#### KM 14(1984) pag 55 - 78 CHRIS DE NEUBOURG \*)

WHAT A DIFFERENCE A DAY MAKES : figures and estimates on work-time reduction

During the crisis of the thirties M. Kalecki (1938), A. Pigou (1927), L. Robbins (1929), J. Robinsson (1937), J. Tinbergen (1939), H. Vernon (1934), the I.L.O. (1933) and many others discussed work-time reduction as a policy instrument to combat unemployment. Their contributions were theoretical and contained only incidentally empirical information (Kalecki's and Tinbergen's contributions are exceptions). Confronted with persistent unemployment in the late seventies and the early eighties the discussion is open again. Today, researchers use more and better statistical data and sophisticated macroeconomic models, to study the viability of a work-time reduction as an instrument to solve the unemployment-problem in a socially acceptable way. The lecture reviews the empirical information at our disposition today and investigates what we can learn from it. It first discusses the changes in the working time over the past century in a international comparative context. The developments in eight industrial countries are studied : Canada, Germany, France, Japan, The Netherlands, Sweden, The United Kingdom and the United States. The results of twelve macro-economic models are compared in the second paragraph. Lessons from the past and from recent experiences in the countries under study are drawn in the paragraph three and four. Our main conclusions may be summarized as follows :

- the average annual working time has declined during the past century and its decrease has accelerated in the seventies without deliberate policy actions;
- the recent working time reduction has not to be attributed to changes in the weekly contractual working time for full-time workers;
- estimates of the impact of a work-time reduction upon employment and unemployment by means of macro-economic models differ widely and must therefore be interpreted with care;
- the unemployment-effects of a non-radical work-time reduction are likely to be small;
- radical work-time reductions meet serious social problems;
- historical experiences do not justify a great optimism concerning the employment effects of a work-time reduction;
- \* For statistical assistance I am indebted to L. Kok. C. de Neubourg, Economic Faculty, P.O. Box 800, 9700 AV Groningen, Tel.: 050-117488. This article was presented at the Economisch Statistische Dag, January 6, 1984 in Utrecht.

- recent practises are especially succesful when the annual or lifetime work-time, rather than the weekly work-time is affected;
- current and expected unemployment, the growth of labour supply and the projected increase in productivity, justify future contemplation of work-time reduction as a policy instrument. However, it is not panacea for the existing economic problems.

This article, however, summarises the lecture only partially and focusses on the comparison of the macro-economic models. The complete text of the lecture is published in the Research Memorandum of the Institute of Economic Research, Economic Faculty, University of Groningen, nr. 141 (P.O. Box 800, 9700 AV Groningen).

# Estimates of the Macro-economic Effects of Working Time Reduction: twelve models compared

Since manipulation of the working time is more and more seen as a useful instrument for labour market policy in general and to reduce current high unemployment rates in particular, several attempts are made to estimate the employment- and unemployment-effects by means of macro-economic models. The results of these models both in their direct and undirect effects, as well as the causes for their mutual differences, will be discussed in this section. The models concerning five European economies are listed below(1):

Belgium	Maribel	(Bureau de Plan, 1982)
	Palasty*	(Palasty, 1983)
	Drèze*	(Drèze, 1983)
France	DMS	(Oudiz, a.o., 1979)
Section in a section of the section of	Metric	(Oudiz, a.o., 1979)
Germany	Henize	(Henize, 1981)
	IAB*	(Reyher, a.o., 1979, 1983)
The Netherlands	Vintaf	(C.P.B., 1979)
	Freia	(S.E.R., 1982)
	AMO-K	(Den Broeder, 1983)
	SCP*	(S.C.P., 1983)
United Kingdom	Treasury	(Allen, 1980)

Not all of these models are macro-economic models in the true sense of the concept. Those marked with an asterix must be considered as partial models. They, nevertheless, estimate employment- and unemployment-effects of different forms of work time reduction and they are therefore interesting to discuss.

 In studying and discussing the majority of the models, I took advantage of the work done by W. van Ginneken, ILO, Geneva (Van Ginneken, 1983)

### Differences in results

Work -time reduction under the condition of a strict proportional wagereduction, is accepted as the most viable policy option in the Netherlands. Table 1 compares the employment effects of this option in the models (or modelvariants). From the table it can be seen, that the effects differ widely, ranging from an .8 per cent increase in employment (in 1981 and 1983) in the French DMS III - and the Dutch Vintaf II - variant to a 58.6 per cent increase in employment (in 1990) in the (equally) Dutch AMO-K I - variant. The comparison of the 'employment elasticities' (2) - i.e. the employment effect of 1% reduction of the working time - yields a better picture of the estimated succes of the reduction of the work time as a policy option. The last column of table 1 corrects the total change in employment as a percentage of total employment for the size of the work-time reduction introduced in the various models. The most pessimistic estimate of the employment effect is obtained in the Vintaf II - variant on the short term : 1 per cent work-time reduction raises employment with only .067 per cent. The most optimistic result is obtained by the AMO -K I - variant on the medium term : 1 per cent work time reduction raises employment by 1.4 per cent: a more than proportional increase. In most of the models the 'employment elasticity' is situated between .2 and .5, with the Dutch official models Vintaf and Freia below that level and the German Hernize I-variant and the Dutch AMO-K and SCP-models as upward outliers (respectively .68, 1.46 and .91).

The reduction of work-time has, besides employment effect, an important impact on major economic variables such as labour costs, final demand, inflation, the balance of payments and the government budget. Most of these variables are themselves targets of economic policy and the impact of a policy option should be judged also in terms of their changes. This is done in table 2 (for the same model-variants listed in table 1). The differences between the models are far less outspoken when the indirect effects of a work time reduction are studied. Private consumption, exports, investments,

(2) The figures in the last column of the tables 1 and 3 cannot be interpreted as a parameter in a production function. It is the calculated effect of a 1 per cent reduction of the work time under the conditions of the model and as a part of the total effect resulting from a larger-than-1-per cent reduction of the working time.

Country	Mode1	Volume and type of Working Time Reduction	Impact	Hypotheses	Year of Impact	No. of Years after intro- duction	Total Reduction at end of period	Change in employment as a percentage of total employment	Employment Elasticity (result 1% reduction)
Belgium	Maribel	2% per year 1983-'86 (+ 1% trendreduction) 4x (-2)%	b	capacity reduction	1986	4	- 8 %	+ 2.7	+ .348
France	DMS-I	2.5% per year 1982-'85 (+ trendreduction) 3x (-2.5)%	с	same capacity	1985	4	- 7.5%	+ 5.6	+ .582
	DMS-II	one hour per week 1x (-2.5)%	e	same capacity	1981	3	- 2.5%	+ 1.1	+ .451
	DMS-III	one hour per week 1x (-2.5)%	e	capacity reduction	1981	3	- 2.5%	+ .8	+ .325
Germany	Henize I	two hours per week 1x (-5)%	d		1981	3	- 5 %	+ 3.4	+ .680
The Nether- lands	Vintaf- I	2.5% per year 1979-'83 5x (-2.5)%	ь	same capacity	1983 1988	5 10	- 12.5% - 12.5%	+ 1.4 + 2.3	+ .118 + .193
	Vintaf- II	2.5% per year 1979-'83 5x (-2.5)%	ь	capacity reduction	1983 1988	5 10	- 12.5% - 12.5%	+ .8 + 2.0	+ .067 + .168
	Freia-I	2.5% per year 1983-'86 4x (-2.5)%	a	same capacity	1986	4	- 10 %	+ 4.7	+ .488
	Freia-II	2.5% per year 1983-'86 4x (-2.5)%	a	capacity reduction	1986	4	- 10 %	+ 1.2	+ .125
	АМО-К І	7% per year 1983-'89 7x (-7)%	a	capacity reduction	1990 2000	7 17	- 40 %	+ 58.6* + 53.5*	+ 1.465 + 1.335
	SCP	10 in 1979 1x (-10)%	a	same capacity	1979	1	- 10 %	+ 9.1	+ .911
U.K.	Treasury I	two hours per week 1x (-5)%	d	accommo- dative monetary p	1981	3	- 5 %	+ 1.4	+ .280

TABEL 1

a = all workers; b = all workers in market sectors; c = all workers except those in agriculture, commerce, real estate, finance and non-market services; d = all employers; e = non-financial and non-agricultural enterprises. \* measured in man-year.

Country	Model*	Year of Impact	Fina	1 Demand	(volume)	2.65	Salar	ies		Account	position (% GDP)
			Private consumpt.	Exports	Invest- ment	Produc- tion	Real hourly Labour costs	Real Income salary earner	Consumer prices	Balance of Payments	Govern- ment budget
Belgium	Maribel	1986	2	2	0	2 <sup>a)</sup>	+ 1.2	- 1.1	+ .3		7
France	DMS I	1985	- 1.9	+ .8	0	4		- 2.2	0 <sup>c)</sup>	+ 2.7	+ 1.8
	DMS II	1981	0	1	+ .1	0	+ .4 <sup>d</sup> )	1	1	0	
	DMS III	1981	2	5	2	3	+ .4 <sup>d</sup> )	1000	+ .1	1	
Germany	Henize I	1981	1.000							1.50	
The Nether- lands	Vintaf I	1983 1988	- 1.7	- 1.4 - 1.0		- 1.7 - 1.0	+ .1 + 1.1	- 2.0	+ .7 + .4	$+ 1.5^{b}$ + 2.1 <sup>b</sup>	$^{0}_{+}^{(b)}_{,9^{(b)}}$
	Vintaf II	1983 1988	- 1.8	- 1.6 - 1.1		- 1.9	0 + 1.0	- 2.0	+ .9 + .4	$+ 1.6^{b}$ + 2.0 <sup>b</sup>	$(+ 0^{b})$ + 1.0 <sup>b</sup> )
	Freia I	1986	7	3	- 1.0	5	+ .7	5	0	+ 1.0 <sup>b</sup> )	+ .5 <sup>b)</sup>
11	Freia II	1986	- 1.0	- 1.0	- 1.0	- 1.5	+ .5	- 1.5	1.5	+ .7 <sup>b)</sup>	+ .3 <sup>b)</sup>
	AMO-K I	1990 2000	- 1.0	+ 2.3		+ .5 3	- 5.3 + .5	- 3.0	- 1.0 + 1.0	+ 7.0 <sup>b)</sup> + 5.75 <sup>b)</sup>	$(+ 9.0^{b})$ + 4.5
	SCP	1979						+ 2.2			
U.K.	Treasury	1981				3	19.5	+ .9	+ 2.6	+ .1	4

The Secondary Effects of Working Time Reduction With Proportional Wage Reduction - deviations from basic projections

TABLE 2

Note: \*more details see table 1; a = value added of enterprices; b = as a percentage of Net National income; c = producer prices; d = defined as average hourly salary divided by consumer prices. production and real income per salary-earner decrease in nearly all cases, though with different percentages. Real hourly labour costs are increased as is the level of consumer prices. The balance of payment position is ameliorated by a reduction of the work time in most models. The government deficit, at last, is lowered except in the Belgian- and the U.K.-model. Two model-variants, however, show amazingly deviant secundary effects : the French DMS-I and the Dutch AMO-K-I. In both models exports are favoured while in the latter work-time reduction is not inimical to production (+ .5), reduce real labour costs considerably (- 5.3) and the amelioration of the government budget is large enough to eliminate the deficit completely on the medium term (1990).

## Causes of the differences

Whether work-time reduction would raise employment significantly or not is nearly impossible to judge from the model-exercises presented in the tables 1 and 2. A discussion of the reasons for these large differences shed some light on the conditions which define the outcome of the operation. Three major causes can be distinguished. a. modalities of the work-time reduction itself

The models in table 1 differ in the first place on the size of the group of workers involved in the work-time reduction (column 4, table 1). Some models exclude workers in the non-market sector, others those in agriculture and finance, while 4 model-variants let all employees work less hours than they used to. In general no firm conclusions can be drawn on the influence of this modality, although the employment-effect tends to be larger as more workers are involved.

A second and more important difference between the models is the magnitude of the reduction and the pace of its introduction. The total reduction of the work-time is specified in column 8 of table 1; the pace can be judged from the number of years specified in the third column. Three groups in the reduction-size can be distinguished : a marginal (5 per cent or less, introduced in one year), a substantial (between 5 and 12.5 per cent, realised in 3 to 5 years) and a radical (40 per cent, realised in 7 years) reduction. It seems very difficult to discover any systematic influence from the magnitude of the reduction upon the employment-effect. Marginal reductions of the work-time yield employment elasticities ranging from .28 to .68 and the employment elasticities of substantial reductions are amongst the lowest and the highest. Remarkably, the one model considering a radical work-time reduction (AMO-K) shows a very large employment effect : a point we will discuss later more extensively.

An extremely important modality of work-time reduction relates to the strict proportional wage reduction. Tables 1 and 2 give no information on other alternatives, but most of the models considered in these tables calculated the direct and indirect effects of work-time reduction with full or some wage compensation - i.e. with rising real hourly wages. The results of these exercises are summarized in the tables 3 and 4. As in the former tables, the employment effects and the 'employment elasticities' widely differ between the models. Immediately striking are the negative employment effects from a substantial work-time reduction (12.5 per cent realised in 5 years) calculated by the Dutch Vintaf IIIand IV-variants. This means that a reduction of the work-time would result in less employment : a rather unattractive solution. A second striking detail is the fact that not all 'elasticities' are smaller than in the variant where no compensation is provided. In the French DMS-IVvariant more employment results when a work-time reduction is combined with full wage-compensation. The German-Henize-model and the Dutch AMO-K-III-variant yield higher 'elasticities' when (partial) wage compensation is provided by a tax reduction. In general the 'elasticities' vary between the various models as much as with a proportional wage reduction and are lower under the former than under the latter assumptions. The reason for this difference can be found in table 4, where it can be seen that exports and production are considerably diminished, and real hourly labour costs and inflation are raised, resulting in a worse balance of payment position and a further increase of government deficits. The French DMS-IV and Metric-model and the Dutch AMO-K-III variant are again notable exceptions.

Neither the coverage of the work-time reduction in terms of number of workers, nor the magnitude of the reduction can be said to have a decisive influence upon the results that could explain the variety of results within the tables 1 and 3. Other causes have to be found. b. assumptions on capacity- and productivity-effects

The introduction of work-time reduction into the macro-economic models requires two crucial consumptions related to the behaviour of the production-capacity and the labour productivity under influence of the work-time reduction itself. Assuming no loss of productive capacity nor a raise in

Country	Mode1	Volume and type of Reduction and wage compen- sation	Impact	Hypotheses	Year of Impact	No. of Years after intro- duction	To Re at pe	duc en rio	tion d of d	Change in employment as a percentage of total employment	Employme Elastic (result	ent ity 1% reduction)
France	DMS IV	2.5% per year 1982-'85 (+ trend reduction) 3x(-2.5)%-full compen- sation	с	same capacity	1985	4	-	7.	5%	+ 6.1	+	.633
	DMS V	one hour per week 1x(-2.5)%-full compen- sation	e	same capacity	1981	3	-	2.	5%	+ 1.0		.393
	Metric	one hour per week 1x(-2.5)%-full compen- sation	e	same capacity	1981	3	-	2.	.5%	+ 1.5	•	.593
Germany	Henize- II	two hours per week $1x(-5)$ %-full compen- sation by tax reduction	d	same capacity	1981	3	-	5	z	+ 4.2		.840
	IAB	11% through various methods in 6 years	a	same capacity	1985	6	-	11	7	+ 8.9	+	.809
The Nether- lands	Vintaf III	2.5% per year 1979-'83 5x(-2.5)%-full compen- sation	ь	same capacity	1983 1988	5 10	-	12	. 5%	- 1.0 - 2.1	-	.084 .177
	Vintaf IV	2.5% per year 1979-'83 5x(-2.5)% full compen- sation	ь	reduced capacity	1983 1988	5 10	-	12	. 5%	- 1.6 - 2.3	-	.135 .193
	AMO-K II	7% per year 1983-'89 7x(-7)% + wage compen- sation 3% per year	a	reduced capacity	1990 2000	7 17	-	40	7.	+ 47.5* + 38.8*	:	1.188 .970
	AMO-K III	7% per year 1973-'89 7x(-7)% + wage compen- sation by tax reduction 7x (-2)%	a	reduced capacity	1990 2000	7 17	-	40	7.	+ 61.1* + 57.3*		- 1.528 - 1.433
U.K.	Treasury II	two hours per week	d	accommoda- tive mone- tary polic	1981	3	-	5	7.	+ .8		.160
	Treasury III	two hours per week 1x(-5)% - full compen-	d	strict mo tary poli	-  1981 cy	3	-	- 5	7.	+ .2		+ .048

TABEL 3 The Impact of the Reduction of the Working Time Without Proportional Wage Reduction - deviations from basic projections

a = all workers; b = all workers in market sectors; c = all workers except those in agriculture, commerce, real estate, finance and non-market services; d = all employers; e = non-tinancial and non-agricultural enterprises. \* measured in man-year.

Country	Model	Year of Impact	r of Final Demand act					Sal	ari	ies		Account Position (% GDP)						
			Pr	ivate nsumpt.	E	orts	Invest- ments	Pt	ro	oduc- on	Real hour labour costs	lyl	Real income salary <b>per</b> sarner	Consumer Prices	Ba Pa	lance of yments	Govern- ment Budget	
France	DMS IV	1985	-	.4	-	.6	- 3.1	-		.4		+	.5	+ 1.9 <sup>c</sup>	+	2.0	+ 1.2	
	DMS V	1981	+	.1	-	.7	- 1.0	-		.2	+ .9 <sup>d</sup>			+ .6	-	.1		
	Metric	1981	+	.5	-	.6	+ .7	+		.3	+ 1.0 <sup>d</sup>			+ .3	-	.3		
Germany	Henize	1981																
The Nether- lands	Vintaf III	1983 1988		.7 .6		2.6		-	2	.1	+ 1.0 + 1.4		.5	+ 1.8 + 1.0	-	.8 <sup>b</sup> 1.4 <sup>b</sup>	$-1.5^{b}$ -2.8 <sup>b</sup>	
	Vintaf IV	1983 1988	-	.8 .6	-	2.8		-	2	.3	+ .9 + 1.4		.5	+ 1.9 + 1.1	-	.7 <sup>b</sup> 1.4 <sup>b</sup>	$-1.5^{b}_{b}$ -2.6	
	AMO-K II	1990 2000	-+	.3 .3	-+	2.0		-	1	.3	- 2.8 + .5	-+	.3	- 2.0 + 1.3	-	2.0 <sup>b</sup> 4.0 <sup>b</sup>	- 4.5 <sup>b</sup> - 6.5 <sup>b</sup>	
	AMO-K III	1990 2000	-	.3	+	1.8		+	1	.0	- 5.3 + .3	-+	1.3 1.3	- 1.3 + 1.0	+++	4.3 <sup>b</sup> 3.0 <sup>b</sup>	+ 5.8 <sup>b</sup> + .8 <sup>b</sup>	
U.K.	Treasury II	1981						-		.3		+	.9	+ 2.6	+	.1	4	
	Treasury III	1981						-		.6		+	.7	+ 2.4	-	.1	9	

The Secondary Effects of Working Time Reduction Without Proportinal Wage Reduction - deviations from basic projections

TABLE 4

Notes: \* more details see table 11; a = value added of enterprices; b = as a percentage of Net National Income; c = producer prices; d = defined as average hourly salary divided by consumer prices. labour productivity, produce the largest employment effect. However, these assumptions are heroic. Since we know that all economies under study operate far below their full capacity-level (see De Neubourg, 1984, see also tables 6, 7,8) and since we are aware of reactions in the past (see next section), it is very likely that some of this excess-capacity will be left unused due to the reduction of the work-time of workers. It is equally very likely that labour productivity will be raised due to a work-time reduction. Internal reorganisation and the use over more overtime may be more attractive to employers than hiring new employees because of the (hiring- and training)costs involved in the latter, especially for the large group of enterprises confronted with salesproblems (3).

Extremely little empirical information is available to sustain trustworthy estimates on the size of impact of work-time reductions on production capacity and labour productivity. In the post World-War-II period no combination of excess capacity, excess supply of labour, and persistent recession similar to the one we are confronted with now, can be found. As for the production capacity, it can be assumed that its reduction will be at maximum proportional to the work-time reduction (4). Concerning the change in labour productivity, however, no such limit can be thought of. In the past work-time changes were rather the consequence of productivity increases, than their causes. Concrete estimates used in models can therefore be based on nothing but arbitrary judgement and common sense.

These estimates have nevertheless a crucial impact on the estimated employment elasticities as is illustrated by table 5. In that table Drèze (1983) calculated the impact of various assumptions on the employment elasticities of work-time reduction for the Belgian economy. It is clear that the succes of work-time reduction in terms of employment strongly depends on the rate of capacity loss, the compensation ratio

(3) Other reasons may also be responsible for a productivity increase: more leisure time may motivate workers to work harder; absenteeism may be reduced; flexibility may be enlarged and marginal equipment may be suppressed more quickly.

(4) The maximum capacity reduction is realistically somewhat lower since firms operating on a 24-hours-a-day, 7-days-a-week-schedule, can not reduce capacity easily. (= a proxy for productivity gains) and the rate of wage reduction to time reduction. In the most favourable case (no capacity loss, small productivity gain and strict proportional wage reduction) employment elasticity is .9; under the least propitious circumstances (.50 per cent capacity loss, large productivity gain and full wage compensation) employment decline by 1.43 per cent for every per cent of work-time reduction.

#### TABLE 5

Employment Elasticity of Working Time Reduction on the Medium Term - Belgium : Drèze-Model.

wage	capacity	Compen = 0	.9 (a)	rate	Compensation rate = 0.65			
reduction	reduction:	0	0.25	0.50	0	0.25	0.50	
0	No. 12 March	-0.72	-1.12	-1.53	-0.52	-0.97	-1.43	-
0.5		0.09	-0.29	-0.67	0.07	-0.31	-0.69	
1		0.90	0.54	0.18	0.65	0.35	0.05	

 (a) = The employment elasticity according to total production = .9. The left hand part of the table assumes employment compensating for working time reduction to be equal to the observed employment elasticity to total production ex ante (= .9); this means no productivity gain. The right hand part of the table assumes a productivity gain and therefore a lower compensation-rate (.65).
 Source: Drèze, 1983, p.75.

In most of the models discussed previously estimates are produced both under the assumption of capacity maintainance and capacity reduction. From the tables 1 to 4 it can be observed that capacity reduction lowers the employment elasticity with .15 at the average. The assumptions made. on productivity increases differ between the models but are not easy to compare. The Treasury model assumes that 70 per cent of the time reduction will be absorbed by productivity gains; the Henize-model uses 50 per cent and the IAB-model 35 per cent, while Freia assumes only a small increase in productivity. The DMS-, Metric- and Maribel-models use a more sophisticated method taking capital utilization, anticipated demand, realised productivity in the previous years and the 'technically optimal employment given the capital stock' (DMS, Metric), into consideration. Productivity gains reduce the employment-effects of a work-time reduction more in the short run than in the long run in most of the models.

Summarizing what have been said, we conclude that the assumptions on the capacity- and productivity-effects are crucial to estimate employment effects of work-time reductions and explain partly the large differences between the results of the models.

c. specification and time horizon of the models.

The main reason for the fact that some models estimate the employmenteffects of a work-time reduction to be substantial, while others foresee a neglectible or even negative outcome, must be sought in the specification of the models themselves. The specification of the main equations and the direct and indirect linkages accounted for in the models are most important in cushioning the initial gross employment effects. The discussion of the complete models falls outside the scope of this paper; table 6 gives, nevertheless, an idea of the differences in the specification in two important equations. It is remarkable that the three Dutch models (Vintaf, Freia and AMO-K) do not include productivity changes into the wage-equations, in contrast with the others. This may be attributable to the specific, highly centralised, wage formation process in that country, but undoubtly influences the outcome of the model. Social security contributions and inflation have less impact in the other models. The Metric- and AMO-K-models do not account for the profit rate nor the interest rate in the investment-equation, while the Henize-model is clearly of Keynesian inspiration with the anticipated growth of finaldemand as the main variable in that equation.

However, more than the specification of single equations, the global structure of models is responsible for establishing final net-employment effects. Most of the models are not built specifically to calculate the consequences of a work-time reduction. Each model emphasizes specific processes in the macro-economic world : Vintaf clarifies the impact of real wage increases on economic growth and employment via a sophisticated vintage-scrapping procedure; Freia and Treasury emphasizes the 'allpervasive influence' of the government deficits; Henize and Metric are demand-oriented models giving weight to multiplier- and accelerator principles, while AMO-K and DMS have the same inclination but find tensions on the labour market to be important (Maribel is a compromise according to good Belgian traditions). Whatever model is used, it is clear that the

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inherent logic of the models lead to quite different results and must be considered as the main factor explaining the observed differences in employment effects.

A final factor contributing to different estimates is the time horizon of the models. Some are ment as short-time models forecasting only one or few years, while most are medium-term models estimating changes in a 3 to 7 years' span. The AMO-K-model is the only one that try to calculate long-term effects (2000). Different time horizons are important since capacity- and productivity-effects differ on the shortand medium-term : this can be seen from the difference between tables 7 and 5.

Dependent variable	Model	Variable	S			
Real hourly Labour costs		Consumer prices	Tension Labour Market	Productivity Changes	Capacity to pay	Social Security Contributions
	DMS	x	x		x	
	Henize		x	x		
	Maribel	x	x	x		
	Treasury		x	x		
	Vintaf	х				x
	Freia	x				x
	AMO-K	x	х	x		x
Investment		Antici- pated growth final demand	Capacity utiliza- tion	Profit rate	Interest rate	
	DMS	x	x	x	x	
	Vintaf	х	x	х	x	
	Freia	х	х	х	x	
	Maribel	х	x	x	x	
	Henize	x				
	Metric	х	x			
	AMO-K	x	x			and the second second

#### TABLE 6

Specification of Key-Equations in the Models

Employment Elasticity of Working Time Reduction on the Short-Time-Belgium : Drèze-Model

	Capacity reduction:	0	0.5	1	
Wage reductio	on				
0	Contraction appeal	0.24	- 0.50	- 0.35	
0.5		0.27	0.01	- 0.25	
1		0.30	0.08	- 0.15	

Source: Drèze, 1983, p.75.

Working time reduction increases employment ?

The ultimate question "Will a reduction of the work-time increase employment" is very difficult to answer on the basis of estimates by means of macro-economic models. "It all depends, Sir", seems to be most accurate reply. In the first place it depends upon the logic and the time horizon of model used. Secondly, empirical scarcely justifiable assumptions on the behaviour of production capacity and labour productivity play a crucial role. Wage compensation tend to reduce the employment effects, although the two models that introduce partial wage-compensation by means of a tax reduction yield better results compared to the situation where wages are reduced proportionally to the time reduction. The number of workers involved does not matter very much as long as it is large; the magnitude of the reduction and the pace of its introduction finally are unimportant factors, unless a radical work-time reduction is introduced.

In general the employment effect of 1 per cent work-time reduction must be situated between .2 and .5 per cent (although it should be noted that the Dutch official Vintaf-and Freia-models produce elasticities far below .2 while the German Henize- and the French Metric-models produce elasticities far above .5). Whether work-time reducing policies consequently are succesful strategies to combat current hyper-unemployment can not be answered on this ground alone. Contemplation on the unemployment-effect is therefore necessary: this will be the subject of the next section.

TABLE 7

One remarkable model-outcome, however, remains to be discussed. The Dutch AMO-K-model proposing a drastic reduction of the work-time from 40 hours a week to 24 hours a week in 7 years, yields after 7 years an employment growth of about 50 per cent - quite a succes. Another, Belgian model enters the discussion on this point. Tamas Palasty launched the equally radical plan to lower daily work-time to six hours a day, without any wage reduction under the condition of a general 12-hours production-day. His plan contains more than a simple reduction of the work-time and is difficult to disentangle in few sentences (5). Besides the elements already mentioned it cuts overall costs for firms by increasing capital productivity, shortening the pay-back period of investment, elimination of profit-taxes and drastic lowering of social security contributions. Moreover, government deficit decreases and disappears on the long term. Despite the fact that the Palasty-plan is illustrated with a lot of empirical data and elaborated examples, it is not a macro-economic model.

The already quoted Dutch AMO-K-model equally calculated the effects of a combined work-time reduction (-40 per cent) and an increase in production time (+ 20 per cent), however, without the other elements of the Palasty-plan. The results of that exercise are discouraging : economic growth is smaller than is the case without policy-changes or with work-time reduction alone, employment is nearly 60 per cent higher than in the basic projection but not significantly different from the effect of work-time reduction alone and the government deficit is on the medium term smaller but in the long run (year 2000) higher than in the basic projection.

The impact on the government budget is equally the widely doubted projection in the Palasty-plan and seems to be the Achilles heel of policy options with production-time increases (6). There is, however, a more fundamental problem of a social nature. Both the Palasty-plan and the drastic work-time reduction policy proposed in the AMO-K-model require

- (5) An excellent summary is found in Palasty, 1984 and in De Ketelaere, Van Bellingen, 1984.
- (6) The Dutch Women Liberation movement also favours the combination of working time reduction and production-time increases.

quite overwhelming social changes. The most important social consequences of the plan are the dramatic rearrangement of working- and leisure time (a 24hour workweek stands for 3 current full-time days), the drastic changes in income-distribution and incomes (-30 per cent in 7 years) and the necessary increase of total labour market participation. The AMO-K-model calculated that the latter must be more than 66 per cent in 1990 (of the total population at working-age). Since they project the total unabled population plus the full-time students to sum op to 2.15 million, this means a 80.5 per cent participation of the remaining population. More concretely this requires that The Netherlands, on this moment the country with the lowest labour market participation rate of the nine countries under study becomes the country with the highest labour market participation rate within a 7-years time-span (De Neubourg, 1983). This implies more specifically that the labour market participation of married women (17.6 per cent in 1977) raises to 70 per cent or more (Sweden 1979 = 61.5 per cent). It is difficult to foresee the social impact of that sudden change.

However, we learn from the AMO-K-model and the Palasty-plan that a drastic reduction of the work-time whether or not combined with other policy measures, promises to have a more clearcut positive effect on employment. A detailed study of the effects of gradually increasing reductions by means of different models for one economy, is justified and may inform us on a policy-path that maximizes the employment effects and minimizes the economic and social shocks.

#### What about unemployment ?

Work-time reduction is considered in the first place to cushion overt unemployment. The unemployment-effects estimated in the models discussed previously are shown in table 8. The medium-term effects are generally not larger than -2.0 per cent. The Dutch Vintaf-model shows a rise in unemployment caused by work-time reduction with wage compensation. Large decreases in unemployment are calculated by the partial SCP- and IAB-models and by the AMO-K-model assuming a radical work-time reduction. Besides the latter case, the effect of work-time reduction must be considered rather small.

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Country	Model*	Year	Change in unemployment as percentage of total labour force
and the second	wage reduction		
Belgium	Maribel	1986	- 2.3
France	DMS I	1985	- 2.2
	DMS II	1981	5
	DMS III	1981	3
Germany	Henize	1981	
The Nether-			
lands	Vintaf I	1988	- 1.2
	Vintaf II	1988	- 1.1
	Freia I	1986	8
	Freia II	1986	- 4.0
	AMO-K-I	1990	- 23.6
	SCP	1979	- 8.7
U.K.	Treasury	1981	- 1.0
120141-06-20-9	wage	night that	and the second of the second
	compensation		
France	DMS IV	1985	- 2.0
	DMS V	1981	4
	Metric	1981	6
Germany	Henize	1981	
	IAB	1985	- 5.2
The Nether-			
lands	Vintaf III	1988	+ 1.1
	Vintaf IV	1988	+ 1.5
	AMO-K-II	1990	- 19.5
	AMO-K-III	1990	- 24.6
U.K.	Treasury II	1981	6
	Treasury III	1981	2

Estimates of the Impact of Work-Time Reduction on Unemployment : Deviations from Basic Projections

TABLE 8

Note: \* for details see table 1 and table 3.

The calculated effects, however, must be regarded as overestimated for various reasons. Firstly, most of the models do not have an endogenous labour supply function; this means that the unemployment effect is calculated under the assumption that a work-time reduction does not generate a higher labour supply. However, it is well-known that the real unused stock of labour resources is considerably larger than the registered unemployment (De Neubourg, 1983). This has to be attributed to the discouragementeffect and to the fact that not all unemployed are registred (because they are not entitled to receive a benefit). The potential expansion and contraction of the labour force can be illustrated empirically, showing that a sixth of the persons <u>not</u> in the labour force during the last quarter of 1975, worked for some time during the preceding 12 months; about 700.000 were squeezed out because of the slack in the economy (data regarding the U.S.A.). Over the same period in 1975, 4.3 million persons (out of 59 million not in the labour force) reported that they wanted jobs but did not look for them for a variety reasons; another 1 million because of discouragement over job prospects (Shiskin, 1976). It is clear that a work-time reduction would activate a part of this potential non-registered labour force.

On top of this effect, an increase of labour supply has to be expected due to the fact that real income per salary-earner diminishes when wages are reduced proportionally to the work-time reduction (additional workers). Siegers estimated recentely the combination of the encouragement- and the additional-worker effect to absorb about 30 per cent of the employment increase by a rise of labour supply among married women in the Netherlands (7) (Siegers, 1983).

Another consequence of decreasing real income per salary-earner that offset the unemployment effect of a work-time reduction is the likely increase of people taking second jobs and moonlighting. Bronfenbrenner and Massin are not very optimistic about these effects and conclude in an empirical study for the U.S.A., that the unemployment-effects of a worktime reduction will be offset by supplementary moonlighting and that there are circumstances in which the offset will exceed the primary effect (Bronfenbrenner, Massin, 1967).

(7) His conclusion that the additional-worker effect has nearly no influence, seems to be rather misleading, since he usescross-section-data to estimate the effects. These data have two important short comings. They do not account for the cummulative effects of succeeding years with diminishing real wages and the supplementary income reduction imposed by work-time reduction. Secondly, they do not reflect the effect of a forced income reduction imposed on the mass of the workers (in contrast with a chosen income-reduction by part-time workers only). His results are likely to underestimate the observed effects.

A third phenomenon that may affect the unemployment-effect of a work-time reduction concerns qualitative discrepancies on the labour market. It is true that the unemployed labour force has another composition than the stock of employed people. Whether this leads to the occurence of matching-problems depends on the mobility of workers and the flexibility of employers. Workers' mobility and employers'flexibility tend to be larger than generally is assumed (Muysken, a.o., 1982) : therefore the impact of this problem should be estimated rather small from a macro-economic point of view.

To conclude this section on the expected impact of a work-time reduction on the unemployment rate, it can be said that the figures in table 8 are likely to overestimate the positive effect. Except in case of a radical work-time change (AMO-K), the unemployment rate will diminish only marginally by say 1 per cent. It is important to note that this does not diminish the positive impact that a work-time reduction may have on the more equal distribution of paid and unpaid work between individuals. This purpose is served even if the unemployment effect would be absorbed completely by an additional (not registered) supply of labour. Making hidden unemployment manifest can even be said to be a positive feature of work-time reductions. Those, however, who hope that a worktime reduction would lower registered unemployment (and the related costs) significantly, should be aware of the countervailing forces discussed above

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#### What a difference reduced work-time makes (in the Netherlands)

From the comparison of the models we learned that the employment effect of a work-time reduction is difficult to estimate. The unemployment effect would be small and even be lowered by adjustment processes not accounted for in the models. Experiences in the past and recent experiments in Belgium and France do not justify a great optimism about the expected effect. This leads to the conclusion that a work-time reduction can not be the panacea for the current economic problems. It should be regarded rather as the magic formula of a dubious magician. A radical reduction of the work-time may provide a serious contribution to redistribute unemployment. Since there is, however, only one model that estimated the effects of this kind of policy, the results should be interpreted with great care. Moreover, the social consequences of a radical work-time reduction are overwhelming and make its realisation troublesome.

Does all this mean that work-time reduction should be rejected as a policy instrument? I do not believe it should, but the likely reality of its impact should be faced. It is no final solution to the problems nor a surrogate for a considered economic policy; it is rather an instrument of social policy that redistributes the burden of a persistent recession.

There are, nevertheless, three good reasons that plea for introducing work-time related policy measures:

- a. The first reason are the current unemployment rates.
- b. The second reason forms the expectation about the future unemployment rate. The OECD recently forecasted that in 1985 the unemployment rate in the Netherlands would be 19 per cent against 12 per cent for the OECD-average. The special (future) position of the Netherlands is partly to be explained by the (future) behaviour of the labour force. The Dutch labour force is growing very fast compared to the other European countries. Its growth has accelerated after 1973. This is partly attributable to purely demographic changes. The growth of the population at working age in the Netherlands outnumbers that of all other European countries. The other factor responsible for an accelerated labour force growth in the Netherlands is the female participation rate, which is situated far below the position of the same rate in other countries, although it increased in the seventies and

accelerated in the eighties. It is to be expected that it will climb to international standards (between 50 and 60 per cent) in the decade to come: this will push the labour force growth further up.

c. The third reason why the introduction of work-time policy measures is to be considered relates to the expected growth of labour productivity due to accelerated technical progress. No hard figures are available but Austrian unemployment is estimated to increase from 2 per cent in 1980 to 10 per cent in 1990, if in that year all technological improvements known in 1980 would be introduced (quoted by Leontieff, 1982).

Given the information gathered in this year, the impact of work-time reducing policy measures upon employment and unemployment is maximized - if a substantial, may be even radical work-time reduction is introduced combined with a tax-reduction compensating falling nominal wages and avoiding deflation;

 if annual working time is affected rather than weekly working time; this implies freedom of employers and suppliers to choose the most suitable form;

- if work-time reduction is an integral part of a broader recovery policy. If it turns out that we have to choose in the near future between social disruption caused by unemployment or social disruption stemming from a radical work-time reduction, the latter should be favoured, since then we may be able to manipulate its extent and its form. BIBLIOGRAPHY

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