The Gender Gap in Tax Evasion

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Abstract

Differences in the labour market outcomes of men and women have been studied extensively, alongside a behavioural literature describing differences in social and economic preferences between men and women. I address a novel question which touches both of these literatures - are there gender differences in tax evasion? Using administrative tax records, I leverage a reform in the construction sector in Romania which altered the optimal income under-reporting strategy, to identify the extent to which men and women in the sector evade tax. Despite the third-party tax reporting system, I find evidence of income under-reporting in the sector and significant differences between men and women's behaviour. Investigating the mechanisms suggests that this is not being driven by gender differences in bargaining power or occupational segregation within the sector, but by segregation in the kinds of firms that men and women work for.

1 Introduction

Gender differences in labour market outcomes, such as participation and wages, have received large amounts of attention, as well as the structural and behavioural factors contributing to the gender gaps. One potential difference in labour market behaviour, which has so far been unexplored, is the gender gap in tax evasion. Leveraging a tax reform in Romania, I find evidence that a significant amount of tax evasion is taking place, and that men appear to have a higher propensity to tax evade than women.

My setting is Romania, a country which is formal enough that the majority of workers and firms are registered with the tax authorities, for which there are strong incentives as a number of benefits such as health insurance, social insurance and pensions are linked to employment. However, it is commonly believed that a substantial amount of tax evasion takes place in a joint employee-employer collusion. This is often called 'grey work' and involves the employer reporting to the authorities that the salary of the employee is the minimum wage, while the remainder of the actual wage is paid cash-in-hand, and thus no income tax or other social contributions are paid on this amount. Using administrative employee-employer tax records, I leverage a reform in Romania which eliminated income tax and reduced the level of other social contributions for those in the construction sector, so long as the employee reports a salary above a given threshold, which is substantially higher (by almost 50%) than the minimum wage. These tax breaks mean that the tax minimising salary to report to the authorities is no longer the minimum wage, but rather this cutoff threshold.

I first show that following the introduction of the policy, workers in Romania's construction sector were almost 30 percentage points less likely to report a salary at exactly the minimum wage, from a pre-reform baseline of 34 percent. Workers in this sector were also approximately 30 percentage points more likely to report their salary as being exactly at the cutoff for the tax and social contributions relief, which is the new tax minimising level of income to report. Workers who were reporting a salary at exactly the minimum wage pre-reform were much more likely to jump to reporting the new, 50% higher, tax minimising salary, despite it being a larger income jump than for other employees earning above the minimum wage and thus nearer to the threshold. As would be expected when income under-reporting requires joint employee-employer collusion, employees are less likely to change their income reporting behaviour in larger firms, and in the very largest firms the effects of the policy on income reporting behaviour are almost zero.

There are a number of reasons why men and women may have different propensities to evade tax. A large literature has shown that there are gender differences in risk aversion (Borghans, Heckman, Golsteyn, & Meijers, 2009), lying aversion (Abeler, Nosenzo, & Raymond, 2019; Childs, 2012; Dreber & Johannesson, 2008), as well as social preferences and competitiveness (Backus, Cubel, Guid, Sánchez-Pagés, & López Mañas, 2023; Cro-

son & Gneezy, 2009; Fehr, Naef, & Schmidt, 2006; Niederle, 2017; Niederle & Vesterlund, 2007). Additionally, Roussille (2021) highlights the role of the gender 'ask-gap' on a job matching platform and Li and Zafar (2023) shows there is also a gender ask-gap for college regrades. Exley and Kessler (2022) shows that there is a, related, gender gap in willingness to self-promote. This may be particularly relevant in the Romanian setting because income reporting is done by the employer and tax evasion requires joint collusion with the firm, and this might require the employee to initiate the collusion. There may be gendered differences in collaboration between employee and employer[1], differentially affecting men and women's opportunity to evade tax. Biasi and Sarsons (2022) shows that when there is flexibility to bargain over wages, women lose out in pay compared to men. In the case where employees and employers jointly collude (or negotiate) over tax evasion, beliefs about others' willingness to engage in tax evasion can influence own willingness to engage. Given its sensitive nature, negotiations over a collusion to evade taxes may be particularly susceptible to gendered differences. Exley, Hauser, Moore, and Pezzuto (2022) shows that *beliefs* about gender differences in social preferences are large while Bursztyn, González, and Yanagizawa-Drott (2020) demonstrates that beliefs about gendered social norms may be incorrect. A lack of transparency (Baker, Halberstam, Kroft, Mas, & Messacar, 2023) that tax evasion can be jointly agreed, or negotiated, may also contribute to a gender gap in tax evasion.

My data comprise of the entire matched employee-employer administrate tax records of Romanian firms and workers. The setting and data are particularly compelling to study tax evasion. It is widely believed[2] that most tax evasion is at the intensive margin, where employees (and employers) are registered formally with the tax authority, but significantly under-report their true income to minimise the tax burden. So-called 'gray work', where they jointly report earning exactly the minimum wage, while the remainder of the true salary is paid cash in hand by the employer is said to be 'as difficult to stop as it is widespread' by one Romanian news outlet[3]. While I cannot observe tax evasion in the black market, I am able to use the tax reform to identify income under-reporting in the formal labour market using the tax records. Bearing in mind that individuals self-select into the formal labour market, the men and women in my sample are likely to be relatively more comparable than men and women in the labour market as a whole, including the black market. My estimates

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[1]Dreber and Johannesson (2008) showed that there were gendered differences in economics research collaborations, contributing to a gender output gap and Cullen and Perez-Truglia (2023) shows that social interactions at work contribute to a gender promotion gap. Beaman, Keleher, and Magruder (2018) shows that women may also be disadvantaged in employee referrals.

[2]Discussed, for example in this Romanian newspaper article https://www.bursa.ro/impactul-optimizarii-fiscale-a-muncii-in-romania-intre-legalitate-si-ilegalitate-21096646?fbclid=IwAR14gxCzEQpROHHcHWqd-9GCyyctYwu4V1TMi-zbHm6spQO2ktFt7g_tldM and this one https://www.europafm.ro/romania-in-direct-psd-si-pnl-maresc-si-salariul-minim-de-ce-o-treime-din-angajati-castiga-doar-salariul-minim-video/?fbclid=IwAR2dTjUZ7fq4KVJMCVb45vYy0P6u81-_c9LwobTKmzyD8BSRX3gKeeGsrho

[3]https://www.avocatnet.ro/articol_19270/Munca-la-gri-intre-evaziune-fiscala-si-avantajele-unor-taxe-mai-mici.html?fbclid=IwAR0ceBd1NTLp99ENYjPXUrs1bMsDOIyMsFAXF54Z6W61KNji_qREXPycFe8

of tax evasion and the gender gap in tax evasion may in fact be under-estimates.

To address the potential role of gender differences in bargaining between employee and employer I run my difference-in-difference specifications on one employee firms (solo self-employment in one-man and one-woman bands), since these workers have full autonomy to decide if they would like to evade tax. For further robustness I also look at industries with highly competitive labour markets, where employees should have strong bargaining power in their relationship with employers, and thus greater autonomy over the decision on under-reporting income.

Gender differences in tax evasion may, instead of being due to preferences, be due to differences in ability to avoid tax - such as segregation in the kinds of work men and women do. While challenging to completely rule out, since my data does not directly contain information on the occupation of employees within firms, I provide evidence that this is not driving the gender gap in tax evasion in Romania's construction sector. To do this I firstly note that manual work in a construction site will exhibit much more seasonality in hours worked than work in an office, due to seasonal weather conditions. I thus use within-individual variance in hours worked to infer whether a worker does manual work in a construction site or work based in an office. Equipped with inferred (and imperfect) information on occupation, I show that within manual classified workers and within office-based workers the gender gap in tax evasion remains. Next, I look individually at a sector code which is very gender-neutral within construction (in terms of the female share of employment) and is also a sector which is based 'in-office' rather than on a building/construction site, meaning it is more formal and there is less scope for gender segregation in work to affect the ability to under-report income - a significant gender gap in tax evasion remains.

The country of Romania provides a compelling setting to study the question of gender differences in tax evasion. In Romania, raw and adjusted wage gaps are remarkably small relative to comparable countries (the raw wage gap is the second lowest in the EU[4]), but the gap in participation[5] is also relatively small by international standards, at 4 percentage points.[6] Romania's relative exceptionalism in gender equality makes it an ideal setting to study differences in preferences for tax evasion, since this mitigates, relative to seemingly comparable countries, concerns that it is due to gender segregation in access or ability to avoid tax. Current attitudes to gender equality are thought to have been shaped by decades of explicit policies of gender equality during the communist regime (Andrén & Andrén, 2015; Vanc & White, 2011).

I contribute to the literature on the measurement, causes, and consequences of gender

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[4]https://commission.europa.eu/strategy-and-policy/policies/justice-and-fundamental-rights/gender-equality/equal-pay/gender-pay-gap-situation-eu_en

[5]Olivetti and Petrongolo (2008) shows that selection into employment is a large contributor to the negative cross-country correlation between wage and employment gaps.

[6]In 2018 and 2019, there were 4,260,890 female employees in the labour force and 4,631,312 male employees.

wage gaps. Blau and Kahn (2017) provides a comprehensive overview of trends in the gender wage gap and Ngai and Petrongolo (2017) deliver an explanation for the narrowing of wage gaps over time - the rise of the service sector. The remaining causes of gaps, such as the structure of jobs and rewards to certain types of working (Adams-Prassl, Hara, Milland, & Callison-Burch, 2023; Goldin, 2014; Petrongolo & Ronchi, 2020) and the effects of parenthood (Cortés & Pan, 2023; Kleven, Landais, & Søgaard, 2019) are emphasised as priorities for progress. I build on this work by showing that progress towards gender equality may be understated if men are more likely to under-report their incomes to tax authorities. There is also a large body of work studying tax avoidance and evasion (Allingham & Sandmo, 1972; Kleven, Knudsen, Kreiner, Pedersen, & Saez, 2011; Pissarides & Weber, 1989; Saez, 2010) and its distributional consequences (Benedek & Lelkes, 2011). Third-party reporting systems (where salaries are reported to the authorities by the employer, rather than the employee) are often considered to be a strong mechanism to induce truth-telling[7]. I add to the body of evidence in the tax literature that employer reporting is not a silver bullet to tax evasion and that joint collusion between employee and employer can be sustained (Bergolo & Cruces, 2014; Bjørneby, Alstadsæter, & Telle, 2021; Kumler, Verhoogen, & Frías, 2020). The policy implications of gender differences in tax-evasion thus extend beyond the effects on gender inequality and to the tax enforcement tactics used by the relevant authorities. Additionally, I contribute to the behavioural literature on gender differences in lying, and to the best of my knowledge am the first to use observational rather than experimental data.

2   Institutional Setting, Data and Identification

2.1   Tax Evasion in Romania

Tax evasion in Romania is thought to be a pervasive issue. Anecdotally, institutions are strong enough that the majority of firms and employees must be formally registered with the tax authorities and report salaries, along with the corresponding tax payments. Operating formally as a firm and an employee also provides the benefits of eligibility for certain forms of government support, such as maternity/paternity benefits, unemployment insurance and pension benefits.

The anecdotal evidence is that tax evasion in Romania is often a 'gray' form of evasion, where the employee is formally registered with the tax authority, but falsely reports earning exactly the minimum wage, while the remainder of the true salary is paid cash in hand. One Romanian newspaper bringing this phenomenon to light has asked "Why do one third of Romanian employees earn only the minimum wage? Is it tax evasion or the power of

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[7]Kleven, Kreiner, and Saez (2016) describes third-party reporting as the reason modern tax enforcement is successful.

the economy?"[8] In the construction sector, notorious for tax evasion, this figure was 50% before the tax reform. Qualitative work (Vâlsan, Druică, & Ianole-Călin, 2020) has shown that public attitudes towards tax evasion are only mildly intolerant of it.

If the minimum wage was indeed binding, then large increases to the minimum wage would be expected to have, at least some, dis-employment effects. Between 2013 and 2023, however, Romania's minimum wage has increased from 750 RON to 3000 RON - an enormous four-fold increase over a decade. Despite large increases to the minimum wage occurring steadily over the past decade, Romania has not suffered from dis-employment effects or from inflationary effects (Heemskerk, Voinea, & Cojocaru, 2018; Pantea, 2020). This is entirely consistent with minimum wages being non-binding, with the true wage for many employees being above the minimum wage and paid under the table. Increases to the minimum wage thus have little effect true wages, but decrease the extent of income under-reporting and tax evasion.

2.2 The Tax System and Policy Reform

The tax and social contributions system in Romania is based on three main components. Firstly, a 10% flat rate of health insurance contribution, secondly a 25% flat rate social insurance contribution and finally a flat 10% income tax on the remaining salary after health and social insurance contributions are paid. This means that for a given reported gross salary, the total tax and social contributions paid will be 41.5% of the reported salary, while the employee will take home 58.5%.

In January 2019, the construction sector, and some manufacturing, became exempt from income taxation so long as employees reported gross income at or above a threshold of 3000 Romanian Lei (RON), while no changes in taxation were announced for other sectors. The NACE sector codes related to manufacturing are 'close to' construction, such as the manufacturing of construction inputs like bricks and concrete, rather than sectors such as the manufacturing of apparel, which is likely to be more formal and more gender neutral. The minimum wage in 2019 was 2080 RON, increasing from 1900 RON in 2018. This policy was unannounced and came into force as a 'Government Emergency Ordinance' at the end of December 2018.

In addition to exempting the employee from personal income tax, the policy also exempted employees from paying the usual health insurance contribution of 10%. Social insurance contributions are usually taxed at a rate of 25% of the income, but the policy reduced this figure to 21.25% for those in the construction sector. The total taxes and social contributions for construction workers reporting a salary of at least 3000 RON would

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[8]https://www.europafm.ro/romania-in-direct-psd-si-pnl-maresc-si-salariul
-minim-de-ce-o-treime-din-angajati-castiga-doar-salariul-minim-video/?fbclid=
IwAR2dTjUZ7fq4KVJMCVb45vYy0P6u81-_c9LwobTKmzyD8BSRX3gKeeGsrho

thus be 21.25%, and the employee would take home 78.75% of their reported income. The schedule of net to gross pay is presented in Figure 1.
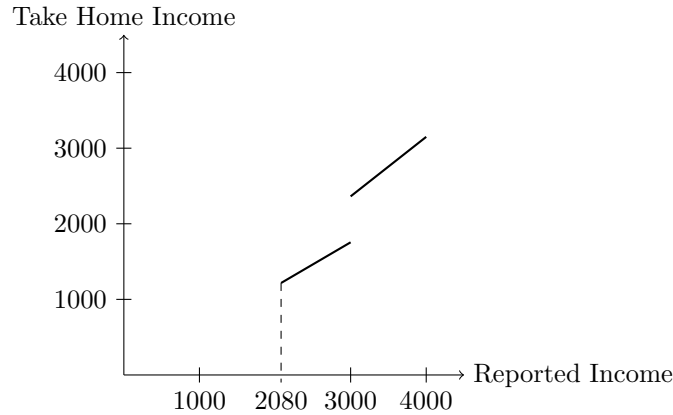
Take Home Income

Figure 1: Take Home Pay vs Reported Gross Salary

The reason for the policy reform was to promote the construction sector in Romania. As a relatively poorer EU country, construction workers have strong incentives to work in richer countries in Western Europe. Even after the reform which made Romania relatively more attractive, there are more Romanians working in construction outside of Romania than inside of Romania[9]. Around the time of the reform, the Romanian government had ambitions for large infrastructure projects but a shortage of workers due to the construction workers going abroad for higher salaries[10]. Thus, the policy was intended to make work in Romania's construction sector relatively more attractive compared with the outside options. A full list of the treated NACE codes is in Appendix B, along with the female share of employment in each of the NACE sector codes and the share of the total construction employment that the code makes up.

The policy changes the tax minimising gross reported wage from the minimum wage to 3000 RON in the treated sector. The total tax and other contributions at 3000 RON would be 637.5 RON, while it would be higher, 863 RON, if reporting the minimum wage of 2080 RON. A graphic presenting the total tax and contributions paid as a function of reported income in the post-reform construction sector is presented in Appendix A.

Identification in this setting thus consists of comparing the construction sector to the remainder of the private sector, pre and post-reform. Individuals in the construction sector moving from a reported gross salary of the minimum wage, onto a reported gross salary of 3000 RON, are interpreted as being tax evading employees. In Section 3 I provide evidence

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[9]According to the following Romanian news website warning that in the absence of the policy, more tax evasion would occur https://www.romania-insider.com/construction-companies-warning-fiscal-allowances-2023

[10]https://www.romania-insider.com/romania-construction-workers

that this change in behaviour is indeed capturing individuals changing their optimal tax evasion strategy in response to the policy reform, rather than genuine behavioural responses.

2.3 Data

I use administrative tax records provided by the Romanian Ministry of Public Finance. The matched employee-employer data are monthly and cover 2018 through 2020. I use the data up to and including January of 2020. In the February of 2020 an issue of missing data prevents me from extending the length of the panel. For my analysis, I create a balanced panel, keeping only individuals whom are active in the labour market throughout the whole period and do not move between the construction and manufacturing sector and the rest of the private sector labour market.[11]

Income reporting in Romania is done by the firm[12] (otherwise known as 'third party reporting'), which is what I observe in the data. Because the data are tax records, demographic variables are limited, but crucially include gender. The number of dependents is also observed. Otherwise, for each individual I observe monthly income, monthly hours of actual work, contracted hours of work, the worker's county (*judet* in Romanian) and locality (*localitate* in Romanian), and the firm that the individual works for. At the firm level, industry NACE codes are provided, which are used to identify whether firms have been treated by the policy. In Table 1 I present descriptive statistics of the full sample by gender and construction vs non-construction sectors. Women make up only 14% of the construction sector, in spite of having a much more equal share of overall labour force participation, and may thus be differentially selected in the sector compared to men.

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[11]I address individuals switching firms in the robustness section.

[12]The tax system has been modernised and digitised, through a partnership with the World Bank: https://www.worldbank.org/en/news/press-release/2013/04/26/romania-modernizes-revenue-administration

	(1)			(2)		
	Construction Sector			Non-Construction Sector		
	Median	Mean	S.D.	Median	Mean	S.D.
Age	42.00	42.45	11.21	42.00	42.15	11.98
Hours Worked	160.00	145.36	49.12	160.00	147.80	46.39
Number of Dependents	0.00	0.27	0.66	0.00	0.34	1.01
Firm Size	27.00	118.25	248.33	97.00	1252.53	3316.14
Female Share of Firm	0.23	0.31	0.24	0.70	0.66	0.23
Full-Time Contract	1.00	0.92	0.28	1.00	0.90	0.30
Bucharest	0.00	0.17	0.38	0.00	0.15	0.36
Observations	1576734			64263673		

Panel (a): Women

	(1)			(2)		
	Construction Sector			Non-Construction Sector		
	Median	Mean	S.D.	Median	Mean	S.D.
Age	43.00	42.88	11.74	43.00	42.84	12.79
Hours Worked	160.00	145.62	47.52	160.00	151.74	40.91
Number of Dependents	0.00	0.29	0.72	0.00	0.33	0.79
Firm Size	30.00	114.80	241.06	103.00	1416.81	3691.08
Female Share of Firm	0.09	0.11	0.11	0.30	0.34	0.24
Full-Time Contract	1.00	0.97	0.18	1.00	0.92	0.27
Bucharest	0.00	0.09	0.29	0.00	0.13	0.34
Observations	9809794			63315734		

Panel (b): Men

Table 1: Descriptive Statistics: Selection into Construction Sector by Gender
Notes: Hours worked are measured monthly. Bucharest is a dummy variable for working in the capital city of Bucharest.

Women in the construction sector are quite observationally similar to women in the non-construction sector, and to men in the construction sector in their age, working hours and number of dependents. Women in the construction sector, however, are substantially more likely to live in the capital city of Bucharest compared to men in the sector and work for firms with substantially (almost three times) higher shares of women in the firm, implying there is some segregation between the kinds of firms that men and women work at.

2.3.1 The Informal Sector

Using the Ministry of Finance provided tax register data, I am unable to observe Romania's informal economic sector. This is a potential concern as the construction sector is likely to be especially informal and, as the policy reform makes working in the formal sector more attractive (even if still under-reporting the true wage) I am unable to observe transitions

between the formal and informal sector. I also cannot distinguish the people who enter the sector, as they might transition from unemployment, from employment abroad or from the black market. The World Bank[13] provides cross-country estimates on the size of the informal economy using model based estimates and survey data, the details of which are described by Elgin, Kose, Ohnsorge, and Yu (2021). The percentage of informal output relative to GDP was estimated, using the range between the two most preferred estimation strategies[14], to be 26.6% - 29.2% in Romania in 2018. To put this into context, the informal sector's share of GDP was estimated to be 11.9% - 12.3% in the UK. Romania is comparable with other Central and Eastern European countries, however. The corresponding figures are 27.8% - 31.8% in Bulgaria, 23.3% - 24.7% in Poland and 16.1% - 16.6% in Slovakia.

According to the same World Bank source, this time using World Bank Enterprise Survey data from 2013, 95.9% of Romanian firms were formally registered when they began their operations in the country. This figure is similar to nearby Central and Eastern European countries.

Although my data do not cover the informal economy, coverage of organised firms is very high. The selected sample of workers who are operating formally (whether or not they under-report their true income) may make the men and women relatively more comparable to each other, in terms of their preferences for honesty, risk and for the benefits offered by being employed formally.

3   Main Analysis - Evidence of Tax Evasion

I first present evidence of tax evasion in Romania, specifically the 'grey' form of evasion where employees and employers collude to falsely report the minimum wage on paper, on which taxes and social contributions are paid, while the remainder of the salary is paid cash in hand. In Figure 2 I present the proportion of employees reporting exactly the minimum wage in the construction sector and the non-construction private sector, by the size of the firm which they work for. It is immediately apparent that smaller firms are substantially more likely to report exactly the minimum wage, consistent with the logic that the employee-employer collusion is harder to sustain in larger firms. In the construction sector, reporting exactly the minimum wage is more prevalent than in the non-construction private sector in 2018, consistent with the sector being one with a higher prevalence of tax evasion. However in 2019 this behaviour is almost eliminated, as the tax minimising gross salary to report is no longer the minimum wage, but the higher value of 3000 RON. For the small number of employees who still report exactly the minimum wage it may be that they are unaware of the policy, that their true (reported plus cash-in-hand) salary was not 3000 RON or above

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[13]https://www.worldbank.org/en/research/brief/informal-economy-database

[14]A Dynamic General Equilibrium estimation strategy and a Multiple Indicators Multiple Causes Model Based estimation strategy

and their firm is thus unwilling to pay this salary for the employee's marginal product, or simply that these individuals are fully complying with the tax authorities and behaving honestly.
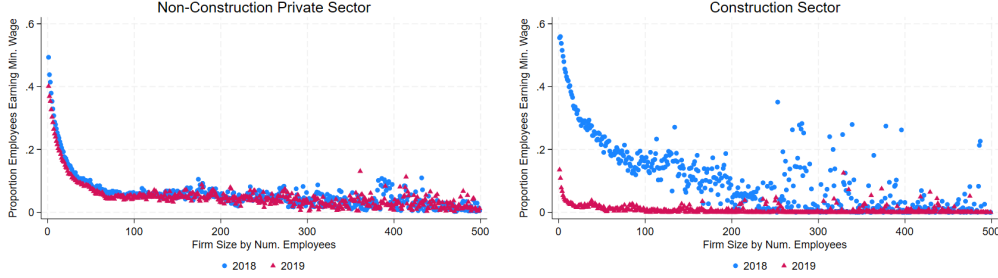

Figure 2: Proportion of employees reporting a salary of exactly the minimum wage
Notes: These graph presents the proportion of employees reporting a salary of exactly the minimum wage for firms of different sizes, up to a firm size of 500 employees. The data is split into two calendar years and the construction sector treated by a policy reform in 2019 and the non-construction private sector. There are no sample restrictions other than the exclusion of the public sector and firms with over 500 employees.

Prior to the reform[15] 50% of Romanian construction workers overall were reporting that they earn exactly the minimum wage, while this figure dropped to just 16% post reform. In the non-construction sector, the figure remained stable at around 25% pre and post-reform.

3.1 Individuals Report Above the Minimum Wage

Following the reform, the optimal way to minimise the tax burden changes, from reporting the minimum wage, to now reporting a salary of 3000 RON. Of course, this would require that employees are being paid a salary of 3000 RON, and previously they were making at least this salary, as a combination of the reported salary and the payment under the table. To test whether individuals are more likely to report a salary above the minimum wage in the construction sector, after the reform, I run the following difference-in-difference regression:

$$y_{i,t} = \beta_0 + \sum_{\forall s/-1} \beta_s \mathbb{1}\{treated_{s=t}\} + \alpha_i + \alpha_t + \sum_{j=1}^{n} \delta_j x_{i,t}^j + \epsilon_{i.t}$$

In this regression, β_0 is an intercept, the series of β_s coefficients are the difference-in-difference treatment effects estimated relative to the base period, one month prior to the

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[15]In the full sample, not the balanced panel which removes individuals who move between the construction and non-construction private sector during the sample period.

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policy's introduction. α_i and α_t are the individual and time fixed effects and the series of coefficients δ_j are included for the control variables x^j.

As an outcome variable, I use an indicator for the individual earning a salary above the minimum wage. The results, in Figure 3, indicate that following the reform, construction workers are almost 30 percentage points more likely to report a salary above the minimum wage. Before the reform[16], 66 percent of construction workers were reporting a salary above the minimum wage, meaning that approximately one-third of workers were reporting at exactly the minimum wage before the reform, but once the incentives to under-report at the minimum wage were removed, almost all of these workers began to report a higher salary.

This form of tax evasion should be less prevalent in large firms, where collusion between employees and employers is less likely to be sustained, so I run my event study specification using very large firms only, specifically those in the top 0.5% of the firm size distribution (which are firms with above 203 employees). The results in Figure 3 show that the reform has almost no effect on these firms.
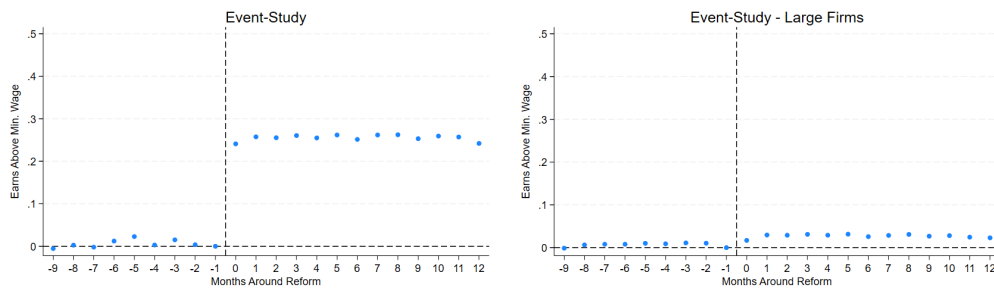

Figure 3: Event-Study - Reporting Above the Minimum Wage

Notes: The sample only includes individuals who remained employed throughout the entire period and excludes those who moved between the treated construction sector and other sectors. The sample size is 3,761,657 individuals in each of the 22 months, of which 1,766,113 individuals are in large firms. The standard errors are clustered at the individual level and the controls are the number of employees in the firm, the contracted hours and the hours actually worked.

Since the reported salary which minimises the tax burden, following the reform, is 3000 RON in the construction sector, I run my difference in difference specification on an indicator of earning exactly 3000 RON. Following the reform, workers in the construction sector are much more likely to report this salary, which minimised the tax burden, but this effect is muted in large firms, where tax evasion as an employee-employer collusion is less likely to take place.
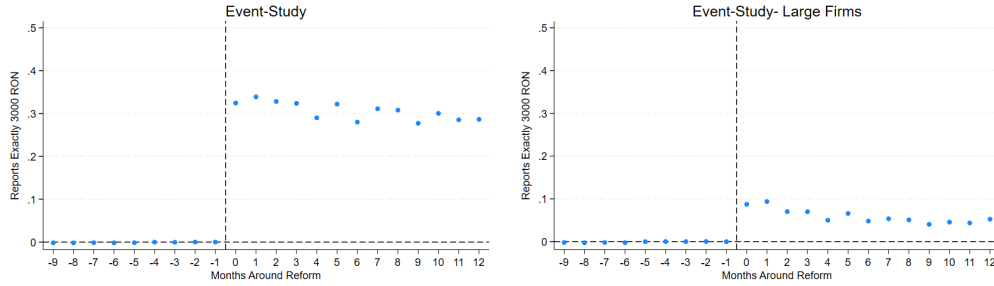
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[16]In the balanced sample.

Figure 4: Event-Study - Reporting 3000 RON

Notes: The sample only includes individuals who remained employed throughout the entire period and excludes those who moved between the treated construction sector and other sectors. The sample size is 3,761,657 individuals in each of the 22 months, of which 1,766,113 individuals are in large firms. The standard errors are clustered at the individual level and the controls are the number of employees in the firm, the contracted hours and the hours actually worked.

As a further validation, I check the probability of jumping to a salary of 3000 RON following the reform for workers who were reporting exactly the minimum wage in the pre-reform period, and those who were on a wage close to, but slightly above (specifically, in the range 1906 to 2000), the minimum wage. Presented in Figure 5, I show that those who were previously reporting exactly the minimum wage are about twice as likely than the average construction worker to jump to reporting a salary of 3000 RON, even though it is a larger jump in reported income than for those closer to 3000 RON, consistent with the minimum wage being used as a tax minimising strategy rather than a true take home wage. Additionally, those previously reporting exactly the minimum wage are even more likely to jump to a report of 3000 RON than those earning marginally more than the minimum wage (labelled as "Almost Min. Wage Workers" in the figure), even though the individuals with a salary above the minimum wage are have a smaller gap between their previous salary and 3000 RON.
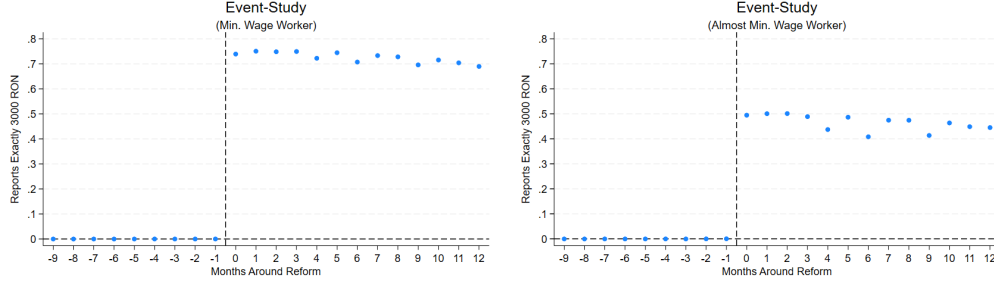
Figure 5: Event Study - Reporting 3000 RON by Pre-Reform Reported Salary

Notes: The sample only includes individuals who remained employed throughout the entire period and excludes those who moved between the treated construction sector and other sectors. The sample size is 242,723 minimum wage workers (defined by earning the minimum wage in the pre-reform period) and 263,288 workers in the range of 1906 to 2000 RON (just above the minimum wage) in each of the 22 months. The standard errors are clustered at the individual level and the controls are the number of employees in the firm, the contracted hours and the hours actually worked.

3.2   Joint Collusion

Given that under third-party reporting evading income tax would require a joint employee-employer collusion, it is assumed that this is much easier to maintain in smaller firms rather than larger firms. To test this, I run the following 2x2 difference-in-difference regression across firms of different sizes:

$$y_{i,t} = \beta_0 + \beta_1 \mathbb{1}\{treated\} + \beta_2 \mathbb{1}\{post\} + \beta_{DiD} \mathbb{1}\{treated\} \cdot \mathbb{1}\{post\} + \sum_{j=1}^{n} \delta_j x_{i,t}^j + \epsilon_{i.t}$$

The outcome variable is an indicator for the employee earning above the national minimum wage. The results in Figure 20 indicate that individuals in smaller firms are much more likely to jump up from reporting the minimum wage following the policy reform. The analogous graph for jumps to reporting a salary of exactly 3000 RON is in Appendix C.
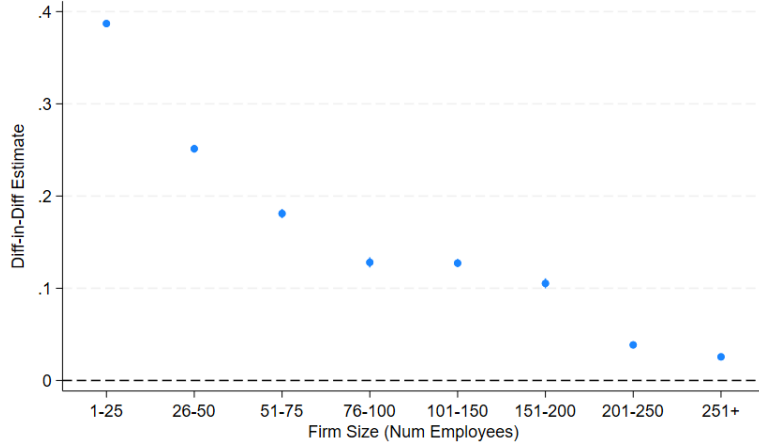
14

Figure 6: 2x2 DiD Estimates of Reporting Above the Minimum Wage by Firm Size
Notes: The sample only includes individuals who remained employed throughout the entire period and excludes those who moved between the treated construction sector and other sectors. The sample size is 3,670,969 individuals in each of the 24 months. The standard errors are clustered at the individual level and the controls are the number of employees in the firm, the contracted hours and the hours actually worked.

This result is consistent with the assumption that workers collude with their employers to engage in 'grey' work, jointly reporting the minimum wage to the tax authorities and receiving the remainder of the salary cash in hand, but that this collusion is unsustainable in larger, more formal, firms.

3.3 Elasticity of Labour Substitution

My interpretation of the jumps in reported income, from the minimum wage to 3000 RON, is that this is evidence of tax-evasion rather than a genuine increase in salaries. This is supported by the fact that this behaviour is much more pronounced in smaller firms than in larger ones, where a joint collusion between the employee and employer to tax evade would be more difficult to sustain. In addition to this, if the increase in reported salaries was not a result of tax evasion, but rather genuine growth in salaries earned, it would be expected that with increases in the earnings in the sector, the sector would grow.

Relative to the rise of salaries in the sector, employment in construction grew very little. The sector grew from employing just below 8 percent of workers to employing about 9 percent of workers following the reform. However, part of this apparent growth in employment in the sector comes not from individuals entering the sector but instead from firms themselves changing their NACE industry classification so that they can benefit from the tax break. Excluding firms that change their classification between the construction and non-construction sectors, the growth in employment in this sector is even more muted, rising

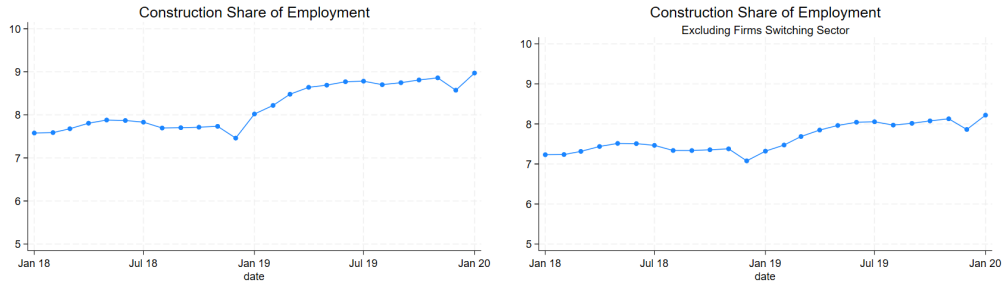from about 7.5 percent of Romanian employment to 8 percent.

Figure 7: Construction Share of Private Sector Employment

Notes: No sample restrictions have been made other than the exclusion of the private sector. In the graphic on the right hand side, firms which switch between the construction sector and the remainder of the private sector are also excluded.

I also follow the approach of Kroft, Luo, Mogstad, and Setzler (2020) to estimate the elasticity of labour supply to the firm. An elasticity close to zero would suggest that the large increases in reported income are not revealing increases in the actual salaries of workers in the sector, since this would be expected to be accompanied by increased employment in the sector. Rather it would suggest that previously hidden income is now being reported. To estimate the elasticity generated by the tax reform, I simply take the ratio of the jump in the log of the number of firms' employees to the log of the jump in reported salaries following the reform. Using a similar approach with variation from winners and losers of public procurement auctions, whereby winners increase wages to hire more workers, Kroft et al. (2020) estimates a labour supply elasticity of about 4 in the US construction sector. Running 2x2 difference-in-differences specifications I find a labour supply elasticity of 0.08 using the gross salary and 0.12 using the net salary. The specification is the same as in the previous subsection and the results are in Table 2.

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	Log Employees	Log Salary (Gross)	Log Salary (Net)
DiD (Post X Construction)	0.032***	0.259***	0.427***
	(0.00)	(0.00)	(0.00)
N. Firms	318,152	318,152	318,152
N. Months	24	24	24

Table 2: NACE Sector Codes Treated With Income Tax Exemption

Notes: The sample only includes individuals who remained employed throughout the entire period and excludes those who moved between the treated construction sector and other sectors. The sample size is 318,152 in each of the 24 months. The standard errors are clustered at the individual level.

The elasticity being so close to zero, relative to the comparable estimate of 4 in the US construction sector, provides strong support for the interpretation that the changes in reported income are to be interpreted as tax evasion becoming revealed rather than changes in the actual take-home incomes.

3.4 Other Corruption in Romania

To validate that my identification strategy is indeed picking up individuals who are tax evading, I compare, by Romanian counties, the tax evasion estimates to the hospital bribery rate. Bribery rates are calculated using Romanian government survey data from the 'Patients Feedback Mechanism'. I run my 2x2 difference-in-differences specification, estimating jumps in reported wage above the minimum wage separately for each of the Romanian counties, while the patients' feedback data provides me with the percentage of individuals who report that they have been asked for a bribe in a hospital in each county. The binscatter relating these is presented in Figure 8 and shows a positive, although weak, correlation between reported hospital briberies and my estimates of tax evasion.
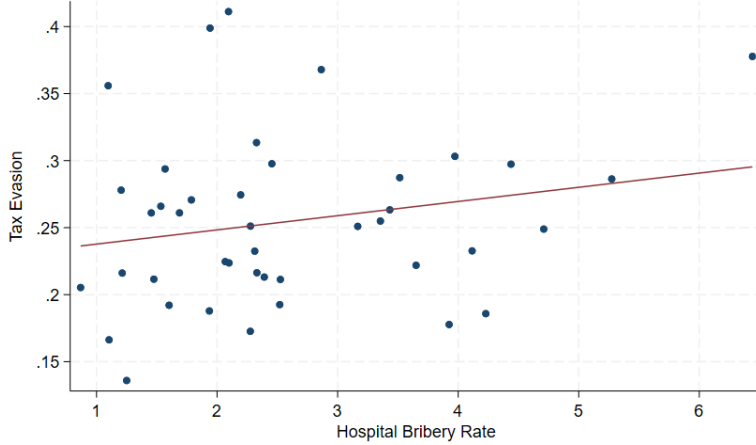
Figure 8: Tax Evasion vs Hospital Bribery Rates

Notes: On the x-axis I present the percent of surveyed patients who report that they have been asked for a bribe in a Romanian hospital, by Romanian county. On the y-axis I present the post X treated DiD estimate for tax evasion, where the outcome in the regression is a dummy variable for reporting a salary above the minimum wage, by Romanian county. Each point in the scatter represents one of the 42 Romanian counties and a line of best fit for these points (linear regression) is overlayed. Hospital corruption data accessed from 'The patient's feedback mechanism', https://data.gov.ro/dataset/mecanismul-de-feed-back-al-pacientului-2023

4 Main Results - Gender Gap in Tax Evasion

Under the interpretation that jumps in income away from the minimum wage and towards the threshold value of 3000 RON indicates that tax evasion is occurring, I run event-study difference-in-differences regressions separately for men and women to compare the rates of tax evasion. I use the following specification:

$$y_{i,t} = \beta_0 + \sum_{\forall s/-1} \beta_s \mathbb{1}\{treated_{s=t}\} + \alpha_i + \alpha_t + \sum_{j=1}^{n} \delta_j x_{i,t}^j + \epsilon_{i.t}$$

The results in Figure 9 show that men are just under 30 percentage points more likely to report a salary above the minimum wage following the reform, while women are just under 20 percentage points more likely to do so.
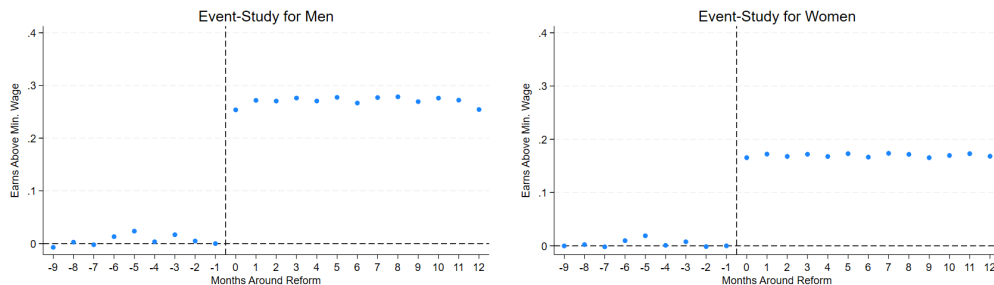
Figure 9: Event Study - Reporting Above the Minimum Wage

Notes: The sample only includes individuals who remained employed throughout the entire period and excludes those who moved between the treated construction sector and other sectors. The sample size is 1,838,477 male individuals and 1,923,180 female individuals in each of the 22 months. The standard errors are clustered at the individual level and the controls are the number of employees in the firm, the contracted hours and the hours actually worked.

The change in the tax minimising reported salary was moved by the policy, from the minimum wage to 3000 RON. Figure 10 shows that men are substantially more likely than women to alter their reporting behaviour to this new level, although both men and women are slightly more likely to move to this reported salary than to increase their reported salary from the minimum wage at all. While the majority of movement to this new salary comes from individuals who were previously reporting the minimum wage, and thus engaging in the 'grey' form of tax evasion, there will also be some individuals between the minimum wage and 3000 RON who will move to this reported salary due to the tax advantages. There may also be salience or reference-dependence effects driving some employers to pay this salary, as Kleven (2016) suggests these effects may also explain excess bunching at kink points of income tax schedules. Jumps to 3000 RON are thus a combination of individuals falsely reporting the minimum wage before the policy introduction and switching to the new tax minimising salary report as well as some individuals who were not previously under-reporting their income but move to a new 'genuine' salary of 3000 RON due to the tax benefits and salience of the figure.
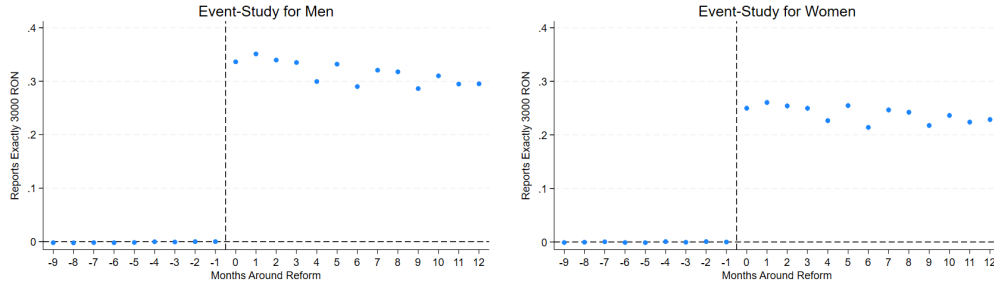
19

Figure 10: Event-Study - Reporting 3000 RON

Notes: The sample only includes individuals who remained employed throughout the entire period and excludes those who moved between the treated construction sector and other sectors. The sample size is 1,838,477 male individuals and 1,923,180 female individuals in each of the 22 months. The standard errors are clustered at the individual level and the controls are the number of employees in the firm, the contracted hours and the hours actually worked.

The evidence of a gender gap in tax evasion is clear, but the mechanisms generating this are difficult to establish. Although differences in preferences, such as preferences over risk and honesty, are one potential explanation, men and women may also have different abilities to under-report income for other reasons. Income under-reporting in Romania requires a joint employee employer collusion, and women may be less willing or able to bargain with their employer to tax evade. It may also be the case that men work in less office-based, 'visible' occupations, such as on construction sites whereas women work in more visible and formal occupations, such as management of building projects or accounting for construction firms. There may also be segregation in the types of firms men and women work for which which may generate differences in tax evasion. Empirically, women do work in firms with substantially larger shares of women than do men.

4.1 Bargaining Power

4.1.1 One (Wo)man bands

Firms with a single employee ('One Man/Woman bands') eliminate concerns about the bargaining between employee and employer over the decision to tax evade, since the single employee has full decision making power. In addition, a One (Wo)man band would receive the entirety of the economic rent generated, rather than a bargaining process over this. The results, presented in Figure 11, again yield a gap between the implied under-reporting of income between men and women for the purpose of tax evasion. In fact, in these firms, the gender gap in tax evasion widens compared to the full sample. The widening of the gap comes mostly from men who are more likely to be tax evading in one man bands, while women are only marginally more likely to tax evade in these firms.
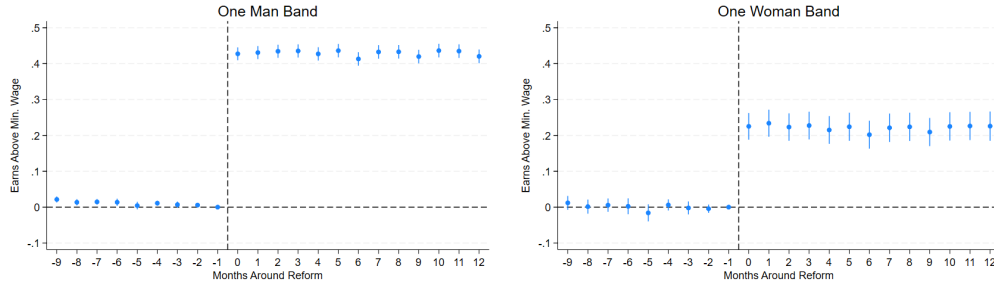
20

Figure 11: Event Study-Effects on One (Wo)man bands

Notes: The sample only includes individuals who remained employed throughout the entire period and excludes those who moved between the treated construction sector and other sectors. The sample contains 61,553 firms of one employee for men and 61,071 for women, of which, respectively, 5,623 and 1,208 are in the construction sector. The standard errors are clustered at the individual level and the controls are the contracted hours and the hours actually worked.

The change in behaviour for men may point to gender differences in lying aversion, whereby men have a higher tolerance for lying, but are less likely to do so in firms with other employees since this is more visible and has a higher chance of the collusion breaking down.

4.1.2 Competitive Industries

Another approach to examine the role of bargaining power in explaining gender differences in tax evasion is to look at highly competitive markets. In a highly competitive labour market workers have more power in the decision to under-report income to the tax authorities and extract the economic rent from underpaying taxes.

I use a Herfindahl–Hirschman Index[17] (HHI) to give local-industries a competitiveness score. To define a local industry I use 4-digit NACE sector codes within each of Romania's 42[18] Counties. While HHIs are often used in product markets to assess market concentration, I instead use market shares of employment rather than output to assess labout market concentration. Specifically, for each firm i in a local-industry j, I calculate their market share of employment:

$$MS_{i,j} = \frac{\#\ Employees_i}{\#\ Employees_j}$$

I then calculate the HHI for each local-industry j using the formula:

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[17]The index is described by the Federal Reserve in Rhoades (1993), which also details the history of the index.

[18]Including the capital city which is its own county

$$HHI_j = \sum_{\forall i \in j} (MS_{i,j})^2$$

For each local-industry, I thus have a measure of market concentration, where an index value close to zero implies a relatively competitive market with many small firms and a value close to one implies a more concentrated market dominated by one or a small number of very large firms. I then run my preferred difference-in-difference specification using the most competitive local-industries - specifically, those with a HHI at or below the 5th percentile of the HHI distribution.[19]

The results of my preferred specification run for this sample of the most competitive local-industry labour markets are presented in Figure 12 and look very similar to Figure 9. This implies that even in highly competitive labour markets, in which employees have more bargaining power in the decision of engaging in tax evasion, the implied propensity of tax evasion of men is significantly higher than it is for women.
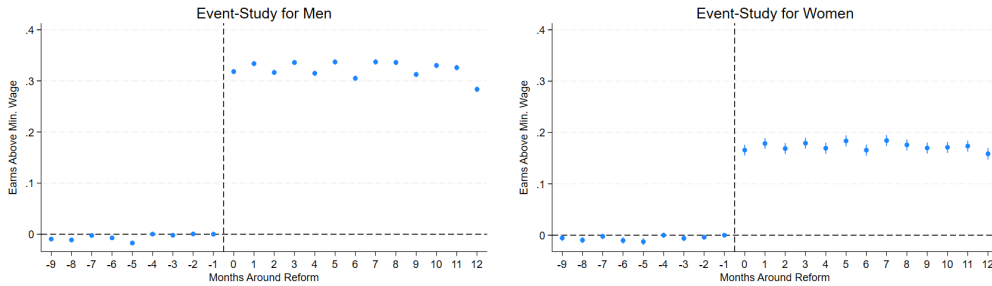

Figure 12: Event Study-Effects on the Most Competitive Industries

Notes: The data filters on only firms with a HHI index below the 5th percentile of the HHI distribution. The specification in the regressions includes controls for actual hours worked, the number of employees in the firm, and the type of contract (full or part-time). The sample size is 173,435 male individuals and 89,953 female individuals. Standard errors are clustered at the individual level and 95% confidence intervals are plotted around the point estimates.

The HHI, a measure of employee concentration, provides one reasonable measure of competitiveness for employees in local industries. Another measure of competitiveness would be rates of flows in and out of firms in a local industry. If there is a high level of observed mobility for employees between firms, this implies that it is relatively easy for workers to take up attractive outside options which are available to them. This in turn would imply that workers in these industries are likely to have strong bargaining power with their employers,

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[19]This HHI value is 0.007. According to the Antitrust division of the US Department of Justice, Unconcentrated Markets usually have a HHI below 0.15, however these are typically calculated using market shares of output, not employment. The mean and median HHI for Romanian local industries are 0.223 and 0.086 respectively

giving them greater autonomy in the decision over tax evasion. I present the results for local industries with high rates of mobility in Appendix C, and generates a gap in implied tax evasion very similar to the use of HHI scores to measure competitiveness.

4.2 Occupational Segregation

The gender gap in propensity to tax evade may be driven by men and women working in different kinds of occupations, within the same industry of construction. Because the administrative tax data does not contain information on the occupation, I try to infer whether or not work is manual or office-based used information which is available in the dataset, as well as focus on one specific NACE industry code within the treated sector which involves a specific and gender neutral office-based type of work.

4.2.1 Occupational Segregation: Implied Occupation by Hours Worked

Manual work in a construction site is much more seasonal than office-jobs based in an indoors office space. I thus use individual-level variation in monthly hours worked to classify those with highly variable working hours as manual workers and those with less variable working hours as office based, addressing occupational segregation between men and women. If the strategy of using variation in working hours to separate office-based vs manual work is indeed picking up these different types of occupations, it would be expected that the tax evasion I identify is higher for the manual work than for the office-based work.

We can see in Figure 13 that office-based workers, defined as having a variance in monthly working hours below the 10th percentile of the distribution[20], have relatively lower implied tax evasion than my main specification presented in Figure 9, consistent with it being more difficult to evade taxes in a more formal office-based environment, but that the gender gap in tax evasion, although somewhat subdued, remains.

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[20]This value is 96 and is also the median variance in individual hours worked. This is because the variance simply comes from variation in the number of working days in the calendar month, with these individuals otherwise having a simple flat working schedule.
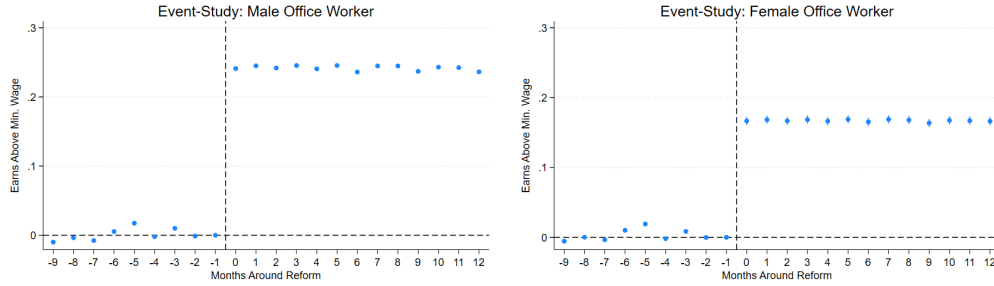
Figure 13: Event Study-Effects on Office-Based Workers

Notes: The sample only includes individuals who remained employed throughout the entire period and excludes those who moved between the treated construction sector and other sectors. The sample size is 1,021,741 male individuals and 956,322 female individuals in each of the 22 months. The standard errors are clustered at the individual level and the controls are the number of employees in the firm, the contracted hours and the hours actually worked.

We can conversely observe that for manual workers, defined by having monthly working hours variance above the 90th percentile in the distribution, the tax evasion implied by my identification strategy is relatively high for both men and women. This is reassuring for my definition of manual workers picking up individuals who are indeed doing more work on construction sites and have greater ability to evade taxes. Indeed, within this category of occupation the gender gap in identified tax evasion remains. The results are presented in Figure 14.
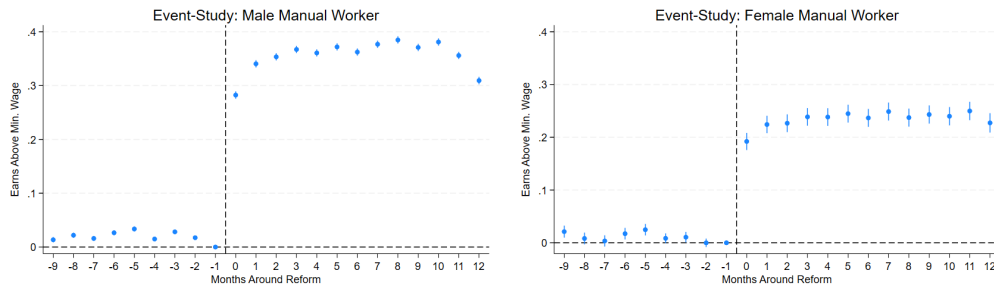

Figure 14: Event Study-Effects on Manual-Based Workers

Notes: The sample only includes individuals who remained employed throughout the entire period and excludes those who moved between the treated construction sector and other sectors. The sample size is 186,418 male individuals and 192,606 female individuals in each of the 22 months. Within the treated construction sector figures are 22,268 and 2,975 respectively in each of the 22 months. The standard errors are clustered at the individual level and the controls are the number of employees in the firm, the contracted hours and the hours actually worked.

An alternative way to implicitly separate manual workers from office-based workers, rather than using the simple within-individual variance in hours worked, is to make more

explicit the type of seasonality that would be expected for manual workers in a country where cold winters makes working on a construction site more challenging. I create another definition of a manual worker by constructing, for each individual, the ratio of hours worked in the months of December, January and February to the hours worked during the rest of the year. A low ratio means that hours dip in the colder months relative to the rest of the year. Equipped with a distribution of values of this ratio, I define my second indicator of a manual worker as a worker with a ratio under the 10th percentile of this distribution. The results are similar to what I present in this section and can be found in Appendix C.

The results presented for office workers and manual workers so far suggests that my main result, that men have a higher propensity to tax evade than women, is not primarily driven by segregation in the kinds of work that men and women do.

4.2.2 Office-Based Work: Implied by Industry Sector

My previous definitions of office and manual work were based on reasonable but imperfect assumptions about differences in seasonality between the different kinds of work. As a further check of whether or not the gender gap in tax evasion is driven by differences in the kinds of work that men and women do, I run my preferred difference-in-difference specification using only "building project development"[21] as a treated industry, and comparing it with the non-construction private sector. This industry classification implies primarily office-based work. It is a treated profession which is relatively gender-neutral (34% female) and more comparable with other private sector jobs than jobs in construction involving manual labour. The number of individuals I observe who work in this NACE code over my sample period is 3,948. The results of the difference-in-difference are presented in Figure 15.
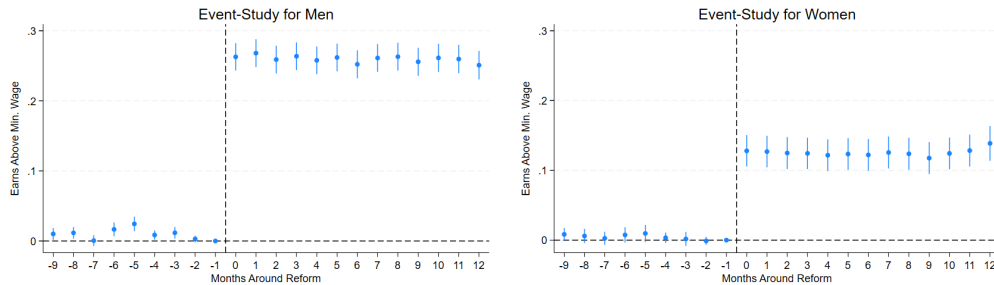

Figure 15: Event Study - Project Development Industry Code

Notes: The specification in the regressions includes controls for actual hours worked, the number of employees in the firm and the type of contract (full or part-time). Standard errors are clustered at the individual level and 95% confidence intervals are plotted around the point estimates.

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[21]This is the 4 digit NACE code: 4110. The description for the code is the following: development of building projects for residential and non-residential buildings by bringing together financial, technical and physical means to realise the building projects for later sale.

The results for the "building project development" profession are, as expected, marginally weaker than for the construction and manufacturing sector as a whole, since the industry is more formal/office-based than traditional construction jobs. The gender gap in tax evasion remains, with men substantially more likely to jump away from reporting a minimum wage salary post reform compared to women.

4.3   Firm Composition

In the wider Romanian economy, and especially in the construction sector, men and women may be segregated. Besides entering different industries, men and women may enter different kinds of firms and have different kinds of occupations within those firms. Since the men in construction work in relatively more male dominated firms compared to the women, I run my preferred specification on female dominated firms, defined as having the female share of employment strictly above 50 percent. The results in Figure 16 suggest that segregation in the types of firms that men and women work at explain a substantial part of the gender gap in tax evasion, since the rates of tax evasion are smaller in these firms for women, compared with the full sample of all firms, but substantially smaller for men in these firms, who are in fact marginally less likely to be tax evaders than women in these female dominated firms.
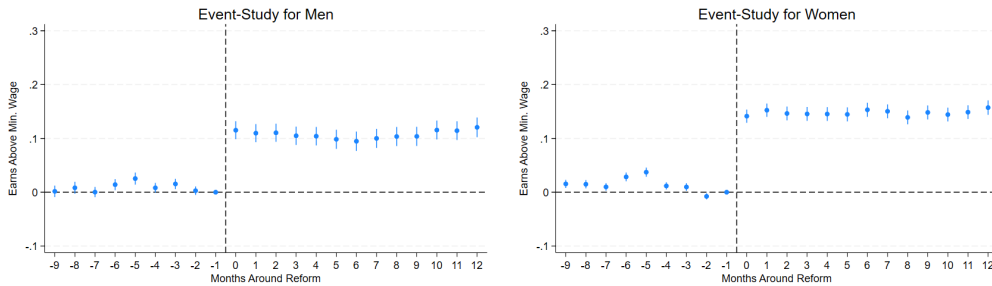

Figure 16: Event Study - Female Dominated Firms

Notes: The sample only includes individuals who remained employed throughout the entire period and excludes those who moved between the treated construction sector and other sectors. The sample size is 520,639 male individuals and 1,433,371 female individuals in each of the 22 months. The standard errors are clustered at the individual level and the controls are the number of employees in the firm, the contracted hours and the hours actually worked.

The evidence suggests that the composition of firms is a strong determinant of the propensity of tax evasion, but only for men. In one-man bands and in firms comprising only of men (presented in Appendix C), men are substantially more likely to be tax evading compared to those in the full sample. At the same time, when they are in female dominated firms, men are less likely to be tax evading than they are in the full sample. On the other hand, the proportion of women under-reporting their income remains largely fixed,

regardless of the gender composition of the firm. This suggests that it may not be the ability to evade tax which is binding for women, but rather they have stronger preferences for honesty compared to men. Meanwhile, when men find it easier to evade tax, such as when they are in a single-person firm or a firm without any women, they are more likely to do it.

5 Robustness

5.1 Strategic NACE Code Reclassification

There is a concern that firms endogenously respond to the policy and falsely reclassify themselves as a construction firm following the policy introduction. This would not affect the results I have presented, since I constructed a balanced panel in which individuals remain in either the treated or untreated NACE sectors throughout the panel period. However, this could still affect gender gaps in tax evasion, if men were more likely to work in firms which falsely reclassified themselves as an income-tax exempt industry. More broadly, this would be a concern for the tax authority due to lost tax revenue. Figure 17 shows that this should not be a major concern. As the start of a new year, January is associated with a spike of industry reclassifications. Approximately 1.5% of firms overall reclassify their industry code, and only 0.5% of firms switch from a non-construction to a construction industry code in the January of the policy reform. Importantly, in January 2020, one year following the reform, there is no spike in reclassifications into construction, but there is a spike in industry reclassifications overall.
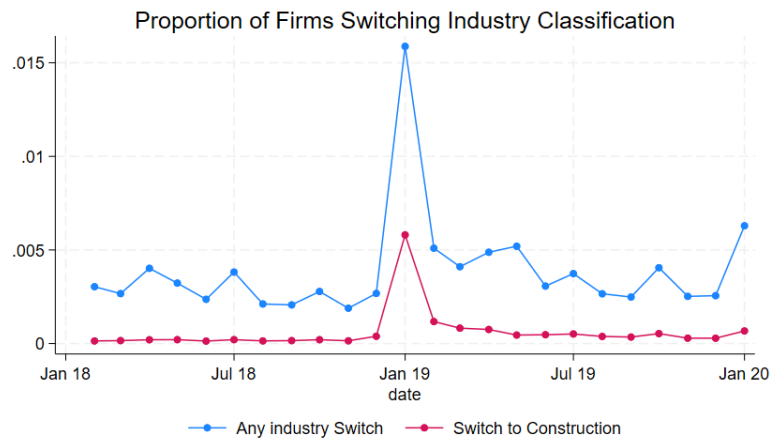

Figure 17: Industry Reclassifications

Notes: The data used in this graph removes the public sector and makes no other sample restriction.

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5.2 General Equilibrium Adjustments

On the other hand, it may be the case that individuals respond to the policy by moving from a non-construction to a construction sector firm. In Section 3 I showed that the construction sector does grow, but this is substantially driven by firm reclassifications. As seen in Figure 18 it does seem to be the case that individuals move into the construction sector, although in a rather small magnitude. This means that not all of the growth in the sector is coming from Romanian unemployment, Romanians previously working abroad, or Romanians in the black market. Less than half of a percent of women make this switch, and only 1.5% of men make this switch. Men opting to move into the construction sector at a higher rate than women is consistent with gender differences in preferences for tax evasion - although differences in mobility may also explain this gap.
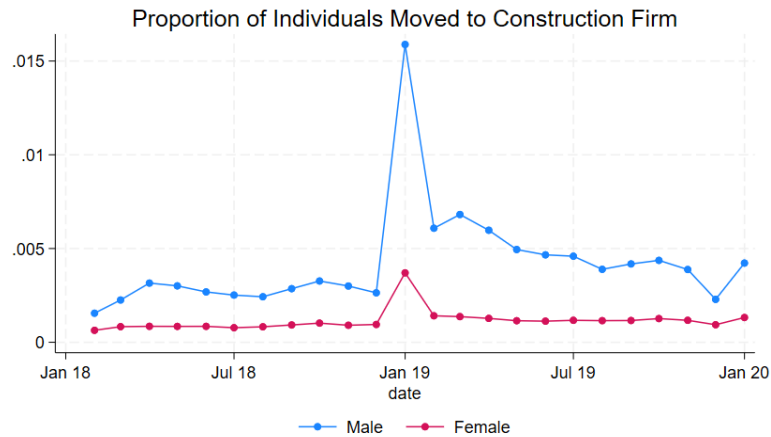

Figure 18: Firm Switching

Notes: The data used in this graph removes public sector workers and makes no other sample restriction.

The policy does induce movement, however limited, from the non-construction to the construction sector. Theoretically, this would push the relative price of labour in the construction sector down, and the relative price of labour in the remainder of the free market up. Thus, if my estimates of tax evasion are affected by equilibrium wage adjustments post-reform, they would be downwards biased. The equilibrium adjustments should push more workers towards the minimum wage, rather than away from it. Moreover, since men move from the non-construction sector into the construction sector at a higher rate than women, the downwards bias would be even larger for men, since their relative wage the construction sector would decrease more than for women. This would mean that the true gender gap in tax evasion is even larger than I observe.

6 Conclusion

Tax evasion in Romania's construction sector is anecdotally widespread, where employees and employers are thought to jointly collude to report the minimum wage as the salary to the tax authorities, and pay the remainder as cash-in-hand. Using a tax reform in the sector, which alters the optimal tax evading reported salary from the minimum wage to a much higher nominal wage, I provide evidence that a large proportion of workers in the sector are under reporting their true incomes. I then show that men are approximately 50 percent more likely to be under reporting their incomes than women

To examine the channels driving this gender gap, I analyse the role that bargaining power between the employee and employer plays, since income under-reporting relies on joint collusion. Looking at firms with only one employee 'one man/woman bands', where the worker has full autonomy over the decision of income under-reporting, is inconsistent with gender gaps in bargaining power driving the gap in tax evasion. In fact, in these firms, the gender gap in tax evasion widens. Using another approach to examine the role of bargaining power, I look at workers who work in industries with highly competitive labour markets, where the workers theoretically have stronger bargaining power. The gender gap in tax evasion remains, suggesting that gender differences in bargaining power are not driving the differences in income under-reporting.

I then examine the role of occupational segregation, whereby men and women doing different kinds of jobs within the construction sector may explain the gender gap in tax evasion. Because my tax data do not contain direct information on occupation, I use variation in individuals' working hours to infer whether a worker is more likely to be doing office-based work or manual work, which is more seasonal. Within jobs classes as office-based or manual, the gender gap in income under-reporting remains largely constant, although those classified as manual workers are overall more likely to be evading taxes. Additionally, since I can distinguish between different firms' NACE sector codes, I look specifically at the sector within construction which is the most office-based, which is the management of building projects. Estimating income under-reporting in this sector only does not close the gender gap in tax evasion, which is fact is higher than in the construction sector as a whole.

Finally, since men are more likely to work in firms with a larger share of male employees compared to women, I look at the effect of the female-share of employees within the firm. The composition of employee gender within firms is the biggest driver of the gender gap in tax evasion. When men and women work in completely segregated firms, the women in the female-only firms are as likely to be tax evading as they are in mixed firms, whereas men are substantially more likely to be tax evading in male-only firms. In contrast, when the female share of employees in a firm is above 50 percent, the gender gap in tax evasion is completely closed, and if anything, is marginally in favour of women. The evidence thus points to a behavioural explanation for the gender difference in tax evasion, whereby men

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have a higher willingness to lie to the authorities, and are especially likely to do so in male dominated firms, but find it more difficult to do so in female dominated firms, meanwhile women have an overall lower propensity to tax evade and this is unaffected by the gender of their colleagues.

My findings contribute to several different areas of economics literature and have policy implications. In the behavioural literature on gender differences in preferences, this is the first study to use observational rather than experimental data to study gender differences in lying, providing additional validation to knowledge derived from experimental work. My study also adds to the public economics literature on tax evasion and third-party reporting systems. Employer ('third-party') income reporting is usually thought to be a robust system to avoid tax evasion, since collusion is thought to be difficult to maintain. I provide evidence that this collusion is indeed widely prevalent in Romania's construction sector, and only in the very largest firms does this not take place. I also contribute to the literature on gender wage gaps. Firstly, my findings have implications on measurement - if men are more likely than women to under-report income, the gender wage gap may not have closed as much as it is has been believed to. Secondly, the literature on gender wage gaps emphasizes the remaining obstacles to gender convergence: the effects of parenthood and the rewards to female-unfriendly types of working and jobs. I highlight tax evasion as a new obstacle to convergence in wages, which is further support for tax authorities in targeting those who break the rules.

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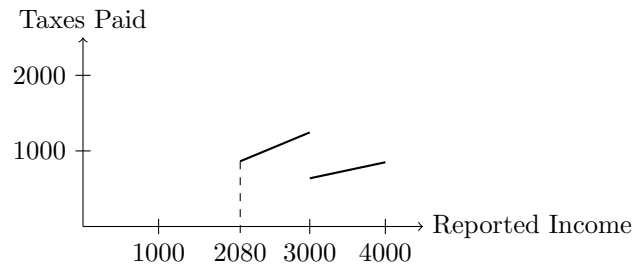
A Other Graphics

Figure 19: Tax and Other Contributions vs Reported Gross Salary

B Sample Details

Industry NACE Code	Female Share	Share of Construction Employment
2331	0.333	0.002
4110	0.324	0.017
2312	0.29	0.009
1623	0.238	0.02
2223	0.226	0.029
2362	0.224	0.002
4212	0.211	0.005
2332	0.208	0.004
2370	0.204	0.006
2512	0.202	0.011
2369	0.2	0.003
4213	0.195	0.003
4332	0.173	0.017
2361	0.171	0.02
2364	0.168	0.002
4291	0.154	0.01
4312	0.15	0.011
811	0.148	0.007
2363	0.146	0.01
4222	0.145	0.013
4313	0.145	0.002
4322	0.144	0.079
4321	0.143	0.076
4311	0.143	0.004
4334	0.135	0.008
4329	0.133	0.012
4221	0.132	0.013
4333	0.13	0.013
812	0.129	0.011
4211	0.128	0.086
4299	0.125	0.013
4339	0.124	0.005
4399	0.116	0.036
4391	0.112	0.007
4120	0.112	0.43
4331	0.103	0.003

Table 3: NACE Sector Codes Treated With Income Tax Exemption

Notes: I present the full list of industry codes which are eligible for the income tax exemption, ordered by the decreasing female share of employment within the industry. I also present for each sector code, the share of the construction employment it makes up.

C   Other results
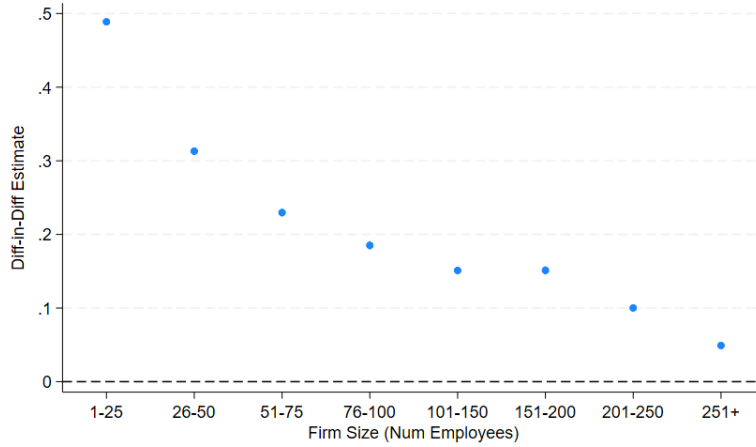
C.1   Joint Collusion: Jumps to Reprting 3000 RON

Figure 20: 2x2 DiD Estimates of Reporting 3000 RON by Firm Size

Notes: The sample only includes individuals who remained employed throughout the entire period and excludes those who moved between the treated construction sector and other sectors. The sample size is 3,670,969 individuals in each of the 24 months. The standard errors are clustered at the individual level and the controls are the number of employees in the firm, the contracted hours and the hours actually worked.

C.2   Manual Workers: Alternative Definition

Here are the results for manual workers using an alternative definition of a manual worker. Rather than using the individual-level variance in hours worked, I construct, for each individual, the ratio of hours worked in the months of December, January and February to the hours worked during the rest of the year. A low ratio means that hours dip in the colder months relative to the rest of the year. Equipped with a distribution of values of this ratio, I define my second indicator of a manual worker as a worker with a ratio under the 10th percentile of this distribution.
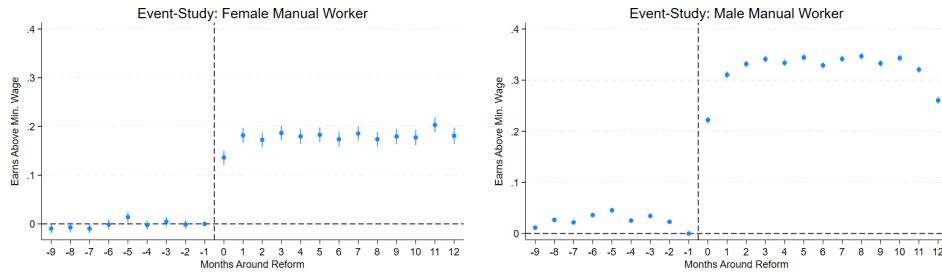
Figure 21: Event Study-Effects in Competitive Industries

Notes: The specification in the regressions includes controls for actual hours worked, the number of employees in the firm and type of contract (full or part-time). Standard errors are clustered at the individual level and 95% confidence intervals are plotted around the point estimates.

C.3 Competitive Industries: Between Firm Mobility

Complementary to using a HHI index to measure the competitiveness of a local industry, I use the rate of between-firm mobility. The logic is that, even in a local industry with just a few firms employing the majority of workers, if the workers find it relatively easy to move between firms, the market is likely to be operating competitively and workers are able to take-home the majority of their marginal product. To construct this measure of competitiveness, I generate a flow rate, which is the sum of flows into a firm in a local industry and flows out of a firm in a local industry, as a share of the total employment in the local industry. I then run my preferred specifications on the sample of men and women employed in a local industry with a high 'flow rate', defined as being above the 90th percentile of the distribution. The results are similar to what is observed in the full sample.

Figure 22: Event Study-Effects in Competitive Industries

Notes: The specification in the regressions includes controls for actual hours worked, the number of employees in the firm and type of contract (full or part-time). Standard errors are clustered at the individual level and 95% confidence intervals are plotted around the point estimates.

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C.4 Segregated Firms

In understanding the role of firms' gender composition on the propensity of men and women to tax evade, I run my preferred difference-in-differences specification on completely segregated firms, which contain only women, or only men. Compared to the results in the full sample, women's propensity to tax evade changes very little in firms which are completely female, whereas in firms which are completely male, men are much more likely to be tax evading.
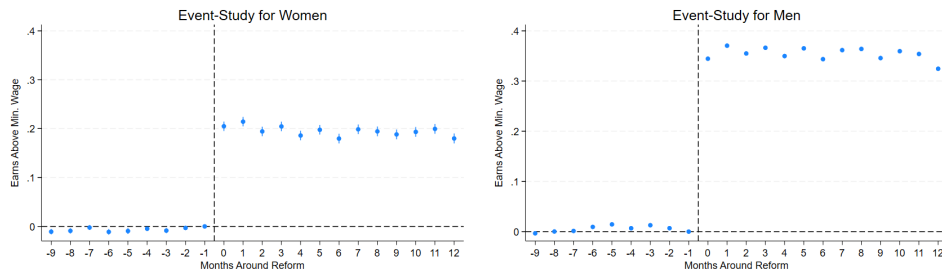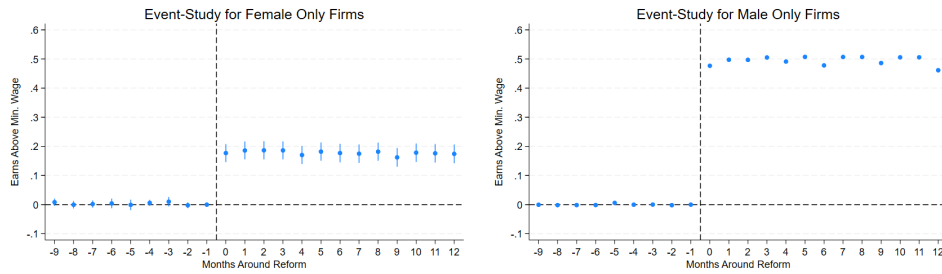

Figure 23: Event Study-Effects in Competitive Industries

Notes: The specification in the regressions includes controls for actual hours worked, the number of employees in the firm and type of contract (full or part-time). Standard errors are clustered at the individual level and 95% confidence intervals are plotted around the point estimates.

D   Standard Errors

I chose to cluster my standard errors at the individual level in my regression specifications. To verify that the significance of my results is not being driven by my choice of standard errors, I run my preferred DiD event-study specification (across both genders) using a number of different choices for the calculation of standard errors. I present the standard errors for my difference-in-difference regressions on the outcome of a dummy for the individual earning above the minimum wage under: 1) individual-level clustering, 2) firm-level clustering, 3) 4-digit NACE industry code clustering, 4) clustering at the level of treatment (construction vs not construction industry) and 5) heteroskedasticity-consistent 'robust' standard errors. These are presented in Table 4 and the standard errors are similarly sized throughout the different specifications. Importantly, they remain remarkable small in under each standard error calculation, which can be attributed to the size of the data. Each point estimate is highly significant at conventional levels under and choice of standard error.

	Indiv	Firm	Industry	Constr.	HC Robust
Month -9	(0.001)	(0.002)	(0.002)	(0.000)	(0.001)
Month -8	(0.001)	(0.002)	(0.003)	(0.000)	(0.001)
Month -7	(0.001)	(0.002)	(0.003)	(0.000)	(0.001)
Month -6	(0.001)	(0.002)	(0.004)	(0.000)	(0.001)
Month -5	(0.001)	(0.002)	(0.005)	(0.000)	(0.001)
Month -4	(0.000)	(0.001)	(0.002)	(0.000)	(0.001)
Month -3	(0.001)	(0.002)	(0.004)	(0.000)	(0.001)
Month -2	(0.000)	(0.001)	(0.002)	(0.000)	(0.001)
Month 0	(0.001)	(0.006)	(0.038)	(0.000)	(0.001)
Month 1	(0.001)	(0.006)	(0.041)	(0.000)	(0.001)
Month 2	(0.001)	(0.006)	(0.041)	(0.000)	(0.001)
Month 3	(0.001)	(0.006)	(0.041)	(0.000)	(0.001)
Month 4	(0.001)	(0.006)	(0.041)	(0.000)	(0.001)
Month 5	(0.001)	(0.006)	(0.041)	(0.000)	(0.001)
Month 6	(0.001)	(0.006)	(0.041)	(0.000)	(0.001)
Month 7	(0.001)	(0.006)	(0.041)	(0.000)	(0.001)
Month 8	(0.001)	(0.006)	(0.041)	(0.000)	(0.001)
Month 9	(0.001)	(0.006)	(0.041)	(0.000)	(0.001)
Month 10	(0.001)	(0.006)	(0.041)	(0.000)	(0.001)
Month 11	(0.001)	(0.006)	(0.039)	(0.000)	(0.001)
Month 12	(0.001)	(0.006)	(0.037)	(0.000)	(0.001)
N	82245572	82245572	82245572	82245572	82245572

Table 4: Different choices for the calculation of standard errors

Notes: I present the point-estimates and standard errors under 1) individual-level clustering, 2) firm-level clustering, 3) 4-digit NACE industry code clustering, 4) clustering at the level of treatment (construction vs not construction industry) and 5) heteroskedasticity-consistent 'robust' standard errors.