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Evidence on the Elasticity of Labor Supply when Workers Are Free to Choose

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Sick of Taxes? Evidence on the Elasticity of Labor Supply when Workers Are Free to Choose

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Abstract

I estimate a price elasticity of sickness absence. Sick leave is an intensive margin of labor supply where individuals are free to adjust. I exploit variation in tax rates over two decades, which provide thousands of differential incentives across time and space, to estimate the price responsiveness. High taxes provide an incentive to take more sick leave, as less after tax income is lost when taxes are high. The panel data, which is representative of the Swedish population, allow for extensive controls including unobserved individual characteristics. I find a substantial price elasticity of sick leave, -0.7, with respect to the net of tax rate. Though large relative to traditional labor supply elasticities, Swedes are half as price elastic as bike messengers, and just as elastic as stadium vendors on the margin which they can adjust freely.

JEL codes: H31, I31, J22

Key words: sick leave, adjustable labor supply, work effort, taxes

1 Introduction

The neoclassical model of labor supply predicts that employees work more when wages are higher, but estimated labor supply elasticities on the intensive margin are small.[1] This finding could reflect that individual preferences are inelastic or that individuals face lumpy labor

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[1]See for example Blundell and MaCurdy (1999) who reviews a large number of papers. Intensive margin elasticities are usually estimated in a range from zero to 0.1.

contracts.[2] A more fundamental problem could be that preferences are reference-dependent or that the model is misspecified in some other way. In this paper I estimate an elasticity of labor supply along a margin where people are free to adjust and find a sizeable labor supply response that is consistent with the neoclassical model.

The analysis is part of a growing literature that studies workers with very flexible labor contracts. These workers are free to choose which days or hours they work. The stadium vendors studied by Oettinger (1999) are free to choose which games they work, and they are more likely to work high wage games like Sundays. The bike messengers studied by Fehr and Goette (2007) are free to sign up for as many shifts as they like, and they work substantially more shifts during a four week wage hike. These studies show that when workers are free to choose they respond strongly to prices.

Yet, everyone who can choose how much to work doesn't behave in the same way. Taxi drivers in New York City, who can choose their hours freely, work less during high wage days as studied by Camerer et al (1997). This negative wage elasticity is inconsistent with the neoclassical model, as a few good fares don't signal a permanent change in earnings opportunities. Camerer et al (1997) suggest an alternative model; workers have a daily income target below which they are very elastic and above which they are much less elastic.[3] Crawford and Meng (2011) estimate a model with both income and hours targets, based on the model of reference-dependent preferences by Köszegi and Rabin (2006). Crawford and Meng (2011) find that taxi drivers work less on days they earn more than average, which supports Camerer et al's (1997) negative wage elasticity. They also find that cumulative

[2] See for example Kahn and Lang (1991) and Dickens and Lundberg (1993).

[3] Farber (2005, 2008) challenges this conclusion by arguing that the decision to stop work primarily is related to cumulative hours of work to that point, and that income targets are too unstable to yield a useful model of labor supply. Farber (2005, 2008) does not estimate a wage elasticity of labor supply.

hours worked are important predictors for the stopping probability, which reconciles Farber's (2005) critique.

This literature pits neoclassical stadium vendors and bike messengers against behavioral taxi drivers. Does either of these findings generalize to the population at large or do they only reflect differences in the environments faced by bike messengers and taxi drivers?[4] I study a representative sample of 162,000 individuals that includes everyone from dentists to day laborers, and I find that they behave like stadium vendors.

I study sick leave in Sweden. Because sick leave is taken at the individual's discretion I can estimate how labor supply responds in a setting where employees are free to choose how much to work. This is similar to the situation of bike messengers and cab drivers.

I use variation in marginal tax rates to identify the price responsiveness of sick leave.[5] Tax law changes are arguably exogenous to individual sick leave decisions. Tax rates vary across time, locations, and due to the progressivity of the tax code. This provides thousands of differential treatments across time and space from which I can obtain the price response, in contrast to the single wage hike for the bike messengers in Fehr and Goette (2007) and the dozen Sunday home games in a baseball season in Oettinger (1999). Marginal tax rates both increase and decrease repeatedly during the 17 year sample.[6] This allows us to replace the common linear trends assumption used in one shot policy evaluations with the weaker assumption that omitted factors don't follow the non-linear path of tax rates over time, paths that also differ substantially across individuals. I estimate the elasticity by comparing the

[4] Oettinger (1999) studies 127 vendors at one baseball stadium, and the taxi papers have data on 13 or 21 drivers in New York City. Fehr and Goette (2007) study 42 bike messengers in Zurich.

[5] Individuals forego some income if they claim sick leave benefits rather than work. The forgone income after tax is less when marginal taxes are high, hence sick leave is expected to be higher when marginal tax rates are higher, ceteris paribus.

[6] See Figure 2 for an illustration of the average marginal tax rates over the sample period 1974-1990.

number of days of sick leave within individuals and across years to the tax schedules faced in those years.

Swedes are highly elastic when they are free to adjust. The elasticity of sick leave with respect to the net of marginal tax rate is estimated to -0.7. Individuals work substantially more during years when they face relatively low tax rates. While the estimate is large relative to traditional labor supply elasticities, it's half that of the bike messengers in Fehr and Goette (2007), and similar to estimates in Oettinger (1999). When Swedes are free to choose they behave as though they are neoclassical and their labor supply elasticity mirrors that of stadium vendors. While the gain-loss utility parameters of Köszegi and Rabin (2006) are important for understanding the behavior of New York City taxi drivers, these parameters are not necessary for understanding the labor supply of the Swedish population.[7]

Beyond wages, the effects of anticipated changes in the work environment on absenteeism have been studied by Ichino and Riphahn (2005). After employment protection kicks in absenteeism increases, which they interpret as an effort response. Sick leave may also be interpreted as an observable effort choice. The sick leave program provides a very flexible way for individuals with low motivation to not exert effort on the job.[8] Fehr and Goette (2007) find a negative wage elasticity of effort,[9] which may look like the negative elasticity found among taxi drivers. However, since wages are anticipated in their experiment it is not clear this is evidence of income targeting based on a model like Köszegi and Rabin (2006)

[7] This is certainly not evidence against the existence of reference-dependent preferences. However, by Occam's razor, the neoclassical labor supply model provides a satisfactory explanation for the elasticity with fewer free parameter assumptions.

[8] Absenteeism as a measure of effort has been studied by Ichino and Maggi (2000) who examine how absenteeism is influenced by regional background.

[9] The negative effort elasticity is implied by the wage elasticity of shifts worked being larger than the elasticity of revenue earned.

where anticipated wage increases are predicted to increase effort. The results, interpreted as effort, are consistent with both the neoclassical and the reference-dependent models as the tax schedules are known when individuals make their sick leave choices.

The results may not be surprising from the perspective of Köszegi and Rabin (2006) given that tax schedules are announced in advance and hence anticipated. The negative wage responses estimated by Crawford and Meng (2011) are driven by unanticipated shocks. The potential bias from ignoring reference-dependent preferences may not be important for estimating the average responses to tax reforms and other pre-announced policy changes.[10] When it comes to two decades of tax reforms, the evidence points to the neoclassical model as a sufficiently good explanation for the estimated elasticity.

The rest of the paper is organized as follows. The next section describes the sick leave program in more detail, and section 3 presents the data. The following two sections discuss the economic and empirical models. The empirical results are presented in section 6. Section 7 concludes.

2 The Sick Leave Program

Sweden has a publicly run sick leave insurance program that covers a fraction of lost earnings in the case of basically any injury or illness.[11] It is very easy to claim the benefits. For the first week of each spell, the law gives the individual the discretion to determine if he is fit to work or not. If he wants to claim the sick leave benefits he makes two phone calls, one to the

[10] Unbiased estimates of the labor supply elasticity are important for assessing the welfare losses of taxation as well as for predicting labor supply responses to tax reforms and other policy measures. From this perspective it's also important to have estimates from a representative population.

[11] In a comparison to the U.S. the program encompasses both 'personal days' provided in employment contracts (although restricted to sick leave) and the workers' compensation program.

social insurance office and one to his employer.[12] There is no fixed allocation of sick leave days, you can use the insurance as long as your sickness requires and for as many spells as you like. For spells up to 7 days the individual himself determines if he is fit to work. For spells longer than 7 days it is required that a physician validates your condition. Monitoring of actual sickness is very light, at least in part due to the difficulty in verifying conditions like stomach ache and back pain.

The rules governing the sick leave insurance have been remarkably constant over the 1974-1990 period.[13] In 1974 sick leave benefits became taxable income[14] and data on the benefits become available. The replacement rate for lost earnings due to sickness was set to 90%. The daily benefit is calculated as 90% of normal annual labor earnings divided by 365, up to a cap. The replacement cap is indexed to inflation. About 93 percent of the incomes are below the cap, and 6 percent of the sick leave observations are above the cap.

Benefits can be claimed from the second day of the sickness spell. The definition of the second day is, however, quite generous. It is sufficient to call in sick before midnight and that day counts as the first day of the spell. If you think you'll be sick tomorrow you can always call in sick today and the first unpaid day is of no consequence, and if it turns out that you're fit for work tomorrow you can change your mind.

If the sickness spell is shorter than 7 days there is no requirement that a physician validates your condition. This system was in place until 1987.[15] From 1988 through 1990 the first day of no coverage was abolished.[16] The analysis can't be extended further than 1990 since other

[12] Benefits are paid by the social insurance office directly to the claimant.
[13] The sick leave program was passed into law in 1962 (SFS 1962:381) and it took effect in 1963.
[14] The updates to the program are detailed in law SFS 1973:465.
[15] Year fixed effects are used to account for aggregate changes in the empirical analysis. Furthermore, the results are robust to excluding 1988-1990 from the analysis.
[16] The updates to the program are detailed in law SFS 1987:223.

reforms make the data from 1991 and on difficult to compare to the previous years.[17]

Most sick leave spells are short, about 95 percent are shorter than one month (Source: Försäkringskassan). You need to have earnings for six months in order to qualify for the sick leave benefits and be less than 65 years of age. The program is universal and it is administered by the central government and does not depend on your employer. Benefits are financed through a flat payroll tax.

The study of sick leave has predecessors in the program participation literature,[18] although they focus on longer term absenteeism or programs where workers are not free to choose, which do not fit the concept of freely adjustable labor supply. Several papers have studied how rule changes affect benefit use.[19] The Workers' Compensation program, which replaces earnings due to work related injuries, would be the most closely related program in the U.S., see Meyer, Viscusi, and Durbin (1995), Krueger (1990), and Curington (1994). The Swedish sick leave program does not impose a limit on the length of spells, hence making it comparable to disability insurance.[20, 21]

Two novel contributions I make to the program participation literature are, first, to use tax rate variation, and second, to study a panel over a long time period to estimate the price elasticity of program use. Using tax rate variation over a long time period complements

[17] Employers are mandated to pay the first two weeks of sick leave so the registry data only includes spells of at least two weeks, which is a very different margin of behavior from what is analyzed here.

[18] Social insurance programs that cover lost earnings due to health shocks exist in most developed nations, see for example Bound and Burkhauser (1999) and Barmby, Ercolani and Tremble (2002).

[19] See Johansson and Palme (1996, 2002, 2005), Henrekson and Persson (2004), and Pettersson-Lidbom and Skogman-Thoursie (2008) for evidence from Sweden, Dale-Olsen (2009) for evidence from Norway, and Ziebarth and Karlsson (2010) and Puhani and Sonderhoff (2010) for evidence from Germany. These papers all provide interesting evidence but they do not capture a discretionary margin of freely adjustable labor supply and the wealth of price variation used in this paper.

[20] Disability insurance behavior has been studied in the U.S. and elsewhere. Studies include Bound (1989), Gruber (2000), Autor and Duggan (2003), Campolieti (2004), and Chen and van der Klaauw (2008).

[21] However, few individuals have long spells during the period studied. There is an early retirement program individuals can enter if permanently injured.

the existing literature that has focused on relatively short run evaluations before and after reforms. Previous evaluations typically study one price change in the program, while the study based on tax rates provides thousands of differential price changes, both increases and decreases, from which I estimate behavioral responses.

3 The Data

I use registry data on individual panels over the period 1974 to 1990 (from 1973 for lagged income). The data draw information from several sources; demographic information from the population registry, income information from the tax authorities, and various public benefits from the social insurance administration. I use a random sample of the 1974 population who are followed for 17 years.[22] About 3 percent of the population is sampled. In addition, household members of sample individuals are included in the data. This allows us to control for the household composition as well as spousal income. I define four education groups; at least 3 years of college, less than 3 years of college, completed high school, and not completed high school.[23]

Individuals are included in the analysis from ages 22 to 60. The age restrictions are due to the looser connection to the labor market of individuals at the tails of the life cycle. The young may still be studying and may not have a firm foot in the labor market. At ages close to retirement individuals face a number of incentives to leave the labor force that I don't model here, and I choose to exclude those observations. I restrict the analysis to individuals who are labor force participants, which is defined as having positive labor earnings in that

[22] The only sampled individuals that disappear from the data are those who die or emigrate. For further details on sample selection and data coverage see Edin and Fredriksson (2000).

[23] The highest education level is observed in 1990 and this value is used for the whole time period.

year. Since the sick leave program is designed to replace lost labor earnings this should be the relevant sample. The baseline regression has just short of 2 million observations, which breaks down to about 162,000 individuals who are in the sample on average 12 years. Summary statistics are presented in Table 1.

3.1 Days of Sick Leave

The data contain direct information on annual sick leave benefits which I transform into days of sick leave. There are two reasons for this transformation. First, economic models usually stipulate that agents choose days of sick leave so examining this measure is more in accordance with these theories. Second, examining days of sick leave makes it easier to interpret the estimated coefficients. The results are robust to using the sick leave benefits directly rather than their transformation to days of sick leave.

Sick leave benefits for each individual are linear in the number of days claimed. Daily benefits are 90% of normal earnings up to a cap above which it is a flat amount per day. For individuals below the cap, days of sick leave are sick leave benefits divided by normal daily earnings qualifying for sick leave benefits. Normal earnings are what you would have earned if you had worked.[24] I measure normal earnings based on a fixed effects regression. Real earned income is regressed on demographic interactions, a business cycle control, and an individual fixed effect for labor force participants over the sample period 1974-1990.[25] The fitted values of this regression including the individual fixed effect are the normal earnings for each individual. Normal annual earnings are divided by 365 to get daily earnings. For

[24] According to the rules normal earnings may or may not correspond to actual earnings but are based on historical earnings.

[25] The demographic variables are full interactions of gender and education with age and age squared. The business cycle control is average regional employment rates.

individuals above the replacement rate cap the procedure is simpler; the daily replacement benefit is the level of the annual cap divided by 365. Days of sick leave are then observed sick leave benefits divided by the maximum daily sick leave benefit.

About 63% of the labor force participants claim some sick leave during the year. Figure 1 plots the distribution of annual sick leave for those who claim some sick leave.[26] Most individuals use the sick leave program at some point. For example, among the generation who turned 25 years of age in 1974 only 1.6% never used the program over the period studied. Many use the program every year. Indeed, using sick leave every year is the mode of the distribution for the aforementioned generation. The vast majority of Swedes use the program multiple times, although there are differences across generations.[27]

3.2 Taxes

Income taxes in Sweden are levied at the national and municipal (kommun) levels. Municipal income tax rates are proportional to income and are set by each of the about 280 municipalities. There is a fair amount of variation in the cross-section of these taxes (the standard deviation in 1990 is 1.2 percentage points). Municipalities raise revenue through the income tax and service fees.[28] The proceeds are used to fund local public services like roads, sanitation, schools, and day care.

National income taxes are progressive. The tax base for the national tax and the municipal taxes are virtually identical. In 1983 a new tax base was introduced, called the additional

[26] The graph is censored at 180 days above which there are very few observations. There is a smaller mass point at 365 days.

[27] The differences in take up rates across generations are studied in Ljunge (2011). Systematic differences across generations are captured by the individual fixed effects in the empirical analysis below.

[28] Property taxes as well as the value added tax are levied by the national government.

amount. The additional amount is a separate tax base where some deductions, such as capital losses are cancelled. The tax base is similar to the alternative minimum tax in the U.S., although the tax is additional rather than alternative.

Sweden has a single filer system, which makes it straightforward to compute marginal tax rates also for married couples. I observe taxable income as recorded by the tax authorities and I know the tax schedules for each year. Given this information I can compute marginal income taxes for each individual in the sample.

Average marginal tax rates for each year are plotted in Figure 2. Marginal income taxes exhibit substantial variation over time and at different points of the income distribution, which is illustrated by the marginal tax rate schedules in Figure 3. There are both increases and decreases in tax rates across the whole income distribution, which is helpful in identifying the price response.[29] The tax schedules in Figure 3 are based on a person living in Stockholm. For individuals in different locations the schedules have the same shape but if the municipal tax rate is higher their tax schedule would be shifted up correspondingly.[30]

I only use tax rate variation within individual and across time. I find that variation in the progressive national part of the income tax is the most important factor. There is variation from changes in the local income tax rates, but this is much less important.[31] The price variation I use has wide support, marginal tax rates vary between 25 and 90 percent.

[29] In comparison, program evaluations frequently look at one increase or one decrease in prices.

[30] Average taxable income is 134,000 SEK. It may also be noted that for 1983-1990 there is an additional source of tax variation introduced by the division of the tax base into the basic and additional amounts. In plotting the 1986 line it is assumed that the basic and additional amounts are equal. However, given the same basic amount taxable income some individuals face higher marginal tax rates if their additional amount exceeds their basic amount taxable income (for example due to capital losses). The tax rate schedule could be thought of as a correspondence rather than a step function.

[31] In the benchmark estimates both national and local tax variation is used. Results are also presented where only variation from the national rate is used. The results from using only the national tax variation are very similar to the benchmark.

One benefit of using tax rates to obtain the price elasticity is that there is a lot of variation in taxes. There are thousands of differential treatments across time and space from which I can obtain the price response.[32] In contrast, the program participation literature has focused on evaluating changes in replacement rates within the program, frequently a change at one point in time with one treated group and one control group.

4 Economic Model

This section presents a simple economic model for sick leave through which the estimates can be interpreted. Consider an economy where agents have utility over consumption C and sick leave S,

$$U(C, S) \tag{1}$$

with utility increasing and concave in both arguments, that is, individuals enjoy both consumption and leisure from sick leave but at a diminishing rate. Decisions, which are made under certainty, are subject to the budget constraint

$$C = w\left(\bar{H} - S\right) + \delta w S + Y \tag{2}$$

The net of tax wage rate is w, δ is the sick leave replacement rate, and Y is non-labor income. $\bar{H}$ is a given labor contract that stipulates the number of work days. The choice of sick leave is a marginal decision while labor contracts are much less flexible. S is required to be no greater than $\bar{H}$. The first order conditions for this problem are

$$\begin{aligned} U_C &= \lambda \\ U_S &\leq \lambda w (1 - \delta) \quad for\ S < \bar{H}. \end{aligned} \tag{3}$$

[32] More than 7,500 different marginal tax rates are observed in the sample.

The multiplier on the budget constraint is λ, and subscripts denote partial derivatives. I assume that consumption and sick leave are additively separable in the utility function and consider an exponential utility function for sick leave such that

$$U_S = \left(\exp -\frac{1}{b}\left(S+f\right)\right) \tag{4}$$

where both $b > 0$ and f are parameters. The parameter b determines how responsive marginal utility is to additional sick leave and f shifts the curve. Some individuals have f -parameters such that they will choose no sick leave, and others may find it optimal to choose $S = \bar{H}$. I substitute the parametric utility function into the first order condition at interior points and use the after tax wage $w = (1-\tau)W$, where τ is the marginal tax rate and W is the gross wage, to get

$$\begin{aligned} -\frac{1}{b}\left(S+f\right) &= \log\left(1-\tau\right) + \log W + \log\left(1-\delta\right) + \log\lambda \Leftrightarrow \\ S &= -b\left[\log\left(1-\tau\right) + \log W + \log\left(1-\delta\right) + \log\lambda\right] - f. \end{aligned} \tag{5}$$

The marginal effect of the log net of tax rate on sick leave is $\frac{dS}{d\log(1-\tau)} = -b < 0$. It is straightforward to allow the utility to depend on individual characteristics. The shifter f could be parameterized to consist of individual characteristics X, an individual specific component u and an idiosyncratic shock e such that $f = pX + u + e$. In the empirical analysis I allow f to depend on a number of individual and aggregate characteristics.

The model builds on the labor supply tradition. It is straightforward to think of S as days absent from work. S may also be considered as a measure of effort, where effort produces disutility that is traded off against consumption.[33]

[33] Note that there is no precautionary motive to save sick days since there is no limit to the number of days one can claim, in contrast the system in for example the U.S..

The model is focused on sick leave choices since it is the behavioral margin for which there is good data. Several factors are taken as given, at least in part due to data limitation.[34] The basic model presented here is static, although I can allow for savings when the model is estimated in first differences.[35] It is also possible that there are dynamic rewards to low sick leave, so the net of replacement rate may not capture the full cost of being absent.[36] Systematic differences in these effects across individuals are captured by fixed effects.

One obvious alternative to the story that taxes influence sick leave behavior is omitted health shocks. It turns out health shocks work opposite to the hypothesis that the log net of tax rate has a negative influence on sick leave. Consider a health shock, which would increase sick leave and in turn reduce income. As the tax rate is progressive the lower income would reduce the tax rate and increase the net of tax rate. The health shock produces a positive relationship between sick leave and after tax wages. This goes against the mechanism I hypothesize. Indeed, health shocks produce a positive bias. To the extent that health shocks are quantitatively important, the point estimate of the price response is hence conservative.

5 Empirical Model

Based on the theoretical model, consider an empirical model where days of sick leave for individual i at time t, denoted by $SL_{i,t}$, are chosen according to the following model

$$SL_{i,t} = \beta \log(1 - \tau_{i,t}) + \theta V_{i,t} + \pi X_{i,t} + u_i + e_{i,t} \tag{6}$$

[34] For example, there is no good data on the type of labor contracts individuals have during this time period.

[35] The fixed effect in each time difference would account for the marginal utility of wealth.

[36] To the extent these effects are correlated with current taxes, the estimate of the elasticity picks up the combined effect. It is beyond the scope of this paper to disentangle the effect of current incentives from future incentives. I study these dynamic effects in a related paper.

where $\tau_{i,t}$ is the marginal tax rate, $V_{i,t}$ is the virtual income that captures income effects of tax changes, $X_{i,t}$ are individual characteristics, u_i is an individual effect, and $e_{i,t}$ is an unobserved i.i.d. shock.[37] The individual effect is assumed to be fixed in the main specification. The choices of sick leave days per year are censored at 0 and 365. In the baseline regressions I use a linear fixed effects estimator with dummies at the two censoring points.

The approach effectively includes only individuals on the intensive margin of sick leave in a given year. It is exactly this margin where the debate on the elasticity of freely adjustable labor supply is alive. The taxi driver papers look at workers who have handed in report cards, that is, they are on the intensive margin.[38] The decision to enter the pool of taxi drivers is not studied. Similarly, Fehr and Goette (2007) study only bike messengers that are active (their intensive margin decisions) and not the population of potential bike messengers. This is the primary reason for the specification I've chosen.[39] Another reason is more practical. I have estimated the model using a Tobit with both lower and upper censoring points. The results are qualitatively similar, but elasticity estimates are much larger in magnitude. However, it does not seem that accounting for the censoring points is very important quantitatively.[40] The assumption of randomly distributed individual effects in these models, as well as the assumption of normally distributed error terms in the Tobit, may be hard to maintain. The linear model with individual fixed effects and dummies at the censoring points relax both these assumptions.

[37] Earlier work includes Allen (1981).

[38] See for example Crawford and Meng (2011).

[39] The sick leave participation decision is studied, from a different perspective, in Ljunge (2011).

[40] I estimate a linear random effects model with dummies at the censoring points. The estimated elasticity is slightly lower than the Tobit estimate, which indicates that accounting for the censoring points is not that important quantitatively. The linear random effects estimate is still much larger than the fixed effects estimate. It indicates that it is very important to relax the random effects assumption and allow for unobserved heterogeneity through the individual fixed effects.

The relevant price facing the individual is the net of tax rate. The net of tax rate is what an individual takes home on the margin. Furthermore, the individual controls include an indicator of income above the replacement cap as these individuals face lower replacement rates than the stipulated rate.[41]

The individual's budget set is linearized using virtual income.[42] Under the assumption that the tax rate was fixed at the same rate as the marginal tax rate he faces, the virtual income captures the net income an individual would have if he had zero taxable income.[43] The estimate of the coefficient θ is used to compute the income elasticity of sick leave with respect to tax changes.

The compensated elasticity of sick leave with respect to the net of marginal tax rate is obtained from the Slutsky relationship. Let $\zeta^{C}_{SL,1-\tau}$ and $\zeta^{U}_{SL,1-\tau}$ denote the compensated and uncompensated elasticities of sick leave with respect to the net of tax rate, $1-\tau$. Then,

$$\zeta^{C}_{SL,1-\tau} = \zeta^{U}_{SL,1-\tau} + \zeta_{SL,V}\frac{SL}{V}$$

where $\zeta_{SL,V}$ is the elasticity of sick leave with respect to virtual income.[44] It is the compensated elasticity that is important from a theoretical perspective to be able to assess the welfare cost of taxation.

To assess the importance of the functional form in (6) I estimate models where the dependent variable is the logarithm of sick leave. I also estimate the model by using the first difference estimator rather than the within estimator. When I don't control for virtual in-

[41] Individuals do of course get sick for many reasons that are unrelated to tax policy, and hence won't affect the estimate. The objective is not to explain the variation in sick leave, only to estimate the influence of tax rates.

[42] The method is frequently used in labor economics, see for example Blundell and MaCurdy (1999).

[43] The virtual income is computed as individual earnings, including capital income, minus income taxes paid minus the net of marginal tax rate times taxable income. In addition, spousal income is added when relevant.

[44] In terms of the empirical model, $\zeta^{C} = \beta/SL + \theta$.

come, the first difference estimator corresponds to an intertemporal model of labor supply where tax schedules are anticipated one period in advance similar to MaCurdy (1981). The assumption that tax schedules are anticipated one period in advance is reasonable given the legislative lags.

5.1 Marginal Tax Rates

The marginal tax rate is a function of earnings. Since sick leave affects earnings there is a potential endogeneity bias in that tax rates are a function of sick leave, in particular if sick leave spells are long or frequent. If I denote the marginal tax rate function by $\tau(.)$, then the tax rate I want in terms of the economic model is $\tau\left(W\bar{H}\right)$. Observed marginal tax rates $\tau\left(W\left(\bar{H}-S\right)+\delta WS\right)$ depend on sick leave choices. Observed sick leave benefits, and the compensations rules, are used to the compute taxable income one would have if no sick leave were claimed. By adding $(1-\delta)WS$ to observed taxable income I compute the taxable income at zero days of sick leave, $W\bar{H}$. The tax code is applied to this adjusted taxable income from which I obtain marginal tax rates at zero sick leave days, $\tau\left(W\bar{H}\right)$.[45] This is the relevant tax rate facing an individual before he decides whether to call in sick or not. This tax rate does not depend on sick leave choices. The marginal tax rate at zero days of sick leave is what is used in the analysis.

Virtual income is adjusted in a similar manner to capture the value at zero days of sick leave. This includes adjusting income to what it would have been if no sick leave had been claimed and increasing the tax bill based on the extra income (taxed at the marginal tax rate

[45] For most individuals this means adding one ninth of sick leave benefits to taxable income. The approach is somewhat different in practice due to the replacement cap. The procedure assumes that these additional earnings would not have been subject to any additional deductions.

at zero days of sick leave). The adjustments make virtual income independent of current sick leave choices.

Relating sick leave to the tax rate at zero days of sick leave avoids the identification challenge in the taxable income literature, where the tax rate is a direct function of taxable income, the dependent variable. Here, in contrast, there is no such direct relationship. The tax rate is computed on income that is not a function of sick leave. There are of course remaining concerns of omitted variables and endogeneities, as in all empirical work, and these concerns are dealt with in the analysis below.

6 Results

Tax rates have a substantial effect on sick leave. The point estimate has the expected negative sign and it is highly significant. Income effects are negligible, and the compensated price elasticities are substantial. The results are robust to controlling for a host of factors and using different estimators.

The basic empirical specification is a linear individual fixed effect estimator with dummies at the censoring points, that is, dummies for 0 and 365 days of sick leave. Only variation from the interior days of sick leave is used to estimate the price elasticities. The main variable of interest is the log of the net of marginal tax rate. Virtual income is controlled for to account for income effects due to tax changes. The first specification in Table 2 includes no other controls. The estimated coefficient on the net of tax rate has the expected sign; a higher after tax cost of reporting sick is associated with fewer days of sick leave. The estimate is identified using variation within individuals, that is, people take less sick leave during years when their net of tax rate is higher than their average level. The magnitude of the effect is that a 10% increase in the net of marginal tax rate, for example from 50% to 55%, leads to a one day reduction in sick days on average. To transform the estimate to an elasticity it is evaluated at the average number of sick days claimed, which produces a compensated elasticity of sick days to the net of marginal tax rate of -0.38.

As sick leave may be influenced by demographic and other factors, which may be correlated with marginal tax rates, a number of controls are introduced into the model. The second specification includes a full set of interactions of age and age squared with gender and the four education categories. Including these variables increase the price responsiveness slightly, as seen in column 2. Including detailed controls for household composition[46] increase the price effects a little further, as seen in the third specification.

Accounting for own income, in column 4 of Table 2, has little effect on the sick leave response. I use a lag since current income may be endogenous. I also include an indicator if the normal income is above the replacement cap. Accounting for regional fixed effects and regional business cycles do not affect the analysis either.[47] Specification 5 adds year fixed effects to account for aggregate shocks like productivity shocks or the uniform effect of tax reforms. Another concern could be that the marginal tax rate is a non-linear transformation of income. It may be that the tax price estimate just picks up non-linear effects across the income scale. To address this issue I make a 5 piece spline of the lagged earnings, with knots at quintiles.[48] Including these controls produce a substantially higher net of tax estimate of -18 as seen in specification 5.[49]

[46] The number of children of different ages are included as well as marital status.

[47] Regional employment rates capture the business cycle.

[48] The results are robust to using a 10 piece spline.

[49] Most of the increase in the estimate follows adding the non-linear income control. Adding the year fixed

The compensated sick leave elasticity now stands at -0.72. Although large relative to traditional labor supply elasticities, it is in the same range as other estimates on workers that are free to adjust. The bike messengers in Fehr and Goette (2007) have a labor supply elasticity between 1.34 and 1.5, while Oettinger (1999) estimates elasticities in the range 0.55 to 0.65 for the stadium vendors.

Alternatively, the estimate can also be transformed into an elasticity of days worked.[50] The compensated elasticity of days of work is then about 0.10. The days of work elasticity is in the upper range of compensated labor supply elasticities.[51] Hence, the estimate here based on only one margin of adjustment can account for all of the labor supply elasticity on the intensive margin in the traditional literature although the workers in that literature are allowed to adjust on all margins.

The analysis based on days of sick leave is preferred for several reasons. First, sick leave is the margin along which employees are free to adjust. I would argue it best matches the related literature on freely adjustable labor supply. The literature has focused on the margin along which the taxi drivers, stadium vendors, and bike messengers are free to adjust and excluded other dimensions of labor supply such as all the jobs they hold. I follow this approach. The second reason is that sick leave is accurately measured in the data. There are not good measures in the data from this period of how many days each individual work and how many days they don't work for reasons other than sick leave.

The analysis thus far shows that the price responsiveness of sick leave does not rely on year to year tax reforms or differences in behavior across different income groups. What I

effects has a small effect.

[50] Here it is necessary to make an assumption on how many days the average employee works.

[51] See for example Blundell and MaCurdy (1999).

exploit is the long time period where tax rates change differentially at different sections of the income distribution. Individuals tend to have higher sick leave during years when they face higher tax rates than they usually face. Since the within estimator is applied the effect is identified from deviations from individual means.

Estimated income effects are economically insignificant throughout, although they are statistically significant. The point estimate on virtual income is negative. From a labor supply perspective that indicates that sick leave is an inferior good, and not quite comparable to leisure. From the perspective of subjective well-being, a negative income effect is to be expected.[52] Higher income may also be associated with more interesting job tasks, and thus a higher cost for being absent.

I believe the estimates have a causal interpretation. Tax policy is exogenous to the individual. It's reasonable to assume that tax reforms are enacted independent of local health trends. The tax changes exploited provide thousands of different incentives for individuals across time. These price changes have a significant impact on individual behavior. The exogeneity of the price changes are explored further below.

6.1 Alternative Specifications

The analysis in Table 2 is based on days of sick leave, which is a transformation of the amount of sick leave benefits observed in the data. How does the transformation of benefits into sick leave days affect the analysis? I run specification 5 in Table 2 with sick leave benefits as the dependent variable. When evaluating the elasticity at the sample mean I find an elasticity

[52] Income is the second strongest correlate with subjective well-being, after health, according to Graham (2009).

of -0.77 as seen in the first column in Table 3.[53] The elasticity is slightly higher than when using the transformed variable, indicating attenuation bias from the imprecise measure of days.

The results are robust to several further alternative specifications. Caring for young children doesn't affect the estimate. Women with children between the ages 0 and 2 are excluded from the sample (only women since care of young children were mostly done by women during the period of study). Excluding this group does not affect the results, as seen in the second column of Table 3. Another concern may be the measurement of sick leave benefits. Up until 1983 maternity leave was included in sick leave benefits but starting in 1984 the parental leave in connection to the birth of a child was reported separately. In addition, care for sick child was reported separately from 1987. These definitional changes could affect the analysis. To examine the impact the sick leave variable is redefined as take up of any of the three programs (sick leave, parental leave, and care for sick child). Redefining the dependent variable does not affect the estimated coefficients much, as seen in specification 3.

There could be a bias from the fact that the data may not include the first uncompensated day of the spell, but I argue that such omissions would bias the estimate toward zero.[54] There is only a concern about the omission of the first day for spells that are correlated with tax rates. Such 'discretionary' sick leave could hence be underreported in the data. However, such underreports would make the estimated price response smaller than the true response since the price variation is related to the observed sick leave variation, which would be smaller than the true variation. The bias would hence be toward zero.

[53] The point estimate on virtual income is larger than before, but since it relates to the monetary amount of benefits its influence on the elasticity is negligible.

[54] As argued above, the uncompensated day would be irrelevant for an individual who anticipates being on sick leave tomorrow if you report sick today.

The estimate is not influenced by individual shifting across programs.[55] Individuals are excluded who have taken up either unemployment benefits or welfare payments during the year. The responsiveness to the net of tax rate is similar to the baseline specification.

The composition of the labor force doesn't affect the results. It could be that unhealthy workers drop out of the labor force, which could affect the estimates if this tends to happen when they face relatively low (or high) tax rates. The fourth specification includes only individuals aged 22-50, an age range with very little exit from the labor force. Estimates are somewhat lower in this group but still sizable and strongly significant.

The results are not driven by individuals with very high or low incomes. Specification 6 only includes individuals whose virtual income is at least 30,000 and less than 3,000,000 SEK.[56] The estimated elasticity is similar to the baseline specification. It may be noted that the income effect is an order of magnitude larger in this specification, but still income effects are not economically significant, and the compensated elasticity remains large.

The results are similar if the sample is split into shorter periods. As the study covers 17 years there could be a worry that some underlying factors have changed over the time period, which may affect the estimate. The sample period has been split in half, from 1974 to 1981 and from 1982 to 1990. Both periods experience both tax increases and decreases, and they produce similar results. Other time period splits produce similar results, such as excluding the last three years when the sick leave rules were slightly different from the first 14 years. The estimates are not driven by the full 17 year period, but the results are also present for shorter periods.

[55] For example, Larsson (2006) finds shifting between the unemployment and sick leave benefits.

[56] Average virtual income is 120,000 SEK.

It could also be that there is some skill bias in sick leave, which is correlated with tax changes.[57] To address the concern of non-linear trends by skill group, year fixed effects interacted with the four education groups are included in specification 7. The estimates are virtually identical after adding these controls. Skill bias is not driving of the results.

Omitted income shocks, over and above the income controls, would be a concern if they reduced the net of tax rate (by increasing the tax rate) and increased sick leave. First note that the estimate of the income effect, the virtual income term, is negative so a positive income shock would be expected to reduce sick leave, in contrast to the concern of sick leave increasing with income. Yet, omitted income shocks may be accounted for by including taxable income, the income the tax schedule is applied to, as a control.[58] The estimated elasticity is still large and significant, although slightly smaller in magnitude compared to the baseline, as seen in the last column of Table 3. Omitted variables, which affect taxable income and sick leave can hence not explain the result. This is a powerful result as it accounts for any omitted income shocks driving both taxable income (and hence tax rates) and sick leave.

6.2 Logarithmic Models in Differences

Based on the distribution of sick leave in Figure 1 it may be interesting to examine a model where sick leave is distributed lognormally. The basic model (6) is reformulated so that the dependent variable is the natural logarithm of days of sick leave. The following specifications only include basic demographic controls, age and age squared interacted with gender and

[57] Although it seems unlikely, a priori, that the skill bias would follow the non-linear pattern of tax rates.

[58] The taxable income has been adjusted to reflect income at zero days of sick leave, as before, in order to remove any direct relationship with the dependent variable.

education, and year fixed effects. The purpose of these more limited controls is to further examine the exogeneity of the tax rate variation, by excluding any potentially endogenous controls that could bias the price response estimate.

The logarithmic specification is first estimated in levels using the individual fixed effects estimator. The estimated coefficient, -0.49 in column 1 of Table 4, should be interpreted as the uncompensated price elasticity of sick leave. Not including the income effects would have a minor effect on the estimated elasticity as the income effects estimated above are very small. The estimated elasticity is a bit larger than specification 2 in Table 2, which may be the closest comparison, but smaller than the baseline estimate in column 5 of Table 2.

The model is estimated in first differences in column 2 of Table 4.[59] This estimator differences out an individual specific effect in each time difference, and may be a more flexible method to account for unobserved heterogeneity compared to the fixed effects estimator. The estimated elasticity of -0.68 is larger than the fixed effects estimate in the previous column and similar in magnitude to the baseline elasticity in column 5 of Table 2. The result indicates that the first difference estimator removes some bias toward zero imposed by the assumption of the within estimator that the fixed effect is constant across time.[60]

The individual tax rate is composed of a local tax rate and a national tax rate. The tax rate may hence depend on where the individual chooses to live, and there may be a concern that individuals with a high demand for sick leave move to places with higher local tax rates, which would induce a negative correlation between tax rates and sick leave. To

[59] The estimated model is $\Delta \log (SL_{i,t}) = \beta \Delta \log (1 - \tau_{i,t}) + \delta \Delta X_{i,t} + \Delta e_{i,t}$ where Δ denotes the first difference operator.

[60] The dependent variable days of sick leave is as discussed a transformation of sick leave benefits, where the benefits are linear in the number of days claimed. Using the log of sick leave benefits as the dependent variable produce very similar result, in the specification just discussed the estimate is -0.717, indicating that the transformation does not drive the results in this specification either.

address concerns that mobility, or any factor correlated with changes in the local tax rate, would affect the estimate I instrument for the individual's total tax rate with the national tax rate, which is independent of location. The first stage in this regression is extremely strong, indicating that almost all the relevant tax rate variation comes from the national rate. The second stage estimate is very similar to the OLS estimate, as seen in specification 3 in Table 4, indicating that mobility does not explain the results.

The national tax rate is progressive across income, as illustrated in Figure 3. It would hence be a concern if the tax reforms studied induce labor supply responses which affect income and in turn sick leave. The labor supply responses would have to follow a particular pattern for this to be a concern. For example, a tax cut could increase labor supply and income that in turn would reduce sick leave, a negative relationship between sick leave and the net of tax rate, if sick leave is a normal good. However, the estimate of the income effect above is negative indicating that sick leave is an inferior good.

There may still be concerns that income responds to tax policy, which in turn influences sick leave.[61] To address this I construct a tax rate that isn't based on current income. Current taxable income is regressed on taxable income lagged five years, demographic interactions (age/gender/education interactions), and growth rates by education groups (year effects interacted with education groups). The tax code is applied to the predicted taxable income from that regression and the log net of national tax rate is computed based on the income prediction, which is differenced and used as an instrument for the difference of the log net of

[61] Most labor supply estimates consider adjustment periods longer than our 1 year window. It may also be noted that the Swedish labor market hardly was the most flexible during this time period, which made it harder to adjust labor contracts immediately following a tax reform.

total tax rate.[62, 63] The first stage is not weak.

The point estimate of -0.64 from using the national tax rate based on projected income is similar to the previous IV estimate and the OLS estimate, as seen in the fourth column of Table 4. The estimate is strongly significant, although the standard errors are now larger.[64] The results are similar if the sixth lag is used instead of the fifth lag in the income projection.[65] I conclude that the estimates are driven by exogenous tax rate variation and not endogenous income responses induced by the tax reforms.

6.3 Heterogeneity

Table 5 presents the estimated price elasticity of sick leave for different demographic and occupational groups. The first difference model estimated with OLS is used just like specification 2 in Table 4. I find that women are more elastic than men, and that married women are more elastic than the unmarried women, as can be seen in the first four specifications in Table 5, in line with the previous labor supply literature. Furthermore, women with children are more elastic than those without children.[66] These patterns may be explained by women being relatively more productive in the home sector and hence more marginal in the market

[62] The projected income is hence used to compute the tax rates used as instruments in both period t and t-1 in each time difference. Note also that only variation from the national rate is used.

[63] This instrumental variables approach is essential in the taxable income literature since the tax rate is a function of the dependent variable taxable income. In the analysis here, however, there is no such direct functional relationship since the tax rates, computed at zero days of sick leave, are independent of the realized number of sick days.

[64] In this specification the tax treatment is based on income 5 years ago, while at the same time differencing out the unobserved heterogeneity between periods t and t-1, which separates the treatment from current individual influences.

[65] The argument for not using the first lag is that temporary income shocks may correlate with the instrument and subsequent sick leave. By using longer lags such concerns are reduced. That the results using the fifth and sixth lags are similar also indicate that there is no remaining mean reversion from temporary shocks at these lag lengths.

[66] Women with children up to age 6 are more elastic compared to women with children up to age 15, who in turn are more elastic than women without children (up to age 6) living at home. The elasticities for the three groups are -1.16, -.98, and -.81, respectively.

sector compared to men, which may induce a higher price responsiveness to market sector returns. The same argument applies to married versus unmarried women, as well as women with and without children. Furthermore, public sector employees are more elastic than the private sector employees, as seen in specifications 5 and 6 in Table 5.[67] This difference may be understood as a response to an environment where public sector workers face less flexible labor contracts compared to the private sector. Public sector employees have access to sick leave, and may respond more to incentives on this margin.

Next, I examine a group that I suspect, a priori, to be unresponsive to incentives. According to the rules of the sick leave program there should be no relationship between marginal tax rates (or other monetary incentives) and use of sick leave benefits. The group who is most familiar with how to apply the rules is the individuals processing the claims. I estimate the model on the sample of social insurance administrators. The point estimate is virtually zero as seen in column 7 of Table 5, and insignificant.[68] Hence, the employees of the social insurance administration pass the falsification test.

Table 6 presents estimates for the same demographic groups as in Table 5 but the dependent variable is sick leave benefits. As discussed above, the measure of days of sick leave is based on a transformation of the sick leave benefits and there could be a concern that the procedure would affect the estimates. Table 6 provides further evidence that this is not the case. Estimates are very similar when using sick leave benefits, though slightly higher in magnitude.[69]

[67]These regressions have fewer observations since the sector information isn't available for the first few years of the sample.

[68]This result is not due to the smaller sample size for this group. The baseline estimate is obtained when drawing random samples of individuals of similar size, and standard errors are similar to those in column 7 of Table 5.

[69]The estimates in Table 6 are not significantly different from the estimates based on sick leave days in

7 Conclusion

To work, or not to work today? The sick leave program in Sweden makes that the relevant question for Swedish employees. The program provides a unique opportunity to study how price elastic labor supply is when the employees can decide how much to work, and how often to call in sick.

I estimate a substantial price elasticity of sick leave, -0.7. The estimates are robust to using alternative estimation methods. I apply fixed effect and first difference estimators, and I use different approaches to account for potential endogeneities and omitted variables. The results support the interpretation that it's the exogenous tax rate variation that causes the behavioral response; individuals claim more sick leave during years when they face relatively higher tax rates and, hence, lower returns to working on the margin.

The sample is representative of the population, where others have examined very select occupations. Two decades of tax reforms provide substantial price variation, in comparison to many studies over short time periods with very limited price variation. Using tax rate variation, which is relevant from a policy perspective, I find that workers along the discretionary margin of sick leave act as though they are neoclassical and highly elastic.

Sick leave is unique in that the individual can use it at his discretion. Most labor supply adjustments are associated with adjustment costs or other distortions, which may drive a wedge between the estimated and the true behavioral elasticities as discussed by Chetty (2011). In an environment where many margins are subject to adjustment distortions, the sick leave elasticity captures behavior when workers face few frictions and are free to choose.

Table 5.

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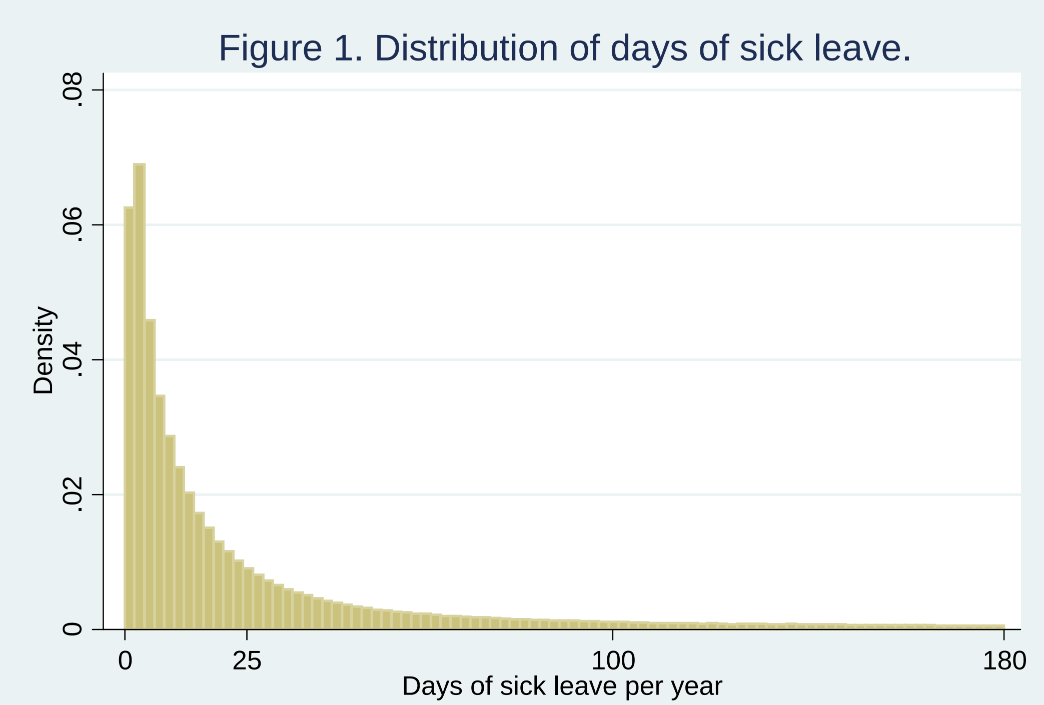
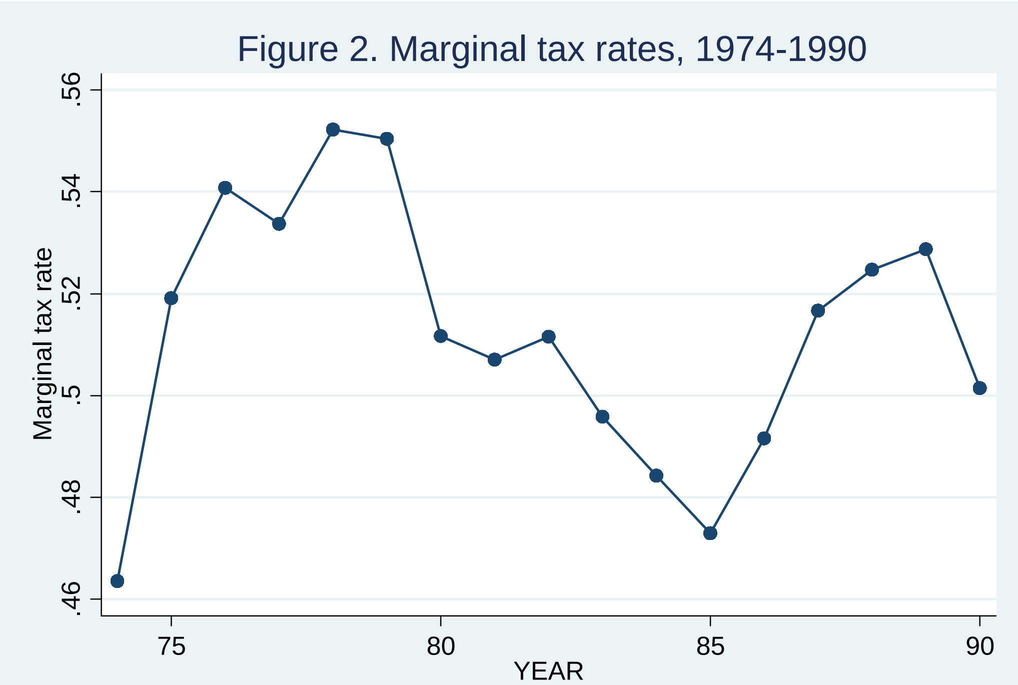
8 Figures and Tables



Note: Only positive number of sick days are included. The graph is censored at 180 days.



Sample: Labor force participants, ages 22-60.

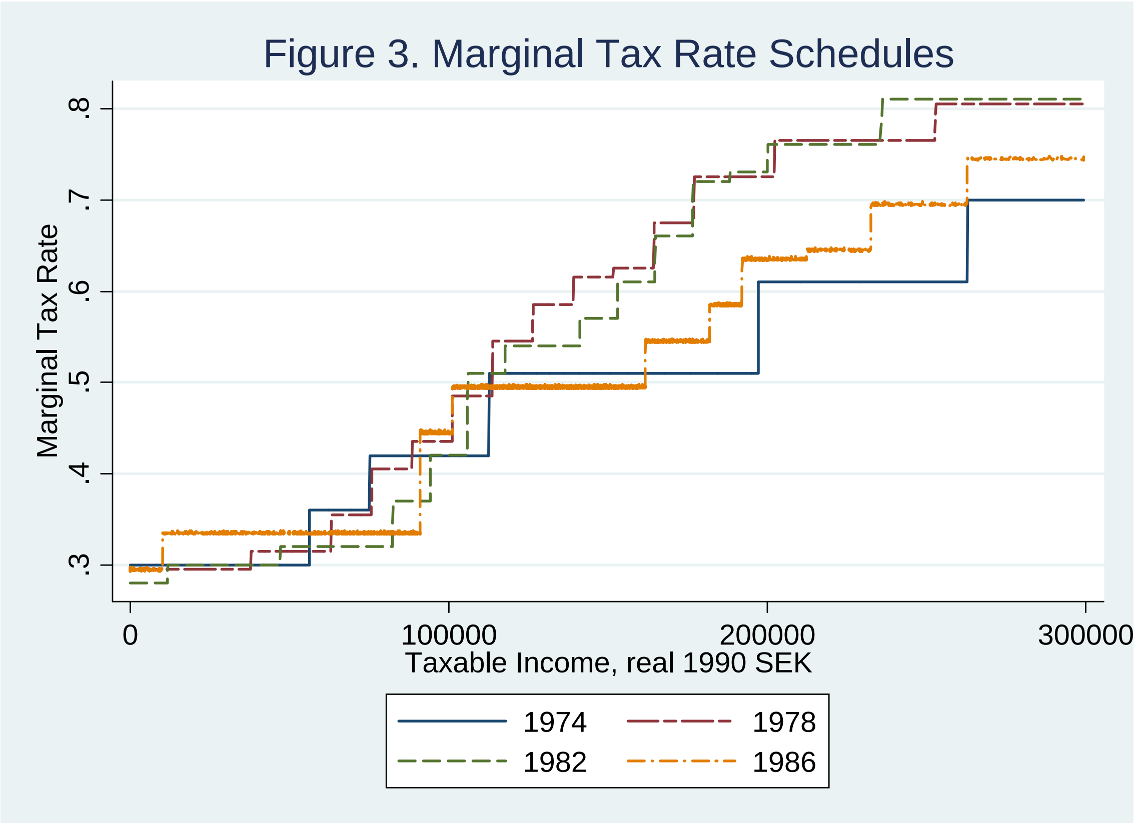


Table 1. Summary statistics

	Obs	Mean	Std. Dev.
Days of sick leave	1950473	25.0	57.6
Program participation rate	1950473	0.636	0.481
Marginal tax rate	1950267	0.498	0.130
Age	1950473	39.9	10.7
Man	1950473	0.523	0.499
Married	1950473	0.596	0.491
Earnings, 1990 SEK	1949142	126884	317706.8
< High school	1950473	0.412	0.492
High school	1950473	0.379	0.485
College, up to 2 years	1950473	0.093	0.290
College, 3+ years	1950473	0.116	0.320

Sample: Labor force participants, 22-60 years old, years 1974-1990.

Table 2. Price Elasticity of Days of Sick Leave.

Dependent Variable: Days of Sick Leave
Individual fixed effect regressions

Variable	(1)	(2)	(3)	(4)	(5)
log(1-t)	**-9.44**	**-10.68**	**-11.24**	**-11.31**	**-18.03**
	(.201)	(.206)	(.198)	(.2)	(.237)
Virtual Income	-0.00063	-0.00052	-0.00056	-0.00055	-0.00070
	(.0002)	(.00017)	(.00018)	(.00018)	(.00022)
Dummies for 0 and 365 days of sick leave	Yes	Yes	Yes	Yes	Yes
Age, age sq interacted with gender and education		Yes	Yes	Yes	Yes
Months with Infant x Female			Yes	Yes	Yes
Child 7 months-2 years			Yes	Yes	Yes
Child 3-6, Child 7-15 years			Yes	Yes	Yes
Marital status			Yes	Yes	Yes
Income lag				Yes	Yes
Income above cap indicator				Yes	Yes
Business Cycle control				Yes	Yes
Regional fixed effects				Yes	Yes
Year fixed effects					Yes
Income lag Spline					Yes
Compensated elasticity of sick leave with respect to 1-t	**-0.38**	**-0.43**	**-0.45**	**-0.45**	**-0.72**
Observations	1948956	1948956	1948956	1948956	1948956

Notes: The marginal tax rate is denoted by t. Virtual income measured in 1000's of 1990 SEK.
Months with infant counts the number of months there is a child of up to 7 months of age in the household.
Education is grouped into 3+ years of college, <3 years of college, high school, <high school.
Business Cycle (BC) control is average regional employment rates.
Permanent income is an estimated individual fixed effect of earnings on demographic interactions and BC controls. Spline is 5 piece with knots at quintiles. Elasticities evaluated at sample means.
Individual panel data from 1974-1990, annually. Estimates of the within estimator.
Standard errors, clustered by individual, in parenthesis. Sample: Labor force participants, 22-60 years old.

Table 3. Alternative specifications.

Dependent Variable (columns 2-8): Days of Sick Leave
Individual fixed effect regressions

Alternative explanation:	Incorrect measure of days	Fertility	Program definition	Use of other programs	Composition of labor force	Income restrictions	Skill biased time trends	Omitted income shocks
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
log(1-t)	**-5978**	**-16.77**	**-17.63**	**-17.31**	**-14.21**	**-16.48**	**-17.88**	**-14.65**
	(156.977)	(.233)	(.243)	(.237)	(.258)	(.269)	(.233)	(.425)
Virtual Income	-0.289	-0.00053	-0.00059	-0.00067	-0.00059	-0.00818	-0.00068	-0.00096
	(.09182)	(.00019)	(.0002)	(.00021)	(.00023)	(.00075)	(.00021)	(.0003)
Additional controls or sample restrictions	Sick leave benefits as dependent variable	Exclude women with children 0-2 years old	Broader sick leave measure	Exclude people with UI benefits, welfare.	Include only ages 22-50	Include only virtual income 30-3000 ksek	Year effects interacted with education	Taxable income at 0 days of sick leave
Compensated elasticity with respect to 1-t:								
Sick Leave Elasticity	**-0.77**	**-0.77**	**-0.65**	**-0.73**	**-0.55**	**-0.78**	**-0.72**	**-0.59**
Observations	1954168	1865072	1948956	1835909	1414046	1523762	1948956	1948956

Notes: All controls used in Table 2, column (5), are included if applicable.
Individual panel data from 1974-1990, annually. Estimates of the within estimator.
Standard errors, clustered by individual, in parenthesis. Sample: Labor force participants, 22-60 years old.

Table 4. Logarithmic specifications estimated in first differences.

Dependent Variable:	log(Sick Leave)	Δlog(Sick Leave)	Δlog(Sick Leave)	Δlog(Sick Leave)
Estimator:	Individual fixed effects (levels)	First differences OLS	First differences IV	First differences IV
Specification	(1)	(2)	(3)	(4)
log(1-t)	**-0.485**			
	(.009)			
Δlog(1-t)		**-0.683**	**-0.716**	**-0.642**
		(.011)	(.011)	(.206)
Instrument:			National tax rate	National tax rate based on projected income
Observations	1231509	929929	929929	670968

Notes: Controls included in all specifications are age and age squared fully interacted with gender and education, as well as year fixed effects. Δ is the first time difference operator.
The dependent variable in columns 2-4 is Δlog(Sick Leave).
Individual panel data from 1974-1990, annually. Column 4 includes data from 1979-1990.
Standard errors, clustered by individual, in parenthesis.
Sample: Labor force participants, 22-60 years old.

Table 5. Heterogeneity across demographic and occupational groups.

Dependent Variable: Δlog(Sick Leave)
First differences regressions

Sample	Men	Women	Women, Married	Women, Unmarried	Public sector employees	Private sector employees	Social insurance administrators
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δlog(1-t)	**-0.54**	**-0.90**	**-0.99**	**-0.80**	**-0.67**	**-0.59**	**0.003**
	(.014)	(.019)	(.026)	(.027)	(.021)	(.017)	(.246)
Observations	453427	476502	282359	194143	308739	359020	1958

Notes: Controls included in all specifications are age and age squared fully interacted with gender and education, as well as year fixed effects. Δ is the first time difference operator.
Individual panel data from 1974-1990, annually. The models are estimated with OLS.
Standard errors, clustered by individual, in parenthesis. Sample: Labor force participants, 22-60 years old.

Table 6. Heterogeneity estimates based on sick leave benefits.

Dependent Variable: Δlog(Sick Leave Benefits)
First differences regressions

Sample	Men	Women	Women, Married	Women, Unmarried	Public sector employees	Private sector employees	Social insurance administrators
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δlog(1-t)	**-0.58**	**-0.93**	**-1.00**	**-0.85**	**-0.69**	**-0.62**	**0.043**
	(.014)	(.019)	(.026)	(.026)	(.021)	(.016)	(.245)
Observations	467472	493572	287395	206177	316705	368736	1962

Notes: Controls included in all specifications are age and age squared fully interacted with gender and education, as well as year fixed effects. Δ is the first time difference operator.
Individual panel data from 1974-1990, annually. The models are estimated with OLS.
Standard errors, clustered by individual, in parenthesis. Sample: Labor force participants, 22-60 years old.