A Reduction of Social Security Contributions: Which Alternatives for a Financing Coverage?

A Reduction in Social Security Contributions: Which Alternatives for Financing Coverage?

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ABSTRACT *This paper uses the INTIMO model of the Italian economy to analyze the economic impacts of a reduction in social security contributions. This manoeuvre is intended to reduce the tax wedge on labour cost. There is a wide choice of ways to neutralize the revenue effects of a lower tax yield, because several of the existing taxes could be increased and new ones could be introduced. In this study, alternative financing coverages are developed and applied in the model. The results of the study show that substituting different taxes for social security contributions affects the cost of production, and impacts vary with industries. A reduction in contributions compensated for by an increase in value-added tax produces the best results in terms of short-term economic indicators, but the improvement in environmental conditions—not analyzed in this study—achieved by energy taxes could be a very important target and could justify the recourse to this tool.*

KEYWORDS: *Interindustry model, social security contributions, taxation*

1. Introduction

Social security contributions have always been an important issue of economic debate in Italy, particularly with respect to industrial policy towards firms and their choices about the inputs of production. During the past three decades, several proposals have been put forward to change the structure of the Italian fiscal system as a whole but, too often, they gave way to occasional measures aimed more at raising additional revenue than at correcting the economic distortions of the system. In the debate about the tax wedge on labour cost, attention has generally concentrated on the part of the tax wedge that consists of mandatory social security contributions (SSC) levied on employers and employees.[1] These contributions might be considered as earmarked taxes, because they play a fundamental role in financing the retirement programme and the National Health Care Service (NHCS).

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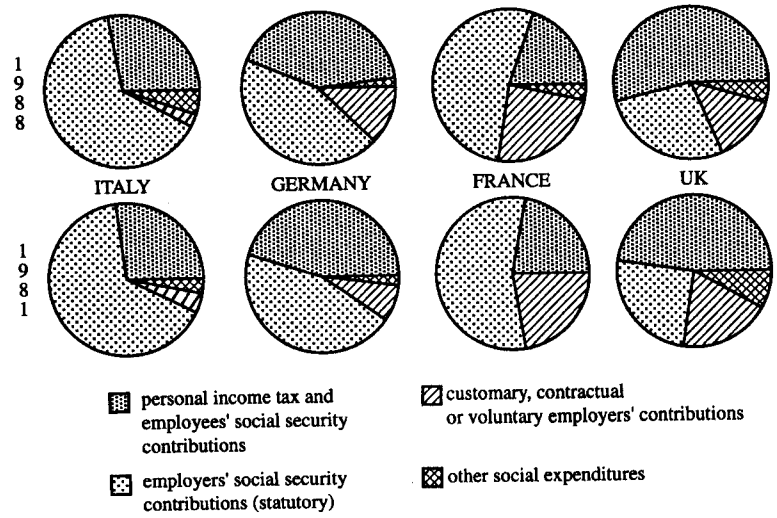

Figure 1. Structure of tax wedge on labour cost for manufacturing industries. *Source*: Bank of Italy (1990). These charts are based on the official data of an annual report of OECD, *The Tax and Benefit Position of Production Workers*, as far as personal income taxes and employees' SSC are concerned. Employers contributions and other expenditures are collected in a survey periodically carried out by EUROSTAT (*Labour Costs*). The 1988 labour cost survey is the most recent one available at present (EUROSTAT, 1988).

This paper is concerned with an empirical analysis of the economic effects that a cut in health contributions paid by employers (EHC) would bring about, including (but not limited to) effects on prices, output and international trade flows. An estimate of these effects is an essential element for the decision on whether or not a substitution of social contributions is advisable, not to mention deciding on what scale and with recourse to which compensative measures.

The Italian tax wedge on labour cost is one of the highest in Europe (Figure 1), and has considerable influence over the labour market and the level of unemployment. It has been noticed that the model of development of the European Union is characterized by a low employment of labour and an intensive use of natural resources (European Commission, 1993).

The 'recipe' suggested to orient the market towards a higher demand of labour and reduced environmental damage is a change in the relative prices of production factors. This can be achieved by increasing the fiscal burden on the use of natural resources and decreasing taxes on labour. With this perspective, it has been asserted that an energy/carbon tax could play a major role. Such a tax can be a practical device to gain a 'double dividend'. A more efficient use of energy products is induced and pollutant emissions are reduced, so improving environmental conditions. The second benefit is that new jobs could be created by lowering the cost of labour. According to the EC Commission proposal, the introduction of a carbon tax should be accompanied by measures to ensure that the principle of tax

Table 1. Tax revenues expressed as a percentage of GDP at market prices

	Total tax revenue		Personal income taxes		Social security contributions: Employees		Social security contributions: Employers		All other taxes	
	1990	1993	1990	1993	1990	1993	1990	1993	1990	1993
Austria	41	n.a.	9	9	6	6	7	7	20	21
Belgium	45	46	14	n.a.	5	n.a.	10	n.a.	16	n.a.
Denmark	49	50	26	26	1	1	0.3	0.3	22	22
Finland	45	47	17	17	0.5	2	9	11	18	17
France	44	44	5	6	6	6	12	12	21	20
Germany	37	40	10	11	6	7	7	8	14	14
Greece	37	n.a.	5	n.a.	5	n.a.	6	n.a.	22	n.a.
Ireland	35	37	11	12	2	2	3	3	19	20
Italy	39	43	10	10	2	3	9	9	17	21
Luxembourg	49	n.a.	12	n.a.	5	n.a.	7	n.a.	25	n.a.
The Netherlands	45	48	11	12	10	12	3	3	20	21
Portugal	31	31	5	6	3	n.a.	5	n.a.	18	n.a.
Spain	34	35	7	8	2	2	9	9	16	15
UK	37	34	11	10	2	n.a.	4	n.a.	20	n.a.

Source: OECD (1994).

neutrality is respected. In particular, the White Paper stresses the opportunity to pursue reduced unemployment by a substantial cut of SSC that is financed by energy/carbon tax revenue.

Among the EC countries, social contributions are very high and, on average, have increased their share of GDP during the last two decades. On this basis, the White Paper presents a new strategy to solve the environmental problem and labour unemployment, with a long-term policy where the use of environmental taxes must be seen with reference to wider reforms of national tax systems. A picture of tax revenues in Europe at the beginning of the 1990s can be found in Table 1.

This international perspective is very important for an understanding of why a general consensus is forming—at the European level—on the opportunity of implementing policies that decrease labour cost in EC countries. Therefore, the reduction of a fundamental component of the tax wedge with high distortive effects is not a national problem and, moreover, can be seen in the framework of a more general reform of the fiscal system. In fact, the compensative measure suggested by the White Paper, i.e. an energy/carbon tax, is only one among a number of options concerning the measures that accompany a health contributions cut.

In the present study, three tax alternatives are considered and simulated. To perform the simulations, a dynamic multi-sectoral model is used: INTIMO (INTerindustry Italian MOdel). This model has been developed by Grassini (1983) and it is the Italian member of INFORUM (Interindustry Forecasting Project University of Maryland)—a system of national multi-sectoral models (Almon, 1991) linked by an international trade model. An approach based on multi-sectoral modelling has the appeal of allowing a detailed estimation of sectoral economic effects. Moreover, INTIMO is very well suited to the task of performing a fiscal manoeuvre, because the model has previously been developed and

Table 2. Legal rates of health contributions in 1994

	Rate on income less than 40 million lire	Rate on income from 40 to 150 million lire
Wages and salary	10.6	4.6
Employer	9.6	3.8
Employee	1.0	0.8
Other labour income	5.6	4.6
Pensions	0.9	0.4
Other income	5.6	4.6

employed to estimate several indirect taxes policies (Bardazzi, 1992; Bardazzi & Piacentino, 1993; Bardazzi *et al.*, 1991a,b, 1994).

Section 2 briefly introduces the policy problem: what has been done in the past about SSC; the present framework; and the distribution of employers' contributions among economic activities. Section 3 puts forth and discusses several alternatives that offset the revenue problem caused by a cut in health contributions. In Section 4, the relevant features of the model are briefly outlined. Section 5 presents the simulation scenarios. Finally, in Section 6, macro-economic and sectoral results are shown and commented on.

2. Health Contributions: The Policy Problem

In Italy, health care is heavily provided by public programmes. The NHCS, founded in 1978, is financed by the National Health Care Fund (NHCF). In 1993, about 59% of the NHCF[2] came from social contributions, 39% was funded by state general revenues and the remainder (2%) by regional funds. The tax is levied on wages and salaries, as well as on other labour income, pensions, proprietor income, dividends and interest income. Legal tax rates on the different types of income are shown in Table 2.

In 1993, half of the contributions were provided by the tax on wages and salaries, while only about 10% of the total NHCF came from other labour income. As can be seen in Table 2, employers contribute the bulk of health taxes, since they are required to pay contributions as part of total labour compensation. Since the tax is levied on virtually all working Italians, discussions on the health contributions issue tend to stress the growing contrast between a health care service characterized by 'universal coverage' of services produced—where beneficiaries include non-working persons, such as the elderly, the disabled and persons with chronic illness—and the 'insurance approach' of the financing system—where the tax is levied against only those persons with income.

From a theoretical point of view, the design of a new funding system has to be based on a clear interpretation of contributions: they can be considered either as a tax or as the price for a public service (Di Biase & Di Marco, 1994). In the current debate, the thesis of contributions as taxes is based on the principle of contributory capacity. According to this approach, there is no clear link between contributions paid and benefits received, so the social security system is part of the general fiscal system. However, a different approach leads to an opposite conclusion. If the principle of benefits is applied, then there should be a strong correlation between contributions paid and benefits received by an individual over his/her life cycle.

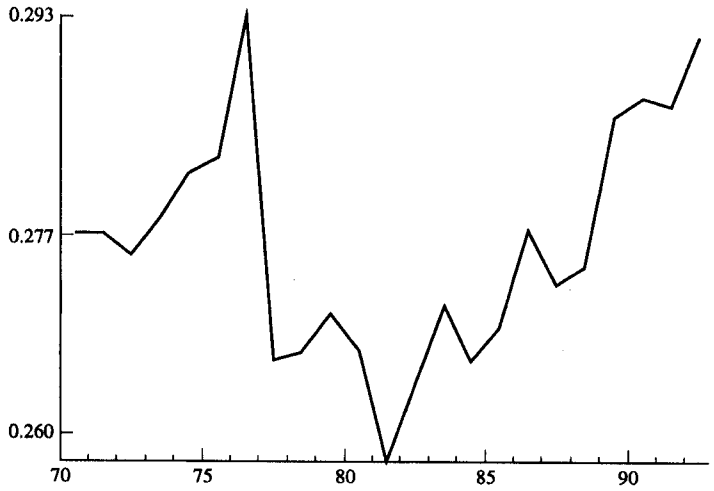

Figure 2. Average employers' share of SSC over labour cost from 1970 to 1992.

In the Italian social security system, the link between SSC and benefits for individuals is very weak. In the case of pension schemes, the link between the burden of contributions and expected benefits is somehow detectable, though unclear. In the case of health contributions, the current situation is a mix of technical rules inspired by both criteria, so that there is a broad consensus towards shifting the NHCS financial burden to general revenues and away from the social security system. Moreover, the Law 833/1978 that set up the NHCS, provided a design for the near future for funding the system out of the general budget ('budget approach'). The rationale of this proposal is the principle that health care is provided for all citizens but is mainly financed by only a portion of citizens—by all working Italians who pay health contributions. This switch to general budget financing has never been realized but it has justified many tax reliefs, some changes of contributions rates and several new proposals aimed at finding the best way of financing social expenditures.

Figure 2 shows the aggregate share of SSC (health and pension contributions) paid by employers with respect to total labour costs.[3] It is easy to see that, at the end of the 1970s (1977–81), the burden of contributions decreased, as a result of tax relief for most industries and services. These interventions were aimed at helping exporters recover their international competitiveness in a period of 'stagflation', with a flexible exchange rates regime and a mechanism of formal indexation of wages and salaries to the inflation rate.

Looking at the sectoral level, there were some economic activities that received the most benefit from the tax relief: energy- and mining-related industries, as well as chemical, machinery and some non-machinery manufacturing industries (leather and shoes, rubber and plastics products), while services received little of the benefit.[4]

During the 1980s, the policy of tax relief was reversed and the average share of contributions over labour cost gradually increased. This policy change was due, in

Table 3. Employers' SSC by sector (share over total nominal value)

Sector	Employers' SSC
Total	100.0
1 Agriculture, forestry, fishery	0.8
Industries (sectors 2–26)	32.3
Energy products (sectors 2–5)	1.9
2 Coal	0.0
3 Coke	0.0
4 Petroleum and refining	0.3
5 Electricity, gas, water	1.6
Manufacturing industries (sectors 7–26)	25.6
7 Ferrous and non-ferrous ores	1.1
8 Non-metal minerals, min. products	2.1
9 Chemicals	2.4
10 Metal products	2.3
11 Agric. and indust. machinery	2.9
12 Office, precis., opt. instruments	0.6
13 Electrical goods	2.2
14 Motor vehicles	1.2
15 Other transport equipment	1.0
16 Meat	0.3
17 Milk and dairy products	0.2
18 Other foods	1.1
19 Non-alcoholic, alcoh. beverages	0.2
20 Tobacco	0.1
21 Textiles and clothing	2.9
22 Leather and shoes	0.8
23 Wood and furniture	1.1
24 Paper and printing products	1.7
25 Rubber and plastics products	1.2
26 Other manufact. products	0.2
Construction	4.8
27 Construction	4.8
Hotels and trade (sectors 28–30)	10.1
28 Recovery and repair services	0.8
29 Trade	8.1
30 Hotels and restaurants	1.2
Transports and communications (sectors 31–34)	6.9
31 Inland transport	3.5
32 Sea and air transport	0.3
33 Transport services	0.8
34 Communications	2.3
Services (sectors 35–40)	14.6
35 Banking and insurance	6.0
36 Other private services	5.6
37 Real estate	0.0
38 Private education services	0.5
39 Private health services	0.8
40 Recreation and culture	1.7
Government (sectors 41–44)	35.0
41 Government services	15.4
42 Public education	12.5
43 Public health	5.6
44 Domestic servants	1.5

Note: Sector 6 covers nuclear fuels. Because of the government's anti-nuclear policy, this sector is empty in Italy.

part, to EEC pressures on national governments to avoid distortions to international competition in the Common Market. For Italian policy-makers, however, the most important reason for the policy change was the need for higher fiscal revenues to finance public expenditures. The problems of a high tax wedge on labour cost and increasing unemployment made the issue of funding the NHCS through general revenues even more relevant than before. Although the devaluation of the lira in 1992 resulted in an Italian trade surplus, and additional help in recovering international competitiveness is unnecessary, a change in health-care funding is strongly desired to increase labour employment and to achieve better equity in financing the health care service. At present, there is a broad consensus in considering the system as part of a network of transfers between individuals along with the rest of the fiscal system. Therefore, a shift towards a 'budget approach' in financing health care might be a better solution.

From the point of view of firms, social contributions distort the capital–labour decision. The social security burden, being a part of labour costs, increases the price of labour relative to the price of capital and increases employers' incentives to adopt labour-saving techniques—decreasing the demand for labour. One important point must be stressed here: whether or not the tax burden shouldered by employers should be considered a production cost depends on the assumption regarding the tax incidence of the contributions. Firms might shift the tax wedge on to prices, wages paid to workers, or some combination of the two. In the latter case, the result is lower wages net contributions and reduced demand for labour. Shifting the tax burden on to wages is rather unlikely, because of trade unions' focus on net real wages. For this reason, econometric models typically assume that employers' SSC translate into higher prices.

According to the above argument, firms perceive SSC as an indirect tax that increases labour costs. However, health contributions paid by employees and self-employed workers are perceived as income taxes, because the base on which contributions rates are applied is the gross wage. Starting from this, it might be of some interest to observe the distribution of employers contributions among economic sectors, as shown in Table 3.

In 1993, non-market services (government) bore 35% of the total SSC. This result was expected, given the high level of employment in the public sector. Manufacturing industries (sectors 7–26) account for 25.6% of the total yield, while energy products—where the number of workers is very low and production is almost entirely imported—contributes only 1.9% to the total. Finally, the relatively high contributions paid by trade, banks and insurance services, and by construction must be noted. As we have already seen in Table 2, the weight of social contributions over wages is very high for the banking sector, since it is a labour-intensive activity. However, in the case of trade and construction, most contributions are paid on the basis of various rates applied over non-wage and salary forms of labour income. This analysis can also be supported by the sectoral ratio of wages and salaries over value added at factor cost, as shown in Table 4.[5]

In general, the mechanical industry as well as the iron and steel industry have higher ratios than most of the other manufacturing sectors and service sectors.[6] This piece of information will be very important when we switch the tax base from wages and salaries (the current base for the employers' social contributions share) to a tax base using total value added (where a tax on firm's value added has to be applied). In fact, in this respect, it can be argued that, *ceteris paribus*, those sectors with a ratio of wages and salaries over value added that is above the average will

Table 4. Labour compensation share of value added at factor cost in 1993

Sector	
1 Agriculture, forestry, fishery	0.262
2 Coal	0.071
3 Coke	0.088
4 Petroleum and refining	0.310
5 Electricity, gas, water	0.426
7 Ferrous and non-ferrous ores	0.418
8 Non-metal minerals, min. products	0.449
9 Chemicals	0.389
10 Metal products	0.392
11 Agric. and indust. machinery	0.454
12 Office, precis., opt. instruments	0.427
13 Electrical goods	0.586
14 Motor vehicles	0.496
15 Other transport equipment	0.377
16 Meat	0.310
17 Milk and dairy products	0.299
18 Other foods	0.268
19 Non-alcoholic, alcoh. beverages	0.589
20 Tobacco	0.352
21 Textiles and clothing	0.370
22 Leather and shoes	0.294
23 Wood and furniture	0.374
24 Paper and printing products	0.395
25 Rubber and plastics products	0.347
26 Other manufact. products	0.315
27 Construction	0.198
28 Recovery and repair services	0.191
29 Trade	0.190
30 Hotels and restaurants	0.358
31 Inland transport	0.348
32 Sea and air transport	0.258
33 Transport services	0.330
34 Communications	0.344
35 Banking and insurance	0.309
36 Other private services	0.000
37 Real estate	0.293
38 Private education services	0.161
39 Private health services	0.155
40 Recreation and culture	0.683
Government services and others (sectors 41–44)	0.829

benefit the most by a substitution between social contributions and a tax on value added.

3. Designing Tax Alternatives

The proposal to cut health contributions has always been accompanied by the design of a number of alternative NHCS financing options. Obviously, the actual situation of the Italian national budget does not allow the financing of such a revenue reduction by increasing the public deficit. Therefore, if it is necessary to neutralize the revenue effects of the contributions cut, then there are many ways to achieve this neutralization. Here, indeed, choice is wide, because many of the existing taxes could be increased or new taxes could be introduced to satisfy the revenue loss. In the present study, three different revenue-raising alternatives are considered:

(1) an increase in the existing energy tax;
(2) an increase in existing value-added taxes (VAT);
(3) a new tax on the value added produced by firms (TVA).

All these revenue-raising alternatives are imposed to recover the revenue lost by the cut in health contributions.

All three alternatives have been put forward during the NHCS reform debate, as well as alternatives that involve changes in income taxation and radical reform of the present system of contributions. At the international level, different proposals have also been developed by several institutions (OECD, 1993; EC, 1993; IMF, 1994) to reduce labour costs and unemployment, and to finance social security by compensative measures, including VAT, income taxes and environmental taxes.

3.1. *Energy Taxes*

As far as the European Community is concerned, special attention has been devoted to the introduction of an energy/carbon tax. With such a tool, European countries could gain a double pay-off. On the one hand, energy consumption could be reduced along with CO_2 emissions; on the other hand, the additional revenue could be given back to the economic system, by relieving social contributions and encouraging employment. Furthermore, an energy/carbon tax shows another distinctive feature: it is a good automatic stabilizer of the economy. In fact, the pattern of energy consumption tends to follow the economic cycle, so the tax yield will increase in the case of inflation and decrease during economic recessions (Bardazzi & Piacentino, 1993; Bardazzi *et al.*, 1994). In the present context, we increase the existing excise taxes on energy products to compensate for the decline in health contributions. This has been done without paying attention to the pollutant content of different fuels.

From a more practical point of view, this fiscal manoeuvre presents some problems. Firstly, the tax base of energy taxes is smaller than the social contributions tax base; therefore, to minimize the deadweight loss, this fiscal measure should be combined with the increase of some other tax. Secondly, as well as the distributional effects on private income, Italian firms will bear a substantial increase in their production costs because they absorb around 80% of the energy products. Therefore, we might anticipate that increased energy taxes will partially offset the expected positive effects on production costs of reduced labour costs that result from the decrease in contributions. The effect of the total 'package' strongly depends on the labour and energy intensities of sectors, and there are likely to be 'winners' and 'losers' at the sectoral level.[7]

3.2. *VAT*

In the perspective of a European Common Budget, a VAT is the fundamental revenue-raising tool among the taxes used by EC countries. The VAT has been heavily criticized since its introduction more than 20 years ago, but its working

mechanism has many advantages and the Italian fiscal system relies on the VAT yield to cover a large share of total fiscal revenue.

In the modern public finance literature, a consumption tax that raises savings is often recommended for situations where investment demand exceeds the supply of funds. For such a situation, a VAT is the natural way out. Here, we are not going to examine the characteristics and problems connected with a VAT, but there is some information about its economic effects that can be useful in interpreting the results of the present analysis.[8]

In the Italian VAT, as well as in some other European VATs, there is a difference between the so-called 'ideal' VAT and the effective working mechanism of the tax. Given the current structure of the VAT, the VAT does not correspond exactly to a consumption tax as far as the economic effects of the two taxes are concerned. This is because, under the VAT, the final consumer is not the only taxpayer of the tax. In fact, several specific tax rules—exemptions, partial deductions or special 'forfeit' systems—introduce barriers that make VAT non-deductible. Because of these tax rules, a consistent tax share (about 25% of the total yield) is borne by the intermediate consumption and investment of some important sectors: banking and insurance, health services and transports. This knowledge has to be taken into account in the empirical analysis of the economic impact of VAT on prices, output and consumption levels. The price equation in INTIMO deals correctly with modelling VAT on intermediate as well as final flows (see Bardazzi *et al.*, 1991a).

3.3. TVA

An alternative proposal for financing a health contributions cut is the introduction of a new tax on firms' value added (TVA), aimed at transferring the cost of financing the NHCS from a single value-added component—wages and salaries—to the total value added at factor cost—wages and salaries, profits and other incomes. The advantages of this tax rely on a wider tax base that allows low rates and also affects some economic sectors traditionally exempted from VAT. Generally speaking, the features of TVA are those of a tax on value added collected by the 'accounts method'. In this case, each firm computes its tax as sales minus purchases of intermediate and capital goods. However, in the debate surrounding the proposal, different versions have been considered to assimilate the tax base either to the VAT base or to the income tax base. In Italy, this issue has been part of the national fiscal system reform debate since the 1960s (Longobardi, 1992; Ceriani *et al.*, 1994) and a kind of TVA was part of a bill before Parliament in 1987 (Proposta di Legge Visco *et al.*, 1987).

In this design, the tax base was determined by the value-added consumption type obtained from the difference between the value of total sales and the value of intermediate consumption and investment, which equals—at the aggregate level—final demand plus imports minus exports and investments. A tax designed in this way was adopted in Denmark for 4 years and was dropped in favour of a VAT with higher tax rates. This decision came along with the EC directives about the future European fiscal system: VAT should be the only general tax on consumption applied by Community members. Despite this EC directive, TVA is one of the most popular alternatives for reducing SSC, although the serious criticism that made policy-makers prefer VAT 20 years ago still persists today. As a means of avoiding a possible European veto on an Italian TVA that would influence international competitiveness by exempting exports and taxing imports, a TVA based on the sum of the compensation of production factors could be designed. For the purpose of this study, the tax base of the TVA has been computed at the sectoral level as the sum of wages and salaries, profits and other income—depreciation included—minus exports. The tax rate has not been applied when the sectoral value of exports exceeded the sum of income to avoid the creation of tax credits and the consequent problem of refunds.

4. The Model: Some Distinctive Features

The model used to perform the simulations is an internationally linkable, dynamic, interindustry model: INTIMO. INTIMO is the Italian partner of the international system of multi-sectoral models called INFORUM and it has been developed by Grassini (1983, 1995).[9]

INTIMO is a modern input–output (IO) model: it could be referred to as an 'integrated IO plus econometric model', according to the classification proposed by West (1995). The aim of this approach is to conjoin the detailed sectoral disaggregation and econometric techniques to imitate as closely as possible the way that the economy behaves.

It is an interindustry model with a detail of 44 sectors: the industry disaggregation plays a central role in the model's causation that runs from the industry detail to the macro-economic totals (bottom-up approach). The model has two component parts: (1) the real side and (2) the nominal side. The essential work of the real side of the model is to solve the standard IO equation

$$\mathbf{q} = \mathbf{A}\mathbf{q} + \mathbf{f}$$

where $\mathbf{q}$ is a vector of sectoral outputs. $\mathbf{A}$ is an IO coefficients matrix and $\mathbf{f}$ is a vector of final demand. The IO coefficients change over time as functions of trends.

There are many components of final demand and most are estimated by regression-based behavioural equations, such as private consumption expenditures, investments, imports, exports and inventory changes. Government purchases are exogenous.

Personal consumption equations are estimated for 40 categories of expenditures defined by the Italian Statistical Office (ISTAT). The expenditure categories are translated into sectors using a bridge matrix supplied by ISTAT. From cross-sectional data, elasticities with respect to disposable income are computed. Then, by using time series data, personal consumptions are estimated as functions of changes in real income, relative prices and trends. The model is not yet well developed on the income side, where the disposable income is assumed to be exogenous, allowing the evaluation of substitution effects but not of income effects in personal consumption equations.

Investment equations are estimated for 23 sectors of investors (using National Accounts statistics). The demand for capital goods is supposed to be the sum of investment for replacement and net investment. The replacement component of investments is supposed to be related to the capital stock, while net investments depend on changes in outputs in the form of a distributed lag over 3 years.

The foreign sector is based on 26 equations for imports and exports of commodities, and about 11 equations for imports and exports of services. Exports of commodities are a function of foreign demand and relative prices, while exports of services are assumed to be proportional to foreign demand. Imports are a

function of product-specific domestic demand and relative foreign-to-domestic prices. The INFORUM international system contributes some of these explanatory variables, such as foreign demands and foreign prices for imports and exports.

The model is dynamic—variable IO coefficients, investments as a function of output—and the solution is iterative, because three sets of equations have to be solved together: output, imports and inventories.[10] Labour productivity is estimated as a function of trends and changes in output; then, employment is determined by labour productivity and output.

The bulk of the work of the price side is to solve the dual equation

$$\mathbf{p}=\mathbf{A}'\mathbf{p}+\mathbf{v}$$

where $\mathbf{p}$ is a vector of sectoral production prices and $\mathbf{v}$ is a vector of value added per unit of output. Prices are measured as price indexes and the base year is the same as that of the IO table; prices out of the base year vary according to the value added per unit of output vector and according to the changes in matrix $\mathbf{A}$.

The sectoral inputs requirements can be domestic or imported, so the cost of intermediate consumptions has to be computed by using different prices for domestic and foreign resources. The price equation can be better specified as

$$\mathbf{p}=\mathbf{H}\mathbf{p}+\mathbf{T}\mathbf{p}^{m}+\mathbf{v}$$

where the elements of $\mathbf{H}$ and $\mathbf{T}$ represent the sectoral ratios of domestic and foreign inputs over output by sector. The vector of import prices $\mathbf{p}^{m}$ is exogenous to the national model.

As in the real side of the model for the final demand, in the price side, the value added can be split in many components: wages, gross operating surplus, indirect taxes and subsidies. Most of these are estimated using behavioural equations, and the explanatory variables can be truly exogenous or endogenous, because they are assumed *a priori*, or computed in the real side or in the nominal side of the model. For instance, the vector $\mathbf{p}$ is an explanatory variable for wages when a formal or informal price indexation is assumed; the labour cost is linked to changes in output that explain labour productivity; profits are specified as a function of a price term and changes in output, along with a mark-up price formation, such that profits in turn take part in the producers' price determination. Such specification is possible in a modern IO model, because of integration and simultaneity of the real and nominal sides: if a price changes, then output also changes, affecting productivity, wages and finally changing prices again. This is a key feature for dealing properly with indirect taxes. Because these variables affect price formation, they are modelled in the nominal side; however, endogenous changes in outputs are extremely important to evaluate tax yields, since they modify the tax base where tax rates are applied.

According to the INFORUM approach to interindustry modelling (Almon, 1991) INTIMO has fully integrated real and nominal sides, so the original IO and price equations can be rewritten as

$$\mathbf{q}=\mathbf{A}\mathbf{q}+f(\mathbf{q}, \mathbf{p}, \mathbf{z}_f)$$

$$\mathbf{p}=\mathbf{H}\mathbf{p}+\mathbf{T}\mathbf{p}^{m}+v(\mathbf{p}, \mathbf{q}, \mathbf{z}_v)$$

where $\mathbf{z}_f$ and $\mathbf{z}_v$ are the variables that are assumed to be exogenous to the model, while the endogenization of many final demand and value-added components allows the meaningful introduction of prices and quantities as endogenous explanatory variables of both equations.

INTIMO has been described in a number of papers and has been previously employed and improved to simulate the effects of fiscal manoeuvres that involve indirect taxation.[11] A quantitative approach based on a multi-sectoral model to analyze the effect of substituting different indirect business taxes for EHC is appealing and interesting. One can look at the difference in the economic impacts for individual industries and trace them back to the different input requirements by sector. The cost of production is affected by the policy in two ways. Firstly, the labour cost will be lowered by the reduction in health contributions, so that prices will decrease. Consequently, the competitiveness of domestic products is improved, and exports and total domestic output increases; unemployment will fall, because the level of employment is a function of changes in output. On the nominal side, wages will be decreased, because of an informal indexation to prices, and this will have another influence on prices. Secondly, an indirect tax rate is increased to make the policy budget-neutral. This will produce the same chain of impacts described above but with opposite sign. *A priori*, we do not know whether there will be a higher or a lower total cost of production, and this will certainly be sectoral specific.

INTIMO can evaluate changes in the main macro-economic variables and can estimate the industry impacts, whereas it does not allow the analysis of the welfare implications of any policy, because the income distribution is not specified. Therefore, the study of these effects is beyond the scope of this work. The features of INTIMO allow us to analyze some important aspects of the problem and these results might be of some interest to the debate. The following sections are devoted to explaining the potential of our database and how this interacts with the model.

4.1. *Contributions Cut at Sectoral Level*

SSC are a component of value added at factor cost. They are variable across time and economic sectors, as we have already shown in Section 2. The sectoral detail of our database allows us to manipulate health contributions either over specific sectors or for a group of sectors, such as the manufacturing industries.

4.2. *Old and New Indirect Taxes*

Most of the literature on indirect taxes deals with the aggregate macro-economic effects of fiscal manoeuvres over final demands, without paying any attention to intermediate consumption, although interindustrial flows represent an important share of the total tax base. Therefore, the impact on prices of a change in excises, such as taxes on energy products, can only be evaluated correctly by modelling intermediate flows; otherwise, the inflationary effect will be underestimated, for example.

A similar problem arises with the VAT. To take into account the effect of non-deductible VAT, it is necessary to apply the tax rates not only to final private consumption flows but also to the intermediate consumption and investment of those sectors—banking and insurance, transports, public health—that are not liable for deducting VAT paid on their inputs of production.

As far as TVA is concerned, within a multi-sectoral model such as INTIMO, the determination of the tax base, i.e. the value-added of the firm as the sum of wages and salaries, profits and other income minus exports, is very straightforward. The sectoral tax base is determined by the level of sectoral output and the

dynamics of value-added components. By applying TVA rates to the tax base we can compute the impact on price formation.

In general, within INTIMO, indirect taxes influence price formation, through the producer price equation. Furthermore, there is an additional impact on prices that is produced outside this equation, because these taxes also apply to the final demand components. In this respect, their impact is mainly on the cost-of-living index and, through this variable, there is a connection between the real and nominal sides of the model. In fact, this index drives wages (by means of formal or informal indexation) so that the inflationary effect on prices has a feedback to the value added, by increasing this component of the tax base. Simultaneously, prices affect real variables through demand equations (consumptions, imports and exports) and these variables exert their effects on the nominal side, as in any modern IO model. This chain of indirect tax effects on aggregate and sectoral economic variables must be noted when policy simulations results are presented in the following.

5. Simulation Scenarios

It is necessary to discuss briefly some of the assumptions that were made, together with the methodology followed for their implementation. The baseline scenario has been designed to represent the evolution of the current situation without any EHC cut. The rates of excises and VAT have been fixed at their level in 1993. For the purpose of this study, 1995 has been chosen as the simulation horizon. From a technical point of view, it would be easy to extend the projection horizon to any period, but the strength of the model's design lies in that it attempts to capture the short-term rigidities in the inputs and labour market that originate from the slow substitution between different factors of production.

To perform a contributions reduction, the first step has been to run the model and compute the revenue drop. If it is decided to pursue the budget neutrality, then we need to calibrate the tax rates to reach this target. We recall that the fiscal revenue, given the rate, arises from a tax base that is the product of two factors: price and quantity. Because prices influence quantities, and vice versa, a tax rate change might modify the tax base through both factors. This is of paramount importance when we apply an *ad valorem* tax such as VAT or TVA. Furthermore, the evolution of a tax base is even more unpredictable in an open economy. This is why the calibration of tax rates for the budget neutrality is approximate: the total tax yield obtained when the process of model iterations converges to a solution is always different from the result of the first iteration. Therefore, the calibration of tax rates requires several trial attempts to be accurate.

The reduction of employers' health contributions has been simulated for the whole economy (Case A), for the industrial sectors only (Case B) and for a group of manufacturing sectors (Case C).

Case A has been simulated only as a reference hypothesis, without any financing coverage, to evaluate the total amount of the contributions reduction. For an economy-wide reduction, the cut should be around 39 300 billion lire, according to the revenue computed for 1995. The time horizon of our exercise is 1 year. Therefore, raising the indirect taxes discussed above to raise the revenue lost by the contributions cut is infeasible in the short term. Increasing the budget deficit also is not feasible. For this reason, we have devoted our attention to contributions relief in a restricted group of sectors where the contributions relief is financed by one of the taxes discussed above.

In Case B, energy sectors and the manufacturing industries receive contributions relief (sectors 2–26). The share of health contributions paid by these sectors in 1993 was about 28% of the total yield, which corresponds to 13 200 billion lire. This is the amount of the contributions cut in this case.

Finally, a contribution relief solely to the manufacturing industries (sectors 7–26) is considered in Case C. In 1993, this group of sectors paid 26% of the health contributions, so the cut would be around 12 300 billion lire. This amounts to approximately 6% of the total contributions.

As we can see, the difference between these two scenarios is very small, because the number of workers employed by the energy sectors is very small. Therefore, for the purpose of this study, we have decided to simulate alternative hypotheses of financing coverage with reference to Case C, i.e. a cut of health contributions paid by manufacturing industries will be neutralized in terms of the national budget by an increase in indirect taxes on the whole economy.

Three different hypotheses of coverage have been simulated: an increase in energy taxes (Case D); the introduction of a tax on a firm's value added, or a TVA (Case E); and an increase in VAT (Case F). Thus, the four scenarios that we will discuss consist of the following:

Case C. A cut in contributions for manufacturing sectors only (sectors 7–26), without an increase in any taxes to offset the contributions cut.

Case D. An increase in energy taxes that leaves the cuts simulated in Case C budget neutral, i.e. the energy taxes increase revenue by the amount that the contributions cut decrease revenue.

Case E. The introduction of TVA that leaves the cuts simulated in Case C budget neutral.

Case F. An increase in VAT that leaves the cuts simulated in Case C budget neutral.

5.1. *Tax Base Used in Alternative Simulations*

For energy tax simulation Case D, we were able to modify tax rates on the following energy products:

- petrol;
- diesel oil (used for transport and heating);
- lubricating oil;
- heavy fuel oil;
- liquid petroleum gas (used for transport and heating);
- natural gas.

For the TVA simulation in Case E, the tax base was calculated at the sectoral level, by deducting from the value added at factor cost the amount of exports. The new tax rate was assumed to equal the base tax rate plus 1% to achieve approximate budget neutrality with regard to Case C.

For the VAT simulation in Case F, we changed the structure of VAT rates as follows:

- reduced and normal VAT rates (13% and 19%) were increased to a new higher rate of 20%;
- reduced rates of 4% and 9% were increased to 10%.

Table 5. Macro-economic indicators for reduction of health contributions with financing coverage, shown as deviations of annual growth rates from baseline scenario

Indicator	Case D	Case E	Case F
Gross domestic product (1988 prices)	0.11	0.07	0.18
Gross fixed investment	0.60	0.12	0.40
SSC	−6.21	−6.15	−6.22
Indirect taxes	11.69	0.26	0.05
Non-deductable VAT	0.92	0.35	9.59
Employment	0.08	0.02	0.06
Index of wages and salaries	0.46	0.62	0.47
Index of producer prices	0.34	0.27	−0.63
Private consumption expenditure	0.53	0.62	0.46

Thus, instead of four different rates, our scenario will simulate a VAT system where transfers of goods and services are taxed at either 10% or 20%.

5.2. *Macro-economic Results*

As a first important result, the reduction in the contributions yield related to Case C has been computed to determine the budget-neutral indirect tax rates required in the other three simulations. The cut in health contributions in the manufacturing industries reduces the tax yield by 12 270 billion lire. The higher tax rates that we impose in Cases D–F yield approximately this revenue, so achieving a fiscal neutral solution.

Macro-economic results are summarized in Table 5 as deviations of annual growth rates from a baseline scenario. The baseline scenario assumed that there was no change in the structure of health contributions.

In Case D, the indirect taxes on energy increase by about 12% to cover the contributions cut. In Case F, the VAT yield increases by 9.6%. The percentage deviation change from the baseline in Case E for the TVA yield cannot be represented in Table 5, because TVA does not exist in the baseline. In terms of absolute values, the introduction of a TVA with a rate of 1% produces a nominal yield of 12 266 billion lire. It is interesting to note that the VAT yield increases when either energy taxes or TVA are increased, because VAT rates are applied over a tax base that includes indirect taxes. Therefore, a fiscal neutralization of a contributions cut could be achieved with lower tax rates, because of the nominal increase of the VAT base.

The alternative scenarios produce aggregate effects that are not surprising if we look at the signs of the deviations, although their relative differences must be stressed to understand the economic impact of the alternative forms of financing the contributions cut. Because the contributions cut and the corresponding tax increase have an immediate impact on the nominal variables of the economy, the analysis of results begins with the price indexes shown in Table 5.

By comparing Cases D and F, we see that the producer price index is lower if we finance the contributions cut with the VAT than with increased energy taxes. In addition, Case F has a lower producer price index than the baseline scenario. This result is explained by the model of producer price determination. Because of

Table 6. Effects on sectoral outputs, shown as deviation in annual growth rate from baseline scenario

Sector	Case D	Case E	Case F
Total	0.18	0.09	0.19
1 Agriculture, forestry, fishery	0.12	−0.09	0.08
Industries (sectors 2–26)	0.20	0.22	0.28
Energy products (sectors 2–5)	−1.39	0.16	0.10
2 Coal	0.00	0.00	0.00
3 Coke	0.44	0.31	0.48
4 Petroleum and refining	−1.97	0.12	0.07
5 Electricity, gas, water	−0.47	0.21	0.12
Manufacturing industries (sectors 7–26)	0.41	0.22	0.31
7 Ferrous and non-ferrous ores	0.39	0.20	0.32
8 Non-metal minerals, min. products	0.49	0.18	0.42
9 Chemicals	0.18	0.18	0.20
10 Metal products	0.68	0.35	0.58
11 Agric. and indust. machinery	0.63	0.39	0.57
12 Office, precis., opt. instruments	0.39	0.19	0.29
13 Electrical goods	0.36	0.26	0.31
14 Motor vehicles	0.82	0.23	0.24
15 Other transport equipment	1.47	0.98	1.26
16 Meat	0.10	0.00	0.13
17 Milk and dairy products	0.09	−0.02	−0.11
18 Other foods	0.13	0.01	0.06
19 Non-alcoholic, alcoh. beverages	0.11	−0.07	0.00
20 Tobacco	0.03	0.09	−0.11
21 Textiles and clothing	0.13	0.11	−0.04
22 Leather and shoes	0.42	0.30	0.55
23 Wood and furniture	0.61	0.26	0.54
24 Paper and printing products	0.33	0.23	0.25
25 Rubber and plastics products	0.36	0.27	0.41
26 Other manufact. products	0.17	0.10	0.14
27 Constructions	0.50	0.01	0.32
Hotels and trade (sectors 28–30)	0.06	0.05	0.09
28 Recovery and repair services	−1.08	−0.02	0.17
29 Trade	0.25	0.10	0.11
30 Hotels and restaurants	0.10	−0.10	0.00
Transports and communications (sectors 31–34)	0.25	0.13	0.12
31 Inland transport	0.47	0.12	0.16
32 Sea and air transport	0.15	0.04	0.04
33 Transport services	−0.22	0.06	0.13
34 Communications	0.17	0.31	0.07
Services (sectors 35–40)	0.20	−0.16	0.09
35 Banking and insurance	0.01	0.04	0.14
36 Other private services	0.23	0.06	0.17
37 Real estate	0.43	−0.22	0.08
38 Private education services	−0.07	−0.23	0.05
39 Private health services	−0.09	−0.98	−0.15
40 Recreation and culture	0.07	−0.24	0.06
Government services and others (sectors 41–44)	0.09	0.22	0.10

the working mechanism of VAT, the producer price is not influenced much by increased VAT rates, but the producer price does benefit by a cut in contributions.

Table 7. Effects on sectoral exports, shown as deviation in annual growth rate from baseline scenario

Sector	Case D	Case E	Case F
Total	0.21	0.16	0.25
1 Agriculture, forestry, fishery	0.00	−0.06	0.02
Industries (sectors 2–26)	0.25	0.19	0.30
Energy products (sectors 2–5)	0.00	0.00	0.00
2 Coal	0.01	−0.14	0.05
3 Coke	0.02	0.00	0.03
4 Petroleum and refining	0.00	0.00	0.00
5 Electricity, gas, water	0.00	0.00	0.00
Manufacturing industries (sectors 7–26)	0.26	0.20	0.31
7 Ferrous and non-ferrous ores	0.00	0.00	0.00
8 Non-metal minerals, min. products	0.50	0.50	0.77
9 Chemicals	0.11	0.13	0.25
10 Metal products	0.49	0.32	0.52
11 Agric. and indust. machinery	0.00	0.00	0.00
12 Office, precis., opt. instruments	0.27	0.18	0.30
13 Electrical goods	0.37	0.28	0.42
14 Motor vehicles	0.05	0.00	0.00
15 Other transport equipment	1.70	1.47	1.94
16 Meat	0.10	−0.09	0.15
17 Milk and dairy products	0.41	−0.25	0.64
18 Other foods	0.23	0.06	0.35
19 Non-alcoholic, alcoh. beverages	0.01	0.00	0.00
20 Tobacco	0.00	0.00	0.00
21 Textiles and clothing	0.00	0.00	0.00
22 Leather and shoes	0.60	0.48	0.69
23 Wood and furniture	0.39	0.26	0.47
24 Paper and printing products	0.38	0.21	0.46
25 Rubber and plastics products	0.63	0.53	0.75
26 Other manufact. products	0.16	0.13	0.20
27 Constructions	0.50	0.01	0.32

As expected, the effects of a higher fiscal burden on final demand components, such as private consumption expenditure (PCE), reduce the positive impact on producer prices. Wages increase by means of an informal indexation mechanism that takes into account the higher cost of living. Therefore, producer prices will increase along with the increase in wages, although the result compared with the reference scenario is a reduction in these prices, because of the contributions cut.[12] In Case C, a non-revenue-neutral contributions cut scenario (not shown in Table 5), the deviation from baseline of producer prices index is −0.90%.

The comparison of results between the energy tax and TVA scenarios is not straightforward. The introduction of a TVA produces a trade-off between a reduction of 20% in a production cost for the manufacturing sector—the health contributions—and an increase of another cost—a tax on value added—over the entire economy.

It is very interesting to analyze the apparent anomaly shown by the PCE deflators for Cases D and E. The reasons for the spread between the producer price index and the PCE deflator are not immediately clear, until one looks at more detailed information about the behaviour of sectoral prices presented later in Table 10. The growth rate of aggregate services presents an increase in producer prices

Table 8. Effects on sectoral imports, shown as deviation in annual growth rate from baseline scenario

Sector	Case D	Case E	Case F
Total	0.36	0.10	0.03
1 Agriculture, forestry, fishery	0.22	0.15	0.03
Industries (sectors 2–26)	0.41	0.09	0.02
Energy products (sectors 2–5)	−0.14	0.02	0.03
2 Coal	0.02	0.30	0.36
3 Coke	−0.05	0.00	−0.07
4 Petroleum and refining	−0.15	0.00	0.00
5 Electricity, gas, water	−0.39	0.17	0.10
Manufacturing industries (sectors 7–26)	0.60	0.12	0.02
7 Ferrous and non-ferrous ores	0.65	0.32	0.50
8 Non-metal minerals, min. products	0.77	0.17	0.55
9 Chemicals	0.26	0.24	0.23
10 Metal products	0.00	0.00	0.00
11 Agric. and indust. machinery	−2.16	−2.62	−3.27
12 Office, precis., opt. instruments	0.40	0.15	0.21
13 Electrical goods	0.60	0.43	0.46
14 Motor vehicles	3.83	0.40	0.07
15 Other transport equipment	0.90	0.23	0.22
16 Meat	0.16	0.01	0.20
17 Milk and dairy products	0.09	−0.02	−0.17
18 Other foods	0.13	−0.01	−0.07
19 Non-alcoholic, alcoh. beverages	0.07	−0.16	−0.17
20 Tobacco	0.11	0.34	−0.44
21 Textiles and clothing	−0.28	−0.20	−2.43
22 Leather and shoes	0.43	0.21	1.27
23 Wood and furniture	0.73	0.23	0.54
24 Paper and printing products	0.41	0.29	0.27
25 Rubber and plastics products	0.32	0.21	0.35
26 Other manufact. products	0.08	0.03	0.03
27 Construction	0.52	0.02	0.33

that is higher in Case E (1.91) than in Case D (0.39). In general, services are not energy-intensive activities but they are sensitive to the introduction of a tax on value added net of exports. Once these prices have an impact over the consumer prices where services have a relevant weight, we might explain why the difference between the index of producer prices and the PCE deflator is higher in the case of the introduction of a TVA.

As far as real macro-economic variables are concerned, the best performance in terms of GDP growth rate is achieved in Case F, but the confidence attached to this conclusion for the long-term horizon is limited, because of a lack of substitution opportunities between energy products and labour and other production factors. Without the possibility of such substitution, the potential effects of this manoeuvre with regard to employment are difficult to determine. In the long term, the inflationary effect could produce an overall activity slowdown and, therefore, a reduction in fiscal yield that should be compensated for by an additional increase in taxes. A picture of sectoral effects on outputs can be seen in Table 6. In general, the manufacturing industries show an increase in growth rate in each scenario. This can be compared with services that benefit the most by an increase in energy taxes and suffer heavily with the introduction of a TVA.[13]

Table 9. Effects on private consumption expenditure

Sector	Case D	Case E	Case F
Total personal consumption expenditure	0.00	0.00	0.00
Food, beverages and tobacco	0.06	−0.02	−0.03
1 Bread and cereals	0.14	0.12	−0.05
2 Meat	0.06	−0.04	0.09
3 Fish	0.00	−0.10	−0.02
4 Milk, cheese	0.07	−0.01	−0.19
5 Oils and fats	0.12	0.02	−0.11
6 Fruits and vegetables	0.03	−0.07	−0.03
7 Potatoes	0.00	−0.10	−0.03
8 Sugar	0.08	0.02	−0.04
9 Coffee, tea, cocoa	0.07	−0.01	−0.03
10 Other foods	0.07	−0.02	−0.03
11 Non-alcoholic beverages	0.09	0.06	−0.10
12 Alcoholic beverages	0.12	−0.17	−0.02
13 Tobacco	0.04	0.12	−0.16
Clothes and shoes	0.17	0.09	−0.11
14 Clothing and repairs	0.16	0.13	−0.31
15 Shoes and repairs	0.17	−0.04	0.61
Rent and electric power	−0.38	−0.05	0.00
16 Rent	0.49	−0.27	0.07
17 Fuel and electric power	−2.53	0.48	−0.15
Household goods and services	0.20	0.12	0.10
18 Furniture	0.40	0.25	0.43
19 Household textiles	0.27	0.27	−0.59
20 Household appliances	0.19	0.12	0.12
21 Glassware	0.24	0.23	−0.14
22 Domestic services	0.09	0.22	0.10
23 Non-durable articles	0.03	−0.11	0.07
Health care	0.08	−0.03	0.00
24 Medical and pharm. products	0.21	0.86	0.25
25 Therapeutic appliances and equipment	0.73	1.77	−0.71
26 Services of physician, nurses, etc.	−0.08	−0.92	−0.14
27 Hospital care	−0.10	−1.11	−0.18
Transports and communications	−0.15	0.15	0.05
28 Personal transport equipment	3.54	0.63	0.22
29 Operation of personal trans. equip.	−4.00	−0.34	−0.02
30 Purchased transport services	2.12	0.08	−0.17
31 Communications	0.08	0.66	−0.11
Entertainment and culture	0.08	−0.14	0.02
32 Radio, TV, etc.	0.04	−0.06	−0.04
33 Books, newspapers and magazines	0.60	0.77	0.33
34 Educational books	−0.06	−0.48	−0.09
35 Entertainment, recreational services	−0.05	−0.63	0.04
Other goods and services	0.08	−0.09	−0.01
36 Personal care and effects	0.06	−0.16	0.02
37 Hotels, restaurants	0.07	−0.13	−0.03
38 Other goods	0.14	0.09	0.00
39 Financial and insurance services	−0.12	−0.22	−0.02
40 Other services	−0.10	−0.26	−0.02

A reduction in health contributions produces a positive effect on exports (Table 7). The results are slightly better in Case F than in Case E, and Case D also presents a good performance. This result can be explained by the sectoral energy

Table 10. Effects on sectoral producer prices, shown as deviation in annual growth rate from baseline scenario

Sector	Case D	Case E	Case F
Total	0.16	0.26	−0.65
1 Agriculture, forestry, fishery	−0.04	0.97	−0.35
Industries (sectors 2–26)	0.10	−0.76	−1.28
Energy products (sectors 2–5)	9.18	0.01	−0.01
2 Coal	0.09	0.73	−0.27
3 Coke	−0.08	0.00	−0.12
4 Petroleum and refining	13.75	0.02	−0.01
5 Electricity, gas, water	0.10	0.01	−0.01
Manufacturing industries (sectors 7–26)	−1.07	−0.86	−1.44
7 Ferrous and non-ferrous ores	−0.44	−0.44	−0.79
8 Non-metal minerals, min. products	−0.04	−1.18	−1.83
9 Chemicals	−0.49	−0.59	−1.11
10 Metal products	−1.44	−1.05	−1.71
11 Agric. and indust. machinery	−1.69	−1.47	−1.96
12 Office, precis., opt. instruments	−0.97	−0.69	−1.20
13 Electrical goods	−1.38	−1.09	−1.60
14 Motor vehicles	−1.21	−1.27	−1.71
15 Other transport equipment	−1.85	−1.62	−2.14
16 Meat	−0.39	0.37	−0.64
17 Milk and dairy products	−0.46	0.31	−0.80
18 Other foods	−0.64	−0.17	−1.02
19 Non-alcoholic, alcoh. beverages	−0.75	−0.25	−1.15
20 Tobacco	0.00	0.00	0.00
21 Textiles and clothing	−1.24	−1.10	−1.61
22 Leather and shoes	−1.42	−1.13	−1.61
23 Wood and furniture	−1.15	−0.79	−1.44
24 Paper and printing products	−1.23	−0.73	−1.59
25 Rubber and plastics products	−1.35	−1.15	−1.63
26 Other manufact. products	−0.71	−0.57	−0.89
27 Construction	−0.33	0.37	−0.76
Hotels and trade (sectors 28–30)	0.43	1.62	−0.13
28 Recovery and repair services	−0.21	0.62	−0.71
29 Trade	0.62	1.91	0.03
30 Hotels and restaurants	0.06	1.25	−0.43
Transports and communications (sectors 31–34)	0.09	0.20	0.01
31 Inland transport	0.00	0.00	0.00
32 Sea and air transport	0.00	0.00	0.00
33 Transport services	0.41	1.57	0.02
34 Communications	0.00	0.00	0.00
Services (sectors 35–40)	0.39	1.91	0.05
35 Banking and insurance	0.44	1.28	0.13
36 Other private services	0.61	1.61	−0.14
37 Real estate	0.20	2.44	0.12
38 Private education services	0.47	1.96	0.34
39 Private health services	0.38	2.23	0.29
40 Recreation and culture	0.32	2.07	0.05
Government services and others (sectors 41–44)	0.00	0.00	0.00

consumption levels. In the manufacturing industries there are sectors—such as agricultural and industrial machinery, office instruments, motor vehicles, textiles,

and leather and shoes—that are more open to international trade, so they can take advantage of a gain in competitiveness that results from the labour cost reduction. Moreover, these sectors have very low energy consumption shares over intermediate energy consumption, and are not affected greatly by an increase in energy taxes. However, sectors such as electricity and chemicals have the highest shares of energy consumption and will bear the highest incidence of an increase in energy taxes. The gain in competitiveness for some economic activities has a positive effect on sectoral production levels, as shown in Table 6.

The increase in VAT rates would have a good result in terms of the balance of trade. In fact, imports would increase less than in the other two scenarios, because foreign goods and services would be taxed at the same rate as domestic goods (Table 8).

Table 9 shows the effects on private consumption expenditures. The model assumes exogenous total PCE, so we can analyze only the price effect and not the income effect of each simulation. A different pattern in producer prices among the alternative scenarios, as we can see in Table 10, has an impact over consumption prices. Through substitution effects, these changes in consumption prices alter the composition of consumption. In Case D, in particular, we see these effects.

In Case D, i.e. the energy tax scenario, the price of electricity is relatively high. This is a serious problem with this scenario, because of the negative consequences that high electrical prices have on the purchasing power of families. The drop in the purchasing power of families brings about increased wages: in this case, a wage–price spiral could occur. Additionally, in Case D, the cost of using personal transport equipment would increase and public transport services would be cheaper. In the TVA and VAT simulations, effects are uneven across goods and services, with no particular deviations to notice.

The conclusion of this exercise is that a reduction in health contributions compensated for by an increase in VAT produces the best results in terms of short-term economic indicators. This conclusion does not mean that VAT is the best tool to be used in the future: as we have seen earlier, a wider perspective could be taken. A gain in competitiveness, an overall positive effect on production and a reduction in production costs are indeed positive results but they could not be the only and the most important targets of the proposal. The improvement in environmental conditions achieved by energy taxes or the use of a wider tax base obtained by the introduction of a TVA could also be very valuable. This study shows that caution should be exercised in implementing these proposals, and also shows some traps hidden in the aggregate results that are revealed by the sectoral analysis.

Notes

1. The total tax wedge is the difference between the gross labour cost and net after-tax income for employees.
2. In 1993, this fund covered 87% of total NHCS expenses. Approximately 5% was financed by local funds. The remaining 8% was funded by the national budget.
3. In Italian official statistics, total labour compensation (*reddito da lavoro dipendente*) includes wages and salaries, and employers' SSC. Wages and salaries (*retribuzioni*) are gross of personal income taxes and employees' SSC. In this study, we refer to total compensaiton as labour cost being the amount paid by firms to buy labour. However, it might sometimes be useful to consider only the labour compensation, i.e. to consider wages and salaries without employers' SSC.
4. The classification of 44 economic activities used in this paper is based on the NACE–CLIO disaggregation of the Italian IO table published by ISTAT.
5. Please note that wages and salaries include taxes on personal income and personal SSC.

6. In estimating the evasion of social contributions for Italy in 1988, Tutino (1992) evaluated a substantial evasion of the tax base that was located essentially over services (61% of the estimated difference between the wages and salaries declared to the Social Security National Institute and the estimated figure), while the manufacturing industries presented a limited evasion (22% of the total discrepancy). In particular, some important activities—electrical goods, ferrous and non-ferrous ores, motor vehicles—showed a value below 5%.
7. As an overall economic result, the conclusion normally drawn from the empirical literature about environmental taxes is that: "the use of revenue to finance a cut in employers' social security contributions is the best choice in order to promote employment. Even if the outcome of the simulation exercises is linked to the structure of the model and to the assumptions on the incidence of the tax, it seems fair to consider this conclusion as largely convincing" (Majocchi, 1994, p. 28).
8. VAT has been studied by the author of the present study in a number of papers (Bardazzi, 1992; Bardazzi & Grassini, 1993; Bardazzi *et al.*, 1991a,b).
9. See Almon (1991) and Nyhus (1991) for a discussion of the INFORUM system of models. McCarthy (1991) fully describes the structure of the US INFORUM model whose basic features are common to INTIMO.
10. Inventory changes are estimated as functions of use of the products and stocks of inventories.
11. The real side of the model is outlined in Grassini (1983), while the nominal side is presented in Grassini (1987). A more detailed background and references can be found in Bardazzi *et al.* (1991a,b). For a discussion of indirect taxation, see Bardazzi (1992), Bardazzi & Piacentino (1993), Bardazzi *et al.* (1991, 1992).
12. See Section 4.2.
13. TVA is not applied over those sectors where the tax base is negative. This is the case for: ferrous and non-ferrous ores; agric. and indust. machinery; office, precis., opt. instruments; motor vehicles; other transport equipment; leather and shoes; other manufact. products; sea and air transport.

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