The Impact of Income Taxes on Worker Shirking

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Abstract

Do workers shirk to adjust short-run labor supply in response to higher income taxation? We test this hypothesis using a 2009 reform in the Austrian tax schedule that reduced marginal taxes in the middle of the income distribution. Based on linked register data, we find that a one percentage point decrease in the marginal tax rate reduces sick days by 10%, which amounts to roughly 10% of the taxable income elasticity. These effects are driven by easy-to-fake diagnoses; overall healthcare expenditures are not affected. Our findings have important implications for firms allocating labor resources and for the design of tax reforms.

JEL codes: H20, H24, H26, J22, I12
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1 Introduction

Societies collect tax revenue to pursue social objectives, yet taxes distort behavior. They affect taxpayers' labor supply (Chetty *et al.*, 2011, 2013; Saez *et al.*, 2012; Neisser, 2021), trigger avoidance and evasion activities (Alstadsæter *et al.*, 2019, 2022; Dwenger *et al.*, 2016; Kleven *et al.*, 2011; Pomeranz, 2015; Slemrod, 2007, 2019; Riedel, 2018), or even impact the observed timing of death (Kopczuk and Slemrod, 2003). While the literature made substantial progress in highlighting various consequences of taxes, our knowledge of their potential distortions is still incomplete. This quasi-experimental paper provides an example of a largely ignored but important distortion: Income taxes trigger employees to shirk their contractual work days.

In theory, such an effect could run through a work incentive channel. Clearly, income taxes distort the return to effort. Shirking is then one way for employees to adjust actually

days worked to the tax-altered work incentives.[1] The shirking effect seems particularly relevant, as employees usually cannot freely choose contractual days worked in the short run (Chetty *et al.*, 2011). In such a setting, households need to resort to non-standard tools to adjust their labor supply to tax changes, and shirking could be one of these means. While theoretically straightforward, empirically, the impacts of taxes on shirking activities are challenging to study. Not only do individuals conceal their shirking activities but also analyzable settings with well-defined shirking incentives are hard to find. Moreover, researchers need suitable identifying variation in tax rates. The effects of income taxes on shirking behavior, therefore, are not fully understood.

Against this background, our paper focuses on the Austrian setting to examine shirking behavior. This setting serves as a fruitful testing ground, as it allows us to tackle the empirical challenges faced. First, it provides rich administrative health, tax, and employment data to identify one particular form of worker shirking: shirking of contractual work days through sick leaves. We have detailed information on sick leaves, including the start and end date as well as the underlying diagnosis for each sick leave, along with other inpatient and outpatient claims of the worker. These data allow us to separate shirking behavior from real impacts on health.[2] Second, the Austrian setting, indeed, imposes incentives for shirking. Individuals who are absent from work for illness-related reasons are entitled to continued wage payments, and, as always, information on one's health is (at least partly) private information. Third, the setting also offers a valuable type of cross-bracket variation in tax rates. A tax reform in 2009 reduced the marginal tax rates in the middle of the income distribution. We exploit this variation by tailoring the novel difference-in-income trends approach of Jakobsen and Søgaard (2020) to the study of shirking behavior.

Our analysis proceeds in several steps. In the first and most crucial step, we demonstrate that income taxes strongly affect the annual number of paid sick days. A 1.8 percentage point decrease in the marginal tax rate cuts the average number of certified sick days by 22% relative to the pre-reform regime.[3] In absolute terms, this effect implies that an average full-time employee shirks 2.2 days less per year. The second step is to benchmark the magnitude of the shirking response against that of other types of behavioral responses. To

[1] The shirking effect aligns with the seminal Shapiro and Stiglitz (1984) model. In this model, shirking allows households to control their actual labor supply. Shirking, however, bears costs (in the form of job and income losses). Hence, individuals face a trade-off between the benefits (more leisure) and costs (income loss) of shirking activities. Income taxes balance this trade-off towards more shirking activities, as higher taxes decrease the potential net income losses.

[2] Additionally, we can zoom in on sick leaves taken on days with particularly good weather, sick leaves taken on bridge days, or one-day sick leaves on Mondays or Fridays. These are examples where we would expect particularly strong shirking responses.

[3] Here, we assume a worker in a fulltime contract and 251 work days within a given year.

that end, we estimate the standard elasticity of taxable income to the net of tax rate (*ETI*), following Jakobsen and Søgaard (2020) and Gruber and Saez (2002). We resort to the *ETI* for our benchmark exercise as it is a broad measure of behavioral responses, reflecting the reactions through a multiplicity of margins (including avoidance and evasion). Strikingly, our sick leave responses amount to approximately 10% of the *ETI*. The last step lies in presenting several pieces of evidence that the sick leave response, indeed, reflects shirking of work hours. In line with shirking, we do not find any impacts on the individuals' health expenditures and that effects are stronger when we look at easy-to-fake diagnoses, such as back pain.

The results of our paper are insightful from various perspectives. From the employers' perspective, our findings imply that tax-induced shirking reduces the effective work hours they can allocate. Because employers have to continue remuneration during sick leave (for a certain period), the loss in labor supply seems particularly problematic for them.[4] In fact, employers then compensate workers for shirked days without receiving any work inputs. We estimate that this effect is substantial: Employers under the higher-tax regime lose an additional 0.88% of the paid workdays due to shirking (compared to the lower-tax regime). This figure, notably, only covers the direct cost of non-worked days. Due to production disruptions or productivity spillovers on coworkers, the effective costs might be much higher.

The second perspective is that our results enrich the discussion on the implications of tax reforms. Particularly, our paper extends this debate by (a) illustrating a new response margin and (b) exemplifying that standard outcomes in tax-reform analyses do not capture all types of behavioral responses. For example, our results imply that if we are interested in the impacts on labor supply, studying contractual work days is not sufficient in the presence of shirking. Similarly, as the shirking response leaves the taxable income unchanged, the *ETI* does not capture this type of behavioral reaction. Another insight is that strong labor supply responses are present at margins that are less restricted by optimization frictions. We conclude that we should account for sick leave responses to get a complete picture of the impacts of income tax reforms.

Lastly, the most general view of our paper is that it contributes to the debate on absenteeism, an important topic of policy relevance. Absenteeism causes a substantial loss of working time worldwide. For example, in 2019, Austrians spent on average 3.6% of the annual working time on sick leave (Leoni, 2020). The ongoing pandemic might even have intensified absenteeism and shirking problems. It is not only that employee monitoring is

[4] In Austria, depending on their tenure status, employers pay the full salary during the first six to twelve weeks. For further four weeks, employers cover 50% of the salary. After that period, employees receive a certain amount of money from the social insurance system.

difficult in pandemic times, but the requirements for sickness certificates have also been relaxed in many countries (to limit social contacts). In this context, it is vital to know how incentives shape absenteeism and shirking, and taxes are an important part of the incentive system.

2 Institutional Background

2.1 Income Taxation in Austria and the 2009 Tax Reform

The basics of income taxation: All Austrian residents are subject to income taxation. Moreover, they are required to file income reports declaring all sources of income unless income generated from sources other than formal employment is lower than EUR 720. In that case, the employers are responsible for exact and cumulative withholding via the employees' payslips. Nonetheless, wage earners can file tax returns at the end of the fiscal year to claim deductions not already accounted for by the employers (e.g., personal expenses). The subject of the income tax is taxable income, which consists of seven types of income sources. These include income from agriculture and forestry, self-employment, commercial operation, employment, capital assets, rentals, and leasing and real estate transactions. Notably, each taxpayer is taxed according to a progressive income tax schedule with several tax brackets and (constant) marginal tax rates. Between 2005 and 2008 (our pre-reform period), the statutory marginal tax rates were zero for taxable income shares below EUR 10,000, 38.33% for taxable income shares between EUR 10,001 and EUR 25,000, 42.6% for taxable income shares between EUR 25,001 and EUR 51,000, and 50% above.

The tax reform: What is crucial for our agenda is that a tax reform in 2009 altered the tax schedules (Schratzenstaller *et al.*, 2009). The purpose of the reform was to decrease the wage and income tax burden. Particularly, the reform raised the bracket thresholds for the lowest and the highest tax brackets. It simultaneously lowered the marginal tax rates except for the top one. The reformed tax schedule was as follows: The statutory marginal tax rates were zero for taxable income shares below EUR 11,000, 36.5% for taxable income shares between EUR 10,001 and EUR 25,000, 42.3% for taxable income shares between EUR 25,001 and EUR 60,000, and 50% above. Figure 1 visualizes the statutory marginal tax rates for wage earners before and after this reform.[5] As discussed in Section 4, we exploit the tax reform for identification purposes.

[5]Note that we abstract from all deductions and tax credits.

2.2 Sick Leaves and the Labor Market

Sick leaves in Austria: Austria has a Bismarckian social security system with universal access to healthcare, pension, disability, and unemployment benefits.[6] Sick leave insurance is designed to compensate workers for earnings losses due to both occupational and nonoccupational disease. Workers are entitled to full wage compensation for 6 to 12 weeks, depending on job tenure, and another 10 to 16 weeks of partial wage compensation. To take sick leave, workers have to submit a medical certificate to the employer. These are typically issued by general practitioners. The sick note itself contains the starting date of the sick leave and its expected duration. The latter is binding only in one way, meaning that the actual absence must not exceed the recommended duration but may fall short of it if the employee decides to return to work earlier.

The Austrian labor market: Strong industrial relations and a centralized bargaining system for wages and working conditions characterize Austria's labor market. Per capita GDP is among the highest worldwide; unemployment is low but has increased steadily in recent years. Female labor market participation has traditionally been low, and almost 50% of females that participate in the labor market work part-time (Statistik Austria, 2020). This share is significantly higher than the OECD average. The labor market is flexible, with relatively weak protection against dismissal and high turnover rates compared to other European countries (Böheim, 2017). The law distinguishes whether labor contracts are terminated unilaterally or in mutual agreement. Unilateral terminations generally do not require a reason to be specified, but a statutory notice period has to be observed.

3 Data

Datasets: One strength of our paper is that we can combine three administrative datasets, which, in combination, allow us to study the effects of income taxation on shirking behavior. First, we use data from the *Austrian Ministry of Finance* (AMF), which contain all payslips for Austrian workers between 1994 and 2012. Because these data contain detailed information

[6] Enrollment into the system is automatic and linked to employment, but the insurance extends to spouses and children, unemployed people, pensioners, and individuals with disabilities. In fact, the health insurance covers 99.9% of the population (Ahammer *et al.*, 2021). Health insurance covers a wide range of services, including visits to outpatient general practitioners (GPs) and specialists, inpatient care, and prescription drugs with no or only minor copayments. Although there is no mandatory gatekeeping system, GPs are traditionally the first point of access to healthcare.

on individual tax payments, they build the core of our analysis.[7] As is typical with administrative tax data, our data do not contain information on the taxpayers' *effective* marginal tax rates. Thus, as there is also no publicly available tax-simulation model for Austria (such as the NBER TAXSIM model for the United States), we have constructed our own tax simulator that accounts for all details of the Austrian tax system between 2001 and 2012.[8]

Second, we have access to employment histories and basic demographics from the *Austrian Social Security Database* (ASSD). The ASSD is a longitudinal matched employer-employee dataset covering the universe of Austrian workers from the 1970s onward (Zweimüller *et al.*, 2009). These data are beneficial for our analyses. For example, they contain information on the taxpayers' contractual work days and allow us to separate blue collar from white collar workers.

Third, our analysis naturally requires data on sick leaves. For workers residing in Upper Austria, one of the nine Austrian federal states, we have medical claims data from the *Upper Austrian Sickness Fund* (USAF) for 1995–2017. These data contain the start and end date of sick leaves, the underlying primary diagnosis, and information on other claims in both the inpatient and outpatient sectors, including drug prescriptions.

Final sample: Based on these data, we construct a panel where each observation comprises information on income, effective marginal tax rates, and sick leaves in a given year. We then restrict our sample to wage earners that did not report any self-employed income or income generated from sources other than regular employment and all public servants and apprentices. Furthermore, we drop all wage earners younger than 18 and older than 64 years of age, the statutory retirement age in Austria. Because our empirical strategy requires all individuals in the sample to have positive income between 2005 and 2011, we effectively restrict our sample to regular blue- and white-collar employees (most short-term contracts do not fulfill this condition). Finally, we limit our analysis to individuals with personal income above EUR 13,000. The sample restrictions leave us with a total of 3.6 million observations. The subset of wage earners in Upper Austria for whom we can match health records totals 505,063 observations, about 45% of all wage earners in Upper Austria.

[7] Specifically, these data contain information on gross earnings, social security contributions, income-related and other deductions, as well as tax credits.

[8] Based on this model and payslip data, we compute the marginal tax rate on a given income component by increasing income by EUR 100 and computing the change by $T = t[z + 100] - t[z]$, where t are the taxes due for income z.

4 Empirical Strategy

In this section, we discuss our empirical approach, which closely follows Gruber and Saez (2002) and Jakobsen and Søgaard (2020).

Intuition: Figure 2 sketches the intuition of our identification strategy. To fix ideas, first, consider an initial period of p years during which the tax schedule remains stable. We call this the pre-reform period. The light-blue line exemplifies the growth rate of actually worked days (i.e., contractual days net of sick leave days) during this period. Importantly, the growth rate should smoothly evolve across the income distribution. Next, suppose a tax reform in period $p+1$ would decrease the marginal tax rate below a certain income threshold k. To enable comparison to the pre-reform period, we define a post-reform period of length p and plot the corresponding growth rate as a function of income. The dark-blue line in Figure 2 sketches this growth rate. We can now illustrate the reform's expected effects: First, because the tax schedule did not change above k, we do not expect to observe significant changes in the growth rate above this threshold. We label the region above k "validation region," as it allows us to test if the growth rates in both periods indeed follow a similar trend. Second, below the threshold, the growth rate of actually worked days in the post-reform period should increase relative to the pre-reform period (see "identification region"). The reason is that individuals' should shirk fewer days under lower taxes, leading to an increase in the growth rate of actually worked days. Now, we can state the idea of our empirical approach: We (a) use the pre-reform period as a counterfactual for the post-reform period and (b) estimate effects by comparing the post-reform trend break at the threshold to the corresponding pre-reform change at k.

Estimation and identifying assumption: More specifically, our estimation strategy proceeds in two steps. Our first step is to apply the estimator of Jakobsen and Søgaard (2020) to our data, which is similar to a standard difference-in-difference (DiD) estimator. However, in our case, the pre-reform period takes the role of the control group in the DiD setting, and the post-reform period serves as the treatment group. Moreover, the income variable replaces the time dimension in the standard DiD setting. Then, the identifying assumption mirrors the one of a standard DiD model: Absent the reform, the growth rates in the post-period and the pre-period should have followed the same parallel trend across the income distribution. Also, similar to the standard DiD model, we can check the plausibility of this assumption. To that end, we can simply examine if the growth rates in both periods evolve in parallel in the validation region. Our second step is relating the difference-in-trends model

to elasticities to the net of tax rate. To that end, we use a standard Gruber and Saez (2002) instrumental variable estimation (IV) approach. Notably, Jakobsen and Søgaard (2020) nicely demonstrate that the identifying assumption of the IV approach corresponds to the parallel trends assumption of our DiD model.

Details of estimation approach: First step: Next, we discuss the details of our empirical strategy, starting with clarifying our differences-in-income-trends approach. This approach compares changes in actually worked days within income bins. To clarify our strategy, we introduce some notation. Let $D^w_{i,t-1}$ denote a vector of initial income bins with size EUR 1,750. Our pre-reform period, which was not affected by the 2009 reform, is $\mathscr{C} = \{2005, 2008\}$ and the post-reform period is $\mathscr{T} = \{2008, 2011\}$.[9] Further, we define $t-1$ as the first year in each period (2005 in $\mathscr{C}$ and 2008 in $\mathscr{T}$) and t as the last year in each period (2008 in $\mathscr{C}$ and 2011 in $\mathscr{T}$).

Using this notation, we start by estimating the following regression for both windows $w = \{\mathscr{C}, \mathscr{T}\}$:

$$\Delta \ln s^w_{i,t} = \beta_0 + \beta_1 D^w_{i,t-1} + \eta^w_{i,t}. \tag{1}$$

The outcome $\Delta \ln s^w_{i,t}$ refers to the logarithm of the change in the actual number of days worked (net of sick days) over contractual work days,

$$\Delta \ln s^w_{i,t} \equiv \ln \frac{\Delta days^w_{\text{contractual}} - \Delta days^w_{\text{sick}}}{\Delta days^w_{\text{contractual}}} \tag{2}$$

where, for example, $\Delta days^w_{\text{contractual}} = days^w_{\text{contractual,t}} - days^w_{\text{contractual,t-1}}$. We also label $\Delta \ln s^w_{i,t}$ the rate of worked days. Furthermore, the parameter β_1 gives differences in shirking trends relative to individuals reporting EUR 29,375 of taxable income at the start of each window, which is the leave-out bin.

Our ultimate goal is to compare trends between the pre-reform and post-reform periods. To that end, we run the following model:

$$\Delta \ln s^w_{i,t} = \delta_0 + \delta_1 D^{\mathscr{C}}_{i,t-1} + \delta_2 D^{\mathscr{T}}_{i,t-1} + \delta_3 (D^{\mathscr{C}}_{i,t-1} \times D^{\mathscr{T}}_{i,t-1}) + \kappa^w_{i,t}, \tag{3}$$

where $D^{\mathscr{C}}_{i,t-1}$ and $D^{\mathscr{T}}_{i,t-1}$ are dummies indicating income bins in the pre-reform and post-reform period, respectively, and δ^t_3 captures the changes in outcome trend differentials across the income distribution between both windows.

[9] As already shown by Kleven and Schultz (2014), three-year intervals are just enough to account for sluggishness in behavioral adjustments and long enough to capture long-term effects, while avoiding losing variation and power.

Details of estimation approach: Second step: In a second step, we estimate the elasticity of the rate of worked days $\Delta \ln s^w_{i,t}$ to the net of tax rate. An apparent complication of this exercise is that the effective marginal tax rate is a deterministic function of taxable income and, thus, contractual days worked. Thus, observed changes in the effective net of tax rates are likely endogenous. To break this endogeneity problem, we follow the standard approach of Auten and Carroll (1999) and Gruber and Saez (2002) and use predicted changes in the effective marginal net of tax rates τ^p_{it} as an instrument for the actual changes in the marginal net of tax rate τ_{it}. Specifically, we exploit our tax simulator to calculate these predictions under the assumption that the taxpayers' had the same taxable income as in the initial period $t-1$. Our identifying variation then solely stems from changes in the statutory marginal tax rates.

More formally, we run a two-stage-least-squares (2SLS) specification for each point $h \in [17125, 24125]$ of the initial income distribution in the identification region. The second stage regressions of these 2SLS models read:

$$\Delta \ln s_{i,t} = \gamma_0 + \gamma_1 D_{i,t-1} + \gamma_2 D^{\mathcal{T}}_{i,t-1} + \gamma_3 \Delta \ln \tau_{i,t} + \gamma_4 \Delta \ln \tau_{i,t} \times [z_{i,t-1} - h] + \varepsilon_{i,t}, \qquad (4)$$

where we include the marginal net of tax rate both by itself and interacted linearly with initial income $z_{i,t-1}$. Hereby, we capture both the level and slope of the income elasticity centered on h. In the first stages, we instrument $\Delta \ln \tau_{i,t}$ and $\Delta \ln \tau_{i,t} \times [z_{i,t-1} - h]$ by their respective predicted values.[10]

5 Results

Effects on sick-leave taking: In Figure 3, we report our main results for the effects of the 2009 tax reform on changes in actually worked days. Panel A shows how the effective marginal tax rates change in the pre-reform and post-reform periods. In the pre-reform period, ranging from 2005 to 2008, we see close to no changes in the effective marginal net of tax rates across the income distribution and, as indicated by the P1-P99 range, within a given income level. Second, the 2009 reform increased the marginal net of tax rate by about 1.5 log points for the lower part of the income distribution, while the average change for wage earners with taxable incomes above EUR 25,000 is less than 0.4 log points.

[10] Following Jakobsen and Søgaard (2020), we also assign weights for observations in the identification and validation regions to estimate the implied elasticity for each income group h separately. To do so, we first assign a weight of 1 to all the observations within the validation region. Second, for each point h of initial income in the identification region, we use triangular weights computed as: $w = \frac{\max[1{,}750 - |z-h|]}{1{,}750}$. By running the 2SLS regression for each point h in the identification region separately, we effectively move the treatment group from right to left in our identification region while keeping the control group constant.

Panel B provides first graphical evidence that taxes affect sick leaves. To that end, it separately considers the pre-reform and post-reform period and shows how the rate of worked days trends across the income distribution. Three observations stand out. First, we note that the rate of worked days evolves close to parallel in the validation region. This observation is reassuring, as it suggests that there are no systematic differences in sick-leave-taking behavior where the tax reform has no bite. Second, in the identification region, workers tend to have lower increases in the rate of worked days compared to baseline-income workers. Third, in line with an effect on sick leaves, we indeed observe a marked difference between the pre- and post-reform periods in the identification region. For workers affected by the reform (the dark blue line), we notice a higher growth rate in the rate of worked days compared to workers in the pre-reform period.

Panel C isolates the corresponding effects of income taxes on the rate of worked days by estimating model (3). Again, we note that the rate of worked days increased for workers affected by the tax cut. By contrast, the rate of worked days in the validation region closely resembles that of individuals in the pre-reform period. Regarding effect sizes, on average, we find that a two percentage point increase in the effective marginal net of tax rate is associated with a 0.34% increase in the rate of worked days.

Panel D applies our IV strategy to transform the results into elasticities of the rate of worked days to the net of tax rate. The elasticities range from 0.04 to 0.09. On average, an increase in the net of tax rate by 1% led to an increase of 0.071% in the rate of worked days. Given that the average number of sick leave days in 2005 was about ten days, a worker with a full-time contract would have reduced her total number of days on sick leave by about 2.2. This corresponds to a reduction of 22%, which is equivalent to a 0.88% increase in days actually worked.

Effects on income: To put the estimated elasticities of the rate of worked days into context, we repeat the analysis described above for changes in taxable income as the outcome variable.[11] Similar to our analysis of sick-leave taking, Panel B shows significantly larger growth rates of the taxable income for individuals in the identification region that were affected by the tax cut compared to those in the pre-reform period. Moreover, Panel C provides causal and non-parametric estimates of the taxable income responses to the 2009 tax reform. Translating those non-parametric estimates into taxable income elasticities, we estimate elasticities from about 1 for individuals at the lower end of the income distribution

[11] Panel B of Figure 4 shows downward sloping curves for both the pre- and post-reform periods, indicating mean reversion to be a dominant feature of the underlying income process.

to close to 0 for individuals close to the third tax bracket.[12] These numbers imply that our previously estimated elasticities of the rate of worked days are about 10% of our estimate of the *ETI*.

Effects on shirking behavior: The last step of our analysis is examining if our results are indeed driven by shirking behavior. We present several pieces of evidence in line with this notion. First, we study the effects on drug expenses and inpatient days. Panels A and B in Figure 5 show the corresponding estimates. Both types of outcomes remain unaffected due to the reform, which suggests that changes in the workers' health status do not explain the effects on sick leaves. Second, we follow Pichler and Ziebarth (2015) and identify certain diagnoses that are particularly easy to fake because their consequences are not immediately salient. These include acute upper respiratory infections (ICD-10 category J06), infectious intestinal disease (A0), unspecified back pain (M5), migraine (G43), headache (R51), and other headaches syndromes (G44). Similarly, we identify sickness diagnoses associated with salient and hard-to-fake symptoms, such as fractures. This category comprises fractures (ICD-10 groups S40–S73) and diseases of the digestive system (K). When we compare effects for sick leaves due to easy-to-fake and non-fakeable diseases, we clearly see that our results are driven by the former, with a clean zero effect on sick leaves due to non-fakeable diseases.[13] We conclude that our results reflect shirking behavior.

6 Conclusion

This paper studies if income taxes affect individuals' short-run labor supply through shirking behavior. To that end, we exploited a 2009 reform in the Austrian tax schedule that reduced the marginal tax rates in the middle of the income distribution. Based on linked register data, we find that a 1.8 percentage point decrease in the marginal tax rate reduces sick days by 22%, which amounts to roughly 10% of the taxable income elasticity. In line with shirking, these effects are driven by easy-to-fake diagnoses. In sharp contrast, the reform does not impact overall healthcare expenditures. Our findings have important implications for firms allocating labor resources and designing tax reforms.

[12] In our context, the decreasing estimate of the *ETI* is not surprising, as individuals at the upper part of the identification region are constrained by the upper bound of the middle tax bracket at EUR 25,000.(Kleven, 2016)

[13] The next version of this paper will present additional tests. For example, we will study if the effects on sick leaves are larger during periods of good weather, around bridge days, or on Mondays and Fridays.

References

AHAMMER, A., WIESINGER, R. and ZOCHER, K. (2021). The Austrian Healthcare System: Changes and Challenges. In B. H. Baltagi and F. Moscone (eds.), *The Sustainability of Health Care Systems in Europe*, *Contributions to Economic Analysis*, vol. 295, Emerald Publishing Limited, pp. 153–166.

ALSTADSÆTER, A., JOHANNESEN, N., HERRY, S. L. G. and ZUCMAN, G. (2022). Tax evasion and tax avoidance. *Journal of Public Economics*, **206**, 104587.

—, — and ZUCMAN, G. (2019). Tax evasion and inequality. *American Economic Review*, **109** (6), 2073–2103.

AUTEN, G. and CARROLL, R. (1999). The effect of income tax on household income. *The Review of*.

BÖHEIM, R. (2017). The labor market in Austria, 2000–2016. *IZA World of Labor*.

CHETTY, R., GUREN, A., MANOLI, D. and WEBER, A. (2011). Are micro and macro labor supply elasticities consistent? A review of evidence on the intensive and extensive margins. *American Economic Review*, **101** (3), 471–75.

—, —, — and — (2013). Does indivisible labor explain the difference between micro and macro elasticities? A meta-analysis of extensive margin elasticities. *NBER Working Papers 16729*, pp. 1–56.

DWENGER, N., KLEVEN, H., RASUL, I. and RINCKE, J. (2016). Extrinsic and intrinsic motivations for tax compliance: Evidence from a field experiment in Germany. *American Economic Journal: Economic Policy*, **8** (3), 203–32.

GRUBER, J. and SAEZ, E. (2002). The elasticity of taxable income: evidence and implications. *Journal of Public Economics*, **84** (1), 1–32.

JAKOBSEN, K. M. and SØGAARD, J. E. (2020). Identifying behavioral responses to tax reforms: New insights and a new approach. *CESifo Working Paper No. 8686*, (8686).

KLEVEN, H. J. (2016). Bunching. *Annual Review of Economics*, **8**, 435–464.

—, KNUDSEN, M. B., KREINER, C. T., PEDERSEN, S. and SAEZ, E. (2011). Unwilling or unable to cheat? Evidence from a tax audit experiment in Denmark. *Econometrica*, **79** (3), 651–692.

— and SCHULTZ, E. A. (2014). Estimating taxable income responses using danish tax reforms. *American Economic Journal: Economic Policy*, **6** (4), 271–301.

KOPCZUK, W. and SLEMROD, J. (2003). Dying to save taxes: Evidence from estate-tax returns on the death elasticity. *Review of Economics and Statistics*, **85** (2), 256–265.

LEONI, T. (2020). Fehlzeitenreport 2020. *Österreichisches Institut für Wirtschaftsforschung*.

NEISSER, C. (2021). The elasticity of taxable income: A meta-regression analysis. *The Economic Journal*, **131** (640), 3365–3391.

PICHLER, S. and ZIEBARTH, N. R. (2015). The pros and cons of sick pay schemes: A method to test for contagious presenteeism and shirking behavior. *Available at SSRN 2568046*.

POMERANZ, D. (2015). No taxation without information: Deterrence and self-enforcement in the value added tax. *American Economic Review*, **105** (8), 2539–69.

RIEDEL, N. (2018). Quantifying international tax avoidance: A review of the academic literature. *Review of Economics*, **69** (2), 169–181.

SAEZ, E., SLEMROD, J. and GIERTZ, S. H. (2012). The elasticity of taxable income with respect to marginal tax rates: A critical review. *Journal of Economic Literature*, **50** (1), 3–50.

SCHRATZENSTALLER, M. *et al.* (2009). The tax reform 2009-10. *Austrian Economic Quarterly*, **14** (4), 217–232.

SHAPIRO, C. and STIGLITZ, J. E. (1984). Equilibrium unemployment as a worker discipline device. *The American Economic Review*, **74** (3), 433–444.

SLEMROD, J. (2007). Cheating ourselves: The economics of tax evasion. *Journal of Economic Perspectives*, **21** (1), 25–48.

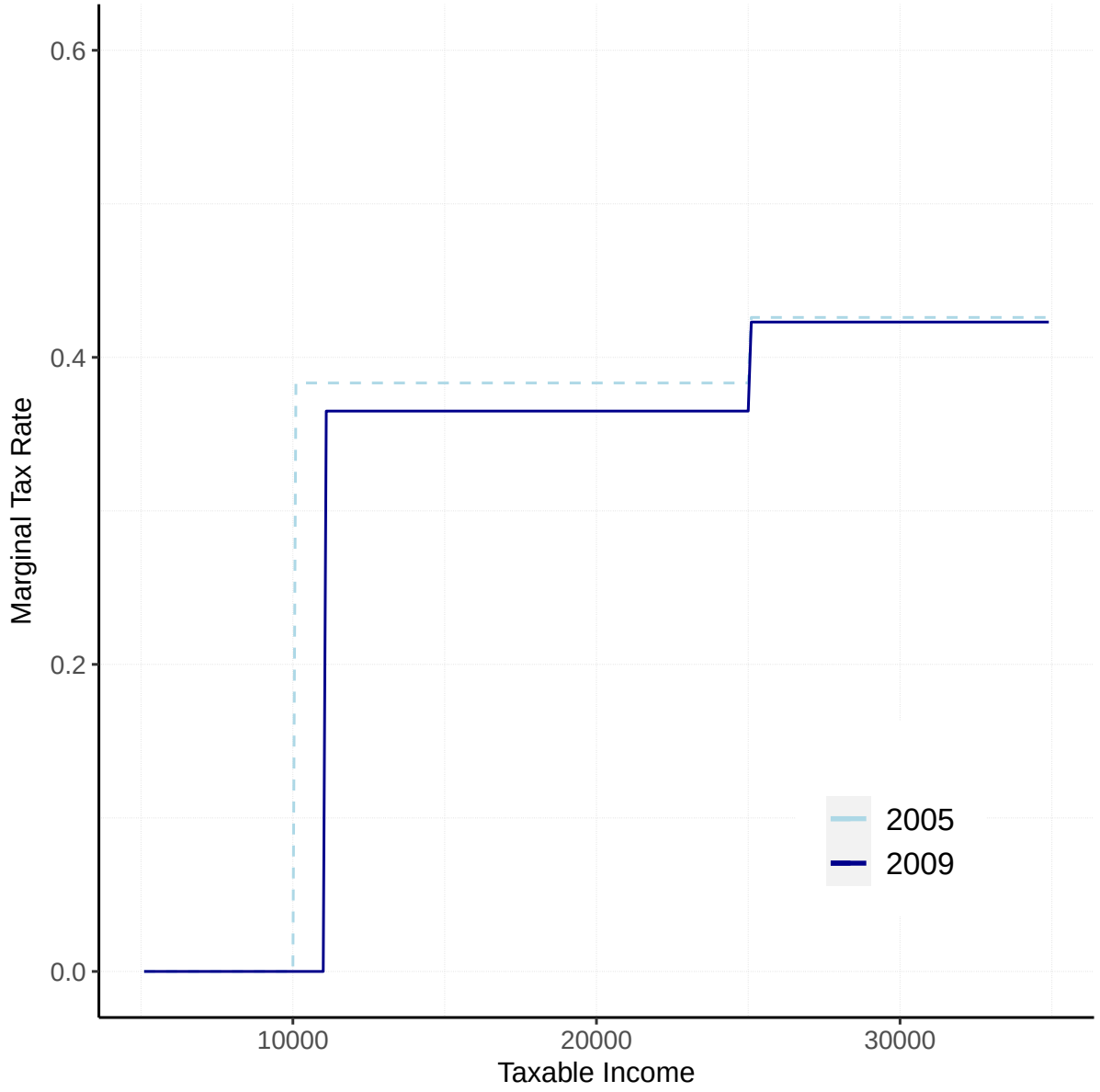
— (2019). Tax compliance and enforcement. *Journal of Economic Literature*, **57** (4), 904–54.

STATISTIK AUSTRIA (2020). *Persons in Employment and Employees by Full-Time/Part-Time and Sex since 1994*. Statistical Fact Sheet, Statistik Austria.

ZWEIMÜLLER, J., WINTER-EBMER, R., LALIVE, R., KUHN, A., WUELLRICH, J.-P., RUF, O. and BÜCHI, S. (2009). Austrian social security database. *Available at SSRN 1399350*.

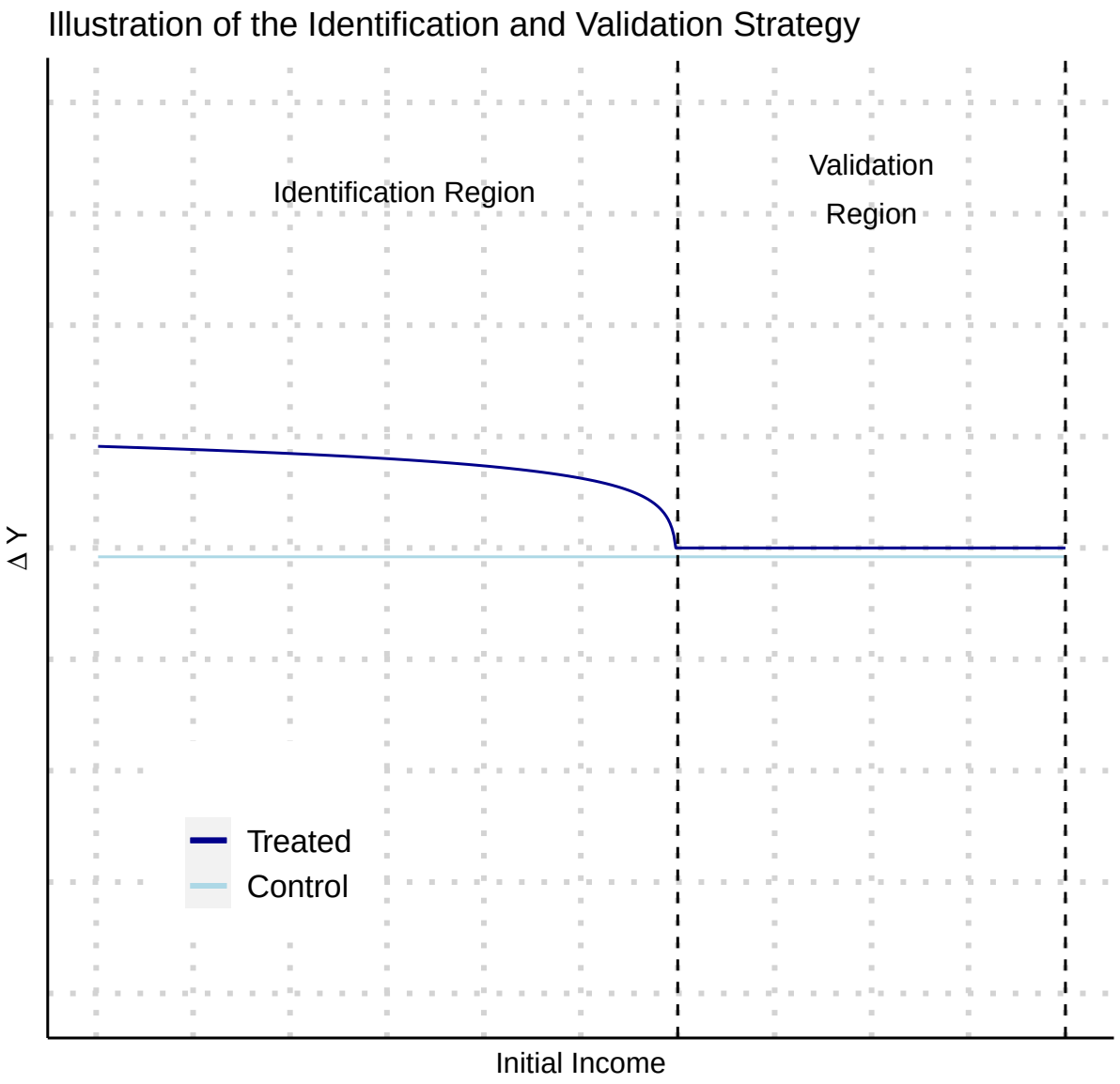
A Figures

FIGURE 1 — The 2009 income tax reform



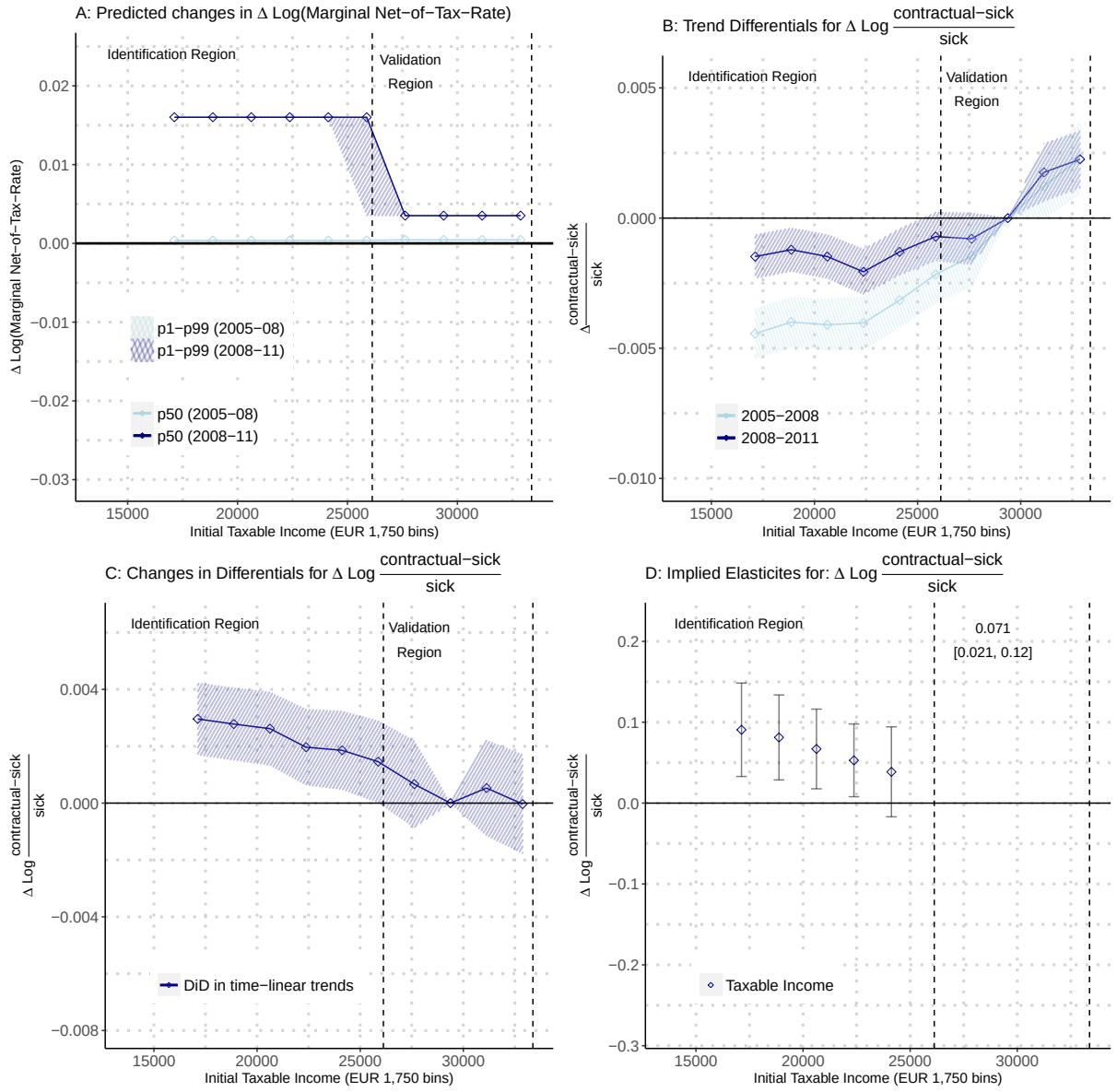
Notes: Statutory Marginal Tax Rates in 2008 and 2009, respecitively. Calculated for employees without employee and commuter tax credit and any other deductions.

FIGURE 2 — Illustration of the identification strategy



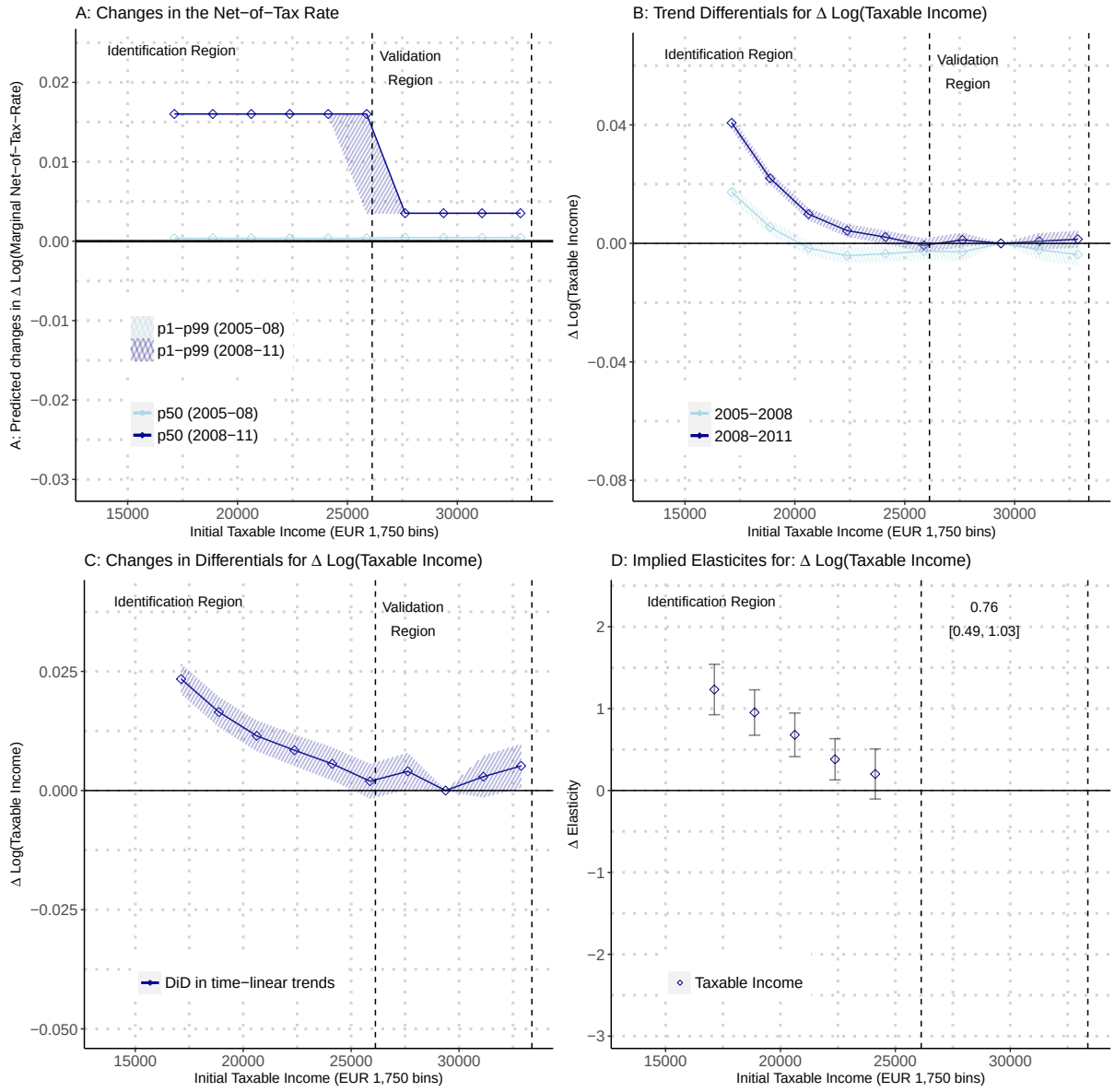
Notes: The figure shows the statutory changes in log worked days across the income distribution for two time periods: a pre-reform period, where the tax system remains stable and a reform period, where the top tax is reduced. Under the assumption that this pattern would have remained constant (relative to the overall growth in the economy) in absence of the reform, we can identify the reform effect from the differences between the reform and pre-reform periods for the population with initial income below the EUR 25,000 tax threshold (the identification region). In contrast, we should observe no differences for the part of the population with initial income above the EUR 25,000 tax threshold (the validation region). Thus, comparing the reform and pre-reform periods in this part of the income distribution acts as a placebo test for the validity of the identifying assumption.

FIGURE 3 — Effects on sick-leave taking



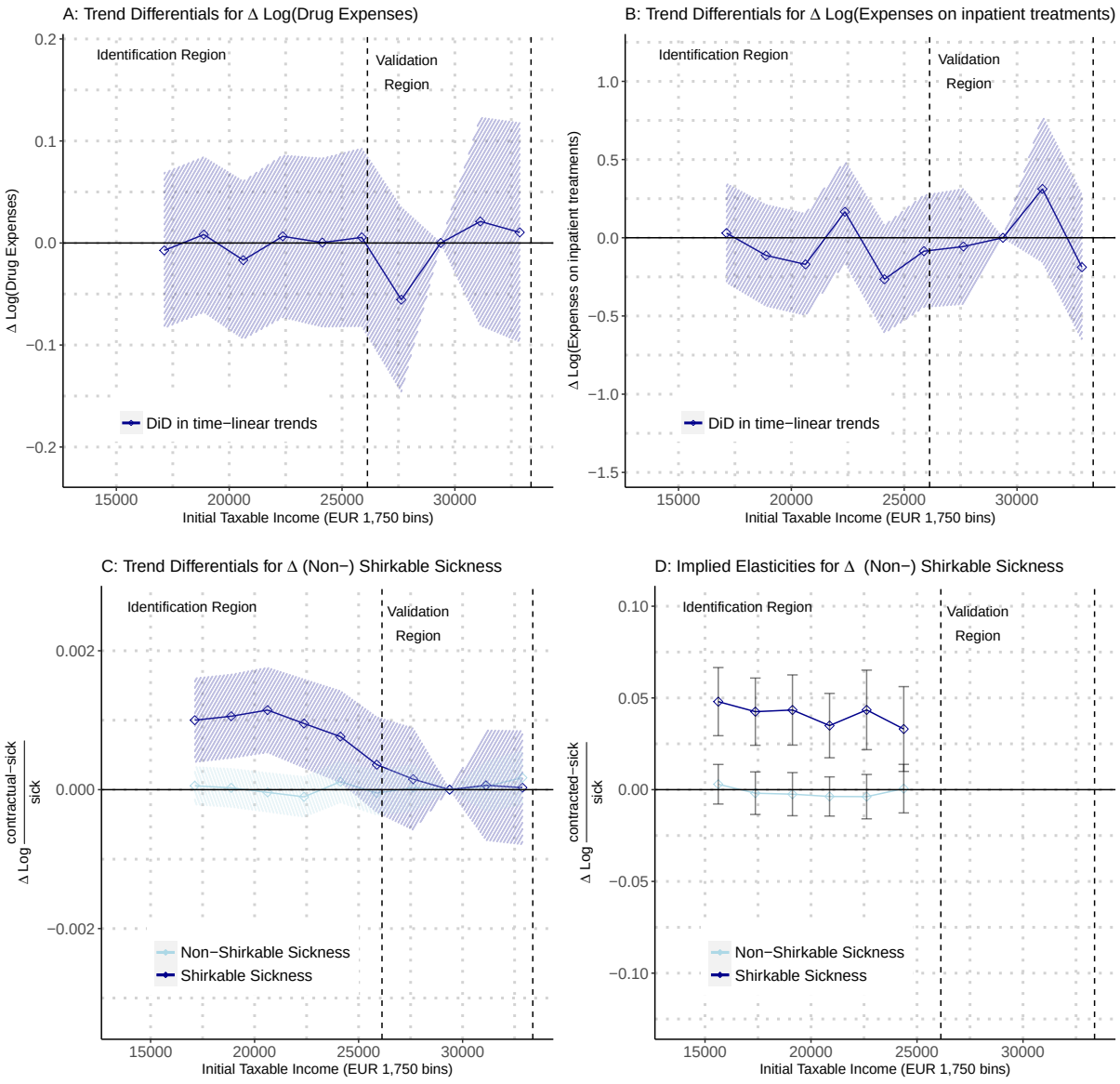
Notes: Panel A shows the predicted changes in the log net-of-tax rate from 2005 to 2008 (the pre-reform period) and 2008 to 2012 (the reform period). The curves show the median changes within each income bin and the shaded areas show the 1th and 99th percentile ranges. Panel B separately depicts the pre-reform and post-reform period and shows how the rate of worked days trends evolved across the income distribution. Panel C shows the estimated changes in trend differentials based on equation (3). Panel D shows the implied elasticities over in the identification region using the 2SLS local linear estimation described in section 4. Initial income always refers to taxable income measured in 2005 and 2008. Confidence bounds are based on robust standard errors.

FIGURE 4 — Effects on income



Notes: Panel A shows the predicted changes in the log net-of-tax rate from 2005 to 2008 (the pre-reform period) and 2008 to 2012 (the reform period). The curves show the median changes within each income bin and the shaded areas show the 1th and 99th percentile ranges. Panel B separately depicts the pre-reform and post-reform period and shows how the taxable income trends evolved across the income distribution. Panel C shows the estimated changes in trend differentials based on equation (3). Panel D shows the implied elasticities over in the identification region using the 2SLS local linear estimation described in section 4. Initial income always refers to taxable income measured in 2005 and 2008. Confidence bounds are based on robust standard errors.

FIGURE 5 — Effects on shirking behavior



Notes: Using equation (3), panel A shows the estimated changes in trend differentials for log transformed doctor expenses. Panel B shows the estimated changes in trend differentials for log transformed inpatient care expenses. Panel C shows the estimated changes in trend differentials based on equation (3) for different sick leave diagoneses. The coefficient estimates in lightblue refer to changes in the rate of worked days using only sick leaves that are associated with salient and hard-to-fake symptoms, such as fractures. Coefficient estimates presented in darkblue refer to to changes in the rate of worked days when fokussing on sick leaves that are prone to shirking. Panel D shows the implied elasticities over in the identification region using the 2SLS local linear estimation described in section 4. Initial income always refers to taxable income measured in 2005 and 2008. Confidence bounds are based on robust standard errors.