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WORKING PAPER

Social Protection Competition in the EMU

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Abstract

How important could the problem of the levelling down of social protection be in the EMU? To investigate this, we use a standard two-country model of international trade in differentiated goods which is extended along three lines, including imperfect competition in the labour market, governments that maximise social welfare facing an equity-efficiency trade-off, and a mechanism of endogenous product development. By calibrating the model for the European Union, we give a (rough) estimation of how important this problem actually seems to be. Apparently, the threat of social protection competition seems to be of minor importance.

1. INTRODUCTION

Every step towards the completion of European integration appears to be met with renewed concern over its potential negative social side-effects, particularly as regards protection against social risks (unemployment, sickness and invalidity, age, …) and poverty. Governments of different Member States as well as the two EU Commissions headed by Jacques Delors took seriously the menace of 'beggar-thy-neighbour' policies by means of income or social security measures in an integrated market. The EMU would provide an even greater temptation to do so because other economic policy instruments such as trade policy or monetary policy are kept under tight control. Moreover, the potential benefits (at member state level) of this policy could be more important precisely because of market unification, as competition and the price elasticity of the demand of "tradables" increases with diminished transaction costs. The traditional reply to this argument is that social convergence will follow from income convergence, i.e. convergence in economic productivity and efficiency. In addition, in the presence of long term differences in technological capacity and innovation, lasting differences in social protection levels between countries may exist. But is this a sufficient answer to the levelling down fear, especially when innovation efforts are endogenous ? In regard of the obstinate reappearance of the issue in EU politics, perhaps it is not.

In this paper we shall examine how great the problem of social dumping may be in the context of the EMU. The approach we take is to compare the existing levels of protection with the optimal level of protection, which a European central planner might aim for. We will not consider employment or wage effects of the transition to economic unification or the trade policy consequences of labour market imperfections as shown by, for example, Brander and Spencer (1988) and Mezzetti and Dinopoulos (1991). Instead, we concentrate on the equilibrium outcomes of the EMU as such (like Abraham, 1993 and 1994, Lejour, 1995 and Lejour and Verbon, 1996). We use a standard two-country general equilibrium model of international trade in differentiated goods (e.g. Helpman and Krugman, 1985) without trade barriers but with a common currency and extend it along three lines. First, in order to take better account of European institutional reality, we include imperfect competition in the labour market (like e.g. Driffill and Van der Ploeg, 1995 and Huizinga, 1993), assuming a monopoly union model of wage determination where workers get a social security allowance in case of unemployment. As in Alesina and Perotti (1994), the social security allowance determines international competitiveness for given national differences in labour productivity and a given number of national product varieties. Second, distinct from Alesina and Perotti (1994), social security allowances are determined by the income policy of benevolent governments, through the maximisation of a welfare function that expresses an equity-efficiency trade-off, by including national income level and income inequality as arguments. Third, entrepreneurs engage in the development of new product varieties (as in Grossman and Helpman, 1991). This allows us to take account of the dynamic efficiency consequences of social protection and income redistribution and of the influence of technological innovation on the downward levelling of social protection.

We begin this paper in the second section with a brief description of how the (relative) levels of social protection have come about. Section 3 describes the model that makes it possible to conceive the problem of a sub-optimal level of social protection as a consequence of international competition, including the deduction of its long-term

characteristics in a dynamic framework. In section 4 we calibrate the model in a 'North-South' context of the European Union, with higher social protection levels and higher levels of productivity in manufacturing and research and development in the North. By comparing the uncoordinated social protection outcome in the monetary union with the options of policy co-ordination, we give an indication of the social protection loss resulting from the EU institutional framework as it presently exists. Section 5 contains our conclusions.

2. SOCIAL PROTECTION AND EUROPEAN ECONOMIC INTEGRATION

To get an idea of the consequences of the absence of explicit co-ordination of social protection policy in the various stages of European integration, we can take a look at the way social protection has evolved during the stages of European economic integration that have been accomplished so far. For this we need figures for a sufficient number of countries over a sufficiently long period of time if most of the stages towards European integration are to be more or less completely covered. This obliges us however to use a fairly crude measure of social protection, namely the share of social security funding in the national GDP.

Eurostat publishes data on this respect for 12 of the 15 current Member States of the EU. For 8 countries (the six original Member States plus Denmark and the United Kingdom), these go back to 1970. This enables us to see how social protection in the EU at the level of the Member States has evolved in terms of two of the four enlargements which the EU has been through and the completion of the single European market in 1992. We show this in two figures which should be considered together : the evolution of the social security to GDP quota of the separate Member States on the one hand and on the other the coefficient of variation thereof within the group of the six original Member States, respectively the enlarged group of 9 and 12.

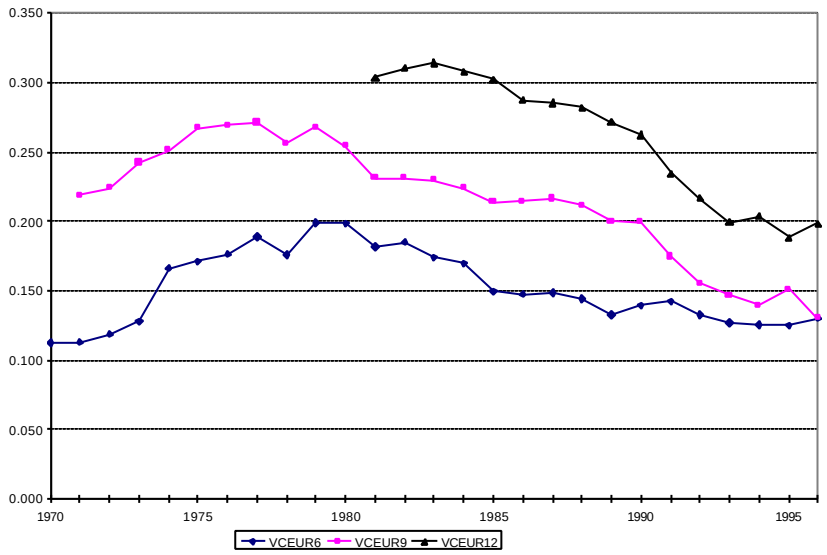

Figure 1. Coefficient of variation in the SS/GDP quota, EU-Member States 1970-1996

Source : own calculations based on Eurostat

Figure 1 shows a substantial convergence in variations on the social security/GDP quota, in particular since the 1980's as far as the three country-groups in question are concerned. For the latter two this is accompanied by a reduction in divergence from the level in their first year of membership. For the original six EEC Member States this is obviously much less the case. Certainly the six original countries managed during the 1980s and 1990s to eliminate the increased divergence in social protection of the 1970's without for all that reducing it to less than what it had been at the beginning of that period. We get far rather the picture of an area was fairly well integrated socially already at the start and which has managed to recover from the economic shocks to which it was continually subject during the 1970's.

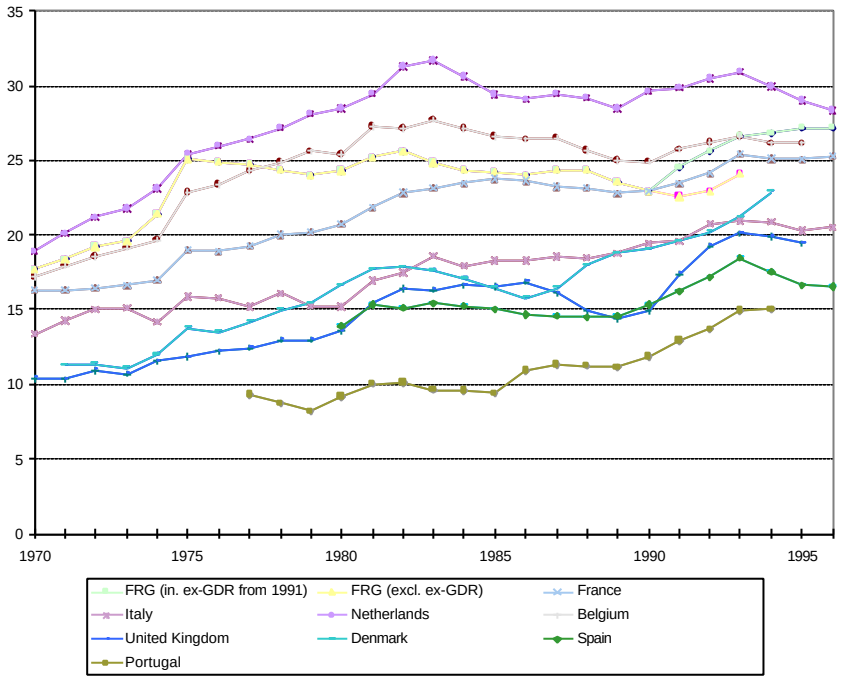

Figure 2. Progress of the share of SS in the GDP, EU Member States 1970-1996

Source : own calculations on the basis of Eurostat.

Consideration of the variation coefficient is not sufficient to explain the appearance or otherwise of a levelling down of social protection, precisely because a fall in the variation coefficient provides no indication of the levels towards which the countries are tending. To this end, we must consider the evolution of social protection at the level of the individual countries. This makes immediately clear that, in the period under consideration, there was a steady increase in the social security to GDP quota, in particular in the new EU Member States, while the level of social protection stabilised in those countries where it was at its most developed, if the high SS/GDP quota is anything to go by. In short, what we find is an apparent convergence during the period from 1970 to 1996 in the level of social protection towards that obtaining in those countries where it was already at its highest. We find no clear evidence of a downward trend.

Naturally, it is not possible to come to any hard and fast conclusions. The SS/GDP quota initially gives you an indication of the impact or the pervasiveness of the SS system in the economy. This however depends not only on the level of protection per beneficiary but also on the number of those receiving benefit and pensioners, which in turn is determined by a country's economic and demographic situation. An increase in the SS/GDP quota will therefore not allow you automatically to conclude that there is necessarily an improvement in social protection. In addition, the GDP share of social expenditures gives strictly speaking more an indication of the effort put in than the benefit derived. The correlation between the two can be distorted by the bureaucracy that accompanies social protection, the fact that institutionalised programmes may not be fully efficient, and the influence of structural and demographic changes. In other words, indications of social (in)security or the poverty level would be far more to the point for a picture of social protection, but these are not available to the extent required. Finally, formulating ones expectations about the future exclusively based on past experiences might not be the best thing to do. Hence, a theoretically somewhat more rigorous approach seems required.

3. THE MODEL

3.1 The product markets

We assume a world consisting of two countries (the variables for the foreign country are denoted with an asterisk). Each country is endowed with a fixed number of entrepreneurs (M) and a number of workers (L). Entrepreneurs set up the supply of goods, which are provided in different varieties. At this end, they develop blue-prints of (new) goods and, once the product is developed, hire workers for the manufacturing of the goods. The number of goods that are supplied is determined endogenously by their net profitability. Each entrepreneur earns an income that depends on the net profits of producing and selling goods. In order to have a meaningful equity-efficiency trade-off, we assume that their number is small with respect to the total number of products (respectively N and N*). Workers can either be employed in manufacturing and earn a wage w, or be unemployed and obtain a social security allowance b from the government. Hence, income differences are in this model the only cause of inequality at the country level.

Consumer preferences are identical in both countries and given by a Dixit-Stiglitz utility function of all available varieties home and abroad[1] :

$$u_h = \left[\int_1^{N+N^*} c_h(i)^{(s-1)/s} di \right]^{s/(s-1)} \qquad (1)$$

$c_h(i)$ represents the consumption of a good i by a domestic consumer h. The elasticity of substitution s is identical for all goods and is assumed to be greater than 1. The goods can be traded freely without any tariff or non-tariff barriers home or abroad in a monetary union or a system of fixed exchange rates. The utility of the goods to the individual is thus identical regardless of their origin.

[1] To simplify notation, the time index t is omitted where not explicitly necessary.

As a fundamental result of duality theory, the price index P is associated with u :

$$P = \left[\int_1^{N+N^*} p(i)^{1-s}\, d(i) \right]^{1/(1-s)} . \qquad (2)$$

From the first-order conditions for utility maximisation follows the demand function of an individual domestic consumer for a good of type i :

$$c_h(i) = \left(\frac{p(i)}{P} \right)^{-s} \frac{e_h}{P} .$$

where e_h represents total expenditure of a domestic consumer h. With identical preferences at home and abroad and no opportunity for price discrimination, $c_f^*(i)$ can be expressed in a similar way. We obtain the total demand for good i by aggregating the individual demand of all consumers, both at home and abroad, respectively $(M+L)$ and (M^*+L^*) :

$$x(i) = C(i)+C^*(i) = \left(\frac{p(i)}{P} \right)^{-s} \frac{1}{P} \left(\left(\sum_{h=1}^{M+L} e_h + \sum_{f=1}^{M^*+L^*} e_f^* \right) \right) = \left(\frac{p(i)}{P} \right)^{-s} \left(\frac{E_w}{P} \right). \qquad (3)$$

with $E_W = E + E^*$, the sum of total domestic and foreign nominal expenditures. The demand for a good i is a negative function of its relative price and a positive function of the total real world demand. The choice of a 'numéraire' ensures complete determination of (3). Here we follow Grossman and Helpman (1991) and set total nominal spending E_W equal to 1. This can be considered as representative for a policy of strict control of the money supply in the EMU.

The production side of the economy home and abroad is characterised by two distinct activities : the manufacturing of existing goods and the creation of blueprints of new goods. This allows us to endogenise the number of product variants and hence to take account of the dynamic economic consequences of social protection policy and its co-ordination in a monetary union. If the number of product variants depends on research and development efforts, then social security policy may have an additional impact on economic efficiency and on a country's market share, on top of its impact in the (existing) goods markets. A downward adjustment of social security protection might have potentially higher gains from a dynamic point of view and could be additionally attractive.

Following Sørensen (1994) and others, we keep the manufacturing sector of the economy as simple as possible. n and n^* goods are produced according to an identical constant returns to scale production function with one input, labour (l or l^*). We take account of international differences in technology by assuming labour productivity sectorally equal but internationally different (a and a^*), such that :

$$x(i) = al(i) \quad (i = 1,...,N) \;; \qquad x^*(j) = a^* l^*(j), \quad (j = n+1,...,N^*) \quad . \qquad (4)$$

Each existing product variety will be produced by only one firm. This can be motivated by assuming that the patent systems home and abroad provide a perfect and infinitely protection of the entitlement rights of a blueprint required for producing a known variety. Using (3) and (4), and the assumption that entrepreneurs take no account of the effect of a price change in the individual variety on the price index P, like Helpman and Krugman (1985, Chapter 6), the profit maximising price of an existing variety will be set at a fixed mark-up of the unit labour costs, as a function of the 'perceived' elasticity of demand s :

$$p(i) = \left(\frac{s}{s-1} \right) \frac{w(i)}{a}, \quad i = 1,....,N \,. \tag{5}$$

A similar expression is valid for goods $j = n+1,...,N^*$ produced abroad. Substituting (5) and its equivalent for products produced abroad in (2) and (3), we obtain an expression for the output of an existing product variety and the profit it yields.

$$x(i) = P^{(s-1)} \left[\left(\frac{s}{s-1} \right) \frac{w(i)}{a} \right]^{-s} \tag{6}$$

$$p(i) = \frac{1}{s} \left[\left(\frac{s}{s-1} \right) \left(\frac{w(i)}{aP} \right) \right]^{(1-s)} . \tag{7}$$

(6) and (7) are functions of the wages in the $N + N^*$ manufacturing sectors. Hence output (employment) and profits of existing product varieties just depend on home and foreign labour costs, negatively on the former and positively on the latter.

The creation of new domestic and foreign blueprints is characterised by the following product development functions :

$$dn = \frac{(l_M + A)^b}{B} dt \,; \quad dn^* = \frac{(l^*_{M^*} + A^*)^b}{B^*} dt \tag{8}$$

$l_M + A$ $(l^*_{M^*} + A^*)$ units of entrepreneurial labour in R&D generate $\frac{(l_M + A)^b}{B} dt$ $(\frac{\left(l^*_M + A^*\right)^b}{B^*} dt)$ new products for the individual entrepreneur in the time interval dt. A and A^* can be considered as a fixed outlay in labour terms that is required for innovation. B and B^* represent the unit labour input requirements home and abroad for producing a new design. Hence, both countries are endowed with a -not necessarily equal- innovation capacity[2]. The R&D scale parameter $ß$ is for reasons of simplicity assumed to be identical in the two countries. A meaningful economic equilibrium requires that $b \leq 1$. We will focus on the situation where $ß$ is strictly smaller than 1, i.e. a situation of decreasing returns to scale, instead of e.g. Grossman and Helpman (1991) who always assume $ß$ equal to 1[3].

The total value created by R&D is $v\left(\frac{(l_M + A)^b}{B} \right) dt$. v is the value of the company that produces the newly created good, given by :

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[2] We do not adopt an 'innovation-imitation' framework, which might be too optimistic. First, it may beg the question by attributing to one country a technological advance that would allow it to maintain a higher level in social protection. Besides, this social protection level moreover would remain unchallenged by a technological following country that would merely try to catch up. Second, existing models of innovation and imitation (e.g. Grossman and Helpman, 1991, Chapter 11) point to the positive link between innovation and imitation, which implies that conflicting interests that would lead to policy co-ordination failures are not necessarily present in this situation. Yet, this is still the most straightforward hypothesis to explain social policy competition and 'social dumping'.

[3] Usually, R&D employment is determined in models of product innovation and endogenous growth using the labour market clearing condition, e.g. Grossman and Helpman (1991). As in our model we take account of imperfect competition on the labour market (see further) and the possibility of unemployment in equilibrium, the assumption of decreasing returns to scale in the R&D sector is a simple way to obtain an explicit expression for labour demand in the R&D sector. The introduction of the fixed labour outlays A and A^* in innovation modifies the Inada conditions such that steady state equilibrium is reached in a finite time.

$$v(t) = \int_t^{\infty} e^{-[R(t)-R(t)]} p(t)dt \ , \qquad (9)$$

where *R(t)* represents the cumulative discount factor, applied to the profits earned at moment *t*. In other words, companies home and abroad are assumed to be valued at their intrinsic value, i.e. the discounted sum of their future earnings. Hence, a 'no arbitrage' condition is valid, according to which the total yield of an investment in a new product is equal to the return (r) on a risk free loan of the same amount in each period *t*. The return on innovation consists of the profits from holding the production entitlements of a good and of the potential capital gains or losses, caused by exit or entry of other firms.

$$\frac{p}{v} + \frac{\dot{v}}{v} = r \qquad (10)$$

where we use $\dot{x}$ for $\frac{\partial x}{\partial t}$. Assuming that the opportunity cost of R&D for the individual entrepreneur is the marginal product of labour in manufacturing system (since he can always be employed in his own firms), a meaningful general economic equilibrium requires (if both entrepreneurs and workers contribute to the social security) :

$$v\frac{\partial \dot{n}}{\partial l_M}(1-t) \leq w(1-t) \text{ , with equality and } l_M > 0 \text{ if } \dot{n} > 0 \qquad (11)$$

3.2 The labour market

Once the wages in each sector are known, we can solve for the equilibrium number of goods, the output and the profit of each product variety and determine the model. With respect to the labour market, we assume that workers are organised in a trade union and that wages are established through agreements between firms and trade unions. Once an agreement has been reached, firms determine their profit maximising price from which employment follows. By taking account of the presence in the labour market of institutional parties who negotiate over pay and working conditions we aim to represent more adequately the European macro-economic context.

Concerning the trade union position, we followed the commonly adopted monopoly union approach, which gives an 'inefficient' but plausible outcome[4]. All workers join one sectoral trade union which counts O_i members who either work and earn a wage w_i or are unemployed and receive social security benefit b. The social security system is financed out of a contribution τ levied on the wage paid to each employed worker. The level of benefit paid is determined by the government and is therefore exogenous as far as the union is concerned. t is determined by the fact that the social security budget is required to balance. The sectoral trade union

[4] The assumption that the unions determine wage levels unilaterally as such is too strong. Current practice is better represented by the so-called 'right to manage' approach (see also Oswald, 1985 and Holmlund *et al*, 1989) in which the employer decides on employment unilaterally, but negotiates with the union over wages. The monopoly union approach leads to similar results and predictions so that 'Occam's razor' can be invoked to in order to choose it (see Oswald, 1985, p. 169). See Holmlund (1989) for a discussion of the validity of this argument.

organisations are not directly concerned with public finance matters and therefore do not take the equilibrium of the social security system into account as an external constraint.

The objective of the trade union organisation is the maximisation of the unweighted sum of the utility of all its members $l_i u_e + (O_i - l_i)\, u_u$. The suffixes e and u refer respectively to the benefit, given by (1), of working and non-working members. Reverting to the indirect utility functions, the sectoral trade union organisations has as objective :

$$\underset{w_i(1-t)}{Max} \left\{ V_i = l_i \frac{w_i(1-t)}{P} + (O_i - l_i)\frac{b}{P} \right\}, \tag{12}$$

subject to (4) and (6), i.e. firm employment determined by the entrepreneurs. We assume that the trade unions take no account of the implications of their behaviour on the general price index P, any more than the monopolistic firm did in setting its profit maximising price. This enables us in particular to neglect, along with the technological symmetry of the product variations (so that the labour demand function is the same in all sectors), any possible complications regarding the degree of centralisation of the wage negotiations (see Moene et al., 1993, p. 75-76)[5]. This yields for the level of wages in the different (domestic) firms:

$$w_i = w = \frac{s}{(s-1)} \frac{b}{(1-t)}. \tag{13}$$

A similar expression is valid for the wages abroad. The net wage is thus a fixed mark-up above social security benefit b and, as in Holmlund (1989, p. 27), is invariable as regards the level of social security contributions. A rise in taxes in other words is fully recovered on the gross wage and employment adjusts itself accordingly. In addition, firm wages and hence, the price of each product variety, firm output and employment are also the same within each country. In this way the firms are perfectly symmetrical, which means we can simplify (5), (2) and the expressions for x_i and p_i. Next, using (8) and (11) and their foreign counterparts we can determine the equilibrium number of product varieties $\bar{n}$ and $\bar{n}^*$ of the individual entrepreneur in the home and foreign country, (see Appendix 1) :

$$\bar{n} = b \left\{ rs\ wBA^{(1-b)} \left[M + M^* \left[\left(\frac{B}{B^*} \right) \left(\frac{a}{a^*} \right)^{(1-s)} \left(\frac{w}{w^*} \right)^{(s-1)+b} \right]^{\frac{1}{(1-b)}} \right] \right\}^{-1} \tag{14}$$

$$\frac{\bar{n}}{\bar{n}^*} = \left[\left(\frac{B^*}{B} \right) \left(\frac{a^*}{a} \right)^{(1-s)b} \left(\frac{w^*}{w} \right)^{sb} \right]^{\frac{1}{(1-b)}} \tag{15}$$

from which immediately follows the total number of product varieties in the home and foreign country :

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[5] As an alternative to utiliaritarian trade union behaviour, we could have assumed the maximisation of the monopoly rent $(w_i - b)l_i$ as the objective of the trade union, like Huizinga (1993) . This is equivalent to utilitarian behaviour when the number of members is given and the members are risk-neutral as regards working and non-working (Huizinga, 1993 and Oswald, 1985). However the maximisation of the monopoly rent as trade union behaviour is conceptually difficult to jusitfy. According to Pencavel (1985) and Holmlund (1989), we had to assume that the trade union (in part) controls the social security system and perceives this as an implicit internal transfer, which according to Pencavel (1985, p. 201) is only valid for very direct forms of income transfer.

$N = M\bar{n}$; $N^* = M^*\bar{n}^*$

Hence, even though product development is explicitly allowed for, the long term equilibrium is characterised by a fixed number of product varieties for constant w and w^*. Intuitively, this can be illustrated as follows. Corporate profits and, along with them, the value of the companies are inversely related to the total number of product varieties since they determine (ceteris paribus) the market share of an individual product. Suppose that at some $N + N^*$, the profit rate exceeds the return on a risk free investment. In that case, an incentive to invest in R&D is present and new products are developed. As a result, however, corporate profits fall and with them the stock market value of the companies that produce the existing varieties because of the capital losses they suffer. With constant nominal wages and R&D costs, this will temper the incentive to develop new varieties. This is reflected by the fall in R&D employment required to counterbalance the fall in stock market value for the R&D labour allocation condition (11) to remain valid with equality. If present anyway, product innovation implies a continuous drop in firm value and in product development employment, until R&D grinds to a halt when an increase in the marginal productivity of R&D employment can no longer compensate for the fall in firm value. At this point, the profit rate is equal to the return on a risk free investment.

As we obtain a long term equilibrium with a fixed number of product varieties and no positive steady state growth, due to the absence of spill over effects, the difference from a situation in which the number of variants is exogenously defined, seems at first sight not that great. In this framework however, the number of product varieties towards which an economy tends, depends upon innovation returns and expenditures. This is perhaps the most crucial step as it determines, together with the output and the price of each product variety, the share of a country in world GDP, which by definition remains constant on a steady state growth path.

3.3 The role of the government and social security

In the previous section, we showed that all the variables in the model depend on the workers' wage level. This, in its turn, is a function of the social security allowance, which is fixed by the government. Consequently, commodity prices and demand as well as the demand for labour ultimately depend on the transfer and income policy of the government. Yet, it does not imply that the government can influence economic activity in an entirely arbitrary manner, because it has to take into account the country's position with respect to the rest of the world, i.e. its competitiveness. In the model, this is reflected by the relative price of the commodities. Through the price index P in which the prices of all goods supplied are included, the value of the variables is influenced by the price level and the number of foreign good varieties. Since these in turn depend on the wage level abroad, all the variables in the model are determined after the necessary substitutions by the home and foreign social security allowance b and b^*.

The outcome of the government's income policy is thus conditioned by the policy that is applied abroad. Because of the country's competitiveness, each government has an interest in ensuring that social benefits abroad are as high as possible relative to their home level. This can result in a fall in social protection to levels lower than would otherwise be preferred. We may formally represent this mechanism by assuming "benevolent" governments that aim to maximise national social welfare (SW), which has the following form:

$$\max_{b,t}\left\{ SW = \frac{m^{(1-e)}(1-I)^{(1-e)}}{(1-e)} \right\}, \qquad (16)$$

subject to the budget restriction, assuming that workers as well as entrepreneurs contribute to the social security system,

$$(L-Nl)b = t\ \left(Nlw + Np\right). \qquad (17)$$

Where

$$m = \frac{1}{M+L}\left[Nl\frac{w(1-t)}{P} + N\frac{(1-t)p}{P} + (L-Nl)\frac{b}{P} \right] \text{ and}$$

$$I = 1 - \left[\frac{1}{M+L}\left(Nl\left(\frac{w(1-t)}{Pm} \right)^{(1-e)} + M\left(\frac{n(1-t)p}{Pm} \right)^{(1-e)} + (L-Nl)\left(\frac{b}{Pm} \right)^{(1-e)} \right) \right]^{\frac{1}{(1-e)}},$$

i.e. the Atkinson index of relative inequality. e represents the inequality aversion with $I \to 0, if\ e \to 0$ and $I \to \frac{b}{Pm}, if\ e \to \infty$, as b is the lowest possible income (Atkinson, 1972). Hence, a rising e implies that more weight is attached to transfers to the lowest incomes and less weight to the top of the distribution.

The social welfare function consists of two components : the level of real national income level and its the distribution among the national economic subjects. The Atkinson index of relative inequality allows us to use the abbreviated social welfare function in terms of m and I (Lambert, 1993, Chapter 5), which facilitates the interpretation of the model. We impose the following restriction on e :

$$\frac{\partial SW}{\partial b^*} > 0 \ , \ \frac{\partial SW}{\partial t^*} > 0 .$$

By improving competitiveness and raising profits, a rise in the level of benefit paid abroad will have a positive impact on welfare at home because profits and employment will go up. In contrast the utility of the unemployed will fall if P rises and benefits remain constant. This may result in an increase of the level of income inequality (see appendix 2). If the latter would dominate the former, the weight of income inequality in the social welfare function would be so great that a country would pay no attention whatever to economic efficiency considerations. Discarding this possibility implies that a rise in b^* has an unambiguous positive effect on home social welfare.

The precise value of e and the extent to which a government is sensitive to income distribution matters, could have depended on the outcome of a political decision process, for example, on the characteristics of the median voter, like Gabszewicz and van Ypersele (1995). In this approach it seemed to us sufficient to consider e as exogenous within the specified range, as do Alesina and Rodrik (1991) to determine the relative strength of workers and capitalists.

By specifying the government's anticipations of foreign policy reactions, we are able to derive more explicit results concerning its welfare maximising policy. At first, an uncoordinated policy situation is considered in which governments determine their policy independently from a "nationalistic" point of view, i.e. taking no account of the repercussions of their policies on other countries. Social welfare is maximised for a given foreign country's policy which (in simplified terms) is considered as a mere external restriction that is expected to remain unchanged.

The balanced budget restriction (17) of social security allows to derive an expression for the equilibrium values of t and t^* as functions of b and b^* (denoted as $\bar{t}$ and $\bar{t}^*$), which can be inserted in the social welfare function (16). Though highly non-linear, we may accept for these expressions on intuitive grounds that :

$$\frac{\partial \bar{t}}{\partial b} > 0 ; \quad \frac{\partial \bar{t}}{\partial b^*} < 0 .$$

And similarly for the equilibrium contribution rate abroad. Hence, it follows that :

$$e_{wb} = \frac{w}{b}\frac{\partial w}{\partial b} = \left(1 + \frac{\bar{t}}{(1-\bar{t})} e_{\bar{t}b}\right) > 0 , \tag{18}$$

$$e_{wb^*} = \frac{w}{b^*}\frac{\partial w}{\partial b^*} = \frac{\bar{t}}{(1-\bar{t})} e_{\bar{t}b^*} < 0 . \tag{19}$$

These expressions are sufficient to determine the first derivatives of the other variables of the model. In particular, it is easy to show that $e_{nb} < 0$ and $e_{nb^*} > 0$. The relationship between domestic (foreign) social security protection and domestic product development is strictly negative (positive)[6].

With respect to the optimisation problem of the government, we can demonstrate that, in fairly general terms, the following holds true (see Appendix 2) :

$$\frac{\partial m}{\partial b} < 0 \quad \text{and} \quad \frac{\partial I}{\partial b} < 0 .$$

The government is faced with a trade-off between the income level and income inequality, or between economic efficiency and social equity. Average and total income can only rise if income inequality increases. In (16), the equity-efficiency trade-off is determined by $\frac{I}{(1-I)}$, which is ultimately a function of the inequality aversion e.

In that respect the government's policy choice for maximising social welfare depends on the value of e . In terms of the values of e and e^*, we distinguish between three 'qualitatively' different situations.

First, if e is equal to or 'sufficiently' close to 0, then the government allows efficiency considerations to prevail on equity and opts for a minimum level of social protection, i.e. the level at which full employment is reached. In other words, the optimisation problem has no interior solution. This choice is independent of what social security policy is adopted abroad, i.e. the choice of b^*. Nevertheless the policy the foreign country opts for is certainly important since home welfare increases with social protection abroad. If the inequality aversion in the foreign objective function is sufficiently small too, then there will be a universal choice in favour of a minimum level of social protection. But is this really the best that governments can do? Given that home welfare increases with social protection abroad (which itself will be limited by home competitiveness), will a country not gain from a policy that allows social protection to rise abroad? In addition, will foreign welfare not increase from it?

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[6] Recent developments in economic growth theory focus on the positive effect of income redistribution on economic growth by alleviating credit constraints on human capital accumulation (e.g. Banerjee and Newman, 1991, Galor and Zeira, 1993, Perotti, 1993 and, for an overview, Bénabou, 1996 or Aghion and Howitt, 1998). Hence, conceiving the relationship between social security protection and innovation as exclusively negative might be biased. However, this assumption allows us to bring the problem into sharp focus, because the trade-off between equity and efficiency would be the most serious in this case.

However, the maximisation problem of the governments, subject to their respective budgetary constraints, when they internalise the foreign repercussions of their policies :

$$\max_{b,b^*}\left\{SW + SW^* = \left(\frac{m^{(1-e)}(1-I)^{(1-e)}}{(1-e)}\right) + \left(\frac{m^{*(1-e^*)}(1-I^*)^{(1-e^*)}}{(1-e^*)}\right)\right\} \qquad (20)$$

has no internal solution for e and e^* equal to 0[7]. The negative consequences of a rise in social protection at home are greater than the positive effects of a rise in social protection abroad. In other words if only economic efficiency is taken into consideration, governments will not be hindered in their policy decisions by the absence of any policy co-ordination.

Second, a sufficiently high value for e and e^* (i.e. where considerations of income distribution are given sufficient importance in the objective function of the government) is therefore necessary for an internal solution for the welfare maximisation problem of the government. This implies a level of social protection that is above the minimum, even if it means a cost in terms of economic efficiency and employment. In most EU Member States the social welfare function would appear to correspond to this situation whereas indifference to the effects on income distribution of full employment policies is identified more with the American or Anglo-Saxon position. An internal solution for the government objective in the case where government policy is independent, is moreover sufficient for a level of social protection that is lower than that which would apply if policies were co-ordinated. In the latter situation each government sets as its target the maximisation of social welfare at home and abroad. In the Nash-equilibrium this global social welfare function is rising in respect of policy parameters b (b^*), because of the positive relationship between social welfare and the level of social security abroad[8]. Like in the first case, social protection in both countries is limited by cost competitiveness considerations. But here the welfare gain of a rise in the level of social protection is sufficient to compensate for the loss in terms of economic efficiency through the higher level of social protection that is possible abroad (since competitiveness constraints are reduced) and the lower income inequality at home that is now 'sufficiently' valued. As a result, if policies are co-ordinated, a choice will be made for a higher level of social protection than will be the case in the situation of policy independence.

A feature of this situation are the mutual restrictions on social policy which can be remedied by a co-operative strategy. The establishment of obligations regarding the minimum level of social protection or the introduction of so-called 'social clauses' is then out of place in this context. These would imply unilateral changes in competitiveness and enable the one country to realise a higher level of social protection at the expense of the other, without there being any reason for it in view of the reciprocal restrictions between the countries.

Third, what happens in the asymmetrical situation in which one country grants sufficient weight to income inequality in its welfare objectives, but the other country takes into consideration solely (or predominantly) economic efficiency ? Where there is no co-ordination of policy, the one country opts for a level of protection

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[7] In particular, $SW + SW^*$ is (approximately) equal to $\frac{1}{P}$ for e and e^* ("sufficiently" close) equal to 0, which is always decreasing in b and b^* (see Appendix 2).

[8] The difference between the first order condition of the uncoordinated and co-ordinated maximisation problem of the government is the first derivative of foreign social welfare to the own policy instruments (e.g. $\frac{\partial SW^*}{\partial b}$), which is positive.

that is above the minimum, while the other country does not. The latter country can then achieve its efficiency objectives at a lower social cost (because it is more competitive) compared with the situation where both countries would choose for full employment. Sufficiently high priorities concerning equality in the first country will result in a unilateral abstention of reducing social allowances to their minimum level. The other country will benefit from this as a positive externality. In contrast, the equality objectives of the first country will incur a higher cost in terms of unemployment, profits and real national income as compared with the symmetrical situation. One may expect that the first country will try to modify the extreme distribution of costs and benefits of this externality. However, it is less likely that this may be achieved by policy co-ordination, in particular because for the country that opts for a minimum level of protection, a co-operative strategy is not readily welfare improving[9]. Hence, in such an asymmetrical situation, pressure for, say, minimum international standards regarding social protection and working conditions and policy conflict, are more likely to occur.

Policy co-ordination on social protection in the EMU therefore makes sense only insofar as countries or regions are characterised by a combination of inequality aversion parameters e and e^*, that fit the second or third situation. A co-operative solution to the problem of co-ordination is sufficient in the former but not in the latter in which the regions might, as it were, be diametrically opposed to each other.

4. CALIBRATION AND SIMULATION OF THE MODEL

In simulating the model we try to get an idea of the potential extent of the problem of social co-ordination (or, if one prefers, social 'dumping') within the European Monetary Union. The simulations are performed in a two-region context in which one region (the "North") is characterised by a higher degree of social protection than the other (the "South"). The idea here is to reflect the duality that exists in this respect in the European Union, as can be seen from most indicators. The "South" region is therefore representative of the group comprising Spain, Portugal, Greece and Ireland.

The parameters of the model are subdivided into two categories : exogenous parameters that remain constant in the various model simulations and those that vary in the calculations and which we use to measure the sensitivity of model results. The fixed parameters consist of the values for the working population and the number of entrepeneurs. Concerning the first, we chose values that more or less coincide with the real size of the total

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Hence, b (b*) must increase from its Nash equilibrium value such that the first order condition under policy co-ordination is binding.

[9] This is especially true if $\frac{\partial I}{\partial b^*} \geq 0$ (respectively, $\frac{\partial I^*}{\partial b} \geq 0$), i.e. when gains in competitiveness go together with an increase in inequality. This can be seen from the first order derivative in the asymmetrical situation :

$$\max_b \left\{ SW + SW^* = m \; + \frac{m^{*(1-e^*)}\left(1-I^*\right)^{(1-e^*)}}{\left(1-e^*\right)} \right\} \Leftrightarrow \frac{m}{b} e_{mb} + \frac{m^{*(1-e^*)}\left(1-I^*\right)^{(1-e^*)}}{b} \left(e^*_{m^*b} - \frac{I^*}{\left(1-I^*\right)} e^*_{I^*b} \right) \leq 0 \text{ where}$$

$e^*_{m^*b} > 0$ (see Appendix 2).

The sign of this derivative is indeterminate in general. It is negative for e*→0 (see footnote 7). In addition, a corner solution for the home country is more likely when increases in home social protection level cause an increase in foreign income inequality and the higher is the equity-efficiency trade-off.

active labour population of the "North" and the "South" in the EU, the latter was arbitrarily set at 5% of the first[10]. The variable parameters in the model and the range considered are summarised in Table 1.

Table 1. Model Simulation parameters and simulation range.

Simulation Parameter	**Range**
Substitution elasticity (s)	[1.5-2]
Labour productivity differential in manufacturing (a^*/a)	[.1-.9]
Labour productivity differential in product development (B/B^*)	[.1-.9]
Scale parameter in R&D ($ß$)	[0.25-0.75]
Inequality aversion parameter "North" (e)	[2-6]
Inequality aversion parameter "South" (e^*)	[2-e]

The extent of the co-ordination problem in the field of social protection is estimated by the relative difference between the social protection levels and equilibrium contribution rates in the case of policy co-ordination and policy independence (which we considered as a proxy for the present situation in the EU). They are determined respectively by the solution of (20) and (16), subject to (17) and its foreign counterpart, starting from t-values (the social security to GDP-rates) that are representative for both regions (0.2 and 0.1 respectively). We summarise our results in Table 2, which gives for the main variables of the model the average ratio of the co-ordination levels to the non-co-ordination levels for the lower and upper bound of the range of s considered.

Table 2. Average co-ordination/non-co-ordination differential.

Variable	**s = 1.5**	**s = 2**
b	1.028	1.017
b*	1.024	1.016
τ	1.047	1.047
τ^*	1.026	1.021
μ	0.870	0.933
μ^*	0.881	0.944
I	0.988	0.953
I*	0.989	0.313

As indicated in Table 2, social security co-ordination in the EMU would result in an increase in social benefit levels in the two regions, which goes together with an increase of the social security contribution rates and a fall in average income and income inequality. It would cause some convergence in average income between the "North" and the "South", but not in social protection levels of which the gap between the two regions on the

[10] Modifying this proportion did not qualitatively affect the results.

contrary would seem to widen slightly. Hence, social policy co-ordination does not necessarily imply social convergence, which is logic if the levels in both countries are constrained by competitiveness requirements.

However, the most striking feature that emerges from these calculations is the rather limited extent of the gap between the co-ordinated and non co-ordinated values of the variables, except for the drop in income inequality in the "South" when the degree of market imperfection is not "too low". This is possible because in the latter situation the "South" benefits from higher social allowances as well as from an increase in competitiveness (and hence employment). But concerning social protection levels, policy co-ordination would make a difference of 2 or 3% at most. This would suggest that in the present situation, the cost in social protection of the absence of social policy co-ordination is very low. From this we may conclude that *the problem of social dumping as a result of unbridled competition between EU-Member States is of minor importance in the EMU.*

What might explain this possibly somewhat surprising finding?. The model simulations point to a rather substantial loss (from 5 to 10% or more) in terms of economic efficiency (average income) that would result from a further increase in social protection in the "North" and the "South". Table 2 shows that the gains in social protection from co-ordination diminish when the the substitution elasticity between the product varieties rises and efficiency losses increase, due to the higher costs of producing existing varieties as well as the lower innovation incentive. As both regions have already opted for a rather high level of social protection, in particular higher than the minimum (although lower than the optimum) the marginal social utility of 'equity' is rather low compared to 'efficiency'.

5. CONCLUSION.

In this paper we have tried to provide an answer to the question how serious social protection competition might be in the EMU. We showed that, in a model with endogenous product development that takes account of imperfect competition in the commodity and the labour markets and where social welfare consists of the level and the distribution of income, the possibility of social protection competition is theoretically conceivable. When at least one country wishes to opt for a level of social protection superior to the minimum, it will be typical below the optimum level, either in a situation of mutual or of unilateral restriction (when the partner country persistently opts for the lowest possible level of social protection, but benefits from the externality of the refusal of this option elsewhere). The absence of policy conflict and co-ordination failure seems possible only when a minimum level of social protection is universally adopted and when economic efficiency is granted an absolute priority.

However, the actual occurrence of this possibility, at least in the present EU context, should not be exaggerated. From the calibration of social protection policy and competition scenarios in a "North-South" framework in the EU, for a broad value range of parameters related to the preference structure, the equity-efficiency trade-off and the technological efficiency, we saw that the difference between the social benefit levels with and without policy co-ordination was very limited in both regions. Policy co-ordination would imply somewhat higher levels of social protection but not very substantially, without however enhancing social convergence between the regions. To that extent, there would appear to be no real threat of downward adjustments in social protection within the EMU.

What hypothesis could we advance to explain this finding? Because of the already considerable efficiency implications of the option for a more than minimal social protection level, one may understand that the countries have but a limited incentive to drastically encourage this policy option. The fact that the EU-Member States ("regions") seem broadly to exhibit the same behaviour patterns, may imply at the institutional level that – despite all the existing differences – implicit co-ordination and co-operation can produce satisfactory results for a social Europe, i.e. without any immediate need for an impressive EU-superstructure – something that the development of social policy throughout the various phases of European integration would seem to suggest.

APPENDIX 1.

The number of home and foreign product varieties in equilibrium are derived in two steps. Using (8), it follows from (11) that :

$$l_M + A = \left(\frac{b\, v}{Bw} \right)^{\frac{1}{(1-b)}}, \text{ iff } \; v > \frac{\bar{p}}{r} \text{ and } l_M = 0, \text{ if } v \leq \frac{\bar{p}}{r},$$

where $\bar{p}$ represents the profits earned with a (domestic) product variety in equilibrium. In an infinitesimal neighbourhood of the steady state, we write product innovation as :

$$\lim_{e \to 0^+} dn = \lim_{e \to 0^+} \frac{1}{B} \left(\frac{b\left(\frac{\bar{p}}{r} + e \right)}{Bw} \right)^{\frac{b}{(1-b)}} dt \text{ , and analogously abroad. After taking ratios :}$$

$$\lim_{e \to 0^+} dn = \left[\lim_{e \to 0^+} \frac{1}{B} \left(\frac{b\left(\frac{\bar{p}}{r} + e \right)}{Bw} \right)^{\frac{b}{(1-b)}} \right] \left[\lim_{e^* \to 0^+} \frac{1}{B^*} \left(\frac{b\left(\frac{\bar{p}^*}{r} + e^* \right)}{B^* w^*} \right)^{\frac{b}{(1-b)}} \right]^{-1} \lim_{e^* \to 0^+} dn^*,$$

this expression is integrated over *t*. As the first factor of the right hand side is determined by the equilibrium values of the variables and is independent of t, we may write :

$$\lim_{e \to 0^+} \bar{n} = \left[\lim_{e \to 0^+} \frac{1}{B} \left(\frac{b\left(\frac{\bar{p}}{r} + e \right)}{Bw} \right)^{\frac{b}{(1-b)}} \right] \left[\lim_{e^* \to 0^+} \frac{1}{B^*} \left(\frac{b\left(\frac{\bar{p}^*}{r} + e^* \right)}{B^* w^*} \right)^{\frac{b}{(1-b)}} \right]^{-1} \lim_{e^* \to 0^+} \bar{n}^*.$$

Because of the absence in equilibrium of product development, the number of product varieties home and abroad converges to a fixed value (denoted $\bar{n}$ and $\bar{n}^*$). This enables us to take the limit of the left and right hand side and to obtain for the expression of the ratio of the number of home and foreign product varieties in equilibrium :

$$\frac{\bar{n}}{\bar{n}^*} = \left(\frac{B^*}{B}\right)^{\frac{1}{(1-b)}} \left(\frac{\bar{p}}{\bar{p}^*}\frac{w^*}{w}\right)^{\frac{b}{(1-b)}}. \qquad \text{(A1a)}$$

From (7) and its foreign counterpart :

$$\frac{\bar{p}}{\bar{p}^*} = \left(\frac{p}{p^*}\right)^{(1-s)} = \left(\frac{a^* w}{a w^*}\right)^{(1-s)},$$

which gives (15), after substitution in (A1a).

From the R&D labour allocation function (11), the firm value in equilibrium is given as :

$$\bar{v} = \frac{\bar{p}}{r} = \frac{wBA^{(1-b)}}{b}. \qquad \text{(A1b)}$$

Using (A1c) , (2), (7), its foreign counterpart and (15), we obtain (14).

APPENDIX 2

Using (5), (6) and (17), we may simplify the expression of m as follows :

$$m = \frac{Np^{(1-s)}P^{(s-2)}}{(M+L)}. \qquad \text{(A2a)}$$

The elasticity of average income with respect to domestic social benefit can be written as :

$$e_{mb} = e_{nb} + (1-s)e_{pb} + (s-2)e_{Pb}. \qquad \text{(A2b)}$$

From (5) and (18), it follows that ε_{pb} is positive and greater than 1. Because of the highly non-linear character of the expressions for $\bar{t}$ and $\bar{t}^*$, and their rather tedious interpretation, it seems more convenient to discuss the behaviour of the model by introducing an additional, intuitively appealing assumption. Concerning the elasticity of the price index P with respect to the domestic and the foreign social security allowance, we may accept that $0 \le e_{Pb} \le 1$ and $0 \le e_{Pb^*} \le 1$. The lower bound means that a country contributes more to real world income $(\frac{1}{P})$ by improving its own competitiveness and efficiency than by improving the competitiveness of the foreign country. The upper bound implies that a nominal increase (fall) of the social security allowance is required for a real increase (fall) of the social security allowance. This is a sufficient (though not necessary) condition for $e_{mb} < 0$.

Along the same lines, using (5), (6) and (19), it follows that

$$e_{mb^*} = e_{nb^*} + (1-s)e_{pb^*} + (s-2)e_{Pb^*} \qquad \text{(A2c)}$$

is certainly positive for values of s not 'too close' to 1.

Taking the first derivative of I (I^*) with respect to b (b^*), is somewhat more elaborate. First, using (13), (4), (6) and (7) we write I as :

$$I = 1 - \frac{b}{Pm}\left[\frac{1}{(M+L)}\left[\left(L - Nl\left(1 - \left(\frac{s}{s-1}\right)^{(1-e)}\right)\right) + M\left(nl\frac{s}{(s-1)^2}\right)^{(1-e)}\right]\right]^{\frac{1}{(1-e)}} \qquad \text{(A2d)}$$

Next, taking the derivative with respect to b and working this expression out, we obtain :

$$\frac{I}{(1-I)}e_{Ib} = (e_{mb} + e_{Pb} - 1) + D^{-1}(e_{nb} + e_{lb})\left[\frac{Nl}{(1-e)}\left(1-\left(\frac{s}{s-1}\right)^{(1-e)}\right) - M\left(nl\frac{s}{(s-1)^2}\right)^{(1-e)}\right]$$

where $D = \left[\left(L - Nl\left(1-\left(\frac{s}{s-1}\right)^{(1-e)}\right)\right) + M\left(nl\frac{s}{(s-1)^2}\right)^{(1-e)}\right]$

Similarly :

$$\frac{I}{(1-I)}e_{Ib^*} = (e_{mb^*} + e_{Pb^*}) + D^{-1}(e_{nb^*} + e_{lb^*})\left[\frac{Nl}{(1-e)}\left(1-\left(\frac{s}{s-1}\right)^{(1-e)}\right) - M\left(nl\frac{s}{(s-1)^2}\right)^{(1-e)}\right]$$

The sign of these expressions is not unambiguously determined since the first and second term are of opposite sign for $e \geq 0$. However, for $e \to \infty$, the second term vanishes and $\varepsilon_{Ib} < 0$ ($\varepsilon_{Ib^*} > 0$), in view of (A2b) and (A2c). Hence, there exists an e_c (e'_c) such that for $e \geq e_c$ (e'_c), $\frac{\partial I}{\partial b} < 0$ $\left(\frac{\partial I}{\partial b^*} > 0\right)$. For $e < e_c$, an equity-efficiency trade-off situation might be absent, but in case of a low inequality aversion, economic efficiency will outweigh income inequality in the determination of the optimal social protection choice, whatever its effect on income inequality.

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