Online Appendix to:
Coordination of Hours within the Firm

Claudio Labanca
Monash University

Dario Pozzoli
Copenhagen Business School

July 27, 2018

Abstract

Although coworkers are spending an increasing share of their working time interacting with one another, little is known about how the coordination of hours among heterogenous coworkers affects pay, productivity and labor supply. In this paper, we use new linked employer-employee data on hours worked in Denmark to first document evidence of positive correlations between wages, productivity and the degree of hours coordination – measured as the dispersion of hours – within firms. We then estimate labor supply elasticities by exploiting changes made to the personal income tax schedule in 2010. We find that hours coordination is associated with attenuated labor supply elasticity and spillovers on coworkers not directly affected by the tax change. These spillovers led to a 15% increase in the marginal excess burden from the 2010 tax reform, and if ignored, they induce substantial downward bias in estimates of the labor supply elasticity. We explain these findings in a framework in which differently productive firms choose whether to coordinate hours in exchange for productivity gains, leading more productive firms to select into coordinating hours and to pay compensating wage differentials.

JEL Codes: J31, H20, J20

A Supplementary derivations of the theoretical model

A.1 The optimal demand of consumption and leisure

Workers with skill i maximize utility (1) given an hourly wage rate w_i and an income tax rate t_i and facing the budget constraint

$$E_i \equiv \int_{\omega\in\mathbf{\Omega}} p(\omega)q_i(\omega)\,\mathrm{d}\omega \;\leq\; h_i\mathrm{w}_i(1-t_i)+T+\bar{\pi}\;\equiv Y_i, \tag{1}$$

where E_i is expenditures, Y_i is after-tax income under a lump-sum transfer T that balances the government's budget (there are no other government expenditures), and $\bar{\pi} \equiv \int_{\omega\in\mathbf{\Omega}} \pi(\omega)\mathrm{d}\omega/(n_H+n_L)$ represents the equal distribution of firm profits as dividends. A worker i's optimal product demand then is

$$q_i^*(\omega) = \left[\frac{p(\omega)}{P}\right]^{-\sigma} Q_i, \tag{2}$$

and labor supply is implicitly given by

$$\eta\, v'\,(\ell^*\,) = \frac{\mathrm{w}_\mathrm{i}^*\,(1-t_i)}{P\,Q}, \tag{3}$$

for the (exponentiated) price index $P^{\sigma-1} \equiv \int_{\omega\in\mathbf{\Omega}} p(\omega)^{-(\sigma-1)}\,\mathrm{d}\omega$. Finally, note that in optimum, $E_i = PQ_i$.

A.2 Wage-hours function and optimal hours: the case of an additive separable utility function

Since the indifference condition (2) implicitly defines the wage rate as a function of the hours worked, it can be used to express $\hat{\mathrm{w}}'(\hat{h})$ in terms of marginal utilities. Thus, starting from

$$\Phi(\hat{\mathrm{w}}_\mathrm{i},\hat{h}) = U\left(\mathrm{P}^{-1}\hat{\mathrm{w}}_\mathrm{i}\,(1-t_i)\,\hat{h}+P^{-1}(T\bar{\pi}),1-\hat{h}\right) - U\left(\mathrm{w}_\mathrm{i}^*\,(1-t_i)h_i^*++P^{-1}(T\bar{\pi}),1-h_i^*\right) = 0, \tag{4}$$

we have

$$\hat{\mathrm{w}}_i'(\hat{h}) = -\left(\frac{\partial\Phi(\hat{\mathrm{w}}_\mathrm{i},\,\hat{h})}{\partial\hat{h}}\right)\left(\frac{\partial\Phi(\hat{\mathrm{w}}_\mathrm{i},\,\hat{h})}{\partial\hat{\mathrm{w}}_\mathrm{i}}\right)^{-1} = -\frac{[P^{-1}U_C\hat{\mathrm{w}}_\mathrm{i}(1-t_i)-U_\ell]}{P^{-1}U_C\hat{h}(1-t_i)}. \tag{5}$$

Under decreasing marginal rates of substitution

$$\hat{\mathrm{w}}_i'(\hat{h}) = -\frac{[P^{-1}U_C\hat{\mathrm{w}}_{\mathrm{i}}(1-t_i) - U_\ell]}{P^{-1}U_C\hat{h}(1-t_i)} \begin{cases} <0 & \text{if } \hat{h} < h_i^* \\ =0 & \text{if } \hat{h} = h_i^* \\ >0 & \text{if } \hat{h} > h_i^* \end{cases}. \tag{6}$$

Assuming that the utility function is additive separable as in (1), the second derivative of the wage rate with respect to hours is

$$\hat{\mathrm{w}}_i''(\hat{h}) = -\left[\frac{\hat{\mathrm{w}}_i'\,\hat{h} - \hat{\mathrm{w}}_i}{\hat{h}^2}\right] - \left[\frac{P}{\hat{h}^2(1-t_i)}\right]\frac{U_\ell}{U_C} - \frac{U_C U_{ll} + U_{CC}U_\ell\left[P^{-1}\hat{\mathrm{w}}_i'\,\hat{h}\,(1-t_i) + P^{-1}\hat{\mathrm{w}}_{\mathrm{i}}(1-t_i)\right]}{P^{-1}U_C^2(1-t_i)\,\hat{h}}. \tag{7}$$

Thus, rearranging the terms in (7), we have[1]:

$$\hat{\mathrm{w}}_i''(\hat{h}) = -\frac{2}{\hat{h}}\,\hat{\mathrm{w}}_i' - \frac{U_C U_{ll} + U_{CC}U_\ell\left[P^{-1}\hat{\mathrm{w}}_i'\,\hat{h}\,(1-t_i) + P^{-1}\hat{\mathrm{w}}_i\,(1-t_i)\right]}{P^{-1}U_C^2\,(1-t_i)\,\hat{h}}. \tag{8}$$

In (8), we notice that

$$\left[P^{-1}\hat{\mathrm{w}}_i'\,\hat{h}\,(1-t_i) + P^{-1}\hat{\mathrm{w}}_i\,(1-t_i)\right] = \frac{-P^{-1}U_C\hat{\mathrm{w}}_{\mathrm{i}}(1-t_i) + U_\ell + P^{-1}U_C\hat{\mathrm{w}}_{\mathrm{i}}(1-t_i)}{U_C} = \frac{U_\ell}{U_C} > 0. \tag{9}$$

Assuming $U_C > 0$, $U_\ell > 0$, $U_{CC} < 0$ and $U_{ll} < 0$, it follows that the second term in (8):

$$-\frac{U_C U_{ll} + \frac{U_{CC}U_\ell^2}{U_C}}{P^{-1}U_C^2(1-t_i)\,\hat{h}} > 0. \tag{10}$$

(10) captures the loss in terms of marginal utilities from working one extra hour. This loss requires wage rates to increase at an increasing rate when hours increase. Combining (10) and (8), we have

$$\hat{\mathrm{w}}_i''(\hat{h}) = -\frac{2}{\hat{h}}\,\hat{\mathrm{w}}_i' - \frac{U_C U_{ll} + \frac{U_{CC}U_\ell^2}{U_C}}{P^{-1}U_C^2(1-t_i)\,\hat{h}}. \tag{11}$$

If $\hat{h} = h^*$ since $\hat{\mathrm{w}}_i'(\hat{h}) = 0$, then $\hat{\mathrm{w}}_i''(\hat{h}) > 0$. If $\hat{h} < h_i^*$ then $\hat{\mathrm{w}}_i'(\hat{h}) < 0$ and $\hat{\mathrm{w}}_i''(\hat{h}) > 0$. Finally, if $\hat{h} > h_i^*$, then $\hat{\mathrm{w}}_i'(\hat{h}) > 0$ and the sign of $\hat{\mathrm{w}}_i''(\hat{h})$ is ambiguous. Using (5) to rearrange (11) $\hat{\mathrm{w}}_i'' > 0$ implies

$$2\frac{\hat{\mathrm{w}}_i(1-t_i)}{P} > \frac{U_\ell}{U_C} + \frac{U_{\ell\ell}}{U_C} - \frac{U_{CC}U^2}{U_C^2}. \tag{12}$$

[1]The rearrangement here involves substituting (5) into the first term on the right-hand side of (7). Then we take the sum of the first two terms. To gain a more transparent intuition of the results, we then express the sum of the first two terms in (7) in terms of w'(h).

This is the case when P is particularly small and/or $U_{\ell\ell}$ is particularly high.

A.3 Optimal hours worked in coordinated firms: derivations

The first-order conditions relative to the minimization problem of section 2.3.2 are

$$\hat{\mathrm{w}}_{\mathrm{L}}' \hat{h} \hat{n}_L + \mathrm{w}_{\mathrm{L}} \hat{n}_L + \hat{\mathrm{w}}_{\mathrm{H}}' \hat{h} \hat{n}_H + \hat{\mathrm{w}}_{\mathrm{H}} \hat{n}_H = G_H \hat{n}_H + G_L \hat{n}_L, \tag{13}$$

$$G_H = \hat{\mathrm{w}}_{\mathrm{H}}(\hat{h}), \tag{14}$$

$$G_L = \hat{\mathrm{w}}_{\mathrm{L}}(\hat{h}), \tag{15}$$

$$\hat{\gamma}\phi\, G(\hat{n}_L\, \hat{h},\, \hat{n}_H\, \hat{h}) = \, \hat{q}(\omega). \tag{16}$$

Replacing G_H from (14) and G_L from (15) into (13) we obtain

$$\hat{\mathrm{w}}_{\mathrm{H}}'(\hat{h}) \hat{n}_H \hat{h} + \hat{\mathrm{w}}_{\mathrm{L}}' \hat{n}_L \hat{h} = 0, \tag{17}$$

dividing by $\hat{h}$ we obtain condition (4).

The optimality condition (4) implicitly defines optimal hours in coordinated firms as a function of the marginal tax rate faced by high-skilled workers. Thus it can be used to obtain the derivative of $\hat{h}$ with respect to the tax rate t_H. Defining the implicit function

$$\Phi_{t_H}(h, t_H) = \hat{\mathrm{w}}_{\mathrm{H}}'(\hat{h}) + \alpha \hat{\mathrm{w}}_{\mathrm{L}}' = 0, \tag{18}$$

we have

$$\frac{d\hat{h}}{dt_H} = -\left(\frac{\partial \Phi_{t_H}}{\partial t_H}\right)\left(\frac{\partial \Phi_{t_H}}{\partial \hat{h}}\right)^{-1}. \tag{19}$$

Using (5) to solve for the numerator in (19) gives equation (6).

A.4 The product market: prices, revenues and profits

A firm producing variety ω maximizes its profits by setting the variety-specific price $p(\omega)$ given total demand. By summing the demand indexes Q_i^* and $\hat{Q}_i$ over all consumers of different skills and with employment in different labor markets, we arrive at aggregate consumption Q, which firms take as given under monopolistic competition. However, in the product market for their individual variety ω, firms are monopoly price setters, taking demand for their variety into account:

$$q(\omega) = [p(\omega)/P]^{-\sigma} Q,$$

after summing (2) over all consumer groups.[2] The generic profit maximization problem is

$$\pi(\omega) \equiv \max_{p(\omega)} p(\omega)\, q(\omega) - \frac{\mu}{\gamma\phi}\, q(\omega) - F \qquad \text{s.t.} \quad q(\omega) = \left[\frac{p(\omega)}{P}\right]^{-\sigma} Q, \tag{20}$$

where the constant μ is the marginal production cost (given constant returns to scale). Note that $F = 0$, $\gamma = 1$ and $\mu = \mu^*$ in the non-coordinated market, whereas $F = \hat{F}$, $\gamma = \hat{\gamma} > 1$ and $\mu = \hat{\mu}$ for firms that enter the coordinated market. Applying Euler's rule to constant-returns-to-scale production (with homogeneity of degree one in production factors), the minimized cost function in uncoordinated firms takes the form

$$C^*(\omega) = \frac{\mu^*}{\phi}\, q^*(\omega) \qquad \text{with} \quad \mu^* \equiv \mu(\mathrm{w}_H^*, \mathrm{w}_L^*, h_H^*, h_L^*),$$

where μ^* is the Lagrange multiplier of the constrained minimization problem (3), and $q^*(\omega) = \phi\, G(n_H^* h_H^*, n_L^* h_L^*)$, whereas the function $\mu(\cdot)$ also depends on the parameters of the production function. In coordinated firms the minimized costs function takes the form:

$$\hat{C}(\omega) = \frac{\hat{\mu}}{\hat{\gamma}\phi}\, \hat{q}(\omega) \qquad \text{with} \quad \hat{\mu} \equiv \mu(\hat{\mathrm{w}}_H, \hat{\mathrm{w}}_L; \hat{h}(\eta, P, t_H, t_L; \phi)),$$

where $\hat{\mu}$ is the Lagrange multiplier of the constrained minimization problem in Section 2.3.2 and $\hat{q}(\omega) = \hat{\gamma}\, \phi\, \hat{h}\, G(\hat{n}_H, \hat{n}_L)$. The optimal prices resulting from (20) are

$$p^*(\omega) = \frac{\sigma}{\sigma - 1} \frac{\mu^*}{\phi} \qquad \text{and} \qquad \hat{p}(\omega) = \frac{\sigma}{\sigma - 1} \frac{\hat{\mu}}{\hat{\gamma}\phi}. \tag{21}$$

By profit maximization (20), firms with the same ϕ choose the same optimal price–over-cost markups, production and revenue, regardless of their specific product variety ω. We therefore adopt the simplifying notation that optimal prices are $p(\phi)$, optimal production is $q(\phi)$, and optimal revenues are $p(\phi)q(\phi)$. Summing (2) over all consumer groups, total demand for a firm's output can be written as $q(\phi) = [p(\phi)/P]^{-\sigma} Q$ and the firm's equilibrium revenues are

$$p(\phi)q(\phi) = [p(\phi)/P]^{-(\sigma-1)} PQ = [p(\phi)/P]^{-(\sigma-1)} E,$$

where $E = PQ$ is economy-wide expenditure, aggregated over all consumer groups. By (20),

[2] Concretely, aggregate demand is $Q \equiv \sum_{i=H,L} N_i^* Q_i^* + \hat{N}_i \hat{Q}_i$, where $Q_i^* = E_i^*/P$ and $\hat{Q}_i = \hat{E}_i/P$ with $E_i^* = h_i^* w_i^* (1 - t_i) + T$ and $\hat{E}_i = \hat{h}\hat{w}_i(1 - t_i) + T$.

the profits of a firm with productivity ϕ are

$$\pi(\phi) = \frac{p(\phi)q(\phi)}{\sigma} - F = \left[\frac{p(\phi)}{P}\right]^{-(\sigma-1)} \frac{E}{\sigma} - F.$$

Using optimal prices (21) for non-coordinated and coordinated firms in this profit relationship, we can state a firm ϕ's prospective profits in the two labor market segments as in Section 2.3.3.

A.5 Tax changes and wage rates with coordination

In the setting described in Section 2, a tax change that affects coordinated hours also affects wage rates through the wage-hours function. The sign of the effect on wages depends on whether the income or the substitution effect prevails and on whether high-skilled workers desire to work more or less hours than low-skilled workers. Figure 4 shows the case in which the tax rate decreases, the income effect prevails and high-skilled workers desire to work more hours (i.e., $h_H^* > h_L^*$). In this case, a decrease in the tax rate moves the equilibrium from A to B. At the new equilibrium, both $\mid \mathrm{w}'_{\mathrm{H}} \mid$ and $\mid \mathrm{w}'_{\mathrm{L}} \mid$ are lower, implying lower wage rates for both high-skilled and low-skilled workers. Intuitively, the lower supply of hours induced by the tax drop moves low-skilled workers (who work more than desired at the original equilibrium) closer to the optimum. This shift results in lower wage premiums for low-skilled workers. For high-skilled workers, the reform drives down both their coordinated and desired hours worked. Coordinated hours, however, decrease less than the desired hours, thus shrinking the gap between the optimum and the coordinated hours. This shift results in lower wage rates. The other possible cases can be derived following a similar reasoning, and they lead to the conclusion that wage rates and hours move together if, in equilibrium, low-skilled workers prefer to work less than high-skilled workers, while hours and wages move in opposite directions if low-skilled workers prefer to work more.

Unfortunately, the specific setting of our empirical analysis does not allow us to distinguish between the two cases. In fact, using the instrumental variable approach described in Section 5, we fail to find significant effects of the 2010 tax reform on wage rates (Table D.10), which may be due to the fact that the spillover effects on hours were too small to generate a significant wage effect.

A.6 A framework for the empirical model of taxation with spillovers

Similar to Gruber and Saez (2002), we assume that type i workers maximize a utility function that depends on consumption (c) and labor income (z). For simplicity, we assume that labor income is given as the product of wage rates and hours worked such that the utility function takes the following form: $U_i\left(c_i,\, h_i \mathrm{w_i}\right)$. Following Kleven and Schultz (2014), we define $c_i = z_i - T_i\left(z\right) = z_i\left(1-\tau_i\right) + y_i$, where $T_i\left(z\right)$ is tax liability, $\tau_i = T_i'()$ and virtual income is defined as $y_i = z_i\tau_i - T_i\left(z\right)$. In uncoordinated firms, the wage rate is exogenously set by the market at $\mathrm{w_i} = \mathrm{w_i^*}$. The optimal choice of hours is then a function of the marginal net-of-tax rate, virtual income and the exogenous wage rate: $h_i = h\,\left(1-\tau_i\,, y_i\,, \mathrm{w_i^*}\right)$. In this framework, changes in τ_i and y_i affect the supply of hours as follows:

$$dh_i = -\frac{\partial h}{\partial\left(1-\tau_i\right)}\,d\tau_i + \frac{\partial h}{\partial y_i}\,dy_i \tag{22}$$

Defining the uncompensated elasticity of hours with respect to the net-of-tax rate as $\alpha_2 = \left[\left(1-\tau_i\right)/h_i\right]\left[\partial h/\partial\left(1-\tau_i\right)\right]$ and the income elasticity as $\alpha_3 = \left(1-\tau_i\right)\left[\partial h/\partial y_i\right]$, then the terms in equation (22) can be rearranged as

$$\frac{dh_i}{h_i} = -\alpha_2\,\frac{d\tau_i}{\left(1-\tau_i\right)} + \alpha_3\,\frac{dy_i}{h_i\left(1-\tau_i\right)} \tag{23}$$

Using a log-log specification, equation (23) can be estimated as

$$\Delta log(h_i) = \alpha_0 + \alpha_2\,\Delta log\left(1-\tau_i\right) + \alpha_3\,\Delta log(y_i) + \varepsilon_i \tag{24}$$

The compensated elasticity of hours to a net-of-tax rate change (ζ^c) can be obtained from α_2 and α_3 using the Slutsky equation: $\zeta^c = \alpha_2 - \alpha_3$.

If firms coordinate hours among workers, then the supply of hours by type i workers in a firm will also depend on the hours worked by other types of workers in the same firm. Hours worked by other types will, in turn, depend on the net-of-tax rate, the virtual income and the market wage rate that the other types face. We assume there is one type of other workers, indexed as $-i$. Hours worked by type i workers can then be expressed as $h_i = h\,\left(1-\tau_i\,, y_i\,, h_{-i}\,, \mathrm{w_i^*}\right)$, where $h_{-i} = h\,\left(1-\tau_{-i}\,, y_{-i}\,, \mathrm{w_{-i}^*}\right)$. In defining h_{-i}, we assume that hours worked by type $-i$ workers are independent of the tax rate and virtual income faced by type i workers. This assumption, while restrictive, fits well our empirical setting in which tax changes experienced by low-skilled workers (type i) are of small magnitude and do not affect hours worked by high-skilled (type $-i$) workers in a significant way. We assume that the assignment of workers to a type does not change when the tax rate changes. This finding is consistent with our framework, in which workers are defined as high- or low-skilled based on the marginal tax rate that they face prior to the reform and the mechanical marginal tax rates that they face after the reform.

Changes in τ_i, y_i, τ_{-i} and y_{-i} affect the supply of hours of type i workers as follows:

$$\frac{dh_i}{h_i} = -\alpha_2 \frac{d\tau_i}{(1-\tau_i)} + \alpha_3 \frac{dy_i}{h_i\,(1-\tau_i)} + \frac{\partial h}{\partial h_{-i}} \frac{1}{h_i} \left[-\beta_2 \frac{h_{-i}\, d\tau_{-i}}{(1-\tau_{-i})} + \beta_3 \frac{dy_{-i}}{(1-\tau_{-i})} \right] \tag{25}$$

In a log-log specification, equation (25) can be estimated using the following empirical model:

$$\Delta log(h_i) = \alpha_0 + \alpha_1 \Delta \widehat{log\,(h_{-i})} + \alpha_2 \Delta log\,(1-\tau_i) + \alpha_3 \Delta log(y_i) + \varepsilon_i \tag{26}$$

Where $\Delta \widehat{log\,(h_{-i})}$ is predicted using $\Delta log\,(1-\tau_{-i})$ and $\Delta log(y_{-i})$ as instruments.

A.6.1 Marginal excess burden with hours coordination

We measure the marginal excess burden (MEB) as the ratio of the change in tax revenues due to behavioral responses (dB) to total changes in tax revenues (dR). Abstracting from spillovers, we have

$$MEB = \frac{dB}{dR} = \frac{dB_H + dB_L}{dM_H + dM_L + dB_H + dB_L}$$

where the change in tax revenues due to behavioral responses for a type i worker is defined as $dB_i = (\, e_i \cdot h_i \cdot w_i \cdot \frac{\tau_i}{1-\tau_i} d\tau_i) \times N_i$, and e_i, h_i, w_i, τ_i, N_i are, respectively, the elasticity of type i hours, average hours, average wage rates, average marginal tax rates and the number of type i workers in our sample. $d\tau_i$ measures the average change in marginal tax rates on labor income due to the reform among type i workers. The mechanical change in tax revenues is defined as $dM_i = d\tau_i \cdot h_i \cdot w_i$ and captures losses (gains) in revenues due to changes in the tax schedule absent behavioral changes.

In our setting, e_L is insignificant, so dB_L can be ignored. In comparing the MEB with coordination relative to the MEB that would be implied by low coordination, we first estimate MEB assuming $e_H = -0.05$, which is the elasticity across all firms. Then we compute MEB under $e_H = -0.1$, which is the elasticity in low-coordination firms (column 5 in Table 5).

Including spillovers, we have

$$MEB^{Spillover} = \frac{dB^{Spillover}}{dR} = \frac{dB_L^{Spillover} + dB_H + dB_L}{dB_L^{Spillover} + dM_H + dM_L + dB_H + dB_L}$$

where $dB_L^{Spillover} = e_L^{Spillover} \cdot (dh_H/h_H) \cdot w_L \cdot h_L \cdot \tau_L$. Here, $e_L^{Spillover}$ is the elasticity of low-skilled hours to the hours of high-skilled coworkers, and dh_H is the change in hours of high-skilled workers due to the reform. In practice, we consider spillovers from normal hours only because they have better power in first-stage regressions (column 3 in Table 7).

B Further institutional details and data descriptions

B.1 The overtime and vacation time regulation in Denmark

Overtime work is defined in the large majority of collective agreements as the number of weekly hours worked beyond the normal hours set in the employment contract. In order to remunerate overtime work, there are two options: i) an hour of paid leave for each hour of overtime work or ii) an increase in the hourly wage according to the rates set in the collective agreements.[3] Many agreements, for example, set the overtime premium to 50% for the first three hours of overtime and to 100% for overtime over three hours. Work on Sundays and during public holidays is also considered overtime work, which is usually rewarded with a 100% increase in the hourly rate. Collective agreements generally establish a cap on overtime hours per week unless explicitly agreed upon differently by the employer and the union representatives at the company level.[4]

Moreover, overtime work is also indirectly affected by two laws regarding working time. The first law states that every worker is entitled to rest at least 11 hours per day on average and at least one day per week (Health and Safety Act, passed in 1996).[5] The daily rest period of 11 hours can be reduced by a local agreement, even though it cannot be below 8 hours per day on average.

[3]This is not the case for salaried workers, who are not entitled to overtime pay.

[4]In the manufacturing sector, the cap on overtime work is currently 8 hours, and it can be increased to 12 hours for the reparation of machines (*Industriens Overenskomst 2014-2017*). In the transport sector, the same cap is set to 3 hours per week (*Industriens Overenskomst 2014-2017*). In the financial sector, there is not an explicit limit on overtime work (*Standardoverenskomst 2014- Finansforbundet*), but there is a reference to the rule on maximum weekly working hours.

[5] *Arbejdsmiljloven (2010)*

The second law sets the maximum weekly working hours, including overtime work, to an average of 48 hours per week over a reference period (Directive on working time, passed in 2002).[6]The reference period, however, can vary substantially from sector to sector. For instance, both in the manufacturing sector and in the public sector, the 48-hour maximum is always determined over a reference period of 4 months, unless a shorter or longer period of maximum 12 months is negotiated at the company level. In the service sector, the picture is more blurred. The reference period is 4 months for employees working in shops, but those employees working in offices and warehouses have a reference period of 6 months.[7] However, deviations from the 4- or 6-month period can be specified at the sectoral level. Finally, employees in the transportation sector have stricter limitations on maximum weekly hours, which should not exceed 42 hours.

As far as vacation time is concerned, the "holiday year" runs from the 1st of May until the 30th of April. Under the Danish Holiday Act, every employee in Denmark receives five weeks of leave per year as long as they have worked for one calendar year before the beginning of the holiday year. If the employee has not completed a full calendar year, they are entitled to 2.08 days of holiday for every month in which they have been employed. Any employee who has not earned their full five-week holiday allowance is still entitled to take up to five weeks per year as unpaid holiday. Generally, if the employee does not take vacation during the holiday year, they can transfer some of this vacation time to the next vacation year or convert the fifth week of holiday into wages. Employees are also entitled to additional vacation days, which are often referred to as the sixth week of vacation. These days are not covered by the Danish Holiday Act and are usually part of bilateral negotiation between employers and employees. Therefore, the rules can differ from place to place with regard to eligibility, use and possible payout.

B.2 Construction of the data on hours and earnings

In equation (8) of the main paper, we use hourly wages derived as the ratio of labor earnings gross of taxes and total working hours. We use hours and earnings relative to the highest-paying job in the November spell. This is the only spell that can be matched to employers' data through

[6] *Bekendtgrelse af lov om gennemfrelse af dele af arbejdstidsdirektivet (2004)*

[7] In the financial sector, the reference period is set to 13 weeks (*Standardoverenskomst 2014- Finansforbundet*).

FIDA. For workers whose November spell lasts less than 1 entire year, we annualize hours and earnings multiplied by the inverse of the share of the year in which they stayed in the spell. We exclude from the analysis the workers with annualized earnings lower than 2000$ (13000 DKK) or those with annual hours greater than 5,616 ($18 \times 6 \times 52$). This results in the exclusion of approximately 10,000 observations over the years 2003-2011 (Table D.2).

We use the gross labor earnings variable called *joblon* from *IDA* based on yearly labor earning records, which include all forms of labor compensation, excluding pension contributions.[8]. Following Kleven and Schultz (2014), we use information on labor and total earnings stemming from the income register (*INDK*) in the tax simulator.[9] As a deflator for the income variables, we use the Consumer Price Index from Statistics Denmark with 2000 as the base year.[10]

Normal working hours are from *Lønstatistikken* (LON thereafter) and are inclusive of vacation, weekends, legal holidays and lunch breaks, whereas unpaid leave and overtime hours are excluded. *Lønstatistikken* also reports information on overtime hours (i.e., *overtid*), which takes a value of zero for approximately 70% of our final sample. Among salaried workers, this share increases to 81%, while among hourly workers, this share is approximately 42%. All the information contained in LON originates from employers.

For most private companies (with the equivalent of at least 10 full-time employees), the data are collected by the Danish employers confederation (*Dansk Arbejdsgiverforening and Finanssektorens Arbejdsgiverforening*). Employers in Denmark report hours worked because they make contributions for each employee to a pension fund (*Additional Pension from the Labor Market*, known as ATP), and the size of the contribution depends on hours and the contract type (i.e., monthly paid, weekly paid and casual work, see also Table D.1).

Over the 2003-2011 period, only approximately 55% of the observations in IDA can be matched to LON. Attrition can be partially explained by the fact that data on approximately 15% of the firms surveyed are judged to be of low quality by Statistics Denmark, and they are

[8] *IDA* also contains two alternative measures of earnings. The first is *lonind*, which measures the gross annual labor earnings, not just those for the November spell. The second is *timelon*, which measures hourly wages. However, this measure is missing for approximately 20,000 observations. Additional details about how the gross annual earnings are measured can be found at `http://www.dst.dk/da/TilSalg/Forskningsservice/Dokumentation/hoejkvalitetsvariable/loenforhold-der-vedroerer-ida-ansaettelser-/joblon`

[9] In this register, the variable capturing labor earnings is *qlontmp2*.

[10] This index can be accessed at `http://www.statistikbanken.dk/PRIS6`

not released in LON. Data on hours are also available in 2002 when, however, only 30% of the observations in IDA can be matched to LON. For this reason, we exclude the year 2002 from the analysis. We do not consider part-timers, who are defined as those working less than 26 weekly hours, where weekly hours are calculated by dividing annual hours by 52.

With the introduction of the e-income registry (*E-indkomst*), the Danish tax authorities obtained information on hours worked by all employees over the age of 14, including employees in smaller enterprises, on a monthly basis.[11] This database is available only for the years 2008-2011. For this reason, we use *E-indkomst* as a secondary source of data to check the robustness of our baseline results. We make hours in *E-indkomst* comparable to those in LON by aggregating monthly hours into annual hours. We also exclude observations for which hours are imputed.

B.3 Accounting data

As far as firms' variables are concerned, capital stock (MAAT) is measured as the value of land, buildings, machines, equipment and inventory, according to the Accounting Statistics register (Regnskabsstatistik).[12] We obtain total sales (OMS) from the same register. The definition of value added is that suggested by Statistics Denmark. This definition changes over the sample period to account for adjustments in accounting standards. Specifically, from 2002 to 2003, the value added is calculated as

$$(OMS + AUER + ADR + DLG) -$$
$$(KRH + KENE + KLOE + UDHL + UASI + UDVB + ULOL + EKUD + SEUD)$$

where AUER is the value of work performed for one's own purposes and capitalized as a part of fixed assets, ADR represents other non-operating income (such as interest payments), DLG measures inventories, KRH consists of purchases of raw materials, finished goods and packaging (excluding electricity), KENE denotes energy purchases, KLOE represents labor costs, UDHL measures rents, UASI represents losses on small inventories, UDVB denotes the costs of hiring workers from other companies (such as temporary agency employment), ULOL measures leasing

[11] The hours variable that we use is called *ajoloentimer*.

[12] http://www.dst.dk/da/Statistik/dokumentation/Times/regnskabsstatistik-for-firmaer/

costs, EKUD represents other external costs (a part from secondary costs), and SEUD measures secondary costs.

From 2004 to 2012, the valued added is calculated as
$(OMS + AUER + ADR + DLG) -$
$(KVV + KRHE + KENE + KLOE + UASI + UDHL + UDVB + ULOL + EKUD + SEUD)$

where KVV is the purchase of goods for resale, while KRHE consists of purchases of raw materials, finished goods and packaging (excluding electricity).

B.4 Total factor productivity

Total factor productivity (TFP) is obtained from a Cobb-Douglas production function:

$$y_{it} = \beta_0 + \beta_l \, \ell_{it} + \beta_k \, k_{it} + v_{it} + \varepsilon_{it} \tag{27}$$

where y is log value added, ℓ is the log number of full-time employees and k is the log of physical capital in firm i at time t. We assume that the error component ε_{it} cannot be observed or predicted by firms, while the productivity shock v_{it} is assumed to follow a Markov process so that $p(v_{it+1} \mid I_{it}) = p(v_{it+1} \mid v_{it})$, where I_{it} - the information held by a firm at time t- includes the realization of v_i up to t (Olley and Pakes, 1996). This assumption implies that

$$v_{it} = g(v_{it-1}) + \xi_{it} \tag{28}$$

where $E[\xi_{it} \mid I_{it}] = 0$ by construction. We assume that capital at t is a function of capital and investments at $t-1$: $k_{it} = \kappa(k_{it-1}, i_{it-1})$, while labor is chosen after $t-1$. Furthermore, following Ackerberg et al. (2015) (henceforth ACF), we assume that labor is part of the demand of intermediate inputs (m_{it}):

$$m_{it} = f(k_{it}, v_{it}, \ell_{it}) \tag{29}$$

As in other studies, we assume that $f()$ is strictly increasing in v_{it} so that

$$v_{it} = f^{-1}(k_{it}, m_{it}, \ell_{it}) \tag{30}$$

and replacing this equation in (27), we have

$$y_{ijt} = \beta_0 + \beta_l \, \ell_{it} + \beta_k \, k_{it} + f^{-1}(k_{it}, m_{it}, \ell_{it}) + \varepsilon_{it} = \Phi_{it}(k_{it}, \, \ell_{it}, m_{it}) + \varepsilon_{it} \tag{31}$$

As in ACF we use the following moment condition to obtain an estimate of Φ_{it} ($\hat{\Phi}_{it}$) through GMM:

$$E\left[\varepsilon_{it} \mid I_{it}\right] = E\left[y_{it} - \Phi_{it}(k_{it},\, \ell_{it}, m_{it}) \mid I_{it}\right] = 0 \tag{32}$$

Then, we estimate β_0, β_l and β_k through GMM from the following moment condition:

$$\begin{aligned} &E\left[\varepsilon_{it} + \xi_{it} \mid I_{it-1}\right] = \\ &\quad E\left[y_{it} - \beta_0 - \beta_l\, \ell_{it} - \beta_k\, k_{it} - g\left(\Phi_{it}(k_{it-1},\, \ell_{it-1}, m_{it-1}) - \beta_0 - \beta_l\, \ell_{it-1} - \beta_k\, k_{it-1}\right) \mid I_{it-1}\right] = 0 \end{aligned} \tag{33}$$

Finally, TFP is derived as

$$TFP_{it} = \hat{\Phi}_{it} - \hat{\beta}_l\, \ell_{it} - \hat{\beta}_k k_{it} \tag{34}$$

In practice, we proxy for $f^{-1}()$ using a 4th order polynomial function of k, ℓ, m and a full set of interactions among these terms, while $g()$ is assumed to be a quadratic function of v_{it-1}.

B.5 The Danish Tax System

Table D.20 reports all types of income relevant to the Danish tax system.[13] The taxable income (TI) is defined as the sum of personal income (PI) and capital income (CI) minus deductions (D). Personal income is given by the sum of labor income (LI) and other sources of income, such as transfers or grants. Table D.21 shows tax rates and tax bases in the years 2008-2011. The tax system consists of a flat regional tax[14], progressive national taxes, labor market and EITC contributions. Income deriving from stocks (SI) is taxed following a separate progressive schedule. The tax rates shown in the table are cumulative. This means, for instance, that the tax rate for a taxpayer in the top tax bracket is the sum of the tax rates in the bottom, middle and top tax brackets, along with the regional tax rate, the labor market contribution and the EITC contribution rates. The sum of the tax rates, however, cannot exceed a marginal tax rate ceiling. If it does, then the ceiling is binding.

As shown in Table D.21, several changes to the tax system occurred over the years consid-

[13] We base Table D.20 on Table 1 in Kleven and Schultz (2014). We update the table to reflect the tax code relevant in the period that we analyze.

[14] The regional tax consists of a church, a municipality and a county tax. In the exposition that follows, we show regional tax rates in the average municipality.

ered. In 2009, the income cutoff of the middle and top tax brackets were equalized, while the bottom tax rate slightly decreased. The changes were particularly beneficial to taxpayers in the middle bracket, for whom the marginal tax rate ceiling was not binding and who had a tax base wide enough to fully exploit the change in bottom tax rates. In the following year, the 2010 Tax Reform abolished the middle tax bracket and lowered the bottom tax rate from 5.04% to 3.67%. As an effect of those changes, the marginal tax rate ceiling was also lowered from 59% to 51.5%. As a result, between 2008 and 2011, the marginal tax rate on labor income in the top tax bracket decreased from 62.28% to 55.83%, while in the middle tax bracket, it decreased from 45.06% to 37.78% (Figure 6). Finally, in the bottom tax bracket, the marginal tax rate on labor income decreased from 39.54% to 37.78%. The same reform also introduced a 40,000 DKK deduction on capital income in the top bracket while increasing the income cutoff of the top tax bracket. In fact, the lowest income amount to be considered in the top tax bracket increased in nominal terms from 335,800 DKK to 389,900 DKK. This shift corresponds to an increase of 9% in real terms, which further reduced the actual marginal tax rate faced by high incomes.

C Appendix: additional results

C.1 AKM estimation: exogenous mobility and separability

We estimate equation (8) in the main paper using the methodology developed by Abowd et al. (2002) to identify sets of connected firms. These sets consist of firms that have movers in common. In the analysis that follows, we focus on the largest set of connected firms. Due to the high mobility that characterizes the Danish labor market, the largest connected set contains more than 99% of the workers and firms in the sample (Table D.11). The simultaneous identification of the firm and the individual wage component requires setting to zero either one firm fixed effect or one individual fixed effect. Thus, the firm effect $\psi_{j(i,t)}$ has to be interpreted as the proportional wage premium or discount paid by firm j to all employees.

The estimation of unbiased coefficients from equation (8) requires that the unobserved component of the hourly wage rate r_{ijt} is mean independent of individual and firm fixed effects and time-varying characteristics:

$$\mathbb{E}\left(r_{ijt}|X_{ijt},\, \alpha_i,\, \psi_{j(i,t)}\right) = 0 \tag{35}$$

To gain a better understanding of condition (35), following Card et al. (2013) (henceforth CHK), we assume that the error component r_{ijt} consists of 3 parts:

$$r_{ijt} = \eta_{ij(i,t)} + \zeta_{it} + \varepsilon_{it} \tag{36}$$

$\eta_{ij(i,t)}$ is a match-specific component that captures an idiosyncratic wage premium (or discount) earned by individual i at firm j. This component is assumed to have a mean zero for all i and j. ζ_{it} is a unit root component meant to capture drifts in the portable component of the individual's earning power (e.g., health shocks, unobserved human capital accumulation, etc.). This component is also assumed to have a zero mean. Finally, ε_{it} is a residual mean-reverting component.

Under these assumptions, $\mathbb{E}\left(r_{ijt}\alpha_i\right) = 0$ for all i and t. Furthermore, assuming that the components of X_{ijt} are exogenous (i.e., $\mathbb{E}\left(r_{ijt}X_{ijt}\right) = 0 \ \forall \ i, t$), then condition (35) holds if the vector of firm fixed effects is exogenous to the error component (i.e., $\mathbb{E}\left(r_{ijt}\psi_{j(i,t)}\right) = 0 \ \forall \ i, t$). As shown in CHK, for this condition to hold, the assignment of workers to firms must obey a strict exogeneity condition (i.e., the "conditional exogenous mobility").

Following CHK, we investigate the plausibility of the "conditional exogenous mobility" assumption by considering 3 cases in which the assumption is violated. First, we consider the case of sorting based on the idiosyncratic employer-employee match component of wages $\eta_{ij(i,t)}$. This type of sorting is problematic because workers are paid differently in each firm, depending on the match component. Absent any match effect, the average wage gains and losses from moving from high- to low-wage firms are expected to be symmetric. This is the case for both males and females. The existence of match effects, however, will tend to offset the losses associated with moving to a low-wage firm. In the extreme case, in which all transitions were voluntary and selection was based only on the match component, movers will experience no wage losses.

To check this possibility, we follow CHK and construct the mean of log coworkers' wages for each person in each year to obtain a distribution of coworkers' wages in each year. Thus, we assign each worker to a quartile of the coworkers' wages distribution in a year based on the average log wage of his/her coworkers in that year. We then identify movers as workers who move from one firm to another and who can be observed for two consecutive years in both the sending firm and the receiving firm. Thus, we derive average wage rates of movers in the two years before and after the move in each quartile of the coworkers' wages distribution.[15] Figure D.3 shows the wage trends of movers from the 1st (i.e., low paying) or 4th (i.e., high paying) quartile of the coworkers' wage distribution. Similar to other studies, we find rather symmetric wage losses and wage gains for workers moving from high- to low-paying firms, and vice versa. This evidence is confirmed in Tables D.12 and D.13, which show the average log wage changes associated with transitions from and to each quartile of the coworker wage distribution. We also fail to find large changes in the wages of workers moving across firms in the same quartile of the coworkers' wage distribution. Overall, this evidence suggests that the sorting based on a match component is likely to play a minor role in our setting.

A second case in which the exogenous conditional mobility is violated is when mobility is related to the drifts in the expected wage a person can earn at all jobs (i.e., the shocks at the unit root component of ζ_{it}). For instance, if a worker's ability is revealed slowly over time and if it is valued differently at different firms, workers who are more productive than expected will experience rising wages at their initial employer and may be more likely to move to higher-paying firms. The absence of any systematic trend in wages prior to a move for workers who move to high- versus low-paying firms (Figure D.3) suggests that this type of mobility likely plays a minor role in our setting.

Finally, a third problematic case might arise if mobility is related to the transitory fluctuations in the unobserved component ε_{it} of wages. This is the case, for example, if workers leave firms that experience negative shocks and join firms that experience positive shocks. This type of correlation would imply systematic dips in the wage of leavers and unusual growth in the wage of joiners, which we fail to find in our data (Figure D.3).

Related to the particular framework discussed in this paper, mobility might be attributable to unobserved shocks to preferences over hours worked. An unexpected disease, for instance,

[15] Since our sample period ranges from 2003 to 2011, we focus on movers who moved in the years 2005-2009.

might induce a worker to move to a lower-paying firm in exchange for a working schedule that better fits the new desired hours. If this is the case, however, we would observe substantial changes in hours worked by movers, particularly for workers moving from top- to bottom-paying firms, and vice versa. Table D.14 shows the average percentage change in annual hours worked by movers in the two years prior versus the two years after the job change. Hours worked by movers are relatively stable across employers paying different wages. This is the case for males and females, independent of whether they move between the top- and bottom-paying firms or not.[16] This finding suggests that unobserved shocks to preferences over hours play a minor role in determining mobility in our sample. The sample that we consider, however, is composed of full-time workers who move between firms in the private sector only. Therefore, we do not consider movers from full-time to part-time work and from the private sector to the public sector, for whom we might expect greater variation in hours (Arizo et al., 2016).

Overall, the evidence from this paragraph suggests that the matching between firms and workers in our sample is based predominately on a combination of permanent firm and individual characteristics. Other recent studies reach similar conclusions (e.g., Card et al., 2013; Card et al., 2016; Song et al., 2016).

Equation (8) assumes additive separable firm and individual fixed effects. Systematic departures from this assumption would imply great residuals from (8). Following CHK, Figure D.4 plots mean residuals within cells defined by deciles of the estimated worker and firm effects. Reassuringly, the mean residuals are uniformly low and never exceed 3.7%, with the largest deviations appearing among the lowest deciles of the individual and firm effects. Therefore, while for some workers and firms, we observe small deviations from the additivity assumption, these appear unlikely to play a major role.

[16]The average wage changes by quartiles of the coworkers' wage distribution in the sending firm never exceed 0.5%, which is equivalent to approximately 9 hours on a yearly basis.

C.2 Validation of coordination measures using survey data

C.2.1 Survey of Adult Skills (PIAAC)

The Survey of Adult Skills (PIAAC) collects, among other variables, information on a range of generic skills required of individuals in their work. The survey covers approximately 166,000 adults aged 16-65 who were surveyed in the following countries: Australia, Austria, Belgium (Flanders), Canada, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Ireland, Italy, Japan, Korea, the Netherlands, Norway, Poland, the Slovak Republic, Spain, Sweden, the United Kingdom (England and Northern Ireland), the United States, Cyprus and the Russian Federation. The data collection took place from August 1, 2011, to March 31, 2012, in most participating countries.

In the analysis that follows, we exclude from PIAAC workers in the public sector, self-employed workers and students. We focus on the following two characteristics of a job: *Sharing work-related information* and *Time cooperating with coworkers*, both of which imply the coordination of hours. These characteristics are measured on a discrete scale ranging from 1 to 5, where 1 means that the characteristic is not important and 5 means that it is extremely important. In order to merge this information with the Danish Registers, we first take the modal value of each characteristic within each 4-digit (ISCO-08) occupation and then merge them to the registers using the same occupation code. We finally take the average value of each characteristic within a firm as a measure of the importance of each characteristic. Figure D.5 plots the standard deviation of hours across skill groups against the importance of these characteristics in each firm-year of our sample. We find a strong and negative correlation of the standard deviation with both job characteristics that is consistent with the evidence presented in section 4.3.1. That is, in firms in which these characteristics are more important, hours coordination is also high.

C.2.2 Measures of coordination in time use survey data

The time use survey was conducted in 2001 and 2008 by the Danish National Institute of Social Research. Industry information, however, is available only in the 2001 survey, and for this reason, in the following analysis, we use only 2001 data. The data collection consists of a questionnaire interview that collects information on demographic and labor market characteristics and two diaries; one diary is for a weekday, while the other is for a weekend day. Each diary is divided into 10-minute intervals and stretches from 4am to 4am the following day. In each interval, the respondent must note i) what he/she did (the primary activity) and ii) where he/she was. The survey includes a representative sample of approximately 3,000 individuals. We restrict our analysis to full-time employees (>26 weekly hours) in the private sector or approximately 750 observations.[17]

Based on this specification, we construct a coordination index as follows: we group workers into two educational groups, the tertiary educated and all others. For each educational group and in each sector and hour of the day, we compute the share of workers who are at work relative to the total number of workers in that educational group:

$$Share_{ehs} = \frac{N_{ehs}}{N_{es}} \tag{37}$$

where e indicates either tertiary educated (t) or other workers (o); h is hour of the day, which ranges from 4am to 4am the following day; while s indicates sector. Due to the limited number of observations in the survey, we use a 1-digit sector classification analogous to the one used in Table D.4. The coordination index in a sector is defined as the correlation between the share of tertiary educated and other workers across the 24 hours of the day:

$$Coordination\, index_s = correlation\,(Share_{ths}\,,\, Share_{ohs}) \tag{38}$$

High correlation between the share of differently educated workers throughout the day can be interpreted as signaling high coordination.

Table D.15 shows the coordination index in each sector. In line with Table D.4, the index is extremely high in some of the service industries, such as utilities, trade and the financial sector, while it takes relatively low values in agriculture and construction. In line with Table D.15, the index is higher in manufacturing than in construction and agriculture but lower than in most of the service sectors. Differently from Table D.4, the residual sector (i.e., "Public

[17] The variable that identifies workers in the private sector is missing for 1,073 observations out of 3,000. We also exclude from the analysis self-employed workers, students and workers whose industry of employment is missing.

administration, education, health and arts") shows a lower index relative to the other services. In our final sample, however, only 29 firms out of more than 8,000 are part of this sector.

C.2.3 Coordination and regular work schedule

Following the same procedure as in Section 4.3.1, we use O*NET to derive a measure of the importance of a regular work schedule at the firm level. In Figure D.6, we plot this measure against our measure of coordination. The figure shows that greater coordination is associated with a lower importance of having a regular work schedule, thus suggesting that our measure is not driven merely by the use of traditional work arrangements (i.e., 9am to 5pm jobs).

C.3 Coordination and wage differentials: additional robustness checks

Hours worked might be measured with errors, which might bias the estimated correlation between coordination and wage premiums. To obtain a sense of the size and the direction of this bias, in column 1 of Table D.16, we use the average importance of the *Contact*, *Teamwork* and *Communication* in a firm (see Section 4.3) as an instrument for the standard deviation of hours in equation (7). To the extent that the importance of these factors is correlated with the coordination of hours, this IV approach allows us to better separate the coordination component from the measurement error in σ_j. The coefficient from this specification is negative and greater in magnitude than that in the baseline model, which suggests that measurement errors generate attenuation bias and that the division bias (Borjas, 1980) is unlikely to play a major role in our setting.[18]

Column 2 of Table D.16 shows the results obtained while using the median absolute deviation from the median hours (MAD) as an alternative measure of coordination. This measure is less sensitive to outliers. The magnitude of the standardized coefficients in this specification increases, suggesting that, if anything, outliers might drive down the correlation between wages and coordination.

[18] If the first and second moments of the distributions of the errors and the actual hours are uncorrelated, then measurement error can be shown to generate downward-biased estimates.

Van Reenen (1996) finds that innovation in a firm causes higher wages. While we cannot directly measure innovation, if we control for the stock of immaterial assets in a firm, we find that the coefficient on coordination is barely affected (column 3). Moreover, coordination may be expected to be more important among workers of the same plant. In fact, when we restrict the analysis to single-plant firms (80% of the sample), we find the coefficient to be greater in magnitude than in the baseline (column 4). In the last column (5) of Table D.16, we control for the number of skill groups in a firm as a way to remove any spurious correlation between high dispersion in hours and the skill diversity of the workforce in a firm. The results are robust to this control.

In the baseline specification, we focus only on the firms in which attrition in hours worked is low (i.e., less than 5% of the workforce in a year). Columns 1 and 2 in Table D.17 report the coefficients estimated when we consider all firms in the largest set of connected firms. The coefficient is negative and significant, and the coordination share within 3-digit industries (column 2) is similar to that estimated in the baseline model.

In the baseline version of equation (8) of the main paper, we control for firm time-varying characteristics to isolate the firm fixed effects from capturing temporary fluctuations in wages due to firm-specific shocks.[19] As a robustness check in columns 3 and 4 of Table D.17, we show the results obtained from estimating equation (8) with a parsimonious specification in which we include only workers' time-varying controls.[20] The coefficients of these regressions are still negative and significant, even if less precisely estimated possibly because the temporary variations in wages add some noise to the firm fixed effects in this specification.

Finally, in order to check whether the correlation we find is driven by other period-specific factors, we divide the overall sample period into 3 sub-periods (2003-2005, 2006-2018 and 2009-2011). Then, we estimate equation (8) separately for each of these shorter panels to obtain the firm component of the wages specific to a sub-period ($\psi^s_{j(i,t)}$). In the second step, we then relate

[19]The time-varying characteristics that we use are value added, sales per employee, exporter status and the share of salaried workers

[20]These controls are a set of interactions between year dummies and educational attainments and interaction terms between quadratic and cubic terms in age and educational attainments.

$\psi^s_{j(i,t)}$ to coordination in that sub-period σ^s_j, a set of controls and sub-period fixed effects γ^s.

$$\widehat{\psi^s_{j(i,t)}} = \delta_0 + \delta_1\,\sigma^s_j + \delta_2\,\bar{Z}^s_j + \gamma^s + v^s_j \tag{39}$$

While the fixed effects allow us to control for factors specific to a sub-period, this panel regression is based on firm fixed effects ($\psi^s_{j(i,t)}$) estimated for shorter panels and thus for a lower number of movers, which might be reflected in less accurate estimates. With these caveats in mind, column 5 in Table D.17 shows δ_1 estimated from equation (39). The coefficient remains negative and significant but less precisely estimated, as expected.[21]0

C.4 Additional robustness checks on the coordination of the labor supply and tax changes

Table D.23 shows the labor supply elasticity of normal hours in the residual group, obtained through the same empirical model used for high-skilled workers (equation (10)). Independently of the specific controls for base-year income, the elasticity remains positive, close to zero and insignificant (columns 2 to 5). At the point estimate, however, the elasticity is twice as large among workers who are in the bottom half of the income distribution within the residual group. These workers are also more distant from the top tax bracket, which is suggestive of weaker responses among workers who are more likely to end up in the top bracket by increasing their hours.

In columns 1 and 2 of Table D.24, we examine the labor supply response of high-skilled women with children and of high-skilled workers in the top 10% of the income distribution in 2008. In line with other recent studies, we find stronger responses among women and top incomes. Differently from high-skilled males, women show a positive elasticity. The type of specification that we use assumes away bunching at the kink points. With significant bunching, however, bias may be created. Thus, in column 3, we exclude workers at the major kink points of the tax schedule. The estimated elasticity is extremely robust to this specification. Finally, in column 4, we estimate the effect of the reform on labor income rather than hours. In order to compare our results with those of other studies, we estimate this specification for

[21]The lower precision, however, is likely due to outliers because when we use the median absolute deviation of hours as a measure of coordination, the coefficient is much more precisely estimated (column 6)

all wage earners. In line with Kleven and Schultz (2014), we estimate a positive and small (0.03) elasticity of labor income, which suggests that the negative elasticity of hours that we find might be linked to the specific sample for which data on hours are available.

For the reasons discussed in Section 5.5, the instrumental variables that we use depend on income at time t. This can be problematic due to mean reversion or to the existence of other trends that unevenly affect the labor supply of workers across the distribution of income at the same time as the tax reform. In columns 3 to 7 of Table 5, we control for pre-reform income using piece-wise splines of income at $t-1$ and the log change of income between time $t-1$ and t (similar to Kopczuk, 2005). We select this specification based on the strength of the first stage. However, to check whether the baseline results are sensitive to controls of base-year income, in Table D.25, we estimate equation (10) in the main paper by controlling for pre-reform income in a number of flexible ways. In columns 1 and 2, we control for 5-piece splines of income at time t (similar to Gruber and Saez, 2002), while in columns 3 and 4, we control for a 5th-order polynomial function of income at time t and an indicator function for positive base-year income (as in Dahl and Lochner, 2012). Finally, in columns 5 and 6, we include 5-piece splines of income at $t-1$ and the change of income between $t-1$ and t (similar to Kopczuk, 2005).[22] The results from these alternative specifications are very much in line with the baseline ones. In particular, the labor supply in low-coordination firms is significantly more elastic than that in firms with a high degree of coordination in all the specifications. The magnitude of the elasticity in low-coordination firms is close to that estimated in the baseline regressions, and it ranges from -0.07 to -0.1, depending on the specification.

In Table D.26, we perform a similar set of robustness checks on the spillover effects estimated through equation (11) of the main paper. In these specifications, we control for base-year income (column 1), 5-piece splines of income at t (column 2), and a 5th-order polynomial function of income at time t (column 3). The coefficient on $\Delta log\, \overline{h^H}$ remains significant, positive and of comparable magnitude to the baseline results.

The significance and magnitude of the spillovers that we find is robust to the inclusion of

[22]Gruber and Saez (2002) use 10-piece splines, while we use 5-piece splines of the base year income. Since we focus on a limited sample of the Danish population and since we exploit only one tax reform, we do not have enough power to estimate more than 5-piece splines of income.

firm and base-year fixed effects that capture the unobserved characteristics of a firm or of the time period over which the reform occurred (columns 1 and 2 in Table D.27). The coefficient capturing the spillovers is of greater magnitude, but less precisely estimated, when we condition it on the effects of being in a firm with a share of unionized workers above the median (column 3 in Table D.27). This result suggests that spillovers are not driven by differences in unionization. The spillovers remain of similar magnitude and significance when we control for the average change in hours among coworkers in the residual group. In addition, consistent with the fact that hours in the residual group are unaffected by the reform, we do not find significant spillovers from this group on low-skilled coworkers (column 4 of Table D.27).

In columns 1 to 4 in Table D.28, we present the results obtained from using the alternative measure of coordination described in Section 4.3, where skill groups are defined from the intersection of education (primary, secondary and tertiary) and occupation (blue collar, middle and top manager) groups. In columns 1 and 2, we estimate equation (10) from Section 5.3 on workers in high- and low-coordination firms. As in the baseline model, the labor supply in low-coordination firms remains significantly more elastic, and the magnitude of the coefficients is close to the baseline. Columns 3 and 4 show the results obtained from estimating equation (11) in Section 5.4 for workers in low-coordination firms. In column 3, we focus on normal hours of work, while in column 4, we consider total hours inclusive of overtime. The spillovers remain significant and of similar magnitude to those estimated in the baseline model.

In columns 5 and 6 in Table D.28, we estimate equation (10) of the main paper using data on hours worked from *E-indkomst* (called "BFL hours" in the tables). This database is an alternative source of administrative data on hours worked for the years 2008-2011 only (see Appendix B.2). We restrict the analysis to the workers included in the baseline specification, which can be matched to *E-indkomst.* As in the baseline regressions, we do not find significant effects on the elasticity of hours of high-skilled workers in high-coordination firms. The elasticity in low-coordination firms remains significant and of similar magnitude as in the baseline regressions. In column 7, we estimate the spillovers from equation (11) of the main paper using data on hours from *E-indkomst.* The spillovers remain significant and of a magnitude comparable with that of the baseline specification. However, these results must be interpreted with caution because some of the first-stage regressions lack power (i.e., F-stat lower than 2).

C.5 Income and uncompensated elasticity to tax changes

In the specifications that we discuss in the paper, the labor supply elasticity is inclusive of the income effect. In the robustness section, we also present separate estimates of the income effects for both high- and low-skilled workers. To estimate the income effects, we follow the standard model used in the taxable income literature, and we modify equation (10) and equation (11) of the main paper in the following way:

$$log\left(\frac{h^H_{ijt+3}}{h^H_{ijt}}\right) = \theta_0 + \theta_1\, log\left(\frac{1-\tau^H_{it+3}}{1-\tau^H_{it}}\right) + \theta_2\, log\left(\frac{vy^H_{it+3}}{vy^H_{it}}\right) + \theta_3\, X_{ijt} + \upsilon_{ijt} \tag{40}$$

$$log\left(\frac{h^L_{ijt+3}}{h^L_{ijt}}\right) = \mu_0 + \mu_1\, log\left(\frac{\overline{h^H_{jt+3}}}{\overline{h^H_{jt}}}\right) + \mu_2\, log\left(\frac{1-\tau^L_{it+3}}{1-\tau^L_{it}}\right) + \mu_3\, log\left(\frac{vy^L_{it+3}}{vy^L_{it}}\right) + \mu_4\, X_{ijt} + \epsilon_{ijt} \tag{41}$$

In these models, the terms $log(vy^L_{it+3}\,/\,vy^L_{it})$ and $log(vy^H_{it+3}\,/\,vy^H_{it})$ indicate the changes in virtual income of low- and high-skilled workers, respectively, between time t and $t+3$. Due to the same endogeneity problems that we discussed in Section 5.5, we estimate these specifications using mechanical changes of the virtual incomes and net-of-tax rates as instruments for the observed changes in these variables. Mechanical changes of the virtual income are obtained from simulating the post-reform virtual income while assuming that the real income remained constant between t and $t+3$ as described (Section 5.5).

Following Kleven and Schultz (2014), we define virtual income as $\tau z_{LAB} + \sum_{n=1}^{N} t^n z_n - T(z_{LAB}, z_1, ..z_N)$, where T() indicates total tax liabilities, τ is the marginal tax rate on labor income (z_{LAB}), and t^n is the marginal tax rate on the n^{th} component of income z_n. This characterization is a generalization of the standard definition of virtual income to a situation with multiple income components. It differs from the definition used in some of the existing studies (e.g., Gruber and Saez, 2002) where virtual income is defined as after-tax income. Based on this, the coefficients θ_1 and μ_2 measure the uncompensated elasticity of hours worked to the marginal net-of-tax rates. θ_2 and μ_3 measure the elasticity of hours with respect to virtual income (see Section A.6).[23]

In columns 1 and 2 of Table D.29, we estimate equation (40) in high- and low-coordination firms, respectively. Unfortunately, due to the fact that our identifying variation is based on one tax reform only, we miss the power to estimate the income effect and the uncompensated elasticity separately. Even if they are imprecisely estimated, the point estimates show a substantial difference in both the income and the uncompensated elasticity between firms at high versus low degrees of coordination. In fact, in line with the baseline results, the uncompensated elasticity and the income effects are greater in magnitude in low-coordination firms. In the last column of Table D.26, we show the spillover effects obtained from estimating equation (41). In this specification, we use the mechanical change in the virtual income of low-skilled workers as an instrument for the observed change in virtual income. In the first-stage regressions, we also use the average virtual income of high-skilled coworkers as an additional instrument. Adding these additional controls does not have sizable effects on the estimated spillovers, which remain significant and of similar magnitude as in the baseline model.

C.6 The effect of the 2010 tax reform on firm characteristics

We investigate the effects of the tax reform on firm characteristics using the following regression model:

$$log\left(\frac{y_{jt+3}}{y_{jt}}\right) = \gamma_0 + \gamma_1\, log\left(\frac{\overline{1-\tau^H_{jt+3}}}{\overline{1-\tau^H_{jt}}}\right) + \gamma_2\, Z_{jt} + \varepsilon_{jt} \tag{42}$$

We estimate this model considering 4 different y variables: firm size, the share of high-skilled workers, the share of low-skilled workers in a firm and the amount of physical capital. The regressor of interest in this model is

$$log\left(\frac{\overline{1-\tau^H_{jt+3}}}{\overline{1-\tau^H_{jt+3}}}\right) = log\left[\frac{H^{-1}_{jt+3}\sum_{i\in\, H_{jt+3}}(1-\tau_{ijt+3})}{H^{-1}_{jt}\sum_{i\in\, H_{jt}}(1-\tau_{ijt+3})}\right] \tag{43}$$

[23]Other studies in this literature use the after-tax income rather than virtual income in estimating similar types of regressions (e.g., Gruber and Saez, 2002). In these studies, the analogue of θ_1 or μ_2 in our specification measure the compensated elasticity of hours. In our specification, θ_1 and μ_2 can be combined to θ_2 and μ_3, respectively, using the Slutsky equation to obtain the compensated elasticity (Section A.6).

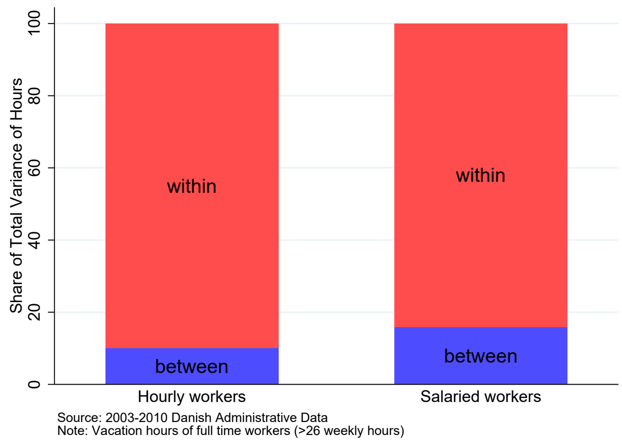
This equation measures the log change of the average net-of-tax-rate on labor income faced by high-skilled workers in a firm. We see this as a proxy of the intensity of the effect of the tax reform on firm j. For reasons similar to those discussed in Section 5.5, we use the mechanical change $log\left(\overline{1-\tau^H_{Mjt+3}}\right) - log\left(\overline{1-\tau^H_{jt}}\right)$ defined in equation (13) as an instrument for the actual change defined in equation (43). Z_{jt} is a vector of firm characteristics measured in the base year.

Table D.30 shows the results from this model. The coefficient of interest in these specifications is the one attached to the variable $\Delta log\left(\overline{1-\tau^H}\right)$ that corresponds to γ_1 in equation (42). Each column of the table reports the effects on a different outcome variable y. In column 1, the outcome variable is the log change in firm size, in columns 2 and 3, we analyze the effects on the log change of the share of high-skilled workers and the share of low-skilled workers in a firm, respectively. Finally, in column 4, we look at the effects on the amount of physical capital in a firm. The coefficient γ_1 estimated in all these specifications remains small and insignificant, consistent with the fact that firms did not change their production technologies as an effect of the reform.

D Appendix: Additional Tables and Figures

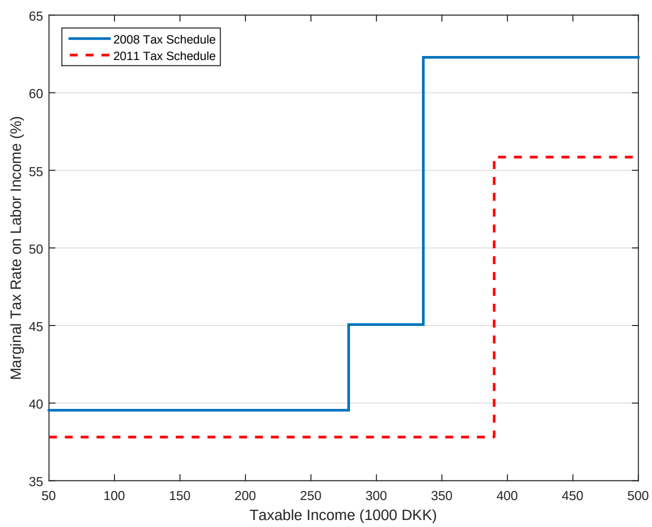
D.1 Additional graphs and tables

Figure D.1: Variance of vacation hours: between and within firm component



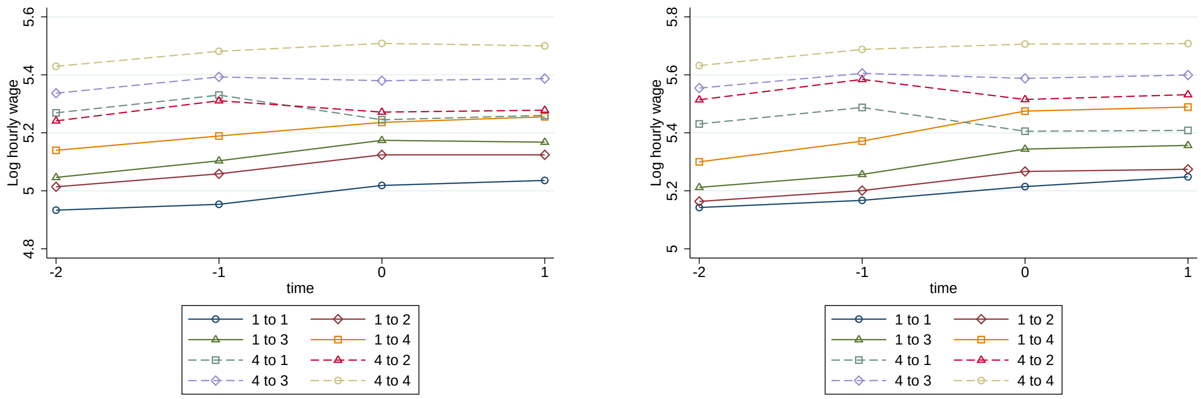
Notes: The figure shows the decomposition of the variance in vacation hours in between and within firm components (footnote 5) in the main paper. We consider total vacation hours of full-time workers (> 26 weekly hours). The first bar refers to vacation hours of hourly workers, the second one to salaried workers. Data on hours of vacation are available between 2003 and 2010.

Figure D.2: The Danish tax schedule



Notes: The figure plots the marginal tax rate on labor income over taxable income in 1000 DKK (5 DKK $\simeq$ 1 USD). Taxable income is in nominal terms. The solid line plots the tax schedule prior to the tax reform (2008). The dashed line plots the tax schedule after the tax reform (2011). The figure is based on Table D.21. Marginal tax rates on labor income in the bottom and middle brackets are obtained as follows: Statutory Marginal Tax rate * (1 - Labor Market contribution) + Labor Market contribution - EITC; in the top bracket, they are obtained as Marginal Tax Ceiling*(1 - Labor Market contribution) + Labor Market contribution.

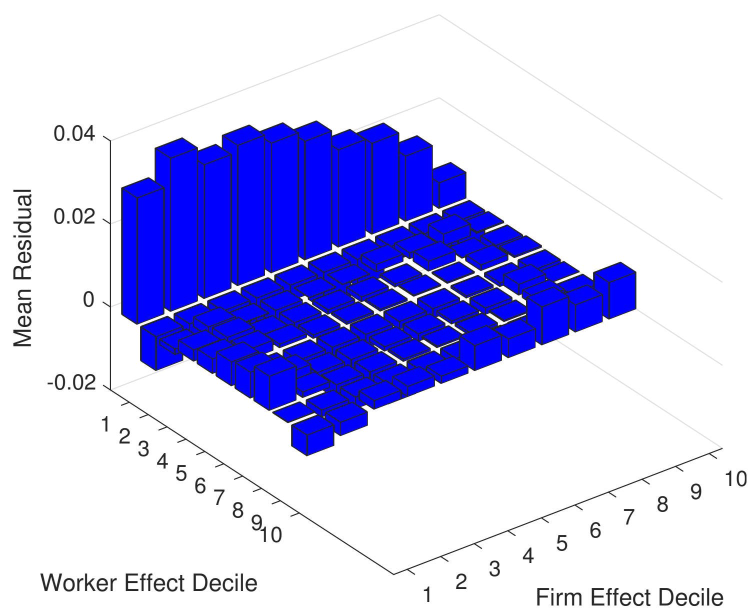
Figure D.3: Wage dynamics of movers



(a) Females

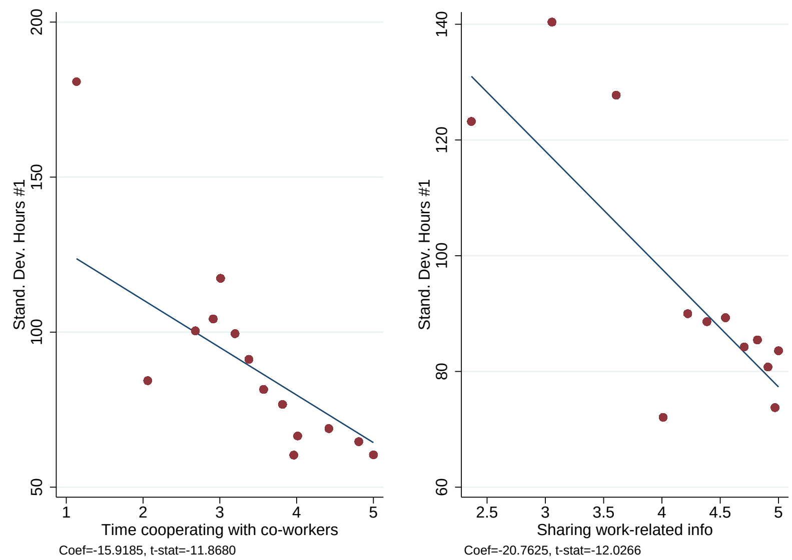
(b) Males

Figure D.4: Mean residuals by person-establishment deciles



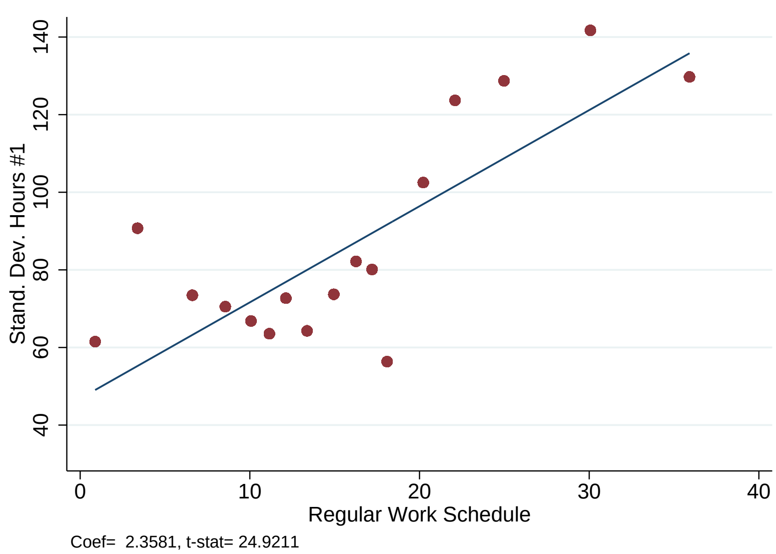
Notes: The figure shows the mean residuals from estimated AKM with cells defined by decile of estimated firm effect, interacted with decile of the estimated person effect.

Figure D.5: PIAAC validation exercise coordination



Note: Classification of the variable "sharing work related information": 1-Never, 2-Less than once a month, 3-Less than once a week but at least once a month, 4-At least once a week but not every day, 5-Every day. Classification of the variable "time cooperating with coworkers": 1-None of the time, 2-Up to a quarter of the time, 3- Up to half of the time, 4-More than half of the time, 5-All of the time. We group firms in 20 equally sized bins based on the variable on the x-axis.

Figure D.6: Coordination and regular work schedule job from O*NET



Notes: The figure shows the standard deviation of hours across skill groups within firms on the y-axis (Section 4.3 of the main paper) and the importance of a regular work schedule in that firm, based on O*Net, on the x-axis. This variable measures the importance of a regular work schedule on a scale that ranges between 0 and 100 for each SOC occupation. We map the SOC classification in O*Net with the ISCO-88 classification of the Danish registers using the crosswalk provided by the National Crosswalk Center. For each firm, we then compute the median importance of a regular work schedule among workers. We break ties in median scores using the average. In the graph, firms are grouped into 20 bins, which each one containing the same number of firms. We plot mean values within each bin. At the bottom of each graph, we show the coefficient and the associated t-stat from a regression of the y variable in the graph on the x variable.

Table D.1: ATP contributions and hours worked (2008-2015)

	Contributions paid by workers (in DKK)	Contributions paid by employers (in DKK)	Total contributions
Montly paid workers			
(Working hours per month)	*Monthly Contribution*	*Monthly Contribution*	*Monthly Contribution*
At least 117	90	180	270
Between 78 and less than 117	60	120	180
Between 39 and less than 78	30	60	90
Less than 39	0	0	0
Forthrightly paid workers			
(Working hours per fortnight)	*Forthrightly contributions*	*Forthrightly contributions*	*Forthrightly contributions*
At least 54	47.4	94.8	142.2
Between 36 and less than 54	31.6	63.2	94.8
Between 18 and less than 36	31.6	15.8	47.4
Less than 18	0	0	0
Weekly paid workers			
(Working hours per week)	*Weekly contributions*	*Weekly contributions*	*Weekly contributions*
At least 27	23.7	47.4	71.1
Between 18 and less than 27	15.8	31.6	47.4
Between 9 and less than 18	7.9	15.8	23.7
Less than 9	0	0	0
Casual workers	*Hourly contributions*	*Hourly contributions*	*Hourly contributions*
	0.64	1.28	1.92

Notes: Causal workers are those whose pay does not occur at any of the other frequencies.

Table D.2: Steps of the data preparation

	Obs.	Workers	Firms	Obs. share tot.	Workers share tot.	Firms share tot.
1. Entire Population	22,379,298	3,518,236	266,196	100	100	100
2. Lønstatistikken sample	12,130,358	2,649,618	39,778	54.20	75.31	14.94
3. Firms administrative data sample	5,211,149	1,485,789	29,957	23.29	42.23	11.25
4. Keep firms with more than 2 workers	5,209,536	1,485,478	29,576	23.28	42.22	11.11
5. Keep full time workers only	4,476,222	1,207,580	29,116	20.00	34.32	10.94
6. Drop Outliers in hours and income	4,466,676	1,205,301	29,111	19.96	34.26	10.94
7. Keep firms with less than 5% of obs. missing	787,683	400,653	8,293	3.52	11.39	3.12

Notes: Workers younger than 15 and older than 65 are excluded from the entire population.

Table D.3: Desired hours by skill groups

Skills Definion 1	Average desired weekly hours	Obs.
skill ≤ 10th percentile	37.34	465
10th percentile< skill < 20th percentile	36.78	462
20th percentile< skill < 30th percentile	37.69	463
30th percentile< skill ≤40th percentile	37.72	461
40th percentile< skill ≤ 50th percentile	38.55	461
50th percentile< skill ≤ 60th percentile	38.33	463
60th percentile< skill ≤ 70th percentile	38.48	463
70th percentile< skill ≤ 80th percentile	39.33	461
80th percentile< skill ≤ 90th percentile	38.79	462
skill > 90th percentile	40.42	461
Skills Definition 2	**Average desired weekly hours**	
Primary education, blue collar	37.67	963
Secondary education, blue collar	37.73	1,512
Tertiary education, blue collar	38.31	106
Primary education, middle manager	38.39	245
Secondary education, middle manager	38.25	852
Tertiary education, middle manager	39.17	693
Primary education, manager	41.55	43
Secondary education, manager	41.72	113
Tertiary education, manager	43.97	96

Notes: Information on desired hours is obtained from the 2008-2010 Danish labor force survey data. We focus on workers whose reference week is in November to better match information in the Labor Force Survey to registers data. Skills Definition 1 refers to skill groups defined as deciles of the distribution of $\hat{\alpha}_i + \hat{\beta} X_{ijt}$ *from equation (8) (AKM regression). AKM regressions are estimated on the years 2008-2010. Skills definition 2 refers to skill groups defined at the intersection of occupational and educational category.*

Table D.4: Coordination by sector

	Stand. Dev. Of Total Hours		Unionization rate
Coordination by Industry (2003-2011)	Mean	Std. Dev.	
Agriculture, forestry and fishing, mining and quarrying	118.69	90.47	0.71
Manufacturing	104.08	86.92	0.77
Constructions	140.70	104.12	0.72
Utilities,Trade and Transport	76.04	88.49	0.64
Financial and insurance, Real estate, Other business services	84.72	84.09	0.63
Other services	65.20	57.37	0.71
Overall sectors	95.59	94.00	0.68
Observations	8182		

Notes: The first 2 columns of the table show the mean and standard deviation of our measure of coordination (i.e., the standard deviation of hours across skill groups from Section 4.3) in each of the 6 major sectors of the Danish economy. The last column shows the average share of workers unionized in each sector. For each firm in the sample (8182 total) and in each year (2003-2011), we compute the share of workers unionized and the standard deviation of hours across skill groups within that firm-year. Then, we take the average (and standard deviations) within each sector.

Table D.5: Wage differentials from hours coordination: Lavetti and Schmutte (2016) approach

	(1) OME	(2) TWFE
Dependent Variable	Log Wage - $\hat{\beta}\,X$	Log Wage
Stand. Dev. Def. 2	-0.052***	-0.050***
	(0.009)	(0.010)
R-squared	0.911	0.684
Obs.	664632	664632

Notes: Following Lavetti and Schmutte (2016), column 1 reports the effects from an orthogonal match effect model (OME) obtained from a two-step procedure. In the first step, we estimate the following regression: $ln\, \mathrm{w_{it}} = \beta_1 X_{it} + \beta_2 \sigma_{jt} + \Phi_{ij(i,t)} + \epsilon_{it}$*, where* σ_{jt} *(labeled as "Stand. Dev. Def. 2") is the measure of coordination described in Section 4.3, and skills are defined as the intersection of education and occupation groups (definition 2) so that they do not depend on the estimates from the AKM model.* $\Phi_{ij(i,t)}$ *is the match effect between individual i and firm j, and* X_{it} *includes the following set of controls: year dummies interacted with education dummies, quadratic and cubic terms in age interacted with education dummies, VA per employee, capital per employee, sales per employee, exporter status, and the fraction of salaried workers. The second step consists of estimating the following regression:* $P_{it} = \alpha_i + \lambda_t + \gamma_{ome}\, \sigma_{jt} + \psi_{j(i,t)} + r_{it}$ *where* $P_{it} = ln\, \mathrm{w_{ijt}} - \hat{\beta_1} X_{it}$*,* α_i *is an individual fixed effect,* λ_t *is a year fixed effect, and* $\Psi_{j(i,t)}$ *is a firm fixed effect. Column 1 in the table reports the coefficient* $\hat{\gamma}_{ome}$ *estimated from the second step regression that captures the wage differentials from hours coordination. In column 2, we estimate a two-way fixed effects model (TWFE) of the following type:* $ln\, \mathrm{w_{it}} = \alpha_i + \gamma_{twfe}\, \sigma_{jt} + \psi_{j(i,t)} + \beta_1 X_{it} + \xi_{it}$ *where the notation is the same as in the OME model above. Column 2 in the table reports* $\hat{\gamma}_{twfe}$*. The table shows standardized coefficients that are therefore comparable to those of Table 3. Standard errors are clustered at the 2-digit industry level.*

Table D.6: Elasticity of high-skilled hours: salaried and hourly workers

	(1) High Coord.	(2) Low Coord.	(3) High Coord.	(4) Low Coord.	(5) High Coord.	(6) Low Coord.
Dependent variable	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^H$
$\Delta log\,(1-\tau^H)$	-0.012	-0.026	-0.004	0.002	-0.058	-0.045
	(0.017)	(0.031)	(0.013)	(0.032)	(0.051)	(0.051)
Log base-year income	-0.001	-0.010	-0.001	-0.007	-0.016	-0.116***
	(0.003)	(0.007)	(0.001)	(0.007)	(0.019)	(0.030)
Salaried work. only	YES	YES	YES	YES	NO	NO
Hourly workers only	NO	NO	NO	NO	YES	YES
IV	YES	YES	YES	YES	YES	YES
Overtime Hours	YES	YES	NO	NO	YES	YES
Mean Hours	1937.70	1965.55	1913.64	1928.79	1833.02	1813.96
Pvalue $High = Low$	0.69		0.87		0.87	
F-stat Excl. Inst.	1132.07	98.27	1132.07	98.27	141.89	139.60
P-value Excl. Inst.	0.00	0.00	0.00	0.00	0.00	0.00
N Firms	576	522	576	522	93	349
N	17183	5059	17183	5059	1685	2548

*Notes: Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, share of high- and low-skilled workers in the firm (the residual group is omitted). Observations are weighted by labor income. The table report Angrist-Pischke F-stats and P-values relative to the variable $\Delta log\,(1-\tau^H)$. First-stage regressions are available from the authors upon request. Standard errors in parentheses are clustered at the firm level. * p<0.10, ** p<0.05, *** p<0.01.*

Table D.7: Elasticity of high-skilled hours: difference in difference

	(1) Log Hours	(2) Log Hours
High Sk. × Post	-0.011***	-0.011***
	(0.003)	(0.003)
High Skilled	0.052***	0.048***
	(0.003)	(0.003)
Post	0.018***	0.018***
	(0.003)	(0.003)
Individual Controls	NO	YES
N Firms	1518	1518
N	156591	156591

*Notes: The regressions are based on data for the 2008-2011 period. The variable Post is a dummy that takes a value of 1 in the post tax-reform years of 2010 and 2011. The treatment group consists of high-skilled workers, while the control group is composed of low-skilled workers, both of which are defined in section 5.1. The specification in column 2 includes the following controls averaged over the pre-reform year (2008-2009): work experience, work experience squared, age, and the number of children. Column 2 also includes as controls the modal value over the pre-tax reform period of the following dummy variables: gender; marital status; and primary, secondary and tertiary education. We consider total hours worked (regular and overtime). Standard errors in parentheses are clustered at the firm level. * p<0.10, ** p<0.05, *** p<0.01.*

Table D.8: The spillover effects on low-skilled hours: salaried and hourly workers

	(1)	(2) Low Coord.	(3)	(4) Low Coord.
	$\Delta log\, h^L$	$\Delta log\, h^L$	$\Delta log\, h^L$	$\Delta log\, h^L$
$\Delta log\, \overline{h^H}$	0.779*	0.655	0.047	-0.055
	(0.464)	(0.568)	(0.685)	(0.584)
$\Delta log\,(1 - \tau^L)$	-0.194	-0.101	0.240*	0.150
	(0.172)	(0.174)	(0.134)	(0.154)
Hourly workers only	YES	YES	NO	NO
Salaried work. only	NO	NO	YES	YES
IV	YES	YES	YES	YES
Overtime Hours	NO	NO	NO	NO
Mean Hours Low Sk.	1700.72	1668.11	1889.59	1882.18
Mean Hours High Sk.	1840.16	1832.65	1899.04	1872.92
N Firms	380	315	826	355
N	4117	2684	5966	1410

Notes: This table reports the results from estimating equation (11) of the main paper separately for salaried and hourly workers. Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, share of high- and low-skilled workers in the firm and 5 component splines of income at t-1 and income change between t-1 and t. Low-coordination firms (columns 2 and 4) are defined as being in the top half of the distribution of the standard deviation of hours across skill groups in 2008. First-stage results are available from the authors upon request. Observations are weighted by labor income. Standard errors in parentheses are clustered at the firm level. $p<0.10$, ** $p<0.05$, *** $p<0.01$.*

Table D.9: Spillovers and peer effects

	(1) Baseline Specification	(2)	(3) 5 percent most repetitive occupations	(4) Remaining Occupations	(5) Occupations with low learning content	(6) Remaining Occupations
Dependent Variable	$\Delta log\, h^L$	$\Delta log\, h^L$	$\Delta log\, h^L$	$\Delta log\, h^L$	$\Delta log\, h^L$	$\Delta log\, h^L$
$\Delta log\, \overline{h^H}$	0.878***		-0.697	0.867***	0.362	0.866***
	(0.301)		(3.897)	(0.299)	(0.987)	(0.302)
$\Delta log\, \overline{h^H}_{same\, occupation}$		0.384				
		(0.664)				
$\Delta log\, \overline{h^H}_{different\, occupation}$		0.874				
		(1.416)				
IV	YES	YES	YES	YES	YES	YES
Splines of log $t-1$ Inc. and $\Delta log\ inc.\ t-1-t$	YES	YES	YES	YES	YES	YES
Overtime Hours	NO	NO	NO	NO	NO	NO
F-stat Excl. Inst.		2.40, 1.77	0.28	14.91	2.67	14.13
P-value Excl. Inst.		0.12, 0.18	0.6	0.00	0.11	0.00
Mean Hours Low Sk.	1812.51	1807.17	1758.18	1814.89	1855.84	1811.87
Mean Hours High Sk.	1875.00	1869.94	1841.98	1876.44	1877.18	1874.97
N Firms	968	723	101	958	66	962
N	10091	8001	422	9669	148	9943

Notes: This table reports the results from estimating equation (11) in the main paper. It shows the elasticity of low-skilled hours to the average hours worked by high-skilled coworkers. The specification in column 2 separates between the elasticity to the average hours worked by high-skilled coworkers in the same 3-digit occupation and the elasticity to the average hours worked by high-skilled coworkers in different occupations. In columns 3 and 4. we estimate the elasticity separately for workers in the 5% most repetitive occupations and for workers in other occupations. In columns 5 and 6, we estimate the elasticity separately for workers in occupations with low learning content and for workers in other occupations. A complete list of the 5% most repetitive occupations and of the occupations with low learning content can be found in the appendix Table F.3 of Cornelissen et al. (2017). We use mechanical changes of the average net-of-tax rate among high-skilled workers in a firm as an instrument for the average change in hours. We also control for changes in marginal net-of-tax rate of low-skilled workers $\Delta log\,(1-\tau^L)$, and we use the mechanical change in the net-of-tax rate of low-skilled workers as an instrument for observed changes of 1-τ^L (Section 5.5). First-stage results are available on request. Each regression contains the following controls measured in the base year (2008): work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high and low-skilled workers in the firm (the residual group is omitted). "Splines" refer to a flexible piecewise linear functional form with 5 components. We consider only low-skilled workers who are at the same firm between 2008 and 2011. We estimate this regression on changes between 2008 and 2011. Observations are weighted by labor income. Standard errors in parentheses are clustered at the firm level. $p<0.10$, ** $p<0.05$, *** $p<0.01$.*

Table D.10: The spillover effects on the hourly wages of low-skilled workers

	(1)	(2)	(3)	(4) Low Coord.	(5)	(6) Low Coord.
	$\Delta log\, w^L$	$\Delta log\, w^L$	$\Delta log\, w^L$	$\Delta log\, w^L$	$\Delta log\, w^L$	$\Delta log\, w^L$
$\Delta log\, \overline{h^H}_{normal}$	-0.248	-1.528	-1.019	-0.497		
	(0.217)	(1.228)	(1.125)	(0.958)		
$\Delta log\, \overline{h^H}_{total}$					-1.556	-0.557
					(1.972)	(1.086)
$\Delta log\,(1-\tau^L)$	-0.504***	1.322***	0.606	0.400	0.618	0.417
	(0.060)	(0.350)	(0.499)	(0.444)	(0.511)	(0.442)
IV	NO	YES	YES	YES	YES	YES
Region F.E.	YES	YES	YES	YES	YES	YES
Splines of log $t-1$ Inc. and $\Delta log\ inc.\ t-1-t$	NO	NO	YES	YES	YES	YES
Overtime Hours	NO	NO	NO	NO	YES	YES
F-stat Excl. Instr.		12.65, 163.45	14.94, 77.89	11.34, 48.34	3.97, 77.72	7.46, 51.25
P-value Excl. Instr.		0.00, 0.00	0.00, 0.00	0.00, 0.00	0.05, 0.00	0.01, 0.00
Mean Hours Low Sk.	1812.88	1812.88	1812.88	1742.40	1831.72	1763.13
Mean Hours High Sk.	1875.10	1875.10	1875.10	1846.59	1910.16	1882.25
N Firms	967.00	967.00	967.00	484.00	967.00	484.00
N	10043	10043	10043	4066	10043	4066

Notes: This table reports the results of estimating a model equivalent to equation (11) and using changes in wages rather than changes in hours as the dependent variable. It shows the elasticity of low-skilled wages to the average hours worked by high-skilled coworkers. We consider both regular (normal) hours (columns 1 to 5) and total (regular and overtime) hours (columns 6 and 7) worked by high-skilled workers. Specifications in columns 2 to 7 use mechanical changes in the average net-of-tax rate among high-skilled workers in a firm as an instrument for the average change in hours and the mechanical change in the net-of-tax rate of low-skilled workers as an instrument for observed changes of 1-τ^L (Section 5.5). First-stage results are available from the authors on request. Low-coordination firms (columns 5 and 7) are defined as being in the top half of the distribution of the standard deviation of hours across skill groups in 2008. Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high- and low-skilled workers in the firm (the residual group is omitted). "Splines" refer to a flexible piecewise linear functional form with 5 components. We consider only low-skilled workers who are at the same firm between 2008 and 2011. We estimate this regression on changes between 2008 and 2011. Observations are weighted by labor income. Standard errors in parentheses are clustered at the firm level. $p<0.10$, ** $p<0.05$, *** $p<0.01$.*

Table D.11: Summary statistics of the AKM regression

	All Sample	Largest group of connected firms
Person and estabilishment parameters		
Number of person effects	1205295	1195884
Number of firm effects	26227	26121
Summary of parameters estimates		
Std. dev. of person effects	0.962	0.960
Std. dev. of firm effects	0.141	0.137
Std. dev. Of Xb	0.829	0.828
Adjusted R-squared	0.913	
Std. dev. of log wages	0.451	0.450
Number of person-year observations	4466655	4445484

Notes: Controls in first step (AKM) regressions: year dummies interacted with education dummies, quadratic and cubic terms in age interacted with education dummies, VA per employee, capital per employee, sales per employee, exporter status, and the fraction of salaried workers.

Table D.12: Mobility and wage changes: males

		Log wages of movers (mean)		Log wage change	
Origin to destination quartile	Number of moves	2 years before	2 years after	Raw	Adjusted
1 to 1	2895	5.14	5.25	0.11	0.00
1 to 2	1515	5.16	5.28	0.12	0.03
1 to 3	965	5.21	5.36	0.15	0.05
1 to 4	500	5.29	5.48	0.19	0.09
2 to 1	960	5.22	5.25	0.03	-0.06
2 to 2	2443	5.29	5.35	0.06	-0.02
2 to 3	1824	5.33	5.43	0.10	0.02
2 to 4	925	5.39	5.51	0.13	0.04
3 to 1	612	5.37	5.37	0.00	-0.07
3 to 2	2110	5.39	5.43	0.05	-0.03
3 to 3	6217	5.40	5.46	0.06	0.00
3 to 4	2120	5.49	5.59	0.10	0.02
4 to 1	304	5.43	5.41	-0.02	-0.10
4 to 2	760	5.51	5.55	0.03	-0.05
4 to 3	2354	5.55	5.60	0.05	-0.02
4 to 4	6395	5.62	5.70	0.08	0.00

Notes: Entries are observed mean log real hourly wages in the 2003-2011 period for job changers with at least 2 years of wages at the old job and the new job. Job refers to the firm of main occupation in the year. Origin/destination quartiles are based on mean wages of coworkers in the year before (origin) or year after (destination) a job move. Four-year wage changes in adjusted regressions include controls for age, age squared and cubed, education dummies, and quadratics of age fully interacted with education.

Table D.13: Mobility and wage changes: females

Origin to destination quartile	Number of moves	Log wages of movers (mean) 2 years before	2 years after	Log wage change Raw	Adjusted
1 to 1	2869	4.94	5.04	0.10	0.00
1 to 2	759	5.01	5.12	0.11	0.02
1 to 3	496	5.04	5.17	0.13	0.03
1 to 4	240	5.12	5.24	0.12	0.03
2 to 1	511	5.08	5.12	0.04	-0.05
2 to 2	1128	5.11	5.18	0.07	-0.01
2 to 3	869	5.13	5.23	0.10	0.01
2 to 4	465	5.19	5.29	0.10	0.01
3 to 1	324	5.15	5.17	0.03	-0.06
3 to 2	873	5.18	5.24	0.06	-0.02
3 to 3	2934	5.24	5.30	0.06	0.00
3 to 4	1064	5.29	5.40	0.11	0.02
4 to 1	195	5.27	5.27	0.00	-0.08
4 to 2	419	5.24	5.28	0.04	-0.05
4 to 3	1371	5.34	5.39	0.05	-0.01
4 to 4	3177	5.41	5.49	0.07	-0.01

Notes: See notes from Table D.12

Table D.14: Dynamics in the hours of movers

Average change in annual hours worked by movers (%)
Breakdown by quartiles of the coworkers wage distribution

Type of origin firm	Males		Females	
	Obs.	Mean change (%)	Obs.	Mean change (%)
1st Quartile	6709	0.05	4920	-0.25
2nd Quartile	7182	0.01	3444	-0.31
3rd Quartile	12924	0.27	5952	0.06
4th Quartile	11549	0.04	5913	-0.39

Mean change (%) in annual hours worked by movers
Detailed Breakdown for movers in the 1st and 4th quartile

Sending to Receiving firm	Males		Females	
	Obs.	Mean change (%)	Obs.	Mean change (%)
1st to 1st	3284	0.02	3202	0.43
1st to 2nd	1775	0.04	853	-1.06
1st to 3rd	1084	0.08	575	-0.40
1st to 4th	566	0.24	290	0.04
4th to 1st	351	0.01	220	-0.52
4th to 2nd	995	0.00	502	-0.70
4th to 3rd	2709	0.23	1541	0.10
4th to 4th	7494	0.07	3650	-0.45
Mean Hours		1935		1930

Notes: Panel A in the table shows the average percentage change in hours worked by movers broken down the quartile of the coworkers wage distribution of the sending firm. In Panel b we then further break down the hours change within the 1st and 4th of the sending firm depending on the quartile of the coworkers wage distribution of the receiving firm. We do this in each interval 2003-2007, 2004-2008, 2005-2009, 2006-2010 and 2007-2011. In the table we show the average change across these periods.

Table D.15: Coordination index by sector using TUS data

	Coordination index
Agriculture, forestry and fishing, mining and quarrying	0.833
Manufacturing	0.978
Construction	0.956
Electricity, gas, steam and air conditioning supply, trade and transport	0.982
Financial and insurance, Real estate, Other business	0.986
Public administration, education, health, arts	0.929
Observations	748

Table D.16: Coordination and wage differentials: measurement error and regular hours

	(1) Firm f.e.	(2) Firm f.e.	(3) Firm f.e.	(4) Firm f.e.	(5) Firm f.e.
Stand. Dev. Tot. Hours	-0.342**		-0.069***	-0.072***	-0.061***
	(0.172)		(0.018)	(0.018)	(0.017)
Median Abs. Dev. Tot. Hours		-0.085***			
		(0.015)			
Firm size	0.003	0.010	0.009	0.148*	0.004
	(0.006)	(0.007)	(0.007)	(0.075)	(0.004)
Exporter status	0.023	0.072***	0.065***	0.059***	0.051***
	(0.029)	(0.018)	(0.016)	(0.019)	(0.015)
Union. Rate	0.068**	0.035	0.030	0.030	0.020
	(0.029)	(0.023)	(0.023)	(0.022)	(0.023)
Female Share	-0.113***	-0.108**	-0.104**	-0.087**	-0.111**
	(0.038)	(0.042)	(0.044)	(0.040)	(0.044)
Average Hours	0.024	-0.001	0.008	0.006	0.002
	(0.043)	(0.025)	(0.026)	(0.027)	(0.025)
log(Cap/empl)	0.019	0.029**	0.025*	0.038***	0.028**
	(0.015)	(0.013)	(0.013)	(0.014)	(0.013)
Numb. of skill groups					0.072***
					(0.012)
(Intang. Assets)/empl			0.019**		
			(0.009)		
O*NET IV	YES	NO	NO	NO	NO
Multi-plant firms	YES	YES	YES	NO	YES
Coordination Share		0.279	0.256	0.273	0.200
F-stat excl. instr.	8.942				
R-sq	0.020	0.118	0.101	0.101	0.105
N	6089	7374	7312	5695	7312

*Notes: The stand. dev. of total hours is the standard deviation of the average hours worked across skill groups within a firm. The median abs. dev. is the the median absolute deviation of median hours across each skill group within a firm. Skill groups are defined as deciles of the distribution of $\hat{\alpha_i} + \hat{\beta} X_{ijt}$ from the AKM model. O*NET IV refers to a vector composed of the average importance of the Contact, Teamwork and Communication in the firm (Section 4.3). All regressions show standardized coefficients. Exporter and industry dummies are based on the median value between 2003 and 2011. (Cap/emp) stands for physical capital per employee. Intang. Assets/empl indicates intangible assets per employee. All regression include a vector of controls for the share of workers in each skill group and for the average value of the individual fixed effects $\hat{\alpha_i}$ in each quartile of the distribution of $\hat{\alpha_i}$ within a firm. Coordination share is derived as the ratio of "Part. R-sq SD Hours" and "Part. R-sq VA and Sales". Standard errors are clustered at the 2-digit industry level. *, ** and *** are 10, 5 and 1 percent significance levels, respectively.*

Table D.17: Wage differentials and coordination: additional robustness

	(1) Firm f.e.	(2) Firm f.e.	(3) Firm f.e.	(4) Firm f.e.	(5) Firm f.e.	(6) Firm f.e.
Stand. Dev. Def. 1	-0.041***	-0.021**	-0.051***		-0.030*	
	(0.011)	(0.010)	(0.018)		(0.016)	
Median Abs. Dev. Def. 1				-0.069***		-0.034***
				(0.016)		(0.012)
Firm size	0.007***	0.011***	0.010	0.011	0.009	0.010
	(0.002)	(0.002)	(0.007)	(0.008)	(0.007)	(0.008)
Exporter status	0.048***	0.022**	0.044***	0.042***	0.013	0.012
	(0.011)	(0.009)	(0.015)	(0.016)	(0.009)	(0.009)
Union. Rate	0.041***	0.040***	0.038	0.042	0.027	0.029
	(0.015)	(0.013)	(0.026)	(0.026)	(0.018)	(0.018)
Female Share	-0.150***	-0.089***	-0.131***	-0.134***	-0.055**	-0.057**
	(0.039)	(0.020)	(0.044)	(0.042)	(0.027)	(0.026)
Average Hours	-0.021**	-0.045***	-0.015	-0.028	-0.045**	-0.055**
	(0.010)	(0.010)	(0.024)	(0.022)	(0.022)	(0.021)
log(Cap/empl)	0.022*	0.036***	0.026**	0.026**	0.017	0.017
	(0.013)	(0.010)	(0.012)	(0.012)	(0.012)	(0.012)
Connected set sample	YES	YES	NO	NO	NO	NO
3 digits Sector f.e.	NO	YES	NO	NO	NO	NO
3-year sub-period f.e.	NO	NO	NO	NO	YES	YES
AKM individual controls	NO	NO	YES	YES	NO	NO
Part. R-sq SD Hours	0.002	0.001	0.003	0.003	0.001	0.001
Part. R-sq VA and Sales	0.022	0.008	0.014	0.014	0.004	0.004
Coordination Share	0.084	0.074	0.182	0.209	0.198	0.190
R-sq	0.153	0.200	0.092	0.094	0.380	0.380
N	20766	20766	7305	7305	8487	8487

*Notes: The stand. dev. of total hours is the standard deviation of the average hours worked across skill groups within a firm. The median abs. dev. is the the median absolute deviation of median hours across each skill group within a firm. Skill groups are defined as deciles of the distribution of $\hat{\alpha}_i + \hat{\beta} X_{ijt}$ from the AKM model. All regressions show standardized coefficients. Exporter and industry dummies are based on the median value between 2003 and 2011. (Cap/empl) stands for physical capital over the number of full-time equivalent employees. Specifications (7) also include quadratic and cubic terms of value added per employee. All regression include a vector of controls for the share of workers in each skill group and for the average value of the individual fixed effects $\hat{\alpha}_i$ in each quartile of the distribution of $\hat{\alpha}_i$ within a firm. Coordination share is derived as the ratio of "Part. R-sq SD Hours" and "Part. R-sq VA and Sales". Standard errors are clustered at the 2-digit industry level. *, ** and *** are 10, 5 and 1 percent significance levels, respectively.*

Table D.18: Value added, sales and and wage premiums relative to Table 3

	(1) Firm f.e.	(2) Firm f.e.	(3) Firm f.e.	(4) Firm f.e.	(5) Firm f.e.	(6) Firm f.e.
log(VA/empl)	0.122***	0.095***	0.168***	0.168***	0.166***	0.157***
	(0.020)	(0.019)	(0.020)	(0.025)	(0.021)	(0.022)
TFP	0.049	0.031	0.097***	0.113***	0.096***	0.059**
	(0.034)	(0.024)	(0.029)	(0.029)	(0.029)	(0.023)
Firm size		0.016**	0.013*	0.041***	0.013*	0.013**
		(0.007)	(0.007)	(0.012)	(0.007)	(0.006)
Exporter status		0.062***	0.046***	0.047**	0.047***	0.037***
		(0.017)	(0.015)	(0.020)	(0.015)	(0.013)
Union. Rate		-0.001	0.038	0.045	0.039	0.067***
		(0.026)	(0.024)	(0.031)	(0.024)	(0.025)
Female Share		-0.058	-0.107***	-0.111***	-0.105***	-0.098***
		(0.040)	(0.035)	(0.035)	(0.035)	(0.020)
Average Hours		-0.020	-0.031	-0.030*	-0.030	-0.063***
		(0.022)	(0.021)	(0.018)	(0.021)	(0.023)
log(Cap/empl)		0.019	-0.008	0.023	-0.007	-0.007
		(0.012)	(0.013)	(0.016)	(0.013)	(0.015)
Persuasion						-0.188**
						(0.074)
Social Perceptiveness						0.025
						(0.044)
Adjust Actions to others						0.005
						(0.017)
Negotiation						0.254**
						(0.097)
Region F.E.	NO	YES	YES	YES	YES	YES
Compos. cntr	NO	NO	YES	YES	YES	YES
Ability Measures	NO	NO	YES	YES	YES	YES
Av. Hours b/w 36.5 and 37.5	YES	YES	YES	NO	YES	YES
Part. R-sq VA and Sales	0.022	0.010	0.032	0.038	0.032	0.020
R-sq	0.022	0.041	0.148	0.153	0.147	0.165
N	7117	7117	7060	4279	7047	5904

*Notes: All regressions show standardized coefficients. Exporter and industry dummies are based on the median value between 2003 and 2011. (Cap/empl) stands for physical capital over the number of full-time-equivalent employees. All specifications control for quadratic and cubic functions of value added per employee and TFP. TFP is obtained as described in Appendix B.4. "Compos. cntr" refers to a vector of controls for the share of workers in each skill group. "Ability Measures" indicate a vector containing the average value of the individual fixed effects $\hat{\alpha_i}$ in each quartile of the distribution of $\hat{\alpha_i}$ within a firm. Coordination share is derived as the ratio of "Part. R-sq SD Hours" and "Part. R-sq VA and Sales". Standard errors are clustered at the 2-digit industry level. *, ** and *** are 10, 5 and 1 percent significance levels, respectively.*

Table D.19: Value added, sales and and wage premiums relative to Table 4

	(1) Firm f.e.	(2) Firm f.e.	(3) Firm f.e.
log(VA/empl)	0.159***	0.148***	0.142***
	(0.019)	(0.020)	(0.019)
TFP	0.122***	0.083***	0.084***
	(0.029)	(0.021)	(0.021)
Firm size	0.012**	0.007*	0.018*
	(0.005)	(0.004)	(0.010)
Exporter status	0.034**	0.018	0.010
	(0.013)	(0.012)	(0.012)
Union. Rate	0.044*	0.042	0.043
	(0.026)	(0.028)	(0.028)
Female Share	-0.136***	-0.083***	-0.066***
	(0.030)	(0.023)	(0.025)
Average Hours	-0.041**	-0.052***	-0.057***
	(0.017)	(0.018)	(0.017)
log(Cap/empl)	-0.005	-0.001	0.006
	(0.013)	(0.013)	(0.011)
Region f.e.	YES	YES	YES
Compos. and Ability cntr.	YES	YES	YES
1 digit Sector f.e.	YES	NO	NO
2 digits Sector f.e.	NO	YES	NO
3 digits Sector f.e.	NO	NO	YES
Part. R-sq VA and Sales	0.033	0.016	0.014
R-sq	0.156	0.183	0.188
N	7055	7055	7055

*Notes: All regressions show standardized coefficients. Exporter and industry dummies are based on the median value between 2003 and 2011. All specifications control for quadratic and cubic functions of value added per employee and TFP. TFP is obtained as described in Appendix B.4. "Compos. cntr" refers to a vector of controls for the share of workers in each skill group. "Ability Measures" indicate a vector containing the average value of the individual fixed effects $\hat{\alpha}_i$ in each quartile of the distribution of $\hat{\alpha}_i$ within a firm. Coordination share is derived as the ratio of "Part. R-sq SD Hours" and "Part. R-sq VA and Sales". Standard errors are clustered at the 2-digit industry level. *, ** and *** are 10, 5 and 1 percent significance levels, respectively.*

Table D.20: Income types in the Danish tax system

Acronym	**Income Type**	**Main Intems Included**
LI	Labor income	Salary, wages, honoraria, fees, bonuses, fringe benefits, business earnings
PI	Personal income	LI+ transfers, grants, awards, gifts, received alimony -Labor market contribution, certain pension contributions
CI	Capital income	Interest income, rental income, business capital income -interest on debt (mortgage, bank loan, credit cards, student loans)
D	Deductions	Commuting costs, union fees, UI contribution, other work expenditures, charity, paid alimony
PCP		Private capital pension contribution
ECP		Employer paid capital pension contribution
TI	Taxable income	PI+CI-D
SI	Stock Income	Dividends and realized capital gains from shares

Table D.21: Personal income tax system in Denmark

	2008			2009		
Tax type	**Base**	**Rate**	**Tax Bracket (DKK)**	**Base**	**Rate**	**Tax Bracket (DKK)**
Regional tax*	TI	33.16		TI	33.21	
National taxes						
Bottom tax	PI+CI(>0)	5.48	0 - 279799	PI+CI(>0)	5.04	0 - 347199
Middle tax	PI +CI(>0)	6.0	279800 - 335799	PI +CI(>0)	6.0	>347200
Top tax	PI+CI(>0)+PCP+ECP	15.0	335800	PI +CI(>0)+PCP+ECP	15.0	>347200
Labor market contribution	LI	8.0		LI	8.0	
EITC	LI	4.0		LI	4.25	
Tax on stock income	SI	28.0, 43.0, 45.0		SI	28.0, 43.0. 45.0	
Marginal tax ceiling	PI/CI/TI	59.0		PI/CI/TI	59.0	

	2010			2011		
Tax type	**Base**	**Rate**	**Tax Bracket (DKK)**	**Base**	**Rate**	**Tax Bracket (DKK)**
Regional tax*	TI	33.32		TI	33.38	
National taxes						
Bottom tax	PI+CI(>0)	3.67	0 - 389899	PI+CI(>0)	3.64	0 - 389899
Middle tax	-	-		-	-	
Top tax	PI +CI(>40000)+PCP+ECP	15.0	>389900	PI +CI(>40000)+PCP+ECP	15.0	>389900
Labor market contribution	LI	8.0		LI	8.0	
EITC	LI	4.25		LI	4.25	
Tax on stock income	SI	28.0, 42.0		SI	28.0, 42.0	
Marginal tax ceiling	PI/CI/TI	51.5		PI/CI/TI	51.5	

Notes: Acronyms are explained in Table D.20. The regional tax includes municipal, county and church taxes. The regional tax rate in the table is the average across municipalities. Tax rates are cumulative. For example, the marginal tax rate in the top bracket (in the average municipality) in 2008 is equal to 33.16 + 5.48 + 6 + 15 = 59.64 percent. Since this figure exceeds the marginal tax ceiling (59 percent), however, the ceiling is binding. For labor income, there is a labor market contribution of 8 percent on top of the tax ceiling, but at the same time, labor income enters all the other tax bases net of the labor market contribution. The effective tax ceiling on labor income in 2008 is therefore equal to 8.0 + (1 − 0.08) × 59.0 = 62.3 percent. The sum of regional and National taxes (with the exclusion of the stock income tax) can not exceed the marginal tax ceiling.

Table D.22: Elasticity of high-skilled hours: normal hours worked

	(1) $\Delta log\, h^H$	(2) $\Delta log\, h^H$	(3) $\Delta log\, h^H$
$\Delta log\,(1-\tau^H)$	-0.022***	-0.050***	-0.028**
	(0.007)	(0.016)	(0.013)
Log base-year income			-0.008***
			(0.002)
IV	NO	YES	YES
Region F.E.	YES	YES	YES
Overtime Hours	NO	NO	NO
Mean Hours	1888.27	1888.27	1888.27
F-stat Excl. Inst.		1355.00	754.53
P-value Excl. Inst.		0.00	0.00
N Firms	1166	1166	1166
N	26489	26489	26489

*Notes: Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high- and low-skilled workers in the firm (the residual group is omitted). We consider only regular hours worked. Observations are weighted by labor income. Standard errors in parentheses are clustered at the firm level. First-stage regressions are available from the authors upon request. * p<0.10, ** p<0.05, *** p<0.01.*

Table D.23: Elasticity of hours of workers in the residual group

	(1) $\Delta log\, h^H$	(2) $\Delta log\, h^H$	(3) $\Delta log\, h^H$	(4) $\Delta log\, h^H$	(5) $\Delta log\, h^H$	(6) $\Delta log\, h^H$
$\Delta log\,(1-\tau^{Residual})$	-0.014**	0.007	0.007	0.011		0.017
	(0.006)	(0.020)	(0.019)	(0.020)		(0.026)
$\Delta log\,(1-\tau^{Residual}_{5th})$					0.011	
					(0.024)	
IV	NO	YES	YES	YES	YES	YES
Splines of inc. at t	NO	NO	YES	NO	NO	YES
Splines of log t-1 inc. and Δ log inc. t-1-t	NO	NO	NO	YES	NO	NO
5th ord. polynomial inc. t	NO	NO	NO	NO	YES	NO
Base-year inc. above median only	NO	NO	NO	NO	NO	YES
Mean Hours	1876.15	1876.15	1876.15	1879.48	1870.05	1878.65
F-stat Excl. Inst.		407.80	476.59	348.64	377.72	291.47
P-value Excl. Inst.		0.00	0.00	0.00	0.00	0.00
N Firms	932	932	932	792	965	742
N	6246	6246	6246	4962	4958	3123

*Notes: Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high- and low-skilled workers in the firm (the residual group is omitted). We consider only regular hours worked. Observations are weighted by labor income. Standard errors in parentheses are clustered at the firm level. First-stage regressions are available from the authors on request. * p<0.10, ** p<0.05, *** p<0.01.*

Table D.24: Elasticity of hours and labor income: extra specifications

	(1) $\Delta log h^H$	(2) $\Delta log h^H$	(3) $\Delta log h^H$	(4) $\Delta log(\, Labor\, income^H)$
$\Delta log(1-\tau^H)$	0.071**	-0.063*	-0.045***	0.0336***
	(0.035)	(0.037)	(0.015)	(0.0087)
Log base-year income	-0.012	-0.003	-0.008***	-0.1988***
	(0.012)	(0.005)	(0.003)	(0.0063)
Women with kids only	YES	NO	NO	NO
Workers at kinks	YES	YES	NO	YES
Top 10\% income only	NO	YES	NO	NO
Mean Hours	1888.72	1951.85	1927.68	
F-stat Excl. Inst.	189.17	14.46	678.35	5.66e+04
P-value Excl. Inst.	0.00	0.00	0.00	0.00
N	2998	2648	24736	1865067

*Notes: The regression in columns 1 to 3 contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high- and low-skilled workers in the firm (the residual group is omitted). We consider both regular and overtime hours worked. To be consistent with Kleven and Schultz (2014), we include the following controls in column 4: labor market experience, experience, squared, age, gender, marital status, number of children aged 0-18 years, educational degree, industry, municipality, local unemployment rate, and base-year fixed effects. Observations are weighted by labor income. Standard errors in parentheses are clustered at the firm level. First-stage regressions are available from the authors on request. * p<0.10, ** p<0.05, *** p<0.01.*

Table D.25: Elasticity of high-skilled hours: income controls

	(1) High Coord. Top 50%	(2) Low Coord. Bottom 50%	(3) High Coord. Top 50%	(4) Low Coord. Bottom 50%	(5) High Coord. Top 50%	(6) Low Coord. Bottom 50%
Dependent Variable	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^H$
$\Delta log\,(1-\,\tau^H)$	-0.020	-0.082***			-0.024**	-0.072**
	(0.014)	(0.027)			(0.012)	(0.029)
$\Delta log\,(1-\,\tau\_5th^H)$			-0.023	-0.115***		
			(0.022)	(0.031)		
IV	YES	YES	YES	YES	YES	YES
Region F.E.	YES	YES	YES	YES	YES	YES
Splines of inc. at t	YES	YES	NO	NO	NO	NO
5th ord. polynomial inc. t	NO	NO	YES	YES	NO	NO
Splines of log t-1 inc. and Δ log inc. t-1-t	NO	NO	NO	NO	YES	YES
Pvalue High=Low	0.05		0.02		0.02	
Mean Hours	1904.10	1847.66	1904.29	1850.89	1907.00	1853.11
F-stat Excl. Inst.	1298.25	461.91	307.72	79.46	857.62	250.09
P-value Excl. Inst.	0.00	0.00	0.00	0.00	0.00	0.00
N Firms	584	583	584	581	537	519
N	19067	7421	17852	6814	15619	5649

*Notes: Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high- and low-skilled workers in the firm (the residual group is omitted). "Splines" refer to a flexible piecewise linear functional form with 5 components. τ_{5th} refers to marginal tax rates obtained as in Dahl and Lochner (2012). "P-value High=Low" refers to the p-value of the null hypothesis that the coefficient attached to $\Delta log\,(1-\,\tau^H)$ is equal in low- and high-coordination firms. Observations are weighted by labor income. Coordination is measured using Std. Dev. Definition 1. Standard errors in parentheses are clustered at the firm level. First-stage regressions are available from the authors on request. * p<0.10, ** p<0.05, *** p<0.01.*

Table D.26: Spillover effects: income controls

	(1) $\Delta log\, h^L$	(2) $\Delta log\, h^L$	(3) $\Delta log\, h^L$
$\Delta log\, \overline{h^H}$	1.152***	1.160***	1.115**
	(0.373)	(0.365)	(0.464)
$\Delta log\, (1-\tau^L)$	0.050	0.044	
	(0.105)	(0.123)	
$\Delta log\, (1-\tau^L_{5th})$			0.030**
			(0.015)
Log base-year income	YES	NO	NO
Splines of inc. at t	NO	YES	NO
5th ord. polynomial inc. t	NO	NO	YES
F-stat Excl. Inst. 13.65, 105.11	17.17, 62.25	3.91, 459.04	
P-value Excl. Inst.	0.00, 0.00	0.00, 0.00	0.05, 0.00
Mean Hours Low Sk.	1809.02	1809.02	1809.49
Mean Hours High Sk.	1877.51	1877.51	1877.50
N Firms	1157	1157	1151
N	14402	14402	13654

*Notes: Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high- and low-skilled workers in the firm. "Splines" refer to a flexible piecewise linear functional form with 5 components. τ_{5th} refers to marginal tax rates obtained as in Dahl and Lochner (2012). Observations are weighted by labor income. First-stage regressions are available from the authors on request. Standard errors in parentheses are clustered at the firm level. * p<0.10, ** p<0.05, *** p<0.01.*

Table D.27: The spillover effects on low-skilled hours: additional specifications

	(1)	(2)	(3)	(4)	(5)
	$\Delta log\, h^L$	$\Delta log\, h^L$	$\Delta log\, h^L$	$\Delta log\, h^L$	$\Delta log\, h^L$
$\Delta log\, \overline{h}^H_{normal}$	0.888***		1.763	0.983**	0.893***
	(0.333)		(1.214)	(0.445)	(0.303)
$\Delta log\, \overline{h^H} \times$ High Union Share			-1.200		
			(1.394)		
$\Delta log\, \overline{h}^H_{total}$		1.217**			
		(0.576)			
$\Delta log\, \overline{h}^{Residual}_{normal}$				-0.179	
				(0.567)	
High Union Share			0.012		
			(0.008)		
$\Delta log\,(1-\tau^L)$	0.163*	0.151	0.006	0.026	0.064
	(0.088)	(0.094)	(0.066)	(0.069)	(0.116)
Overtime hours	NO	YES	NO	NO	NO
Firm f.e.	YES	YES	NO	NO	NO
Base-year f.e.	YES	YES	NO	NO	NO
Workers at kinks	YES	YES	YES	YES	NO
Mean Hours Low Sk.	1815.25	1833.23	1813.05	1811.60	1811.95
Mean Hours High Sk.	1873.63	1906.57	1875.14	1877.83	1874.93
F-stat Excl. Inst.	6.23,24.55	2.45, 25.57	1.81, 8.57, 133.48	4.41,12.16, 122.94, ,	13.97, 77.48
P-value Excl. Inst.	0.01,0.00	0.12, 0.00	0.18, 0.00, 0.00	0.04,0.00, 0.00	0.00,0.00
N Firms	835	835	977	799	958
N	15985	15985	10196	9606	9979

Notes: This table reports the results from estimating alternative specifications of equation (11) in Section 5.4. We consider both regular (normal) hours (columns 1, 3, 4 and 5) and total hours (column 2). All specifications use mechanical changes of the average net-of-tax rate among high-skilled workers in a firm as an instrument for the average change in hours, and the mechanical change of the net-of-tax rate of low-skilled workers as an instrument for observed changes of 1-τ^L (Section 5.5). The dummy variable "High Union Share" in column 3 takes a value of 1 if the firm had a share of unionized workers above the median in 2008. In column 4, we also consider change in average hours among workers in the residual group within the same firm. We instrument for the average change in hours in this group using the average mechanical change of the net-of-tax rate among workers in the residual group. Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, the shares of high- and low-skilled workers in the firm, 5 component splines of income at t-1 and income change between t-1 and t. Workers close to the kink points (column 5) are defined as having taxable income within 5,000 DKK of the top kink or 2,000 DKK of the bottom kink (Kleven and Schultz, 2014). In evaluating the closeness of workers to kinks, base year income is measured in 2005 DKK (6 DKK $\simeq$ 1 USD in 2005). Observations are weighted by labor income. Standard errors in parentheses are clustered at the firm level. $p<0.10$, ** $p<0.05$, *** $p<0.01$.*

Table D.28: Elasticity of high-skilled hours: alternative definitions of coordination and data on hours

	(1) High Coord. Top 50% Def. 2	(2) Low Coord. Bottom 50% Def. 2	(3) Low Coord. Bottom 50% Def. 2	(4) Low Coord. Bottom 50% Def. 2	(5) High Coord. Top 50% BFL Hours	(6) Low Coord. Bottom 50% BFL Hours	(7) BFL Hours
Dependent variable	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^L$	$\Delta log\, h^L$	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^L$
$\Delta log\, (1-\tau^H)$	-0.001	-0.092***			-0.008	-0.091**	
	(0.012)	(0.022)			(0.041)	(0.042)	
$\Delta log\, \overline{h^H_{normal}}$			0.684**				
			(0.307)				
$\Delta log\, \overline{h^H_{total}}$				0.760**			
				(0.319)			
$\Delta log\, \overline{h^H_{blf}}$							1.015**
							(0.400)
$\Delta log\, (1-\tau^L)$			-0.016	-0.077			0.187
			(0.107)	(0.113)			(0.291)
Log base-year income	-0.001	-0.022***			-0.022**	-0.010	
	(0.002)	(0.007)			(0.009)	(0.010)	
Overtime hours	YES	YES	NO	YES	NO	NO	NO
BFL hours	NO	NO	NO	NO	YES	YES	YES
Mean Hours	1905.27	1863.52	1760.44	1783.84	1901.01	1854.16	1851.93
Pvalue High=Low	0.00				0.15		
F-stat Excl. Inst.	1034.04	282.28	5.43,35.78	9.88,35.78	962.85	179.52	1.37,33.69
P-value Excl. Inst.	0.00	0.00	0.00,0.00	0.00,0.00	0.00	0.00	0.26,33.69
N Firms	583	583	489	489	477	521	802
N	15701	10788	4749	4749	15521	6330	8562

*Notes: Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high- and low-skilled workers in the firm (the residual group is omitted). Columns 3, 4 and 7 contain controls for flexible piecewise linear functions with 5 components of income at t-1 and the change in income between t-1 and t. BFL hours refer to hours from E-indkomst. Total hours refer to the sum of normal and overtime hours. Coordination is measured using the St. Dev. Definition 2 in columns 1 to 4 and the St. Dev. Definition 1 in columns 5 to 7. Observations are weighted by labor income. Standard errors in parentheses are clustered at the firm level. First-stage regressions are available from the authors on request. * p<0.10, ** p<0.05, *** p<0.01.*

Table D.29: Uncompensated elasticity and virtual income

	(1) High Coord. Top 50%	(2) Low Coord. Bottom 50%	(3)
Dependent variable	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^L$
$\Delta log\,(1 - \tau^H)$	-0.028**	-0.552	
	(0.014)	(6.212)	
$\Delta log\, vy^H$	-0.013	-1.154	
	(0.017)	(15.801)	
$\Delta log\, \overline{h^H}$			0.957***
			(0.283)
$\Delta log\,(1 - \tau^L)$			-0.008
			(0.065)
$\Delta log\, vy^L$			-0.008
			(0.020)
Log base-year income	0.002	0.429	0.010
	(0.007)	(6.200)	(0.013)
Overtime hours	YES	YES	NO
Mean Hours	1924.91	1907.33	1812.58
Pvalue $\Delta log\,(1 - \tau^H)$ High=Low	0.98		
Pvalue $\Delta log\, vy^H$ High=Low	0.98		
F-stat Excl. Inst.	2049,43.8	0.65,0.01	23.84,5,78,29.7
N Firms	583	584	968
N	18824	7618	10066

*Notes: Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high- and low-skilled workers in the firm (the residual group is omitted). In column 3, we consider only regular hours worked. Observations are weighted by labor income. "P-value $\Delta log\,(1 - \tau^H)$ High=Low" refers to the p-value of the null hypothesis that the coefficient attached to $\Delta log\,(1 - \tau^H)$ in low- and high-coordination firms is equal. "P-value $\Delta log\,(1 - vy^H)$ High=Low" refers to the p-value of the null hypothesis that the coefficient attached to $\Delta log\,(1 - vy^H)$ in low- and high-coordination firms is equal. First-stage regressions are available from the authors on request. Standard errors in parentheses are clustered at the firm level. * p<0.10, ** p<0.05, *** p<0.01.*

Table D.30: The effects of the tax reform on firm characteristics

	(1)	(2)	(3)	(4)
	$\Delta log\,(FirmSize)$	$\Delta log\,(ShareHighSk.)$	$\Delta log\,(ShareLowSk.)$	$\Delta log\,(PhysicalCapital)$
$\Delta log\,(\overline{1-\tau^H})$	-0.204	0.161	-0.466	0.063
	(0.398)	(0.349)	(0.357)	(1.481)
Firm Size	-0.000	0.000	-0.000*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Ind. Exp.	-0.055***	0.034**	-0.071***	0.251**
	(0.020)	(0.016)	(0.022)	(0.101)
Ind. Mupltiplant	-0.036*	-0.011	0.025	0.003
	(0.021)	(0.014)	(0.020)	(0.106)
Share of Low Sk.	0.053	-0.527***	-0.214	-0.599
	(0.100)	(0.089)	(0.141)	(0.567)
Share of High Sk.	0.042	-0.128	-0.800***	-0.315
	(0.095)	(0.081)	(0.125)	(0.542)
Mean Log base year (t) income	-0.047	-0.011	0.243**	0.299
	(0.116)	(0.068)	(0.111)	(0.455)
IV	YES	YES	YES	YES
Region F.E.	YES	YES	YES	YES
F-stat Excl. Inst.	116.04	116.04	116.04	117.07
P-value Excl. Inst.	0.00	0.00	0.00	0.00
N Firms	968	968	968	963

*Notes: Each regression contains the following additional controls measured in the base year: average work experience, average work experience squared, share of males, share of married workers, average worker age, average number of children per worker, local unemployment (firm municipality), share of primary, secondary and tertiary educated workers, and region fixed effects. "Mech." stands for mechanical change. First-stage regressions are available from the authors on request. F-stat Excl. Inst. refers to the Angrist-Pischke F-statistic. Standard errors in parentheses are clustered at the firm level. * p<0.10, ** p<0.05, *** p<0.01.*

D.2 *First-stage regressions*

Table D.31: First-stage regression relative to Table 5

	(1)	(2)	(3) High Coord.	(4) Low Coord.	(5) High Coord. Top 25%	(6) Low Coord. Bottom 25%
Dependent Variable	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^H$	$\Delta log\, h^H$
$\Delta log\,(1-\tau^H)$ Mech.	1.935***	2.086***	1.942***	2.429***	1.952***	2.499***
	(0.053)	(0.076)	(0.054)	(0.175)	(0.082)	(0.216)
Log base-year income		-0.030***	-0.016***	-0.056***	-0.010	-0.057***
		(0.007)	(0.004)	(0.016)	(0.006)	(0.014)
IV	YES	YES	YES	YES	YES	YES
Region fe	YES	YES	YES	YES	YES	YES
Overtime Hours	YES	YES	YES	YES	YES	YES
F-stat	1.36e+03	7.55e+02	1.29e+03	1.93e+02	5.66e+02	1.34e+02
p-value	0.00	0.00	0.00	0.00	0.00	0.00
N Firms	1167	1167	584	583	293	291
N	26488	26488	18875	7613	8307	2371

*Notes: Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high- and low-skilled workers in the firm (the residual group is omitted). The abbreviation "Mech." stands for mechanical changes. Observations are weighted by labor income. Coordination is measured using Std. Dev. Definition 1. F-stat Excl. Inst. refers to the Angrist-Pischke F-statistic. Standard errors in parentheses are clustered at the firm level. * p<0.10, ** p<0.05, *** p<0.01.*

Table D.32: First-stage regression relative to Table 6

	(1) $\Delta log\,(1-\tau^H)$	(2) $\Delta log\,(1-\tau^H)$	(3) $\Delta log\,(1-\tau^H)$	(4) $\Delta log\,(1-\tau^H)\times$ Size	(5) $\Delta log\,(1-\tau^H)$	(6) $\Delta log\,(1-\tau^H)\times$ Size	(7) $\Delta log\,(1-\tau^H)$	(8) $\Delta log\,(1-\tau^H)\times$ Export	(9) $\Delta log\,(1-\tau^H)$	(10) $\Delta log\,(1-\tau^H)\times$ Export
$\Delta log\,(1-\tau^H)$ Mech.	1.835***	2.182***	1.946***	136.367***	2.494***	93.787***	2.086***	0.202***	2.529***	0.197***
	(0.047)	(0.116)	(0.067)	(44.471)	(0.195)	(21.641)	(0.132)	(0.026)	(0.266)	(0.066)
$\Delta log\,(1-\tau^H) Mech.\times$ Mech. Size			-0.000	1.684***	-0.000	1.710***				
			(0.000)	(0.021)	(0.000)	(0.101)				
$\Delta log\,(1-\tau^H) Mech.\times$ Export							-0.167	1.685***	-0.159	1.888***
							(0.138)	(0.050)	(0.213)	(0.102)
Log base-year income	-0.012***	-0.038***	-0.016***	-7.925**	-0.056***	-7.290***	-0.016***	-0.015***	-0.056***	-0.025***
	(0.004)	(0.008)	(0.004)	(3.299)	(0.016)	(1.894)	(0.004)	(0.003)	(0.016)	(0.006)
Firm F.E.	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO
Base-year F.E.	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO
F-stat	1542.40	353.25	1033.24	6991.11	291.82	605.65	204.80	4583.96	113.01	658.43
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N Firms	785	675	584	584	583	583	584	584	583	583
N	26497	10267	18875	18875	7613	7613	18875	18875	7613	7613

*Notes: Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high and low-skilled workers in the firm (the residual group is omitted). "Mech." stands for mechanical changes. Observations are weighted by labor income. F-stat Excl. Inst. refers to the Angrist-Pischke F-statistic. Standard errors in parentheses are clustered at the firm level. * p<0.10, ** p<0.05, *** p<0.01*

Table D.33: First-stage regression relative to Table 6

	(1) $\Delta log\,(1-\tau^H)$	(2) $\Delta log\,(1-\tau^H)\times$ High Union. Share	(3) $\Delta log\,(1-\tau^H)$	(4) $\Delta log\,(1-\tau^H)\times$ High Union. Share	(5) $\Delta log\,(1-\tau^H)$	(6) $\Delta log\,(1-\tau^H)\times$ High TFP	(7) $\Delta log\,(1-\tau^H)$	(8) $\Delta log\,(1-\tau^H)\times$ High TFP
$\Delta log\,(1-\tau^H)$ Mech.	1.961***	0.126***	2.612***	0.397***	2.058***	0.164***	2.480***	0.193***
	(0.082)	(0.020)	(0.192)	(0.136)	(0.061)	(0.025)	(0.222)	(0.038)
$\Delta log\,(1-\tau^H) Mech.\times$ High Union. Share	-0.029	1.696***	-0.255	1.794***				
	(0.096)	(0.056)	(0.179)	(0.120)				
$\Delta log\,(1-\tau^H) Mech.\times$ High TFP					-0.190**	1.625***	-0.105	1.843***
					(0.082)	(0.062)	(0.183)	(0.107)
Log base-year income	-0.016***	-0.009***	-0.057***	-0.039**	-0.017***	-0.010***	-0.056***	-0.013***
	(0.004)	(0.003)	(0.016)	(0.019)	(0.004)	(0.003)	(0.016)	(0.004)
Firm F.E.	NO	NO	NO	NO	NO	NO	NO	NO
Base-year F.E.	NO	NO	NO	NO	NO	NO	NO	NO
F-stat	508.71	4396.99	193.07	633.39	992.97	2269.59	152.40	915.10
p-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
N Firms	584	584	583	583	584	584	583	583
N	18875	18875	7613	7613	18875	18875	7613	7613

*Notes: Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high- and low-skilled workers in the firm (the residual group is omitted). "Mech." stands for mechanical changes. Observations are weighted by labor income. F-stat Excl. Inst. refers to the Angrist-Pischke F-statistic. Standard errors in parentheses are clustered at the firm level. * $p<0.10$, ** $p<0.05$, *** $p<0.01$*

Table D.34: First-stage regression relative to Table 7

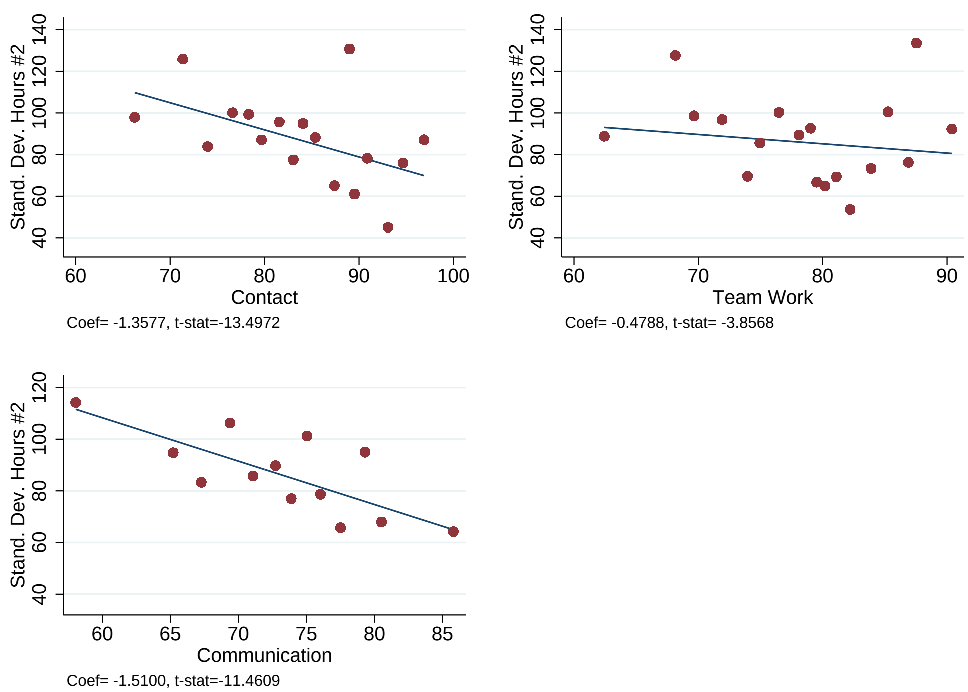
	(1) $\Delta log\,\overline{h^H}$	(2) $\Delta log\,(1-\tau^L)$	(3) $\Delta log\,\overline{h^H}$	(4) $\Delta log\,(1-\tau^L)$	(5) $\Delta log\,\overline{h^H}$	(6) $\Delta log\,(1-\tau^L)$	(7) $\Delta log\,\overline{h^H}$	(8) $\Delta log\,(1-\tau^L)$	(9) $\Delta log\,\overline{h^H_{total}}$	(10) $\Delta log\,(1-\tau^L)$	(11) $\Delta log\,\overline{h^H_{total}}$	(12) $\Delta log\,(1-\tau^L)$
$\Delta log\,(\overline{1-\tau^H})$ Mech.	-0.432***	-0.185*	-0.432***	-0.178*	-0.438**	0.139	-0.545***	-0.187	-0.277	-0.178*	-0.495**	-0.187
	(0.163)	(0.111)	(0.163)	(0.097)	(0.193)	(0.118)	(0.192)	(0.152)	(0.178)	(0.097)	(0.194)	(0.152)
$\Delta log\,(1-\tau^L)$	-0.063*	0.649***	-0.061	0.492***	-0.061	0.478***	-0.143**	0.858***	-0.038	0.492***	-0.107*	0.858***
	(0.036)	(0.051)	(0.037)	(0.060)	(0.037)	(0.059)	(0.056)	(0.113)	(0.037)	(0.060)	(0.061)	(0.113)
Region F.E.	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Splines of log t-1 Inc. and Δlog inc. t-1-t	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Log Mean Inc. High Sk.	NO	NO	NO	NO	YES	YES	NO	NO	NO	NO	NO	NO
Overtime Hours	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	YES	YES
F-stat Excl. Inst.	13.09	160.40	15.45	76.76	4.66	55.84	11.90	48.55	4.43	76.72	8.39	50.92
P-value Excl. Inst.	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.04	0.00	0.00	0.00
N Firms	968	968	968	968	968	968	484	484	968	968	484	484
N	10091	10091	10091	10091	10091	10091	4100	4100	10091	10091	4100	4100

*Notes: Each regression contains the following controls measured in the base year: work experience, work experience squared, sex, age, number of children, marital status, education, local unemployment (municipality), region fixed effects, firm size, exporter status, and the shares of high- and low-skilled workers in the firm (the residual group is omitted). Observations are weighted by labor income. "Mech." stands for mechanical change. F-stat Excl. Inst. refers to the Angrist-Pischke F-statistic. Standard errors in parentheses are clustered at the firm level. * $p<0.10$, ** $p<0.05$, *** $p<0.01$.*

D.3 Standard deviation of hours definition 2: tables and graphs

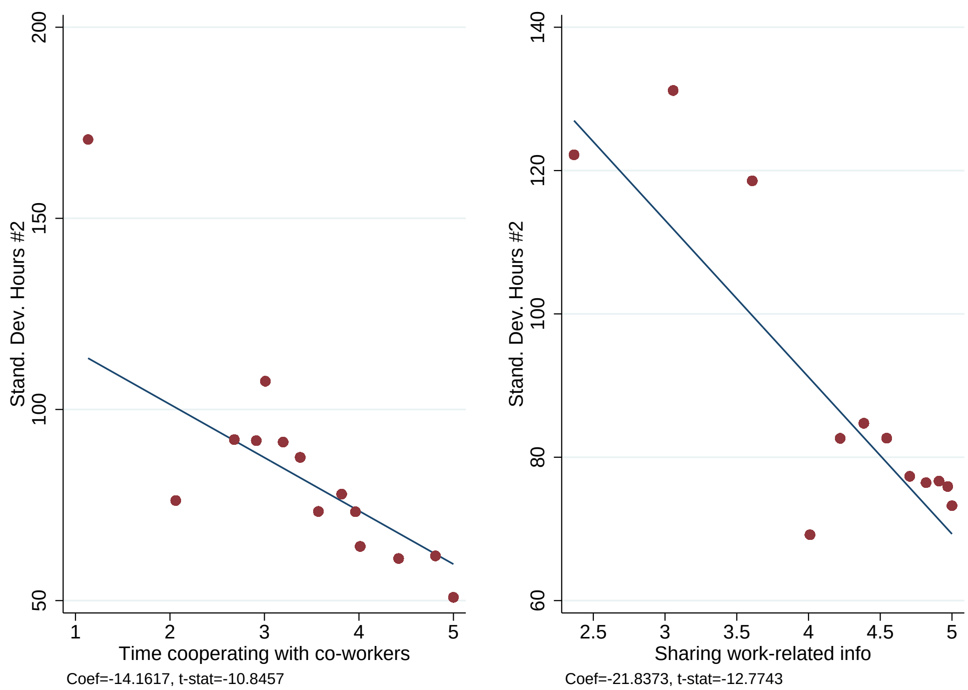
In this section, we present the results of a parallel analysis performed using the standard deviation of hours across skill groups, where skill groups are defined at the the intersection of 3 educational groups (i.e., primary, secondary and tertiary education) and 3 broad occupational categories (i.e., manager, middle manager and blue collar) (Section 4.3).

Figure D.7: Tasks and coordination of hours (Def. 2 education-occupation)



Notes: We group firms into 20 equally sized bins based on the variable on the x-axis.

Figure D.8: PIAAC validation exercise coordination (Def. 2)



Notes: We group firms into 20 equally sized bins based on the variable on the x-axis.

Table D.35: Coordination by sector (def. 2)

	Std. Dev. hours Def. 2 (education occupation)	
Coordination by Industry (2003-2011)		
	Mean	Std. Dev.
Agriculture, forestry and fishing, mining and quarrying	112.25	101.70
Manufacturing	98.55	80.31
Constructions	129.04	96.06
Electricity, gas, steam and air conditioning supply, Trade and transport	68.15	86.97
Financial and insurance, Real estate, Other business	79.00	80.38
Public administration, education, health, arts, entertainment and other services	67.41	65.92
Overall sectors	87.79	89.60
Observations	8182	

Notes: The table shows average values over the 2003-2011 period.

Table D.36: Coordination and firm characteristics (Def. 2)

	Stand. Dev. Def. 2 (education-occupation)		**Obs.**
	(1)	(2)	
V.A. /employee	-0.037***	-0.014*	17714
	(0.008)	(0.007)	
Capital/employee	-0.006	-0.005***	17714
	(0.007)	(0.001)	
Sales/employee	-0.042***	-0.004	17714
	(0.009)	(0.020)	
TFP	-0.112***	-0.061***	16148
	(0.008)	(0.013)	
Firm size	-0.018**	-0.050***	17714
	(0.007)	(0.015)	
Share of tertiary educ.	-0.139***	-0.061***	17714
	(0.008)	(0.014)	
Number of plants	-0.022***	-0.027	17714
	(0.007)	(0.017)	
Exporter status	-0.133***	-0.009	17714
	(0.007)	(0.010)	
Fraction of hourly work.	0.317***	0.235***	17714
	(0.007)	(0.017)	
Fraction of Unionized work.	0.095***	0.025**	17714
	(0.008)	(0.012)	
Fraction of Females	-0.019**	0.061***	17714
	(0.008)	(0.016)	
Fraction of Part-Time work	0.207***	0.121***	17714
	(0.008)	(0.014)	
Mean Managerial Ability	-0.055***	-0.022**	17714
	(0.008)	(0.011)	
Negotiation	-0.291***	-0.128***	16401
	(0.009)	(0.015)	
Persuasion	-0.298***	-0.134***	13353
	(0.009)	(0.015)	
Social Perceptiveness	-0.277***	-0.099***	13353
	(0.009)	(0.015)	
Adjust Actions to others	-0.146***	-0.063***	13353
	(0.009)	(0.013)	
5 digits industry f.e.	NO	YES	

*Notes: The table shows standardized coefficients from a regression of the standard deviation of hours across skill groups on firm characteristics. Each cell is a different regression. TFP is obtained from the procedure described in Appendix B.4. To avoid confusion, we label the O*NET descriptor "Coordination" as "Adjust Actions to Others". Standard errors in parentheses are clustered at the firm level. * p<0.10, ** p<0.05, *** p<0.01.*

Table D.37: Coordination and wage premiums

	(1) Firm f.e.	(2) Firm f.e.	(3) Firm f.e.	(4) Firm f.e.	(5) Firm f.e.	(6) Firm f.e.
Stand. Dev. Def. 2	-0.070***	-0.047**	-0.042**	-0.077***		-0.038**
	(0.019)	(0.018)	(0.018)	(0.016)		(0.016)
Stand. Dev. Normal Hours					-0.044**	
					(0.019)	
Firm size		0.015*	0.014**	0.038***	0.014**	0.012**
		(0.007)	(0.006)	(0.014)	(0.007)	(0.005)
Exporter status		0.069***	0.083***	0.085***	0.084***	0.081***
		(0.015)	(0.017)	(0.025)	(0.018)	(0.016)
Union. Rate		-0.003	0.047*	0.038	0.046*	0.053**
		(0.025)	(0.026)	(0.029)	(0.026)	(0.025)
Female Share		-0.055	-0.070**	-0.077***	-0.067*	-0.049**
		(0.045)	(0.034)	(0.028)	(0.035)	(0.019)
Average Hours		0.003	-0.011	0.002	-0.012	-0.039
		(0.025)	(0.025)	(0.023)	(0.025)	(0.026)
log(Cap/empl)		0.038***	0.067***	0.083***	0.067***	0.064***
		(0.012)	(0.013)	(0.017)	(0.013)	(0.014)
Negotiation						0.201
						(0.123)
Persuasion						-0.151***
						(0.056)
Social Perceptiveness						0.017
						(0.068)
Adjust Actions to others						-0.034*
						(0.017)
Region F.E.	NO	YES	YES	YES	NO	YES
Compos. cntr	NO	NO	YES	YES	NO	YES
Ability Measures	NO	NO	YES	YES		YES
Av. Hours b/w 36.5 and 37.5	YES	YES	YES	NO	NO	YES
Part. R-sq SD Hours	0.006	0.002	0.002	0.002	0.002	0.001
Part. R-sq VA and Sales	0.022	0.010	0.006	0.006	0.008	0.005
Coordination Share	0.276	0.251	0.280	0.260	0.255	0.227
R-sq	0.006	0.031	0.072	0.073	0.072	0.079
N	7285	7285	7285	4392	7271	6067

*Notes: The "Stand. Dev." is the standard deviation of the average total hours worked across skill groups within a firm. The Stand. Dev. of normal hours is the standard deviation of the average normal hours worked across skill groups within a firm. Skill groups are defined as deciles of the distribution of $\hat{\alpha}_i + \hat{\beta} X_{ijt}$ from the AKM model. All regressions show standardized coefficients. The exporter dummy is derived as the modal exporter status between 2003 and 2011. (Cap/empl) stands for physical capital over the number of full-time equivalent employees. "Compos. cntr" refers to a vector of controls for the share of workers in each skill group. "Ability Measures" indicate a vector containing the average value of the individual fixed effects $\hat{\alpha}_i$ in each quartile of the distribution of $\hat{\alpha}_i$ within a firm. The dependent variable (firm f.e.) in column (5) is based on the wage rate from normal hours. To avoid confusion, we label the O*NET descriptor "Coordination" as "Adjust Actions to Others." Coordination Share is derived as the ratio of "Part. R-sq SD Hours" and "Part. R-sq VA and TFP". "Part. R-sq VA and Sales" is from Table D.18. Standard errors are clustered at the 2-digit industry level. *, ** and *** are 10, 5 and 1 percent significance levels, respectively.*

Table D.38: Coordination and wage differentials within sectors

	(1) Firm f.e.	(2) Firm f.e.	(3) Firm f.e.	(4) Firm f.e.	(5) Firm f.e.	(6) Firm f.e.	(7) Firm f.e.	(8) Firm f.e.
Stand. Dev. Def. 2	-0.038**	-0.031*	-0.028				-0.038**	-0.032*
	(0.016)	(0.017)	(0.017)				(0.019)	(0.019)
Median Abs. Dev. Def. 2				-0.049***	-0.037**	-0.034**		
				(0.015)	(0.015)	(0.015)		
Firm size	0.013**	0.009*	0.021*	0.013**	0.009*	0.020*	0.015**	0.014**
	(0.006)	(0.005)	(0.011)	(0.005)	(0.005)	(0.010)	(0.007)	(0.006)
Exporter status	0.058***	0.039***	0.031**	0.054***	0.037***	0.029**	0.086***	0.077***
	(0.017)	(0.013)	(0.013)	(0.017)	(0.013)	(0.013)	(0.017)	(0.018)
Union. Rate	0.038	0.035	0.033	0.038	0.035	0.033	0.050**	0.058***
	(0.028)	(0.031)	(0.031)	(0.029)	(0.032)	(0.032)	(0.025)	(0.022)
Female Share	-0.085**	-0.037	-0.016	-0.085**	-0.037	-0.017	-0.078**	-0.063**
	(0.036)	(0.024)	(0.021)	(0.036)	(0.025)	(0.023)	(0.033)	(0.025)
Average Hours	-0.019	-0.030	-0.036	-0.022	-0.033	-0.038*	-0.013	-0.019
	(0.023)	(0.024)	(0.023)	(0.021)	(0.022)	(0.021)	(0.025)	(0.025)
log(Cap/empl)	0.057***	0.043***	0.044***	0.058***	0.045***	0.047***	0.067***	0.021
	(0.010)	(0.010)	(0.010)	(0.011)	(0.010)	(0.011)	(0.013)	(0.029)
log(VA/empl)								0.145**
								(0.071)
Region f.e.	YES	YES	YES	YES	YES	YES	YES	YES
Compos. and Ability cntr.	YES	YES	YES	YES	YES	YES	YES	YES
1 digit Sector f.e.	YES	NO	NO	YES	NO	NO	NO	NO
2 digits Sector f.e.	NO	YES	NO	NO	YES	NO	NO	NO
3 digits Sector f.e.	NO	NO	YES	NO	NO	YES	YES	YES
Part. R-sq SD Hours	0.001	0.001	0.001	0.002	0.001	0.001	0.002	
Part. R-sq VA and Sales	0.009	0.005	0.004	0.009	0.005	0.004		
Coordination Share	0.163	0.171	0.150	0.113	0.276	0.237		
R-sq	0.065	0.087	0.091	0.066	0.088	0.092	0.076	0.083
N	7240	7240	7240	7306	7306	7306	7035	7035

*Notes: The "Stand. Dev." is the standard deviation of the average total hours worked across skill groups within a firm. The Median Abs. Dev. is the the median absolute deviation of median hours across all skill groups within a firm. Skill groups are defined as deciles of the distribution of $\hat{\alpha_i} + \hat{\beta} X_{ijt}$ from the AKM model. All regressions show standardized coefficients. Exporter and industry dummies are based on the median value between 2003 and 2011. (Cap/empl) stands for physical capital over the number of full-time equivalent employees. In column (8), TFP is used as an instrument for valued added per employee (log(V.A./empl)). TFP is obtained as described in Appendix B.4. "Compos. cntr" refers to a vector of controls for the share of workers in each skill group. "Ability Measures" indicate a vector containing the average value of the individual fixed effects $\hat{\alpha_i}$ in each quartile of the distribution of $\hat{\alpha_i}$ within a firm. Coordination share is derived as the ratio of "Part. R-sq SD Hours" and "Part. R-sq VA and TFP". "Part. R-sq VA and Sales" is from Table D.19. Standard errors are clustered at the 2-digit industry level. *, ** and *** are 10, 5 and 1 percent significance levels, respectively.*

References

Abowd, J. M., Creecy, R. H., and Kramarz, F. (2002). Computing person and firm effects using linked longitudinal employeremployee data. *Cornell University. Working paper.*

Ackerberg, D. A., Caves, K., and Frazer., G. (2015). Identification properties of recent production function estimators. *Econometrica.*, 83 (6):2411 – 2451.

Arizo, K., Hotz, J., and Per, J. (2016). Family friendly firms? Worker mobility, firm attributes, and wage trajectories of women and men. *working paper.*

Borjas, G. (1980). The relationship between wages and weekly hours of work: The role of division bias. *Journal of Human Resources*, 15:409–423.

Card, D., Cardoso, A., and Kline, P. (2016). Bargaining, sorting, and the gender wage gap: Quantifying the impact of firms on the relative pay of women. *Quarterly Journal of Economics*, 131 (2):633–686.

Card, D., Heining, J., and Kline, P. (2013). Workplace heterogeneity and the rise of west german wage inequality. *The Quarterly Journal of Economics*, 128 (3):967–1015.

Cornelissen, T., Dustmann, C., and Schnberg, U. (2017). Peer effects in the workplace. *American Economic Review*, 107(2):425–56.

Dahl, G. B. and Lochner, L. (2012). The impact of family income on child achievement: Evidence from the earned income tax credit. *American Economic Review*, 102(5):1927–56.

Gruber, J. and Saez, E. (2002). Elasticity of taxable income: Evidence and implications. *Journal of Public Economics*, 84:1–32.

Kleven, H. J. and Schultz, E. (2014). Estimating taxable income responses using *d*anish tax reforms. *American Economic Journal: Economic Policy*, 6(4):271–301.

Kopczuk, W. (2005). Tax bases, tax rates and the elasticity of reported income. *Journal of Public Economics*, 89:2093–2119.

Lavetti, K. and Schmutte, I. (2016). Estimating compensating wage differentials with endogenous job mobility. *working paper.*

Olley, G. S. and Pakes, A. (1996). The dynamics of productivity in the telecommunications equipment industry. *Econometrica*, 64 (6):1263–1297.

Song, J., Price, D. J., Guvenen, F., Bloom, N., and von Watcher, T. (2016). Firming up wage inequality. *work in progress.*

Van Reenen, J. (1996). Wages and innovation in a panel of u.k. companies. *The Quarterly Journal of Economics*, 111:195–226.