Job search, efficiency wages and taxes

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January 30th, 2023

Abstract

Norwegian workers' job mobility decisions are related to firms' wage policies, but also depend on the national tax schedule. By utilising Norwegian population-wide administrative linked employer-employee data on workers and firms during 2010-2019, we study how the job-to-job turnover of employees is affected by marginal taxes and firms' pay policies, thus drawing inference on job search behaviour. By paying higher wages, job-to-job separation rates drop, but this negative relationship is weakened when taxes increase. Higher taxes imply strictly reduced search activity, but less so for bonus job-workers than salaried workers. Bonus jobs are associated with fewer separations in general.

Keywords: Job search, marginal taxes, monopsony, wages, effort

JEL-codes: H24, J42, J63, M12

Acknowledgement: We thank the Norwegian Research Council for funding (grant numbers No 295914 and No 324358). Corresponding author: Harald Dale-Olsen (hdo@socialresearch.no)

1. Introduction

Prices on goods act as signals to equate demand and supply of goods. Wages offered to workers act similarly, but in contrast to prices on goods, wages also reflect how productive labour is or should be. However, firms pay apparently similar workers different wages, as suggested by Richard Lester (Lester, 1946, 1952) 80 years ago, and identified using population-wide register data the last three decades (Abowd et al., 1999; Card et al., 2016, 2018; Goldschmidt and Schmieder, 2017, Schmieder, 2023). One explanation is that firms follow different wage strategies. In contrast to goods, people act on information, and this allows workers to search for jobs (as unemployed) or new better jobs (as employed). Employers may use wages to both recruit and retain workers, to optimise with respect to turnover costs (Salop and Salop, 1976; Salop, 1979). Thus, wage offers can affect job mobility. However, there are multiple profit-maximising strategies with some firms choosing low wage strategies with high worker turnover, while others offer higher wages inducing lower worker turnover and a queue of job seekers. This is the essence of the on-the-job search model of Burdett and Mortensen (1998). The presence of labour market frictions makes this possible. Labour market frictions also provide firms with monopsonistic power allowing them to pay a mark-down on productivity (Manning, 2003; Langella and Manning, 2021).

These labour market frictions can lead to the dissolution of a job not expressed by a job destruction rate. Another set of frictions arises from the information flow related to job offers, usually expressed by a job offer arrival rate. Although often taken for granted in analyses, these frictions can be influenced by workers. For instance, expectations of future pecuniary rewards in new employment relationships influence workers in terms of how hard they look for new jobs. Thus, the probability that a worker ends an employment relationship is not only related to wage offers and factors outside the worker's control, but also how intensively they search for new jobs (Christensen et al., 2005). And yet few analyses examine the influence of earnings taxes on search behaviour.

That tax policies might affect search behaviour has theoretically been recognised since the 1970 (Kesselman, 1976) and been addressed by Gentry and Hubbard (2004) empirically. Kesselman (1976) observed that, theoretically, for most tax and transfer policies the slope of the labour-supply schedule affects the direction of search incentives. In their empirical study for the United States Gentry and Hubbard (2004) found that higher tax rates and increased progressivity decrease the probability that a head of household will move to a better job during the coming year. Thus, in practice, job search activity in the U.S. diminishes as tax levels and progressivity increase. To our knowledge, this is the sole study addressing this. We contribute to the literature by establishing whether the results hold twenty years in another country. If it is the case that labour taxes affect the search behaviour of workers, this is likely to provide firms with monopsonistic wage-setting powers with implications for the operation of the labour market and public authorities.

In this paper, we study how Norwegian workers' job mobility decisions are related to firms' wage policies under different tax regimes. We draw inspiration from the rich literature on the elasticity of taxable income with respect to marginal tax rates (Gruber and Saez, 2002; Saez et al., 2012; Kleven and Schultz, 2014). This literature highlights the negative association between marginal taxes rates and income due to reduced effort when the returns to work diminish. This literature identifies modest labour income elasticities for wage earners on average, but larger impacts whenever tax changes are large, consistent with the notion that smaller changes are attenuated by optimising frictions (for example, adjustment costs and inattention). Previous studies for Norway also indicate labour income responses following tax reforms (Aarbu and Thoresen, 2001). However, the notion that effort is affected by tax changes also has implications for firm wage policies and worker turnover. In one interpretation of efficiency wage models, firms pay wage premiums to avoid shirking workers (Shapiro and Stiglitz, 1984). If taxes on earnings change the effort distribution of workers by shifting the non-shirking wage upward then, if unchanged, workers start shirking and this will induce turnover as is seen in Piyapromdee (2018). Since performance pay is one strategy to overcome informational deficiencies concerning workers' provision of effort (Lazear, 2000; Lucifora and Origo, 2015) we differentiate between fixed pay and performance-pay. Performance pay is often associated with improved firm performance (Lazear, 2000; Lucifora and Origo, 2015) and although some argue that monetary incentives undermine intrinsic motivation and thus performance, this has been refuted in field tests (Esteves-Sorensen and Broce, 2022).

We utilise Norwegian administrative register data on the population of workers and firms during the period 2014-2019. Except for 2014, we exploit monthly data on jobs including information on work hours, hourly wages and bonuses. Data comprise roughly 3.65 million men and 3.64 million women, and slightly less than 70 million monthly observations for each gender. To avoid complications related to motherhood and family obligations affecting labour supply decisions and job search, we focus our analyses on private sector employment relationships in firms reporting to the Accounting Register, and conduct these on a yearly basis. To derive measures of firms' wage policies, we apply standard linear fixed effect regressions as they were introduced by Abowd et al. (1999) and which numerous studies have applied (Dale-Olsen, 2006; Barth and Dale-Olsen, 2009) and recently extended (Barth et al., 2021; Engbom et al., 2022; Schmieder, 2023).

During our period of observation, Norwegian earning tax schedule changes on a yearly basis. The tax schedule is stepped by brackets, and both the brackets and the marginal tax rate within brackets change. Thus, a minor change to a workers' earnings might induce a strong tax change due to moving this worker across brackets. This, together with changing tax rates within brackets, is what we exploit in the empirical analyses. These analyses comprise linear job-to-job separation regressions incorporating fixed worker effects, marginal tax rates and a measure of the predicted probability of receiving a better job offer. To derive a causal interpretation, we utilise instrumental variables (IVs) based on the information on the individual's lagged taxable labour income and total factor productivity at their employer.

The remainder of the paper is structured as follows: Section 2 describes the labour tax legislation in Norway during 2014-2019. Section 3 introduces the theoretical background which motivate our empirical analyses. Section 4 presents the data, describes the derivation of key empirical measures, and provides descriptive statistics on these key variables. In Section 5, we address our key question by studying how the job-to-job separation rates of Norwegian male workers react to changes in the marginal tax schedule and employers' wage policies. Section 6 briefly concludes.

2. The Norwegian Labour Income Tax Schedule

Norwegian labour income tax legislation comprises three tax parts which together yield a progressive labour tax schedule. Earnings above a lower threshold are subject to national insurance contributions. However, even above the limit one should never pay contributions or tax exceeding 25 percent of labour income after the deduction. All workers also pay income tax which is independent of the income level, with those living in northern Norway face a slightly lower general income tax rate (as an incentive to live in the more inhospitable climate). Finally, workers face a bracket tax depending on their income level (called surtax in 2015 and previous years). This bracket tax implies higher tax rates for income in higher brackets. Table 1 describes the different tax components, and how these changed during the period 2015 to 2020. Thus, the marginal tax rate is given by the sum of the national insurance contributions, the general income tax and the bracket tax. Thus, the marginal tax rate follows a stepped schedule as labour income increases.

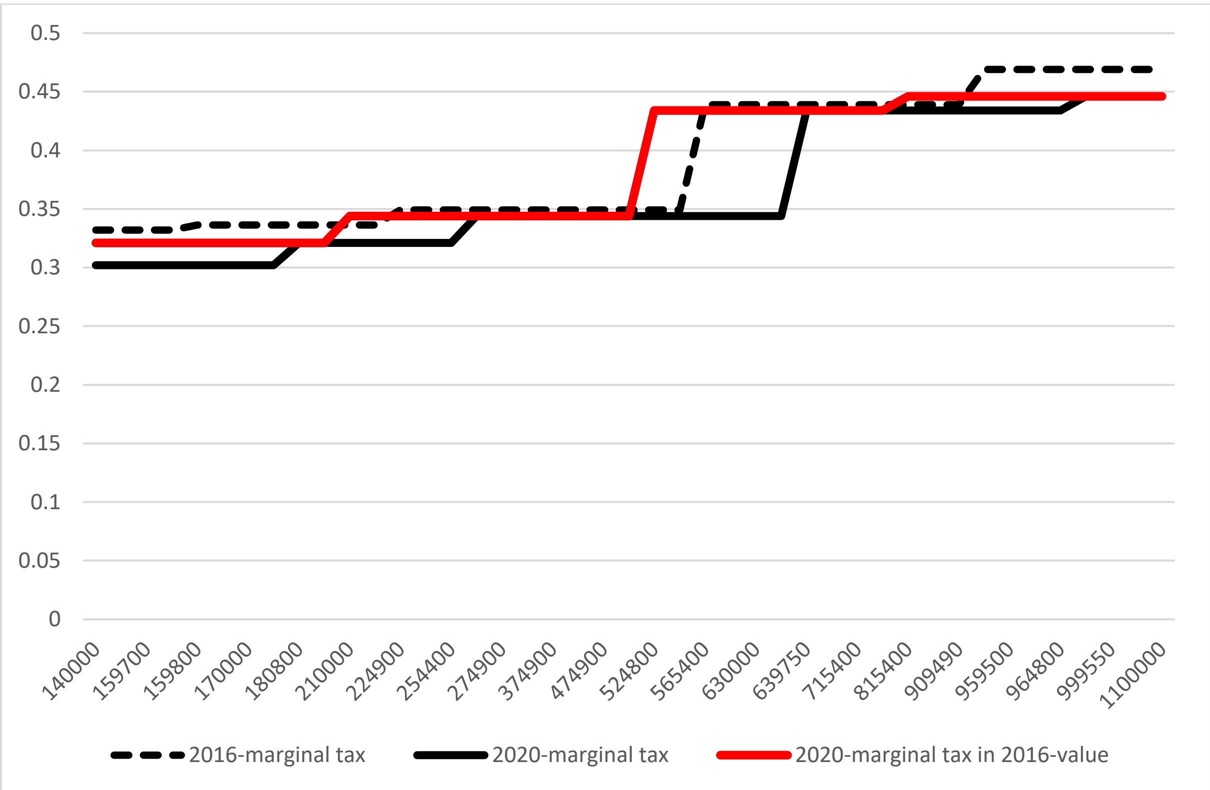
Table 1 Distribution of changes in the marginal tax (in percent). Income above baseline social services threshold (1G)

	2015	**2016**	**2017**	**2018**	**2019**	**2020**
National insurance contributions						
Basic	0.082	0.082	0.082	0.082	0.082	0.082
Lower limit/ deduction (25%)	49650	49650	54650	54650	54650	54650
General income						
Basic	0.270	0.250	0.240	0.230	0.220	0.220
Low	0.235	0.215	0.205	0.195	0.185	0.185
Bracket tax (surtax 2015)						
0	<550550:0	<159800:0	<164100:0	<169000:0	<174500:0	<180800:0
1		<224900:0.0044	<230950:0.0093	<237900:0.014	<245650:0.019	<254500:0.019
2		<565400:0.017	<580650:0.0241	<598050:0.033	<617500:0.042	<639750:0.042
3basic	<885600:0.09	<909500:0.107	<934050:0.1152	<962050:0.124	<964800:0.132	<999550:0.132
3low	<885600:0.07	<909500:0.087	<934050:0.0952	<909500:0.104	<909500:0.112	<999550:0.112
4	Else:0.120	Else:0.137	Else:0.1452	Else:0.154	Else:0.137	Else:0.137

Note: Marginal tax rate comprises national insurance contributions + general income tax + bracket tax/surtax. The low-tax areas comprise workers living in the county of Finnmark and selected municipalities in North-Troms.

During our period of observation, Norwegian workers experience tax rate changes on a yearly basis. First, both the 'basic' general income tax and the 'low' general income tax in the North fall. Second, the bracket defining the bracket tax changes over time. Third, as is seen after the bracket interval, the tax rates within the brackets change over time. Figure 1 reveals the stepped nature of the marginal tax schedule. Since the bracket tax increases slightly, particularly for middle incomes, but not at the top, thus, this implies to a certain degree a less progressive tax schedule. In addition, the general income tax declines, thus actually making the marginal tax rate less progressive. Overall, the marginal tax rates would on average decline over time, but inflation and wage drift cause labour incomes to increase. In the figure, we have added the 2020-marginal tax rates based for 2016-incomes added average wage growth. With this perspective, we see that some workers will face higher marginal taxes and others experience a drop. A minor change to a workers' earnings might induce a strong tax rate change. Between two years (and not 4 as shown here), inflation and realised wage drift might be stronger than the general reduction in marginal taxes as is seen in the tax rates.

Figure 1 Changes in the marginal tax rate and the bracket tax over time due to tax schedule changes. 2016 and 2020



Note: See Norwegian Tax Administration (see skatteetaten.no) and own calculations.

3. Theoretical Motivation

We base our theoretical motivation mainly on Christensen et al. (2005), which addresses the relationship between wage dispersion, mobility and optimising search effort under search frictions. This model embeds endogenous search intensity or search effort (depending on the expected gain from a wage offer) into the Burdett and Mortensen-model (Burdett and Mortensen, 1998). We have no intention of providing an explicit combination of these two models adding tax schedules, but we argue that it is possible to indicate or derive empirical predictions.

In this model, a firm posts a wage offer w, hires any worker accepting this offer, and pays all its workers this wage. The wage offer distribution is denoted by F(w), where F(w) represents the probability that a randomly selected wage is not greater than w. Workers search randomly for wage offers. Each worker receive job offers at a rate λs, where s is a measure of the worker's search effort. Each worker chooses search effort subject to an increasing convex search cost function $c(s)= c_0s^2$, where c_0 is a positive parameter. Finally, employment relationships are destroyed exogenously at a rate δ. As unemployed, the workers receive b and pay no tax. Let t denote the marginal tax rate. When employed, the workers receive instantaneous utility of (1-t)w. We assume that each worker maximises expected wealth, which can be expressed by:

1) $$rV_e(w) = \max_{s \geq 0}((1-t)w - c(s) + \lambda s\left[\int \max\left(V_e(w), V_e(x)\right) dF(x) - V_e(w)\right] + \delta[V_u - V_e(w)]),$$

where V_u is the value of unemployed search. Following the derivation of Christensen et al. (2005) while incorporating (1-t)-tax element, shows that Equation 1) can be rewritten as

$$V_e(w) = \max_{s \geq 0}\{\frac{(1-t)w - c(s) + \delta V_u + \lambda s\left[\int \max\left(V_e(w), V_e(x)\right) dF(x)\right]}{r+\delta+\lambda s}\}, \text{ where } V_e{}'(w) = \frac{(1-t)}{r+\delta+\lambda s(w)[1-F(w)]} > 0.$$

Then, as shown by Christensen et al., (2005), optimal search effort is given by the first order condition:

$$c'(s(w)) = \lambda \int_w^{\overline{w}} [V_e(x) - V_e(w)] dF(x) = \lambda \int_w^{\overline{w}} V_e{}'(w)[1-F(x)] dx = (1-t)\lambda \int_w^{\overline{w}} \frac{1-F(x)}{r+\delta+\lambda s(x)[1-F(x)]} dx.$$

Since c(s) is positive convex, s(w) is decreasing in w. Christensen et al. (2005) show that since search effort is not observed, one cannot identify λ and s separately, but one could recover one joint parameter comprising the search cost parameter, c_0, and λ. With a squared search cost function, this would yield $\lambda(w) = (1-t)\frac{\lambda^2}{c_0}\int_w^{\overline{w}} \frac{1-F(x)}{r+\delta+\lambda(x)[1-F(x)]}dx$, which is declining in w and t. For completeness, the expected discounted lifetime income for an unemployed worker be given by

2) $$rV_u = \max_{s \geq 0}(b - c(s) + \lambda s[\int \max(V_u, V_e(x))\, dF(x) - V_u].$$

The worker's reservation wage, R, is given by the condition $V_e(x) = V_u$, implying that search effort at unemployed equals s0=s(R), and that R=b/(1-t).

From Christensen et al. (2005: Equation 6)), we know that a firm's separation rate can be expressed as:

3) $$Q(w) = \delta + \lambda s(w)[1 - F(w)],$$

where $s'(w)<0$ and F'(w)<0 and Q expresses separation rate from the firm. $\overline{F}(w)$=1-F(w) then expresses the probability of receiving a better job offer. Incorporating taxes in the search intensity function then yields the separation function:

4) $$Q(w) = \delta + (1-t)\lambda s(w)[1 - F(w)].$$

In this separation function, firms differ pay their payment policy only by the virtue of frictions and optimising turnover behaviour, and workers optimise on search effort.

However, the classical Burdett and Mortensen (1998)-model without endogenous search effort has been extended by Piyapromdee (2018), to allow the output of a match between a worker and a firm to depend on a worker's effort level with that effort being costly for the worker. Firms monitor workers imperfectly, at a cost, and fire shirking workers if found shirking. While this model comprises many of the traits and characteristics of a standard equilibrium search model, it also comprises elements similar to the classical Shapiro and Stiglitz (1984)-model. For example, wages and monitoring are two means employers use to manage shirking. From this, reminiscent of the Shapiro and Stiglitz-model, Piyapromdee (2018) derives an equilibrium non-shirking-wage, which will be the lowest wage offered in the economy, where nobody shirks. No employed worker shirks, but the wage is higher than it would have been, given contractable effort. Adding taxes to this model, should imply that since a tax hike reduces the return to work, a tax hike would increase the non-shirking wage.

In the Piyapromdee (2018) model, effort affects worker output, firms optimize wages and monitoring to achieve profit-maximising labour supply. However, firms cannot contract on output. In a standard textbook performance pay model where the relationship between output and effort is not directly observed, the optimal solution is that the risk-neutral principal offers a constant absolute risk-averse (CARA) agent with convex effort costs, a linear contract comprising a fixed salary and a bonus depending on output. It is not within the scope of this paper to introduce performance pay into the model above. However, by introducing a labour income tax affecting the agent in the standard principal-agent model, one easily sees that the agent's optimum effort is reduced, and thus the optimum contract is changed.[1] However, the piece-rate on performance is not changed, it is the salaried part that should increase with increasing marginal taxes. Thus, changing labour taxes affects the participation constraint of the agent, and induces separations of workers to better aligned contracts between workers and employers.

In Equation 4), this will also contribute to make the m(t) a positive function of the marginal taxes. Adding labour taxes and separations due to monitoring and misalignment of wage contracts to Equation 4), then yields Equation 5):

5) $$Q(w) = \delta + m(t) + (1 - t)\lambda(w)\overline{F}(w).$$

Finally, a literature exists that argues that although a single firm might benefit from providing performance pay, from a social planner's perspective in equilibrium this induces too high-powered incentives causing more productive workers to exert too much effort (Moen and Rosén, 2005). In this literature, by increasing marginal taxes, employers will respond by providing less high-powered incentive schemes, reducing the expected rent associated with employment and reducing unemployment (Moen and Rosén, 2006).

[1] If output is given by $y=e+\varepsilon$, where e is effort and ε a zero-mean random normal-distributed shock with variance σ^2, the offered linear contract is $w=(1-t)(s+\beta y)$, the CARA risk-averse agent's effort is convex $x(e)=0.5ce^2$, the agent's optimum effort will be given by $e^*=(1-t)\beta/c$, while the optimal contract offered by the principal will be $\beta^*=1/(1+cr\sigma^2)$ and $s^*=(U^*/(1-t)r)-0.5(1-t)^2 \beta^{*2}[(1/c)-r \sigma^2]$. Thus, $\partial\beta^*/\partial t=0$ and $\partial s^*/\partial t>0$.

4. Econometric Model

Our starting point is Equation 5), which predicts that the separation rate from a workplace depends on the marginal tax rate, the probability that the worker receives a better job offer, and some exogenous reasons (not related to pay). We model the probability that worker i employed at workplace f at year t leaves for a new job at another workplace in year t+1 by the simple linear probability model expressed by Equation 6):

6) $$Q_{ift} = \delta + \alpha_t \tilde{t}_{it+1} + \alpha_F \overline{F}_{ft} + \alpha_{FT} \tilde{t}_{it+1} X \overline{F}_{ft} + \alpha_Z Z_{ift} + \xi_{ift},$$

where ξ_{ift} expresses a standard error term and Z_{ift} expresses time-varying exogeneous control variables. Our key variables are the expected marginal tax for the next year ($\tilde{t}_{it+1}$), the probability that the worker receives a better job offer ($\overline{F}_{ft}$) and the interaction between these. We implicitly let the job search intensity be a function of the marginal tax rate only added a constant (which expresses the average), i.e., $\lambda s(\mathrm{w};\mathrm{t})$=$\lambda(\alpha_F$+$\alpha_{FT}\tilde{t}_{it+1})$. Note that α_{FT} directly expresses $\lambda\partial \mathrm{s}(\mathrm{w};\,\mathrm{t})/\partial t$, and as such, we expect it to be negative. We expect [α_F+$\alpha_{FT}\tilde{t}_{it+1}$] to always be positive, a higher probability of a better job offer should always increase the separation probability. However, higher marginal tax rates affect both the shirking probability and the job search incentives and thus the sign of [α_t+$\alpha_{FT}\overline{F}_{ft}$] is ambiguous a priori.

As pointed out in Section 3, firms optimize their wage policy with respect to turnover and monitoring costs, making firms' wage policies endogenous in Equation 6). Similarly, individuals' separation decisions next year could be strongly related to the mechanisms that determine this year's labour income. Since this year's labour income also determines marginal taxes next year, we could face an omitted variable bias or bias arising from endogeneity related to workers' optimizing behaviour. Thus, to avoid these biases we introduce IVs for the marginal tax rate, the probability that the worker receives a better job offer, and the interactions. As IVs, we use firm- and year-specific total factor productivity and a synthetic marginal tax rate (and interaction). These IVs are discussed and described more in detail in Section 5.

5. Data

We utilise Norwegian administrative register data on the population of workers and firms during the period 2014-2019. During these years, we have monthly data on jobs, including information on work hours, hourly wages and bonuses. Data comprise roughly 3.65 million men and 3.64 million women, with nearly 70 million monthly observations for each gender. In total, our data comprise slightly more than 133 million observations. Our main analyses use yearly data because monthly tax changes are not sizeable. We focus on male private sector employment relationships in firms reporting to the Accounting Register. We select employment relationships active on December 5th each year. Thus, except for deriving the workplaces' wage policies, which is based on the monthly data on all employment relationships (both men and women), we utilise information on 1.15 million male workers and 5 million observations, while limiting the data to private sector employment relationships in firms reporting to the Accounting Register gives us information of 2.5 million observations on 664 thousand workers.

The quality of the data is very good, since these data comprise a linking of the Central Population Register and the Tax Authorities' registers of jobs and earnings collected for tax purposes. The wages derived from these data comprise the value of taxable fringe benefits reported to the Tax Authorities. In addition, we know their working hours. This allows us to derive a measure of hourly wages which includes the value of fringe benefits. Furthermore, we know monthly bonuses paid during the year, thus we are able to differentiate between performance pay (bonus) and fixed salaried pay.[2] Finally, when linking information from the Income Register by the workers' identifying numbers, we also get all taxable labour income, which directly let us identify the marginal tax. Our data comprise a full panel of firms and their employees, with detailed information on workers and workplaces.

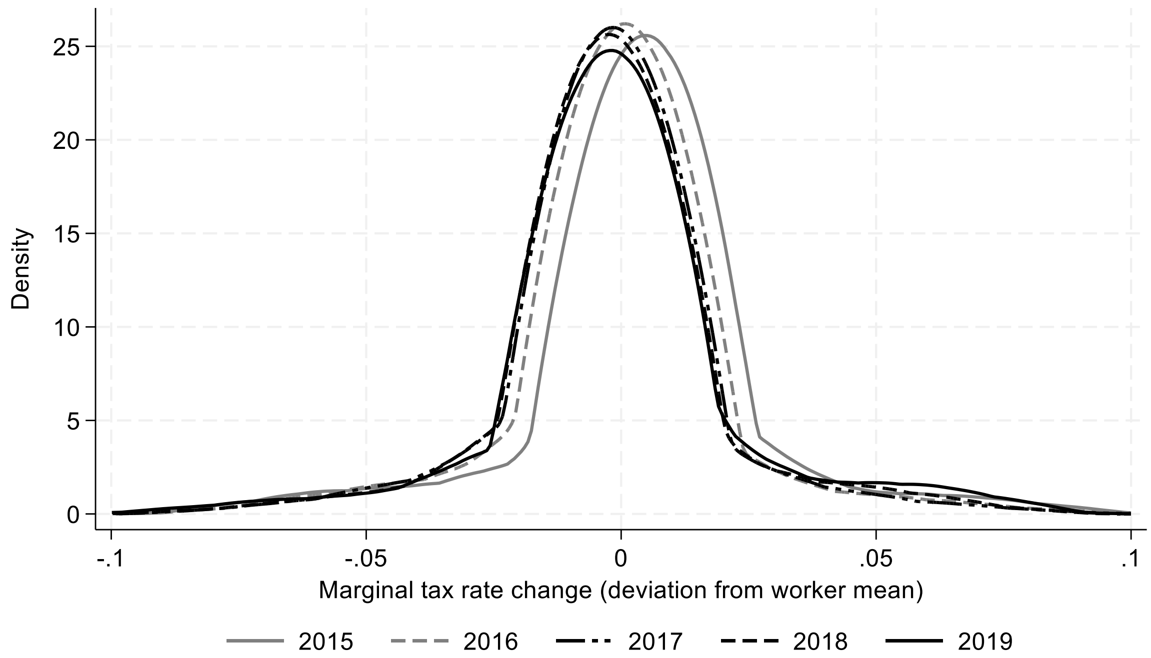
[2] Note our original data is based on monthly observations for each month in the year, thus focussing on December 15th has no impact on the definition of bonus pay jobs versus salaried jobs.

5.1 Key measures and descriptives

Job-to-job separation dummy, Q: Defined as a worker employed at workplace f at the end of year t, but moves to another workplace at year t+1.

Expected marginal tax rate for year t+1, $\tilde{t}_{it+1}$: The marginal tax rate is given by the sum of the national insurance contributions, the general income tax and the bracket tax. The rate depends on labour income and the tax schedule. The expected marginal tax for year t+1, $\tilde{t}_{it+1}$, is calculated from the tax schedule of year t+1 based on the labour income for worker i from year t multiplied by the industry and occupation-specific wage growth rate from year t-1 to t. In Figure 2, we see the development over time in the marginal tax rate within worker. Due to the reduction in the general income tax, the distributions shift downwards. However, we also see a tendency to wider distributions over time, indicating larger dispersion in marginal taxes which follows from the increase in the bracket tax (by moving brackets and changed tax rates within brackets).

Figure 2 Changes in the marginal tax rate distribution within worker



Note: Based on male employment relationship active on December 1st each year. Deviation from worker mean.

Synthetic marginal tax rate for year t+1, $t(\widetilde{I_{it-1}})_{it+1}$: The synthetic marginal tax rate for year t+1, $t(\widetilde{I_{it-1}})_{it+1}$, is calculated from the tax schedule of year t+1 based on the labour income for worker i from year t-1 multiplied by the industry and occupation-specific wage growth rate from year t-2 to t ($\widetilde{I_{it-1}}$).

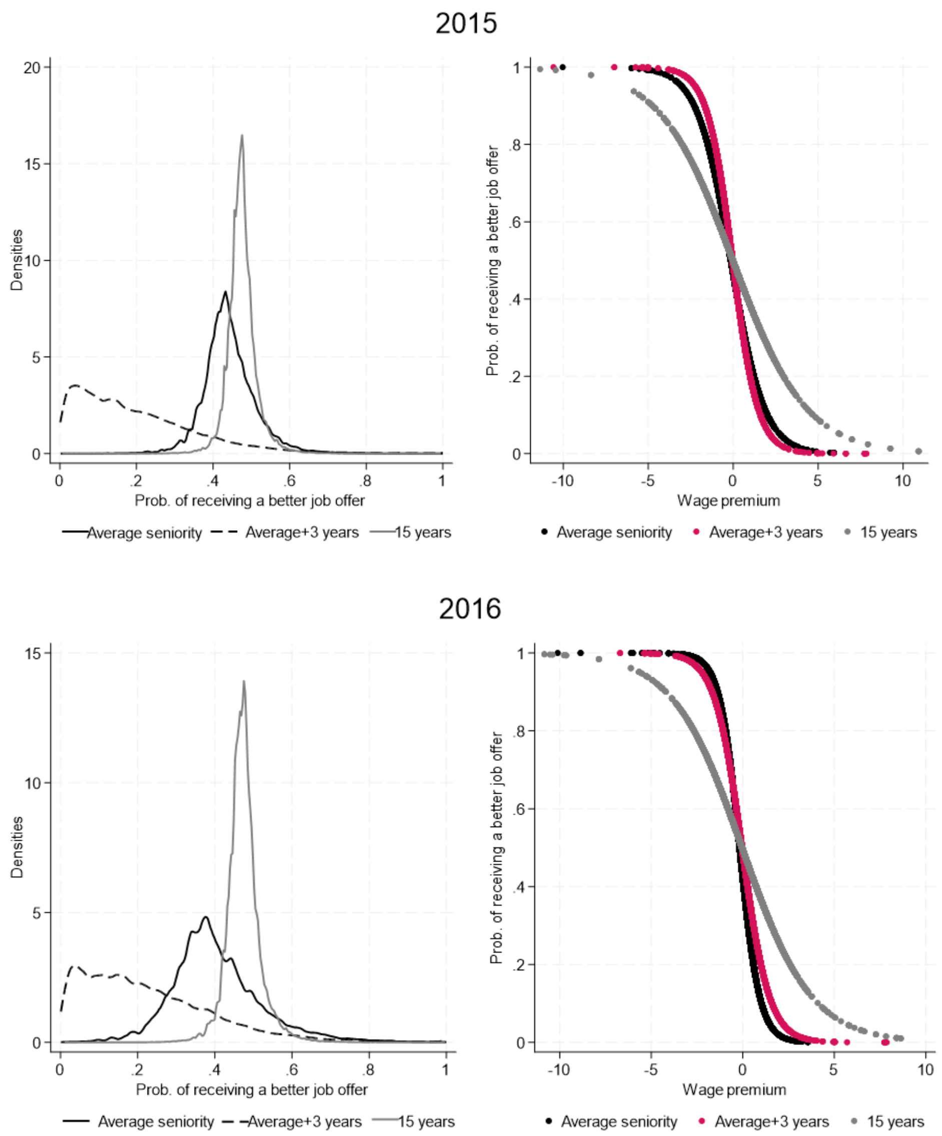
Wage policy at workplace f at time t: The wage policy at workplace f at time t is estimated based on the population-wide monthly data following Barth and Dale-Olsen (2024). We apply standard linear fixed effect regressions as they were introduced by Abowd et al. (1999) and recently extended e.g. to incorporate time-varying firm effects (Barth et al., 2021; Engbom et al., 2022; Schmieder, 2023). We start by residualizing the log hourly wage, by taking into account worker age (age and age squared measured relative to 35 years of age) and education (7 dummies) as seen in Table A3 in the appendix. Then, having added the intercept to this residualised wage, we estimate the regression given by Equation (7) for worker i employed by firm f in year y and month m:

7) $$lnW^{r}_{ifmy} = \alpha_0 + \theta_i + \Delta_{fy} + \beta_{fy}\ln{(seniority)_{ifmy}} + \varepsilon_{ifmy},$$

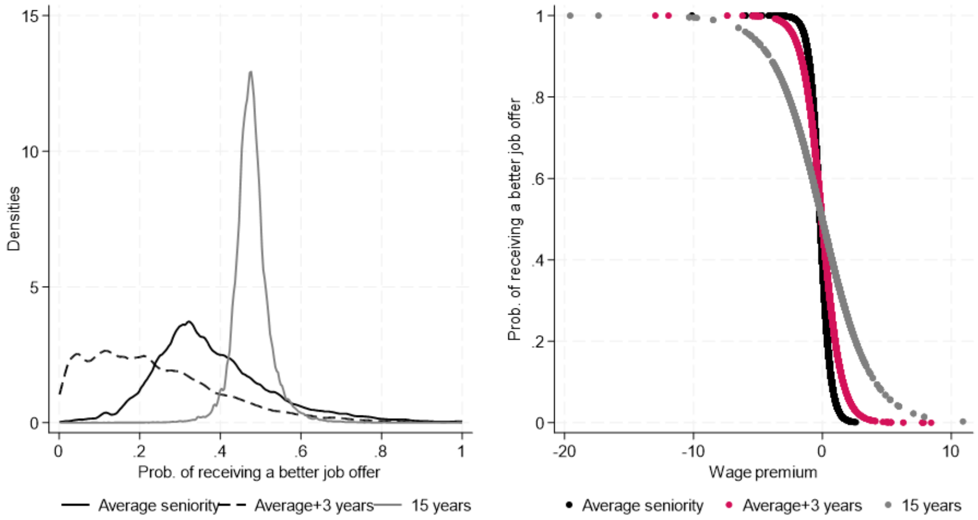
where ε_{ifmy} expresses a standard error term, θ_i expresses a worker FE. This equation identifies a standard wage premium or firm FE, Δ_{fy}, as is seen previously in the literature, but adds in firm- and year-specific returns to seniority profile, β_{fy}, i.e., allows for firm heterogeneity also in the seniority wage profile. Measured at the firm yearly average, $\Phi_{fy} = \Delta_{fy} + \beta_{fy}\overline{\ln{(seniority)_{fy}}}$, expresses the standard wage premium. We measure the wage premium of the firm at three seniority stages: at average seniority (Φ^{s}_{fy}), three years added to each workers' seniority and then averaged (Φ^{s+3}_{fy}) and after 15 years (Φ^{15}_{fy}) . These three wage premiums provide rankings of the firms based on how much higher(lower) these firms pay at different seniority levels. We assume that the distributions of the wage premiums follow a standard logistic distribution, where the mean and scale is defined by the average and standard deviation of the wage premium across firms within a year. Let $F_{fy}(\Phi^{k}_{fy})$, k=newly hired, average seniority, and 15 years, express these distributions. The probability that a worker receives a better job offer is then expressed by $\overline{F_{fy}(\Phi^{k}_{fy})}$=1-$F_{fy}(\Phi^{k}_{fy})$. When analysing quit behaviour, we let time be denoted by t (instead of y), since these are conducted on yearly observations.

In Figure 3, we map for each year the density of the probability that a worker receives a better job offer and the corresponding cumulative probability. On one hand, for each year, we see that adding 3 years of seniority to workers' observed seniority shifts workers upward in the distribution of wage offers compared to the average (to the left). On the other hand, measured at 15 years of seniority, we see a more compressed offer distribution, but with heavier tails, thus making the cumulative job offer distribution less steep.

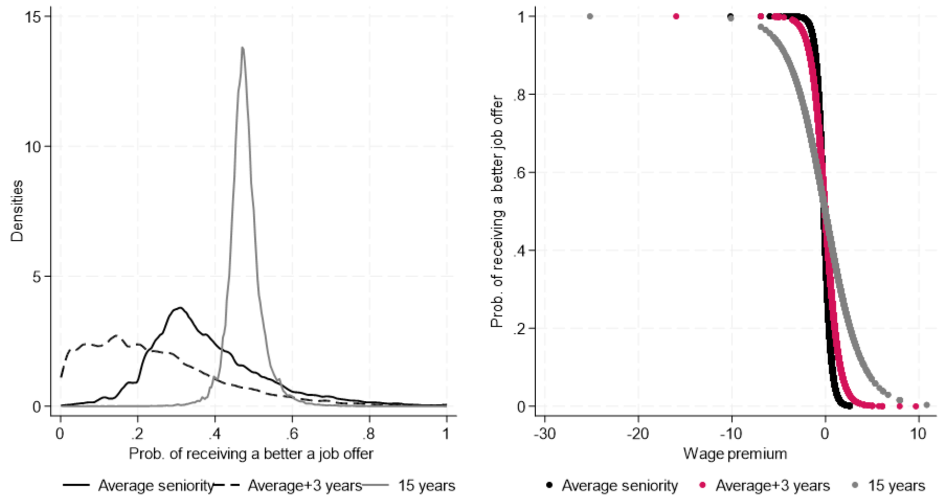
Figure 3 The predicted probability of receiving a better job offer (across workplaces)



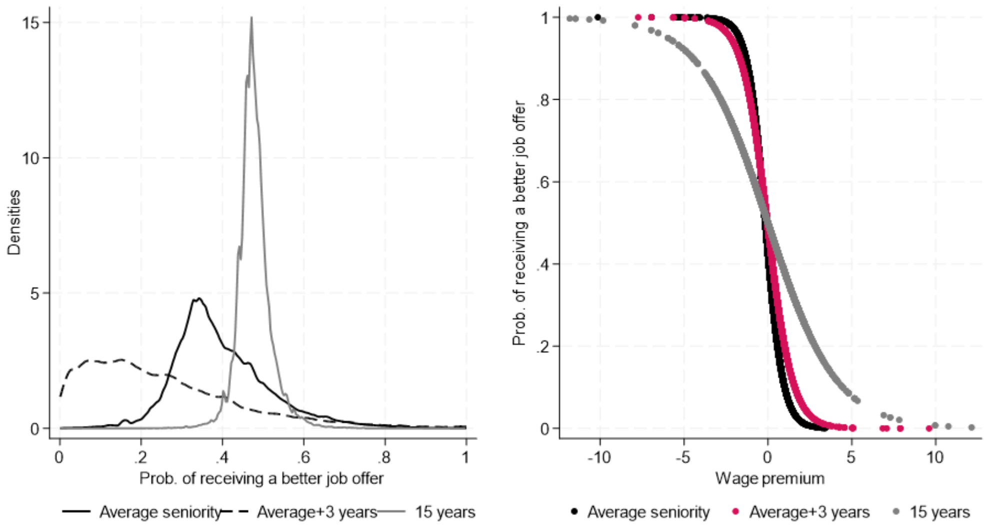
2017



2018



2019



Bonus job: we define a bonus job for worker i employed by firm f as a job where the worker receives a bonus at least once during the employment spell.

Table 2 Descriptive statistics. Workers

	2015	**2016**	**2017**	**2018**	**2019**
All workers					
Job-to-job separation rate	0.129	0.134	0.143	0.144	0.144
	(0.336)	(0.341)	(0.349)	(0.350)	(0.351)
$\tilde{t}_{it+1}$	0.390	0.383	0.381	0.381	0.381
	(0.050)	(0.050)	(0.050)	(0.051)	(0.051)
Δ^s_{ft}	-0.228	-0.292	-0.330	-0.328	-0.300
	(8.532)	(7.902)	(7.481)	(7.685)	(7.995)
β_{ft}	0.075	0.084	0.091	0.091	0.091
	(1.604)	(1.494)	(1.387)	(1.425)	(1.459)
$\overline{F_{ft}(\Delta^s_{ft})}$	0.454	0.420	0.400	0.394	0.413
	(0.083)	(0.135)	(0.167)	(0.167)	(0.137)
Seniority(months)	71.961	73.105	73.650	73.773	74.289
	(85.371)	(84.675)	(84.191)	(83.906)	(83.936)
Log I_{it-1}	12.961	13.002	13.007	13.021	13.054
	(0.737)	(0.686)	(0.698)	(0.706)	(0.699)
Bonus job$_{if}$	0.188	0.193	0.194	0.189	0.173
	(0.391)	(0.394)	(0.395)	(0.391)	(0.378)
Private sector+accounting registers workers					
Job-to-job separation rate	0.111	0.114	0.124	0.129	0.125
	(0.315)	(0.318)	(0.330)	(0.336)	(0.331)
$\tilde{t}_{it+1}$	0.391	0.383	0.381	0.381	0.381
	(0.049)	(0.050)	(0.050)	(0.051)	(0.051)
$t\widetilde{(I_{it-1})}_{it+1}$	0.395	0.388	0.384	0.382	0.381
	(0.049)	(0.050)	(0.051)	(0.053)	(0.054)
Δ^s_{ft}	-0.152	-0.237	-0.266	-0.257	-0.226
	(0.685)	(0.655)	(0.669)	(0.684)	(0.796)
β_{ft}	0.065	0.076	0.080	0.079	0.077
	(0.142)	(0.141)	(0.146)	(0.150)	(0.171)
$\overline{F_{ft}(\Delta^s_{ft})}$	0.443	0.404	0.380	0.377	0.398
	(0.070)	(0.118)	(0.147)	(0.148)	(0.120)
TFP_{ft}	0.055	0.080	0.081	0.092	0.103
	(0.361)	(0.381)	(0.383)	(0.398)	(0.407)
Seniority (months)	81.181	82.955	83.489	83.277	83.574
	(90.531)	(90.528)	(90.673)	(90.808)	(91.106)
Log I_{it-1}	12.983	13.017	13.017	13.027	13.059
	(0.712)	(0.665)	(0.682)	(0.695)	(0.686)
Bonus job$_{if}$	0.367	0.380	0.379	0.367	0.339
	(0.482)	(0.485)	(0.485)	(0.482)	(0.474)

Note: Active jobs per December each year for workers earning at least 1 G (Social Services Baseline Figure).

Table 2 provides simple descriptive statistics on our key variables over the years. We see that the job-to-job separation rate increases weakly over time. This is true for all workers and for private sector workers employed in firms reporting to the accounting register. Average seniority, however, also increases over time, indicating that employment level adjustments also occur. Marginal tax rates appear to drop weakly, while no clear pattern over time can be found concerning the probability of receiving a better job offer. However, total factor productivity clearly grows from 2015 to 2019.

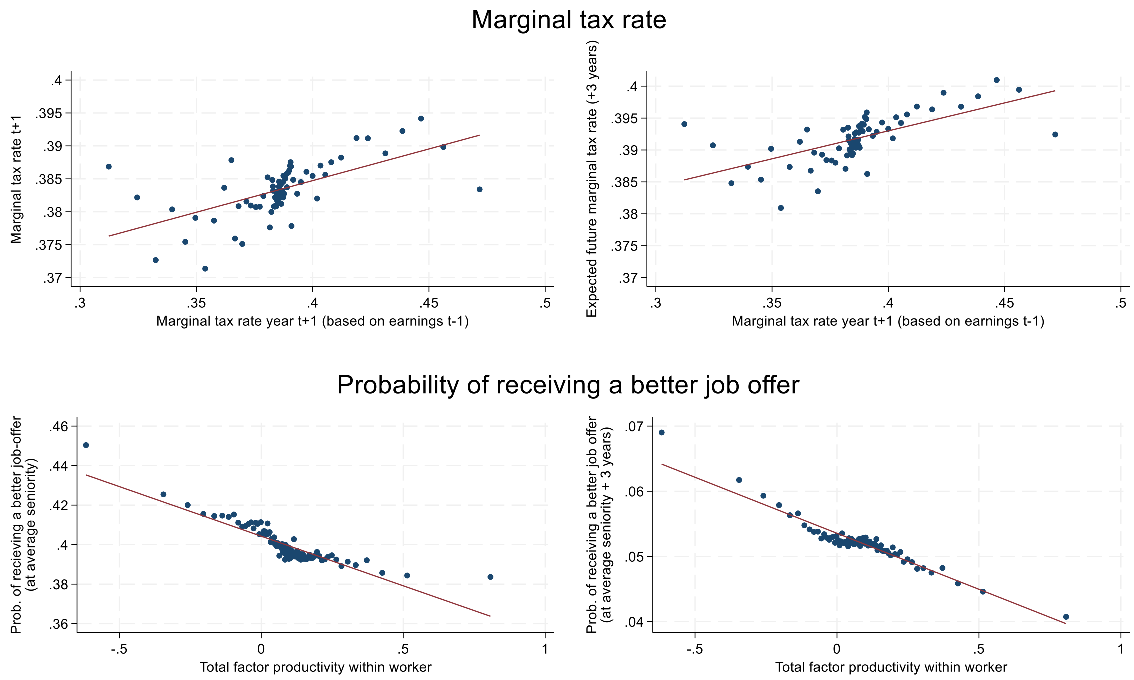
5.2 On the relationships between the different IVs and the endogenous variables

As pointed out in Section 4, it is not unreasonable to believe that changes in marginal taxes are endogenous in a job-to-job separation regression. Next year's marginal taxes are calculated based on this year' labour income, and this year' labour income can follow from workers' optimizing behaviour. Thus, to avoid the potential bias affecting the marginal tax rate in the job-to-job separation regression, we introduce a synthetic marginal tax rate as an IV. This synthetic tax rate is calculated using the tax schedule of year t+1, but rests on the lagged annual labour income from year t-2. This is less likely to be endogenous w.r.t. the separation decision in year t+1, since the lagged labour income from year t-2 and the tax schedule of year t did not generate a separation in year t. Still, we expect the synthetic marginal tax rate to be positively correlated with the next year's marginal tax rate.

Furthermore, as pointed out in Section 4, the distribution of receiving better job offers also follows from firms' optimising decisions on optimal workforce size and monitoring costs. Thus, to avoid bias from this, we follow Barth and Dale-Olsen (2024) and utilise information from the Accounting register and estimate firm- and time-specific total factor productivity based on the control function approach of Ackerman et al. (2016) and Gandi et al. (2020). We apply a Cobb-Douglas value added production function, with capital and labour as factors of production, treat labour as a free factor and utilise intermediates in the control function to avoid the standard endogeneity issues relating to capital and labour in the production function estimation literature. More productive firms are more likely to pay better, and thus total factor productivity should be negatively correlated with the probability of receiving a better job offer. By shifting the labour demand at different productivity levels, we map the labour supply curve.

In Figure 4, we observe simple bin-scatters of the relationships between the endogenous variables and the instruments measuring these relationships within worker, i.e., they are measured as deviations from worker means. We see, as expected, that the marginal tax rate is positively correlated with the synthetic tax rate, while total factor probability is negatively correlated with the probability of getting a better wage offer. The figure also shows the corresponding relationships where we have added three years of seniority to each worker and recalculated the expected marginal tax and the expected probability of receiving a better wage offer. This does not change these relationships in any qualitative way.

Figure 4 The relationship between endogenous variables and corresponding IVs



6. Results

6.1 General impact

In this section, we finally start to analyse how sensitive workers' separation decisions are to marginal taxes and firms' wage policies. We model the probability that worker i employed at workplace f at year t leaves for a new job at another workplace in year t+1 by the simple linear probability model expressed by Equation 9), where we add the marginal tax rate, the predicted probability that the worker receives a better job offer, and the interaction between the two. Time dummies and the constant express the contributions to job-to-job transitions not related to job search, taxes and pay. The estimated parameter associated with the interaction yields direct evidence on how labour taxes affect job search behaviour. Note that we have subtracted the global mean from both the tax rate and predicted probability before calculating the interaction term, so the parameters associated the tax rate and predicted probability directly yield the impacts measured at the global mean.

Table 3 presents these regression results. We start in the three first models to estimate Equation 9) on observations from both private and public sectors. Model 2 differs from Model 1 by incorporating controls for industry. However, we see that the estimates from the two models are quite similar, although the interaction effect is smaller when we take into account industry differences.

Table 3 The impact of marginal tax and pay policy changes on yearly job-to-job separations. Men.

Dep: dummy for job-to-job separation t+1	All sectors			Accounting statistics				
	Model 1 -FE	Model 2 -FE	Model 3 -FE	Model 4 -FE	Model 5 -FE	Model 6 -FE	Model 7 -FE-IV	Model 8 - FE-IV
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
$\tilde{t}_{it+1}$			**-0.105****			**-0.158****		**-0.716****
			(0.008)			(0.011)		(0.206)
$\overline{F_{ft}(\Delta_{ft}^{s})}$	**0.463****	**0.389****	**0.387****	**0.519****	**0.385****	**0.380****	**1.588****	**0.692****
	(0.003)	(0.003)	(0.003)	(0.006)	(0.006)	(0.006)	(0.054)	(0.086)
$\tilde{t}_{it+1}$ X $\overline{F_{ft}(\Delta_{ft}^{s})}$	**-0.559****	**-0.249****	**-0.272****	**-0.522****	-0.017	-0.115	**-8.424****	**-7.168****
	(0.040)	(0.004)	(0.067)	(0.067)	(0.066)	(0.067)	(1.047)	(1.137)
Strength of instruments								
Kleibergen-Paap F-value							810.42	426.33
Controls								
yearFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Worker FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lagged earnings vignitiles	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry		Yes	Yes		Yes	Yes	Yes	Yes
W	1157014	1157014	1157014	647783	647783	647783	647783	647783
N	5031549	5031547	5031547	2503178	2503178	2503178	2503178	2503178

Note: For detail on first stage estimates, see Table A2. *p<0.05, ** p<0.01, (se clustered on workers).

In Model 3 we allow a direct effect of marginal taxes on the separation rate. These estimates tell us that, on average, 10 percentage points higher marginal tax implies a reduction in the job separation rate around 1.05 percentage points. Similarly, increasing the predicted probability that a worker receives a better job offer by 1 percentage point increases the separation rate by 0.38-0.46 percentage points. Of course, these estimates just reveal correlations, still they indicate that job search is hit by labour taxes, but firms' pay policies are successful in affecting worker turnover.

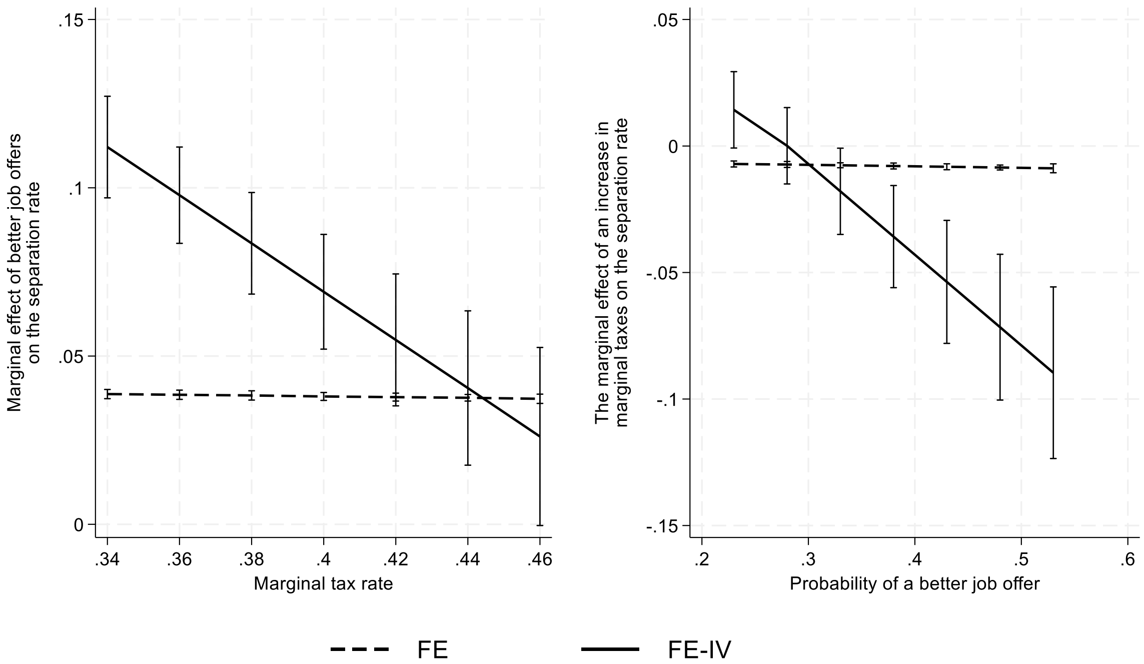
In the next three models, models 4-6, we repeat the analyses for all sectors on observations from private sectors firms linked to the accounting registers. We see that the estimates for the private sectors are quite similar. They tell us that, on average 10 percentage point higher marginal tax implies a reduction in the job separation rate around 1.5 percentage points. Similarly, increasing the predicted probability that a worker receives a better job offer by 1 percentage point increases the separation rate by 0.38-0.52 percentage points. Thus, also in these private sector firms, job search is hit by labour taxes, and firms' pay policies affect worker turnover.

However, marginal taxes and the predicted probability that a worker receives a better job offer might be considered endogenous in the separation regression. Thus, in models 7-8 we instrument these variables and their interaction by the total factor productivity and marginal taxes based on lagged labour income (and their interaction). As the Kleibergen-Paap F-value reveal, these instruments perform nicely and are strong. The first stage estimates are presented in Table A2 in the appendix. This IV-strategy has a strong impact on our estimates. From model 8, we see that on average across these workers, increasing the marginal tax by 10 percentage points causes *increased* job separation by 7.1 percentage points. Similarly, increasing the predicted probability that a worker receives a better job offer by 1 percentage point increases the separation rate by 0.069 percentage points. Still, we observe a strongly significant and negative parameter associated with the interaction term. This estimate directly tells us that the search intensity of workers drops as the marginal tax increases. Due to the interaction term, it is difficult to interpret the total effect of marginal tax changes.

To ease interpretation, Figure 5 depicts the marginal impacts on the job-to-job separation rate for increased marginal taxes and increased better job offer probabilities based on the estimates of Model

8 in Table 3. In the figure to the left, we measure the impact on the separation rate of 1 standard deviation increase in probability of a better job offer across the marginal tax distribution. We see that while the FE-estimates indicate that better job offer probabilities matter only marginally, but positively, on the separation rate, the IV-estimates reveal strongly diminishing impacts across the tax distribution. The figure to the right, we measure the impact on the separation rate of 1 standard deviation increase in the marginal tax rate across the probability of receiving a better job offer distribution. We see that while the FE-estimates indicate that higher marginal taxes matter marginally, but negatively, on the separation rate, the IV-estimates reveal strongly diminishing impacts across the probability of receiving a better job offer distribution.

Figure 5 The marginal impacts on job-to-job separation rate from marginal tax and better job offer probability changes



This means on one hand that if a worker is located at the bottom of the tax distribution, firm pay policies have a strong impact on his mobility, but as one moves upwards in the tax distribution, firm pay policies close to always continue to be important, but less so. On the other hand, if a worker is working at firm located at the bottom of the wage offer distribution, the tax policy has strong detrimental impact on this worker's search efforts and mobility decisions. If the worker is employed at a firm paying top wages, future gain from mobility is limited already and the marginal taxes have limited impact on mobility.

6.2 Convexity of the seniority profile and the role of expected future income

Due to the progressivity of the tax schedule, the marginal tax might have differential impact on mobility and job search depending on the position in the within-firm wage distribution. One source causing within-firm distribution is firms' different wage-seniority profiles. Some firms backload wages, some do not. Similarly and related, workers' mobility decision and job search might depend on expected outcomes, i.e., changes in the tax schedule might have a differential impact on job search and mobility depending workers' expectation of strong wage growth in the future, no wage growth, or negative wage growth.

In Table 4, we address the importance of firm-specific seniority profiles, future expected income and the convexity of the tax schedule. First, we estimate the residuals from a simple linear regression of the marginal tax calculated based on lagged income on year dummies, age group FE, industry FEs, lagged income vigintile Fes, and worker FE. Models 1 and 2 repeat the analyses of Model 8 of Table 3, but where we study the potential differential impacts related to growing or diminishing marginal taxes as expressed by positive or negative residuals. We see that positive shocks to the marginal tax (as expressed by the residuals), yields a twice as strong impacts than if the shocks are negative. Better job offers induce separations more strongly given negative tax shocks and under positive tax shocks. The search effort, however, appears quite similar in intensity.

Model 3 also repeats the analyses of Model 8 of Table 3, but where we measure the probability of receiving a better job offer for those working three years beyond average seniority and calculate the tax rates assuming an income growth following an additional 3 years of seniority. This marginal tax rate thus expresses a future expected tax rate conditional on continued employment at this workplace for another 3 years. Once again, we see that the underlying pattern is unchanged. However, we see that on average across these workers, the separation reducing impact of higher marginal taxes is lower, when future expected income growth has been taken into account. However, to receive a better job offer induces separations more strongly.

Table 4 The impact of marginal tax schedule and pay policy changes on yearly job-to-job separations. Men. Different seniority profiles and future expected marginal tax changes.

Dep: dummy for job-to-job separation t+1	Private sector+accounting registers			
	Model 1 -FE-IV "Negative tax shocks"	Model 2-FE-IV "Positive tax shocks"	Model 3-FE-IV	Model 4-FE-IV
	b/se	b/se	b/se	b/se
$\tilde{t}_{it+1}$	**-0.769****	**-1.656****		**-0.301***
	(0.304)	(0.567)		(0.152)
$\overline{F_{ft}(\Delta_{ft}^{s})}$	**0.930****	**0.658****		
	(0.163)	(0.086)		
$\tilde{t}_{it+1}$ X $\overline{F_{ft}(\Delta_{ft}^{s}}$	**-10.006****	**-10.525****		
	(1.955)	(2.045)		
$\overline{F_{ft}(\Delta_{ft}^{15})}$				**3.528****
				(0.430)
$\tilde{t}_{it+1}$ X $\overline{F_{ft}(\Delta_{ft}^{15}}$				**-39.654****
				(5.503)
t_{it+1}^{s+3}			**-0.311***	
			(0.140)	
t_{it+1}^{s+3} X $\overline{F_{ft}(\Delta_{ft}^{s}}$			**-7.361****	
			(1.156)	
$\overline{F_{ft}(\Delta_{ft}^{s+3})}$				
t_{it+1}^{s+3} X $\overline{F_{ft}(\Delta_{ft}^{s+3})}$			**3.612****	
			(0.086)	
First stage strength of instruments				
Kleibergen-Paap F-value	163.98	89.74	524.99	151.55
Controls				
yearFE/worker FE/industry FE/lagged income vigintile FE	Yes	Yes	Yes	Yes
W	431714	384619	647783	647783
N	1117743	912618	2503178	2503178

Note: Details on first stage estimates, available from the authors upon request. *p<0.05, ** p<0.01, (se clustered on workers).

Finally, Model 4 also repeats the analyses of Model 8 of Table 3, but where we measure the probability of receiving a better job offer for those having 15 years seniority. This provides a similar picture as that seen in Model 3, except that the search intensity appears to drop even more strongly.

6.3 Pay schemes

Firms apply different strategies to motivate workers and ensure optimum performance of employed workers. One of these strategies is to pay bonuses whenever a performance target is reached. Bonus pay can be interpreted as a method of compensating workers for effort (which they dislike) and to insure them for firm performance variation outside their control, thus eliciting better performance by workers.

In Table 5, we ask whether the presence of performance pay alters our previous findings. We repeat the analyses of Model 5 in Table 3 while adding information on performance pay. In models 1 and 2, we just add a dummy on whether the job is salaried or if pay also incorporate bonuses.

Table 5 The impact of marginal tax and pay policy changes on yearly job-to-job separations. Men. Different pay regimes.

Dep: dummy for job-to-job separation t+1	Private sector+accounting registers			
	Model 1 -FE-IV	Model 2-FE-IV	Model 3-FE-IV	Model 4-FE-IV
	b/se	b/se	b/se	b/se
Bonus pay job$_{if}$	**-0.080**[**]	**-0.080**[**]	**-0.085**[**]	**-0.075**[**]
	(0.003)	(0.003)	(0.003)	(0.003)
$\tilde{t}_{it+1}$		-0.281	**-0.716**[**]	**-0.860**[**]
		(0.197)	(0.206)	(0.209)
$\overline{F_{ft}(\Delta_{ft}^{s})}$	**1.547**[**]	**1.531**[**]	**0.679**[**]	**0.618**[**]
	(0.055)	(0.062)	(0.087)	(0.095)
t_{it+1}^{s+3} X $\overline{F_{ft}(\Delta_{ft}^{s})}$	**-8.245**[**]	**-8.490**[**]	**-7.080**[**]	**-9.459**[**]
	(1.072)	(1.184)	(1.278)	(1.401)
BonusX$\tilde{t}_{it+1}$				**0.293**[**]
				(0.055)
BonusX $\overline{F_{ft}(\Delta_{ft}^{s})}$				0.094
				(0.062
BonusXt_{it+1}^{s+3} X $\overline{F_{ft}(\Delta_{ft}^{s})}$				**7.199**[**]
				(1.562)
First stage strength of instruments				
Kleibergen-Paap F-value	811.72	442.75	427.25	200.89
Controls				
In all regressions, yearFEs, Age group Fes, Worker FEs, income vigintile FEs				
Industry			Yes	Yes
W	647783	647783	647783	647783
N	2503178	2503178	2503178	2503178

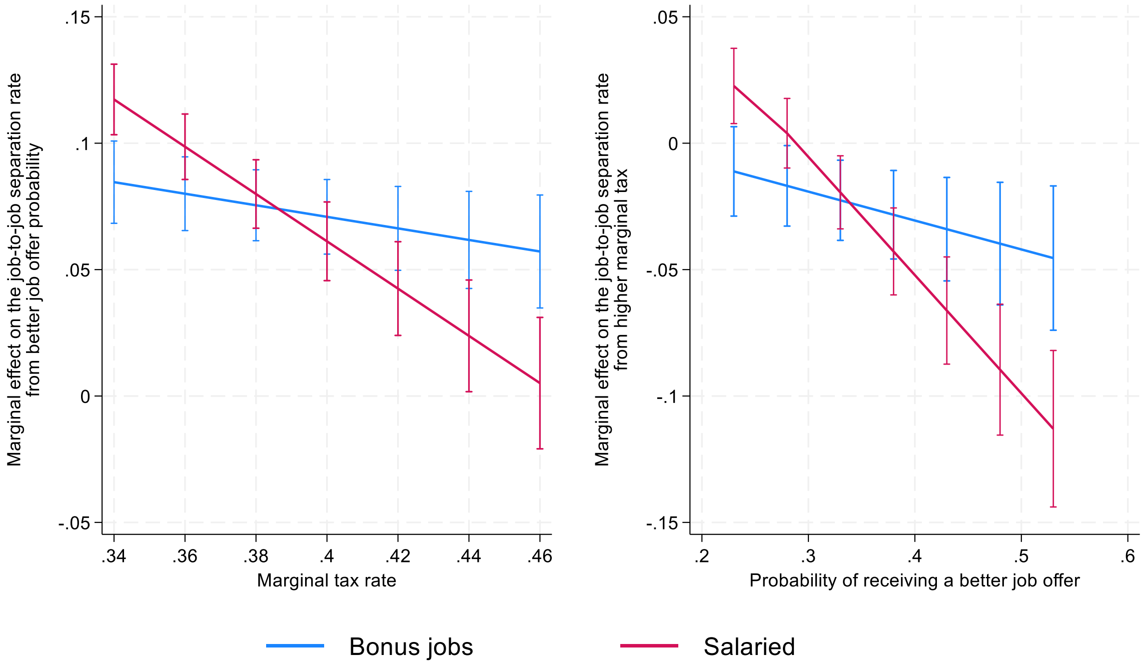
Note: Details on first stage estimates, available from the authors upon request. [*]p<0.05, [**] p<0.01, [***] p<0.001 (se clustered on workers).

In Model 3 we also add dummies for industry. Potentially our results in Model 1 could reflect industry only. The occurrences of bonuses are highly related to industries and occupations. In Model 4, we then interact bonus pay, marginal tax and predicted probability of receiving a better wage offer, making it possible to study differential impact depending on pay regime. Models 1 and 2 reveal a similar picture regarding the impact of marginal taxes and the probability that a better job offer is received. More interesting is the finding in both models that separations drop when bonus pay is utilised. This is of course only correlations, but it is still indicative that workers do not dislike bonus pay. Adding industry controls in Model 3 has minor impact. Finally, in Model 4 we see strongly significant results, but qualitatively they appear unchanged from previous findings with one exception: the job search intensity parameter becomes much more negative under fixed pay than under bonus pay.

Still, to interpret an interaction rich model such as Model 4 is difficult. Thus, to ease interpretation, we present in Figure 6 the marginal effects associated with the tax rates and the probabilities that the worker receives a better job offer. The left-hand side of the figure plots the marginal effect on the separation rate of a better job offer across the 10-90 percentiles of the marginal tax distribution. The right-hand side of the figure plots the marginal effect on the separation rate of higher marginal taxes across the 10-90 percentiles of the job offer distribution.

Figure 6 reveals differences between the two pay regimes in how wage policies and labour taxes shape the separation patterns across firms, differences which becomes significant at the very top and the very bottom of the distributions. Employees under salaried contracts behave as seen in the previous tables and figures. If a worker is located at the bottom of the tax distribution, firm pay policies have strong impact on his mobility, but as one moves upwards in the tax distribution, firm pay policies diminish in importance. On the other hand, for a worker employed by a low-paying firm, the tax policy has strong impact on this worker's search behaviour and expected gains from search and thereby strong impact on the mobility decision. When employed by a high-wage firm, on the other hand, future gain from mobility is limited which itself should reduce job search intensity. Additional changes in the tax rates should have minor impacts on search, but still induce mobility due to wage contract-effort misalignment.

Figure 6 The marginal impacts on the job-to-job separation rate from higher marginal tax and better job offers changes under different pay regimes

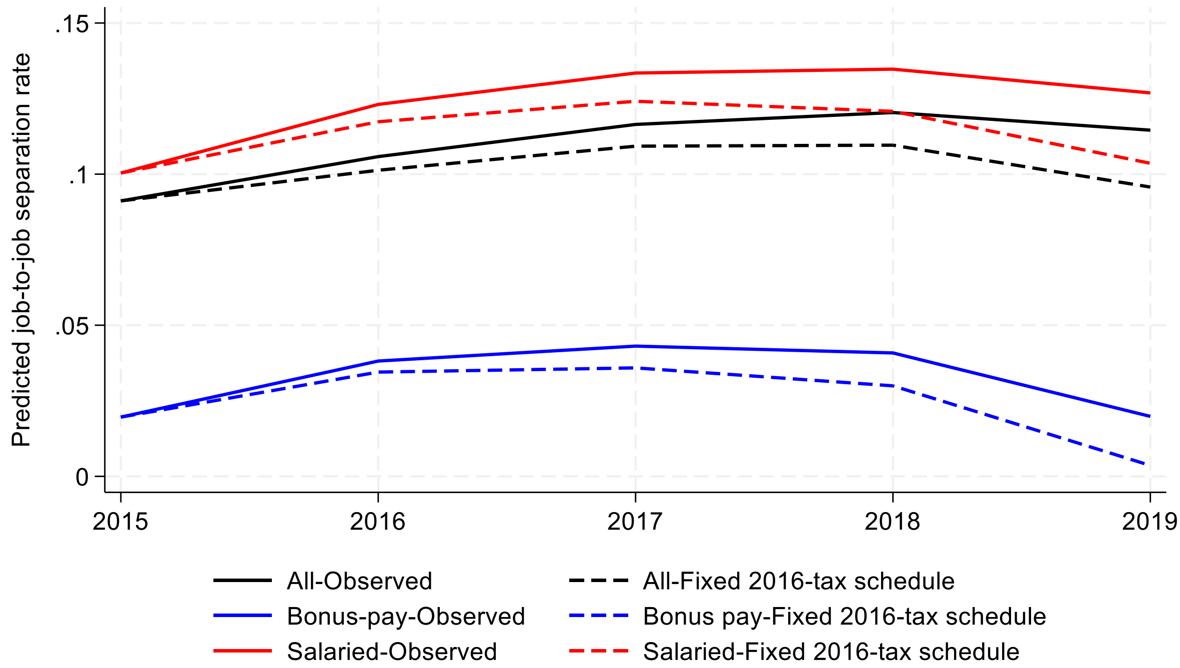


These relationships for the salaried workers appear to be true for bonus-pay workers as well, but they appear much weaker. The mobility decision of bonus-job workers appears to be more sensitive to the wage premiums of firms at high tax-levels but less at low tax-levels, and their search decision is similarly less affected by the taxes. Whether this is true because these workers have less control over their actual pay (the pay of salaried is fixed and completely transparent) making it more difficult to evaluate search and mobility cost versus mobility gains, or whether there is other aspect associated with performance pay that influence mobility we do not know.

6.4 Contrafactual development

In this final sub-section, we ask whether these changes in the tax schedule really matter, when it comes to job-to-job turnover. While the previous analyses clearly document that job-to-job turnover is affected statistically significant, these impacts might not be economically sizeable and important. To shed light on this question, we make a simple, admittedly unrealistic, exercise. First, we assume that any changes in the tax schedule does not affects the number of jobs, pay and pay structure, work effort, occupational choices or firms, except for the impact on job search and job-to-job turnover. These are highly unrealistic assumptions. Second, we fix the tax schedule to what is observed for 2016, i.e., no changes in the tax schedule occurred afterwards, except that we let the bracket intervals be inflationary adjusted by the National Insurance Scheme's Basic Amount (1G). Then we predict a contrafactual development for all workers based on Model 8 in Table 3. Similarly, to highlight the importance of pay schemes, the same strategy is used, but where we apply the estimates from Model 4 in Table 5. For comparison, we use the observed values of the marginal tax to predict the realised job-to-job-turnover-pattern over time given the observed tax-schedule changes. Figure 7 presents our results.

Figure 7 Contrafactual development of job-to-job quits based on no marginal tax changes since 2016



Note: Figure on wage distribution is based on Model 8 in Table 3, while figure on pay schemes are based on Model 4 in Table 5. The graphs Fixed 2016-schedule express the contrafactual development, where we have kept the tax schedule of 2016 fixed for all years, except that we let the labour income brackets be adjusted by the growth in the National Insurance Basic Amount (G). Except for the marginal tax rate, all other variables are measured as observed, and we also assume that the population of workers, employers, industry and occupational choices are unaffected by the tax schedule.

On average, we observe a minor growth the in the job-to-job turnover rate over time, although it diminishes slightly in 2019. Similarly, workers under bonus payment schemes experience lower turnover and less steep growth in turnover rates than salaried workers. However, for all these groups, the job-to-job turnover rates decrease considerably when we fix the tax schedule to the level and structure of 2016. The impact is stronger on average in the economy and for those employed under salaried payment schemes than for the salaried workers.

7. Conclusion

The literature on the elasticity of taxable income focuses on how taxable income changes in response to net-of-tax changes. Vattø (2020) estimates an elasticity in Norway around 0.11-0.15. Kleven and Schultz (2014) report values around 0.04-0.06 for wage earners in Denmark. In Finland, Matikka (2016) identify an elasticity of 0.16. On the other hand, Weber (2014) reports an elasticity as high as 0.86 on U.S. data from Michigan. The meta-study of Neisser (2017) reports average estimates ranging from 0.16-0.40 based on difference-in-difference analyses. Thus, the behavioural responses appear to be modest in the Nordic countries, while they can be considerably larger elsewhere. From this, one might infer that the marginal tax rates in Norway effectively ensure public finances, while contributing to redistribution.

Our starting point is somewhat different, in that our focus is on what other kinds of responses (other than solely income) might follow from tax reforms and marginal tax rates. The presence of labour market frictions provides firms with monopsonistic powers, which allow them to pay a mark-down on productivity (Manning, 2003; Langella and Manning, 2021). Another set of frictions arises from the information flow related to job offers, which can be interpreted as job search intensity. A very scarce U.S. literature indicates that labour taxes affect the search behaviour of workers, they influence and provide firms with monopsonistic power, which is probably an unintended and unknown side-effect for public authorities, since this means that the public authorities contribute to inequality in the labour market.

In this paper, we study how Norwegian workers' job mobility decisions are related to firms' wage policies under different tax regimes. We utilise population-wide Norwegian administrative register data on the population of workers and firms during the period 2014-2019, although the bulk of our analyses will pertain to the private sector employment relationships in firms reporting to the accounting register. This limitation allows us to draw causal interference.

By paying higher wages, job-to-job separation rates drop, but this negative relationship is weakened when the marginal tax increases. Higher taxes imply strictly reduced search activity, but less for workers employed in bonus jobs. For these bonus jobs, it does not matter whether the worker is located at the bottom or the top of the tax distribution, firm pay policies always have a strong impact on these workers' mobility. Thus, our findings are quite clear, public authorities' tax policies affect the search intensity of workers and thus contribute to labour market frictions, mobility and thereby wage inequality between groups, not related to productivity differentials.

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Appendix

Table A2 The impact of marginal tax and pay policy changes on yearly job-to-job separations. First stage estimates Table 3-Models 5-7

	Private sector+accounting registers		
Dep. Variable:	t_{it+1}	$\overline{F_{ft}(\Delta^{s}_{ft})}$	$\tilde{t}_{it+1}$ X $\overline{F_{ft}(\Delta^{s}_{ft}}$
	b/se	b/se	b/se
Model 5			
$t(\widetilde{I_{it-1}})_{it+1}$	**0.057*****	**-0.044*****	**-0.003*****
	(0.001)	(0.002)	(0.001)
TFP_{ft}	**0.001*****	**-0.037*****	**0.001*****
	(0.0001)	(0.001)	(0.003)
$t(\widetilde{I_{it-1}})_{it+1}$X TFP_{ft}	**-0.004*****	**0.199*****	**-0.020*****
	(0.001)	(0.004)	(0.001)
Kleibergen-Paap F-value		448.41	
Model 6			
$t(\widetilde{I_{it-1}})_{it+1}$	**0.057*****	**-0.045*****	**-0.003*****
	(0.001)	(0.002)	(0.001)
TFP_{ft}	**0.001*****	**-0.022*****	**0.001*****
	(0.0001)	(0.001)	(0.0001)
$t(\widetilde{I_{it-1}})_{it+1}$X TFP_{ft}	-0.002	**0.096*****	**-0.018*****
	(0.001)	(0.004)	(0.003)
Kleibergen-Paap F-value		453.28	
Model 7			
$t(\widetilde{I_{it-1}})_{it+1}$	**0.078*****	**-0.073*****	**-0.006*****
	(0.001)	(0.002)	(0.001)
TFP_{ft}	**0.001*****	**-0.022*****	**0.001*****
	(0.0001)	(0.001)	(0.0001)
$t(\widetilde{I_{it-1}})_{it+1}$X TFP_{ft}	**-0.008*****	**0.113*****	**-0.022*****
	(0.001)	(0.004)	(0.003)
Log I_{it-1}	**0.002*****	**0.004*****	**0.001*****
	(0.001)	(0.001)	(0.0001)
Kleibergen-Paap F-value		487.09	
Controls			
yearFE	Yes	Yes	Yes
Worker FE	Yes	Yes	Yes
Tax schedule step	Yes	Yes	Yes
Industry		Yes	Yes
Log lagged income			Yes
W	664645	664645	664645
N	2559640	2559640	2559640

*p<0.05, ** p<0.01, *** p<0.001 (se clustered on workers)

Table A3 Wage premium estimation

	Residualising (age and education)	Wage policy
		$\ln W^{r}_{ifmy}$
		b/se
Constant	**5.3454*****	**5.3617*****
	(0.0001)	(0.0001)
Age-35	**0.0156*****	
	(0.0001)	
$(\text{Age-35})^2$	**-0.0005*****	
	(0.0001)	
Education FE(7)		
Controls		
Worker FE (2961791)		Yes
WorkplaceXyearFE (1068087)		Yes
β_{fy}X ln$Seniority_{ifmy}$ (1068087)		Yes
N	133146893	133146893

$^{*}p<0.05$, $^{**}p<0.01$, $^{***}p<0.001$ (se clustered on workers)