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Gerhard Rübel\*

## Reducing Working Hours in the Context of Growing Real Capital Mobility

*Can the reduction of working hours be a suitable policy instrument to reduce unemployment? The following article presents a model of the effects of such a reduction – without offsetting adjustments to wage rates – on unemployment in the context of growing real capital mobility between countries and discusses the consequences for economic policy.*

On 1st October 1995, the 35-hour week came into effect in the West German metal-working industry. This represented the realisation of a demand which, as early as 1978/79, had been at the root of a six-week strike by steelworkers in North-Rhine Westphalia. The gradual introduction, in stages, of a shorter working week was accompanied by intensive discussions and academic studies. On the one hand, attention was focussed on the effect of hourly wage rates being adjusted upwards to offset, either partially or fully, the reduction in the hours worked. On the other hand, interest centred on what consequences would materialise from the increases in productivity that a reduced working week was expected to trigger.<sup>1</sup>

The agreement reached with the union in May 1990 to introduce, step by step, a 35-hour working week seemed at the time to have settled the whole issue for the foreseeable future. On 25th November 1993, however, the IG Metall, the metal-workers' union, and Volkswagen AG reached an agreement to introduce a 4-day week at VW. With effect from 1.1.1994, working hours were to be reduced by 20% to 28.8 hours a week. The settlement was designed to safeguard 30,000 jobs at VW.<sup>2</sup> This opened up a new dimension in the dispute over what can be achieved by reducing working hours – one that has little in common with the issues debated in the seventies and eighties.

The renewed debate takes place against the background of the fundamental transformation undergone by the world economy over the last 10 years, a transformation that has hit traditional exporting nations like Germany particularly hard. The dramatic advances made in information and communications technology, together with the associated fall in the cost of transferring technological know-how internationally, are resulting in manufacturing processes becoming

increasingly globalized. This confronts industrialized countries with the challenge of finding ways to retain jobs within their borders, i.e. they need to attract, or continue to attract, internationally mobile productive capital. Besides a number of general prerequisites, such as infrastructure, corporate taxation and economic policy, this hinges increasingly on how attractive they can make their internationally immobile factors of production – and this means, above all, the factor labour. As the mobility of technological know-how continues to grow, and as international labour productivity levels consequently converge, western industrialised countries will find it less feasible to compensate for their high labour costs, as they have done until now, with levels of labour productivity that are correspondingly higher than their international competitors': it will thus become harder for them to keep their labour unit costs within competitive bounds.

Quite apart from the issue of unduly high wage costs and non-wage labour costs, working hours are another important determinant of unit labour costs. It has been proposed that these be lowered by extending plant utilisation times and by making weekly and annual working hours more flexible. On top of this, the trade unions, in particular, insist that it is imperative for weekly working hours to be cut across-the-board, on the basis of the VW model, so that the diminishing amount of work available can be

<sup>1</sup> Cf. the overview in Wolfgang Franz: Is Less More? The Current Discussion About Reduced Working Time in Western Germany: A Survey of the Debate, in: Zeitschrift für die gesamte Staatswissenschaft, Vol. 140, 1984, pp. 626-654.

<sup>2</sup> A rather more sober view, however, is now taken at VW. Even though the drastic reduction in working hours was meant to ensure that the number of workers employed by the firm in Germany should remain at about 100,000 (which was the size of the workforce in 1994), VW is continuing to shed jobs: by the year 2000 it is planned to reduce the workforce to around 80,000. All that will be avoided is having to actually lay off workers (cf. on these figures: Frankfurter Allgemeine Zeitung for 18.10.1995).

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spread across "more shoulders". "If each individual worker works a little less, if, in other words, he relinquishes a portion of his daily or weekly tasks, then the total amount of labour required to produce a given output can be distributed across more people".<sup>3</sup> Is, then, reducing weekly working hours the right way to combat growing international competitive pressures? Such views have not gone unchallenged: "Having abandoned the fifth day of the working week after Japan appeared on the scene, are we to respond to the advent of Chinese goods on world markets by dropping the fourth working day? If so, what are we going to do to compete with Indonesia?"<sup>4</sup> – this ironical question makes the problem clear. What is at issue today is not the risk of an economy running out of work and having to distribute what remains. The issue is to determine under what conditions multinational enterprises will create and preserve jobs within the domestic economy. Thus, it cannot be the object of labour market policy to distribute a given volume of work differently: on the contrary, the aim must be to increase this volume of work by making the economy more competitive.

Germany, however, has already gone a good deal further than others down the road of reducing working hours: in 1996, it had, for the 12th time in a row, the shortest annual working hours in the world. In 1994,

an effective total of 1527 hours were worked annually, 175 hours fewer than in 1980.<sup>5</sup> In the USA, by contrast, annual working hours rose markedly over the same period, from 1876 to 1994 hours. Whereas in the German economy the total number of jobs rose from 1980 to 1994 by 6%,<sup>6</sup> in the USA the number increased by four times as much, by 24% – in spite of (or precisely because of?) the increase in working hours. In a comparative study of 15 industrialized countries, Neumann<sup>7</sup> comes to analogous conclusions for the period of the eighties. His study demonstrated a clear positive correlation between annual working hours and employment levels, i.e. the less working hours were reduced, the greater was the increase in employment. Similarly, in an empirical study Lehment<sup>8</sup> also comes to the conclusion that the rise in employment enjoyed by West Germany in the eighties cannot be attributed to the reduction in working hours. To be sure, these studies do not furnish definitive proof of any correlation between the number of hours worked and the number of jobs available in an economy, since employment levels are affected by a multitude of factors. Nonetheless, a comparison between the USA's and Germany's experiences in the recent past does suggest that the posited employment-creating effect of a reduction in working hours needs to be queried.

This article attempts to analyse a number of effects resulting from reductions in working hours that have until now been largely neglected: it will thus try to assess the suitability of such measures as a policy instrument to boost employment. It is not intended to reopen the discussions held in the seventies and eighties. At that time, the debate was generally based on the premise of closed economies: what was examined was, first and foremost, the effects of adjusting hourly wage rates upwards to offset the fall in working hours and ways in which productivity in the companies concerned might be changed as a result of organisational measures. In this way, efforts were made to separate out the employment effects of a reduction in working hours into its effects on the factors rationalisation, labour cost increases and actual rises in employment levels.<sup>9</sup> In contrast, the present article will concentrate on the cost effect which arises even if no offsetting adjustments to wage rates are made: in addition, the wishes and reactions exhibited by workers adjusting to a general reduction in weekly working hours will be considered. For this purpose, the point of departure taken in the article will be a simple two-sector basic model of an open economy, in which increasing international competitive pressures are causing a rise in unemployment. This

<sup>3</sup> Cf. Hartmut Seifert: Ausmaß und Effekte der Arbeitszeitverkürzung, in: Peter Hampe (ed.): Zwischenbilanz der Arbeitszeitverkürzung, Munich 1993, p. 11.

<sup>4</sup> Cf. Rüdiger Dornbusch, Lecture held at a Conference of the Friedrich-Ebert-Stiftung in Washington in December 1993, quoted in: Horst Siebert: Geht den Deutschen die Arbeit aus?, Munich 1994.

<sup>5</sup> On these and the following figures cf. Franz Josef Link: Arbeitszeit, Produktivität und Beschäftigung im internationalen Vergleich, in: IW Trends, Vol. 22, 1995, pp. 29-38.

<sup>6</sup> Approximately 2/3 of this increase in jobs took place, however, in the private service sector, where reductions in working hours played little or no role; the rest was accounted for by strong-growth sectors. Even within the German metal-working industry, where the same reduction in working hours was implemented everywhere, the changes in employment levels varied from +27% in the aerospace industry to -26% in shipbuilding; cf. Jürgen Huisman, Elisabeth Neifer-Dichmann: Arbeitszeitverkürzungen – ein beschäftigungspolitischer Fehlschlag, in: Peter Hampe (ed.): Zwischenbilanz der Arbeitszeitverkürzung, Munich 1993, p. 60.

<sup>7</sup> Cf. Manfred Neumann: 35-Stunden-Woche – Probleme und Risiken, Cologne 1989; cf. also Norbert Berthold: Arbeitslosigkeit, Arbeitszeitverkürzung und Arbeitsplatzbesitzer, in: WIRTSCHAFTSDIENST, 1994, pp. 167-171.

<sup>8</sup> Cf. Harmen Lehment: Lohnzurückhaltung, Arbeitszeitverkürzung und Beschäftigung. Eine empirische Untersuchung für die Bundesrepublik Deutschland 1973-1990, in: Die Weltwirtschaft, No. 2, 1991, pp. 72-85.

<sup>9</sup> Cf. for example Peter A. Görres: Beschäftigungseffekte von Arbeitszeitverkürzungen, in: Zeitschrift für Wirtschafts- und Sozialwissenschaft, Vol. 102, 1982, pp. 337-362; Robert Linde: Beschäftigungseffekte von Arbeitszeitverkürzungen mit Lohnausgleich, in: Jahrbücher für Nationalökonomie und Statistik, Vol. 198, 1983, pp. 425-436.

basic model will be used to show, first, the naive view of how reducing working hours affects employment levels. In the subsequent sections of the article, the basic model will then be extended step by step, with the result that at each stage greater doubt will be cast on what positive employment effects can be expected from a reduction in working hours. On the basis of the inter-relationships discussed, alternative measures that might be taken to improve the employment situation will then be discussed.

### Structure of the Model

In the economy concerned there are two sectors, which use the factors labour and capital to produce the goods X and Y respectively. Linear-homogenous production technology is used.

$$(1) X = X(N^X, E^X)$$

$$(2) Y = Y(N^Y, E^Y)$$

where  $N^i$ ,  $E^i$ : efficiently utilised units of the factors capital and labour in Sector  $i$ .

We start from the assumption that there is a given amount of the factor capital available in any specific sector, i.e. at the national level, real capital is immobile. At the international level, on the other hand, the productive potential in a sector is mobile: if it becomes unprofitable to deploy it in Sector  $i$  of the country concerned, then it will be shifted into the equivalent sector abroad rather than being shifted into Sector  $j$  within the domestic economy. This seems to be a justifiable assumption for the production factor capital today: if overly high labour costs make it unprofitable to manufacture vehicles in Germany, then the company concerned will shift its production of cars abroad rather than remaining in the domestic economy and manufacturing coffee-machines, for example, instead of cars.

A distinction is made between the number of units of capital available and the number of units of capital that are being used productively. The productive utilisation of the available capital stock depends on the intensity of utilisation ( $z^i$ ), which in turn is determined by plant utilisation times ( $l^i$ ):

$$(3) z^i = z^i(l^i) \quad z^i > 0$$

The time taken to switch the plant on and off, together with the repair breaks, which depend on the amount of time the machinery is kept running, mean that the intensity of utilisation does not necessarily have to be identical with the plant utilisation time. The costs associated with a productively used unit of capital ( $k^i$ ) are thus:

$$(4) k^i = r^i/z^i$$

where  $r^i$ : cost of an available unit of capital.

This means that the following obtains:

$$(5) (K^{ji} - NK^i) z^i = N^i$$

$K^{ji}$ : total stock of capital in Sector  $i$  held by domestic investors.

$NK^i$ : net stock of the production factor capital in Sector  $i$  that is held abroad. In the following, it is assumed that  $NK^i$  is positive, which is the case for Germany.

The net amount of the factor capital that is exported depends not only on how high the returns are that can be obtained domestically and abroad (\*), but, equally, on how technologically feasible it is to shift production. Such determinants are taken into account by a transfer parameter  $t^i$ . A rising  $t^i$  indicates that it is more feasible to shift capital abroad as a consequence of influences that are not explicitly explained in the model: it thus implies that any manufacturing advantages that exist abroad can be better exploited. The following obtains:

$$(6) NK^i = NK^i(r^i, r^{*i}, t^i) \quad NK^i_r < 0; NK^i_{r^*} > 0; NK^i_{t^i} > 0$$

The qualifications required from the workers in the two sectors are so different that it is initially assumed that this factor, too, is immobile at the national level. In terms of persons, there is a given supply of labour available ( $A^i$ ) in a specific sector. The number of people employed is  $L^i$ .  $u^i$  designates the unemployment rate, in terms of persons, in Sector  $i$ .  $h^i$  will be taken to be the number of hours worked per employee,  $H^i$  the number of hours worked in the period concerned. Thus the following obtains:

$$(7) L^i = (1 - u^i) A^i$$

$$(8) H^i = h^i L^i$$

It has been shown empirically that the effective wage rates paid in Germany are always above the minimum basic rates agreed with the unions. Firms thus possess a certain scope to adjust wage levels in response to changed circumstances – to the extent of precisely this “wage margin”. A survey of employers carried out in 1994<sup>10</sup> showed that the wage margin for workers being paid time rates was approximately 7.5%, whilst for workers being paid piece rates the figure ranged from 20% up to 35%. Similar surveys carried out on the basis of the IAB panel of firms produced an average wage margin in the economy as

<sup>10</sup> Cf. Claus Schnabel: Die übertarifliche Bezahlung, Cologne 1994.

a whole of 13.4%, when only those firms which paid more than collectively-agreed basic rates were taken as a basis.<sup>11</sup> In an analysis based on a survey of firms, Meyer<sup>12</sup> reaches a figure of about 11% for the average wage margin. There are many reasons for wages being paid that are above collectively-agreed basic rates, even in the face of unemployment, and there are a number of different theories to explain this phenomenon.<sup>13</sup> One of the key explanations is provided by the efficiency wage theory, which says that the amount of work performed depends on the efficiency of the workers. The efficiency of labour is, in turn, influenced by various factors, for example, by the level of wages paid or, equally, by the rate of unemployment prevailing.

These correlations will be taken into account in the model by allowing for efficiency units.<sup>14</sup> If  $E$  is taken to designate the level of employment, expressed in efficiency units, and  $e$  is the efficiency parameter, then the following obtains:

$$(9) E^i = e^i H^i$$

The efficiency parameter  $e$  depends initially only on the level of wages and the rate of unemployment in the sector concerned. A rise in wages boosts the worker's willingness to improve his performance; similarly, by increasing the worker's risk of losing his or her job, a rise in unemployment results in labour efficiency improving, for instance as a consequence of fewer workers taking sick leave. Other factors that exert an impact will be taken into account at a later point.

$$(10) e^i = e^i(w^i, u^i) \quad e_{w^i}^i > 0; e_{u^i}^i > 0$$

<sup>11</sup> Cf. Lutz Bellmann, Susanne Kohaut: Effektiv- und Tariflöhne in der Bundesrepublik Deutschland: Eine empirische Analyse auf der Basis des IAB-Betriebspanels, in: Knut Gerlach, Ronald Schettkat (eds.): *Determinanten der Lohnbildung*, Berlin 1995.

<sup>12</sup> Cf. Wolfgang Meyer: Analyse der Bestimmungsfaktoren der "übertariflichen Entlohnung" auf der Basis von Firmendaten, in: Knut Gerlach, Ronald Schettkat (eds.), op. cit.

<sup>13</sup> Cf. an overview in: Claus Schnabel: Übertarifliche Entlohnung: Einige Erkenntnisse auf Basis betrieblicher Effektivverdienststatistiken, in: Knut Gerlach, Ronald Schettkat (eds.), op. cit.; cf. also W. Meyer, op. cit.

<sup>14</sup> On efficiency-wage theories and on the conditions necessary for the optimal wage margin, cf., for example, Jan Beyer Schmidt-Sørensen: The Equilibrium Effort-Wage Elasticity in Efficiency-Wage Models, in: *Economic Letters*, Vol. 32, 1990, pp. 365-369; H.-Peter Spahn: Sind "effiziente" Löhne zu hoch für die Vollbeschäftigung?, in: *Jahrbücher für Nationalökonomie und Statistik*, Vol. 203, 1987, pp. 225-243; Janet L. Yellen: Efficiency Wage Models of Unemployment, in: *American Economic Review, Papers and Proceedings*, Vol. 74, 1984, pp. 200-205.

<sup>15</sup> Cf. Horst-Tilo Beyer: *Betriebliche Arbeitszeitflexibilisierung zwischen Utopie und Realität*, Munich 1986.

<sup>16</sup> Cf. R. Solow: Another Possible Source of Wage Stickiness, in: *Journal of Macroeconomics*, Vol. 1, 1979, pp. 79-82.

It is further assumed that the secondary derivations are negative, i.e. that the curve showing changes in performance flattens off.

Many of the components of a firm's labour costs depend not on the number of hours worked, but on the size of the workforce employed. Such items include, for example, the administrative and coordination costs involved in staff planning or providing further education, costs which rise in proportion to the size of the workforce; equally, they include fringe benefits such as canteens, mileage allowances, working clothes etc. There are statutory regulations that depend on the size of the workforce: exceeding particular ceilings creates additional costs, related, for example, to the size of the works council, the formation of "economic committees" (which report to the works council), the number of jobs that must be reserved for disabled workers, the number of works' doctors and health and safety experts and so on.<sup>15</sup> In the following, the costs related to the number of employees will be treated as a constant figure per employee,  $a$ , for the period concerned. The total costs of an efficiency unit ( $g$ ) thus amount to:

$$(11) g^i = \frac{a/h^i + w^i}{e^i}$$

In minimizing their effective labour costs, firms determine the level of employment and, via the wage margin, the effective level of the wage rate. With  $u$  at a given level, the optimal wage rate is thus:

$$(12) w^i = \frac{e^i}{e_w^i} - \frac{a}{h^i} \text{ and thus } \varepsilon_w^i = g^{iw} < 1$$

where:  $\varepsilon_w^i$  is the wage elasticity of labour efficiency and where

$$g^{iw} \equiv \frac{w^i}{e^i g^i}, g^{ia} \equiv \frac{a/h^i}{e^i g^i}$$

is the proportion of the total costs of an efficiency unit accounted for by hourly wages or by those costs that depend on the size of the workforce (workforce-related costs).

The literature on efficiency wage relationships allocates a value of one to the wage elasticity of labour efficiency, which is the so-called Solow Condition:<sup>16</sup> if, however, allowance is made for workforce-related costs, then this figure is, in fact, lower than one. It corresponds to the proportion of the total costs of an efficiency unit that is accounted for by hourly wages.

Firms endeavour to minimize their total costs ( $C^i$ )

$$(13) \text{Min} C^i = \text{Min}(g^i E^i + k^i N^i)$$

The unit cost functions (b) are derived from this cost minimization calculation.

$$(14) b^i = b^i(g^i, k^i)$$

$$\text{where: } b_g^X = \frac{E^X}{X}; b_k^X = \frac{N^X}{X}; b_g^Y = \frac{E^Y}{Y}; b_k^Y = \frac{N^Y}{Y}$$

In view of the immobility of the production factors, at the national level, there are four equilibrium conditions on the factor market.

$$(15) b_g^X X = E^X = e^X h^X (1 - u^X) A^X$$

$$(16) b_g^Y Y = E^Y = e^Y h^Y (1 - u^Y) A^Y$$

$$(17) b_k^X X = N^X = z^X (K^{JX} - NK^X)$$

$$(18) b_k^Y Y = N^Y = z^Y (K^{JY} - NK^Y)$$

Assuming the existence of perfect competition, the minimum unit costs compatible with profit maximisation will correspond to the price of goods on global markets.

$$(19) p^i = b^i(k^i, g^i)$$

The following obtains in the formulae below:

$a^{Ni}$ ,  $a^{Ei}$ : proportion of total costs accounted for by capital and labour costs respectively

$a^{NKi}$ : net volume of capital units utilised abroad as a proportion of the total volume of utilised capital units held by domestic investors.

$\eta_{ij}^i$  ( $j = E, N$ ;  $i = X, Y$ ;  $v = g, k$ ): price elasticities of the demand for factors. The usual characteristics apply: a rise in labour costs results in less labour and more capital being used, a rise in the cost of capital has the reverse result.

$p^i < 0$ ;  $p^{i*} > 0$ : interest-rate elasticities displayed by net real capital export

$\tau^i > 0$ : mobility elasticity displayed by net real capital export

$\lambda^i > 0$ : elasticity of capital utilisation, dependant on plant utilisation times

$\epsilon_{ww}^i > 0$ : percentage change in labour efficiency as a result of a percentage change in the unemployment rate

$$\epsilon_{ww}^i \equiv \frac{\partial(\partial e^i / \partial w^i)}{\partial w^i} \frac{w^i}{\partial e^i / \partial w^i} < 0$$

percentage measure for the decrease in the positive influence of rising wages on labour efficiency. In the following, it will be assumed that the influence of a variation in wages on labour efficiency changes only slowly. The following obtains:  $-\epsilon_{ww}^i < \epsilon_{ww}^i < 0$

It will be assumed that an exogenous increase in technological mobility at first affects only Sector X in the country concerned, a sector in which less highly-qualified workers are employed. Let us also suppose that workers with a comparable range of qualifications

are available abroad, but at lower wage costs. The exogenous mobility shock thus results in the level of direct outward investment rising. In the sector concerned, this leads both to a fall in output and to a reduction in the volume of factors utilised. The unemployment rate will rise accordingly:

$$(20) \frac{\hat{X}}{\hat{X}} = \frac{1}{D} \left\{ -\tau X_n NKX \left[ \frac{u^X}{1-u^X} + \frac{\epsilon_u^X}{a^{NX}} \right] \left[ T - a^{NK} \left( 1 + \frac{\epsilon_w^X}{\epsilon_{ww}^X} \right) \right] \right\} < 0$$

$$(21) \frac{\hat{u}^X}{\hat{X}} = \frac{1}{D} \left\{ -\tau X_n NKX \right\} > 0$$

with

$$D \equiv \frac{u^X}{1-u^X} + \frac{\epsilon_u^X}{a^{NX}} \left[ S + T - a^{NX} \left( 1 + \frac{\epsilon_w^X}{\epsilon_{ww}^X} \right) \right] > 0$$

$$S \equiv a^{NX} \eta_g^{NX} - a^{EX} (\eta_k^{NX} + p^X n^{NKX}) > 0$$

$$T \equiv a^{EX} \eta_k^{EX} - a^{NX} \eta_g^{EX} > 0$$

If, instead of assuming efficiency wage relationships, one were to depart from a fixed-wage model, the negative employment effect would be even greater – in D only the first term would remain unchanged. If efficiency wages are taken into account, the increase in the unemployment rate has a positive influence on labour efficiency, which allows firms to lower the wage margin. This then tends to reduce costs and thus cushion the negative impact of the real capital export on domestic employment levels. Equally, the rise in the domestic returns to capital diminishes the incentive to export capital.

If one attempts to bring down the unemployment rate by reducing the hours worked in any given period, then the results will depend on what interrelationships one takes into account. In the following, it will be consistently assumed that working hours are reduced without hourly wage rates being adjusted at all to offset this. Earlier studies have already demonstrated in detail that the employment effects created by a reduction in working hours are diminished if costs are increased by an offsetting upward adjustment in hourly wage rates. If, moreover, one ignores both efficiency-wage relationships and workforce-related costs, then one arrives at the result postulated by the trade unions. The unemployment rate falls, the number of people employed rises in proportion to the reductions made in working hours.

$$(22) \frac{\hat{u}^X}{\hat{h}^X} = \frac{1}{\frac{u^X}{1-u^X}} > 0 \text{ or } \hat{L}^X = -\hat{h}^X$$

Since in this scenario the reduction in working hours has no impact on the level of domestic output ( $\hat{X}/\hat{h}^X = 0$ ), the argument that reducing working hours will make it possible to distribute a given volume of work across more shoulders is entirely accurate.

In the following, we shall modify this result by taking into account a number of different interrelationships. To re-examine the argument that reducing working hours will make it possible to distribute a given volume of work across more shoulders, thus lowering unemployment, we will first illustrate the change in the domestic employment potential, expressed as a function of the volume of domestic output. The change in the net stock of capital held abroad is always inversely proportional to the change in the volume of domestic output. We shall then discuss how, on the basis of the interrelationships depicted, the unemployment rate changes in response to a reduction in collectively agreed working hours.

### Workforce-related Costs and Labour Efficiency

Simply taking into account the influence exercised on labour efficiency by the unemployment rate invalidates the results depicted in equation (22), which purport to show that reducing working hours allows a constant volume of work to be distributed across more shoulders. A fall in the unemployment rate leads to a deterioration in labour efficiency, which induces firms to increase the wage margin. This makes labour more expensive, so that firms reduce domestic production and shift larger amounts of real capital abroad.

The same holds true if workforce-related costs are taken into account. The reduction in working hours in this case results in costs per efficiency unit rising, since the same aggregate cost has to be spread across fewer working hours. As a result of these relationships, the following applies to the change in the level of domestic output:

$$(23) \quad \frac{\hat{X}}{\hat{h}^X} = \frac{1}{D} \left\{ [S] \left[ \frac{\varepsilon_u^X \varepsilon_w^X}{a^{NX}} + \frac{g^{Xa}}{a^{NX}} \frac{u^X}{1-u^X} \right] \right\} > 0$$

Reducing working hours will also have a direct influence on the efficiency of the factor labour. This influence may, on the one hand, be determined by the nature of the work flow, or it may, on the other hand, be rooted in the workers' reactions, which will, in turn, be affected by their motivation. The issue of how reductions in working hours might affect productivity was discussed in detail in the eighties.

This article will concentrate on efficiency changes that are rooted in the way the workers, on the basis of their motivation, react. One of the basic tenets of microeconomic theory is that the utility function attributed by households to leisure needs to be taken into account in order to determine the optimal number of hours that are to be worked by a household. If the collectively agreed total of working hours is greater than the optimal total, then we speak of a "preference for leisure", in the reverse case, we speak of a "preference for income".

A whole number of surveys have attempted to discover what households' preferences in this area actually are. Almost all of them come to the conclusion that, given the freedom to choose for themselves, at least a relative majority of workers would opt for shorter working hours.<sup>17</sup> Most of these surveys, however, implicitly assume that hourly wage rates would be adjusted upwards by a greater or lesser margin to offset the shorter hours worked. "If the survey contains only a weak reference to the impact on income, then the desired number of working hours is lower than if it is explicitly pointed out that earnings will be geared to the hours worked".<sup>18</sup> Thus, a study commissioned by the State Ministry of Labour, Health and Social Security in North-Rhine Westphalia comes to the conclusion that 89% of those fully employed do not wish to work less in the future if this involves their taking a corresponding cut in their incomes.<sup>19</sup> The desire to work shorter hours is least pronounced amongst unskilled and semi-skilled workers, which is to say amongst the low-income groups. This is, however, precisely the group that is likely to be affected most by a rise in real capital mobility. Similarly, responses to the question of whether shorter working hours or increased wages would be preferred, in a situation in which there was a given distributional scope, indicate that there has been a shift in Germany in favour of higher wages. Whereas in 1989, 44% of workers were willing to forgo a rise in wages in return for a reduction in working hours, the proportion willing to do so had shrunk to 33% by 1994.<sup>20</sup>

It is thus fair to assume that, whilst there is un-

<sup>17</sup> Cf. the overview provided in: Bernd Hof: Von der Voll- zur Teilzeit, Internationale Erfahrungen und Perspektiven, in: IW-Trends, Vol. 21, 1994, pp. 31-51.

<sup>18</sup> Ibid., p. 47.

<sup>19</sup> Cf. Frank Bauer, Gabi Schilling: Arbeitszeit im Überblick, Cologne, edited by: Ministerium für Arbeit, Gesundheit und Soziales des Landes Nordrhein-Westfalen 1994.

<sup>20</sup> Cf. European Commission: Ergebnisse der Umfrage bei den Unternehmen und den Verbrauchern, Europäische Wirtschaft, No. 10, 1994.

doubtedly a desire to work shorter hours, the overwhelming majority of workers are not willing to accept this unless there is at least some offsetting upward adjustment to hourly wage rates. The present situation on the labour market, however, together with international competitive pressures, make it inevitable that any reduction in working hours must, in future, involve the workers forgoing some of their wages. This is also demonstrated by the fall in real net wages experienced in Germany over the last few years.

If we assume in the following that workers do not have a preference for the option of shorter working hours accompanied by cuts in their income, then any such policy must imply a loss of utility. This is likely to result in a fall in work motivation, which will be evinced in poorer work quality, higher levels of absenteeism due to sickness and so on. This involves a decrease in labour efficiency. To take these relationships into account, the collectively agreed working hours will be included in the efficiency function.

$$e^i = e^i(w^i, u^i, h^i)$$

where  $\varepsilon_h^i$ : percentage change in labour efficiency resulting from a percentage change in collectively agreed working hours. If reducing the number of working hours without making any compensating adjustment to wage rates leads to workers suffering a loss of utility, and if this results in their work motivation falling, then this gives  $\varepsilon_h^i > 0$ .

The fall in labour efficiency that follows a loss of motivation triggered by a reduction in working hours induces firms to increase the optimal level of the wage margin. As a consequence, domestic workers become less competitive. The volume of domestic output falls further and capital exports rise still further. The result (23) is extended in the brackets.

$$(24) \quad \frac{\hat{X}}{\hat{h}^X} = \frac{1}{D} \left\{ [S] \left[ \frac{\varepsilon_u^X \varepsilon_w^X}{a^{NX}} + \frac{u^X}{1 - u^X} \left( \frac{g^{Xa}}{a^{NX}} + \frac{\varepsilon_h^X}{a^{NX}} \right) \right] \right\} > 0$$

### Supply of Labour

Any analysis of the effects triggered by shorter working hours must also take into account the reactions of workers who, in addition to their main job, take on supplementary jobs or who work on the black market. Reducing working hours in people's main job enables them to opt for such a course of action – and any associated cuts in income may make this necessary. Similarly, the reactions of family members need to be taken into account – for example, a wife's decision to start looking for employment in order to secure the family's income. It is well-known that in the USA this kind of "moonlighting" (carrying out more than one job) has increased sharply over the last few

years. Although it has not until now been so common for people in Germany to take on such supplementary jobs, the trend is unmistakeable. An analysis carried out by the Federal Ministry of Labour and Social Security<sup>21</sup> showed that in 1992 almost 1.5 million people had supplementary jobs; on top of this, there were nearly 3 million working in part-time employment that was too insignificant to make them liable to social security contributions. The number of people employed in the black economy can only be estimated. The above figures mean that the number of people engaged in supplementary employment in Germany has risen since 1987 by 126%.

There are a large number of reasons for this trend.<sup>22</sup> Thus, for example, falling real incomes are cited as a reason, as is a general rise in the numbers of people with a preference for income. There is, however, no doubt that the reduction in working hours in people's main jobs plays a key role in the growing prevalence of supplementary employment. In the first place, workers who did not in any case have a preference for leisure are motivated even more strongly to take on extra work. On top of this, if shorter working hours are not offset by a rise in wage rates, then this will result in households suffering a fall in income. If, at the same time, the tax burden increases (income-tax surcharge to finance German reunification, pension contributions etc.), then this creates an additional incentive for people to take on supplementary work. The increased supply of labour deriving from married women is particularly significant where the reduction in working hours makes family incomes fall and where it is families in the bottom third of the income scale that are affected. Similar results were obtained from a study investigating the impact of the 1990 tax reform on the supply of supplementary labour. Especially for low or middle income households, the substitution effect of the increase in net wages was smaller than the income effect of the tax reduction.<sup>23</sup> If one inverts this conclusion, then it follows that it will be, above all,

<sup>21</sup> Cf. Bundesministerium für Arbeit und Sozialordnung (ed.): Sozialversicherungsfreie Beschäftigung, Cologne 1993.

<sup>22</sup> Cf. for example Johannes Schwarze: Mehrfachbeschäftigung – eine theoretische und empirische Analyse für abhängig beschäftigte Männer, in: Richard Hauser, Uwe Hochmuth, Johannes Schwarze (eds.): Mikroanalytische Grundlagen der Gesellschaftspolitik, Vol. 1, Berlin 1994; Joachim Merz, Klaus Wolff: Die Nebenerwerbstätigkeitsumfrage des Sonderforschungsbereichs 3 zur Analyse markt- und nichtmarktmäßiger Aktivitäten privater Haushalte, in: Richard Hauser, Gert Wagner, Notburga Ott (eds.): Mikroanalytische Grundlagen der Gesellschaftspolitik, Vol. 2, Berlin 1994.

<sup>23</sup> Cf. Joachim Merz: Wirkungen der Steuerreform 1990 auf Haupterwerb, Nebenerwerb und Schwarzarbeit, Sonderforschungsbereich 3 der Universitäten Frankfurt und Mannheim, Mikroanalytische Grundlagen der Gesellschaftspolitik, Working paper No. 333, 1990.



those households which are less highly skilled and which are consequently hit especially hard by a shift in technology that will be most likely to seek supplementary work – be it in legal or in illegal employment – to compensate for any fall in their incomes that results from a reduction in working hours.

If one summarizes the results of the various studies, then it transpires that most of the arguments tending to encourage workers to take up additional employment apply to precisely the group that is most likely to be hit by a rise in real capital mobility – to the relatively poorly qualified workers in the lower income brackets. If efforts are made to reduce this group's working hours without offering them an offsetting rise in hourly wage rates, then they are likely to take up supplementary jobs and their family members are likely to contribute to a rise in the supply of labour. In a simulation study carried out as long ago as 1983, at a time when the tax burden had not by a long chalk reached today's proportions, Galler and Wagner<sup>24</sup> came to the conclusion that up to 50% of the employment effect of a reduction in working hours might be offset by those already in employment taking up additional part-time jobs and by married women entering the labour market for the first time and thus increasing the supply of labour. If such reactions are taken into account, then clearly the increase in employment – if any – that is triggered by a reduction in working hours need not necessarily be identical with a fall in unemployment. The number of people in employment might rise and yet still be accompanied by an increase in unemployment, if the increase in the supply of labour that is triggered by shorter working hours is greater than the rise in the number of jobs.

If we adjust the relationships in our model to make allowance for an increase in the supply of labour triggered by a reduction in working hours, then the unemployment rate will initially rise. This results in higher labour efficiency, allowing firms to reduce the wage margin, whereupon they take on more workers and raise domestic output. Rising yields also result in more real capital being imported. The results obtained thus far are extended by a further term, one which is, however, this time negative. In this context,  $\alpha_h^x$  is the percentage change in the supply of labour related to

the percentage change in collectively agreed working hours.

$$(25) \quad \frac{\hat{X}}{\hat{h}^x} = \frac{1}{D} \left\{ [S] \left[ \frac{\epsilon_u^x \epsilon_w^x}{a^{NX}} + \frac{u^x}{1-u^x} \left( \frac{g^{Xa}}{a^{NX}} + \frac{\epsilon_h^x}{a^{NX}} \right) + \frac{\epsilon_u^x \alpha_h^x}{a^{NX}} \right] \right\}$$

### Plant Utilisation Times

Our discussion of the effects that a reduction in working hours is likely to have has, thus far, been based on the premise that plant utilisation times will remain constant. The implicit assumption has been that a reorganisation of the work process would make it possible to increase the ratio between plant utilisation time and the individual employees' working hours. If, however, this is not possible – and particularly in smaller firms this is likely to be the case – then reducing individual employees' working hours will entail a fall in plant utilisation times, too. This phenomenon was observed in Germany when working hours were reduced both in the seventies and in the eighties. It was especially small enterprises with fewer than 50 workers and firms that ran a single shift that were affected. Whereas in 1989 average plant utilisation times stood at 73 hours per week, this figure fell within the next five years to 60 hours – making it the lowest in Europe and 13 hours less than the European average. In the mechanical engineering industry, one of Germany's principal export industries, capacity utilisation times sank by approximately the same amount as that by which working hours were reduced.<sup>25</sup> A fall in the intensity with which a given stock of capital is used has, however, a negative impact on output and employment levels:

$$(26) \quad \frac{\hat{X}}{\hat{I}^X} = \frac{1}{D} \left\{ \lambda^X (1 - \rho^X n^{NKX}) \left[ \frac{u^x}{1-u^x} + \frac{\epsilon_u^x}{a^{NX}} \right. \right. \\ \left. \left. \left[ T - a^{NK} \left( 1 + \frac{\epsilon_w^x}{\epsilon_{ww}^x} \right) \right] \right] \right\} > 0$$

### Working Hours and Unemployment

The discussion so far has shown that reducing working hours can trigger effects that result in domestic output falling and, consequently, exports of real capital rising. It was only the increase in the supply of labour that had a positive effect on domestic output. The more internationally mobile real capital is, the greater all these effects will be. The interim conclusion that has to be drawn from all this is that it is not possible to assume that reducing working hours will simply result in a constant volume of work being distributed across more shoulders, thus bringing down unemployment.

All else being equal, any reduction in working hours

<sup>24</sup> Cf. Heinz P. Galler, Gert Wagner: Arbeitszeitverkürzung und Arbeitsangebot, in: WIRTSCHAFTSDIENST, Vol. 63, 1983, pp. 329-336.

<sup>25</sup> Cf. Institut der Deutschen Wirtschaft: Informationsdienst, Vol. 21, 1995, No. 35, p. 8; Rudolf Geer: Die 35-Stunden-Woche ist und bleibt falsch – Eine "Zwischenbilanz" der Arbeitszeitverkürzung aus der Sicht der Arbeitgeber, in: Peter Hampe (ed.): Zwischenbilanz der Arbeitszeitverkürzung, Munich 1993; Jürgen Husmann, Elisabeth Neifer-Dichmann, op. cit.

will indeed result initially in the unemployment rate falling – for purely mathematical reasons, as was shown in (22). In the following, this will be termed the base effect of a reduction in working hours. This base effect, however, needs to be modified to allow for the changes in domestic output discussed above. The question is how the unemployment rate ultimately reacts to a reduction in collectively agreed working hours. This is depicted in (27).

$$(27) \quad \frac{\hat{u}^X}{\hat{h}^X} = \frac{1}{D} \left\{ 1 + \frac{\varepsilon_w^X g^{Xa}}{\varepsilon_{ww}^X} - [S + T] \left[ \frac{g^{Xa}}{a^{NX}} + \frac{\varepsilon_h^X}{a^{NX}} \right] + \varepsilon_h^X \left[ 1 + \frac{\varepsilon_w^X}{\varepsilon_{ww}^X} \right] + \alpha_h^X \right\}$$

If one takes just the first term in the bracket and in D respectively, then one obtains the positive base effect of a reduction in working hours. The unemployment rate falls. This positive employment effect, however, results in labour efficiency falling. Firms therefore raise the wage margin, labour becomes more expensive and domestic output falls. This diminishes the improvement in the unemployment rate. In D a positive term is added to  $u^X/l - u^X$ . This does not yet reverse the sign (of 27), however, since the decline in output is founded on the improvement in the employment situation. Only if the export of real capital were to display perfect elasticity in reacting to changes in yields ( $|p^X| \rightarrow \infty$ ) would the reduction in working hours have no impact on the unemployment rate at all. The base effect would then be exactly offset by a corresponding fall in the volume of work remaining in the country.

The workforce-related costs ( $g^{Xa}$ ) are taken into account by being subtracted, which thus depicts the negative impact on employment of rising labour costs and falling returns to capital. At this point, the result may already be a rising unemployment rate. This is all the more likely to be the case, the greater the elasticity figures are. As one can see, the more easily the factor of production capital can move across international borders, the greater is the negative effect on the demand for labour. The more the fall in domestic yields leads to capital finding more attractive investment opportunities abroad, the greater will be the consequent negative effects on domestic employment. A sufficient condition for a rise in unemployment is given if international real capital mobility reacts with enough sensitivity to changing yields. If  $|p^X| > \frac{a^{NX}}{a^{EX} g^{Xa} n^{NX}}$  obtained, then the unemployment rate would indubitably rise.

Thus, the initially positive impact of a reduction in working hours on the unemployment rate is severely

limited if one simply takes into account those costs that depend on the size of the workforce. If the figures are assumed to have sufficiently large elasticities, then the overall impact of a reduction in collectively agreed working hours will be to increase unemployment in Sector X, even if there is no offsetting upward adjustment to hourly wage rates at all. This finding is supported by various studies. Econometric estimates come to the conclusion that, assuming the presence of both non-linear labour costs and workforce-related costs, a reduction in weekly working hours will result in a fall in employment. The same conclusion is reached by a study based on a model theory which takes into account those workforce-related costs represented by labour turnover costs.<sup>26</sup>

If the influence exercised by collectively agreed working hours on labour efficiency is taken into account, then a further effect that reduced working hours has on employment levels becomes visible. Assuming that  $\varepsilon_h^X > 0$  obtains, a reduction in working hours is more likely to make unemployment rise – and is likely to make it rise more sharply – than has so far been assumed.

If, on top of this, the rise in the supply of labour triggered by the reduction in working hours is also taken into account, then this, too, will make the unemployment rate rise further, since  $\alpha_h^X$  is negative. Thus, although an increased supply of labour boosts domestic output, there can be no doubt that this rise in employment will be more than offset by the increase in the number of those seeking employment.

The base effect of a reduction in working hours is now countered by cost arguments, effects related to motivational factors and a rise in the supply of labour – and each of these factors, taken on its own, results in a rise in the unemployment rate. Overall then, there is a strong likelihood that, instead of bringing down the unemployment rate, a reduction in working hours will compound the job-destroying effect of increasing technological mobility.

If a reduction in working hours is accompanied by a fall in plant utilisation times, then this, too, will lead to the unemployment rate rising.

$$(28) \quad \frac{\hat{u}^X}{\hat{l}^X} = \frac{1}{D} \left\{ -\lambda^X (1 - p^X n^{NX}) \right\} < 0$$

<sup>26</sup> Cf. Heinz König, Winfried Pohlmeier: Employment, Labour Utilization and Procyclical Labour Productivity, in: *Kyklos*, Vol. 41, 1988, pp. 551-572; cf. also Michael Hoel and Bent Vale: Effects on Unemployment of Reduced Working Time in an Economy where Firms set Wages, in: *European Economic Review*, Vol. 30, 1986, pp. 1097-1104; Lars Calmfors and Michael Hoel: Work Sharing, Employment and Shiftwork, in: *Oxford Economic Papers*, Vol. 41, 1989, pp. 758-733.

If the fall in plant utilisation times implies an exactly proportional fall in the intensity with which capital is used ( $\lambda^X = 1$ ), and if plant utilisation times fall in the same proportion as individual employees' working hours are reduced, then the base effect of a reduction in working hours will be more than offset. The reduction in working hours leads, quite independently of what the elasticity figures are, to an indisputable rise in the unemployment rate.

$$(29) \frac{\hat{u}^X}{\hat{h}^X} = \frac{1}{D} \left\{ \frac{\varepsilon_w^X g^{Xa}}{\varepsilon_{ww}^X} - [S + T] \left[ \frac{g^{Xa}}{a^{NX}} + \frac{\varepsilon_h^X}{a^{NX}} \right] + \varepsilon_h^X \left[ 1 + \frac{\varepsilon_w^X}{\varepsilon_{ww}^X} \right] + \alpha_h^X + p^X n^{NX} \right\} > 0$$

Even if both the workforce-related costs and the reactions of workers were ignored ( $g^{Xa} = \varepsilon_h^X = \alpha_h^X = 0$ ), the negative employment effect of a reduction in working hours would still be indisputable. Only the last term would remain in (29). This effect is a consequence of the international mobility of real capital.

### Sectoral Effects

By assuming that, at the national level, the factors of production are immobile, the discussion has so far imputed a strict separation between different sectors. The impact exercised by the growth in the international mobility of real capital and by a reduction of working hours in Sector X can, however, affect Sector Y, too, via a series of inter-relationships:

□ The rising rate of unemployment in Sector X may motivate the poorly qualified workers in this sector to acquire further qualifications and then seek work in the other sector. In this case, the supply of labour in Sector Y would rise, resulting in increased unemployment. This has a positive impact on labour efficiency in this sector, firms can lower the wage margin and increase their demand for factor units. Output is boosted. To be sure, the unemployment rate remains higher than it was prior to the restructuring of the labour supply, a certain number of those without jobs in Sector X will, however, be able to find work in Sector Y. To that extent, a reduction in working hours in old, no longer competitive sectors may, if accompanied by a commensurate fall in wages, increase the incentive for the workers there to improve their qualifications and switch to other industries. For this to hold, however, the reduction in working hours must always be restricted to certain sectors.

□ The trade unions may, to demonstrate their solidarity, demand that in Sector Y, too – a sector that is here regarded as being unaffected by increasing

real capital mobility – working hours be reduced. The effects of a reduction in working hours discussed above would then manifest themselves in Sector Y, too – both output and the demand for factors would fall.

□ Increasing real capital exports in Sector X, together with the reduction in working hours and its consequent effects, also have impacts on the returns to capital. Increased capital mobility makes domestic yields rise, the reduction in working hours makes them fall. If the impact exercised by the reduction in working hours is greater, then this will create an incentive for the factor capital to shift out of Sector X – not only abroad, but also into Sector Y in the same country. This results in a shift in output volumes and in a corresponding change in unemployment rates in these sectors.

□ The rise in real capital mobility and the reduction in working hours, without any offsetting upward adjustment in wage rates, lead to incomes in Sector X falling. Those employed in this sector might resent such a shift in relative incomes as being “unfair”. This resentment would have a negative effect on labour efficiency. This diminution in efficiency, in turn, leads to a rise in the unemployment rate, and both output and employment levels fall.<sup>27</sup>

If transsectoral effects are taken into account, then they do not, in sum, make the evaluation of a reduction in working hours any more positive. The sole factor that might result in overall employment levels rising is the possibility that poorly qualified workers hit particularly hard by increased real capital mobility might react by improving their qualifications.

### Alternative Options

The foregoing sections have shown that reducing working hours is not a policy that is likely to help bring down unemployment. How, then, can the challenge of increased real capital mobility, and consequently rising unemployment, be met? There is no room here to embark on an exhaustive discussion of locational factors: instead, two exemplary measures that are inherent to our model will be discussed. In the first place, efforts can be made to improve labour efficiency. This can be achieved if the production process is optimized, for example, by resorting more to teamwork, by improving working conditions, by

<sup>27</sup> With respect to this influence, cf. Jan Beyer Schmidt-Sørensen: An Efficiency-Wage-Hours Model and Shorter Working Hours, in: *Scottish Journal of Political Economy*, Vol. 38, 1991, pp. 113-130; cf. also Jonas Agell, Per Lundborg: Fair Wages, Involuntary Unemployment and Tax Policies in the Simple General Equilibrium Model, in: *Journal of Public Economics*, Vol. 47, 1992, pp. 299-320.

making employees bear more responsibility for their own work, by encouraging lifetime learning etc. In the model, these measures will be taken into account via the parameter  $\delta$ , which represents an exogenous increase in labour efficiency.

By improving working conditions and thus increasing labour efficiency, firms will be able to reduce the wage margin. This lowering of costs makes domestic production more profitable, so that the level of output and the demand for units of labour and capital rises. Returns to capital also rise, so that real capital is imported. There is no doubt that sectoral unemployment can be brought down by such a policy.  $\epsilon_\delta^l$  characterizes the percentage improvement in labour efficiency created by a percentage improvement in workers' motivation.

$$(30) \quad \frac{\hat{u}^X}{\hat{\delta}^X} = \frac{1}{D} \left\{ -\frac{\epsilon_\delta^X}{a^{NX}} \left[ S + T - a^{NX} \left( 1 + \frac{\epsilon_w^X}{\epsilon_{ww}^X} \right) \right] \right\} < 0$$

Unlike a reduction in working hours, policies designed to improve labour efficiency thus indisputably result in a fall in unemployment. But working hours, too, can be used as a policy instrument to tackle unemployment, albeit not in the guise of a general reduction.

The fall in employment triggered by a reduction in working hours was found to be attributable to the presence of workforce-related costs, to employees' dissatisfaction with the reduction in working hours and to the rise in the supply of labour in response to the reduction in working hours. A voluntary increase in working hours would reverse all these effects: such an increase in working hours will make proportional workforce-related costs fall. Workers will be less prone to resort to supplementary jobs and black-market labour if they can work longer in their main job. Assuming that the longer hours are worked voluntarily, there will be no dissatisfaction to diminish efficiency. Such a policy would result in domestic output rising, since the latter would become more profitable again in comparison with shifting production abroad. If the increase in working hours is combined with a proportionate rise in plant utilisation times, then the positive effects are boosted still further. Where  $\hat{h} = \hat{l} > 0$  obtains, the change in the unemployment rate is:

$$(31) \quad \frac{\hat{u}^X}{\hat{h}^X} = \frac{1}{D} \left\{ \frac{\epsilon_w^X g^{Xa}}{\epsilon_{ww}^X} - \frac{g^{Xa}}{a^{NX}} [S + T] + \lambda^X p^X n^{NX} + \alpha_h^X - \frac{\epsilon_h^X}{a^{NX}} \left[ S + T + a^{NX} \left( 1 + \frac{\epsilon_w^X}{\epsilon_{ww}^X} \right) \right] + (1 - \lambda^X) \right\}$$

If the rise in plant utilisation times increases the intensity with which the plant is used to an equal extent ( $\lambda^X = 1$ ), then the unemployment rate will indubitably fall as a result of the increase in working hours, and the term (31) is negative. There are a number of reasons for this. Thanks to the fall in proportional workforce-related costs, the increase in working hours will lower the costs of an efficiency unit. This effect is expressed by the first two terms in (31). The increase in plant utilisation times improves manufacturing conditions, real capital will flow into the domestic economy from abroad, and output and employment levels will thus rise. (The third term in (31)). The more sharply the international mobility of real capital reacts to changes in capital yields, the stronger this effect will be. The fourth term in (31) shows the fall in the supply of labour, since it is now less necessary for workers to take up supplementary employment. The fifth term illustrates the way in which the increase in working hours boosts motivation and thus efficiency, which again results in a positive employment effect. In terms of their utility, the workers' position is improved by the increase in working hours, since they are now no longer obliged to take on supplementary jobs or to work on the black market in order to safeguard their income ( $\epsilon_h^X > 0$ ). There can be no doubt that this effect will materialize, since it is left entirely up to the workers whether they wish to take the opportunity of working longer hours. The sixth term in (31) shows how an increase in working hours, by triggering a redistribution of work, causes unemployment to rise: at the same time, however, this effect is countered by the corresponding fall in unemployment that results from an extension of plant utilisation times. If  $\lambda^X$  is equal to one, then these two effects added together give zero and the unemployment rate is still indubitably reduced by a voluntary increase in working hours. It is equally certain that such a policy will boost the volume of domestic output and result in a net import of real capital.

### Summary

This article has demonstrated that a reduction in working hours, even without an offsetting upward adjustment in wage rates, can increase the unemployment rate if firms have a global orientation and if they react to a rise in the cost of domestic production by shifting production abroad. If domestic unemployment is being caused by this international mobility in real capital, then reducing working hours will cure neither the symptoms nor the causes of such unemployment. Production is being shifted abroad

because Germany is failing to make itself sufficiently attractive to manufacturers – and the primary locational problem is rooted in unduly high unit labour costs. How, though, is a reduction in working hours supposed to lower unit labour costs? This will not even cure the symptoms, since reducing working hours is not going to distribute a given volume of work across more shoulders. Instead, there will be, on the one hand, a further fall in the volume of work available, whilst, on the other hand, the response displayed by workers trying to offset the above-mentioned effects will multiply the number of shoulders! Ultimately, reducing working hours is likely to make unemployment rise still further.

If a high-wage country like Germany wants to maintain wage differentials vis-à-vis other countries, notwithstanding the tendency for gaps in international labour productivity levels to narrow increasingly, then the factor labour must be made more inhomogeneous. The availability of better qualified workers is proving to be an ever more decisive locational advantage. Education, however, amounts to nothing more or less than investing in human capital. Voices are to be heard from all directions lamenting that unduly short plant utilisation times make it more difficult to amortise the substantial costs of capital investment. But exactly the same applies to the factor labour. The less long a well-qualified worker places his abilities at the disposal of a firm, the less profitable investments in human capital will be. Thus, in the long term reducing working hours makes Germany less attractive to manufacturers. With vocational training programmes, neither the overall length of the courses, nor the time spent at a vocational school has changed: thus, the impact of any reduction in working hours is borne entirely by time spent on on-the-job training. In the first place, this makes it harder for young people who are less talented to manage to obtain qualifications; in the second place, a survey has shown that 55% of firms are worried about reductions in working hours causing long-term damage to the quality of vocational training.<sup>28</sup> The training facilities provided by firms are also jeopardized by reductions in working hours.

Since, however, there will always be gaps in the level of qualifications possessed by different workers

in Germany, no matter how much effort is made to improve educational standards, and since the danger of jobs being shifted abroad rises the less skilled the work is, policies on working hours will always have to be tailored to the group of workers concerned. Reducing working hours across the board to show solidarity, as was done at VW, jeopardizes the jobs of better qualified workers, too. As the innovation cycles for new products become ever shorter, firms need to be able to react flexibly to changed market data, especially in the area of research and development. Reducing working hours generally diminishes the potential to raise the level of qualifications and thus poses an additional potential threat to jobs. This is why it will in future be necessary in many areas to work longer hours. That will reduce manufacturing costs, make firms more competitive, safeguard existing jobs and create new ones. Any measure taken to change working hours should, moreover, rely on the workers' voluntary acquiescence. If the individual worker is given autonomy over the hours he chooses to work, then this will enable him to achieve his own optimal combination of working hours and leisure time, without search costs being incurred. What is more, he will be able to restrict his activities to his main job, which is the occupation for which he has been trained and in which his productivity will be higher than in any supplementary jobs: this will boost his motivation to work. In addition, less recourse will be taken to black-market jobs, which will in turn mean that the state will be able to collect higher tax revenues.

Together with giving workers greater autonomy over their own time, factory hours also need to be lengthened so that unit costs can be lowered by extending plant utilisation times. This, too, will create jobs, since it makes the country more attractive to internationally mobile real capital. A combination of these instruments<sup>29</sup> – improving the factor labour's level of qualifications, giving workers the option to choose voluntarily how long they wish to work whilst keeping hourly wage rates constant, extending plant utilisation times – will make Germany, too, more attractive to internationally mobile real capital. The trend towards shifting jobs abroad could be halted and new jobs could be created. Reducing working hours generally, however, in the belief that a given volume of work can be distributed across more shoulders, is scarcely going to diminish unemployment in the short term – and in the long term, such a policy will provide firms with a further motive to shift production abroad.

<sup>28</sup> Cf. Rudolf Geer, *op. cit.*; and Institut der Deutschen Wirtschaft: Informationsdienst, Vol. 21, 1995, No. 10.

<sup>29</sup> In addition, there are a whole number of policies worth striving for, such as reducing corporate taxes, loosening bureaucratic procedures and so on: there is not enough space here, however, to go into these in detail.