Less Contributions, More Employment?

What will cutting social-security contributions accomplish?

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1. Introduction

Social security in Germany is financed primarily by mandatory contributions levied on wages. Compared to other countries, in fact, Germany can be considered a classic example of a social insurance system financed by direct, earmarked contributions. About 65 % of the system's total revenues here come from such contributions, while the Danish system, for example, draws more than 60 % of its revenues from general tax funds (cf. Eichhorst, Thode and Winter, 2004, p. 205). However, the proportion of revenues derived from general tax funding is steadily rising in Germany.

Directly encumbering labour with social-security contributions—a considerable portion of which should be viewed simply as taxes—may have had an adverse impact on employment growth.[1] In other words, a portion of the country's persistent high level of unemployment may be attributable to high social-security contributions.[2] For example, comparative international studies almost always show a negative correlation between the tax burden, usually measured as the "tax wedge," and a given country's unemployment rate.[3]

The presumed negative causal relationship between the level of social-security contributions and the macroeconomic level of employment implies an obvious recommendation in terms of economic policy: Bring down social-security contributions.

Hence it is no surprise that economic policy debates commonly prescribe lower contributions as a recipe for higher employment. This suggestion has become an everlasting issue in the policy debate of the past ten years; in this context, the substantial rise in the combined contribution rate from 35.8 % in 1990 to 41.3 % in 2002 has fuelled the discussion especially significantly. Germany's Red-Green coalition government, like its predecessor, has already implemented the concept, albeit on a small scale, by adopting what has become known as the "Eco-Tax Reform."

It seems somewhat curious to place so much emphasis on the non-wage costs of labour. After all, it is the total cost of labour that determines employment. However, reducing the cost of labour by lowering non-wage costs does have certain advantages in terms of economic policy. It avoids direct cuts in employee compensation, and therefore represents a more attractive goal politically. This will be particularly the case, if the question of compensatory financing is answered only vaguely. A self-financing effect is often mentioned, but without further quantification. Moreover, legislators either have no direct influence on wage policy or shy away from making wage policy recommendations.

The call for lower social-security contributions is of course only a first step. It must be supplemented with concepts for covering the resulting loss of revenue. There is a

[1] The outright tax component in social-security contributions (i.e., the component for which there is no direct quid pro quo) varies rather sharply from one insured individual to another. In health insurance and unemployment insurance, it is relatively high for many individuals, because they would be able to obtain coverage for less from a private insurer or by simply saving. A separate issue is the extent to which those covered by mandatory public insurance schemes view their contributions as taxes, since these individuals commonly underestimate both the need for purely private coverage, and the scope of that coverage.

[2] On the general relation between taxes and/or social-security contributions, on the one hand, and employment, on the other, cf. for example Nickell and Layard (1999), Bach and Wiegard (2002), or Bovenberg (2003).

[3] A survey of the results of several recent studies is furnished by Beissinger (2003, p. 421).

variety of conceivable tools. For example, social-security benefits might be cut. This is the route that has recently been taken—for a short distance, at least—in almost every branch of social insurance. Or one might increase other taxes, or replace wage-based social-security contributions with lump-sum contributions, as in the proposal currently under debate for a health insurance premium. Finally, at least for a certain amount of time, it would also be possible to pay for the reduction in social-security contributions by borrowing.

Meantime, in contrast to the public debate, economists seem to have lost a good deal of interest in this issue. To be sure, consultants on economic policy continue to call for lower contributions; for example, Germany's Council of Economic Experts explicitly stated in its Expert Opinion for 2002 (Item 428) that "the high marginal tax and contribution rates charged on employment income" should be lowered. But in the past few years there has been hardly any further quantitative investigation of a general reduction in contributions. This development may in part be simply because everything relevant has already been said. Since the publication of the studies by Zika (1997) and Buscher et al. (1999) in particular, one might conclude that such steps cannot be expected to yield any major increases in employment.[4]

A second explanation might be that the issue can be examined only with an empirical macroeconomic model, and that all the models used in Germany have already been applied in this connection.

The basic reform concept crops up in many different variants. In the recent past, particular attention has gone toward efforts to reduce contributions only for low incomes, or to introduce an exemption (cf. Kaltenborn et al. 2003). In the present article, we examine the impact of a general reduction in social-security contributions. The resulting revenue reduction must be compensated accordingly. The available instruments to ensure the compensation are the value-added tax (VAT), and lower government expenditures, which may also be interpreted as a reduction in social-security benefits. Thus the investigation takes the form of a *differential incidence* analysis.

The special feature of this article is that we employ three different macroeconomic simulation models to study the issue's impact on employment. We approach the impact of lower social-security contributions and the methods of financing them from different methodological directions. The PACE-L numerical equilibrium model has a rigorous microeconomic basis. It incorporates the theory of taxation and is able, for example, to reflect the different impact of changes in marginal tax rates and in average tax rates. But because it is a static model, it cannot provide information about the time sequence and duration of any specific project for reform. The other models, however, do have this capability. Both are macroeconometric models, estimated with time-series data. The IAB/RWI model is particularly well suited for simulating short-term effects. The IAB/INFORGE model, by comparison, is good for predicting medium and long-term effects. Both models also make it possible to investigate a debt-financed reduction in social-security contributions, as the PACE-L model cannot do. The two macroeconometric models have their roots in Keynesian macroeconomic theory. PACE-L, by contrast, combines neoclassical general equilibrium theory with New-Keynesian elements.

What we want to know is whether the judgment on a specific reform proposal varies with the method of investigation, and if so, what economic mechanisms cause the

[4] Two recent studies (Kaltenborn et al. 2003 and Bach, Koch and Spitznagel 2004), motivated by an interest in the effects of an exemption, also arrive at similar findings.

difference. But a much more important question is whether it is in fact correct to equate lower social-security contributions with higher employment. A certain number of factors (see above) lead one to doubt that the equation is right. Empirical evidence about the differential impact of various taxes provides only scant support for the assumption that social-security contributions have adverse effects. For example, Nickell and Layard (1999, pp. 3057 ff.) come to the conclusion that changes in the tax structure have no impact worth mentioning on employment. Theoretical considerations as well argue that the effects cannot be extremely great. Politicians however often appear to overlook that gross earned income—in other words, the very basis on which social-security contributions are assessed—are not invariant with respect to policy changes. But in the medium term, at least, wages should be endogenous. Thus it is by no means certain that wages will not rise significantly and largely consume the reduction in the contribution burden. It is also unclear what labour-market model the argument is based on. The only thing clear is that a perfect market cannot be intended, because in that case one cannot really expect an impact great enough to make a difference (in other words, an impact on employment). Findings about the wage elasticity of labour supply strongly suggest that in a perfect labour market, in practical terms, only the division of gross wages between net wages and social-security charges would change; the amount of labour traded would not. Finally, it is not clear whether the political adherents of cutting social-security contributions are willing to accept the potential negative distribution effects, or whether they assume that these effects will not happen or do not need to happen.

As to the organisation of this article, the section below discusses the theory of the policy measures to be studied. Section 3 describes the macroeconomic models we employ. Here we limit ourselves to a brief survey. The subsequent section presents and explains the results from simulations with the various models. The fifth section compares the results with one another. The article concludes with a summary and evaluation of key findings.

2. Preliminary theoretical considerations

The purpose of the reform proposal is to reduce labour costs and thus increase the demand for labour. At a given pre-tax wage, reducing social-security contributions will reduce the total wage costs that a company must pay. It also increases the employees' disposable income. Consumer spending will rise as a consequence. Higher corporate profits make it likely that demand for capital goods will rise. But this scenario applies only to the first year of a reduction in social-security contributions that is financed by borrowing, where interest rates are kept unchanged.

Although ideas for relieving tax burdens on income are usually described in considerable detail in the political debate, the financing end is often left rather cloudy. Where concrete proposals are made, there is seldom any discussion of why a shift in financing will generate employment. In part, this phenomenon is reminiscent of what used to be called the "noticeability debate" in public economics some years ago. The advocates of shifting funding from direct mandatory social-security contributions to indirect taxes, one might assume, derive the advantages of such a change from the assumption that indirect taxes are "noticed" only partially or not at all, while contributions that show up directly on pay slips are much more obvious. It is also unclear whether the potential distribution effects of such a reform project have gone unnoticed, or have been tacitly acknowledged, although this matter is among the "classics" of public economics.

From tax theory in public economics, we know that under some circumstances, an employment income tax (withholding tax, mandatory contributions) and a general consumption tax (VAT) are equivalent. To that extent, overly optimistic expectations should be viewed with a certain fundamental scepticism, unless it can be shown that the hypothesis of equivalence leans too heavily on assumptions that are not applicable in reality. This point will be examined next.

First of all, equivalence applies only if the taxpayers for both types of tax are identical. This is not the case in reality, because if the VAT is to be paid by consumers, it must be paid by *all* consumers, irrespective of their source of income. Thus a VAT must also be paid by recipients of income from transfer payments (such as retirement pensions, unemployment compensation or social welfare assistance), or from capital gains, if they spend those revenues. In order for equivalence in the strict sense to apply, moreover, there must be no differences in tax rates or tax exemptions for certain types of goods and services. Furthermore, a levy collected indirectly on consumption is equivalent only to a proportional income tax, not a progressive one.

Equivalence is based on adjustments in wages and in the price of goods. It is true that if employment income tax is reduced, households' disposable income will increase, assuming that the pre-tax wage remains the same. But an increase in VAT raises consumer prices. If the markets for goods and labour are perfectly competitive, and given the conditions for the validity of the equivalence hypothesis just described above, wages and prices will adjust in precisely such a way that the ratio of the two quantities—the real wage—does not change. Having noted this it is also clear that market imperfections may also disrupt equivalence.[5]

The interesting question for researchers is whether the described deviations from the assumptions of the equivalence hypothesis are mechanisms that lead to appreciable differences in effects, and particularly a change in employment other than zero. A quantitative macroeconomic model seems necessary to investigate this question, for two reasons. First, we are interested in not just the sign of the overall effect, but its dimensions as well. Second, taking account of a many causal relations—especially general equilibrium effects—makes a theoretical analysis too complex, and therefore unfeasible.

All the same, it is very important to address the issue theoretically. Only in this way can important chains of effects be identified. The task of the numerical model is to make a quantitative comparison of what are sometimes contrary effects.

A key aspect of the relevance or irrelevance of taxes to employment policy is the variability of the effective labour supply. In a perfect labour market with an inelastic labour supply, the burden of taxes and social-security contributions will be borne almost entirely by employees, no matter who actually pays the tax. In an imperfect labour market as defined by Layard et al. (1991), the effects depend on the wage-setting curve, which can also be interpreted as a collective or effective labour-supply schedule. Only if this curve is to some extent elastic will direct taxes have any effect at all on employment. Thus one of the necessary conditions for an impact on employment is an elastic function for the effective labour supply. A second condition is that the alternative funding of social security must cause a change in real wages.

If employers and employees must both contribute to social security, the argumentation becomes more complex at first glance. But in fact that is not the case.

[5] The case of minimum wages presents a particularly clear example.

It is not important who pays the tax on paper. What is important for employment impact is the effective incidence. Theoretical analyses of the incidence of taxes on imperfect labour markets have shown that what matters most is the difference between employment income and the income of those who are unemployed. If this difference does not change, or changes only slightly with the agreed wage, then the burden of taxes and social-security contributions will be borne (primarily) by employees.

The role of a VAT charge is not unequivocally clear in labour market models with imperfect competition. In a trade union model, it seems an obvious choice to define the unions' objective function in terms of real wages. Conversely, it takes a certain stretch of the imagination not to do the same thing for employers' profits. But if the same price index prevails for both parties in the negotiations, a change in VAT can have only indirect effects, for example by means of different ways of shifting it forward to consumer prices in various sectors of the economy. Hence it is hardly surprising that a VAT as well may act mainly by the way already described above, the difference between income while employed and alternative income while not employed. This is the case, for example, if unemployment compensation does not vary with either wages or prices.

In addition to the debate about tax instruments in public economics, we must not forget the macroeconomic perspective here. After all, we are also using two explicit macromodels. In this regard, older macroeconomic theory (of both classical and Keynesian provenance) is concerned less with the distorting effects of taxes than with income transfers between private economic units and the state. The distinction between direct and indirect taxes is of importance only to the extent that it influences total demand. This is the case, for example, if one distinguishes among several consumers who are affected differently by the various types of taxes. In conditions of full employment, a tax increase in the standard Keynesian model results in excess demand, because the decline in consumption among private individuals will be less than the tax-induced increase in the government's demand for goods (cf. for example Felderer and Homburg, 1999, pp. 166 ff.), and prices will rise until total demand for goods returns to its original level. The situation in a condition of underemployment is different. In that case, an expansion of state demand financed by tax increases can increase production and employment. Accordingly, tax cuts per se are not necessarily favourable to employment. In an open economy, domestic demand may decline as a result of a tax cut if the state buys goods primarily domestically, and if private households in contrast consume more foreign goods and also invest abroad.

In summary, we can list the following potential effects.

1) A reduction in contributions that is financed through the VAT may lead to a different distribution of the tax burden. If it is possible to mitigate the burden on employment income at the expense of other income, a positive employment impact can be expected.

2) The reform in question (assuming progressive income taxation) will alter the marginal rate for mandatory contributions and/or the average tax burden on employment income. This may affect real wages, and therefore employment.

3) The VAT imposes a variable burden on different segments of the economy and/or different consumer goods. The result may be a macroeconomic employment impact if the intensity of employment varies among different sectors. Additionally, the rise in consumer prices also depends on tax reductions and tax exemptions.

4) Passing taxes on or back affects real wages through both, the goods and the labour market. This may alter real wages and thus affect employment.

5) A key variable for shifting the tax burden forward to labour is the gap between the income that can be earned in a job and income when one is not employed. Social-security contributions and the VAT may alter this difference. This is particularly the case when government unemployment benefits do not vary with wages and prices.

6) The income distribution via taxes from households and businesses, on the one hand, to the state on the other hand, may alter the level of aggregate demand, and thus employment.

7) In an open economy, lower social-security contributions may result in higher exports. Labour costs in the export business are lowered by reducing social-security contributions. By contrast, a higher VAT is irrelevant for exports.

3. The employed macroeconomic models

The IAB currently uses three models in researching macroeconomic effects: the IAB/RWI model, the IAB/INFORGE model, and PACE-L. Below we will present these three models briefly and explain the fields where they are typically used at the IAB.

3.1. The IAB/RWI model

The RWI model is a typical medium-sized short-term model (about 120 equations in the original version), based on quarterly data.[6] Behavioural and definition equations are used primarily to explain aggregate demand (and thus production and employment), prices, income distribution, income generation, and government activity.

Like other models of its kind, this model is not based on a self-contained theory. The basic concept is Keynesian, as is particularly expressed in the fact that production is determined by the demand side. But there are also neoclassical and monetarist traits in some equations, such as the interest rate in the consumption function. The labour market includes elements of New Keynesian macroeconomics: Employment is essentially explained by aggregate demand and a wage variable, and wage setting is explained by an expanded Phillips-curve approach. However, with the RWI, wage setting is often handled exogenously for purposes of projection and simulation. Labour supply—reflected as the potential workforce—is set exogenously in the RWI model and is assumed to be sufficiently large. Other exogenous variables are the major determinants of foreign trade (e.g. oil prices), a number of variables for economic policy instruments, and interest rates (because these are largely determined by the world market).

The econometric estimation of the model is carried out equation by equation with OLS, based on the last 40 quarters (moving window method). In the version of the model currently being used, estimates are based on the period from the third quarter of 1992 through the second quarter of 2002. The Gauss-Seidel method is used in running simulations with the—weakly linear—model.

[6] For a detailed explanation of the RWI model cf. Heilemann (2003).

In the IAB's version, the RWI model is expanded with a detailed part for the labour market. But this expansion is of relevance for the present issue only in that the macroeconomic employment function has been slightly modified from the original version by including average working time as an explanatory variable.

An important determinant for the development of employment in the IAB/RWI model is the wage-price mechanism. Prices are essentially determined by a mark-up on the unit cost of labour. Wage changes, as measured by the growth of contractual wages, can be expressed *ex post facto* as a function of price changes, productivity changes and unemployment.[7] However, it must be noted *ex ante* that these wages are set by negotiating parties and thus are subject in part to collective bargaining policies. To that extent, it should be clear that statistical relationships found in the past may not apply if there are policy changes. To address this problem, different simulations can be run to identify the two extremes of possible collective bargaining policies. In this way, at the one extreme, changes in collectively bargained wages can be explained endogenously in accordance with correlations from the past. This means in particular that any price increase, including one induced by the VAT, is also reflected completely—in other words, with an elasticity of one—in an increase in collectively bargained wages. At the other extreme, changes in collectively bargained wages can be set exogenously. Here the base figures—like all other exogenous figures—are drawn from the original version of the RWI model.

Exogenous development was assumed for long-term interest rates. This seems plausible, because interest rates are more and more commonly determined internationally, and therefore economic development in Germany has little influence on how these rates change. But in a case where social-security contributions are reduced without compensatory financing, it means that an increase in net borrowing, and thus the long-term rise of public debt, will not result in higher interest rates. If that is not the case in reality, then the actual employment impact—especially by way of the influence of interest rates on investment—will be less stable than the model simulations show.

The total for social-security contributions is made up of the contributions from employees and those from employers. These are a function of the average contribution rate, which is reduced in the simulations. Employee contributions reduce total net wages and salaries, and thus the income of relevance for consumer spending. Employer contributions, as part of overall labour costs, increase the unit cost of labour. The latter, together with total demand and working time, determines the number of jobs.

3.2. The IAB/INFORGE model

The INFORGE model (INterindustry FORecasting GErmany) is a projection and simulation model, finely subdivided by sectors, that has been updated annually since 1996 and has many applications.[8] The version used for this article is based on the new "General Industrial Classification of Economic Activities within the European Communities" (NACE Classification) used in the National Accounts of the German Federal Statistical Office.

[7] On the derivation of a macroeconomic wage function from microeconomic calculations, cf. Beissinger (1996).

[8] Cf., for example, Lichtblau / Meyer / Ewerhart 1996; Elixmann / Keuter / Meyer 1997; Meyer / Ewerhart 1997, 2001; Meyer / Ewerhart / Siebe 1998, 1999; Distelkamp / Elixmann / Lutz / Meyer / Schimmel 2000 ; Meyer/Ahlert 2000

INFORGE is characterised by two design principles, *bottom-up* and *full integration*. The *bottom-up* principle means that each of the 59 sectors of the economy is modelled in detail, and macroeconomic variables are formed by explicit aggregation within the context of the model. The *full integration* principle implies a complex, simultaneous modelling that describes both inter-industrial dependencies and the generation and distribution of income, the state's redistribution activity, and private households' use of income for various goods and services.

The in-depth sector breakdown is indispensable to long-term projections for the labour market. The number of people employed in a sector is defined by the development of output, the real per-capita cost of labour in that sector, and a time trend, in a double-logarithmic function. This specification assumes a linear-limitational production technology that changes with technical progress. If the left and right sides of the employment function are divided by the output, on the left side one gets the labour input coefficient, which declines with rising output, rising labour costs and the time trend. Rising output brings learning effects to bear that reduce the labour input coefficient. The real per capita cost of labour measures the influence of technical progress induced by cost pressure, and the negative time trend measures the impact of autonomous technical progress.

The determinants of sectoral labour demand evolve very differently in different industries over the course of long-term structural changes. Contrary to widely held belief, therefore, the quality of estimates and projections is better with a disaggregated analysis than with an aggregated system, which is unable to identify these structural differences.

The model has a high level of endogeneity. Essentially, the exogenous variables are a few tax rates, the labour supply, and the world market variables of the international GLODYM System.[9]

INFORGE is an econometric input-output model that may be called an evolutionary model (Meyer 2002). The behavioural equations describe decision routines that are not derived explicitly from individual optimisation behaviour, but instead are based on bounded rationality. Prices are explained by monopolistic pricing behaviour. Time in the model is historical and nonreversible. Adjustment of the stock of capital generates path dependency.

The model's dynamics are generated by adjustment of the stock of capital, lagged adjustment of wages to changes in productivity and prices, lagged adjustment of government consumption to changes in the state's available revenues, lagged adjustment of the government's nominal expenditures on social-security benefits to social-security revenues, and other lags in demand functions.

The input-output approach is generally said to be demand-oriented. But this is only partially the case for INFORGE. Although demand does determine production in INFORGE, all demand variables for goods and factors depend in part on relative prices, and the prices in turn are determined by businesses' unit costs in the form of a pricing hypothesis. Businesses choose their selling prices on the basis of their cost situation and the price of competing imports. Buyers respond with their decision, which then determines the level of production. Thus supply and demand elements are both present.

[9] Cf. Meyer/Uno 1999, Meyer/Lutz 2002,a,b,c

In addition to the data for 59 industries defined by the input-out tables, the model includes the accounting system for the National Accounts of the Federal Republic of Germany – with its institutional transactors (General government, Private households, Financial enterprises, Non-financial enterprises and the rest of the world), and functional transactors (production, income generation, income use, income distribution, income redistribution, changes in wealth and financing) for the purpose of calculating macroeconomic aggregates. This system incorporates the entire redistribution of income, including social-security contributions and taxation, between the state, private households, and firms, and thus makes it possible to calculate disposable incomes, which in turn are important determinants of final demand. Additionally, the borrowing balances of the institutional transactors are determined. Thus the model explicitly includes government budget restrictions, and thus fiscal policy is endogenously incorporated into the system. Monetary policy—to the extent that it influences interest rate levels—is likewise endogenous.

It should be emphasised that the entire system has a simultaneous structure, and is solved accordingly. Only the variables for the GLODYM world trade model are removed from the simultaneous block. The structure of the INFORGE model is interdependent. Apart from the usual interdependencies within the circular flow of the economy, it reflects quantity-price interdependencies and wage-price interdependencies.

As a rule, the parameters for the model equations are estimated econometrically, in double-logarithmic form by ordinary least squares (OLS) over the period from 1991 to 2000. The structural break in Eastern Germany in 1991 and 1992 was covered using dummy variables so far as necessary.

In selecting alternative estimation specifications, *a priori* information about the signs and orders of magnitude of the coefficients to be estimated was applied first. In other words, economically senseless estimates were discarded. The remaining estimates were checked for auto-correlation of residuals using the Durbin-Watson statistic, and for the significance of the estimated parameters using the t-test. If it was not possible to discriminate between competing approaches on this basis, the coefficient of determination of the estimate was consulted. Given the size of the model, OLS seems the most appropriate estimation method, because it is the simplest.[10]

Social-security contributions have a direct effect at two points in INFORGE. First, in determining the cost of labour, the total gross wage and salary per employed individual is multiplied by the employer's social-security contribution rate. Second, social-security contributions reduce private households' disposable income. Thus the model reflects the tax wedge. Sector-specific contractual wages depend indirectly on the level of social-security contributions by way of two variables, macroeconomic employment and the price of goods, which are influenced by labour costs. These effects come into play only after a time lag, because hourly wages depend on the values for the previous period.

[10] The quality of the model's projections is regularly checked by historical simulations. For example, Frohn et al. (1998) acknowledge an earlier version of the model to have a "generally good quality in adapting to reality." Additionally, the model offers a way of working out the significance of assumptions and individual equations by way of alternative calculations.

3.3. PACE-L

PACE-L is a static applied general equilibrium model in the tradition of Shoven and Whalley (1984).[11] While numerical equilibrium models have been widely used for many years as an empirical method in public and international economics, they have been employed for studying labour market related issues only over the past decade. The basic approach is the same in all applications. The model economy is first described in an initial state, which takes the form of a system of numerical equations. Usually a given year is chosen as the benchmark equilibrium, and the economic variables observed for that period (e.g., employment, capital input, production) are put into the equations of the system.[12] The analyses are of a comparative static nature and thus are based on comparing a reference situation without an intervention, and the situation after an intervention. This method may be interpreted as an economic experiment (Fehr and Wiegard, 1996, p. 297). It has the great advantage that it allows the effects of a policy measure under examination to be studied in isolation.[13]

The basic components of a numerical equilibrium model are representative agents. As a rule, a model includes at least one household, one firm and the government. The economic subjects are assumed to have certain behaviours. In general the neoclassical theory of the household and the firm is employed. For a specific formulation, one must choose functional forms and define values of model parameters. The free parameters here are set in such a way as to replicate the original equilibrium. This method is called calibration. As a rule, however, the number of free parameters exceeds the number of equilibrium conditions. Therefore, to determine these parameters one needs additional information. This data usually comes from econometric estimates regarding households' or firms' responses to changes in certain variables.

Traditionally, applied equilibrium models are the more complex relatives of the analytical models in the tradition of Arrow and Hahn (1971) and Debreu (1959). But there is no reason to limit oneself to such a Walrasian world of perfect markets, apart from questions of the existence or uniqueness of equilibria. By the same token, the concept of "equilibrium" must not be equated with market clearing. It should be understood either quite in general as a state of rest, or in the sense of game theory, as a state of mutual best responses.[14]

In the version used here, PACE-L distinguishes four households, seven business sectors and the state.[15] Three households are only endowed with labour. They differ in their formal training (with and without vocational training, and university graduates). The fourth household receives only corporate profits and capital income. For workers with low and medium qualifications, in each sector simultaneously a single, unitary union negotiates with a single employers' association. The unions' objective variables are employment and the difference between net wage and expected alternative income in the event that negotiations collapse. This alternative income is a function of

[11] The models are also called numerical or computable equilibrium models.

[12] There are three classes of applied general equilibrium models, static, recursive-dynamic and fully dynamic models. PACE-L belongs to the first.

[13] By contrast, econometrics usually attempts to filter out the sought effect from the observed overall variation in endogenous variables, or to apply controls for such influences.

[14] For a detailed discussion of the concept of equilibrium and the characteristics of a numerical equilibrium analysis, see Feil and Zika (2005).

[15] A detailed description of PACE-L is provided in Böhringer et al. (2002) and in Böhringer, Boeters and Feil (2005).

unemployment compensation and an average net wage accounting for the expected wage if the representative union member finds a job in another sector. The model follows the “right to manage” approach. Thus negotiations concern only wages, not employment. Wages established by collective bargaining are above market-clearing wages. Unemployment prevails.

Different sectors pay different wages. To ensure that job seekers are indifferent about where to apply for a job (equilibrium condition), the sectors also differ in regard to the probability of finding a job.[16]

Firms produce differentiated goods by a linear-homogenous technology using labour, capital and intermediate inputs. Prices of goods are set in accordance with the model of monopolistic competition as a mark-up on marginal cost (mark-up pricing). The model economy is integrated into the world economy, and it is assumed that importing and exporting have no influence on world market prices (small open economy assumption). The model makes it possible to choose between two different capital market regimes. One of these assumes that domestic firms can purchase capital goods on a world market at a given interest rate. In this case the capital supply is infinitely elastic. The other assumes that the capital market is closed. In that case, only savings accrued domestically will have an effect on production in future periods as capital equipment. Within a given simulation period, the economy operates with a given stock of capital. Savings accumulation is modelled on the example of Ballard et al. (1985). The factors of capital and highly skilled labour are traded in perfect markets. All factors are mobile among different economic sectors.

The state provides a bundle of public goods combining intermediate services and inputs from private firms. It covers its expenditures with taxes on private consumption, capital and labour. Social insurance is modelled separately from the remainder of the government budget. In the unemployment insurance system, contributions are collected and unemployment compensation is paid. Pension insurance and health insurance are combined, and transfer payments are made to employee households out of these systems’ contribution revenues. The state pays subsidies to both social insurance systems.

Social-security contributions drive a wedge between the cost of labour and net earned income. Reducing contributions, all other things remaining equal, will lead to lower producer wages and higher consumer wages. Employment will increase because first of all, capital is replaced by labour, and second, private demand is higher than before. Rising employment and higher corporate profits lead unions to demand higher wages. The overall effects depend on the measures taken to fund the reduction in social-security contributions. If it is possible to shift the tax burden away from labour, for example by some sort of a lump-sum tax, then employment gains can be expected in the new equilibrium as well. Ultimately, what counts is whether the lower social-security contributions can be replaced by a financing tool that causes less distortion in the labour market.

4. Simulations

As has already been explained above, the three models were designed for different purposes. To examine a single policy with all three takes a certain amount of effort.

[16] Firms in high-wage sectors receive more applications from job seekers than do those in relatively low-wage sectors. Thus one might also say that the waiting queues are longer in the high-paying sectors.

Our goal is to take advantage of the degrees of freedom in the models in such a way that so far as possible, the same variables are endogenous in all three cases and settings for exogenous variables are as equivalent as possible. A concrete example is the assumed development of labour supply. Here all models assume an exogenously determined labour force.

Our simulations examine the following scenarios.

A. Social-security contributions are reduced by one percent. No distinction is made among the various branches of social security. The loss in revenues is made up by state grants. Net borrowing remains unchanged. This is ensured by adjusting the VAT.

B. Like A., but with the difference that lost revenues are now compensated by reducing expenditures. (Only with the IAB/INFORGE model and PACE-L; the simulation results from the IAB/RWI model in this regard will be completed and published at a later date.)

The small reduction in contributions was chosen to make it possible to analyse the marginal responses of major variables.

In none of the models do public expenditures alter private firms' methods of production. The public stock of capital therefore does not affect the productivity of private capital. Moreover, no model includes a substitution relationship between public and private goods. Thus households do not adjust their consumption when state consumption changes. Here there is only an indirect correlation by way of changes in disposable income.

In PACE-L it makes no sense to increase government net borrowing as a form of funding, because in a long-term equilibrium there should be no free lunch, thus compensatory financing should always be ensured. Nevertheless, in describing the short-term effects of the rate cut, the case of an increase in public debt is very interesting. For that reason, this case was simulated with both econometric models.

4.1. IAB/RWI model

Keeping the scope of benefits provided by the social-security system unchanged, relieving the burden on employment income and labour costs by reducing contribution rates will of course result in lower contributions to the social insurance institutions. To finance the reduction in contributions entirely through an increase in VAT, the tax rate would have to be raised about 0.41 percentage points. The simulations assume that only private consumption is taxed by a higher VAT rate.[17] Besides we assume that the increase in VAT will be shifted forward entirely onto consumer prices. The tax increase has no influence on other prices. In reality, of course, other final-demand aggregates will be affected, too. The described approach is a compromise in order to include the effects of an increase in VAT on the circular flow of the economy completely.

[17] This assumption is necessary because in the version of the RWI model used here, VAT is not incorporated, as it still is for example in Heilemann (2003), as an explanatory variable in the estimation equation for the consumer price index.

Table 1: IAB/RWI model—One-percent reduction in social-security contributions financed by VAT (endogenous wages)

	Quarter											
	1	2	3	4	6	8	10	12	16	24	32	48
Employment	-0,01	-0,02	-0,03	-0,03	-0,02	0,00	0,02	0,02	0,00	-0,03	-0,03	-0,02
GDP	-0,08	-0,09	-0,10	-0,07	-0,03	-0,03	-0,04	-0,06	-0,08	-0,08	-0,07	-0,06
Private Consumption	-0,21	-0,24	-0,27	-0,25	-0,19	-0,18	-0,15	-0,17	-0,18	-0,18	-0,17	-0,14
Capital expenditures	-0,24	-0,24	-0,21	0,03	0,27	0,23	-0,03	-0,18	-0,32	-0,24	-0,22	-0,21
Unit cost of labour	-0,06	-0,07	-0,09	-0,12	-0,11	-0,03	0,03	0,08	0,07	0,03	0,04	0,04
Consumer Prices	0,36	0,36	0,36	0,35	0,34	0,34	0,35	0,36	0,39	0,41	0,43	0,47
Gross wages	-0,25	-0,25	-0,26	-0,29	-0,26	-0,18	-0,15	-0,11	-0,14	-0,17	-0,17	-0,16

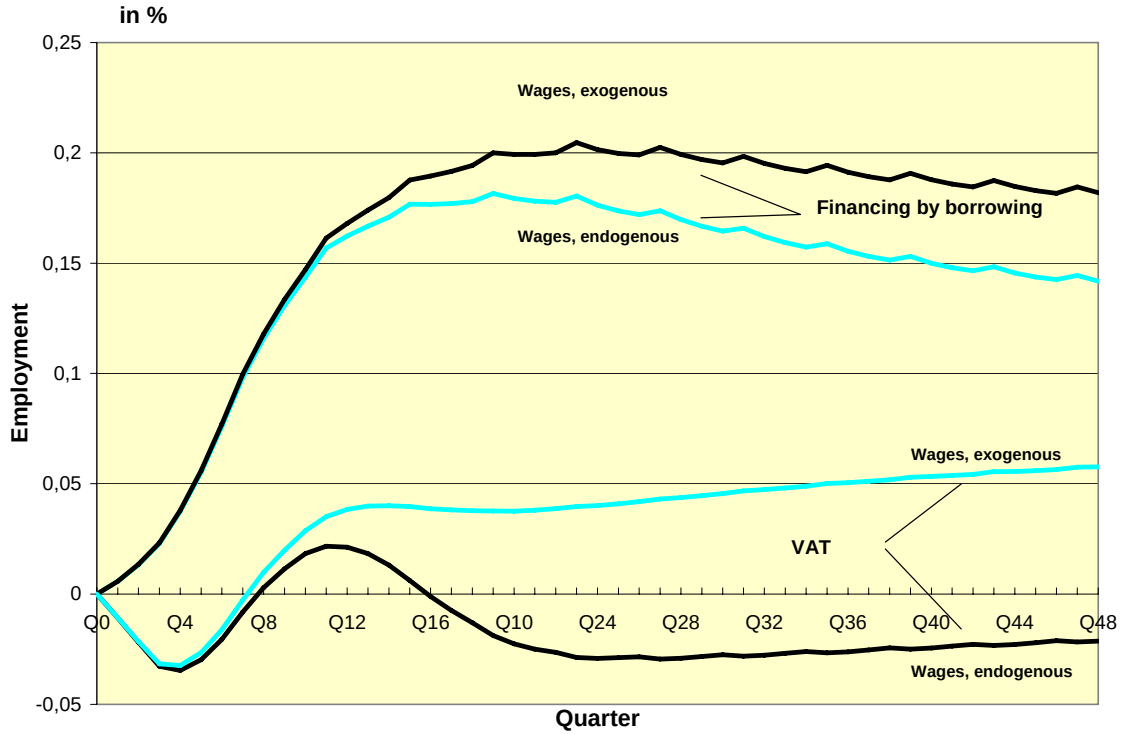
The assumption about the passing on of the VAT is critical for the development of private consumption (in real terms). In other words, whether the rise in disposable income due to lower contributions will dominate over the rise in consumer prices depends on the assumption about how the VAT is shifted forward. Economic development as a whole in turn depends heavily on changes in consumer spending. For that reason, the employment effect also depends on the hypothesis about how consumption taxes are shifted forward.

However, it should be noted that if wages are endogenous, an increase in VAT will also have an impact on real aggregates by way of the price-wage correlation. In the wage equation, higher consumer prices result in a rise in wages. This will impact on other variables.

The reduction in contributions causes an increase in disposable income, which initially induces additional consumer demand, so that production and employment rise. At the same time, a higher VAT has adverse effects on consumer demand. In all, the two effects in the variant of the IAB/RWI model used here cause consumer demand to decrease slightly. Additionally, investment demand declines. This is triggered by the rise in unit labour costs due to increases in wages under collective bargaining agreements. In all, the result is that employment is not quite 0.02 % less than in the reference scenario (Table 1).

Our primary scenario assumes endogenous wage setting. In this case, wages result from the estimated equation for contractual wages. For a better understanding of the importance of flexible wages, however, we also report on simulations in which wages were fixed (Fig. 1).

Fig. 1: Employment effects of a 1% reduction in social-security contributions under the IAB/RWI model



In the case where wage changes are entirely exogenous, the impact in the medium term (about 3 years) from a 1% reduction in social-security contributions is slightly positive overall, on the order of about 0.04 % more persons employed than in the base case (Table 2). This results solely from factor substitution as the cost of labour declines, because the lower contributions also reduce the unit cost of labour.

Table 2: IAB/RWI model—One-percent reduction in social-security contributions financed by VAT (exogenous wages)

	Quarter											
	1	2	3	4	6	8	10	12	16	24	32	48
Employment	-0,01	-0,02	-0,03	-0,03	-0,02	0,01	0,03	0,04	0,04	0,04	0,05	0,06
GDP	-0,07	-0,09	-0,09	-0,06	-0,02	-0,01	-0,03	-0,04	-0,04	-0,02	-0,02	-0,01
Private Consumption	-0,21	-0,24	-0,27	-0,24	-0,19	-0,17	-0,15	-0,17	-0,16	-0,14	-0,12	-0,10
Capital expenditures	-0,24	-0,23	-0,15	0,15	0,39	0,42	0,18	0,14	0,12	0,17	0,19	0,21
Unit cost of labour	-0,10	-0,10	-0,13	-0,16	-0,18	-0,13	-0,11	-0,10	-0,10	-0,10	-0,10	-0,10
Consumer Prices	0,36	0,35	0,35	0,34	0,33	0,32	0,32	0,32	0,33	0,33	0,34	0,37
Gross wages	-0,29	-0,28	-0,30	-0,32	-0,30	-0,25	-0,23	-0,21	-0,21	-0,20	-0,20	-0,18

In all, therefore, changing the funding of social security by increasing the VAT causes hardly any change in employment. The sign of the very small change, that we find, depends essentially on how wages under collective bargaining agreements respond to the higher VAT. If the response of these wages is limited only to the inflation induced by the VAT, such a change in the form of funding may have a weakly positive effect. But if the VAT increase causes collectively bargained wages to rise by the same amount, the impact on employment may even be negative, albeit small. This phenomenon can be viewed as an indicator that in the event that such a policy is adopted, it would be helpful for collective bargaining negotiations to bear in mind that the lower social-security contributions will also increase disposable income.

Table 3: IAB/RWI model—One-percent reduction in social-security contributions financed by borrowing (endogenous wages)

	Quarter											
	1	2	3	4	6	8	10	12	16	24	32	48
Employment	0,01	0,01	0,02	0,04	0,08	0,12	0,14	0,16	0,18	0,18	0,16	0,14
GDP	0,04	0,06	0,08	0,11	0,13	0,14	0,14	0,13	0,13	0,11	0,10	0,08
Private Consumption	0,11	0,16	0,18	0,21	0,27	0,28	0,31	0,29	0,30	0,28	0,27	0,24
Capital expenditures	0,13	0,16	0,47	0,73	0,70	0,71	0,53	0,49	0,39	0,27	0,20	0,17
Unit cost of labour	-0,19	-0,20	-0,19	-0,19	-0,16	-0,11	-0,07	-0,04	-0,02	0,01	0,02	0,01
Consumer Prices	-0,01	-0,02	-0,03	-0,04	-0,05	-0,05	-0,05	-0,05	-0,04	-0,02	-0,01	0,00
Gross wages	-0,18	-0,18	-0,17	-0,15	-0,11	-0,06	-0,03	-0,01	0,00	-0,01	-0,02	-0,03

If no compensatory financing—meaning an increase in the VAT—is pursued, production and employment will initially rise because of additional consumer demand. At the same time, lower contributions will also reduce unit labour costs, leading in turn to a rise in the demand for capital goods. In all, the result will be employment of a full 0.1% more employees than in the base scenario with unchanged contribution rates (Table 3). Indeed, the effects are somewhat more marked if—as is simulated in the case with exogenous wages—collectively bargained wages do not respond to the improved situation in the labour market (Table 4).

Table 4: IAB/RWI model—One-percent reduction in social-security contributions financed by borrowing (exogenous wages)

	Quarter											
	1	2	3	4	6	8	10	12	16	24	32	48
Employment	0,01	0,01	0,02	0,04	0,08	0,12	0,15	0,17	0,19	0,20	0,20	0,18
GDP	0,04	0,06	0,08	0,11	0,14	0,14	0,14	0,14	0,14	0,13	0,12	0,11
Private Consumption	0,11	0,16	0,18	0,21	0,27	0,28	0,30	0,29	0,30	0,29	0,28	0,26
Capital expenditures	0,13	0,16	0,48	0,76	0,75	0,78	0,61	0,62	0,55	0,45	0,40	0,38
Unit cost of labour	-0,19	-0,20	-0,19	-0,20	-0,17	-0,13	-0,11	-0,08	-0,06	-0,04	-0,04	-0,05
Consumer Prices	-0,01	-0,02	-0,03	-0,04	-0,05	-0,06	-0,06	-0,06	-0,06	-0,05	-0,04	-0,04
Gross wages	-0,18	-0,18	-0,17	-0,16	-0,12	-0,07	-0,05	-0,03	-0,03	-0,03	-0,03	-0,04

The positive effects on employment result in a certain degree of self-financing for the reduction in contribution rates. However, the level of self-financing depends critically on how strongly transfer payments change. Many income transfer payments—such as unemployment benefits—are more or less closely related to net wages. Reducing the net contribution rates for social security will increase net wages. If the amount of income transfers is automatically adjusted to net wages—as the simulations assume—the transfer payments will also rise accordingly. On one hand, this will increase disposable income once again, and thus ultimately result in higher consumption and more employment. But on the other hand, the self-financing ratio will be lowered equivalently, because the higher transfer benefits must also be financed.

4.2. IAB/INFORGE

During the period when the reform is implemented, the reduction in social-security contributions is reflected entirely in lower costs of labour, because wages do not begin changing until the second period. Since employment is a function of the real cost of labour and real production, the important question now is whether the expansive effect of reducing social-security contributions (higher disposable income) dominates the opposite effect of a higher VAT. The numerical results show that total demand increases (Table 5). To be sure, the VAT does lower employees' real

demand, but it also reduces the purchasing power of other kinds of income. So it is borne by a broader-based group. Thus the VAT is not equivalent to social-security contributions.

Beginning with the second period, (collectively bargained) wages respond to changes in productivity, consumer prices and unemployment. All three variables act to increase wages. Productivity, measured as GDP per person employed, has risen. INFORGE assumes a positive correlation between production and productivity, on the basis of learning effects. The cost-of-living index has likewise risen, because of the increase in VAT. Unemployment has decreased. Gains in gross wages accelerate until the fifth year, after which they taper off slightly. Higher wages have a direct negative impact on employment. But indirectly, by strengthening consumer spending, they also have a positive effect.[18]

Table 5: IAB/INFORGE model—One-percent reduction in social-security contributions financed by VAT (endogenous wages)

	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Employment	0,14	0,17	0,13	0,12	0,11	0,11	0,11	0,11	0,11	0,11	0,11	0,11
Unemployment	-0,89	-1,08	-0,79	-0,76	-0,68	-0,65	-0,67	-0,69	-0,71	-0,75	-0,79	-0,85
GDP, real	0,12	0,09	0,07	0,05	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04
Private consumption, real	0,23	0,14	0,12	0,08	0,07	0,06	0,06	0,07	0,07	0,07	0,07	0,07
Gov't spending, real	-0,05	0,00	-0,01	-0,02	-0,03	-0,03	-0,03	-0,03	-0,04	-0,04	-0,04	-0,04
Capital expenditures, real	0,03	0,08	0,03	0,01	0,00	-0,01	-0,01	-0,01	0,00	0,00	-0,01	-0,01
Exports, real	0,01	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Imports, real	0,03	0,03	0,01	-0,02	-0,03	-0,03	-0,03	-0,03	-0,03	-0,03	-0,03	-0,03
Production, real	0,09	0,05	0,02	0,00	-0,01	-0,01	-0,01	-0,01	-0,01	-0,01	-0,01	-0,01
Cost of living index	0,06	0,15	0,19	0,21	0,22	0,22	0,21	0,21	0,21	0,21	0,21	0,21
Cost of labour, nom.	-0,20	-0,18	-0,12	-0,11	-0,10	-0,10	-0,11	-0,11	-0,11	-0,11	-0,11	-0,11
Gross wages, nom.	0,00	0,02	0,09	0,09	0,10	0,10	0,10	0,10	0,09	0,09	0,09	0,09
Disp. income, nom.	0,39	0,28	0,30	0,28	0,28	0,28	0,27	0,27	0,28	0,28	0,27	0,27

The growth of GDP, driven primarily by consumer spending, reaches its maximum as early as the first year. Employment peaks one period later. All variables stabilise from year five onwards. The longer-term gain in employment is 0.11%. Unemployment is 0.85% lower at the end of the simulation period.

Table 6: IAB/INFORGE model—One-percent reduction in social-security contributions financed by lower public consumption (endogenous wages)

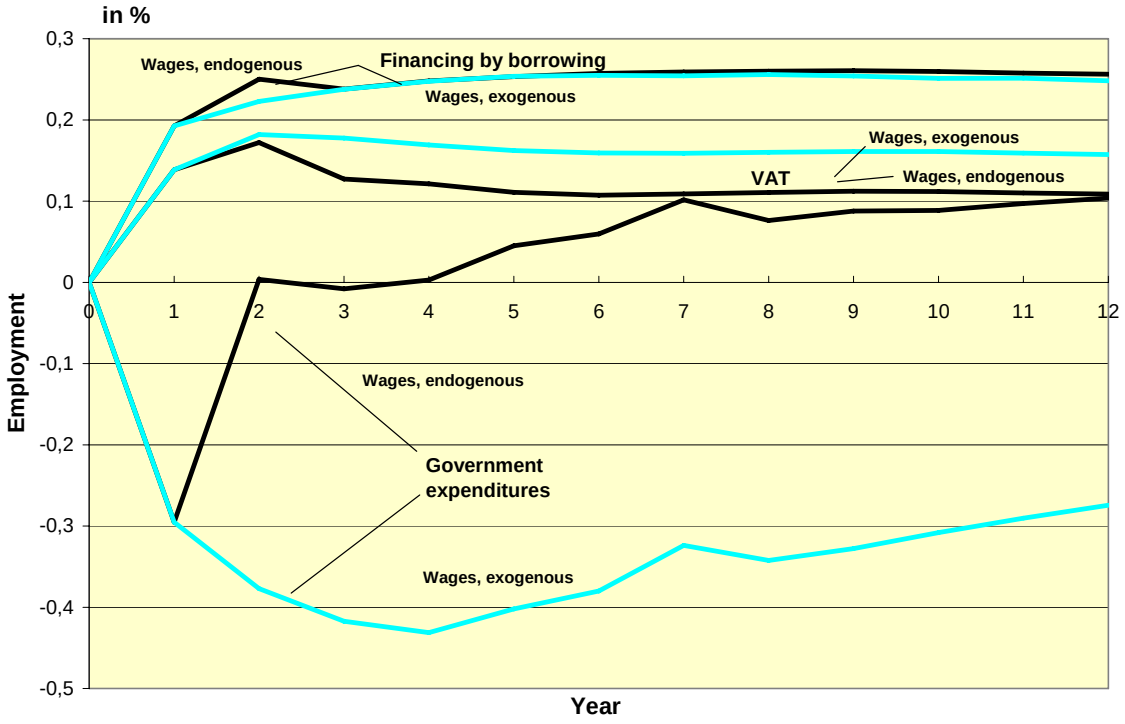
	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Employment	-0,30	0,00	-0,01	0,00	0,05	0,06	0,10	0,08	0,09	0,09	0,10	0,10
Unemployment	2,17	0,31	0,41	0,37	0,10	0,01	-0,27	-0,12	-0,21	-0,24	-0,33	-0,42
GDP, real	-0,45	-0,56	-0,60	-0,61	-0,57	-0,53	-0,55	-0,48	-0,45	-0,43	-0,40	-0,38
Private consumption, real	-0,08	-0,21	-0,22	-0,21	-0,17	-0,13	-0,19	-0,07	-0,05	-0,03	-0,01	0,00
Gov't spending, real	-2,06	-2,32	-2,57	-2,69	-2,66	-2,61	-2,56	-2,53	-2,45	-2,40	-2,34	-2,29
Capital expenditures, real	-0,42	-0,53	-0,46	-0,44	-0,38	-0,32	-0,25	-0,28	-0,23	-0,21	-0,19	-0,17
Exports, real	0,00	-0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Imports, real	-0,24	-0,35	-0,36	-0,36	-0,33	-0,30	-0,27	-0,27	-0,25	-0,24	-0,23	-0,22
Production, real	-0,40	-0,47	-0,49	-0,49	-0,45	-0,42	-0,44	-0,37	-0,34	-0,32	-0,30	-0,29
Cost of living index	0,01	-0,12	-0,14	-0,16	-0,17	-0,18	-0,17	-0,18	-0,18	-0,18	-0,18	-0,17
Cost of labour, nom.	-0,18	-0,90	-0,97	-1,03	-1,06	-1,05	-1,03	-1,02	-0,99	-0,96	-0,94	-0,91
Gross wages, nom.	0,00	-0,70	-0,78	-0,83	-0,86	-0,84	-0,82	-0,79	-0,78	-0,74	-0,72	-0,70
Disp. income, nom.	0,01	-0,26	-0,28	-0,29	-0,27	-0,23	-0,38	-0,17	-0,16	-0,14	-0,12	-0,11

[18] In INFORGE, higher real costs of labour cause the growth rate of labour-saving technical progress to accelerate.

If the reduction in contribution rates is financed by way of lower state consumption (Table 6), the initial result in the first year is a negative impact on employment. As early as the second year after the reform, the number of jobs returns to its pre-reform level. The cause is the contractive effect (–2.06 %) of lower government expenditures. While the state spends all funds it collects from social-security contributions and taxes, private spenders always spend only a portion of their disposable income on consumption. It is true that in INFORGE, as in the other models, savings must match total investments, but only to the extent that domestic capital expenditures must be financed by cutting back consumption domestically or abroad. Hence an increase in savings does not increase capital goods demand one for one. Investment demand depends on production, the stock of capital, and the real interest rate. By assumption, our simulations omit the responses of investment into line with one another. Capital goods demand responds to lower production caused by lower government spending. The change in savings affects demand abroad. The increase in private households' disposable income is very weak, as a consequence of higher unemployment, and therefore cannot compensate for slackening investment demand. On the contrary, private consumption actually declines slightly. The negative picture (real production –0.4 %) is somewhat exaggerated by the practically nonexistent response of exports. Here one would have to expect lower labour costs to have a positive influence.

Beginning with the second period, collectively bargained wages respond to lower employment and employment begins to rise again. Over the longer term, employment growth is almost the same as in the case of financing by way of the VAT (Fig. 2).

Fig. 2: Employment effects of a 1% reduction in social-security contributions under the IAB/INFORGE model



The overall development does not come out as well if wages do not respond to the changing situation (Table 7), but instead follow the track projected for the reference scenario. Such a constellation may be interpreted as a wage policy that simply

ignores the reduction in demand and the associated weaker performance of the labour market, and follows exogenous (i.e., predetermined) perceptions about the evolution of nominal wages.

Table 7: IAB/INFORGE model—One-percent reduction in social-security contributions financed by lower public consumption (exogenous wages)

	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Employment	-0,30	-0,38	-0,42	-0,43	-0,40	-0,38	-0,32	-0,34	-0,33	-0,31	-0,29	-0,27
Unemployment	2,17	2,60	2,82	2,95	2,74	2,58	2,24	2,42	2,35	2,35	2,39	2,47
GDP, real	-0,45	-0,52	-0,55	-0,56	-0,53	-0,50	-0,52	-0,45	-0,42	-0,40	-0,38	-0,36
Private consumption, real	-0,08	-0,08	-0,11	-0,10	-0,05	-0,02	-0,09	0,03	0,04	0,05	0,07	0,08
Gov't spending, real	-2,06	-2,42	-2,58	-2,70	-2,67	-2,61	-2,57	-2,54	-2,46	-2,41	-2,36	-2,31
Capital expenditures, real	-0,42	-0,46	-0,44	-0,42	-0,37	-0,32	-0,25	-0,28	-0,23	-0,21	-0,19	-0,18
Exports, real	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Imports, real	-0,24	-0,27	-0,28	-0,29	-0,26	-0,24	-0,21	-0,21	-0,20	-0,19	-0,18	-0,17
Production, real	-0,40	-0,44	-0,47	-0,47	-0,44	-0,41	-0,43	-0,36	-0,34	-0,32	-0,30	-0,29
Cost of living index	0,01	0,01	0,01	0,00	-0,01	-0,01	-0,01	-0,02	-0,03	-0,03	-0,03	-0,03
Cost of labour, nom.	-0,18	-0,20	-0,19	-0,19	-0,21	-0,21	-0,22	-0,22	-0,21	-0,21	-0,21	-0,21
Gross wages, nom.	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Disp. income, nom.	0,01	0,00	-0,02	-0,01	0,02	0,04	-0,12	0,08	0,08	0,09	0,10	0,11

In the basic scenario where the rate cut is financed by an increase in the VAT, wage policy plays a less important role (Table 8). Nevertheless, here too there is a difference from the case with endogenous wages. But now the sign is reversed. Exogenous wage changes would strengthen the positive effects. While endogenous wages yield wage growth of approximately 0.1 %, here that increase is absent. Under IAB/INFORGE, lower wages imply higher employment. But private consumption works out to be less.

Table 8: IAB/INFORGE model—One-percent reduction in social-security contributions financed by VAT (exogenous wages)

	Year											
	1	2	3	4	5	6	7	8	9	10	11	12
Employment	0,14	0,18	0,18	0,17	0,16	0,16	0,16	0,16	0,16	0,16	0,16	0,16
Unemployment	-0,89	-1,14	-1,09	-1,04	-0,99	-0,96	-0,96	-0,99	-1,01	-1,07	-1,14	-1,22
GDP, real	0,12	0,09	0,07	0,05	0,04	0,04	0,04	0,04	0,04	0,04	0,04	0,04
Private consumption, real	0,23	0,14	0,10	0,07	0,05	0,05	0,05	0,06	0,06	0,06	0,06	0,06
Gov't spending, real	-0,05	0,01	0,00	-0,02	-0,03	-0,03	-0,03	-0,03	-0,03	-0,04	-0,04	-0,04
Capital expenditures, real	0,03	0,08	0,02	0,01	0,00	-0,01	-0,01	-0,01	0,00	0,00	0,00	-0,01
Exports, real	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Imports, real	0,03	0,03	0,00	-0,02	-0,03	-0,04	-0,04	-0,03	-0,03	-0,03	-0,03	-0,03
Production, real	0,09	0,05	0,02	0,00	-0,01	-0,01	-0,01	-0,01	-0,01	-0,01	-0,01	-0,01
Cost of living index	0,06	0,14	0,17	0,19	0,20	0,20	0,19	0,19	0,19	0,19	0,19	0,19
Cost of labour, nom.	-0,20	-0,20	-0,21	-0,21	-0,20	-0,20	-0,20	-0,20	-0,20	-0,20	-0,20	-0,20
Gross wages, nom.	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Disp. income, nom.	0,39	0,27	0,26	0,25	0,25	0,24	0,24	0,24	0,25	0,25	0,25	0,24

Since gross wages hardly change, the distinction between endogenous and exogenous wage changes is of practically no importance for the scenario with financing by borrowing. It would cause employment to rise about twice as fast as in the VAT funded variant (Table 9). Similarly to financing with the VAT, the effects also come into play very quickly, and remain almost unchanged from then onwards.

Table 9: IAB/INFORGE model—One-percent reduction in social-security contributions financed by borrowing (endogenous wages)

	Year											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Employment	0,19	0,22	0,24	0,25	0,25	0,25	0,25	0,26	0,25	0,25	0,25	0,25
Unemployment	-1,29	-1,43	-1,50	-1,58	-1,61	-1,61	-1,62	-1,67	-1,69	-1,77	-1,90	-2,05
GDP, real	0,18	0,22	0,23	0,24	0,24	0,24	0,24	0,23	0,23	0,23	0,22	0,22
Private consumption, real	0,35	0,41	0,43	0,44	0,44	0,45	0,45	0,45	0,46	0,46	0,45	0,45
Gov't spending, real	0,05	0,11	0,14	0,14	0,14	0,14	0,14	0,14	0,14	0,13	0,13	0,13
Capital expenditures, real	0,06	0,11	0,11	0,10	0,09	0,08	0,07	0,07	0,06	0,06	0,05	0,05
Exports, real	0,01	0,01	0,02	0,02	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
Imports, real	0,15	0,19	0,19	0,19	0,19	0,19	0,18	0,18	0,18	0,17	0,17	0,16
Production, real	0,15	0,21	0,21	0,22	0,22	0,22	0,22	0,21	0,21	0,21	0,20	0,19
Cost of living index	-0,07	-0,08	-0,08	-0,08	-0,08	-0,08	-0,08	-0,08	-0,08	-0,08	-0,08	-0,08
Cost of labour, nom.	-0,20	-0,20	-0,20	-0,21	-0,22	-0,22	-0,22	-0,23	-0,22	-0,22	-0,22	-0,22
Gross wages, nom.	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Disp. income, nom.	0,27	0,33	0,34	0,35	0,35	0,36	0,36	0,36	0,37	0,37	0,37	0,36

We may conclude that in the case of a reform in social-security contributions where the direct burden on labour is reduced by shifting the tax structure to indirect taxes, the advantages derive from differences in the tax incidence. The simulation results thus conform to the general result in public economics that a tax on earned income and consumption taxes are not equivalent if taxpayers differ. This is obviously the case with the VAT, because it must also be paid out of transfer income such as pensions or unemployment compensation.[19]

4.3. PACE-L

The results from the general equilibrium model show the long-term responses. The model does not provide a time structure for the changes in individual variables.

It must first be pointed out that the changes of aggregates shown in Table 10 sometimes conceal contrary changes of their components (i.e. the sub-aggregates). The most conspicuous is the change in labour costs, which is equal to zero for all groups of employees together. In fact, the cost of labour for highly skilled workers declines very slightly. For the group of skilled workers, it remains nearly constant, and for the group of low-skilled workers it rises slightly. Accordingly, it is possible that in the course of adjustment processes, increases in collectively bargained wages may be greater than the cost relief resulting from lower employer contributions.

Starting with the fourth column in Table 10, we see that reducing social-security contributions financed by a higher VAT, although formally benefiting both employers and employees, leads under PACE-L to new collective bargaining agreements (see *Gross wages*). This is true even if the phenomenon is looked at in isolation, or in other words, without the feedback effects that act by way of increased production or higher consumer prices.[20] But this does not yet explain why some collectively bargained wages rise faster than contributions fall. The critical factor here is the progressive taxation of employment income. For a given pre-tax income, the

[19] Although VAT is not paid on income from capital investments (cf. Homburg, 1997, p. 144 f.), raising this tax reduces the purchasing power of such income if a higher VAT leads to higher consumer prices.

[20] It would be pure chance if the reduction in social-security contributions were split exactly fifty-fifty between employers and employees.

reduction in social-security contributions will reduce the progressiveness of taxation.[21] For the unions, the trade-off between gross wages and employment has shifted in the direction of the wage term. Therefore they demand higher wages. But higher wage demands from the unions cause employment income to "grow back into" the progressive tax structure again. Accordingly, wages can grow approximately until the point where the old degree of progressiveness has been attained.[22]

The rise in bargained wages compensates almost entirely for the fall of contributions. Total labour costs fall by -0.02 %. Employment increases slightly (+0.08 %). The macroeconomic stock of capital and the GDP grow minimally.

The change in the form of funding for social security affects the structure of aggregate demand. Since employee income rises, so does private consumption. The increase in the indirect tax burden reduces savings among wealthy households, and so the demand for capital goods declines. Additionally, the difference in the burden on different kinds of consumption as a result of the VAT also has an effect, which however can be neglected. The change in the structure of total demand affects employment differently in the various sectors of the economy. While employment in the service sectors (transportation, retail, banks, insurance, etc.) rises slightly, there are slight declines in the construction industry and manufacturing. Quantitatively, the structural effect is of minor importance. Therefore relaxing the extreme distributive assumption causes no changes worth mentioning.

Table 10: PACEL-L—One-percent reduction in social-security contributions with simultaneous compensatory financing (endogenous wages)

	Gov't expenditures fixed replace. rate	Gov't expenditures fixed benefit	VAT fixed replace. rate	VAT fixed benefit
Employment	-0.03	**0.18**	-0.01	**0.08**
Unemployment	0.19	**-1.06**	0.05	**-0.50**
GDP	0.01	**0.20**	-0.01	**0.09**
Production	0.04	**0.23**	-0.01	**0.09**
Private Consumption	0.29	**0.38**	0.06	**0.16**
Capital expenditures	0.02	**0.07**	-0.17	**-0.10**
Government	-0.71	**-0.35**	0.00	**0.00**
Exports	0.13	**0.42**	-0.02	**0.15**
Imports	0.10	**0.25**	-0.03	**0.07**
Consumer prices	0.00	**-0.03**	0.45	**0.33**
Cost of labour, nom.	0.01	**-0.04**	0.00	**-0.02**
Gross wages, nom.	0.18	**0.14**	0.18	**0.16**
Net wages, nom.	0.49	**0.47**	0.62	**0.58**
Stock of capital	0.05	**0.21**	0.00	**0.09**

If the rate cut is financed by lower public expenditures (second column), the effects are roughly doubled. Employment increases by 0.18 %, GDP by 0.2 %. The advantage of this form of funding over a higher VAT arises from the fact that lower government outlays come without any negative side effect. In sharp contrast to the

[21] The change in progressiveness is caused because the marginal tax rate declines faster than the average rate.

[22] For a better understanding of the significance of the progressive income tax, we also ran a simulation in which employment income is taxed proportionally. In this case, the cost of labour changes practically not at all for all employees.

two previous models a new allocation of disposable incomes between the public and the private sector leaves total demand unchanged. [23] Put differently, there is no change in the economy's external net lending position. Since lower state consumption has also no effect on private production and we abstract from the utility derived from public goods, there is no negative consequence associated with the policy under scrutiny.

The two other scenarios we report on (column 1 and 3) differ with respect to a single assumption. Here the unemployment benefits vary with net wages, i.e. there is a fixed replacement rate, not a fixed benefit payment. The assumption about benefits is crucial, as the results show. With a fixed replacement rate the effects are turned around completely. Now employment and output fall, because bargained wages increase more than before. This rise is more pronounced than Table 10 shows, since labour costs is computed as an average over all types of workers.

With the distinction between variable and fixed unemployment benefits the question arises, which of the two cases should be considered as the more appropriate one. While this issue has not been settled completely yet, a fixed benefit payment is our preferred specification.[24] This seems at odds with German social legislation. However, one should be cautious to ask for a one-to-one reproduction of social law in PACE-L. The important point is how trade unions conceive unemployment benefits. A fixed replacement rate means that the unemployment benefit which is part of the unions' fall-back option is proportional to the wage under negotiation. But this is obviously counterfactual. If negotiations fail, unemployment benefits will be based on wages paid up-to the moment of abortion. Since PACE-L is a static model we cannot distinguish wages accordingly to their term of contract. Both ways of defining unemployment benefits are rather crude, however, in our opinion a fixed benefit payment captures reality more closely.

The simulations with a fixed replacement rate show, that reducing social-security contributions benefits almost entirely employees. This means, conversely, that high social-security contributions cannot be responsible for the high cost of labour and the resulting unemployment. The economic reason behind this perhaps surprising result is that the difference between net wages and alternative incomes, which is so important for wage negotiations, does not change when social-security contributions are varied. This in turn is because alternative income is a linear function of the negotiated net wage. Ultimately, this phenomenon is a consequence of the configuration of unemployment compensation assumed here.

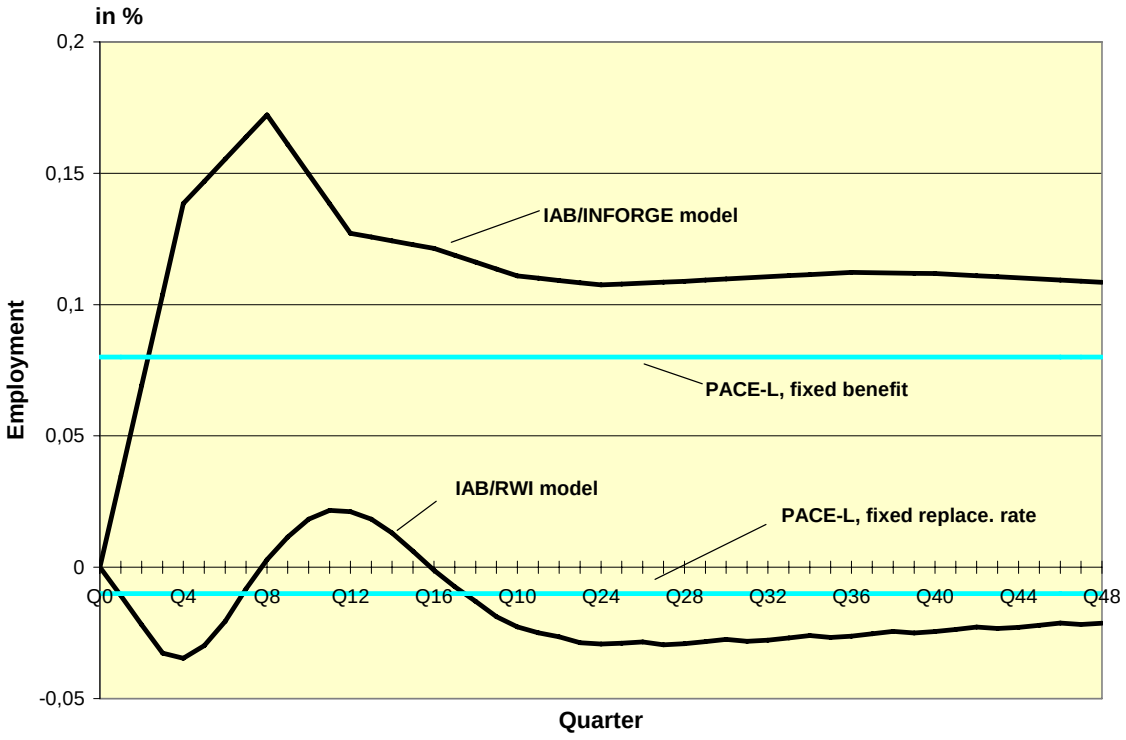
To our way of thinking, the simulation results from PACE-L mean that the reform measure under examination has a small but positive employment impact. The discussion of the results has indicated the significance of progressive taxation. From additional simulations, we know (cf. also Böhringer, Boeters and Feil, 2005) that this mechanism is one of the factors with the most significant quantitative influence. Whether the importance of tax progression is exaggerated within PACE-L is a question that has to answered by future research. There are at least some indications that this might be true.

[23] By the Armington assumption domestic investment demand of course includes imported goods.
[24] A more detailed discussion of this issue is provided in Feil and Zika (2005a).

5. Comparison of model results

Let us return to the question we asked in the introduction regarding what the measures under examination here will mean for labour market policy. Stated briefly: Will reducing social-security contributions be of any use? The IAB/INFORGE model indicates a positive effect for a contribution reduction financed either via the VAT or by reducing public expenditures (cf. Fig. 2). Employment increases by 0.11 %. In the economic-policy debate, it is more common to report the employment effect associated with a reduction of one *percentage point*. That effect is approximately 0.24 %. Referred to the number of employees (approximately 34 million in 2003), this figure represents an increase of around 90,000 persons. Whether that is a few or many is ultimately a matter of opinion.

Fig. 3: Employment effects of a 1 % reduction in social-security contributions financed by an increase in VAT



One might now argue that the calculations based on the IAB/INFORGE model offer no arguments against pursuing such a policy. Nor do the results with the other two models really oppose such a recommendation. As a worst case, the measure will accomplish nothing.[25] Are there nevertheless weighty objections to such a policy? First, it must be pointed out that no simulation examines effects on the distribution of personal income. Hence it is impossible to quantify distribution effects in any detail. Nothing more is possible than a rough indication that such a reform would cause a deterioration in the position of such groups as pensioners and the unemployed. As regards the production side of the economy, no major impact on economic structure

[25] The simulations with the IAB/RWI model and PACE-L can, as has been shown, result in a small employment loss. These reductions, however, have their origins in two strong assumptions which are not entirely convincing, at least to us.

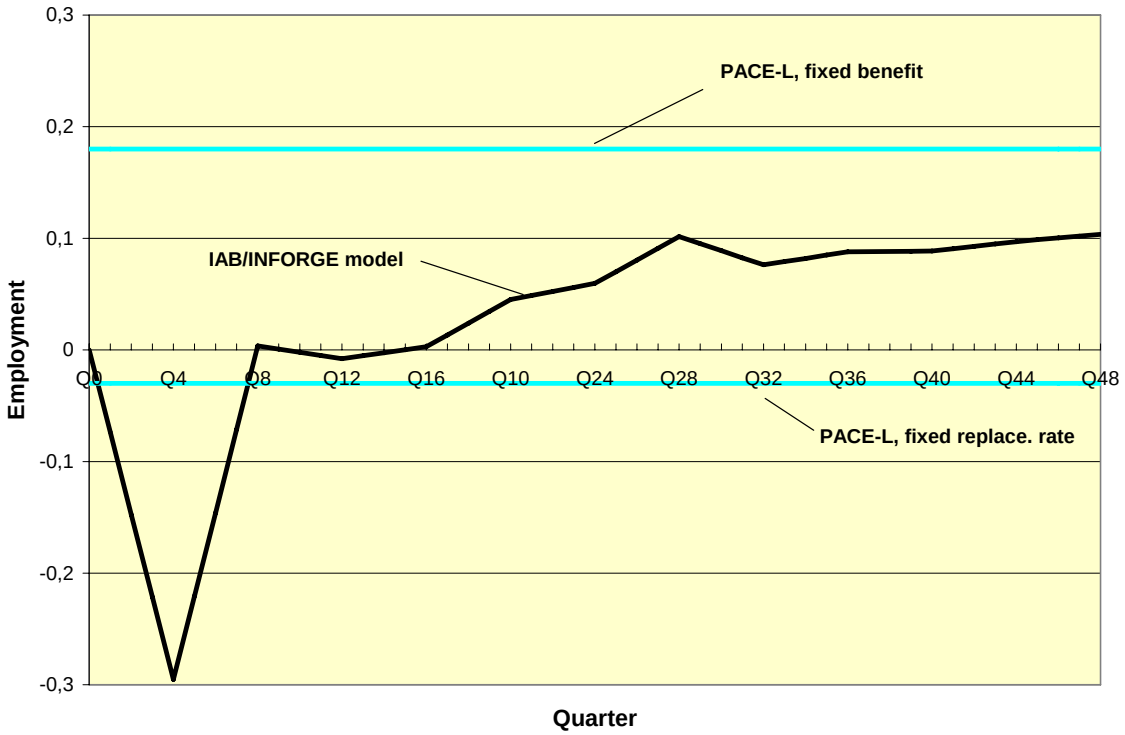
can be expected. But that does not preclude significant effects in certain (smaller) sectors, which are part of the sectors explicitly considered.

The simulations with PACE-L reveal two effects that economic policy might additionally put to use. One is the finding that a progressive income tax can have quite positive effects. From this, one can derive a warning against reducing progressive taxation too steeply. Second, it was found that effects are better if unemployment compensation benefits do not rise at the same rate as collectively bargained wages. Besides mitigating the pressure of transfer payments on public budgets, fixed unemployment compensation benefits may moderate wage demands by trade unions. A similar effect might also be achieved if the unions were willing to waive wage increases that the reform policy would make possible. The results with both IAB/INFORGE and PACE-L show that the effects on employment are greater if collective-bargaining wage agreements are lower (Fig. 3).

The IAB/INFORGE model provides no confirmation for the suspicion that a VAT increase might reduce aggregate demand. Though weak, the increase in GDP is certainly positive. However, the calculations using the IAB/RWI model raise some doubts as to whether this result is correct. They show that the change in consumer prices is the critical point, and that the simulated reduction in private consumption results from the assumption about how the consumption tax is shifted forward. Since VAT is not charged uniformly for all applicable purposes, and competition conditions differ in various goods markets, one can expect that a higher VAT will not be shifted forward entirely to consumer prices. And even if that is the case (at least approximately), lower labour costs will result in lower output prices. Finally, exports should increase and thus at least partially compensate for possible declines in domestic demand.

It is more difficult to judge a reduction in nonwage costs of labour financed by lower state expenditures. For the first few years, the results with the IAB/INFORGE model yield a rather negative picture (cf. Fig. 4). In the long term, assuming endogenous wage changes, the growth in employment is similar to that for financing with a VAT, but in the first year employment declines, and an increase in employment cannot be expected until the fifth year. The simulations with PACE-L, in the version with a fixed replacement rate, come out even worse. Here, in fact, there is an actual loss of employment in the long term. But this result in turn follows from the change in progressiveness of the combined charge for social-security contributions and income tax, and can be avoided if the income-tax rate is adjusted. An entirely different picture results when unemployment compensation benefits are either fixed objectively or are treated as given by the unions. In that case there is a significant increase in employment (0.18 %). This is the strongest gain in any of our simulations.

Fig. 4: Employment effects of a 1 % reduction in social-security contributions financed by a reduction in state expenditures



6. Conclusions

The purpose of the present simulation study was to answer the question whether reducing social-security contributions can have a significant impact on employment. In addition, we were interested in whether the assessment of such a measure varies with the macroeconomic model used. For this purpose, simulations were run with three models currently employed in macroeconomic research at the IAB: the IAB/RWI model used to support short-term projections, the IAB/INFORGE model used in projecting long-term labour demand, and the PACE-L policy simulation model.

The models differ in their fields of application, and thus necessarily also in their construction—in other words, in the assumptions they make, the data they employ, the theories behind them, and so forth. For that reason, the same effects could never be expected from all three models. However, at the same time, each model in itself is believed to furnish a reflection of reality. From this point of view it is not far-fetched to assume that making allowances for the fields of application for which they were constructed, all three models arrive at “correct” results. With regard to our present question, this would mean that the IAB/RWI model would reveal the short-term adjustment processes resulting from a reduction in social-security contributions, while the IAB/INFORGE model would reflect the medium and long-term processes. PACE-L, by contrast, would provide the effects that would ultimately come along in a new equilibrium evolving over the long term, or in other words, after all adjustment processes were completed.

The simulation results show that the question as to the quantitative significance of the reform proposal cannot be separated from the question of how the assessment

differs depending on which model is used. In concrete terms, for the base scenario, in which lost social-insurance revenue is covered by a subsidy from the state budget financed by the VAT, the resulting employment impact is within the range from –0.03 % to +0.11 %. If a VAT increase is replaced by saving on public expenditures, the range is –0.03 % to +0.10 %. Further simulations regarding the sensitivity of these results to important assumptions generally confirm this range. The interval permits one to derive an optimistic and a pessimistic appraisal. The unequivocal result of the analysis is that reducing nonwage costs of labour can do no more than help reduce underemployment, and by itself cannot in any case offer a way out of the employment crisis.

Employing models with different time-range bases calls attention to an important point: the time structure of the effects. The adjustment processes that are caused by the policy measure may be of extreme interest to political decision-makers. For example, it may be of critical importance for the feasibility of a measure whether it yields positive effects from the outset, or whether a dry spell of several years must be expected first.

In general, this model comparison makes clear how important it is to look more deeply into the origins of concrete results that are often and popularly presented as simple “rules of thumb”, like a decrease of contribution rates by one percentage point yields 100.000 jobs. Although economists are often well aware of the assumptions under which such a result was derived, in general, these assumptions are usually not mentioned in the press or in political debate. The consequence is that public discussion often comes to ignore the stated restrictions. In the end, one can merely say:

> [It is] always dangerous to reduce the results of complex models to a single figure or a few figures. First, the figures may be simply wrong, because of computational errors. […] And even if the produced figures have been computed correctly—although that is almost impossible to check—the underlying models may be extremely poor.
>
> Fehr and Wiegard (1996, p. 329, *translated by the authors*)

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