MICROSIMULATION MODELLING OF WORK-RELATED EXPENSES: A NEW APPROACH

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ABSTRACT

Based on a representative data set of more than 36,000 original tax report extracts, we develop a microsimulation model that calculates the fiscal impact of changes in the area of tax deductible work-related expenses, in particular expenses for travelling from private home to the place of work, in Germany. The new model allows a more accurate estimation of the fiscal impact of changes in the German income tax law than previously possible and thus facilitates an informed evaluation of tax policy options.

INTRODUCTION

Political Background

The tax deductibility of commuting expenses is a hotly debated topic on the German economic policy agenda. In principle, it was abolished on January 1st 2007. Since then, German courts of law have questioned the constitutionality of this abolishment. Political parties and lobby groups came forward with many proposals on how to reestablish or reorganize the tax deductibility of commuting expenses.

Typically, these discussions rely on vague projections of the effects on tax revenues. Estimates of the grossed up revenues due to that tax concession have varied widely. For example, referring to 2005, the European Environment Agency estimates foregone revenues due to the commuting allowance to be less than 4.8 billion € (see European Environment Agency, 2007), whereas the Institute for European Environmental Policy quotes more than 5.8 billion € for the same period (see IEEP et al, 2007). This huge difference is far from satisfactory. Rational public policy must rely on precise figures.

Our model presents a first interpersonally verifiable way to assess the quantitative impact of any reform of the deductibility of work-related expenses, especially the commuting allowance, not only in terms of aggregate revenue effects but also in terms of the number of "winners" and "losers". The German Ministry of Finance uses the model on a regular basis. Its results have been published nation-wide (see e.g. Franz, 2007; Schrinner, 2007a,b).

Legal Background

In Germany, work-related expenses are tax deductible (see § 9 of the German Income Tax Law (EStG)). There is a 920 € lump-sum allowance per gainfully-employed person (§ 9 a EStG). When the taxpayer proves that his or her expenses are higher, they are fully deductible.

As from the assessment period 2001, a distance allowance for commuting between the private home and place of work was introduced in the Income Tax Law (see § 9 Section 2 EStG). From 2001 to 2003, the distance allowance amounted to 0.36 € for the first ten kilometers, and 0.41 € for more than ten kilometers up. From 2004 to 2006, there existed a uniform distance allowance of 0,30 € per kilometer.

With effect of January 1st, 2007, the tax deductibility of commuting expenses was abolished. There is a special hardship compensation, however. Deductions still can be made from the 21st kilometer of travel to the place of work: For any means of transportation and for the shortest distance between private home and place of work a commuter can deduct 0.30 € per kilometer for any actual working day, with a maximum of 4,500 € per fiscal year. The 4,500 € limit does not apply to claims for commuter expenses if the taxpayer uses an automobile which he or she owns or has the right to use or if he or she provides documentary proof that costs of public transport are higher than 4,500 €. There are special written evidence rules for these claims that are explained in § 9 Section 2 EStG and the references quoted there.

Why use the Model?

Up to now, "official" estimates of the effects on total tax revenue of any amendments of § 9 Section 2 EStG have been calculated by the Federal Ministry of Finance according to the Income Tax Law and directives, administrative practice and judicature applicable. Estimation heavily relied on expert knowledge and operating experience. The validity of previous revenue forecasts was reduced by the fact that persons in dependent employment very often do not give full particulars of their commuting expenses if the sum of commuting and other work-related tax-deductible expenses is below the general lump-sum

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allowance per gainfully-employed person (i.e. currently 920 €). They often report their work-related commuting expenses to the tax authorities only if the sum of commuting and other work-related tax-deductible expenses is greater than this lump-sum allowance. Our new microsimulation model for work-related expenses resolves this problem using modern statistical techniques.

What he Model does

The aim of this microsimulation model is to facilitate an informed evaluation of policy options regarding the tax-deductibility of work-related expenses with special regard to commuting expenses. For example, this model helps policy makers in calculating to what extent changes of the commuting allowance can be financed through a reduction in the lump-sum allowance per gainfully-employed person.

How the Model works

For speed and simplicity, the model is split into two entirely different programs.

First, a data generating program takes data from the Statistical Office and generates the sub-sample that is needed by the model. The data generating program also performs the matching procedures necessary to model tax deductible expenses such as changes in the commuting allowance. This initial processing of the data is computationally very demanding. Once the base data set has been generated, these tedious calculations have not to be repeated again each time a new policy option is modelled. Furthermore, the resulting model data set to be delivered to policy makers is much smaller that the original data sets.

Second, the simulation program proper includes a routine that calculates aggregate tax revenues (wage tax, income tax and solidarity surcharge) as well as the total number of "winners" and "losers" of the reform. The program allows the user to change the parameters of the rules governing the deductibility of work-expenses interactively at run time. The results are incorporated in an easily manageable and intuitive spreadsheet.

Policy makers using the model will start off by setting basic parameters, such as:

- the levels of the commuting allowance for different distances between private home and place of work,
- the lump-sum allowance per gainfully-employed person, and
- the upper limit for users of public transport.

At any time, the user may set and change any of these basic parameters. Once data have been entered and parameters set, the user can start changing the parameters to examine the effects on total revenue and the number of "winners" and "losers". As the parameters are changed, policy makers instantly see the impact of changes.

What the Model does not do

Tax reforms typically are designed in the light of broader concerns such as creating work-incentives and fostering long-run economic growth. A model that would take into account these concerns would be quite an ambitious project and is well beyond the scope of the present model.

Summing up

This microsimulation model provides policymakers with a simple way of calculating the budgetary and welfare implications of alternative reforms of treating work-related expenses, particularly commuting expenses. It is then up to policymakers to decide on the reform scenario that is the most feasible in the particular context. The model is a flexible, easily manageable tool, not a substitute for good policy-making.

The next section describes the data generation process, then we turn to the setting up of the model, and finally we describe the results of an evaluation of some recent tax reform policy proposals.

DATA

Introduction

The primary data set used in this study was put at out disposal by the German Ministry of Finance. It is based on a special evaluation ("Sonderauswertung") of the income tax statistics in 2002. Sampling was carried out by the German Federal Statistical Office based on records not disclosed to the public.

Unfortunately, official income tax data lack important information necessary to model work-related expenses. Most importantly, official statistics neither provide complete information on work-related expenses submitted by documentary proof nor on the distance between private home and place of work. This information can be derived from our secondary data set, the German Socio-Economic Panel (GSOEP). The GSOEP is an ongoing representative longitudinal study of private households and individuals living in the Federal Republic of Germany (see e.g. Wagner et al., 2007).

So, to overcome the lack of information in German official income tax statistics, we combined information from two different sources. As the two samples do not observe the same set of units, neither merging nor record linkage techniques can be used. Instead, we applied appropriate statistical matching methods described in Buck (2006) or Wagenhals and Buck (2007).

As a result, we obtained a representative sample of more than 36,000 records. Each record represents a precisely defined number of taxation cases. Based on this representative sample we can assess the impact of tax reforms on the population of all taxation cases and thus on the resident population of Germany.

Sampling Design

We start with a stratified ten per cent random sample of all taxation cases in Germany in 2002. This sample

was drawn for our project by the German Statistical Office according to their standard procedures. Stratification variable is the aggregate income ("Gesamtbetrag der Einkünfte"). Stratified sampling ensures that the sample reflects the population of tax units with respect to this variable. The sample is drawn such that high income earners have a higher sampling probability, because high income classes are sparsely populated. Weighting factors make sure that this sample is representative. Based on this sample we draw a simple random sample.

We start with the hypothesis that we can do without a second stratification because of the high number of sample observations. In order to control this hypothesis we drew 50 additional samples and compared the empirical distributions (notably arithmetic mean and quantiles) of important variables like taxable income and marginal tax rates.

The differences between these random samples and the original 10 per cent sample are very small. Detailed results are available upon request.

Imputation of Work-related Expenses

When filing an income tax return, documentary proof for work-related expenses is only required if they exceed the 920 € lump-sum allowance. We assume that filers with work-related expenses well below this limit do not bother to itemize all positions (e.g. specialist literature, work clothes or contributions to professional organizations). To be exact, we assume that taxpayers do without itemized documentary proof if total work-related expenses are below 920 € and if the sum of itemized deductions with documentary proof amounts to less than 200 €.

This means that we include all taxpayers that do not submit documentary material with respect to their work-related expenses. We account for taxpayers who itemize some but not all of their work-related expenses in the tax declaration. They may only list items that are easy to produce such as subscriptions to newspapers or journals without specifying *all* work-related expenses in detail. We chose the limit of 200 € to account for these "lazy" taxpayers in our data fusion.

In our procedure to match supplement records to our primary data set, we supplement itemized work-related expenses of such taxation cases with itemized work-related expenses of taxation cases with work-related expenses exceeding the 920 € lump-sum allowance per gainfully-employed person. The premise behind this approach is that taxpayers with work-related expenses above this overall allowance provide evidence for all expenses eligible for inclusion as work-related expenses because it reduces their tax burden. Our matching approach allows for taxation cases with work-related expenses above the overall allowance with proved evidence of at most 400 €. The reason for that is the fact that on average some 25 to 30 per cent of the total work-related expenses are itemized expenses, the rest is commuting allowance. Therefore it can be assumed that filers with itemized work-related expenses of more than 400 € typically will also claim the commuting allowance because in general they may reckon that the sum of all work-related expenses will be above the overall allowance. In cases of joint filing (marital income splitting) we modify this procedure to allow for husbands or wives without gross income. Spouses not gainfully employed or in marginal employment were removed by considering in our matching procedure only persons with gross incomes of more than 1,000 € per year.

Imputation of Distance between Home and Place of Work

Some taxpayers do not report the distance between private home and place of work. For these persons we complete records using the German Socio-Economic Panel (GSOEP). We only use data of GSOEP respondents who report the distance between private home and place of work and who report a distance of 10 kilometers or less. The reason for this procedure is that in our reference period the standard allowance was exhausted for distances exceeding 13 kilometers. According to official statistics the commuting allowance accounts for some 70 to 75 per cent of the total work-related expenses. Therefore we assume that taxpayers report distances between private home and place of work of 11 kilometers or more, because even with low other itemized work-related expenses their tax base will be smaller when they report the distance compared to the case where they claim the standard lump-sum allowance only.

Imputation of Number of Workdays

In addition to information on the distance between home and place of work, we must also provide data on the number of workdays for the "lazy" taxpayers who do not report their commuting expenses. We use the median of all taxpayers reporting commuting expenses based on official statistics. For single filers, the value is 221 days, for joint filers we obtain 223 days for husbands and 220 days for wives.

Uprating Monetary Values

Our base data set refers to the assessment period 2002. The time lag between the reporting period and the evaluation date is due to (legal) delays in filing tax returns which can take up to several years. This time lag makes it necessary to uprate the monetary values in our model to current price levels. We do this using the consumer price index published by the German Statistical Office.

Marginal Tax Rates

Based on the uprated taxable income we calculate individual marginal tax rates using the first derivative of the income tax function according to § 32a EStG.

APPROACH TO MODELLING

Introduction

The central impetus of our work was to provide an interface that is user-friendly, allows easy simulations and scenario analysis and fast delivery of the results to decision makers. Therefore, we used Microsoft Excel® as a platform.

The computationally intensive data processing steps using complex statistical methods were performed with a high speed computer at the University of Hohenheim using the commercially available software Stata®. The final results are incorporated into the Excel model. As the complex, time-consuming task of data processing has not to be performed repeatedly, the response time to decision makers is almost imperceptible.

Individual Data

Our model is a comparative static microsimulation model. The model engine includes the individual data that are used for the simulations in a spreadsheet. Each of the more than 36,000 rows of this spreadsheet corresponds to a certain number of taxation cases given by inflation factor. Further particulars of the taxation cases include the following

- assessment type (i.e. single or joint filers),
- distance between private home and place of work,
- number of working days,
- audited and itemized "other" work-related expenses,
- taxable income, and
- individual marginal tax rate.

Based on this micro-data set changes of the established law can be simulated.

Revenue Effects

For the simulation of the effects of tax changes we perform a kind of marginal analysis.

First, we calculate work-related expenses in the current legal position, or in any new legal position adjustable by the user. We not only take into regard commuting and other work-related expenses, but also the 4,500 € limit of quantitation of public transport expenses described in the subsection on the legal background of our model.

Second, we simulate changes of the tax base in different scenarios. To calculate the effect of a change of the tax base on individual tax receipts we multiply the difference of the pre- and post-reform tax bases with the individual marginal tax rate. Then we multiply with the inflation factor und sum over all taxation cases in the data set. Implicitly we assume a constant marginal tax rate. This is plausible, because the changes in taxable income to be expected realistically are not expected to lead to dramatic changes of the marginal tax rates but in very few cases.

Finally, the income tax changes are used to calculate the solidarity surcharge, that is a federal tax levied at a rate of 5.5 percent of the personal income tax liability, when this liability exceeds the limit of 972 € (single filers) or 1,944 € (joint filers).

The model output includes the aggregate total revenue effect and its breakdown in wage tax, that is income tax payable on the wages and salaries of employees collected by way of deduction from the source, income tax (other than wage tax), and the solidarity surcharge.

"Winners" and "Losers"

For any tax reform, we check whether an individual tax payer is better off, worse off or whether the financial position does not change. Then we apply inflation factors, gross up to the total population and obtain the total number of "winners" and "losers" of a tax reform.

APPLICATION EXAMPLES

This section contains a series of examples that illustrate uses of our model.

In our introduction we have alluded to an ongoing discussion in Germany on the constitutionality of the virtual abolishment of the distance allowance for commuting between the private home and place of work as of January 1st 2007. Since then, this allowance will be granted only as from a distance of 21 kilometers. The Fiscal Courts of Lower Saxony (decision of February 27th 2007, 8 K 549/06) and the Saarland Fiscal Court (decision of March 22nd, 2007, 2 L 2442/06) consider the commuter tax regulations as unconstitutional. In its decision of August 23rd 2007 (VI B 42/07) the German Federal Fiscal Court, that is the Court of last resort within the German jurisdiction over tax and customs matters, has also announced doubts concerning the constitutionality of the new regulation as well. A final decision of the highest court in Germany, the Federal Constitutional Court, is to be expected in 2008.

In Germany today, many call for a revision of the current legal regulations, but there is no mutual consent on counterfinancing. Our model provides a flexible, easy-to-use tool to assess the impact of various changes in the deductibility of work related expenses.

For example, the speakers of the German Chancellor Angela Merkel and the Minister Of Finance Peer Steinbrück have thought aloud about financing a return to the pre-2007 commuting allowance by a revenue-neutral decrease of the flat-rate allowance, currently amounting to 920 €. With a few mouse clicks a user of our model shows that this proposal results in far more losers than winners. A revenue-neutral 0.25 € per kilometer commuting allowance starting with the first kilometer in distance requires the flat-rate allowance to fall from 920 € to 600 €. Compared to the current legal status, 9.9 million taxpayers would be relieved, but in return 18.6 million taxpayers would have to pay more taxes.

The gap between winners and losers increases for a commuting allowance of 0.25 € accompanied by a revenue-neutral reduction of the flat-rate allowance to 780 €. In this case we obtain 7.9 million winners and 20.6 million losers. The reason for this effect is the fact that many employees have no or very small work-related expenses. For them, the reduction of the 920 € flat-rate allowance acts as a tax increase. For example, a top earner with an individual marginal tax rate of 45 per cent and no work-related expenses would have to pay 144 € more per annum, plus solidarity surcharge, plus church tax if applicable.

If revenue neutrality is to be achieved, if the 920 € flat-rate allowance for work-related expenses remains unchanged and if the commuting allowance starts with the first kilometer in distance, then the commuting allowance must drop to 0.15 €. In this case, the number of winners is greater than the number of losers. Some tax lawyers have announced doubts concerning the legitimacy of such a relatively small commuting allowance. They argue that work-related expenses, even if typified, have to be in line with the actual costs which are considerably higher than 0.15 € per kilometer in distance. Contrary to this opinion, many renowned economists, tax jurists and legal practitioners advocate a complete cancellation of the commuting allowance in the context of a comprehensive *tax cut cum base broadening* tax reform (see e.g. Bareis, 2004; Franz, 2007; Wernsmann, 2007).

A user of our model quickly assesses the effects of other alternatives. Assume that the Minister of Finance is prepared to give up revenue neutrality. What happens if we introduce a 0.20 € per kilometer in distance commuting allowance? Well, almost 8 millon employees profit from this reform, while only some 700,000 long-distance commuters lose. Cost in terms of revenue foregone: 750 millon €.

And what if the tax authorities are ready to give up one billion Euro? The amount of 1.08 billion € could be used to finance a commuting allowance of 0.22 €, the number of losers could be reduced to 400.000. And what if the tax man is ready to take 1.6 billion less? This amount could finance a commuting allowance of 0.25 €. Almost ten million commuters would be better off, the number of losers would be close to zero.

FURTHER RESEARCH

Our model refers to the current assessment period 2008. Future research has to concentrate on maintenance and updates of the model. If the legal framework changes then model adjustments are necessary. Examples for such changes include:

- *Revisions of the income tax schedule (§ 32 a EStG).* Revisions of the tax schedule require a recalculation of marginal tax rates. In this study we use the 2008 tax function. Other tax functions are programmed easily.
- *Abolishment of marital income splitting*. The current system of marital income splitting is a permanent bone of contention in tax policy discussions (see Seel, 2007, for the status quo of this discussion). Its abolishment would require us to consider both spouses as single filers which can be done without difficulty.
- *Introduction of new calculation methods for commuting expenses* requires an adjustment of programs and re-computation of the allowance. Currently, the model allows at most three distance steps.
- *Substantial changes in the tax-deductibility of certain types of income-related expenses* require an adjustment of the data base. This calls for a repetition of the computationally intensive matching process.

In the medium term, the model requires adjustments to changing socio-economic and demographic structures in the population of taxpayers.

CONCLUSION

In this paper, we present a new approach to microsimulation modelling of work-related expenses with special consideration of the commuting allowance. Our aim is to facilitate an informed evaluation of policy options regarding work-related expenses in the German tax system.

The underlying philosophy in developing our model has been to make it as user-friendly as possible. We have developed a "front end" which allows the user to change the parameters of the tax rules governing work-related expenses, activate the run, and view the inputs and outputs from within an interactive environment.

The model is used routinely by the German Ministry of Finance and some of its results have been quoted in the media. Hopefully, the model will help to objectify tax policy discussions.

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