α of 0.08. If he changes into an equilibrium thinker, his new optimum will be at the point, where the elasticity, but now in the equilibrium model, is -0.08. This point will be at a considerably lower level of the replacement ratio.

[19] Remember that a mini-system can also be defended by pointing out that social security should only correct the private insurance market failures and should not aim at further redistribution.

ces a mini-system of unemployment insurance, with a benefit level equal to the current unemployment assistance benefit level. The replacement ratio, according to this system (based on the 1988 unemployment assistance replacement ratio), is 63.9 percent. Figure 8 shows the effects of the mini-system, compared to the actual replacement ratio in 1988, by a shift along the output possibilities curves. According to the disequilibrium model, the gain in real output by the mini-system would be 0.8 percent, and, according to the equilibrium model, 2.3 percent. These effects are both balanced-budget, keeping the government's budget deficit fixed. A sensitivity analysis shows that the effects of the mini-system are dependent on the elasticity of labour supply with regard to the replacement ratio: the higher this elasticity, the larger the positive effects of the mini-system on output and employment.
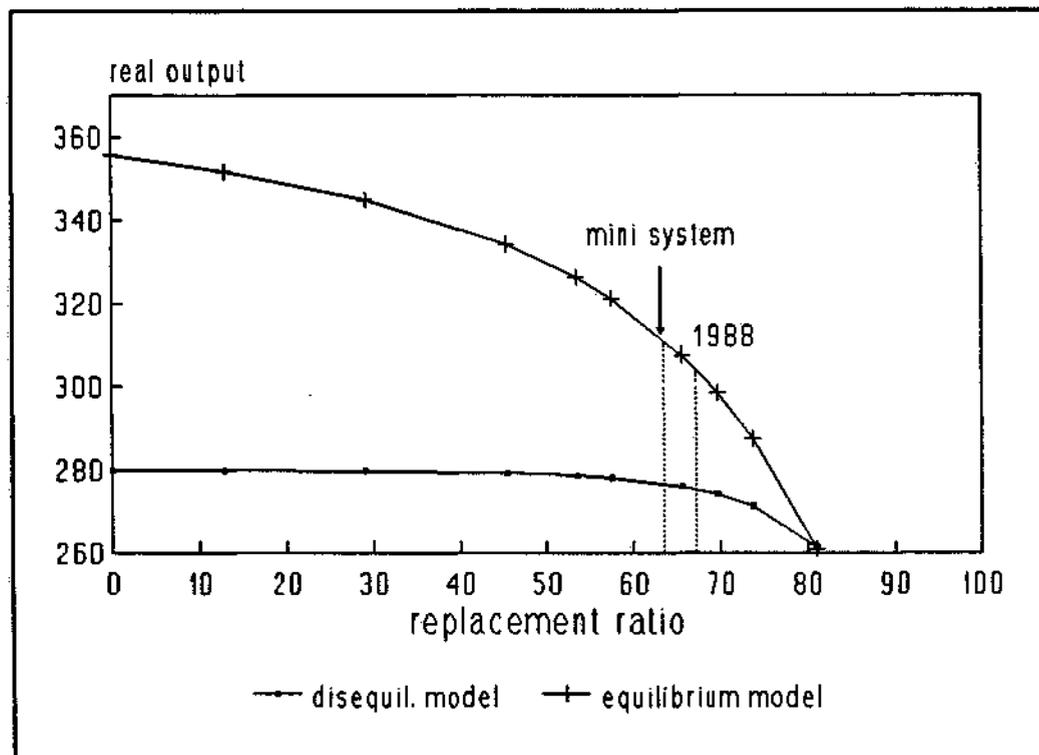

Figure 8 : The effects on output of the introduction of two mini-systems of unemployment insurance

5   SUMMARY

This paper is concerned with equity and efficiency in social security. If social security, or more specifically unemployment insurance, leads to losses in employment and output, then why is it such a widely observed phenomenon? The first rationale for social security is

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utility interdependence or a preference for equality, combined with the public good character of income redistribution. Secondly, the combination of risk, aversion to risk and private insurance market failures is an important raison d'être for social security. With regard to unemployment insurance, the problems of undiversifiable uncertainties, adverse selection and moral hazard may be powerful in explaining the amount of state intervention. As was said earlier, social security may even be *efficiency-increasing* when it takes care of privately uninsurable risks. However, social security remains a second-best solution, since, in practice, taxes that do not distort economic decisions and unemployment benefits without moral hazard are impossible. Additional reasons for the existence of social security are the administrative efficiency of the system and paternalism.

The second-best character of unemployment insurance raises the question of the optimal balance between efficiency and equity (equality and risk reduction). Some models of optimal unemployment insurance, discussed in Section 3, leave out the equality aspect and indicate the elasticity of unemployment with respect to the replacement ratio, the degree of risk aversion, and capital market imperfections as the determinants of the optimum benefit level. An application to the Netherlands of one of these models, the Baily-model, suggests that Dutch unemployment benefit levels are 'too high'. However, as stressed in Section 4, one's taste for equality plays a major part in determining the optimum level of income redistribution. Otherwise stated, it will be difficult and probably impossible, to establish what *the* Dutch unemployment benefit level should be.

What we can determine, is a relation between the feasible levels of equity and efficiency, the output possibilities curve. Three typical views on equity (capturing equality and income protection) are confronted with this output possibilities curve: firstly, the extreme liberal view, that regards the market outcome as a fair income distribution and that assumes private insurance markets to function perfectly; secondly, the moderate liberal view, that advances a mini-system of social security and, thirdly, the egalitarian view that promotes income redistribution beyond minimum standards of living. For an egalitarian, his preferences with regard to equality and efficiency, his degree of risk aversion and his judgment of the functioning of the labour market are crucial in determining the optimum benefit level.

With regard to unemployment insurance in the Netherlands, we constructed two output possibilities curves: one, assuming the Dutch labour market is characterized by excess-supply and one, assuming the Dutch labour market is instantaneously cleared by flexible wages. The trade-off between equity and efficiency in Dutch unemployment insurance is simplified to a relation between the replacement ratio and output. Hence, some other aspects of the unemployment insurance system that affect efficiency, such as the financing method and the time profile of benefits, are not considered. As could be

expected, the models differ significantly in their evaluation of the efficiency cost of Dutch unemployment insurance: for example, according to the equilibrium model, the 1982-replacement ratio of 65.6 percent causes output to be 13.5 percent smaller than it would be in a situation without unemployment insurance, while the output loss is only 1.4 percent, according to the disequilibrium model. There are theoretical and empirical indications (see Springer, 1991, pp. 59-73, Graafland, 1990, p. 24, and Vijlbrief, 1992) that the Dutch labour market is best described by the latter model, which would make the effects, according to the disequilibrium model, the most realistic.

This paper then returns to the question of the optimal unemployment insurance benefit level. The view, which was increasingly supported in the eighties, that the unemployment benefit level is too high in the Netherlands can be related to the, above mentioned, determinants of the optimum benefit level: preferences may have shifted towards efficiency, risk aversion may have declined and more people may believe now, that the Dutch labour market is cleared by flexible wages. However, there may be other reasons (for example the high burden of taxes and premiums) that have induced the view that the Dutch social security system is too generous. Finally, we calculate the output gain of a mini-system of unemployment insurance. Again, the results heavily depend on the assumption of a clearing versus a non-clearing labour market in the Netherlands.

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ABSTRACT

This paper is concerned with equity and efficiency in social security. If social security, or more specifically unemployment insurance, leads to losses in employment and output, then why is it such a widely observed phenomenon? The first rationale for social security is utility interdependence or a preference for equality, combined with the public good character of income redistribution. Secondly, the combination of risk, aversion to risk and private insurance market failures is an important raison d'être for social security. Additional reasons for the existence of social security are the administrative efficiency of the system and paternalism. However, social security remains a second-best solution, since in practice taxes that do not distort economic decisions and benefits without moral hazard are impossible. The second-best character of unemployment insurance raises the question of the optimal balance between efficiency and equity (equality and risk reduction). Some models of optimal unemployment insurance leave out the equality aspect and indicate the elasticity of unemployment with respect to the replacement ratio, the degree of risk aversion, and capital market imperfections as the determinants of the optimum benefit level. However, one's taste for equality plays a major part in determining the optimum level of income redistribution. The paper determines a relation between the feasible levels of equity and efficiency, the output possibilities curve. Three typical views on equity (capturing equality and income protection) are confronted with this output possibilities curve: the extreme liberal view, the moderate liberal and the egalitarian view. With regard to unemployment insurance in the Netherlands, we constructed two output possibilities curve's: one, assuming the Dutch labour market is characterized by excess-supply and one, assuming the Dutch labour market is instantaneously cleared by flexible wages. The models differ significantly in their evaluation of the efficiency cost of Dutch unemployment insurance: for example, according to the equilibrium model, the 1982-replacement ratio of 65.6 percent causes output to be 13.5 percent smaller than it would be in a situation without unemployment insurance, while the output loss is only 1.4 percent, according to the disequilibrium model. Finally, we calculate the output gains of a mini-system of unemployment insurance. Again, the results heavily depend on the assumption of a clearing versus a non-clearing labour market in the Netherlands.

Keywords: Social security, unemployment insurance, labour market, optimum benefits