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**CONSEQUENCES OF TAXING LABOUR
IN A SMALL OPEN ECONOMY**

H. Bogaert, T. de Blolley, J. Verlinden



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H. Bogaert
T. de Biolley
J. Verlinden
Planning Bureau, Brussels

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I. Introduction

For many years the taxation of labour by means of the employers social security contributions has been an important issue of Belgium's economic policy.

Throughout the sixties and the beginning of the seventies, the economy was growing at a high level of employment and an impressive social security network has been built, largely financed by the employers' contributions based on the wage bill. After the first oil shock the economy developed a vicious circle: lack of growth and employment provoked a growing public deficit, which in turn induced the Government to increase taxation, mostly on the labour factor, by increasing periodically the rate of the employers' contributions.

In the beginning of the eighties repeated notices by the Planning Bureau and university instances pointed out to the negative effects of the patronal contributions on competitiveness and employment, and led to the so-called 1981 Maribel operation (named after the Planning Bureau Model used to prepare it): a decrease of the employers' contributions on the manual workers wages (these were perceived as belonging mostly to the sector of the economy open to international competition) equivalent to roughly 1 % of the GDP and compensated by an equivalent rise of the VAT.

In 1984, faced with an unsustainable public deficit, the Government introduced the "index jumps" which had as effect to increase by 6 % the rate of the employers' social security contributions in three annual steps of 2 % each. Most Belgian economists felt that this way of curing the public finances was unduly destructive in terms of employment, and even self-defeating in terms of public finances, and in 1987-88 a representative group of professional economists issued a statement asking for a new Maribel operation of a larger scale than the preceding one.

The present paper does not pretend to encompass all the aspects of this question but will focus on the analysis of the consequences of variations of the rate of employers's social contributions on some key macroeconomic variables. This will be done with the help of the Maribel II model of the Planning Bureau. The main purpose of the exercise is to show the supplement of information and understanding brought by disequilibrium models.

The paper is organised as follows:

First a short presentation of the Maribel II model with some attention given to the wage equation, obviously a crucial part of any model used to deal with the taxation of labour.

Various simulations will then be analysed. It will be shown that the consequences of an increased taxation of the factor labour depend strongly on the long-term reaction of the real wages on the one hand, and on the probability that the enterprises are facing demand or supply constraints. We will therefore present "variants on variants" to illustrate the responses of the economy in different contexts.

Finally we shall summarize the main findings and suggest some further improvements.



II. Short description of Maribel II.

1. Main features of the model

Maribel II is a complete disequilibrium model of the Belgian economy. The still experimental version of the model, which counts around 260 equations, is presently in use for research inside the Planning Bureau.

The model has been extensively described in a Planning Paper¹. The version used for the present paper differs slightly from the publication, some updating and improvements having been done in the last months. Here we briefly describe the core of the model with some insistence on the wage equation.

Disequilibrium econometric models are based on the fundamental assumption that if, for some reason, relative prices and wages are rigid, then quantitative constraints are taken into account in the rational agents' optimization plans. This leads to the existence of so-called short-term fixed price non-walrasian equilibria².

The main characteristic of these non-walrasian equilibria is that they are situations in which observed transactions do not coincide with the interaction of notional supply and demand, i.e. do not clear the markets. As the agents who perceive a quantitative constraint on one market choose to react by restricting their supply or demand on another market rather than modifying the price at which they are prepared to operate transactions, effective supply and demand may differ from notional supply and demand which are therefore unobserved.

These assumptions are convenient because they permit to explain short-term disequilibrium situations, such as the patent imbalances on the labour market of most European countries, without having to accept that they result from voluntary choices of the economic agents, as postulated by the classical theory. However the cost of incorporating disequilibrium theory in macroeconomic models is high because it implies the modelisation of the unobserved notional supply and demand functions and the estimation of a complex relation between aggregate effective transactions and aggregate supply and demand quantitative restrictions.

These problems have been addressed to with success in the now well known work of Sneessens and Drèze³. The modelisation of the productive sector of Maribel II is largely inspired by their pioneering model.

Hereafter we shall briefly describe the main characteristics of the goods and services market and of the labour market in the productive sector of the model. The productive sector, also referred to in the rest of the text as the endogenous sector of the economy, embodies all the enterprises. Its aggregate value added is equivalent to G.D.P. with the exclusion of the values added of the state sector, the residential sector and the domestic servants sector.

¹ **Bogaert, J., de Biolley, T., Verlinden, J.:** *A Disequilibrium Macroeconomic Model of the Belgian Economy: the Maribel II Model of the Planning Bureau*, Planning Bureau, 1989

² For a theoretical exposition of the foundations of disequilibrium models see:
Cuddington, J.T., Johansson, P.O., Löffgren, K.G.: *Disequilibrium Macroeconomics in Open Economies*, Basil Blackwell, Cambridge, 1984.
Picard, P.: *Théorie du Déséquilibre et Politique Economique*, Economica, Paris, 1985.

³ **Sneessens, H., Drèze, J.:** Discussion of Belgian Unemployment Combining Traditional Concepts and Disequilibrium Econometrics, *Economica*, vol. 53, supplement, p.89-120.



Table 1 presents the model in a nutshell and hereafter we comment it.

Table 1: *The model in a nutshell*

Goods and services market

Supply

Technical coefficients

Labour $A^{-1} = f_a(w/p)$

Capital $B^{-1} = f_b(l/p, p_e)$

Production capacity

Capital stock:

$$\dot{K} = f_k[(B - B^* \phi), B^*, ZP, \zeta]$$

Production capacity

$$YP = B \cdot K_{-1}$$

Full employment output:

$$YS = A \cdot LS$$

Demand

Absorption

$$ABS = C + G + I$$

Notional exports

$$XD = X - XND = f_x(QW, \Xi_x)$$

$$XND = g_x^-(ZP)$$

Notional imports

$$MD = M - MND = f_m(QT, p/p_m)$$

$$MND = g_m^+(ZP)$$

Distributed output

$$QT = ABS + X$$

Notional demand

$$YD = ABS + XD - MD$$

Effective transactions

$$YT = [YD^{-\rho} + YS^{-\rho} + YP^{-\rho}]^{-1/\rho}$$

and

$$YT \equiv ABS + X - M$$

so that

$$YD - YT = MND - XND$$

Tension factors

Degree of capacity utilisation

$$ZP = c \cdot YP / YT$$

Degree of demand pressure

$$ZD = YD / YT$$

Table 1: The model in a nutshell (continuation)

Labour market

Supply

$$LS = N - LEXO - ULD$$

Demand

Classical employment $LP = A^{-1} \cdot YP$

Keynesian employment $LD = A^{-1} \cdot YD$

Effective transactions

Theoretical effective employment

$$LT^* = [LD^{-\rho} + LS^{-\rho} + LP^{-\rho}]^{-1/\rho}$$

Short term labour productivity:

$$A' = YT/LT = f_1 (w/p, A'_{-1}, ZP, \dots)$$

Wages and prices

Wages

$$\dot{w} (1 - t_s) = f_w (\dot{p}_c, LT/LS, \Omega)$$

Domestic prices

$$\dot{p}_1 = f_p ([a ULC + (1 - a) p_m], ZD), \quad i = C, I, G, \dots$$

Export prices

$$P_x = f_{px} (P_w)$$

Profitability

Pure profit rate:

$$\zeta = R_k - (RR - \dot{p}_1)$$

Export profitability:

$$E = P_w - [(1 - a) [b APC + (1 - b) p_m]$$



Goods and services market

Supply

The modelisation of the aggregate supply is based on the following assumptions:

- in the long-run production factors are substitutable along a Cobb-Douglas type technology;
- in the short-run technical coefficients are relatively rigid.

If we call A and B the technical productivities of respectively labour and capital, depending on factors and product relative prices ¹, we are able to define the short-term production capacity (YP) and full employment output (YS) :

$$YP = B \cdot K_{-1}$$

$$YS = A \cdot LS$$

with

K : the capital stock measured at the end of period;

LS: the supply of labour.

The modelisation of the capital accumulation has been based on the following assumptions:

- Firms realise productivity investments in order to adapt the technical coefficients to variations in the relative factor prices.
- Firms increase their production capacity when they anticipate an expansion of demand they will not be able to meet with their available capacities.
- Firms unable to satisfy the present demand because of capacity constraints will invest in order to lower or eradicate the constraint.

Developments of these hypotheses, explained in the Planning Paper describing the model, lead to the following specification:

$$\dot{K} = f_k \{ (B - B^* \phi), B^*, ZP, \zeta \}$$

where $B^* \phi$ is the long-term technical capital productivity corrected for energy price changes, and ζ the pure profit rate defined as the difference between the real after tax rate of return on investments in real assets and the real after tax interest rate.

$$\zeta = R_k - (RR - \dot{p}_I)$$

Demand

The aggregate supply of goods and services is the sum of domestic and imported supply and corresponds to the aggregate distributed output (QT) or to the addition of the various final demand categories, absorption plus exports.

In a small open economy like Belgium, where an effective liberalization of goods and services in international transactions has been achieved for long, it is reasonable to assume that

¹ In order to take account of the acceleration of the capital obsolescence consecutive to rising energy prices, the capital productivity depends on energy prices.

domestic absorption cannot be constrained by limitations of domestic supply. Quantitative supply constraints have therefore spill-over effects on the international trade flows. To handle these spill-over effects we followed the approach of Entorf et al.¹

The various components of absorption will not be detailed here, they are endogenised in the traditional way.

Notional or structural demand is an accounting identity:

$$YD = ABS + XD - MD$$

where ABS is the domestic demand of consumption and investment supposed to be always satisfied, while XD and MD are the structural or notional exports and imports, i.e. the exports and imports that would be demanded, given existing relative prices and prevailing technical coefficients, in the absence of quantitative supply constraints.

Notional imports and exports are unobserved variables and the effects of rationing have been estimated in the effective imports and exports equations.

On the import side it is supposed that excess demand for domestic products induces a shift in imports; therefore the non structural imports (MND) depend on the degree of capacity utilisation (ZP) with a positive first derivative:

$$MND = g_m^+ (ZP)$$

Effective imports (M), the difference between structural and non structural imports, depend on income and relative prices as in the textbooks. The income variable is total distributed output (QT). The import equation is estimated in the form:

$$MD = M - MND = f_m (QT, p/pm)$$

On the export side the spill-over effects take the form of a shift of exports towards domestic sales when the local capacities are under pressure. Therefore

$$XND = g_x^- (ZP)$$

and the estimated export equation takes the form:

$$XD = X - XND = f_x (QW, \Xi)$$

with QW the potential market for Belgian exports and X the export profitability. The economy is small and very open so that export prices tend to align fully on international prices. Export profitability is measured as the difference between export prices and export producing costs, i.e. a linear combination of average unit domestic production costs (capital and labour) and import costs:

$$\Xi = P_w - [b APC + (1-b) p_m]$$

¹ Entorf, H., Franz, W., König, F., Smolny, W.: *The Development of German Employment and Unemployment: Estimation and Simulation of a Disequilibrium Macro Model*, University of Mannheim and University of Konstanz, Mimeo, March 1989.



Effective transactions

The consequence of these assumptions of short-term rigidities in the relative price adjustments is that at any period the technical coefficients and the available quantities of factors are given and, therefore, effective production is limited, either by a deficient demand, by a lack of profitable equipment, or by an insufficient or inadequate supply of labour.

On each micro market any of these constraints is binding. It is very unlikely that all firms will be submitted simultaneously to the same type of constraint, and, as in most recent disequilibrium models, we aggregate the heterogeneous individual situation with a CES function type aggregator proposed by Lambert¹ :

$$YT = [YD^{-\rho} + YP^{-\rho} + YS^{-\rho}]^{-1/\rho}$$

where $\rho > 0$ is a parameter implying the simultaneous existence at the aggregate level of an insufficient demand on some micro-markets and of unused production capacities (both in terms of available capital and labour) on others. A small ρ corresponds to a situation where there is a wide dispersion of the equilibrium prices on the micro-markets with respect to the general price level. We should note that:

$$YT \leq \min(YD, YP, YS)$$

The preceding equation leads to an interesting decomposition. Raising both sides at the power $-\rho$ and rearranging terms leads to

$$\begin{aligned} 1 &= (YD/YT)^{-\rho} + (YS/YT)^{-\rho} + (YP/YT)^{-\rho} \\ &= \Pi_d + \Pi_s + \Pi_p \end{aligned}$$

where the Π_i are the proportions of enterprises facing each type of supply or demand constraints.

We also note that in an "equilibrium" situation when all enterprises are facing each constraint with the same probability, i. e. when $\Pi_d = \Pi_s = \Pi_p$, we have that

$$(YD-YT)/YD = (YS - YT)/YS = (YP-YT)/YP = 1 - 3^{-\rho}$$

This expression defines the structural degree of inutilisation of the production factor (and the structural degree of excess demand), or the global degree of mismatching in the economy.

Finally, as the CES aggregator is a linear homogeneous function it leads to the following decomposition² :

$$dYT = (\partial YT/\partial YD) \cdot dYD = (\partial YT/\partial YS) \cdot dYS = (\partial YS/\partial YP) \cdot dYP$$

and

¹ Lambert, J.P. : *Disequilibrium Macroeconomic Models. Theory and Estimation of Rationing Models Using Business Survey Data.*, Cambridge University Press, 1988.

² See Drèze, J.: *European Unemployment: Lessons from a Multi-Country Econometric Exercise.* Mimeo. CORE, Louvain-la-Neuve, 1989



$$dYT / YT = \Pi_d \cdot dYD / YD + \Pi_s \cdot dYS / YS + \Pi_p \cdot dYP / YP$$

The rate of growth of the effective output is therefore a linear combination of the rate of growth of the structural demand, the full employment output and the production capacity. The weights are the proportions of regimes.

Tension factors

Two tension factors can be derived.

The degree of capacity utilisation:

$$ZP = c \cdot YP / YT$$

The coefficient c is simply a scaling factor used to level YP/YT with the degree of capacity utilisation of the National Bank which is introduced in the estimation of the short-term technical coefficients equations as well as in the imports and exports equations.

The degree of demand pressure is

$$ZD = YD / YT$$

Labour market

Supply

The labour supply is the active population minus the employment of the exogenous sector (which is therefore supposed to be priorly served in case of labour supply rationing), and minus the long duration unemployed (unemployed for two years or more). It was found that the exclusion of the long duration unemployed improved significantly the estimation results of all equations involving the labour supply, in particular the wage equation and the labour hoarding equation.

As long duration unemployment cannot be considered as irremediately excluded from the labour force, the process of formation of this kind of unemployment as been modelised.

Demand

Exactly as on the goods and services market, several potential employment situations exists, given the short-term rigidities.

The classical employment is the potential employment required to operate the available production capacity at the prevailing labour productivity, regardless of demand:

$$LP = A^{-1} \cdot YP$$

and the keynesian employment is the potential employment necessary to satisfy the existing structural demand:

$$LD = A^{-1} \cdot YD$$

Effective transactions

Theoretical effective employment is obtained by aggregating the potential employment in a way perfectly parallel to the determination of transactions on the goods and services market:

$$YT \cdot A^{-1} = [(YD/A)^{-\rho} + (YP/A)^{-\rho} + (YS/A)^{-\rho}]^{-1/\rho}$$

giving



$$LT^* = [LD^{-\rho} + LP^{-\rho} + LS^{-\rho}]^{-1/\rho}$$

LT^* is used because the effective theoretical employment may differ from the observed labour demand due to the labour hoarding process.

The apparent short-term productivity equation is then:

$$A' = YT / LT = f_1 (A^*, A'_{-1}, ZP, \dots)$$

It is as a partial adjustment on the long-term technical productivity, the speed of adjustment being influenced by the degree of capacity utilisation.

Wages and prices

The wage formation process will be analysed in detail in the next section; it leads to a Phillips curve with the growth of the real wage rate depending on the ratio of demand to supply in the labour market and on the unemployment allowance.

The equation explains the wage cost rate excluding social security contributions of the employers.

Under the assumptions of imperfect competition final demand prices are obtained by fixing a mark-up on the average unit production costs. The mark-up is a function of the rate of structural to effective demand.

Export prices, as it has been said, align on world prices.

The value added deflator is obtained by identity.

2. The wage equation

The wage rate determination follows the approach of the trade union models developed by McDonald¹ and Wyplosz². The main features of this model are:

- the trade unions, acting as a monopoly on the labour market fix the wages knowing the demand for labour by the enterprises;
- firms fix the level of employment.

The trade unions maximize the following function:

$$(1) \quad U = (LT/LS) \cdot u(W) + \frac{LT - LS}{LS} \cdot u(\Omega)$$

where LT/LS and $(LS-LT)/LS$ represent respectively the employed and unemployed fractions of the labour supply. The utility level of the workers is a weighted average of the utility derived from having a job and the level of the wage attached to it, $u(W)$, and the utility derived from the unemployment allowance, $u(\Omega)$, obtained by those who have no job.

Maximizing (1) subject to the demand of labour function of the firms leads to the following first order condition for the wage rate:

¹ **McDonald, I. and Solow, R.:** Wage bargaining and employment, *American Economic Review*, 1981, vol. 71 n.5, p.896-908.

² **Wyplosz, C.:** La France en 1986: bilan et perspectives macro-économiques, *Revue Economique*, volume 38, n.3, mai 1987, p. 677-702.



$$\frac{\partial LT}{\partial W} \cdot \frac{W}{LT} \cdot \frac{u(W) - u(\Omega)}{u(W)} + \frac{W}{u(W)} \cdot \frac{\partial u(W)}{\partial W} = 0$$

The solution of this equation gives the wage rate W^* , considered as optimal from the trade unions' point of view. If the utility function $u(W)$ is characterised by a constant relative risk aversion we have that $\ln u(W) = \xi + \gamma \ln W$ and, after approximation, reduce to

$$\frac{d \ln LT}{d \ln W} \cdot \left[1 - \left(\frac{\Omega}{W^*} \right)^\gamma \right] + \gamma = 0$$

i.e.

$$(2) \quad W^* = \Omega \left[1 + \gamma / (d \ln LT / d \ln W) \right]^{-1/\gamma}$$

$$(3) \quad W^* = \Theta \Omega$$

Equation (4) shows that the wage target of the trade unions is a function of the unemployment allowance Ω . Θ is greater than 1 and depends on the elasticity of employment with respect to the wages. In a disequilibrium model this elasticity differs according to the type of rationing the firms are facing, and in particular it depends on the proportion of firms which are in a situation of excess demand with respect to the supply of labour,

$$\begin{aligned} d \ln LT / d \ln W &= d \ln (YT/A) / d \ln W \\ &= \frac{d \ln [(YP/A)^{-\rho} + (YS/A)^{-\rho} + (YD/A)^{-\rho}]}{d \ln W} \\ &= \frac{d \ln YP}{d \ln W} \cdot \Pi_p + \frac{d \ln YS}{d \ln W} \cdot \Pi_s + \frac{d \ln YD}{d \ln W} \cdot \Pi_d - \frac{d \ln A}{d \ln W} \end{aligned}$$

as

$$\begin{aligned} \frac{d \ln YP}{d \ln W} &= \frac{d \ln B}{d \ln W} + \frac{d \ln K}{d \ln W} = 0 \\ \frac{d \ln YS}{d \ln W} &= \frac{d \ln A}{d \ln W} + \frac{d \ln LS}{d \ln W} = \eta_3 + \eta_1 \\ \frac{d \ln YD}{d \ln W} &= \eta_2 \end{aligned}$$

we have that

$$\begin{aligned} \frac{d \ln LT}{d \ln W} &= \eta_1 \cdot \Pi_s + \eta_2 \cdot \Pi_d + \eta_3 \cdot (\Pi_s - 1) \\ (4) \quad \frac{d \ln LT}{d \ln W} &= \eta_2 \cdot \Pi_d - (1 - \Pi_s) \cdot (\eta_1 + \eta_3) + \eta_1 \end{aligned}$$

$\eta_1 \geq 0$ is the supply elasticity of labour with respect to the wage rate;

$\eta_2 \leq 0$ is the demand elasticity of goods and services with respect to labour (competitiveness effect);



$\eta_3 \geq 0$ is the elasticity of the labour productivity to the wage rate.

Substituting (4) into (5) we obtain the expression of the target wage rate:

$$\ln W^* = \ln \Omega - \frac{1}{\gamma} \ln \{ 1 + \gamma \cdot [\eta_2 \cdot \Pi_d - (1 - \Pi_s) \cdot (\eta_1 + \eta_3) + \eta_1]^{-1} \}$$

giving by approximation:

$$(5) \quad \ln W^* = \ln \Omega - [\eta_2 \cdot \Pi_d - (1 - \Pi_s) \cdot (\eta_1 + \eta_3) + \eta_1]^{-1}$$

Equation (6) gives the equilibrium level of the wages provided the trade unions have a perception of the elasticities η_1 and of the disequilibrium situations on the goods and services and the labour markets. If they perceive only the short-term technical coefficients, η_3 is zero and the wage rate they will claim will be:

$$(6) \quad \ln W^* = \ln \Omega - [\eta_2 \cdot \Pi_d + \eta_1 \cdot \Pi_s]^{-1}$$

and only the constraints on the supply of labour and competitiveness will intervene in the wage rate which maximizes their utility function.

If the supply of labour is inelastic in the short-term, $\eta_1 = 0$, an hypothesis common to many macro-econometric models with exogenous active population, the desired wage rate becomes:

$$(7) \quad \ln W^* = \ln \Omega - [\eta_2 \cdot \Pi_d - (1 - \Pi_s) \cdot \eta_3]^{-1}$$

and, finally, if the only non zero elasticity is that of the labour productivity, we get:

$$\ln W^* = \ln \Omega - [(1 - \Pi_s) \cdot \eta_3]^{-1}$$

$$(8) \quad \ln W^* = \ln \Omega - \frac{1}{\eta_3} \cdot \left[\frac{LS-LT}{LS} \right]^{-\rho}$$

These developments on the wage equation call for the following remarks:

- Whatever the disequilibrium situation, there exists a stable short-run wage rate level: this wage rate is not a walrasian equilibrium wage rate. According to the type of disequilibrium the wage rate can be higher or lower than would be required to restore a general equilibrium position.
- The natural wage rate results from the wage equation; it is conditional to a stable disequilibrium situation.

Up to now the best estimation results have been achieved on the basis of equation (9), i.e. a restriction of the general form (6) implying Π_1 and $\Pi_2 = 0$.

Wages in the private sector are fully indexed, though the full indexation takes two years due the present indexation system. The increase in wages is also explained by the level of what could be called the labour utilisation rate, i.e. the ratio of employed over the labour supply for the endogenous sector all in full time equivalents. An increase in this rate moves wages up. Finally, the unemployment allowance term proved very significant.

The fact that the wage rate exclusive of employer's social security payments is the dependent variable implies that a change in this rate of contribution will have a full and immediate effect on the wage cost rate. It has been tried without success to incorporate the employer's social security tax rate and the direct income tax rates in the estimation.

In the retained equation, the labour utilisation rate in equilibrium is only dependent on a constant and the real minimum wage :

The estimation results are presented in table 2

Table 2: Wage cost rate for employers in the private sector

a. Equation

$$dln [W(1-ts)] = \alpha + \beta dln P_c + (1-\beta) dln P_{c-1} - \gamma \ln \frac{LT}{LS} + \delta \ln (\Omega/W_{-1})$$

b. Definitions of the series

W Wage cost rate in the private sector
 ts Rate of social security employer's contributions
 P_c Private consumption price
 LT Effective employment, full time equivalent
 LS Labour supply addressed to the private sector
 Ω Wage cost equivalent of the net unemployment allowance

c. Parameter estimates

		Coefficient	Standard error	t-stat
Short term indexation	β	0.994	0.142	7.0
Phillips term	γ	0.448	0.053	8.4
Unemployment allowance	δ	0.068	0.014	4.9
Constant	α	0.097	0.008	12.0

$\bar{R}^2 = 0.90$ DW = 2.06 S.E.E. = 0.011

Estimation period : 1961-1986
 Estimation method : Three stages least squares with equation of business investment, government investment, residential investment self employed remuneration and private wage rate.



III Simulation of an increase in the employers' social security contributions rate

In this simulation the rate of the employers' social security contributions has been increased from 1989 onwards by 3.2 %¹. This represents the necessary change in the rate to increase, a priori and all other things remaining equal, by 58.7 billion BEF, i.e. 1 % of the GDP the amount of the social security contributions in 1989.

Detailed results appear in table 3.

1. Evaluating the differential impact of a change in the employers' social security rate in different demand and supply situations

a. Mechanical effect of a change in the contribution rate

Chart 1 provides a simplified representation of the path of the initial impact of a variation of the employers' social security contributions through the model.

The first effect is a rise in the nominal labour cost, which is 3.2 % in the present simulation. This rise in the nominal labour cost affects the final demand prices on the one hand, the real labour costs on the other hand.

The increase in the rate of social security contributions has a direct mechanical repercussion on the nominal labour cost. In the present simulation this amounts to an increase of 3.8 % of the wage cost rate and of the macroeconomic labour cost (including wage paid labour and self employed remunerations) which is relevant in the model. This affects two key variables: prices and labour productivity which will be discussed separately in order to disentangle the problems.

¹ The rate of social security contributions is computed in the model with reference to the total wage cost. The simulated variation of this "inside rate" is in fact 2.5 points which amounts to 3.2 points of the more usually adopted "outside rate" based on the gross wage.



Table 3: Main results of an increase in the social security employers' contributions.
Sensitivity analysis: multipliers

	1989 (1)%(2)	1990 (1)%(2)	1991 (1)%(2)	1992 (1)%(2)	1993 (1)%(2)	1995 (1)%(2)	2000 (1)%(2)	2007 (1)%(2)
1. Labour market (June 30)								
Total employment	-0.38	-0.81	-1.09	-1.17	-1.10	-0.75	-0.33	-1.18
Enterprises sector	-0.48	-1.02	-1.36	-1.46	-1.37	-0.94	-0.41	-0.22
State sector	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Active population	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unemployment	3.12	7.20	10.56	12.23	12.23	9.65	5.78	3.66
2. Demand and output								
Private consumption	-0.19	-0.43	-0.58	-0.70	-0.78	-0.81	-1.04	-1.24
Public consumption	0.00	0.00	0.00	0.00	0.00	-0.09	-0.12	-0.14
Gross capital formation	-0.48	-1.02	-0.92	-0.60	-0.16	0.03	-0.80	-0.34
- GFCF enterprises	-0.70	-1.53	-1.23	-0.31	0.66	1.49	-0.53	0.13
- GFCF State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- GFCF residential sector	0.00	0.04	-0.49	-1.82	-2.57	-3.76	-1.89	-1.66
Exports of goods and services	-1.02	-0.88	-0.52	-0.16	0.07	0.20	-0.08	-0.08
Imports of goods and services	-1.22	-1.35	-1.07	-0.73	-0.47	-0.34	-0.67	-0.47
Gross domestic product	-0.09	-0.12	-0.11	-0.08	-0.04	0.00	-0.11	-0.16
Gross national product	-0.05	-0.08	-0.04	0.03	0.10	-0.11	-0.19	-0.22
3. Prices, wages and incomes								
Private consumption price	0.81	1.00	0.78	0.41	0.05	-0.35	-0.14	-0.01
Terms of trade (goods and serv.)	0.02	0.04	0.04	0.04	0.04	0.02	0.01	0.01
Exchange rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wage cost rate	3.81	3.41	2.54	1.61	0.85	0.10	0.28	0.18
Interest rate	0.91	0.20	0.59	-0.10	-0.71	-1.30	0.00	0.08
Households' disposable income	0.66	0.33	-0.21	-0.80	-1.27	-1.54	-1.35	-1.32
Enterprises' gross profits	-10.99	-5.06	-0.07	3.24	4.80	2.86	0.01	0.45
4. Endogeneous sector								
Value added (constant prices)	-0.07	-0.09	-0.07	-0.07	-0.04	0.00	-0.07	-0.09
Value added deflator	1.01	1.07	0.75	0.37	0.03	-0.29	-0.04	0.08
Total output	-0.70	-0.78	-0.61	-0.41	-0.26	-0.18	-0.45	-0.35
Demand constrained production	-0.54	-0.47	-0.37	-0.30	-0.22	-0.12	-0.13	-0.09
Capacity constrained production	0.17	-0.07	-0.27	-0.30	-0.22	0.03	-0.03	-0.09
Labour constrained production	1.05	1.21	1.23	1.04	0.74	0.20	0.00	-0.06
Labour cost rate	3.75	3.34	2.47	1.53	0.79	0.06	0.25	0.15
Unit labour costs	3.13	2.13	0.97	0.04	-0.53	-0.77	-0.07	0.03
5. Productivities								
Technical labour productivity	1.01	1.21	1.38	1.37	1.21	0.80	0.33	0.12
Apparent labour productivity	0.60	1.18	1.49	1.49	1.32	0.84	0.32	0.12
Technical capital productivity	0.17	0.01	-0.03	0.05	0.12	0.12	-0.19	-0.05
Apparent capital productivity	-0.07	-0.01	0.17	0.28	0.30	0.08	-0.23	-0.04
Sensitivity analysis: ratios and variations								
	1989 (1)-(2)	1990 (1)-(2)	1991 (1)-(2)	1992 (1)-(2)	1993 (1)-(2)	1995 (1)-(2)	2000 (1)-(2)	2007 (1)-(2)
Significant ratios								
1. Share in GNP of:								
Public sector deficit	-0.88	-0.69	-0.63	-0.65	-0.72	-0.59	-0.68	-0.70
Interests of the public debt	-0.08	-0.12	-0.16	-0.21	-0.24	-0.01	-0.01	-0.02
Total public debt	-1.89	-2.55	-2.77	-2.90	-3.16	-3.43	-5.65	-8.06
Net exports	0.13	0.34	0.45	0.55	0.60	0.43	0.60	0.62
Wages and self employed incomes	1.14	0.60	0.13	-0.18	-0.34	-0.14	0.13	0.13
2. Saving ratio								
	0.03	-0.20	-0.36	-0.45	-0.49	-0.34	-0.15	-0.07
3. Unemployment rate								
	0.34	0.73	0.99	1.07	1.01	0.70	0.31	0.17
4. Degrees of capacity utilisation:								
Total capacity	-0.98	-1.14	-1.16	-0.98	-0.70	-0.18	-0.06	-0.02
Equipments constrained capacity	-0.22	-0.02	0.18	0.21	0.16	-0.03	-0.04	0.01
Labour constrained capacity	-0.98	-1.14	-1.16	-0.98	-0.70	-0.18	-0.06	-0.02
5. Demand pressure (QDF/QAFFT)								
	-0.48	-0.38	-0.30	-0.24	-0.17	-0.12	-0.06	-0.01
6. Proportion of enterprises								
Demand constrained	3.71	3.13	2.39	1.83	1.30	0.80	0.42	0.04
Capacity constrained	-1.23	-0.10	0.93	1.12	0.87	-0.17	-0.20	0.03
Labour supply constrained	-2.48	-3.03	-3.31	-2.96	-2.17	-0.63	-0.22	-0.07
Absolute variations								
Unemployment	14.69	31.46	42.57	46.11	43.40	30.02	13.21	7.15
Total full time equiv. employment	-18.46	-35.46	-43.96	-44.22	-38.97	-24.30	-11.56	-5.99
Net exports	8.91	23.08	32.25	40.06	44.90	32.60	63.53	97.12
Public sector deficit	-48.07	-39.58	-39.40	-44.44	-53.07	-49.98	-75.95	-114.08

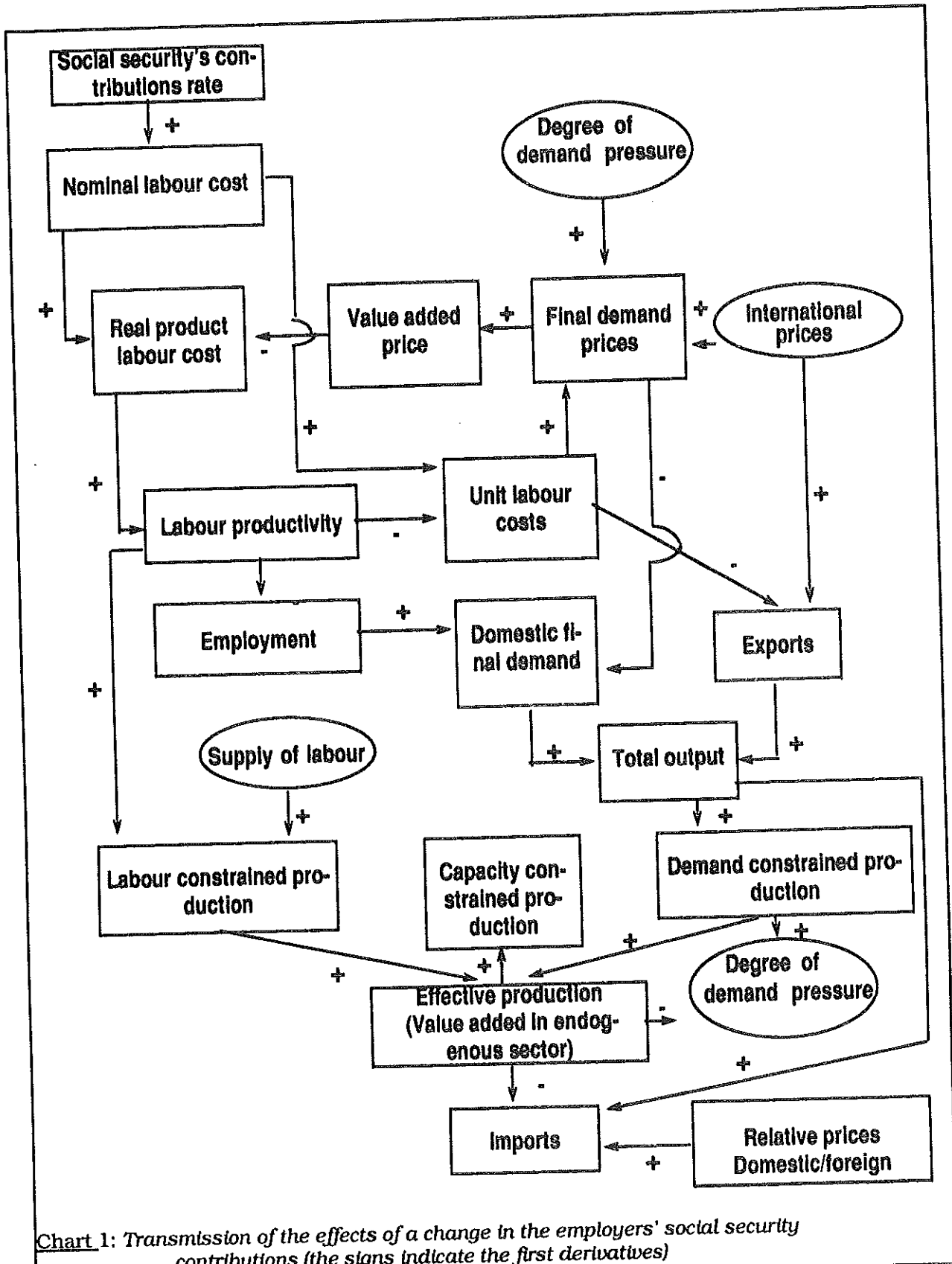


Chart 1: Transmission of the effects of a change in the employers' social security contributions (the signs indicate the first derivatives)



Final demand prices

Final demand prices depend on production costs, a combination of unit labour costs and import prices. Margins come above cost and are affected by the degree of demand pressure, i.e. by the ratio of demand constrained production to effective production.

Taking for example the private consumption price one observes an increase in 1989 with 0.81 % with respect to the baseline projection, a variation that can be decomposed as shown in table 4:

	Changes in % with respect to the baseline projection
Demand pressure A	- 0.54
Apparent labour productivity	+ 0.60
Nominal labour cost :	+ 3.75
Unit labour costs B :	+ 3.13
Private consumption price C $C = .45 \times (.237 \times A + .632 \times B)$	+ 0.81

Labour productivity and employment

Technical labour productivity depends on real product labour costs, i.e. nominal labour costs deflated by the value added deflator. The latter depends on the various final demand prices and the composition of final demand.

In the present case, in the first period, the rise in the value added price is 1.01 % and the variation in the real product labour cost is 4.79 %. Due to the relative rigidity of the technological coefficient only 37.3 % of the rise is passed on in the technical productivity of the current year. The effect on the measured productivity, and therefore on effective employment, is attenuated by fluctuations in the labour hoarding. Nevertheless we observe (see table 3) that the total impact on employment is a loss of 18 thousand full time equivalent jobs, or a rise of unemployment by 15 thousand units. This is entirely to be accounted for by the change in the production techniques induced by the higher wage rate as the effective production remains quasi unchanged.

Effective production and imports

The increase in the labour costs result, in the first period, in a decrease of total output by 0.70 %. Part of it comes from the reduction of the domestic final demand due to higher domestic prices, lower real disposable income (less employment), and part of it from the reduction of exports due to a lower export profitability.

Total output is reduced by 39.9 billion BEF of 1980 in 1989, of which 32.2 billion are a drop in exports, therefore the final demand category the most vulnerable to domestic input costs rises.

The variation in total output induces variations in the demand constrained production and imports. The distribution between these two effects depends on the evolution of the domestic prices relative to the foreign ones, on the one hand, and on the initial proportion of enterprises in the different regimes, on the other. The estimation of the model confirmed a result of former empirical studies, i.e. a fairly low sensitivity of goods and services imports to relative prices, with an elasticity of about -0.13 . The totality of the variations on imports in



the model comes therefore from changes in the production regimes. Table 5 provides the absolute variations in total output, the different constrained production and the effective value added, a well as the proportions of enterprises in each regime before and after the change in the social security rate of contribution.

	Variant minus baseline billion BEF	Prop. of regimes		
		Baseline %	Variant %	
Total output	-39.9			
Structural demand (1)	-15.5	51.4	57.3	Demand
Production capacity (capital)	+4.9	27.8	26.3	Capital
Production capacity (labour)	+32.3	21.0	16.4	Labour
Effective value added	-2.0			
Non structural exports (2)	+1.9			
Non structural imports (3)	-11.6			
Effective value added (1)+(2)-(3)	-2.0			

The contraction in total output of 39.7 billion francs provokes a fall of 15.5 billion of the structural demand but has only a marginal negative impact on the effective value added. This result, at first glance surprising, comes from the fact that the reduction of the structural demand is offset by the increase in the production capacity. In particular the partial adaptation of the labour productivity to the rise in the labour costs produces an important increase in the production capacity linked with the available quantity of labour. Therefore the effective value added, in other words the effective domestic production, is unchanged with respect to the baseline projection and the initial changes in total demand is entirely supported by the rest of the world as it results in a reduction of our imports, and in particular non structural imports.

The lower part of table 5 shows the spill-over effects on exports and imports due to the changes in the constraints faced by each micro-market: the drop of 15.5 billion of structural demand results in a fall of only 2 billion of the effective production because the changes in the situations on each micro market made possible a small increase in the non structural exports (1.9 billion) and a decrease of the non structural imports by 11.6 billion.

Thus at the end of the first period the consequences of a rise in the tax rate on labour is a change in the choice of production techniques by the enterprises - they adopt more capital intensive technologies - but quasi no change in domestic production.

This result is very contingent to the existence of micromarkets facing different situations and to the distribution of enterprises in the different identified regimes, as illustrated on the left part of table 5. The same initial rise in the taxation of labour simulated in a situation where no enterprises are supply constrained would produce both higher unemployment and significantly lower growth.

**b. Medium term effects****Wages, prices and productivity**

The increase in the social security contributions rate is maintained through the simulation and two key variables will progressively adapt to this new situation: the labour productivity and the wage rate exclusive of the employer's social security contributions. Table 6 illustrates these evolutions.

Table 6: Medium term wages and productivity responses to a rise in the employers' rate of social security contributions

	Procentual variations with respect to the baseline projection					
	t	t+1	t+2	t+3	t+4	t+11
SS contribution rate	3.2	3.2	3.2	3.2	3.2	3.2
Real product labour cost rate	2.7	2.3	1.7	1.1	0.8	0.3
Labour productivity (technical)	1.0	1.2	1.4	1.4	1.2	0.3
Labour productivity (measured)	0.6	1.2	1.5	1.5	1.3	0.3
Unit labour costs	3.1	2.1	1.0	0.0	-0.5	-0.1
Value added prices	1.0	1.1	0.8	0.4	0.0	-0.0
Real wages exclusive SS.	-0.3	-0.9	-1.5	-2.0	-2.4	-2.8
Memorandum item						
Ratio of employment to labour supply	-0.7	-1.3	-1.4	-1.2	-0.9	-0.1

The preceding table gives the order of magnitude and the dynamics of the spreading of the injected 3.2 % rise in the wage cost through the price-wage and productivity circuit of the model.

In the beginning of the period labour cost rates increase with nearly the full amount of the rise induced by the taxation (the difference comes from the fact that labour cost includes also the self-employed workers' rate of remuneration which is unaffected by the simulated measure). As a consequence employment decreases and measured productivity rises, but less than the technical labour productivity which is pushed forward by the rise in the real wage cost. This induces a slowing down of the unit labour costs and prices. However, due to the change in technologies by the firms, unemployment is higher and real wages exclusive of the employer's social security contributions react to this new situation by growing less than in the base line simulation. After 11 years the three percent exogenous rise of the real product labour cost is brought back to nearly nil because real wages exclusive of social security employers's contributions have declined by 2.8 %. Progressively wage costs, productivity and employment tend to come back to their long-term path of the baseline scenario, the increase in the taxation of labour being in the long run completely paid by the workers.

Production and imports

The variations in wages, prices and productivity affect in different directions the final demand categories (see the figures on table 3).



Households disposable income is permanently depressed by the increased unemployment and by the lower real wages; this in turn depresses private consumption and residential investments which grow at a slower path than in the baseline projection.

On the other hand business investment and exports are at first depressed by the increase in the unit labour costs. Progressively productivity is catching up prices and unit labour costs return at the level of the basis projection.

On the whole total output is permanently lower in the basis projection but the final effect on the endogenous value added and the GDP is smoothed by the reduction of imports.

2. Simulations based on varying proportions of regimes

One of the main advantages of a disequilibrium model is the distinction between capital, labour and demand constrained enterprises. As has been shown earlier the change in business value added -and hence in all endogenous variables- depends on the shares of enterprises constrained by capital, labour and demand and on the growth rates of the production constrained by capital and labour and demand. So that the proportions of regimes plays a role in the determination of the multipliers.

The impact of a variation of the wage cost on the effective production (and employment) can be decomposed as follows:

$$\partial YT/\partial W = \Pi_d \cdot ZD \cdot (\partial YD/\partial W) + \Pi_s \cdot ZS \cdot (\partial YS/\partial W) + \Pi_p \cdot ZP \cdot (\partial YP/\partial W)$$

where the Π_i 's are the proportions of regimes and ZD, ZS and ZP are the ratios of each potential demand or supply to effective production. This equation shows that the impact of an exogenous wage shock on effective value added depends on the initial proportions or regimes, on the degree of tension on each micro-market and on the sensibility of each potential demand or supply to a variation of the wage cost.

These sensibilities depend on many relations and coefficients in the model:

$$\partial YD/\partial W = (\partial ABS/\partial W) + (\partial XD/\partial W) - (\partial MD/\partial W) < 0$$

< 0
 < 0
 > 0

The impact of an increase in the employers' social security contribution rate on the structural demand will be unambiguously negative. Absorption and structural exports will be negatively influenced by rising costs and prices, while structural imports will be stimulated by the deterioration of the relative domestic to foreign prices.

$$\partial YP/\partial W = (\partial B/\partial W) \cdot K + B \cdot (\partial K/\partial W)$$

< 0
 $?$

The impact on the production capacity cannot be ascertained and it will depend on the value of the coefficients of the investment equation. It is equal to the product of the variation of the capital productivity, B, by the capital stock, plus the product of capital productivity and the variation of the capital stock induced by the change in wages. The first part is negative as the technical capital productivity depends positively on the capital cost relative to the wage cost. The sign of the second term is difficult to assess a priori as the desired capital stock will be submitted to contradictory forces in case of rising wage costs: the declining capital productivity will make more capital necessary to maintain the production capacity, on the



other hand declining profitability will reduce the desired capital stock. In our model in the short run the first impact dominates, in the long-run the second one is the most important and on the whole the partial derivative is slightly positive.

Finally the impact on the full employment output is the impact on the labour productivity times the labour supply plus the impact on the labour supply times the labour productivity:

$$\partial YS/\partial W = (\partial A/\partial W) \cdot LS + A \cdot (\partial LS/\partial W) > 0$$

$$> 0 \qquad \approx 0$$

The impact of higher wage costs on labour productivity is clearly positive. In the present version of the model the labour supply is quasi exogenous, only the long duration unemployment is endogenous (and positively influenced by a rise in the wage cost), therefore the total effect of the full employment output is the productivity effect. This is certainly a limitation of the present version of the model. If the labour supply were endogenous the final effect of an increase in the employers' rate of social security contribution would depend on the way it affects labour supply.

To assess the importance of the proportions of regimes in the studied simulation, two alternative base runs are constructed that are *mainly* demand or supply constrained. As is clear from table 7, the base run that will be called "Demand constrained" has 72 % of the enterprises constrained by demand while 28 % of the enterprises are constrained by either capital or labour. Equally, the "Supply constrained" base run has 31 % of the enterprises constrained by demand and 69 % constrained by capital and labour. These proportions do not of course remain constant over time but are endogenous in the model. They only give the starting point of the simulations.

Table 7: Proportions of enterprises constrained by demand, capital and labour in base runs.

Part of	Central	Demand Constrained	Supply Constrained
Demand constrained enterprises	49	72	31
Capital constrained enterprises	35	19	48
Labour constrained enterprises	16	9	21

The results of the alternative base runs are obtained by changes in the exogenous world demand.

A similar exogenous shock -the increase of the employer's rate of contributions to social security- is applied on each of these base runs. The result is three different simulations, one of them being the simulation explained so far. The results of these simulations are shown in the form of multipliers in the annexes to the paper. Also, a number of graphs is included.

a. Static effects

Business value added:

As is explained in the previous point, the partial derivative of demand constrained production with respect to the wage cost is negative, while the partial derivatives of capital and labour constrained production with respect to the wage cost are positive. The actual effect of an increase in the wage cost is the following for the three base runs :



Table 8. Effect of wage cost increase on constrained production (in percentage w.r.t. base run)

	Central	Demand	Supply
Demand constrained production	-0.5 %	-0.6 %	-0.5 %
Capital constrained production	0.2 %	0.2 %	0.2 %
Labour constrained production	1.1 %	1.1 %	1.0 %
Value added	-0.0 %	-0.3 %	0.1 %

It is clear that the percentage differences of the changes on the three constrained productions are comparable, irrespective of what constraint is most binding to them. The small differences that do occur have to be explained by changes in other variables in the model. The major change, however, concerns the actual value added. This change is, as is explained before, not only dependent on the change in the three constrained productions, but also on the proportion of the enterprises constrained by either demand, capital or labour. The higher the proportion of enterprises constrained by demand, the stronger will be the negative effect on value added. The reason is that the effective marginal propensity to import is lower when most enterprises are demand constrained. This is most clearly the situation in the second column of the table where nearly three quarter of the enterprises are constrained by demand. The result is a decrease in value added by 0.3 %. The opposite situation, where enterprises are constrained by supply, in casu the third column in the table, results in an increase of value added of 0.1 %.

Labour productivity and unit labour costs

Long term labour productivity depends on the real product wage. This rate is hardly influenced by a change in proportions. The short term labour productivity, however, is also influenced by a capacity utilisation rate (see equation for A' on page 11). An increase in value added increases this rate so that in the situation of "supply constrained", the increase in labour productivity is strongest. Lower growth rates in productivity are observed in a situation of a decrease in value added.

Unit labour costs are defined as the labour cost rate divided by labour productivity. In a situation of demand constrained production, the change in the labour productivity will be low and the wage cost rate changes strong (see infra) so that unit labour costs increase strongly. The opposite situation occurs in a situation of supply constrained production.

Table 9: Effect of wage cost increase on labour productivity and unit labour costs (in percentage w.r.t. base run)

	Central	Demand	Supply
Short term labour productivity	0.60 %	0.36 %	0.73 %
Unit labour costs	3.13 %	3.68 %	2.83 %

Wages and prices

While the change in the demand constrained production is comparable in all three base runs, the change in actual value added is not. This results in a change in the degree of the demand pressure that is calculated as the ratio of demand constrained production over value added.



The situation where value added decreases most will be the situation where this ratio increases most so that prices will also increase likewise.

Apart from the demand pressure variable, unit labour and import costs also influence prices, so that differences in these variables will also induce price changes. Notably differences in changes in labour productivity and hence unit labour costs will result in differences in prices.

Table 10. *Effect of wage cost increase on private consumption prices and labour cost rate (in percentage w.r.t base run)*

	Central	Demand	Supply
Private consumption prices	0.81 %	0.99 %	0.72 %
Labour cost rate	3.75 %	4.06 %	3.59 %

Employment

The outcome on employment depends both on the evolution of labour productivity and value added. Because in a situation where value added decreases most, labour productivity also does (situation of "demand constrained") and in an opposite way for a "supply constrained" situation, the differences in the loss of employment is negligible.

Table 11. *Effect of wage cost increase on employment (in thousands w.r.t. base run)*

	Central	Demand	Supply
Employment	-18.5	-18.2	-17.6

Net exports and public sector borrowing requirement

Differences in changes in net exports have to be explained by differences in changes in the volume of imports, changes in import and export prices are determined by world prices and the changes in the volume of exports are comparable in all simulations. The volume of imports is equal to the difference between output and domestic value added. As differences in changes in output are relatively small, domestic value added explains the different reaction of imports. The situation with the strongest decrease of value added results in the smallest change in imports and hence the smallest change in net exports.

Table 12. *Effect of wage cost increase on net exports and the public sector borrowing requirement (in Billion BF w.r.t. base run)*

	Central	Demand	Supply
Net exports	8.9	0.6	15.4
Public sector borrowing requirements	-48	-44	-51

Differences for the PSBR are rather small due to the fact that the major reasons for the changes are similar for all simulations, i.e. the change in the employer's rate of contributions



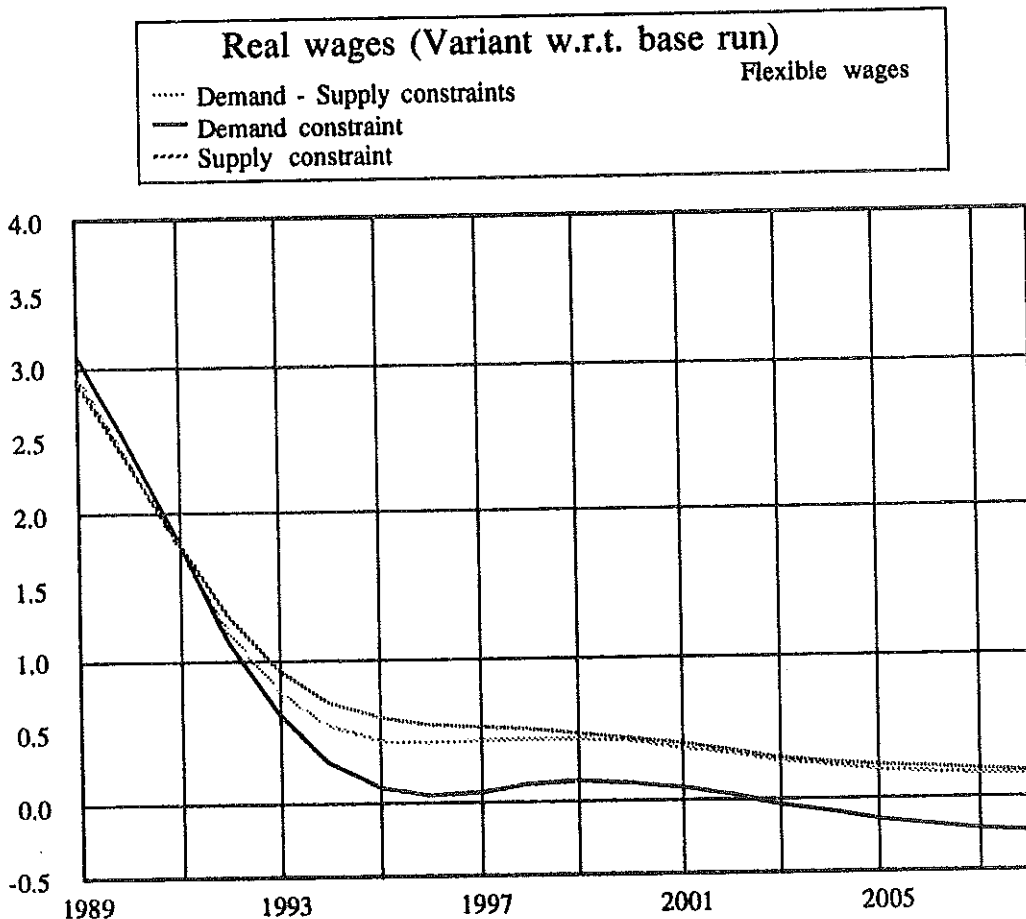
to social security and the change in employment. The small differences have to be explained by differences in value added growth rates and prices.

b. Dynamic effects

In the first year of the application of a higher employer's rate of contributions to social security, it is unclear what the outcome on value added is as long as one does not know the proportions of enterprises. In the long run, however, the differences between the multipliers will become smaller. The reason for this is that gradually the proportion of enterprises constrained by one or the other factor will come into line with each other, so that the reason for differences diminishes.

The reason behind this is the equilibrating effect that goes out from the wage equation, as is explained before. An increase in unemployment has a downward effect on the real wage (see graph 1) and a likewise effect on long run labour productivity. Unit labour costs decrease so that the negative effect of export profitability disappears which results in an increase in exports and a decrease in demand constrained production.

Graph 1



Employment will in the long run be dependent on value added and the long run labour productivity, which is independent of the capacity utilisation rate. This means that the dampening effect on employment destruction (labour hoarding) will no longer have any effect.



The situation with the strongest decrease in value added (demand constrained situation) will also have the strongest effect on employment. In this situation, the labour utilisation rate is lowest so that the downward effects on real wages and labour productivity are strongest.

The final result is a small decrease in employment and an important decrease in the net wage rate (wage rate after taxes and social security contributions). This leads to a smaller real disposable income with a significant effect on private consumption. Total output is lower but value added is unchanged so that the imports must remain lower. Net exports do not return to the initial situation.

Table 13. *Effect of wage cost increase on constrained production in the long run (in percentage w.r.t. base run)*

	Central	Demand	Supply
Demand constrained production	-0.1 %	-0.5 %	-0.1 %
Capital constrained production	-0.1 %	-0.5 %	-0.1 %
Labour constrained production	-0.1 %	-0.5 %	-0.1 %
Value added	-0.1 %	-0.5 %	-0.1 %

Table 14. *GDP multipliers in the medium and long run*

	Central	Demand	Supply
Short-term GDP multiplier (1 st year)	-0.1 %	-0.3 %	0.1 %
Medium-term GDP multiplier (7 th year)	0.0 %	-0.2 %	0.1 %
Long-term GDP multiplier (20 th year)	-0.2 %	-0.5 %	-0.2 %

3. Importance of the wage formation process in evaluating the impact of a change in the employers' social security contribution rate

The wage equation has been of foremost importance in explaining the dynamic effects of the studied simulations. It should be clear then, that different long-run multipliers will be found with a different wage formation process. To quantify this is the aim of this paragraph. Therefore, three alternative base runs had to be prepared. Those were exactly equal to the ones used for the exercise in the previous paragraph, i.e. a "Central base run" and a base run with mainly "Demand constrained" enterprises and one with mainly "Supply constrained" enterprises. The only difference was that the real wage cost rate exclusive employers contributions of social security was exogenous, it grew in all base runs and simulations with 2 % per year.

A similar exogenous shock -the increase of the employer's rate of contributions to social security- is applied on each of the base runs.

**a. Static effects**

One can be very short about the static effects in the simulations as they are totally comparable to the effects studied in the simulations so far. The reason for this is that the effects of the wage rate are mostly felt after a number of years. The small changes concern the change in the real wage rate.

Table 15 *Effect of wage cost increase on real wage rate (in percentage w.r.t. base run).*

	Central	Demand	Supply
Flexible wages	3.0 %	3.1 %	2.9 %
Rigid wages	3.3 %	3.4 %	3.2 %

The results with rigid wages gives the pure effect of the increase of the employer's rate of contributions for social security. The difference with the results with flexible wages can be found in the fact that the downward effect on wages of an increase in employment does not play any role any more.

The effects of these differences on the other variables in the model are only minor. They are more clearly noticed in the medium and long run.

It should also be clear from table 15 that the differences between the results for flexible wages and rigid wages is equal for all base runs. The remaining part of this paragraph will be devoted to the two central base runs, one with flexible wages, the other with rigid wages. Full results of all simulations can be found in the tables and graphs in the annexes.

b. Dynamic effects

There are two major roles of real wages in the model. The first concerns the production technology, the second the income of households.

The real product labour cost rate is the determinant of labour productivity in the long run. As has been noticed when analysing the central simulation, this rate returns to nearly the same level as the one of the central base run.

Table 16. *Effect of wage cost increase on real product labour cost rate (in percentage w.r.t. base run)*

	flexible wages	rigid wages
7 years after implementation	0.4 %	3.1 %
20 years after implementation	0.1 %	3.0 %

In the case of rigid wages, however, the downward effect cannot have any influence. The real labour cost rate remains constant over time.

This has its influence on labour productivity, as can be seen from table 17.



Table 17. *Effect of wage cost increase on labour productivity (in percentage w.r.t. base run)*

	flexible wages	rigid wages
7 years after implementation	0.8 %	3.2 %
20 years after implementation	0.1 %	2.9 %

The meaning of this is that in the case of flexible wages, the production technology will adapt to the new real labour cost, after implementation of a higher employer's rate of contribution to social security. After that, the real labour cost rate will gradually fall again and the production technology will re-adapt. The main difference in the case of rigid wages is that this re-adaptation will not take place as the real labour cost rate cannot decrease.

With a higher labour productivity in the case of rigid wages, the labour constrained capacity will be eased and will be able to increase. This gives a first indication of the effect on value added.

A second effect concerns the wage effect on income. Higher wages will have a positive effect on household's real disposable income - and hence on private consumption and residential investment.

Table 18. *Effect of wage cost increase on household's real disposable income (in percentage w.r.t. base run)*

	flexible wages	rigid wages
7 years after implementation	-1.2%	-0.6 %
20 years after implementation	-1.3%	-0.5 %

This will also ease the demand constrained production. There is, however, another factor that neutralizes this effect. Exports depend on the profitability in the export sector.

Table 19. *Effect of wage cost increase on unit labour costs and the volume of exports (in percentage w.r.t. base run)*

		flexible wages	rigid wages
U.L.C.	7 years after implementation	-0.8%	0.2 %
	20 years after implementation	0.0%	-0.1 %
Exports	7 years after implementation	0.2 %	-0.1 %
	20 years after implementation	-0.2 %	-0.1 %

One factor of export profitability is the unit labour cost. After five years, the labour productivity has not increased fully in the case of rigid wages, with the results of higher ULC. In the long run, labour productivity has adjusted fully to wages so that there is no longer any effect on the profitability of the export sector.

The total effect of higher private consumption and lower exports in the medium term and higher private consumption and unchanged exports in the long run is that demand constrained production hardly moves.

The difference in the capacity constrained production is explained by the fact that in case of



rigid wages, the change to a more capital intensive production implies a higher capital stock. The combined effect of higher labour and capital constrained production leads to a noticeable change in value added. A wage cost increase with rigid wages leads to high multipliers.

The global effect on constrained productions can be found in table 20.

Table 20. Effect of wage cost increase on constrained productions and value added (in percentage w.r.t. base run)

	flexible wages		rigid wages	
	7 yrs	20 yrs	7 yrs	20 yrs
Demand constrained production	-0.1 %	-0.1 %	-0.2 %	0.0 %
Labour constrained production	0.2 %	-0.1 %	2.1 %	1.7 %
Capacity constrained production	0.0 %	-0.1 %	0.2 %	0.6 %
Valued added	0.0 %	-0.1 %	0.4 %	0.6 %

The effect on employment can be deduced from the evolution of labour productivity and value added. The increase in labour productivity is stronger than the increase of valued added with the result that employment continues to decrease.

Graph 2

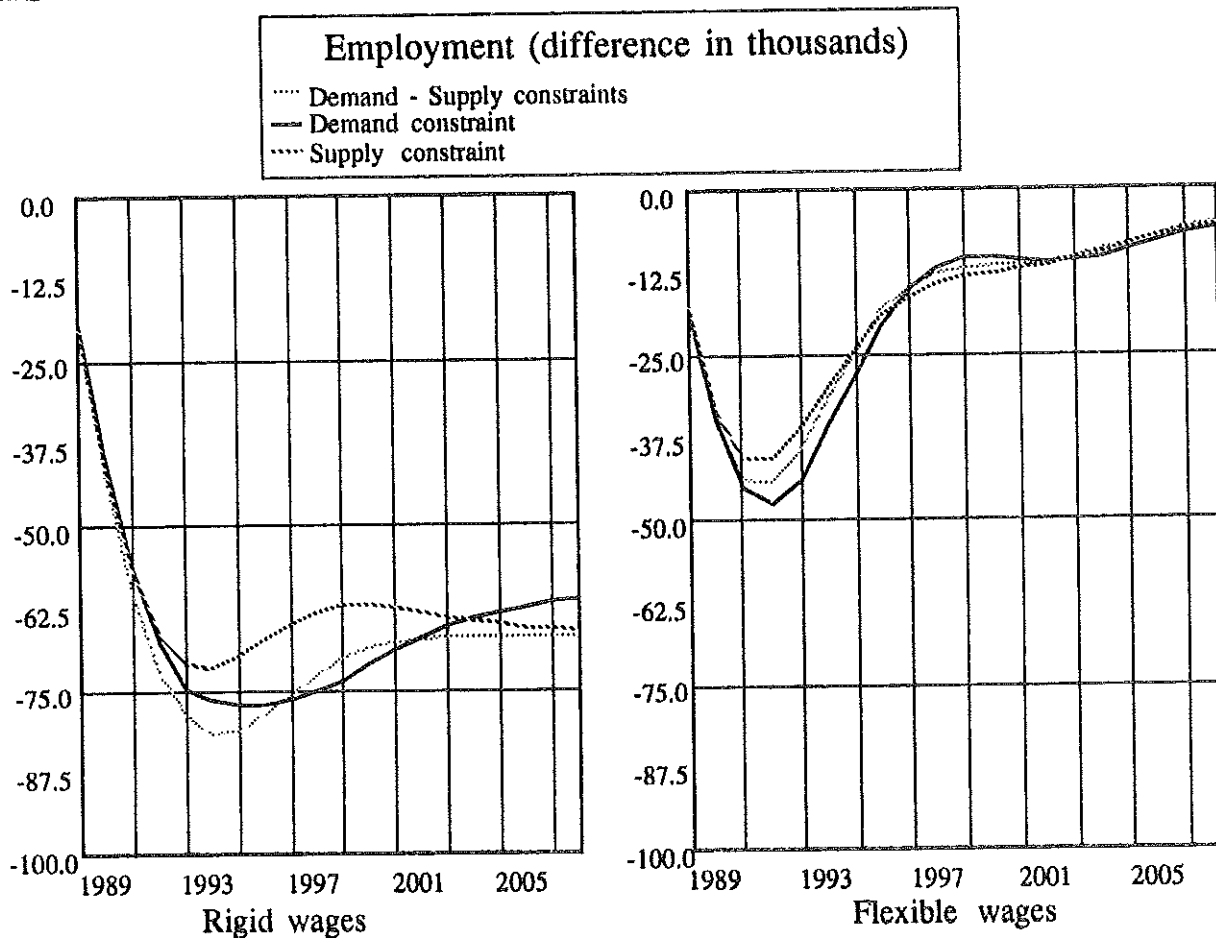




Table 21. *Effect of wage cost increase on employment (in thousands w.r.t. base run)*

	flexible wages	rigid wages
1 year after implementation	-18	-20
7 years after implementation	-24	-81
20 years after implementation	-6	-67

Initially, thanks to the labour hoarding effect, employment destruction remains limited. But after a number of years, the effects on employment are fully felt. Graph 2 shows the evolution of employment (variant minus base run in thousands of people) in both cases of wage formation.

Table 22. *Effect of wage cost increase on the public sector borrowing requirement and net exports (in billions BF w.r.t. base run)*

		flexible wages	rigid wages
PSBR	7 years after implementation	-50 (-0.6)	-61 (-0.8)
	20 years after implementation	-114 (-0.7)	-131 (-0.8)
Net exports	7 years after implementation	33 (0.4)	48 (0.5)
	20 years after implementation	97 (0.6)	119 (0.7)

The public sector borrowing requirement is negatively influenced when wages are rigid because employment decreases strongly. This effect is partly compensated due to higher household's income and hence direct and indirect taxes.

While foreign trade prices are exogenous in a small open economy as Belgium, the volume of exports and imports are endogenous. The evolution of exports has already been explained. The small differences in imports can be explained by slightly higher unit labour costs and domestic prices in the long run so that imports will decrease.

The numbers between brackets in table 22 give the difference in the surplus as percentage of GNP. They indicate how small differences are net exports and PSBR.



IV. Conclusions

Policy simulations carried out with disequilibrium models include two types of development which are difficult to apprehend with more traditional macroeconomic models:

- The complete integration of demand and supply conditions on each identified micromarket.
- The analysis of the spill-over effects when a constraint is encountered on a micromarket.

The question we must address to in the present context is: "do we reach a different conclusion and/or do we learn something new in using a disequilibrium model when simulating an exogenous rise in the employers' rate of social security contribution?"

The main message is not new : rising the wage cost through employers' social security contributions is always damaging employment through two channels :

- In the short-run : loss of competitiveness and reduction of domestic purchasing power restricts demand .
- In the medium and long-term : inducement of productivity rise which offsets the preceding effect but permanently reduces labour requirements.

Additional information we gain is:

- The more excess supply on the labour market, the more harmful is the taxation of labour.
- In situations of insufficient labour supply the taxation of labour can be favorable to growth by stimulating labour productivity and relaxing a supply constraint; we find here the justification of the Selective Employment Tax (SET) imagined by Kaldor and introduced in the sixties in Great Britain to increase productivity by taxing labour in the service sector.
- Consequences of taxing labour as far as the main macro-economic variables are concerned depend strongly on the situations prevailing on the micro-markets, not only because of the direct consequences on supply and demand of relaxing or increasing a constraint, but also because spill-over effects are highly non linear implying strong modification of the marginal propensity to import according to the proportions of regimes in the economy.

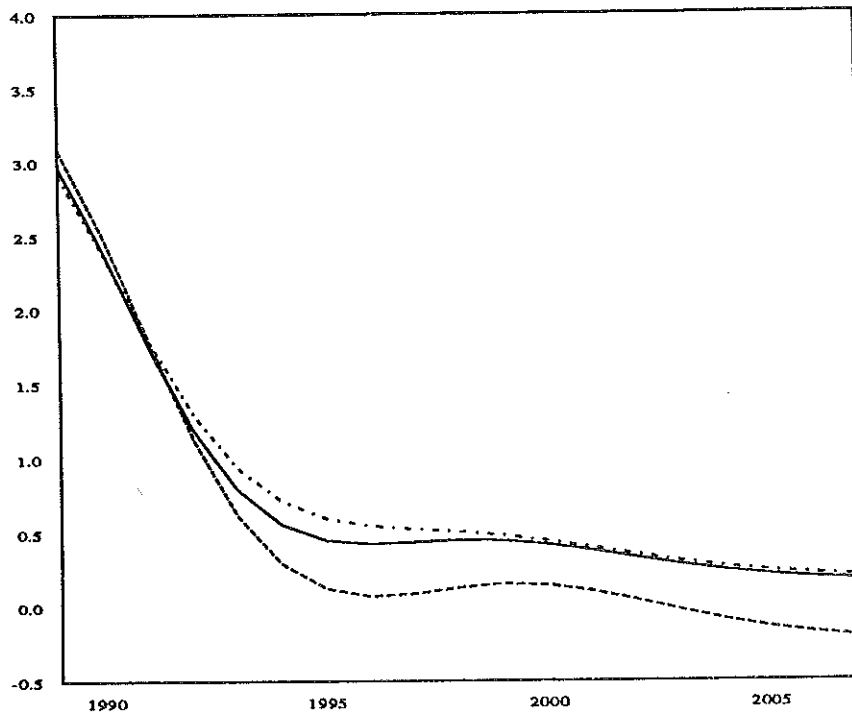
The results achieved in the present exercise strongly support the thesis that employers' social security contributions should be alleviated in priority on low wages because they are probably paid to the less qualified workers, i.e. the fraction of the labour market where excess supply is obvious. One can wonder if the results can be interpreted as supporting a progressive taxation with a high rate on the highest wages supposed to apply to ultra-qualified workers, a category for which insufficient supply is likely to be observed. We believe that this question cannot be answered properly without bringing into the picture the reaction of labour supply to changes in wages. This is a fundamental point that should be the object of further research.

Finally we observe without surprise that the long-term properties of the model depend strongly on the wage equation and its implication in terms of the natural rate of unemployment.



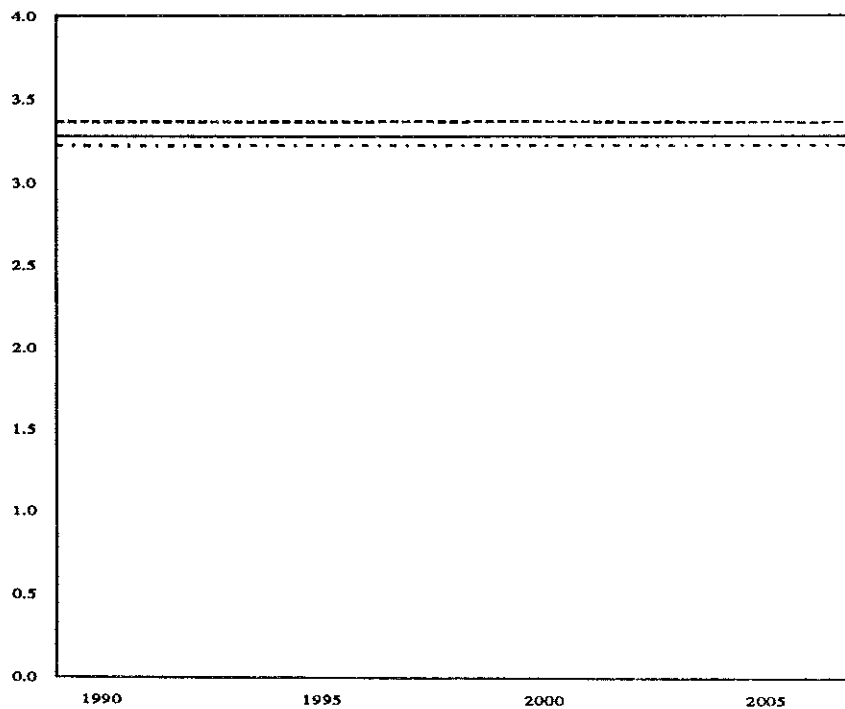
Real wages (Variant compared to Reference) Flexible wages

- D/S constraint
- - - Demand constraint
- . . . Supply constraint



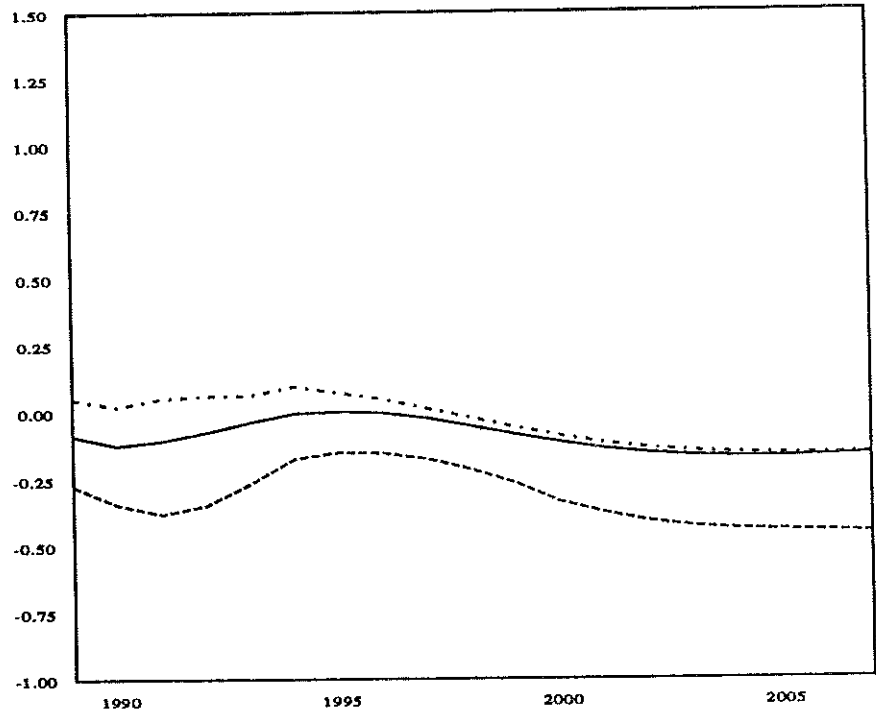
Real wages (Variant compared to Reference) Rigid wages

- D/S constraint
- - - Demand constraint
- . . . Supply constraint

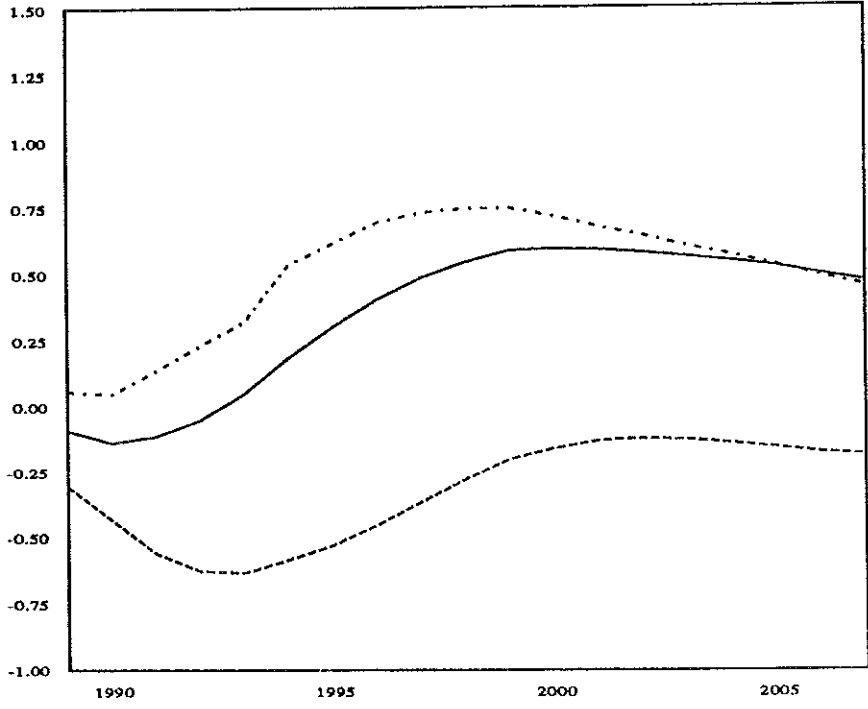




Real GDP (Variant compared to Reference) Flexible wages
— D/S constraint
- - - Demand constraint
· · · Supply constraint



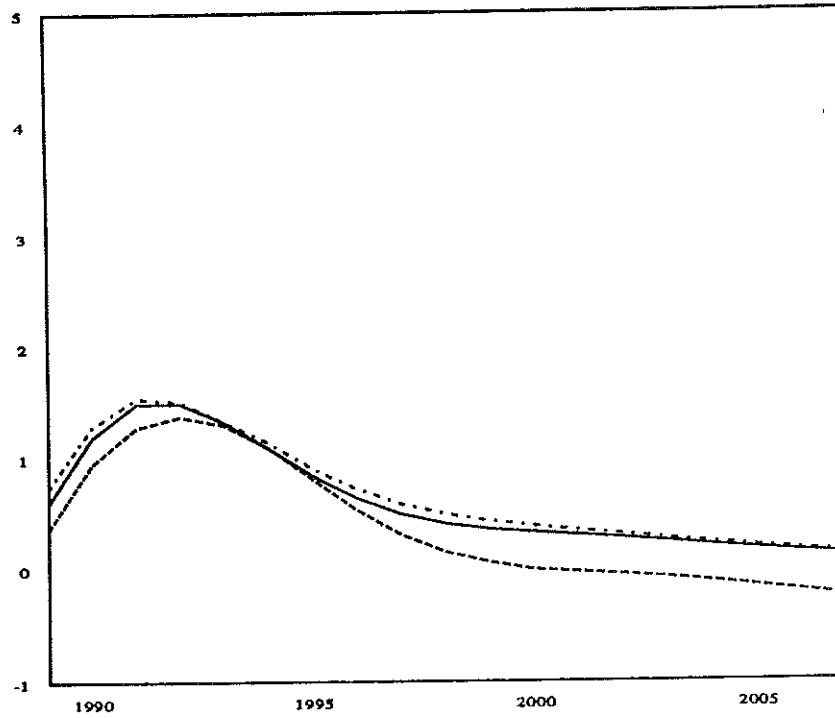
Real GDP (Variant compared to Reference) Rigid wages
— D/S constraint
- - - Demand constraint
· · · Supply constraint





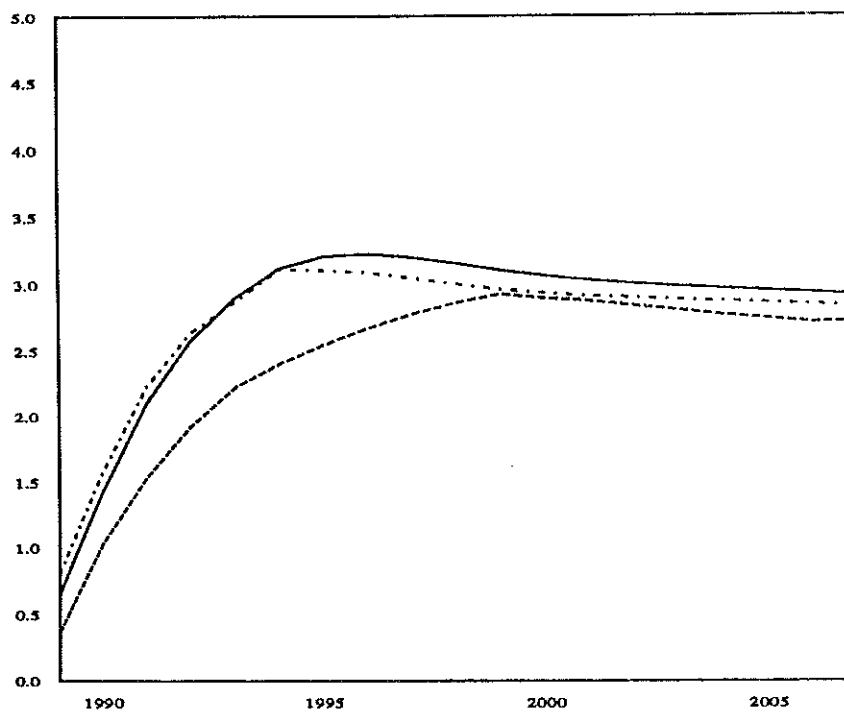
Labour productivity (Variant compared to ref.) Flexible wages

— D/S constrained
- - - D constrained
· · · S constrained



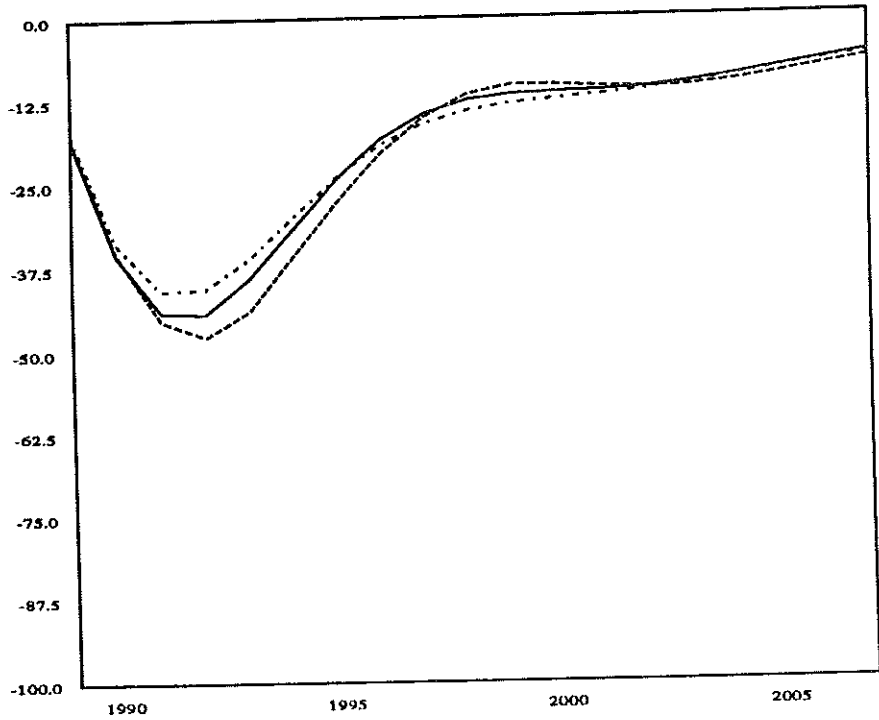
Labour productivity (Variant compared to ref.) Rigid wages

— D/S constrained
- - - D constrained
· · · S constrained

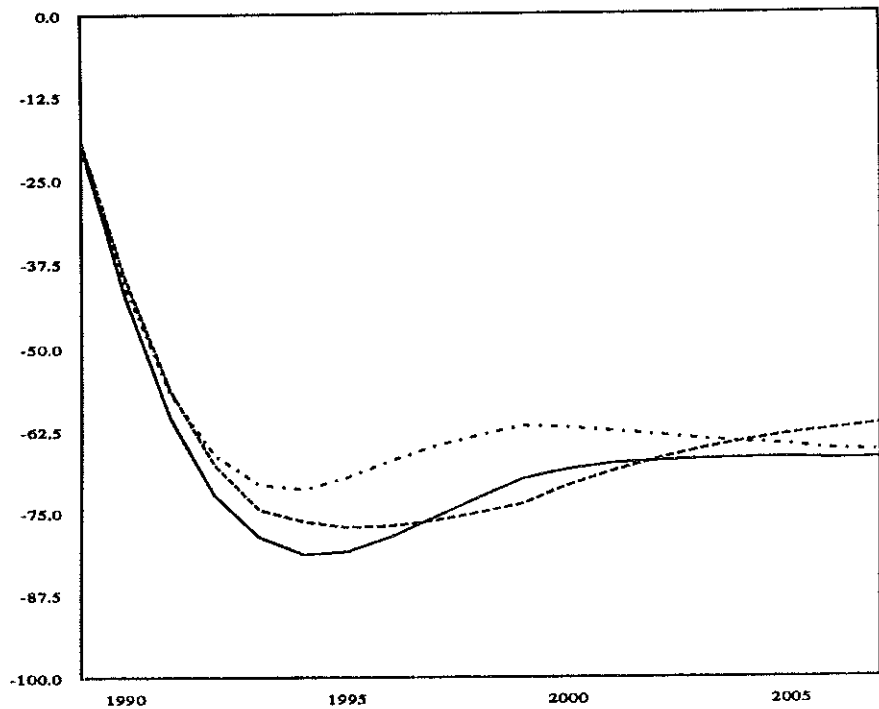




Employment (Difference in thousands) Flexible wages
— D/S constraint
- - - Demand constraint
- . - . Supply constraint



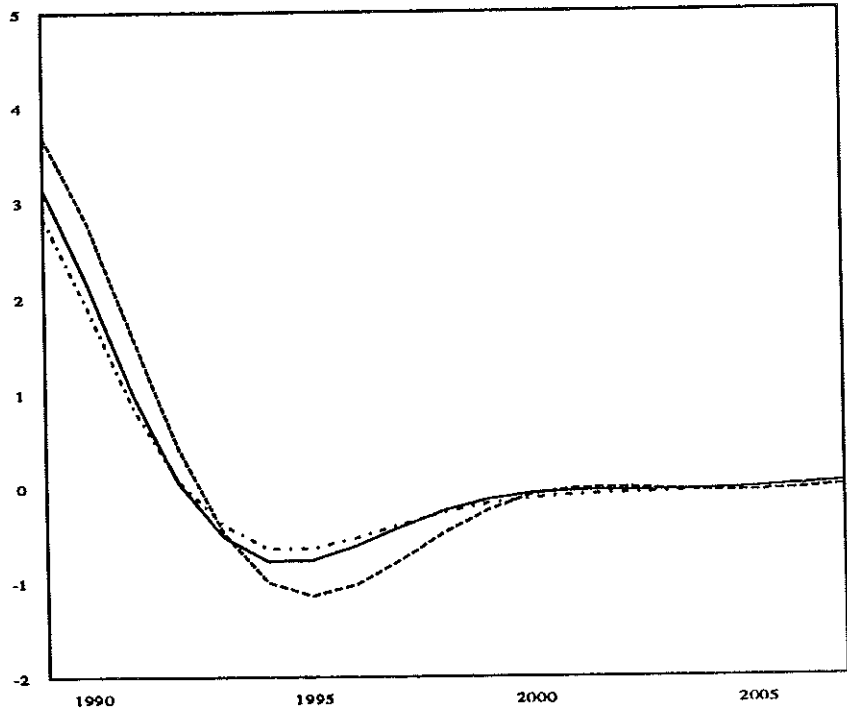
Employment (Difference in thousands) Rigid wages
— D/S constraint
- - - Demand constraint
- . - . Supply constraint





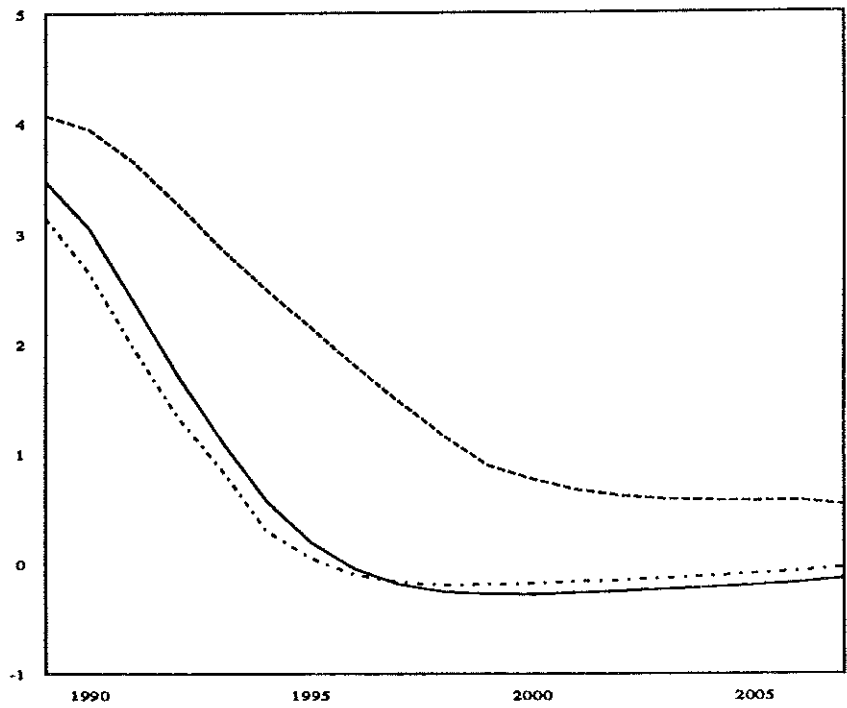
Prices (Variant compared to Reference) Flexible wages

- D/S constraint
- - - D constraint
- . . . S constraint



Prices (Variant compared to Reference) Rigid wages

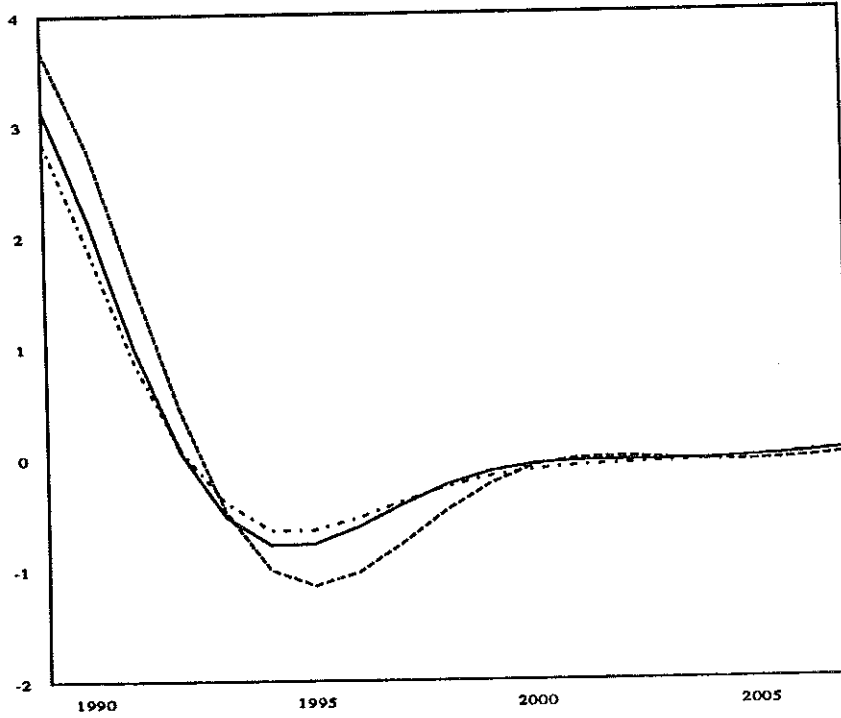
- D/S constraint
- - - D constraint
- . . . S constraint





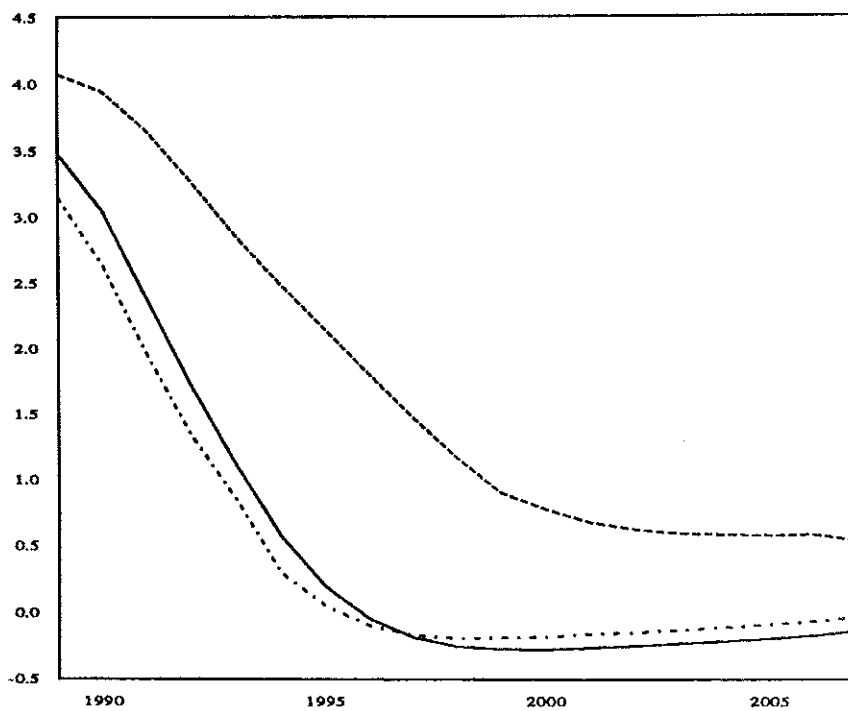
Unit Labour Costs (Simulation comp. to ref.) Flexible wages

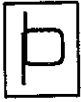
— D/S constraint
- - - Demand constraint
· · · Supply constraint



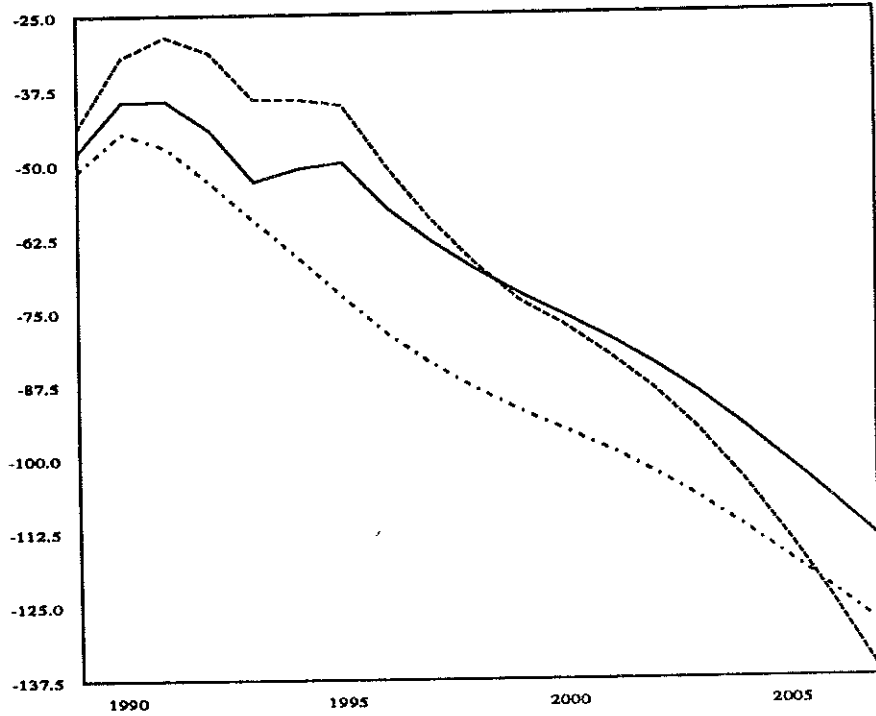
Unit Labour Costs (Simulation comp. to ref.) Rigid wages

— D/S constraint
- - - Demand constraint
· · · Supply constraint

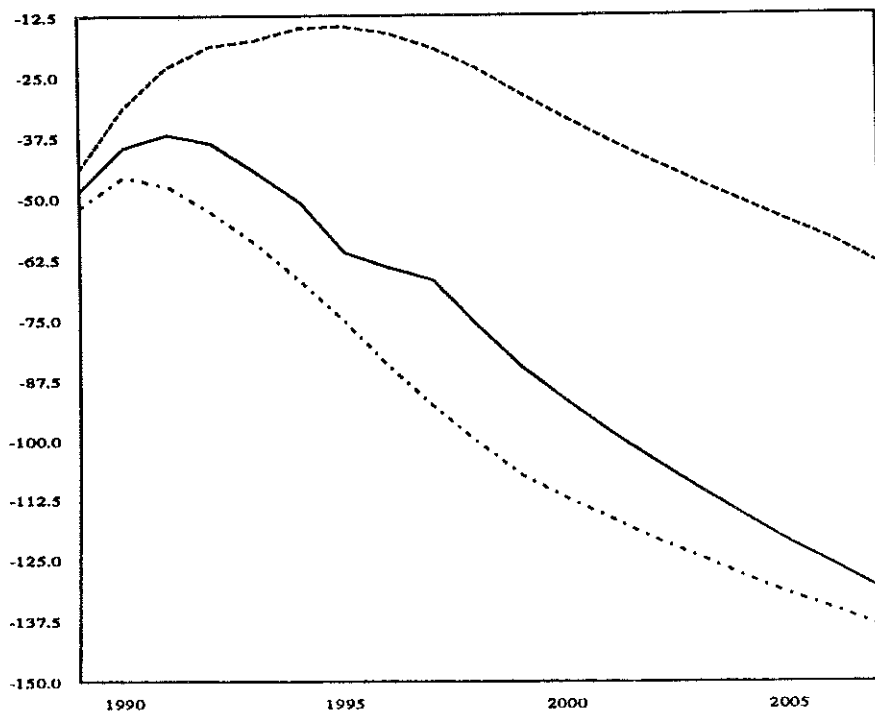




P.S.B.R. (Difference in billions) Flexible Wages
— D/S constraint
- - - Demand constraint
· · · Supply constraint

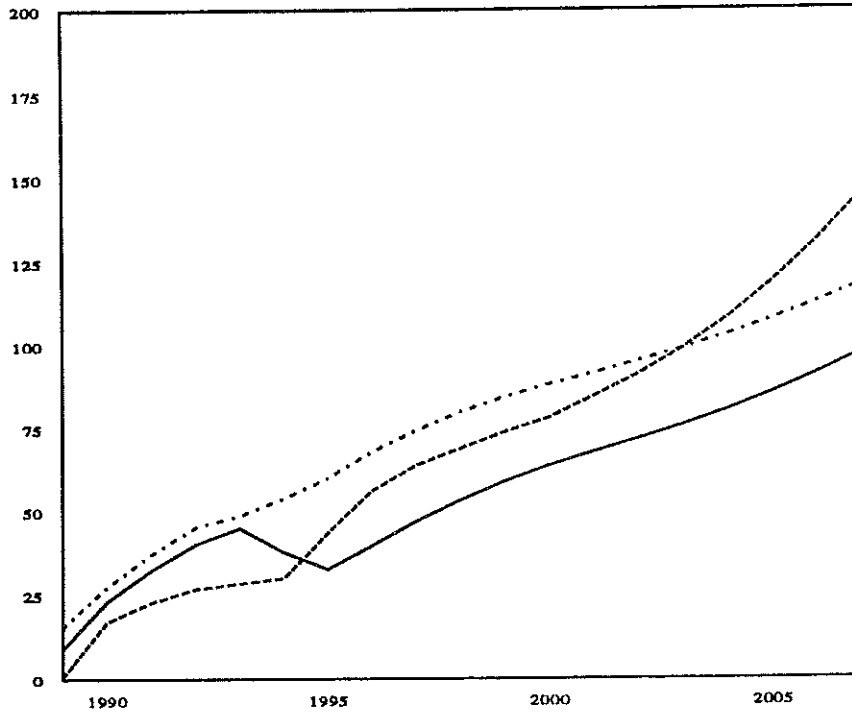


P.S.B.R. (Difference in billions) Rigid wages
— D/S constraint
- - - Demand constraint
· · · Supply constraint

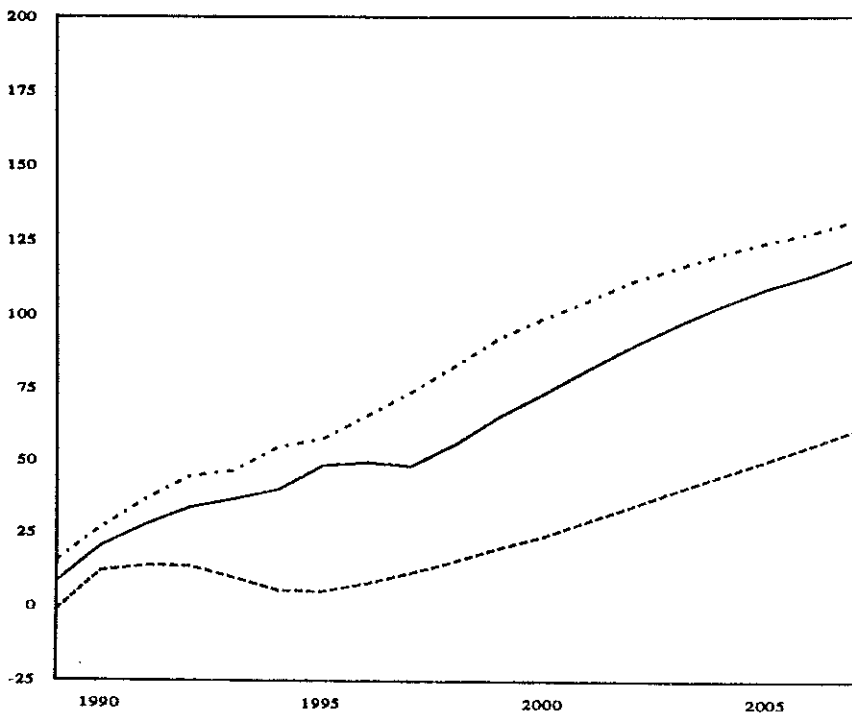




Net exports (Difference in billions) Flexible wages
— D/S constraint
- - - Demand constraint
· · · Supply constraint



Net exports (Difference in billions) Rigid wages
— D/S constraint
- - - Demand constraint
· · · Supply constraint





Simulation with flexible wages, central base run

Sensitivity analysis: multipliers

	1989 (1)%(2)	1990 (1)%(2)	1991 (1)%(2)	1992 (1)%(2)	1993 (1)%(2)	1995 (1)%(2)	2000 (1)%(2)	2007 (1)%(2)
1. Labour market (June 30)								
Total employment	-0.38	-0.81	-1.09	-1.17	-1.10	-0.75	-0.33	-0.18
Enterprises sector	-0.48	-1.02	-1.36	-1.46	-1.37	-0.94	-0.41	-0.22
State sector	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Active population	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unemployment	3.12	7.20	10.56	12.23	12.23	9.65	5.78	3.66
2. Demand and output								
Private consumption	-0.19	-0.43	-0.58	-0.70	-0.78	-0.81	-1.04	-1.24
Public consumption	0.00	0.00	0.00	0.00	0.00	-0.09	-0.12	-0.14
Gross capital formation	-0.48	-1.02	-0.92	-0.60	-0.16	0.03	-0.80	-0.34
- GFCF enterprises	-0.70	-1.53	-1.23	-0.31	0.66	1.49	-0.53	0.13
- GFCF State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- GFCF residential sector	0.00	0.04	-0.49	-1.82	-2.57	-3.76	-1.89	-1.66
Exports of goods and services	-1.02	-0.88	-0.52	-0.16	0.07	0.20	-0.08	-0.08
Imports of goods and services	-1.22	-1.35	-1.07	-0.73	-0.47	-0.34	-0.67	-0.47
Gross domestic product	-0.09	-0.12	-0.11	-0.08	-0.04	0.00	-0.11	-0.16
Gross national product	-0.05	-0.08	-0.04	0.03	0.10	-0.11	-0.19	-0.22
3. Prices, wages and incomes								
Private consumption price	0.81	1.00	0.78	0.41	0.05	-0.35	-0.14	-0.01
Terms of trade (goods and serv.)	0.02	0.04	0.04	0.04	0.04	0.02	0.01	0.01
Exchange rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wage cost rate	3.81	3.41	2.54	1.61	0.85	0.10	0.28	0.18
Interest rate	0.91	0.20	0.59	-0.10	-0.71	-1.30	0.00	0.08
Households' disposable income	0.66	0.33	-0.21	-0.80	-1.27	-1.54	-1.35	-1.32
Enterprises' gross profits	-10.99	-5.06	-0.07	3.24	4.80	2.86	0.01	0.45
4. Endogeneous sector								
Value added (constant prices)	-0.07	-0.09	-0.07	-0.07	-0.04	0.00	-0.07	-0.09
Value added deflator	1.01	1.07	0.75	0.37	0.03	-0.29	-0.04	0.08
Total output	-0.70	-0.78	-0.61	-0.41	-0.26	-0.18	-0.45	-0.35
Demand constrained production	-0.54	-0.47	-0.37	-0.30	-0.22	-0.12	-0.13	-0.09
Capacity constrained production	0.17	-0.07	-0.27	-0.30	-0.22	0.03	-0.03	-0.09
Labour constrained production	1.05	1.21	1.23	1.04	0.74	0.20	0.00	-0.06
Labour cost rate	3.75	3.34	2.47	1.53	0.79	0.06	0.25	0.15
Unit labour costs	3.13	2.13	0.97	0.04	-0.53	-0.77	-0.07	0.03
5. Productivities								
Technical labour productivity	1.01	1.21	1.38	1.37	1.21	0.80	0.33	0.12
Apparent labour productivity	0.60	1.18	1.49	1.49	1.32	0.84	0.32	0.12
Technical capital productivity	0.17	0.01	-0.03	0.05	0.12	0.12	-0.19	-0.05
Apparent capital productivity	-0.07	-0.01	0.17	0.28	0.30	0.08	-0.23	-0.04

Sensitivity analysis: ratios and variations

	1989 (1)-(2)	1990 (1)-(2)	1991 (1)-(2)	1992 (1)-(2)	1993 (1)-(2)	1995 (1)-(2)	2000 (1)-(2)	2007 (1)-(2)
Significant ratios								
1. Share in GNP of:								
Public sector deficit	-0.88	-0.69	-0.63	-0.65	-0.72	-0.59	-0.68	-0.70
Interests of the public debt	-0.08	-0.12	-0.16	-0.21	-0.24	-0.01	-0.01	-0.02
Total public debt	-1.89	-2.55	-2.77	-2.90	-3.16	-3.43	-5.65	-8.06
Net exports	0.13	0.34	0.45	0.55	0.60	0.43	0.60	0.62
Wages and self employed incomes	1.14	0.60	0.13	-0.18	-0.34	-0.14	0.13	0.13
2. Saving ratio	0.03	-0.20	-0.36	-0.45	-0.49	-0.34	-0.15	-0.07
3. Unemployment rate	0.34	0.73	0.99	1.07	1.01	0.70	0.31	0.17
4. Degrees of capacity utilisation:								
Total capacity	-0.98	-1.14	-1.16	-0.98	-0.70	-0.18	-0.06	-0.02
Equipments constrained capacity	-0.22	-0.02	0.18	0.21	0.16	-0.03	-0.04	0.01
Labour constrained capacity	-0.98	-1.14	-1.16	-0.98	-0.70	-0.18	-0.06	-0.02
5. Demand pressure (QDF/QAFFT)	-0.48	-0.38	-0.30	-0.24	-0.17	-0.12	-0.06	-0.01
6. Proportion of enterprises								
Demand constrained	3.71	3.13	2.39	1.83	1.30	0.80	0.42	0.04
Capacity constrained	-1.23	-1.10	0.93	1.12	0.87	-0.17	-0.20	0.03
Labour supply constrained	-2.48	-3.03	-3.31	-2.96	-2.17	-0.63	-0.22	-0.07
Absolute variations								
Unemployment	14.69	31.46	42.57	46.11	43.40	30.02	13.21	7.15
Total full time equiv. employment	-18.46	-35.46	-43.96	-44.22	-38.97	-24.30	-11.56	-5.99
Net exports	8.91	23.08	32.25	40.06	44.90	32.60	63.53	97.12
Public sector deficit	-48.07	-39.58	-39.40	-44.44	-53.07	-49.98	-75.95	-114.08



Simulation with flexible wages, demand constrained base run

Sensitivity analysis: multipliers

	1989 (1)%(2)	1990 (1)%(2)	1991 (1)%(2)	1992 (1)%(2)	1993 (1)%(2)	1995 (1)%(2)	2000 (1)%(2)	2007 (1)%(2)
1. Labour market (June 30)								
Total employment	-0.38	-0.82	-1.15	-1.30	-1.27	-0.91	-0.32	-0.22
Enterprises sector	-0.48	-1.04	-1.45	-1.64	-1.61	-1.15	-0.41	-0.27
State sector	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Active population	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unemployment	2.84	6.01	8.24	9.13	8.84	6.10	2.46	1.96
2. Demand and output								
Private consumption	-0.23	-0.49	-0.66	-0.78	-0.84	-0.84	-0.94	-1.24
Public consumption	0.00	0.00	0.00	0.00	0.00	0.07	0.10	0.20
Gross capital formation	-0.69	-1.71	-1.74	-1.15	-1.19	-0.32	-1.44	-0.68
- GFCF enterprises	-1.03	-2.79	-2.94	-1.61	0.44	2.17	-1.34	-0.39
- GFCF State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- GFCF residential sector	0.00	0.29	0.16	-0.83	-1.56	-5.09	-2.50	-1.62
Exports of goods and services	-0.99	-1.05	-0.66	-0.29	0.03	0.28	-0.13	-0.16
Imports of goods and services	-0.99	-1.49	-1.19	-0.83	-0.47	-0.48	-1.02	-0.99
Gross domestic product	-0.28	-0.34	-0.38	-0.35	-0.27	-0.15	-0.34	-0.46
Gross national product	-0.24	-0.30	-0.32	-0.27	-0.17	0.01	0.09	0.40
3. Prices, wages and incomes								
Private consumption price	0.99	1.29	1.13	0.73	0.26	-0.41	-0.21	-0.03
Terms of trade (goods and serv.)	-0.01	0.02	0.04	0.05	0.05	0.05	0.02	0.04
Exchange rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wage cost rate	4.10	3.81	2.94	1.87	0.88	-0.28	-0.06	-0.23
Interest rate	0.96	-0.11	-0.28	-1.45	-2.88	1.91	0.56	0.38
Households' disposable income	0.83	0.59	0.06	-0.60	-1.20	-1.60	-1.38	-1.39
Enterprises' gross profits	-15.34	-8.35	-2.40	2.13	4.60	6.30	2.41	7.45
4. Endogeneous sector								
Value added (constant prices)	-0.30	-0.35	-0.41	-0.40	-0.34	-0.23	-0.39	-0.50
Value added deflator	1.19	1.36	1.09	0.66	0.21	-0.37	-0.08	0.10
Total output	-0.70	-0.96	-0.81	-0.60	-0.37	-0.33	-0.70	-0.73
Demand constrained production	-0.57	-0.55	-0.53	-0.44	-0.33	-0.26	-0.43	-0.51
Capacity constrained production	0.19	-0.25	-0.56	-0.70	-0.64	-0.25	-0.31	-0.53
Labour constrained production	1.09	1.10	1.11	0.89	0.59	0.02	-0.33	-0.46
Labour cost rate	4.06	3.75	2.86	1.78	0.80	-0.35	-0.09	-0.26
Unit labour costs	3.68	2.77	1.57	0.41	-0.48	-1.15	-0.08	-0.01
5. Productivities								
Technical labour productivity	1.05	1.10	1.25	1.21	1.08	0.69	0.03	-0.26
Apparent labour productivity	0.36	0.95	1.27	1.37	1.29	0.80	-0.01	-0.25
Technical capital productivity	0.19	-0.14	-0.19	-0.12	0.01	0.16	-0.21	-0.02
Apparent capital productivity	-0.30	-0.24	-0.04	0.17	0.32	0.17	-0.30	0.01
Sensitivity analysis: ratios and variations								
	1989 (1)-(2)	1990 (1)-(2)	1991 (1)-(2)	1992 (1)-(2)	1993 (1)-(2)	1995 (1)-(2)	2000 (1)-(2)	2007 (1)-(2)
Significant ratios								
1. Share in GNP of:								
Public sector deficit	-0.85	-0.63	-0.54	-0.54	-0.62	-0.55	-0.99	-1.53
Interests of the public debt	-0.08	-0.13	-0.22	-0.28	-0.34	-0.09	-0.42	-0.93
Total public debt	-1.89	-2.64	-2.79	-2.77	-2.79	-3.10	-7.33	-15.04
Net exports	0.01	0.28	0.36	0.42	0.44	0.65	1.00	1.56
Wages and self employed incomes	1.32	0.76	0.26	-0.14	-0.39	-0.45	-0.19	-0.50
2. Saving ratio	0.07	-0.18	-0.36	-0.49	-0.56	-0.33	-0.21	-0.10
3. Unemployment rate	0.34	0.73	1.01	1.14	1.11	0.79	0.29	0.20
4. Degrees of capacity utilisation:								
Total capacity	-1.18	-1.24	-1.28	-1.09	-0.79	-0.22	-0.05	-0.04
Equipments constrained capacity	-0.45	-0.09	0.14	0.27	0.28	0.01	-0.08	0.02
Labour constrained capacity	-1.18	-1.24	-1.28	-1.09	-0.79	-0.22	-0.05	-0.04
5. Demand pressure (QDF/QAFFT)	-0.27	-0.20	-0.12	-0.04	0.02	-0.03	-0.03	0.00
6. Proportion of enterprises								
Demand constrained	3.07	2.19	1.28	0.39	-0.15	0.26	0.36	0.01
Capacity constrained	-1.35	-0.32	0.49	1.11	1.26	0.06	-0.28	0.09
Labour supply constrained	-1.72	-1.87	-1.77	-1.50	-1.11	-0.32	-0.09	-0.10
Absolute variations								
Unemployment	14.49	31.20	43.50	49.02	47.94	33.93	12.11	8.15
Total full time equiv. employment	-18.21	-35.20	-45.22	-47.64	-43.82	-27.70	-10.47	-6.90
Net exports	0.57	17.00	22.76	26.80	28.41	43.38	77.95	144.57
Public sector deficit	-43.97	-32.13	-28.61	-31.37	-39.27	-40.30	-77.62	-136.57



Simulation with flexible wages, supply constrained base run

Sensitivity analysis: multipliers

	1989 (1)%(2)	1990 (1)%(2)	1991 (1)%(2)	1992 (1)%(2)	1993 (1)%(2)	1995 (1)%(2)	2000 (1)%(2)	2007 (1)%(2)
1. Labour market (June 30)								
Total employment	-0.36	-0.77	-1.00	-1.07	-1.00	-0.72	-0.36	-0.19
Enterprises sector	-0.46	-0.96	-1.25	-1.32	-1.25	-0.89	-0.44	-0.23
State sector	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Active population	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unemployment	3.12	7.55	11.28	13.21	13.27	11.45	6.73	3.33
2. Demand and output								
Private consumption	-0.16	-0.38	-0.52	-0.65	-0.73	-0.83	-1.07	-1.24
Public consumption	0.00	0.00	0.00	0.00	0.00	0.00	-0.08	-0.12
Gross capital formation	-0.34	-0.63	-0.47	-0.27	-0.05	-0.15	-0.80	-0.33
- GFCF enterprises	-0.49	-0.87	-0.48	0.17	0.75	1.08	-0.50	0.10
- GFCF State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- GFCF residential sector	0.00	-0.17	-0.72	-1.92	-2.51	-3.54	-1.98	-1.57
Exports of goods and services	-1.04	-0.78	-0.48	-0.15	0.03	0.16	-0.06	-0.08
Imports of goods and services	-1.34	-1.25	-1.02	-0.72	-0.52	-0.38	-0.61	-0.47
Gross domestic product	0.05	0.02	0.05	0.06	0.06	0.07	-0.09	-0.16
Gross national product	0.08	0.07	0.13	0.18	0.19	0.19	0.00	-0.10
3. Prices, wages and incomes								
Private consumption price	0.72	0.86	0.65	0.33	0.04	-0.31	-0.16	-0.01
Terms of trade (goods and serv.)	0.04	0.04	0.04	0.04	0.03	0.02	0.01	0.01
Exchange rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wage cost rate	3.65	3.25	2.46	1.63	0.98	0.29	0.29	0.20
Interest rate	1.07	0.34	0.69	0.02	-0.61	-0.88	-0.11	0.04
Households' disposable income	0.59	0.25	-0.26	-0.79	-1.20	-1.54	-1.42	-1.31
Enterprises' gross profits	-9.20	-3.93	0.30	3.00	4.19	3.83	1.22	1.15
4. Endogeneous sector								
Value added (constant prices)	0.10	0.09	0.11	0.10	0.08	0.08	-0.04	-0.08
Value added deflator	0.92	0.94	0.64	0.31	0.03	-0.25	-0.06	0.09
Total output	-0.71	-0.67	-0.52	-0.35	-0.24	-0.19	-0.41	-0.35
Demand constrained production	-0.51	-0.45	-0.32	-0.27	-0.19	-0.11	-0.10	-0.08
Capacity constrained production	0.15	0.07	-0.07	-0.05	0.00	0.15	-0.02	-0.08
Labour constrained production	1.02	1.28	1.31	1.13	0.83	0.34	0.04	-0.05
Labour cost rate	3.59	3.18	2.39	1.57	0.92	0.24	0.26	0.18
Unit labour costs	2.83	1.87	0.84	0.06	-0.40	-0.65	-0.12	0.04
5. Productivities								
Technical labour productivity	0.98	1.28	1.45	1.43	1.27	0.89	0.39	0.14
Apparent labour productivity	0.73	1.28	1.54	1.50	1.32	0.90	0.38	0.14
Technical capital productivity	0.15	0.13	0.09	0.14	0.15	0.08	-0.17	-0.05
Apparent capital productivity	0.10	0.15	0.27	0.29	0.23	0.02	-0.19	-0.04

Sensitivity analysis: ratios and variations

	1989 (1)-(2)	1990 (1)-(2)	1991 (1)-(2)	1992 (1)-(2)	1993 (1)-(2)	1995 (1)-(2)	2000 (1)-(2)	2007 (1)-(2)
Significant ratios								
1. Share in GNP of:								
Public sector deficit	-0.91	-0.74	-0.72	-0.74	-0.78	-0.83	-0.82	-0.79
Interests of the public debt	-0.08	-0.11	-0.17	-0.22	-0.24	-0.23	-0.17	-0.12
Total public debt	-1.95	-2.61	-2.93	-3.19	-3.51	-4.40	-7.07	-9.89
Net exports	0.23	0.38	0.49	0.59	0.62	0.70	0.78	0.74
Wages and self employed incomes	1.04	0.54	0.12	-0.14	-0.26	-0.23	0.01	0.06
2. Saving ratio								
	0.03	-0.19	-0.34	-0.41	-0.45	-0.36	-0.17	-0.06
3. Unemployment rate								
	0.33	0.70	0.92	0.99	0.93	0.68	0.34	0.18
4. Degrees of capacity utilisation:								
Total capacity	-0.82	-1.07	-1.07	-0.92	-0.67	-0.23	-0.08	-0.03
Equipments constrained capacity	-0.05	0.01	0.17	0.14	0.07	-0.06	-0.02	0.01
Labour constrained capacity	-0.82	-1.07	-1.07	-0.92	-0.67	-0.23	-0.08	-0.03
5. Demand pressure (QDF/QAFFT)								
	-0.63	-0.54	-0.44	-0.37	-0.28	-0.19	-0.06	-0.01
6. Proportion of enterprises								
Demand constrained	3.06	3.52	2.99	2.65	2.03	1.22	0.40	0.05
Capacity constrained	-0.35	0.08	0.92	0.73	0.38	-0.33	-0.12	0.03
Labour supply constrained	-2.71	-3.60	-3.91	-3.38	-2.41	-0.89	-0.28	-0.08
Absolute variations								
Unemployment	14.00	29.92	39.65	42.47	40.15	29.13	14.43	7.38
Total full time equiv. employment	-17.59	-33.73	-40.76	-40.54	-36.07	-24.04	-12.58	-6.22
Net exports	15.36	27.38	36.97	45.16	48.64	59.92	88.03	117.81
Public sector deficit	-51.20	-44.85	-47.27	-53.22	-59.68	-72.52	-95.54	-128.55



Simulation with rigid wages, central base run

Sensitivity analysis: multipliers

	1989 (1)%(2)	1990 (1)%(2)	1991 (1)%(2)	1992 (1)%(2)	1993 (1)%(2)	1995 (1)%(2)	2000 (1)%(2)	2007 (1)%(2)
1. Labour market (June 30)								
Total employment	-0.42	-0.97	-1.46	-1.83	-2.06	-2.20	-1.87	-1.82
Enterprises sector	-0.53	-1.21	-1.83	-2.28	-2.56	-2.72	-2.31	-2.23
State sector	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Active population	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unemployment	3.38	8.47	13.99	19.03	23.27	30.32	46.81	85.91
2. Demand and output								
Private consumption	-0.17	-0.34	-0.41	-0.45	-0.43	-0.33	-0.21	-0.42
Public consumption	0.00	0.00	0.00	0.00	0.00	0.12	0.18	0.14
Gross capital formation	-0.52	-1.14	-1.10	-0.74	-0.09	0.77	0.43	0.11
- GFCF enterprises	-0.77	-1.82	-1.80	-1.04	0.08	1.97	1.27	0.26
- GFCF State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- GFCF residential sector	0.00	0.39	0.45	-0.28	-0.61	-1.86	-1.52	-0.27
Exports of goods and services	-1.13	-1.17	-1.00	-0.75	-0.54	-0.20	-0.06	-0.07
Imports of goods and services	-1.30	-1.58	-1.46	-1.22	-0.95	-0.58	-0.59	-0.48
Gross domestic product	-0.09	-0.14	-0.12	-0.05	0.05	0.30	0.59	0.47
Gross national product	-0.06	-0.09	-0.04	0.05	0.18	0.49	0.63	0.51
3. Prices, wages and incomes								
Private consumption price	0.91	1.29	1.32	1.14	0.88	0.31	-0.31	-0.26
Terms of trade (goods and serv.)	0.02	0.04	0.05	0.06	0.06	0.05	0.02	0.01
Exchange rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wage cost rate	4.22	4.61	4.64	4.46	4.19	3.60	2.96	3.01
Interest rate	0.90	0.42	1.16	0.78	0.28	-0.24	-0.31	-0.09
Households' disposable income	0.85	0.89	0.75	0.48	0.18	-0.32	-0.72	-0.77
Enterprises' gross profits	-12.63	-8.62	-4.82	-1.93	0.22	2.92	1.46	0.69
4. Endogeneous sector								
Value added (constant prices)	-0.07	-0.09	-0.06	0.00	0.11	0.37	0.73	0.62
Value added deflator	1.12	1.40	1.31	1.09	0.82	0.29	-0.22	-0.18
Total output	-0.75	-0.91	-0.82	-0.65	-0.45	-0.14	-0.10	-0.15
Demand constrained production	-0.59	-0.58	-0.54	-0.50	-0.42	-0.24	0.00	0.02
Capacity constrained production	0.18	-0.03	-0.24	-0.29	-0.21	0.18	0.80	0.64
Labour constrained production	1.16	1.56	1.93	2.13	2.18	2.07	1.75	1.73
Labour cost rate	4.15	4.52	4.53	4.32	4.04	3.41	2.77	2.77
Unit labour costs	3.48	3.05	2.38	1.70	1.11	0.20	-0.28	-0.14
5. Productivities								
Technical labour productivity	1.11	1.55	2.08	2.51	2.80	3.11	3.06	2.94
Apparent labour productivity	0.65	1.43	2.10	2.57	2.89	3.20	3.06	2.91
Technical capital productivity	0.18	0.05	0.03	0.15	0.29	0.46	0.11	0.04
Apparent capital productivity	-0.07	-0.01	0.22	0.44	0.61	0.65	0.04	0.02

Sensitivity analysis: ratios and variations

	1989 (1)-(2)	1990 (1)-(2)	1991 (1)-(2)	1992 (1)-(2)	1993 (1)-(2)	1995 (1)-(2)	2000 (1)-(2)	2007 (1)-(2)
Significant ratios								
1. Share in GNP of:								
Public sector deficit	-0.90	-0.72	-0.63	-0.61	-0.65	-0.77	-0.84	-0.82
Interests of the public debt	-0.09	-0.14	-0.19	-0.23	-0.26	-0.32	-0.17	-0.14
Total public debt	-2.02	-2.93	-3.41	-3.72	-4.01	-4.75	-6.70	-9.60
Net exports	0.12	0.29	0.36	0.42	0.44	0.54	0.64	0.72
Wages and self employed incomes	1.26	0.90	0.58	0.32	0.13	-0.11	0.04	0.11
2. Saving ratio								
2. Saving ratio	0.10	-0.05	-0.13	-0.18	-0.23	-0.26	-0.19	-0.08
3. Unemployment rate								
3. Unemployment rate	0.37	0.87	1.32	1.67	1.89	2.05	1.80	1.78
4. Degrees of capacity utilisation:								
Total capacity	-1.08	-1.45	-1.75	-1.87	-1.83	-1.51	-0.92	-1.00
Equipments constrained capacity	-0.24	-0.06	0.17	0.27	0.29	0.17	-0.07	-0.02
Labour constrained capacity	-1.08	-1.45	-1.75	-1.87	-1.83	-1.51	-0.92	-1.00
5. Demand pressure (QDF/QAFFT)								
5. Demand pressure (QDF/QAFFT)	-0.52	-0.49	-0.48	-0.51	-0.53	-0.62	-0.74	-0.61
6. Proportion of enterprises								
Demand constrained	4.02	3.98	3.85	3.88	3.88	4.19	4.50	4.22
Capacity constrained	-1.36	-0.30	0.91	1.47	1.63	0.99	-0.36	-0.08
Labour supply constrained	-2.66	-3.68	-4.75	-5.35	-5.50	-5.17	-4.14	-4.14
Absolute variations								
Unemployment	15.98	37.30	56.96	71.90	81.38	87.92	76.31	73.47
Total full time equiv. employment	-20.07	-42.46	-60.36	-72.29	-78.67	-80.95	-68.39	-66.73
Net exports	8.13	20.31	27.50	33.46	36.38	48.13	73.00	118.87
Public sector deficit	-48.69	-39.70	-36.98	-38.78	-44.75	-61.24	-91.89	-130.95



Simulation with rigid wages, demand constrained base run

Sensitivity analysis: multipliers

	1989	1990	1991	1992	1993	1995	2000	2007
	(1)%(2)	(1)%(2)	(1)%(2)	(1)%(2)	(1)%(2)	(1)%(2)	(1)%(2)	(1)%(2)
1. Labour market (June 30)								
Total employment	-0.41	-0.93	-1.42	-1.82	-2.11	-2.36	-2.37	-2.19
Enterprises sector	-0.51	-1.18	-1.80	-2.31	-2.68	-3.02	-3.08	-2.89
State sector	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Active population	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unemployment	2.96	6.47	9.26	10.94	11.70	11.06	8.71	6.67
2. Demand and output								
Private consumption	-0.21	-0.43	-0.56	-0.65	-0.68	-0.64	-0.36	-0.42
Public consumption	0.00	0.00	0.00	0.00	0.00	0.05	0.21	0.26
Gross capital formation	-0.77	-2.01	-2.46	-2.29	-1.50	-0.20	-0.24	-0.61
- GFCF enterprises	-1.15	-3.42	-4.61	-4.49	-3.24	0.08	1.03	-0.80
- GFCF State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- GFCF residential sector	0.00	0.62	1.10	0.83	0.83	-0.69	-2.75	-0.62
Exports of goods and services	-1.07	-1.35	-1.23	-1.11	-0.97	-0.68	-0.25	-0.22
Imports of goods and services	-1.02	-1.67	-1.55	-1.36	-1.04	-0.54	-0.38	-0.48
Gross domestic product	-0.31	-0.44	-0.56	-0.63	-0.63	-0.53	-0.17	-0.19
Gross national product	-0.27	-0.39	-0.50	-0.54	-0.53	-0.41	0.02	0.20
3. Prices, wages and incomes								
Private consumption price	1.10	1.67	1.91	1.95	1.87	1.56	0.64	0.34
Terms of trade (goods and serv.)	-0.02	0.01	0.02	0.04	0.05	0.05	0.02	0.02
Exchange rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wage cost rate	4.50	5.09	5.34	5.38	5.30	4.98	4.03	3.72
Interest rate	1.05	0.39	0.80	0.14	-0.47	-0.56	-0.50	-0.04
Households' disposable income	1.04	1.24	1.27	1.16	1.00	0.75	0.05	-0.22
Enterprises' gross profits	-18.74	-16.09	-13.62	-11.05	-8.32	-4.20	0.75	1.92
4. Endogeneous sector								
Value added (constant prices)	-0.34	-0.45	-0.60	-0.69	-0.72	-0.64	-0.24	-0.24
Value added deflator	1.31	1.76	1.87	1.85	1.75	1.47	0.57	0.28
Total output	-0.74	-1.12	-1.12	-1.04	-0.88	-0.57	-0.31	-0.36
Demand constrained production	-0.62	-0.68	-0.75	-0.77	-0.73	-0.60	-0.28	-0.26
Capacity constrained production	0.21	-0.23	-0.59	-0.86	-0.99	-0.89	-0.24	-0.28
Labour constrained production	1.19	1.42	1.74	1.85	1.85	1.69	1.54	1.45
Labour cost rate	4.45	5.02	5.24	5.25	5.14	4.74	3.68	3.26
Unit labour costs	4.07	3.94	3.65	3.26	2.86	2.15	0.77	0.53
5. Productivities								
Technical labour productivity	1.15	1.42	1.88	2.20	2.44	2.70	2.99	2.81
Apparent labour productivity	0.37	1.03	1.54	1.92	2.22	2.54	2.89	2.72
Technical capital productivity	0.21	-0.11	-0.16	-0.09	0.05	0.33	0.20	0.04
Apparent capital productivity	-0.34	-0.33	-0.17	0.08	0.32	0.58	0.20	0.07

Sensitivity analysis: ratios and variations

	1989	1990	1991	1992	1993	1995	2000	2007
	(1)-(2)	(1)-(2)	(1)-(2)	(1)-(2)	(1)-(2)	(1)-(2)	(1)-(2)	(1)-(2)
Significant ratios								
1. Share in GNP of:								
Public sector deficit	-0.86	-0.65	-0.51	-0.43	-0.40	-0.36	-0.54	-0.79
Interests of the public debt	-0.09	-0.14	-0.21	-0.27	-0.31	-0.32	-0.34	-0.50
Total public debt	-2.00	-3.01	-3.49	-3.77	-3.95	-4.22	-4.88	-8.08
Net exports	-0.02	0.19	0.20	0.19	0.13	0.10	0.35	0.70
Wages and self employed incomes	1.47	1.17	0.94	0.72	0.54	0.30	0.01	-0.07
2. Saving ratio								
2. Saving ratio	0.14	0.01	-0.07	-0.11	-0.16	-0.14	-0.20	-0.12
3. Unemployment rate								
3. Unemployment rate	0.36	0.81	1.23	1.56	1.79	1.95	1.87	1.65
4. Degrees of capacity utilisation:								
Total capacity	-1.29	-1.56	-1.91	-2.05	-2.05	-1.80	-1.34	-1.26
Equipments constrained capacity	-0.50	-0.20	-0.01	0.15	0.25	0.24	0.00	0.03
Labour constrained capacity	-1.29	-1.56	-1.91	-2.05	-2.05	-1.80	-1.34	-1.26
5. Demand pressure (QDF/QAFFT)								
5. Demand pressure (QDF/QAFFT)	-0.27	-0.22	-0.15	-0.08	-0.01	0.04	-0.03	-0.01
6. Proportion of enterprises								
Demand constrained	3.16	2.55	1.79	0.91	0.13	-0.41	0.40	0.14
Capacity constrained	-1.46	-0.66	-0.03	0.62	1.14	1.17	-0.02	0.16
Labour supply constrained	-1.70	-1.89	-1.76	-1.53	-1.27	-0.76	-0.38	-0.30
Absolute variations								
Unemployment	15.32	35.02	53.14	67.25	76.85	83.54	79.05	68.16
Total full time equiv. employment	-19.25	-39.77	-56.22	-67.65	-74.51	-77.21	-70.84	-61.54
Net exports	-1.41	11.83	13.57	13.42	9.51	4.93	23.64	60.47
Public sector deficit	-44.28	-31.50	-23.19	-18.84	-17.62	-14.77	-33.64	-63.65



Simulation with rigid wages, supply constrained base run

Sensitivity analysis: multipliers

	1989 (1)%(2)	1990 (1)%(2)	1991 (1)%(2)	1992 (1)%(2)	1993 (1)%(2)	1995 (1)%(2)	2000 (1)%(2)	2007 (1)%(2)
1. Labour market (June 30)								
Total employment	-0.40	-0.92	-1.36	-1.65	-1.82	-1.85	-1.64	-1.77
Enterprises sector	-0.50	-1.15	-1.69	-2.05	-2.25	-2.29	-2.01	-2.16
State sector	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Active population	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unemployment	3.42	9.15	15.76	22.27	28.05	42.68	101.76	143.95
2. Demand and output								
Private consumption	-0.14	-0.29	-0.34	-0.36	-0.34	-0.22	-0.20	-0.45
Public consumption	0.00	0.00	0.00	0.00	0.00	0.12	0.16	0.05
Gross capital formation	-0.37	-0.70	-0.51	-0.13	0.41	1.21	0.28	0.01
- GFCF enterprises	-0.55	-1.06	-0.76	0.00	0.90	2.53	0.89	0.13
- GFCF State	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
- GFCF residential sector	0.00	0.10	0.07	-0.66	-0.91	-1.87	-1.23	-0.33
Exports of goods and services	-1.15	-1.05	-0.91	-0.66	-0.48	-0.16	-0.11	-0.11
Imports of goods and services	-1.44	-1.52	-1.45	-1.22	-0.99	-0.65	-0.71	-0.53
Gross domestic product	0.06	0.04	0.13	0.23	0.32	0.61	0.72	0.45
Gross national product	0.09	0.10	0.22	0.35	0.45	0.74	0.83	0.55
3. Prices, wages and incomes								
Private consumption price	0.80	1.10	1.07	0.87	0.63	0.09	-0.31	-0.20
Terms of trade (goods and serv.)	0.04	0.05	0.06	0.06	0.06	0.05	0.02	0.01
Exchange rate	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wage cost rate	4.05	4.36	4.33	4.12	3.87	3.31	2.90	3.02
Interest rate	1.19	0.69	1.35	0.92	0.37	-0.17	-0.27	-0.17
Households' disposable income	0.77	0.75	0.57	0.29	0.02	-0.39	-0.72	-0.74
Enterprises' gross profits	-10.34	-6.39	-3.00	-0.67	0.69	2.75	1.49	0.83
4. Endogeneous sector								
Value added (constant prices)	0.11	0.13	0.24	0.34	0.43	0.75	0.88	0.60
Value added deflator	1.02	1.21	1.08	0.85	0.60	0.13	-0.18	-0.10
Total output	-0.76	-0.80	-0.70	-0.52	-0.35	-0.06	-0.16	-0.20
Demand constrained production	-0.55	-0.55	-0.46	-0.43	-0.36	-0.22	0.01	0.00
Capacity constrained production	0.17	0.12	-0.01	0.06	0.19	0.64	0.97	0.62
Labour constrained production	1.13	1.64	2.00	2.20	2.23	2.13	1.82	1.73
Labour cost rate	3.98	4.26	4.21	3.99	3.73	3.15	2.74	2.79
Unit labour costs	3.14	2.64	1.95	1.33	0.85	0.05	-0.19	-0.04
5. Productivities								
Technical labour productivity	1.08	1.63	2.15	2.56	2.81	3.07	2.95	2.86
Apparent labour productivity	0.81	1.58	2.22	2.63	2.87	3.10	2.93	2.83
Technical capital productivity	0.17	0.18	0.17	0.30	0.41	0.54	0.04	0.01
Apparent capital productivity	0.11	0.19	0.42	0.59	0.65	0.66	-0.04	-0.01

Sensitivity analysis: ratios and variations

	1989 (1)-(2)	1990 (1)-(2)	1991 (1)-(2)	1992 (1)-(2)	1993 (1)-(2)	1995 (1)-(2)	2000 (1)-(2)	2007 (1)-(2)
Significant ratios								
1. Share in GNP of:								
Public sector deficit	-0.93	-0.77	-0.74	-0.76	-0.79	-0.89	-0.99	-0.86
Interests of the public debt	-0.09	-0.12	-0.18	-0.23	-0.26	-0.26	-0.26	-0.19
Total public debt	-2.08	-2.97	-3.56	-4.03	-4.48	-5.45	-8.32	-11.30
Net exports	0.22	0.36	0.45	0.53	0.53	0.60	0.82	0.78
Wages and self employed incomes	1.15	0.80	0.49	0.26	0.12	-0.04	0.03	0.09
2. Saving ratio								
Unemployment rate	0.09	-0.05	-0.13	-0.18	-0.23	-0.22	-0.18	-0.08
3. Unemployment rate								
Unemployment rate	0.36	0.84	1.25	1.54	1.71	1.78	1.62	1.75
4. Degrees of capacity utilisation:								
Total capacity	-0.91	-1.34	-1.58	-1.67	-1.61	-1.25	-0.32	-1.01
Equipments constrained capacity	-0.05	0.01	0.23	0.26	0.22	0.11	-0.08	-0.02
Labour constrained capacity	-0.91	-1.34	-1.58	-1.67	-1.61	-1.25	-0.87	-1.01
5. Demand pressure (QDF/QAFFT)								
Demand pressure	-0.68	-0.69	-0.71	-0.78	-0.80	-1.00	-0.89	-0.60
6. Proportion of enterprises								
Demand constrained	3.36	4.44	4.71	5.30	5.47	5.48	4.93	4.25
Capacity constrained	-0.39	0.08	1.25	1.34	1.09	0.59	-0.41	-0.09
Labour supply constrained	-2.97	-4.53	-5.96	-6.64	-6.57	-6.07	-4.52	-4.16

Absolute variations

Unemployment	15.39	36.03	53.74	66.23	73.60	76.32	68.53	72.03
Total full time equiv. employment	-19.34	-41.02	-56.69	-66.14	-70.67	-69.61	-62.01	-65.61
Net exports	15.26	26.62	36.31	44.26	46.36	57.35	98.60	131.88
Public sector deficit	-52.08	-45.78	-47.68	-53.13	-59.47	-75.34	-112.37	-138.63