The responsiveness of training participation to tax deductibility[1]

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Abstract

To stimulate investment in training by individuals, the Dutch tax system allows a deduction of out-of-pocket training expenditures from taxable income. This paper investigates to what extent the resulting cost reduction encourages training investments. Two different identification strategies are used. The first strategy uses the progressive structure of the income tax scheme and compares groups with taxable income just above or just below kinks. The second strategy takes advantage of the 2001 tax reform, which implied substantial changes in marginal tax rates. These strategies exploit different sources of exogenous variation and are based on different identifying assumptions. Nevertheless, the results point in the same direction: tax incentives increase training participation.

Keywords: Training, Tax deductions, Human capital.

JEL Codes: H20, J24.

1 Introduction

It is widely recognized that the level of human capital is an important determinant of countries' prosperity. Initial education and work-related training are the two main forms of human capital accumulation. Whereas governments intervene in initial education in many different ways, the set of available policy instruments in the market of work-related training is more limited. Moreover, while many studies have studied the (in)effectiveness of government interventions with regard to initial education, little is known about the effectiveness of the instruments governments can use to influence the market for work-related training.

Although investing in work-related training is primarily a matter to be decided upon by private parties (employers and employees), various theoretical and empirical studies stress that private parties may underinvest in work-related training and hence that governments might want to intervene to achieve the socially optimum investment level (Bassanini et al., 2006). Examples of instruments that governments use to stimulate investments in work-related training include voucher schemes, individual learning accounts (Guido Schwerdt, 2012), certification of training (cf. Acemoglu and Pischke, 2000), tax credits and tax allowances for firms (Leuven and Oosterbeek, 2004) and tax rebates and tax deductions for individuals.

The current paper focuses on this latter instrument which allows individuals to deduct out-of-pocket training expenditures from their taxable income. Tax deduction of training expenditures is possible in various countries including Germany, Italy and The Netherlands (in Italy against the lowest marginal tax rate) but not in other countries such as France, Sweden, Norway and the UK (where it was replaced by the already abandoned individual learning accounts). In other countries including the United States, Canada and Australia training expenditures can be deducted as long as they are made to maintain existing skills. The differences across countries illustrate that tax deductibility of training expenditures is a policy instrument, which is used in some countries but not in others to stimulate training participation.

This paper investigates to what extent tax deductibility of training expenditures affects

training participation. This issue has not been addressed before and therefore fills a gap in the existing knowledge about the effectiveness of this policy instrument (cf. OECD, 2004).

Most closely related are studies by Rosen (1982) who deals with the total impact of taxation on training participation, and Dupor et al. (1996) who use results from a life-cycle human capital investment model to simulate the effect of tax deductibility of the out-of-pocket costs of formal schooling (as opposed to training). A further discussion of related research follows in section 3.

We use panel data from the Dutch tax register covering the period 1996-2002. In the Netherlands out-of-pocket expenditures on training are deductible against the marginal tax rate. The marginal tax rate is (weakly) increasing in taxable income. Consequently people who earn different taxable incomes pay different marginal tax rates and therefore incur different net costs of out-of-pocket training expenditures.

A simple comparison of training participation among individuals who pay different marginal income tax rates would, however, produce a biased estimate. We need to address the follow three complications:

1. Marginal income tax rates depend on income. This makes it difficult to separate the effect of marginal tax rates from the effect of income. This complication is relevant for almost every empirical study on people's responses to taxation (cf. Jappelli and Pistaferri 2003, 2004).

2. Training is an investment and generates returns. Not only the costs are subject to taxation, but also the returns to these investments in the form of increased earnings are taxable.

3. Not only the out-of-pocket costs of training but also its opportunity costs are (implicitly) taxed, and that the tax rate applicable to the deduction of out-of-pocket training costs varies on a one-to-one basis with the the rate at which opportunity costs are taxed. Hence any variation in training participation related to variation in the tax rate applicable to the deduction of out-of-pocket training costs is also related to variation in the tax rate applicable to the deduction of opportunity costs

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of training.

In this paper we apply two distinct identification approaches to address the concerns. Our first approach compares individuals around kink points of the income tax schedule where marginal tax rates jump. The Dutch income tax schedule has fairly large differences in the tax rates between adjacent tax brackets (see below). Individuals with a taxable income below a kink point therefore pay a substantially lower marginal tax rate than individuals with taxable income above that kink point. Consequently, with tax deductible out-of-pocket costs of training, individuals with similar levels of income are confronted with quite different net costs of training. This addresses the first complication mentioned above. Moreover, the small differences in income between individuals with taxable incomes just below or above a kink, ensures that their future incomes are also close and therefore subject to similar marginal tax rates. We will present evidence that this is indeed the case. This addresses the second complication mentioned above. Finally in this local identification approach, we choose the sizes of the intervals around kinks such that on average the net opportunity costs of training for the group just above a kink is the same as that of the group just below a kink. This addresses the third complication mentioned above.

Our second approach exploits a change in marginal tax rates due to a tax reform that took place in the Netherlands between 2000 and 2001. This tax reform changed the relevant marginal tax rate for everybody, but these changes were not the same for everyone. We use this in a difference-in-differences framework. Looking at changes in marginal tax rates for the same individuals addresses the first complication. If returns to human capital investments do not start to accrue within a year after the investment has been made then costs of investment made in 2000 are treated according to the old tax code, whereas costs of investment made in 2001 as well as returns to investments made in 2000 and 2001 are all treated according to the new tax code. Accordingly, there is a change in the tax treatment of investment costs between 2000 and 2001, whereas there is no such change in the treatment if returns to investment. This addresses the second complication. Unfortunately, for the difference-in-differences strategy, we see no opportunity to separate the effect of the change in marginal tax rates on training participation through a change

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in the out-of-pocket costs of training from the effect through a change in the opportunity costs of training.

The results from the two approaches indicate that the level of the tax deductibility rate has a positive impact on the probability that individuals spend money on training. A 10 percentage points increase in the rate against which individuals can deduct their training expenditures raises the probability that they spend money on training by about 0.3-0.8 percentage point (evaluated at a marginal tax rate of 0.4). Given that in any given year only around 3 percent of the taxpayers has deductible training expenditures, we consider this to be a substantial effect.

To motivate our empirical approach Section 2 presents a simple theoretical model of the relation between tax rates and training decisions. Section 3 reviews related empirical studies. No earlier study has focused on the effect of tax deductibility of goods invested in human capital on human capital accumulation. Section 4 describes the Dutch income tax system along with the reform that took place in 2001. Section 5 presents the empirical specification and provides more information about the two identification strategies we use. It discusses in detail the assumptions that have to be satisfied in order to interpret the estimates as causal effects of the tax deductibility rate. Section 6 gives a description of the data. Section 7 presents the results for the local identification approach. Section 8 presents and discusses the results obtained from the approach that exploits the tax reform. Section 9 summarizes and concludes.

2 Theoretical framework

This section introduces a simple theoretical model of the relation between tax rates and training decisions (see Jacobs (2002) for a related model). The main aim of this exposition is to clarify the impact of various relevant tax rates on training participation and to motivate our empirical specification. To this end we introduce a two-period model in which an individual can decide to invest in training, maximizing utility $U(C_1, C_2)$, where C_t is period t consumption. The amount of available time per period is normalized to 1. The individual chooses which fraction s of his time in period 1 will be spend on training. Time

in period 1 can only be spend on work and training, time in period 2 is fully devoted to working. A simplification in our analyses is that we abstract from labor supply decisions. The main reason is that our tax data do not contain information about individuals' hours of work. In practice this assumption might be less restrictive than it appears since the majority of itemizing individuals is male (two-thirds) , and the labor supply of men has proven to be very inelastic (see Blundell and MaCurdy (1999); Heckman (1993) for reviews of this literature).

Out-of-pocket training expenditures are denoted by $p \cdot s$. Where p is the price of a unit of training in the market. Wages in period 1 are equal to w and period 2 wages are equal to $wf(s)$, with $f(0) = 1$, $f' > 0$ and $f'' < 0$. We distinguish four different tax rates:

- τ_1 is the marginal tax rate for labor income below a certain exogenous income threshold (Y_0);

- τ_2 is the marginal tax rate above that threshold, with $\tau_2 > \tau_1$;

- τ_r is the rate at which capital income is taxed; and

- τ_d is the tax rate relevant for the deduction of the out-of-pocket training expenditures.

Substituting the budget constraints of each period into the utility function gives:

$$U(s, a) = U((1 - \tau_1)(1 - s)w - (1 - \tau_d)p \cdot s - a,$$

$$(1 - \tau_1)Y_0 + (1 - \tau_2)(w \cdot f(s) - Y_0) + Ra) \quad (1)$$

with a the amount of savings in period 1, and where $R \equiv 1 + (1 - \tau_r)r$ represents the net rate of return to investment in non-human capital. This expression assumes that $w \cdot f(s) > Y_0$: income in period 2 falls in the higher tax bracket when the amount of

training is positive.[1] The first order conditions for maximum $U(s, a)$ equal:

$$\frac{\partial U}{\partial s} = U_1 \cdot (-(1 - \tau_1)w - (1 - \tau_d)p) + U_2 \cdot (1 - \tau_2)w \cdot f' = 0 \tag{2}$$

$$\frac{\partial U}{\partial a} = -U_1 + U_2 \cdot R = 0. \tag{3}$$

where $U_t = \partial U / \partial C_t$, and combining them gives the following

$$\frac{(1 - \tau_2)w \cdot f'}{w(1 - \tau_1) + (1 - \tau_d)p} = R$$

which essentially states that one should invest in human capital s up to the point where the net-return to human capital (the left-hand side) equals the net-return to capital (right-hand side). Solving this equality for s gives a solution for the optimal level of training s^*

$$s^* = \mathcal{S}(\tau_1, \tau_2, \tau_d, \ R, \ p, \ w) \tag{4}$$

where the functional form of $\mathcal{S}(.)$ is determined by the production function of human capital, but independent of preferences. If $\tau_1 = \tau_2 = \tau_d$ then the optimal s does not depend on the rate at which wages are taxed (f.e. Boskin, 1975; Eaton and Rosen, 1980).

Applying the implicit function rule gives that:

$$\frac{\partial s^*}{\partial \tau_1} = -\frac{w \cdot R}{(1 - \tau_2)w \cdot f''} > 0, \tag{5}$$

$$\frac{\partial s^*}{\partial \tau_d} = -\frac{p \cdot R}{(1 - \tau_2)w \cdot f''} > 0 \tag{6}$$

$$\frac{\partial s^*}{\partial \tau_2} = \frac{f'w}{(1 - \tau_2)wf''} < 0 \tag{7}$$

$$\frac{\partial s^*}{\partial \tau_r} = -\frac{r\,(w(1 - \tau_1) + p(1 - \tau_d))}{(1 - \tau_2)w \cdot f''} > 0 \tag{8}$$

where the inequalities follow from the second order condition for maximum utility $(\partial^2 U / \partial s^2 < 0)$. Higher tax rates for the opportunity costs (5), the deductible out-of-pocket costs (6), and the rate at which income from non-human capital is taxed (8), all

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[1]We make this assumption to keep the exposition simple. The key issue is that τ_2 is the marginal tax rate on returns to an investment in training, while τ_1 is the marginal tax rate relevant for the opportunity costs of such an investment.

lower the cost of investment and therefore boost investment incentives. On the other hand, a higher tax rate on the returns reduces investment incentives (7).

In practice tax codes may not treat τ_1 and τ_d as different elements. If out-of-pocket training costs are fully deductible against the current marginal tax rate, e.g. $\tau_1 = \tau_d$, as is the case in the Netherlands, then the relation between the optimum positive investment level s^{**} and the deductibility rate is given by the expression:

$$\frac{\partial s^{**}}{\partial \tau_d} \equiv \frac{\partial s^{**}}{\partial \tau_1} = -\frac{(w+p)R}{(1-\tau_2)w \cdot f''} > 0. \tag{9}$$

It is important to stress the difference between equations (6) and (9). Equation (6) is the effect on training of a change of the tax deductibility rate keeping other tax rates (τ_1 and τ_2) constant. Equation (9) expresses the effect on training of a change in the tax rate applicable to all (direct and indirect) investment costs. The relation between these two parameters is the following

$$\frac{\partial s^{**}}{\partial \tau_d} = \frac{w+p}{p} \frac{\partial s^*}{\partial \tau_d} \tag{10}$$

This shows that if one is interested in the effect of τ_d only (equation (6)), but estimates the joint effect of τ_d and τ_1 (equation (9)), the effect of interest will be overestimated by factor $(w+p)/p$.

3   Related literature

Empirical work on the relation between taxation and training decisions is limited. To the best of our knowledge, Rosen (1982) is the only study which directly estimates the (total) effect of taxation on on-the-job training decisions. He regresses on-the-job training on the internal rate of return to training and on the marginal tax rate. On-the-job training is measured as an employee's tenure in the job relative to the amount of time required to become fully qualified in that job. The pre-tax internal rate of return is obtained from Mincer type wage functions which are education specific. The marginal tax rate is predicted from a regression of an employee's actual marginal tax rate on age, number of

children, education, non-labor income and region and type of town dummies.

Rosen reports significantly positive effects for both the internal rate of return and the marginal tax rate on on-the-job training. The positive sign for the internal rate of return is in accordance with theoretical predictions. The positive effect of the marginal tax rate is interpreted as evidence that "the effect that dominates is the one which give the individual an incentive to substitute human for physical capital as a means for carrying consumption into the future".

Some remarks with regard to this early study are appropriate. First, the measure of on-the-job training is somewhat unfamiliar by current standards. Differences in training status as measured by Rosen are likely to reflect differences between more and less demanding jobs. Second, none of the instruments for the marginal rate seem to satisfy the exclusion restriction. These two points together suggest that the reported positive effect may easily pick up a reversed causality; individuals holding more demanding jobs pay a higher marginal tax rate (and are older, have more children, are more highly educated etc.).

Gentry and Hubbard (2004) analyze the effects of marginal tax rates and of tax rate progressivity on job turnover using the PSID. Like training, job turnover can be regarded as an investment. Gentry and Hubbard regress job turnover on the marginal tax rate and the convexity in the tax rate. The marginal tax rate is measured as the predicted future tax rate based on household characteristics in year t and the tax code in year $t+1$, assuming 5 percent earnings growth. This tax rate is supposed to capture the marginal incentives for effort at the current level of earnings as well as *the relevant marginal tax rate for deductible expenses associated with job search*. Convexity in the tax rate is constructed as the change in tax rates resulting from a predicted three-years increase in taxable income. This predicted increase is based on the actual distribution of 3-years period (positive) wage growth for twenty different education-age groups.[2] Gentry and Hubbard find that both tax measures have a negative effect on the probability of job turnover. It is important to note that this is not a deductibility effect of the marginal tax rate, but rather a net effect

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[2]The mean value of this constructed variable equals 3 percentage points with a standard deviation of 3 and minimum and maximum values of -15 and 26. For comparison, the mean value of the marginal tax rate is 29 percent.

which includes the effect of the marginal tax rate on effort (comparable to the effect of τ_2) which is predicted to be of opposite sign.[3] The only thing that can be concluded from the analysis with regard to the deductibility effect is that it is dominated by the effort effect.

Loosely related are the studies which show to what extent changes in the marginal tax rate affect taxable income (see: Feldstein, 1995; Gruber and Saez, 2002; Saez, 2003). Changes in taxable income may among other things result from changes in human capital investments. While Feldstein reported very substantial effects, later studies point to more modest responses; Saez et al. conclude that the best available estimates range from 0.12 to 0.40 (p.42).

Some studies have investigated the effect of tax deductibility on other types of expenditures. Examples include Reece and Zieschang (1985) and Glenday et al. (1986) who look at charitable contributions, Jappelli and Pistaferri (2003) who study the effect of tax deductibility on life insurance, and Jappelli and Pistaferri (2004) where the same authors investigate the effect of tax deductibility on home mortgage interest. A fundamental difference between these types of expenditures and training expenditures is that the last is an investment whereas the others are not. This is important because it implies that we also have to be concerned with the taxation of the returns.

Finally, Leuven and Oosterbeek (2004) report estimates of the effect of a policy in which firms (instead of individuals) could deduct training expenditures from their tax. A specific feature of this policy was an extra deduction for training expenditures spent on workers age 40 or older. The effect of this age dependent deduction was evaluated using a regression discontinuity design. The results show a huge gap in training participation of workers just above 40 relative to workers just below 40. Further analysis suggests that this difference is mainly due to the postponement of training participation of younger workers and not to the stimulating effect of the extra deduction.

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[3]An increase in the marginal tax rate reduces the net costs of tax deductible job search activities but also reduces workers' net payoffs from an earnings increase associated with job turnover.

4 The Dutch income tax system

This section provides a brief description of the main elements of the income tax system during the period covered by our dataset (1996-2002). The income tax system was reformed in 2001. We first describe the system as it was in operation during the period 1996-2000, and then discuss the main changes that occurred in 2001. Section 5 discusses how we exploit elements of the system and of the reform to identify the effect of the tax-deductibility of training expenditures on investments in training.

In the Netherlands income tax is only levied by the central government. The basic structure of income taxation is as follows. Starting point is total gross income. This is the sum of incomes from various sources: labor, profit, capital and home ownership. To get from gross income to taxable income, gross income is reduced by a basic allowance, the size of which depends on household characteristics, and by deductions for expenditures on specific items. Expenditures on "study for career purposes" (i.e. training expenditures) is one category of expenditures that qualifies for a tax deduction. Others categories include home mortgage interest payments, alimony payments, charitable contributions and childcare expenditures. Taxable income is subject to a progressive tax scheme. Consequently, the net costs of a given amount of training expenditures is (weakly) lower for individuals with higher taxable income.

The main change induced by the 2001 tax reform is that different sources of income are no longer treated equally. Income generated by working and home ownership is still subject to a progressive tax scheme (with lower marginal rates). The progressive tax on capital income was changed into a flat rate tax on wealth; with the flat rate equal to 1.2% (a presumptive rate of return of 4% times a capital income tax rate of 30%).

Under the new system, training expenditures can be deducted from gross income out of work and home ownership. Only if taxable income from these sources is below a certain threshold, the remaining amount can be deducted from the gross income generated by other sources.

Figure 1 shows the marginal tax rates and the kink points for the years covered by our dataset. For the pre-reform years (1996-2000) the rates pertain to taxable income from all
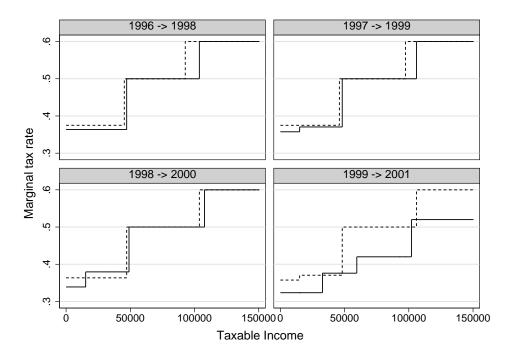
Figure 1. Changes in marginal tax rates and kinks

sources. For the post-reform years (2001 and 2002) the rates pertain to taxable income out of work and home ownership. The figure thus plots the marginal tax rates relevant for the tax deduction of training expenditures.

In 1996, 1997, and 1998 the tax schedule has three different marginal tax rates: a lowest level around 0.37, a second one equal to 0.50 and the top level of 0.60. From 1999 onwards the lower rate is replaced by two rates, which are almost identical and in the vicinity of 0.35. Besides treating different income sources differently, the 2001 tax reform lowered the two higher rates of 0.50 and 0.60 rates to 0.42 and 0.52. The location of the kinks remained at fairly similar levels of taxable income. In Figure 1, taxable income is measured in nominal terms; when measured in real terms the year-to-year differences in the location of kink points almost vanish.

The focus of this paper is on the effect of the tax deductibility of training expenditures on investments in training. For the identification we exploit the fact that due to differences in marginal tax rates different people face different net costs for the same gross investment in training. We assume other tax deductions (including the basic allowance) not to be affected by the training expenditures. The relevant marginal tax rate is therefore the rate

applicable to taxable income before the deduction of training expenditures but after the deduction of all other expenditures and the basic allowance.[4]

Whereas income taxation in the Netherlands is individualized, some deductions can be shifted from one partner in the household to the other. This is also true for the tax deduction on study for career purposes. Consequently, if someone deducts training expenses it is not certain that this person and not this person's partner undertook some training. Households that minimize their tax burden will presumably shift the training expenses to the partner with the highest marginal tax rate. For this reason, we retain the observations of those with the highest marginal tax rate.[5]

5 Empirical implementation

5.1 Specification

Following equation (4) we estimate regression models that are specified as follows:

$$s_{it} = \delta \ln(1 - \tau_{it}) + \alpha_1 E_t \ln(1 - \tau_{i,t+1}) + \alpha_2 \ln R_{it} + \lambda_i + \alpha_t + e_{it} \tag{11}$$

where $\ln(1 - \tau_{it})$ corresponds to $\tau_1 = \tau_d$, and $E_t \ln(1 - \tau_{i,t+1})$ to τ_2 in the model of section 2. λ_i, α_t and e_{it} are unobserved components that vary across individuals, time, and individuals and time. In the analysis s_{it} equals 1 if individual i deducted a positive amount for training expenditures from his income taxes, s_{it} equals 0 otherwise. We are interested in estimating (11) and recover unbiased estimates of δ. The main challenge for the identification of these tax deductibility effects on on training decisions is to find a source of variation in $\ln(1 - \tau_{it})$ (the marginal tax rate that affects the tax deductibility of training expenditures) that does not at the same time correlate with the other right hand side terms in equation (11). For

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[4]When people with an income just above a kink spend more on training than the distance between their income and the kink, then only a part of their training expenditures are deductible at the high rate and the remaining part at the lower rate. We conducted analyses where we replaced the marginal tax rate by the average marginal tax rate given a fixed amount of expenditures of 1000 or 2000 guilders. Results are almost identical to the results reported in the paper.

[5]In the sample of individuals who have no partner with a higher marginal tax rate on average slightly less than 3% has a positive training tax deduction during a year (see also Section 6). In the excluded group of individuals living with a partner with a higher marginal tax rate this percentage is less than 0.5% (but positive), whereas it would have been zero if households minimize their tax burden.

the interpretation of our parameters as tax deductibility effects it is important to control for these right hand terms.

5.2 Identification

The first strategy is based on a comparison of individuals with taxable income (before the deduction of training expenditures) either just below or just above a kink point in the tax schedule. The second method exploits the changes induced by the 2001 tax reform.

5.2.1 Local identification approach

Our first approach compares individuals with taxable income levels just above and just below kink points in the income tax schedule which are due to jumps in marginal tax rates. Around a kink point between two tax brackets, individuals with very similar incomes face different marginal tax rates. For example, an individual who has taxable income equal to 45,000 guilders in 1996 has a marginal tax rate of 0.375, whereas someone with taxable income equal to 47,000 guilders has a marginal tax rate of 0.50 (cf. Figure 1).[6] Consequently, if both persons make a (gross) training investment worth 1000 guilders, the first person pays a (net) price of 625 guilders and the second person pays a (net) price of 500 guilders. Hence, this kink in the tax scheme causes a difference in the net costs of training of 25 percent between two persons whose taxable incomes only differ 4 percent.[7]

Comparing training expenditures between individuals with taxable incomes above and below the kinks in the tax schedule, may thus inform us about the effect of the tax-deductibility of training expenditures on investments in training. This requires, however, that three assumptions are fulfilled.

To discuss these assumptions, we define the following indicator variable:

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[6]During the period covered by our data, 1 guilder is about 0.5 USD. Because all thresholds are defined in guilders, we use this currency rather than euro's which were introduced in 2002.

[7]Our approach is akin to but not the same as a sharp regression discontinuity design (cf. Hahn et al., 2001; Thistlewaithe and Campbell, 1960). The RD design is based on limiting arguments where one would want to compare observations with income 1 guilder above the kink to observations with income 1 guilder below the kink. This is not true in our case. Someone with income 1 guilder above the kink can only deduct 1 guilder of training expenses at the higher marginal tax rate meaning that the difference in treatment is negligible. See also footnote 4.

$$
d_{it}^k(\mu) = \begin{cases} 1 & y_{it} \in [y^{kt}, (1 + \mu)y^{kt}) \\ \\ 0 & y_{it} \in ((1 - \mu)y^{kt}, y^{kt}) \end{cases}
$$

so that $d_{it}^k(\mu)$ equals 1 if individual i is at most μ percent above tax kink k in year t, and 0 if the individuals is at most μ percent below the kink.

The first assumption for the local identification approach to give an unbiased estimate of the effect of tax deductibility on training participation, is that the difference in tax-deductibility is not mirrored by an off-setting difference in the taxation of the returns to training. This requires that observations above and below the kink have on average the same future tax rates.

$$
E_t[\ln(1 - \tau_{i,t+1})|d_{it}^k(\mu) = 0] = E_t[\ln(1 - \tau_{i,t+1})|d_{it}^k(\mu) = 1]
$$

In terms of the previous example: Suppose that the returns to training for the person who pays the higher price of 625 guilders are completely taxed at a rate of 0.375, and that the returns to training for the person paying the lower price of 500 guilders are completely taxed at a rate of 0.50. In that case the difference in training expenditures between people with taxable incomes around the kink points will not identify the separate effect of the tax-deductibility but the joint effect of the tax-deductibility and the different taxation of the returns.

Given, however, that the persons with taxable incomes below the kink points have their incomes close to the persons with taxable income just above the kink points, it is very likely that these groups are confronted with the same marginal tax rates in future years. In Subsection 7 we provide evidence that this is the case. For example, whereas the difference in marginal tax rates between the groups that are just below and just above a kink point in 1996 equals on average 0.11, the difference in marginal tax rates between these same groups is only 0.06 in 1997 and equals less than 0.01 from the year 2001 onwards. The

same reasoning applies to the net rate of return to capital income:

$$E_t[\ln R_{it}|d_{it}^k(\mu) = 0] = E_t[\ln R_{it}|d_{it}^k(\mu) = 1]$$

We also need to assume that the groups around the kinks are not systematically different in (observed and unobserved) characteristics.

$$E_t[\lambda_i|d_{it}^k(\mu) = 0] = E_t[\lambda_i|d_{it}^k(\mu) = 1]$$

This assumption is likely to be satisfied. Consider for instance the kink in the 1996 tax schedule at a taxable income of 45,325 guilders. There is no reason to assume that individuals with taxable incomes in the range of $(1 - \mu)$45,325-45,325 guilders are systematically different from people with taxable incomes in the range of 45,325-$(1 + \mu)$45,325 guilders when μ is small. The only potential threat here is that taxable incomes are manipulated with the purpose of having a higher tax deduction of the training expenditures. One way to examine whether such behavior occurs is by investigating whether taxable incomes bunch around kink points. In section 7 we report evidence that suggests the absence of bunching around kink points.

A final assumption, often implicitly made in tax studies, is that individuals know their relevant marginal tax rate when they make training investments. We share this assumption with all other empirical (and theoretical) tax studies. We realize, however, that especially for individuals with taxable incomes close to a kink point this assumption may be a strong one. This implies that the estimate obtained from the local identification approach possibly underestimates the true effect because individuals that are unaware of their treatment status cannot act upon it, and therefore could represent a lower bound on the true effect.

To actually conduct the analysis, we need to operationalize the meaning of the phrases "just above" and "just below". Although there is a trade-off between on the one hand achieving that people are more similar and on the other hand obtaining a sufficient number of observations, we have an additional consideration to make because we would like to estimate the effect of τ_d keeping τ_1 constant (i.e. equation (6)). We do this by choosing the

bandwidth such that average net wage rates of the group just below a kink and the group just above a kink are equal. This requires that we choose the bandwidth μ such that:

$$\int_{(1-\mu)Y_0}^{Y_0} (1 - \tau_{1B})y dF(y) = \int_{Y_0}^{(1+\mu)Y_0} (1 - \tau_{1A})y dF(y).$$

where τ_{1B} and τ_{1A} are the tax rates relevant for the deductibility of the opportunity costs (and the out-of-pocket training expenditures) just below and above a kink. As we have no information on hours worked, we need to assume that working hours are not systemically different just above and just below kinks. Assuming that income is approximately uniformly distributed around the kink the above condition is satisfied if:

$$\mu = \frac{(1 - \tau_{1B}) - (1 - \tau_{1A})}{[(1 - \tau_{1B}) + (1 - \tau_{1A})]/2}.$$

The bandwidth around the kink equals the difference in net-of-tax rates below and above the kink divided by the average net-of-tax rate. By doing this separately for all 18 quasi-experiments we guarantee that the average income difference between these groups offsets the (net) difference in opportunity cost.

5.2.2 Using the 2001 tax reform In our second identification strategy we exploit a tax reform that was enacted in 2001. The 2001 tax reform changed the marginal tax rate relevant for the deduction of training expenditures. The change in the net costs of training caused by the tax reform is not the same for all individuals. As Figure 1 reveals, the change in marginal tax rates depends on pre-reform taxable income.

Since this approach exploits changes in marginal tax rates due to the tax reform to identify the effect of tax-deductibility of training expenditures on investments in training, we difference equation (11) where t is the post reform year (2001) and $t-1$ the pre-reform year (2000):

$$\Delta s_{it} = \delta \Delta \ln(1 - \tau_{it}) + \alpha_1 \Delta E_t \ln(1 - \tau_{i,t+1}) + \alpha_2 \Delta \ln R_{it} + \Delta \alpha_t + \Delta e_{it}$$

We can simplify this equation because interest income is subject to a flat rate after the

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reform. This implies that

$$\Delta \ln R_{it} = -\ln R_{i,t-1} = -\ln(1 + (1 - \tau_{i,t-1})r_t) \approx -(1 - \tau_{i,t-1})r_t$$

where the first equality follows because R_{it} will be absorbed by the time effects $\alpha'_t = \Delta \alpha_t$. A second simplification follows when returns to training undertaken just before the tax reform will be subject to the same tax schedule as returns from training undertaken after the reform, we assume that $E_t \ln(1 - \tau_{i,t+1}) = E_{t-1} \ln(1 - \tau_{i,t})$ so that $\Delta E_t[\ln(1 - \tau_{i,t+1})] = 0$. We will therefore estimate the following equation.

$$\Delta s_{it} = \delta \Delta \ln(1 - \tau_{it}) + \alpha_{2t}\tau_{i,t-1} + \alpha'_t + \Delta e_{it} \tag{12}$$

If people respond to tax incentives, it is likely that their post-reform income is partially determined by such responses. This induces a potential endogeneity problem: the change in marginal tax rates may correlate with people's responsiveness to taxation which in turn may correlate with their training decision. To address this problem, we present results in which the actual change in marginal tax rates is instrumented by the predicted change in marginal tax rate given pre-reform income: $\Delta \ln(1 - \tilde{\tau}_{it})$. The predicted tax rate $\tilde{\tau}_{it}$ is calculated based on the pre-reform income $y_{i,t-1}$ and the post-reform tax schedule.[8] The identifying assumption is thus that the predicted change in marginal tax rate is exogenous conditional on the pre-reform tax rate and other included observables.

It is important to stress that δ does not estimate the impact of a change of the deductibility rate of out-of-pocket training expenditures on training participation (τ_d), but rather the impact of a change of the tax rate applicable to both out-of-pocket training expenditures and opportunity costs of training (τ_d and τ_1). While we can disentangle the two components in the local identification approach by our choice of bandwidth around

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[8] A practical problem for the instrumentation is that we do not have information on all separate income sources in the pre-reform years. More specifically, we know individuals' pre-reform income out of work but do not know their pre-reform income out of home ownership (the other income source determining the taxable income from which training expenditures can be deducted). However, for the post-reform years the correlation between the actual marginal tax rate and the marginal tax rate predicted on the basis of income from work equals 0.87. The omission of data on income out of home ownership therefore does not appear to be a serious problem.

kinks, there is no equivalent solution available for the reform approach. The consequence of this is that estimates based on the reform approach will overestimate the effect of interest. According to the theoretical model in section 2, the effect of interest is overestimated by factor $(w + p)/p$.

6   Data

The data used in this paper come from the Dutch tax office.[9] They are the tax files of a 1.5 percent representative sample of the Dutch population for the period 1996-2002. The data are longitudinal and track individuals (and their households) from year to year.

The dataset is rich on tax information. For the Netherlands it is the only source with reliable information at an individual level of taxable income and various tax deductions including the amount of any deduction related to training expenditures. Because a vast majority (over 95%) of the observations does not deduct training expenditures we capture this information into a binary variable taking the value one if training expenditures have been deducted and zero otherwise. With the small number of observations with positive deductions it is not feasible to conduct a separate analysis to examine the effect of taxation on the amount of the deduction.

The dataset is limited in terms of relevant background information. It does contain information about gender, age, and size of the household, but has no information on for instance level of formal education, occupation or firm characteristics. For confidentially reasons it is also not permitted (or possible for researchers) to merge the data from the tax register to other data sources. Moreover, the data provide no details about the training or courses related to the tax deduction.

An audit by the Dutch tax office of the tax forms of 2,625 individuals who deducted training expenditures provides some limited information about the kind of training expenditures that were deducted. Almost two thirds fall in the category of tuition fees, another 22 percent is spent on materials (books, computer software). The remaining part relates

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[9]The dataset is not publicly available. Permission for use of the data was granted to us in relation to a research project commissioned by the Dutch ministry of Fiscal Affairs.

Table 1. Sample summary statistics

	Full sample		Local sample	
	Mean	Std. Dev.	Mean	Std. Dev.
ln(Taxable income) : $\ln(y_{it})$	10.50	(0.81)	10.89	(0.37)
Tax deduction rate : τ_{it}	0.41	(0.06)	0.43	(0.07)
ln(Net of tax deduction rate) : $\ln(1 - \tau_{it})$	-0.53	(0.12)	-0.56	(0.13)
Age	41.67	(9.48)	42.35	(9.30)
Household size	3.06	(1.29)	3.03	(1.28)
Female	0.34	(0.47)	0.21	(0.41)
N		291,713		111,257

to traveling costs and conference accommodation.

Our two identification methods exploit variation in marginal tax rates. Marginal tax rates are related to income and we do not want our analyses to pick up variation in income. We condition in some of the specifications for level of income. We exclude beforehand from our analyses observations with exceptionally low (below 5000 guilders) or high (above 150,000) incomes. As mentioned in section 4 we also exclude from the analysis individuals who have a fiscal partner (spouse) having a higher marginal tax rate.

Table 1 gives the mean values and standard deviations for the main variables for the remaining full sample which is used for the reform analysis, as well as the local sample that is used in the local identification approach. The average marginal tax rate at which people deduct training expenditures is in both samples about 0.4. Although household size is comparable, average taxable income is higher in the local sample, and the gender of the person with the highest rate in the household is also less often female.

7   Results from the local identification approach

7.1   Assumption checks

The local identification approach builds on the assumption that the difference in tax-deductibility between people with taxable incomes just below and just above kinks in the tax schedule, is not mirrored by an off-setting difference in the marginal tax rates that apply to the returns to training. Figure 2 shows that this assumption is indeed to a
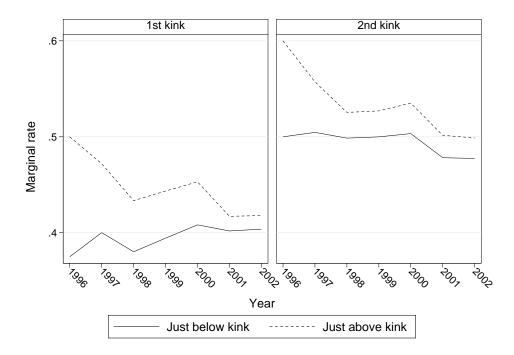
Figure 2. Average marginal tax rates for the 1996 above and below groups

large extent satisfied. In 1996 the average difference in marginal tax rates between the groups above or below the first kink in the tax schedule equals 0.11. Following the same observations during the subsequent years 1997-2002 reveals that much of this difference in tax rates has gone after two years. We see this for both kinks, and especially for the second kink. A very similar picture emerges when we take later starting years (not shown here). Notice that the slightly higher future marginal tax rates for the people with income above the kinks leads to an underestimation of the effect of the deduction rate on training participation.

A second assumption underlying the local identification approach is that the groups that are compared (i.e. the groups around the kinks), are not systematically different in (observed and unobserved) characteristics. The threat here is that taxable incomes are manipulated with the purpose of having a higher tax deduction of the training expenditures. To examine whether this occurs, we investigated whether taxable incomes bunch just above kink points. We do not find any indication of bunching just above (or just below) any of the kinks for the various years, a finding consistent with results reported by Saez (2002).

Table 2. Effect of tax rate on training incidence - Local estimates

	Kink	τ_{Below}	τ_{Above}	Coef.	S.E.	Coef.	S.E.	N
1996	1	0.375	0.500	-0.011	(0.014)	-0.024	(0.013)	13,536
	2	0.500	0.600	-0.004	(0.030)	-0.012	(0.028)	3,626
1997	1	0.375	0.500	-0.019	(0.014)	-0.035	(0.013)	14,062
	2	0.500	0.600	0.010	(0.032)	0.005	(0.031)	3,390
1998	1	0.363	0.500	-0.027	(0.013)	-0.039	(0.012)	13,603
	2	0.500	0.600	0.077	(0.040)	0.075	(0.040)	2,436
1999	1	0.357	0.370	-0.377	(0.642)	-0.218	(0.357)	329
	2	0.370	0.500	-0.006	(0.014)	-0.015	(0.013)	13,257
	3	0.500	0.600	0.025	(0.037)	0.020	(0.036)	2,673
2000	1	0.339	0.380	-0.125	(0.115)	-0.094	(0.098)	994
	2	0.380	0.500	-0.009	(0.015)	-0.016	(0.014)	12,822
	3	0.500	0.600	-0.049	(0.032)	-0.050	(0.031)	2,741
2001	1	0.324	0.376	0.014	(0.060)	0.031	(0.047)	2,941
	2	0.376	0.420	-0.136	(0.057)	-0.135	(0.052)	6,241
	3	0.420	0.520	-0.020	(0.027)	-0.027	(0.026)	5,979
2002	1	0.324	0.379	-0.048	(0.048)	-0.026	(0.040)	2,667
	2	0.379	0.420	-0.059	(0.055)	-0.060	(0.050)	5,107
	3	0.420	0.520	-0.047	(0.027)	-0.054	(0.026)	4,853
Controls				No		Yes		
A. Average (w=N)				-0.024	(0.007)	-0.030	(0.006)	111,257
B. Average (w=Eff.)				-0.016	(0.005)	-0.025	(0.005)	111,257

7.2   Results

Each kink in the tax schedule in each of the seven years included in our dataset constitutes a quasi-experiment. This gives a total of 18 quasi-experiments. Table 2 reports the effects of (log) net of tax rates on training rates. The groups are defined such that the bandwidth around the kinks equalizes net wage rates (e.g. the opportunity costs of training) above and below the kinks separately for all 18 quasi-experiments. Results are reported for two different specifications. In the first specification no controls are included, the second specification includes controls for age, age squared, gender, marital status and economic activity.

The estimates from the separate quasi-experiments are imprecise, yet most estimates have the expected (negative) sign. Only six of the 54 reported effects are negative and significantly different from zero. The insignificance of most effects is probably due to the small numbers of observations located close enough around the kinks relative to the size of

the effect. Consequently, there is a need to aggregate the information from the different quasi-experiments. A crude way to aggregate the information is by observing that only 4 out of 18 effects based on the first and in the second specifications have a positive sign. The probability that no more than 4 out of 18 effects have a positive sign when in fact the odds of a negative and a positive sign are equal, is only 0.015. These results already hint at a negative impact of the (log) net of tax rate on training participation.

The results can also be aggregated by taking a weighted average of the estimates reported in Table 2. The bottom two rows of the table report such estimates. First the separate estimates have been weighted by sample fractions (number of observations of each quasi-experiment divided by total number of observations in all 18 quasi-experiments), as in Card and Sullivan (1988). The next row reports the average effects when the separate estimates have been weighted by the inverse of their variances. This minimizes the variance of the aggregate estimate and is thus the most efficient estimator.[10]

The aggregate estimates using sample fractions as weight are for all three specifications larger than the aggregate estimates using inverse variances as weights. Adding controls increases the size of the effect estimates. All four aggregate estimates have the predicted negative sign are significantly different than zero. The effect size is around -0.02; evaluated at a marginal tax rate of 0.40, this implies that a 10 percentage point increase in the deduction rate, increases training participation by 0.33 percentage points.

The information from the 18 quasi-experiments can also be combined by pooling the data rather than the estimates. The conventional approach is to pool the data from all the local samples, and run regressions with training participation as the dependent variable and the log net of tax rate as the key explanatory variable. Table 3 reports the results.

The first five columns report the results from OLS models. The next five columns report 2SLS estimates where the tax rate was instrumented with the indicator variable that equals one for individuals just above a kink and zero for those just below a kink. All models include year dummies, dummies for the first, second and third kinks and

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[10]We aggregate our local Wald estimates into one (average) estimate $\hat{b} = \sum_i w_i \hat{b}_i$. The w_i that minimize the variance of $\hat{b}$ are $w_i = \text{var}(b_i)^{-1} / \sum_i \text{var}(b_i)^{-1}$. This gives the following expression for the variance of $\hat{b}$: $\text{var}(\hat{b}) = 1 / \sum_i \text{var}(b_i)^{-1}$. Alternatively, the local estimates can be weighted with their sample fractions (as in Card and Sullivan (1988)).

Table 3. Effects based on pooled models — Local sample (N=111,257)

	OLS					2SLS				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
ln(1 − τ)	-0.015**	-0.024***	-0.013	-0.014	-0.014	-0.018***	-0.026***	-0.022*	-0.023**	-0.019*
	(0.006)	(0.006)	(0.011)	(0.011)	(0.011)	(0.006)	(0.006)	(0.011)	(0.011)	(0.011)
Age		-0.002***	-0.002***	-0.002***	-0.002***		-0.002***	-0.002***	-0.002***	-0.002***
		(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)
Female		-0.005***	-0.005***	-0.005***	-0.005***		-0.005***	-0.005***	-0.005***	-0.005***
		(0.002)	(0.002)	(0.002)	(0.002)		(0.002)	(0.002)	(0.002)	(0.002)
Household size		-0.002***	-0.002***	-0.002***	-0.002***		-0.002***	-0.002***	-0.002***	-0.002***
		(0.001)	(0.001)	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)
ln(Taxable Income)			0.011	0.368**				0.004	0.366**	
			(0.009)	(0.174)				(0.010)	(0.174)	
ln(Taxable Income)^2 / 10				-0.164**					-0.166**	
				(0.080)					(0.080)	
ln(Taxable Income) ×Year dummies					✓					✓

Note: All regressions also include year dummies, dummies for the first, second and third kinks of the tax schedule and year/kink-interactions.

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year/kink-interactions. The results are very similar to those in table 2, all suggest a positive effect of the tax deduction rate on training participation. Including covariates for gender, age, age squared and marital status lead to an increase of the effect estimate (columns 2 and 7). If we also include (the log of) taxable income as a control variable, the estimate is somewhat attenuated. Estimates stay the same if we also include the square of (log) taxable income or interact (log) taxable income with year dummies.

The results based on the pooled sample also consistently indicate that a 10 percentage points increase in the rate against which individuals can deduct their training expenditures raises the probability that they spend money on training by about 0.33 percentage point (evaluated at an average tax rate of 0.40).

8 Results from the tax reform

This section reports the results exploiting the changes in marginal tax rates caused by the tax reform. As we argued above, the reform changed the marginal tax rates relevant for the costs of a training investment between 2000 and 2001, whereas the marginal tax rates relevant for the returns to an investment in training were unaffected. Hence relating changes in training decisions to changes in (log) net of tax rates between years will inform us about the effect of the deductibility of training costs on training participation. We do this by estimating various specifications of equation (12).

Table 4 presents the results. The first three columns are based on OLS equations where (the change in) training incidence is regressed on the change is the (log) net of tax rate and various sets of covariates. Endogeneity of the post reform rate might, however, be a problem, and columns (4)–(6) show results from regression models where the change of the marginal tax rate is instrumented by the change of the marginal tax rate predicted on the basis of pre-reform gross income as explained above.[11]

The OLS-estimates are all precisely estimated zero's. The picture is very different if we look at the 2SLS estimates. All three estimates are significantly negative indicating that

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[11]The instrument in highly significant in the first-stage for all the results shown here; the value of the F-test statistic is never below 62.

Table 4. Tax reform results — 1996–2002

	OLS			2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta \ln(1 - \tau_{i,t})$	-0.0002	-0.0005	0.0001	-0.0302**	-0.0450***	-0.0581***
	(0.0060)	(0.0060)	(0.0061)	(0.0139)	(0.0158)	(0.0187)
$\tau_{i,t-1}$	-0.0039	-0.0062	-0.0066	0.0100	0.0166*	0.0322**
	(0.0040)	(0.0044)	(0.0061)	(0.0068)	(0.0085)	(0.0132)
Age		0.0002***	0.0002***		0.0002***	0.0002***
		(0.0000)	(0.0000)		(0.0000)	(0.0000)
Female		0.0013***	0.0014**		0.0023***	0.0022***
		(0.0005)	(0.0006)		(0.0006)	(0.0006)
Household Size		0.0010***	0.0011***		0.0010***	0.0010***
		(0.0002)	(0.0002)		(0.0002)	(0.0002)
$\Delta \ln y_{i.t}$			0.0019			-0.0114*
			(0.0051)			(0.0066)

Note: 219,458 observations. Robust standard errors, clustered at the household level.

people respond to changes in the net costs of training brought about by changes in the tax rates against which training costs can be deducted. The estimated effect on incidence is in the vicinity of -0.05; with an average marginal tax rate of 0.4 this implies that, on average, an increase of 10 percentage points in the tax rate at which people can deduct training costs induces an increase in the training rate of 0.8 percentage points. This is a fairly substantial effect given that average training incidence is around 3 percent.

Recall from our discussion in section 5 that the change in marginal tax rates between 2000 and 2001 affects both the deductibility of out-of-pocket training expenditures and the deductibility of opportunity costs of training. According to the model set out in section 2, the ratio of the effect from the reform analysis and the effect from the local identification approach is equal to $(w + p)/p$. This suggests that the opportunity costs of training participation is 1.5 times as large as the out-of-pocket training expenditures. We think that this is a plausible magnitude.

9   Conclusion

To stimulate training investments by individuals, governments can provide a tax deduction to individuals who make such investments. Government in some countries do so, while governments in other countries do not. Until now, little is known about the actual effect

of this instrument making it hard to tell whether countries that offer tax deductions for training expenditures follow a wise policy.

We evaluated the deductibility of out-of-pocket training expenditures from taxable income using two different approaches. The main challenge is to isolate the effect of tax deductibility of out-of-pocket training expenditures from the (implicit) tax deductibility of opportunity costs of training investment and from the taxation of returns to training investments.

The first method exploits differences in deductibility rates around kinks in the tax schedule. By choosing the intervals around the kinks such that average net wage rates are equal, we reduced the confounding effects of the tax treatment of opportunity costs. We also show that future marginal tax rates for individuals who are above and below kinks in a given year are very similar. This eliminates differences in taxation of returns to training. To the extent that some differences in the taxation of returns still remain, this method underestimates the true effect of tax deductibility of out-of-pocket training expenditures. Results based on the first approach indicate that a 10 percentage point increase in the tax deductibility rate of out-of-pocket training expenditures increase training participation by 0.33 percentage points (which is a 10 percent increase of the training rate).

The second method takes advantage of the 2001 tax reform, which implied a substantial change in marginal tax rates. Investment costs in 2000 (before the reform) were subject to the old tax code, while investment costs in 2001 (after the reform) were subject to the new tax code. We argue that since returns to training materialize with some delay, returns to investments made in 2000 and 2001 were both subject to the new tax code. Accordingly, this method isolates changes in taxation of costs from changes in taxation of returns. It does not, however, isolate tax deductibility of out-of-pocket training expenditures from tax deductibility of opportunity costs. This method identifies the joint effect of these two deductibility rates, and since these operate in the same direction, it will overestimate the effect of interest. Results based on the second approach indicate that a 10 percentage point increase in the tax deductibility rate of training costs increase training participation by 0.8 percentage points (which is a 25 percent increase of the training rate).

According to the theoretical model we presented in this paper, the ratio of the results from the two methods are informative about the ratio of the opportunity costs of training investments and the out-of-pocket expenditures of training investments. The results imply that for a given amount of training, opportunity costs are 1.5 times as large as out-of-pocket expenditures.

There is, however, reason to suspect that the true effect of tax deductibility of out-of-pocket training expenditures is somewhere in between the estimates from the two methods. As we already argued, to the extent that the local identification approach does not fully neutralize differences in the taxation of returns, the estimates based on this method underestimate the true effect. Moreover, this method assumes that individuals are fully aware of the marginal tax rate applicable to their training expenditures. If this assumption does not hold for some individuals with incomes close to a kink, these individuals will not act on their tax treatment and their responsiveness will thus be zero. This also biases the estimate from the local identification method downwards.

On the other hand, we interpret the estimate from the reform method as the joint effect of tax deductibility of out-of-pocket training expenditures and tax deductibility of opportunity costs. The underlying economic model assumes that an individual's opportunity costs of an hour spent on training changes abruptly if this person's taxable income passes a kink in the tax schedule. Individuals who work full-time (as most with incomes at least just below the first kink will do) may not alter their labor supply on the margin, at least in the short term. To the extent that one is willing to believe this, the effect estimate from the reform approach will be closer to the effect of the tax deductibility of out-of-pocket training expenditures.

The reported effect sizes are evaluated at an average marginal tax rate equal to 0.4. If we assume that effects are constant over tax rates, we can calculate which share of the average training rate of 3 percent is attributable to the tax deductibility of out-of-pocket training expenditures. Using the low estimate of 0.33 percentage points change in training participation per 10 percentage point change in deductibility rate, suggests that abolishing the tax deductibility of out-of-pocket training expenditures reduces the share of individuals

who spend money on training for career purposes by almost one half: from 3 percent to 1.7 percent. Using the high estimate of 0.8 percentage points change in training participation per 10 percentage point change in deductibility rate, even suggests that without tax deductibility of out-of-pocket training expenditures no one would spend money on training for career purposes. Tax deductibility of out-of-pocket training expenditures appears to be a fairly effective instrument to stimulate human capital accumulation. At a marginal tax rate of 0.40, every guilder invested by the government in the form of a tax deduction, leads to $\frac{3}{4}$ to $1\frac{1}{2}$ guilders of private expenditures on training investments.

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