Online supplement to: Comparing micro-evidence on rent sharing from two different econometric models

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Abstract

This supplement to our paper "Comparing micro-evidence on rent sharing from two different econometric models" presents (*i*) in Sections 1 and 2 theoretical structural models with which our econometric reduced-form models of productivity and wage determination are compatible and (*ii*) in Section 3 detailed estimates and diagnostic tests that we obtain from estimating the reduced-form models of productivity and wage determination.

In *Section 1*, we present one theoretical structural model behind the econometric reduced-form productivity model that we are able to derive explicitly and which enables us to go from the derived theoretical relationship to the empirical reduced-form productivity equation based on our data.

There are various interpretative schemes behind the expected positive pay-performance link, i.e. behind the wage-profit elasticity in the reduced-form model of wage determination, which stem from various underlying theoretical structural models, as noted in Section 1 "Introduction" and Section 5 "Potential sources of discrepancies between rent-sharing estimates" in the main text. In *Section 2* of this online supplement, we elaborate on three different interpretations of such pay-performance relationship which are compatible with three different theoretical structural models: collective bargaining models, an optimal labor contract model and a search-theoretic model of the labor market. Intuitively, central to collective bargaining models is the existence of workers' bargaining power allowing them to appropriate part of the firm's surplus. In these models, the pay-performance relationship depends on the relative strengths of the bargaining parties. In optimal contract models in which both workers and firms are risk-averse, the pay-performance link depends on the ratio of both parties' relative risk aversion parameters. In two-sided search models with wage posting, the main source of rent sharing is competition between firms to attract workers. Firms have an incentive to hire more workers, thereby reducing search costs. This incentive is particularly pronounced for higher-productivity firms because they face larger opportunity costs of search. Although the three structural models can be developed analytically, we are not able to estimate them econometrically

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because of data constraints as this would require having more detailed worker and firm characteristics. As such, we are not in a position to distinguish between the three potential interpretative schemes empirically.

In *Section 3*, we present detailed estimates that we obtain from estimating the reduced-form models of productivity and wage determination using the system generalized method of moments (SYS-GMM) estimation method. We also report two diagnostic tests: tests on overidentifying restrictions (instrument exogeneity tests) and a test on lack of second-order serial correlation in the differenced residuals (model specification test).

1 A theoretical structural productivity model

A firm i at time t produces output using the following production technology:

$$Q_{it} = Q_{it}(N_{it}, M_{it}, K_{it}) \tag{1}$$

with (N_{it}, M_{it}) a vector of static inputs in production free of adjustment costs (labor and intermediate inputs) and K_{it} capital treated as a dynamic input in production (predetermined in the short run).

We assume that (i) $Q_{it}(\cdot)$ is continuous and twice differentiable with respect to its arguments, (ii) a firm takes the input price of materials as given, (iii) firms produce in a homogeneous good industry and compete in quantities (play Cournot)[1] and (iv) producers active in the market are maximizing short-run profits.

Let us turn to the oligopolistic firm's short-run profit maximization problem. Firm i's short-run profits, Π_{it}, are given by:

$$\Pi_{it} = R_{it} - W_{it}N_{it} - J_{it}M_{it} \tag{2}$$

with $R_{it} = P_tQ_{it}$ an increasing and concave revenue function, P_t the price of the homogenous good at time t, and W_{it} and J_{it} the firm's input prices for N and M, respectively, at time t.

Firm i must choose the optimal quantity of output and the optimal demand for intermediate inputs and labor. The optimal output choice Q_{it} satisfies the following first-order condition:

$$\frac{P_t}{(C_Q)_{it}} = \left(1 + \frac{s_{it}}{\eta_t}\right)^{-1} = \mu_{it} \tag{3}$$

with $(C_Q)_{it} = \frac{\partial C_{it}}{\partial Q_{it}}$ the marginal cost of production, $s_{it} = \frac{Q_{it}}{Q_t}$ the market share of firm i, $\eta_t = \frac{\partial Q_t}{\partial P_t}\frac{P_t}{Q_t}$ the own-price elasticity of industry demand and μ_{it} firm i's price-cost markup.

[1] This assumption is consistent with only observing a domestic industry-wide output price index and not firm-specific output prices.

The first-order condition for the optimal choice of intermediate inputs is given by setting the marginal revenue product of intermediate inputs equal to the price of intermediate inputs:

$$(Q_M)_{it} = \frac{J_{it}}{P_t}\left(1 + \frac{s_{it}}{\eta_t}\right)^{-1} \tag{4}$$

Inserting Eq. (3) in Eq. (4) and multiplying both sides by $\frac{M_{it}}{Q_{it}}$ yields:

$$(\varepsilon_M^Q)_{it} = \mu_{it} s_{Mit} \tag{5}$$

From Eq. (5), it follows that profit maximization implies that optimal demand for intermediate inputs is satisfied when a firm equalizes the output elasticity with respect to intermediate inputs, denoted by $(\varepsilon_M^Q)_{it} = \frac{\partial Q_{it}}{\partial M_{it}}\frac{M_{it}}{Q_{it}}$, to the price-cost markup μ_{it} multiplied by the share of intermediate input expenditure in total sales, denoted by $s_{Mit} = \frac{J_{it}M_{it}}{P_t Q_{it}}$.

Firm i's optimal demand for labor depends on the characteristics of its labor market. We distinguish three labor market settings (LMS): perfect competition or right-to-manage bargaining (PR), strongly efficient bargaining (EB) and static partial equilibrium monopsony (MO).

Under PR, labor is unilaterally determined by firm i from short-run profit maximization, which implies the following first-order condition:

$$(\varepsilon_N^Q)_{it} = \mu_{it} s_{Nit} \tag{6}$$

with $(\varepsilon_N^Q)_{it} = \frac{\partial Q_{it}}{\partial N_{it}}\frac{N_{it}}{Q_{it}}$ the output elasticity with respect to labor and $s_{Nit} = \frac{W_{it}N_{it}}{P_t Q_{it}}$ the share of labor expenditure in total sales.

In a *perfectly competitive labor market model*, a firm takes the exogenously-determined market wage as given. A profit-maximizing firm always chooses employment such that the marginal revenue product of labor equals the wage (Eq. (6)). In the *right-to-manage bargaining model*, the firm and its workers bargain over any surplus in order to determine the wage (Nickell and Andrews, 1983). The firm continues to choose the number of workers it wishes to employ once wages have been determined by the bargaining process, which implies the same static first-order condition for labor as in the perfectly competitive labor market model. The following first-order condition with respect to wages must hold at an interior optimum:

$$W_{it} = \overline{W}_{it} + \gamma_{it}\left[\frac{R_{it} - W_{it}N_{it} - J_{it}M_{it}}{N_{it}}\right] \tag{7}$$

where $\overline{W}_{it}$ represents the worker's alternative wage, $\gamma_{it} = \frac{\phi_{it}}{1-\phi_{it}}$ the relative extent of rent sharing with $\phi_{it} \in [0,1]$ the part of economic rents going to the workers.[2]

[2]Eq. (7) results from maximizing a generalized Nash product, the product of the weighted net gains to the firm and its workers, $\Omega_{RTM} = \left\{N_{it}(W_{it})W_{it} + \left(\overline{N}_{it} - N_{it}(W_{it})\right)\overline{W}_{it} - \overline{N}_{it}\overline{W}_{it}\right\}^{\phi_{it}}\left\{R_{it} - W_{it}N_{it}(W_{it}) - J_{it}M_{it}\right\}^{1-\phi_{it}}$ with respect to the wage rate subject to $(R_N)_{it} = W_{it}$, with R_N the marginal revenue product of labor and $\overline{N}$ the competitive employment level.

Under *strongly efficient bargaining* (EB), the risk-neutral firm and its risk-neutral workers negotiate simultaneously over wages and employment in order to maximize the joint surplus of their economic activity (McDonald and Solow, 1981). An efficient wage-employment pair is obtained by maximizing a generalized Nash product[3] with respect to the wage rate and labor. The first-order condition for wages is given by Eq. (7). The first-order condition for labor is given by:

$$W_{it} = (R_N)_{it} + \phi_{it}\left[\frac{R_{it} - (R_N)_{it}N_{it} - J_{it}M_{it}}{N_{it}}\right] \tag{8}$$

with $(R_N)_{it} = \frac{\partial R_{it}}{\partial N_{it}}$ the marginal revenue product of labor.

An efficient wage-employment pair is given by solving simultaneously the first-order conditions with respect to the wage rate and labor. As such, the equilibrium condition is given by:

$$(R_N)_{it} = \overline{W}_{it} \tag{9}$$

Eq. (9) traces out the locus of efficient wage-employment pairs, known as the contract curve. Given that $\mu_{it} = \frac{P_t}{(R_Q)_{it}}$ in equilibrium, with $(R_Q)_{it} = \frac{\partial R_{it}}{\partial Q_{it}}$ the marginal revenue, we obtain the following expression for the output elasticity with respect to labor by combining Eqs. (7) and (9):

$$(\varepsilon_N^Q)_{it} = \mu_{it}s_{Nit} - \mu_{it}\gamma_{it}(1 - s_{Nit} - s_{Mit}) \tag{10}$$

So far, we have assumed that there is a potentially infinite supply of employees wanting a job in the firm. A small wage cut by the employer will result in the immediate resignation of all existing workers. However, the *static partial equilibrium monopsony model* (MO) postulates that the labor supply facing an individual employer might be less than perfectly elastic because workers might have heterogeneous preferences over workplace environments of different potential employers (Manning, 2003). Such heterogeneity in e.g. firm location or job characteristics (corporate culture, starting times of work) makes workers to view employers as imperfect substitutes. This in turn gives employers non-negligible market power over their workers.

Let us assume that the monopsonist firm is constrained to set a single wage for all his workers and faces labor supply $N_{it}(W_{it})$, which is an increasing function of the wage W. Both $N_{it}(W_{it})$ and the inverse of this relationship $W_{it}(N_{it})$ are referred to as the labor supply curve of this firm. The monopsonist firm's objective is to maximize its short-run profit function $\Pi_{it} = R_{it} - W_{it}(N_{it})N_{it} - J_{it}M_{it}$, taking the labor supply curve as given. Maximizing this profit function with respect to labor gives the following first-order condition:[4]

$$(R_N)_{it} = (W_N)_{it}N_{it} + W_{it}(N_{it}) \tag{11}$$

[3] The generalized Nash product is written as: $\Omega_{EB} = \left\{N_{it}W_{it} + \left(\overline{N}_{it} - N_{it}\right)\overline{W}_{it} - \overline{N}_{it}\overline{W}_{it}\right\}^{\phi}\left\{R_{it} - W_{it}N_{it} - J_{it}M_{it}\right\}^{1-\phi_{it}}$.

[4] From Eq. (11), it follows that profit maximization implies that the optimal demand for labor is satisfied when a firm equalizes the marginal revenue product of labor to the marginal cost of labor. The latter is higher than the wage paid to the new worker $W_{it}(N_{it})$ by the amount $(W_N)_{it}N_{it}$ because the firm has to increase the wage paid to all workers it already employs whenever it hires an extra worker.

Rewriting Eq. (11) gives:

$$W_{it} = \beta_{it}(R_N)_{it} \tag{12}$$

with $\beta_{it} = \frac{W_{it}}{(R_N)_{it}} = \frac{(\varepsilon_W^N)_{it}}{1+(\varepsilon_W^N)_{it}}$. $\beta_{it} \leq 1$ represents the wage markdown and $(\varepsilon_W^N)_{it} = \frac{\partial N_{it}(W_{it})}{\partial W_{it}} \frac{W_{it}}{N_{it}} \in \Re_+$ the wage elasticity of the labor supply curve that firm i faces, measuring the degree of wage-setting power that firm i possesses.[5]

Rewriting Eq. (12) and using that $(R_N)_{it} = \frac{P_t(Q_N)_{it}}{\mu_{it}}$ with $(Q_N)_{it}$ the marginal product of labor, gives the following expression for the elasticity of output with respect to labor:

$$(\varepsilon_N^Q)_{it} = \mu_{it} s_{Nit} \left(1 + \frac{1}{(\varepsilon_W^N)_{it}}\right) \tag{13}$$

Using the first-order condition for intermediate inputs, we obtain an expression for firm i's price-cost markup (μ_{it}) and using the first-order conditions for intermediate inputs and labor, we define firm i's joint market imperfections parameter (ψ_{it}) as follows:

$$\mu_{it} = \frac{(\varepsilon_M^Q)_{it}}{s_{Mit}} \tag{14}$$

$$\begin{aligned} \psi_{it} &= \frac{(\varepsilon_M^Q)_{it}}{s_{Mit}} - \frac{(\varepsilon_N^Q)_{it}}{s_{Nit}} && (15) \\ &= 0 \quad \text{if LMS=PR} && (16) \\ &= \mu_{it}\gamma_{it} \left[\frac{1 - s_{Nit} - s_{Mit}}{s_{Nit}}\right] > 0 \quad \text{if LMS=EB} && (17) \\ &= -\mu_{it} \frac{1}{(\varepsilon_W^N)_{it}} < 0 \quad \text{if LMS=MO} && (18) \end{aligned}$$

In order to make this model empirically implementable, we specify two additional assumptions. First, we consider production functions with a scalar Hicks-neutral productivity term and constant technology parameters across a set of producers, i.e. we assume a Cobb-Douglas production technology (where the elasticity of substitution among inputs is equal to one): $Q_{it} = \Omega_{it} N_{it}^{\varepsilon_N^Q} M_{it}^{\varepsilon_M^Q} K_{it}^{\varepsilon_K^Q}$. Second, we assume constant gaps between the output elasticities of labor and materials and their revenue shares, respectively. Taken together, these assumptions imply that the revenue shares for labor and materials are constant across firms. This constancy of revenue shares is motivated from theory as well as data specificities (practical considerations). In particular, we opt to take out sources of variability that our static theoretical model does not explain: firm-year variations in profits and in adjustment costs which are temporary in nature, i.e. related to the business cycle. Denoting the logs of Q_{it}, N_{it}, M_{it}, K_{it} and Ω_{it} by q_{it}, n_{it}, m_{it}, k_{it} and ω_{it}, respectively, this theoretical

[5] Perfect competition corresponds to the case where $(\varepsilon_W^N)_{it} = \infty$, hence $(R_N)_{it} = W_{it}$. Under monopsony, $(\varepsilon_W^N)_{it}$ is finite and the labor supply curve that firm i faces is upward sloping, hence, the firms sets $W_{it} < (R_N)_{it}$. As such, the degree of firm i's wage-setting power decreases in the wage elasticity of its labor supply curve.

structural model of productivity implies the following reduced-form model of productivity:

$$\begin{aligned} q_{it} &= \varepsilon_N^Q n_{it} + \varepsilon_M^Q m_{it} + \varepsilon_K^Q k_{it} + \omega_{it} \\ &= \mu\left[s_N\left(n_{it} - k_{it}\right) + s_M\left(m_{it} - k_{it}\right)\right] + \psi[s_N\left(k_{it} - n_{it}\right)] + \lambda k_{it} + \omega_{it} \\ &= \mu\left[s_N\left(n_{it} - k_{it}\right) + s_M\left(m_{it} - k_{it}\right)\right] + \mu\gamma[s_N\left(k_{it} - n_{it}\right)] + \lambda k_{it} + \omega_{it} \end{aligned} \tag{19}$$

2 Three theoretical structural wage-determination models

2.1 Collective bargaining models

In collective bargaining models, rents arise from institutions that artificially restrict competition in the labor market, such as some form of employee representation (either trade unions or works councils). Essentially, wages are determined by maximizing a generalized Nash product, which is the weighted product of the firm's and the workers' net gain from reaching an agreement with the weights represented by the party's bargaining power. Independent of the exact nature of the employment function, the following first-order condition with respect to wages must hold at an interior optimum:

$$W = \overline{W} + \gamma\left[\frac{R - WN - jM}{N}\right] \tag{20}$$

where $\overline{W}$ represents the worker's alternative wage and $\Pi = R - WN - JM$ are short-run profits. $R = PQ$ is total revenue where P is the output price and output Q equals $\Omega F(N, M, K)$, with N labor, M material input, K capital and Ω the revenue-shifting parameter being a function of the production technology and the demand for the final good. The prices of labor and material input are denoted by W and J, respectively and $\gamma = \frac{\phi}{1-\phi}$ represents the relative extent of rent sharing with $\phi \in [0, 1]$.

Eq. (20) shows that, to a first-order approximation, the equilibrium wage is determined by the worker's alternative market wage in the event of a breakdown in bargaining $\overline{W}$, the relative bargaining strength of the two parties γ and the firm's ability to pay $\frac{\Pi}{N}$. As such, the existence of collective bargaining power is predicting a positive pay-performance link $\left(\frac{dW}{d\left(\frac{\Pi}{N}\right)} = \gamma > 0\right)$. This equilibrium relationship is compatible with worker-firm negotiations that differ in bargaining scope. Bargaining issues might involve (i) wages and employment (efficient bargaining, McDonald and Solow, 1981), (ii) wages and working practices (labor hoarding, Haskel and Martin, 1992) or only wages (right-to-manage bargaining, Nickell and Andrews, 1983).

As discussed in Section 1, the *strongly efficient bargaining* model (EB) assumes that the workers and the firm negotiate simultaneously over wages and employment in order to maximize the joint surplus of their economic activity. The bounds of the bargaining range are given by the minimum acceptable utility levels for both parties. In the absence of an agreement, both parties receive their fallback utility. It is the objective of the workers to maximize $U(W, N) = NW + (\overline{N} - N)\overline{W}$, where

$\overline{N}$ is the competitive employment level ($0 < N \leq \overline{N}$). Consistent with capital quasi-fixity, it is the firm's objective to maximize its short-run profit function: $\Pi = R - WN - JM$. In the absence of an agreement, the representative worker receives the alternative wage. If no revenue accrues to the firm when bargaining breaks down, the firm's short-run profit equals zero in which case the firm has to bear only the fixed costs of capital. Hence, the generalized Nash product is written as:

$$\Omega_{EB} = \left\{NW + \left(\overline{N} - N\right)\overline{W} - \overline{NW}\right\}^{\phi}\left\{R - WN - JM\right\}^{1-\phi} \tag{21}$$

The *labor hoarding model* (LH) is based on two key assumptions. First, there exists overhead labor at the firm, denoted by N_O, which can either be interpreted as a proportion of the workers' time that is paid for but unproductive to the firm due to e.g. illicit shirking, set-up of machinery or coffee breaks, or the proportion of the workforce (rather than the hour) that is paid for but unproductive due to generous crew sizes or overmanning. Second, workers value on-the-job leisure and their preferences are represented by the following objective function: $V(W, N_O) = (W - \overline{W})\left(\frac{N_O}{N_P} - \overline{\left(\frac{N_O}{N_P}\right)}\right)$, with N_P productive labor, $\frac{N_O}{N_P}$ the degree of overmanning and $\overline{\left(\frac{N_O}{N_P}\right)}$ the alternative overhead labor ratio. The workers and the firm negotiate simultaneously over wages and overhead labor while productive labor is unilaterally chosen by the firm at the profit-maximizing level. Assuming that both types of labor are paid the same, the generalized Nash product is now written as:

$$\Omega_{LH} = \left\{(W - \overline{W})\left(\frac{N_O}{N_P} - \overline{\left(\frac{N_O}{N_P}\right)}\right)\right\}^{\phi}\left\{R - W(N_O + N_P) - JM\right\}^{1-\phi} \tag{22}$$

The *right-to-manage model* (RTM) postulates that the workers negotiate with the firm over wages while the firm chooses its profit-maximizing employment level. The generalized Nash product to be maximized now becomes:

$$\Omega_{RTM} = \left\{N(W)W + \left(\overline{N} - N(W)\right)\overline{W} - \overline{NW}\right\}^{\phi}\left\{R - WN(W) - JM\right\}^{1-\phi} \tag{23}$$

where $N(W)$ represents the optimal employment level chosen by the firm given the level of the bargained wage.

Eq. (20) results from maximization of (*i*) Eq. (21) with respect to the wage rate, (*ii*) Eq. (22) with respect to the wage rate subject to $R_{N_P} = W$, with R_{N_P} the marginal revenue of productive labor and $N = N_O + N_P$, or (*iii*) Eq. (23) with respect to the wage rate subject to $R_N = W$, with R_N the marginal revenue of labor.

2.2 Optimal labor contract model

In a labor contract model with unverifiable effort, the principal (or employer) does not know a priori and with certainty what effort the agent (or employee) has undertaken to achieve the observable performance. The principal is, hence, confronted with a problem of moral hazard. The remuneration rule should depend on observable outcomes that are associated with effort in order to create incentives for the employee to exert the desired level of effort. This remuneration rule will arrive at a compromise between the motives of insurance and incentives. Building on Holmström (1979), we consider a single agent who is contracting with a single principal.

The agent's utility function is given by: $U(W,e) = u(W) - c(e)$, with W the wage he receives, $u(\cdot)$ an increasing and strictly concave function ($u' > 0, u'' < 0$), $e \in \mathbb{R}_+$ his action (effort) and $c(\cdot)$ an increasing and strictly convex cost function ($c' > 0, c'' > 0$). Let $\overline{U}$ denote the reservation utility of the agent, representing the minimum amount that he will require for accepting the employment contract.

The action that the agent takes, affects his performance (output). Denote output by $Q = Q(e, \vartheta)$ where $\vartheta \in \mathbb{R}$ represents the state of nature, and hence the source of risk against which the agent wishes to be insured. Assume that $Q_e = \frac{\partial Q}{\partial e} > 0$. Denote $v(\pi)$ the von Neumann-Morgenstern utility function of the principal with $v(.)$ a strictly concave function of profits ($v' > 0, v'' < 0$) and $\Pi = Q - W$.

A contract specifies the remuneration of the agent. It is a mapping $W : \Delta \rightarrow \mathbb{R}$, with Δ the set of observable and contractible events. Δ only includes the output performance Q, hence, feasible contracts are of the form $W(Q)$. This principal-agent model focuses on the behavior of a principal and an agent whose decisions unfold in the following sequence. The principal offers a contract W. The agent accepts or rejects the contract. If he rejects, he receives his reservation utility $\overline{U}$. If the agent accepts, he chooses effort e. Nature draws ϑ (a random event) that affects the result of the agent's effort $Q(e, \vartheta)$. The principal and the agent observe the result Q. The principal remunerates the agent according to the terms of the contract.

The principal's problem boils down to determining how the payoff $Q(e, \vartheta)$ would be shared optimally between the principal and the agent. He chooses the contract that maximizes his utility, anticipating the action that the agent will choose.

Let us suppress ϑ and view Q as a random variable with a distribution parameterized by the agent's effort. Denote $F(Q|e)$ the distribution of outcomes Q as a function of the effort level e, assuming that F is twice continuously differentiable and $F_e(Q|e) < 0$. The latter, which is implied by $Q_e > 0$, assumes that an increase in e leads to a first-order stochastic-dominant shift in F. Letting λ and φ be the multipliers associated with respectively the participation constraint and the incentive compatibility constraint where the latter is replaced by the first-order condition of the agent, the Lagrangian of the principal's problem is written as:

$$\min_{\lambda,\varphi} \max_{W(Q),e} \mathcal{L} = \int \{ v(Q - W(y)) + \lambda[u(W(Q)) - c(e) - \overline{U}] + \varphi[u(W(Q)) \frac{f_e(Q|e)}{f(Q|e)} - c'(e)] f(Q|e) dQ \} \quad (24)$$

Pointwise optimization of the Lagrangian yields the following characterization of a second-best sharing rule:

$$\frac{v'(y - W(Q))}{u'(W(Q))} = \lambda + \varphi \frac{f_e(Q|e)}{f(Q|e)} \quad \forall Q \tag{25}$$

The conditions reduce to Borch's (1962) rule for first-best risk sharing if the incentive compatibility constraint is slack ($\varphi = 0$). If $\varphi \neq 0$, the incentive compatibility constraint is binding and there is an incentive-insurance trade-off. Hence, the optimal contract is second best. Intuitively, $\frac{f_e(Q|e)}{f(Q|e)}$ measures how strongly the principal is drawing inferences about the agent's effort choice e from the realizations of Q. The characterization in Eq. (25) states that penalties or bonuses expressed in terms of deviations from optimal risk sharing should be paid in proportion to this measure.

Eq. (25) defines an implicit function linking profits and wages. Differentiating Eq. (25) gives:

$$\frac{dW(Q)}{d\Pi} = \frac{v''(\Pi)}{u''(W)} \frac{1}{\lambda + \varphi \frac{f_e(Q|e)}{f(Q|e)}} \quad \forall Q \tag{26}$$

If a high-output realization is good news about the agent's effort, which corresponds to the statistical assumption of the distribution of outcomes conditional on the agent's action choice satisfying the monotone likelihood ratio property $\left(\frac{d\left[\frac{f_e(Q|e)}{f(Q|e)}\right]}{dQ} > 0 \right)$, the agent's remuneration is increasing in his performance $\left(\frac{dW(Q)}{dQ} > 0 \right)$ and $\frac{dW(Q)}{d\Pi} > 0$ (Bolton and Dewatripont, 2005).

Combining Eqs. (26) and (25) gives:

$$\varepsilon_{\Pi}^{W(Q)} = \frac{r_f}{r_w} \quad \forall Q \tag{27}$$

with $r_f = -\Pi \frac{v''(\Pi)}{v'(\Pi)}$ and $r_w = -W \frac{u''(W)}{u'(W)}$ denoting the firm's and the worker's relative risk aversion, respectively. Eq. (27) shows that the pay-performance link depends on the ratio of parties' relative risk aversion.

2.3 Search-theoretic model of the labor market: Wage posting and directed search

We present a competitive search model which considers an environment where employers post wages ex ante and unemployed workers direct their search to the most attractive workers (Moen, 1997). In this model, frictions in the labor market cause firms to pay higher wages in order to increase the flow of workers and to reduce search costs. Paying higher wages as an optimal response to the frictions in the labor market is particularly pronounced for high-productivity firms since they face higher opportunity costs of search.[6]

[6] An alternative search-theoretic model could be one in which competition among wage setters (employers) is driving the positive wage-performance correlation: an extension of the Burdett-Mortensen (1998) model with heterogeneous firms which considers an environment where wages are posted ex ante and search is purely random. In such model, firms that pay higher wages both increase the inflow and reduce the outflow of workers in order to lower search costs. In equilibrium, higher-productivity firms pay higher wages, and hence, are more likely to hire and less likely to lose any worker.

Following Rogerson *et al.* (2005), we consider a static version of the competitive search model. At the beginning of the period, there are a large number of unemployed workers (u) and vacancies (v). For simplicity, let us assume that the number of vacancies is fixed. Let $q^* = \frac{u}{v}$ denote the economywide queue length. There is a sunk cost $c \geq 0$ associated with the opening of a vacancy. Any match within the period $m(u,v)$ produces output Q, which is divided between the worker and the firm according to the posted wage. The matching function m is assumed to be continuous, nonnegative and increasing in both arguments with $m(u,0) = m(0,v) = 0 \ \forall (u,v)$, and is assumed to display constant returns to scale. At the end of the period, unmatched workers get $\overline{W}$, while unmatched vacancies get 0. Then the model ends.

Let us first define the behavior of the workers. Consider a worker facing a menu of different wages. U is the highest value that he can get by applying for a job at some firm. A worker is willing to apply to a particular job offering a wage $W \geq \overline{W}$ only if the arrival rate of jobs to workers $\alpha_W(q) = \frac{m(u,v)}{u}$ is sufficiently large, such that:

$$\alpha_W(q)W + (1 - \alpha_W(q))\overline{W} \geq U \tag{28}$$

In equilibrium, workers are indifferent about where to apply. Therefore, q adjusts to satisfy Eq. (28) with equality.

Let us now define the strategy of the firm. Eq. (28) describes how a change in his wage affects his queue length q. Therefore, the firm's problem is written as:

$$V = \max_{W,q} \{-c + \alpha_e(q)(Q - W)\} \tag{29}$$

$$\text{s.t. } \alpha_W(q)W + (1 - \alpha_W(q))\overline{W} \geq U \tag{30}$$

with $\alpha_e(q) = \frac{m(u,v)}{v}$ the arrival rate of workers to vacant jobs. Eliminating W using Eq. (28) at equality and using $\alpha_e(q) = q\alpha_W(q)$, the firm's problem is written as:

$$V = \max_{q} \{-c + \alpha_e(q)(Q - \overline{W}) - q(U - \overline{W})\} \tag{31}$$

The first-order condition is given by:

$$\alpha_e'(q)(Q - \overline{W}) = U - \overline{W} \tag{32}$$

Since each employer assumes that he cannot affect U, Eq. (32) implies that all employers choose the same q, which in equilibrium must equal the economywide q^*. Hence, Eq. (32) characterizes the equilibrium value of U, and the arrival rates α_W and α_e. Substituting the value of U from Eq. (32) in Eq. (28) at equality gives the market wage W^*:

$$W^* = \overline{W} + \varepsilon_q^{\alpha_e}(q^*)(Q - \overline{W}) \tag{33}$$

with $\varepsilon_q^{\alpha_e}(q^*) = \frac{q^*\alpha_e'(q^*)}{\alpha_e(q^*)}$ the elasticity of $\alpha_e(q^*)$. $\varepsilon_q^{\alpha_e}(q^*) \in [0,1]$ by the assumptions of the matching function m.

From Eq. (33), it follows that the wage rule operates as if the worker and the firm bargained over the rents in the employment relationship $(Q - \overline{W})$, with the worker's share given by the elasticity of $\alpha_e(q^*)$. Intuitively, competition among wage setters incentivizes firms to post high wages in order to attract many workers. This incentive is particularly true for higher productivity firms as they face larger opportunity costs of search.

Substituting Eq. (33) into Eq. (29) determines the number of vacancies, which is equivalent to the firm's profits (Π) under the assumption of a fixed number of vacancies:

$$V = -c + [\alpha_e(q^*) - q^*\alpha_e'(q^*)](Q - \overline{W}) \tag{34}$$

Combining Eqs. (33) and (34) establishes a positive link between wages and profits: $\frac{dW^*}{d\Pi} = \frac{\varepsilon_q^{\alpha_e}(q^*)}{\alpha_e(q^*) - q^*\alpha_e'(q^*)} > 0$.

3 Detailed estimates from the reduced-form productivity and wage determination models

Our comparative analysis sample is based on confidential databases maintained by INSEE (the French "Institut National de la Statistique et des Etudes Economiques"): firm accounting information from EAE ("Enquête Annuelle d'Entreprise"), supplemented by matched firm-worker data drawn from the DADS (the administrative database of "Déclarations Annuelles des Données Sociales"). We end up with a matched firm-worker panel data sample, consisting at the firm level of 109,199 observations for 9,849 firms over the 18 years 1984-2001, and at the worker-firm level of 382,501 observations for 60,294 workers in the 9,849 firms. The comparative analysis sample is broken into 25 manufacturing industries defined on the basis of the 2- and 3-digit level of the French industrial classification ("Nomenclature économique de synthèse"). These are industries where we expect rent sharing to be predominant. They amount to 66% of the firms and 58% of employment in total manufacturing. This high prevalence might be explained by the fact that the government often extends the terms of industry-level bargaining agreements to all employers, implying that collective bargaining coverage is very high (around 95%), making a comparative rent-sharing analysis particularly relevant. Table 1 presents the number of firms and the number of observations for each industry in the comparative analysis sample.

<Table 1 about here>

In order to get consistent estimates of the parameters in the reduced-form productivity and wage determination models, we apply the system generalized method of moments (SYS-GMM) estimation method, developed by Arellano and Bover (1995) and Blundell and Bond (1998). As mentioned in the main text, this method is designed for panels with relatively small time and large cross-sectional dimensions, covariates that are not strictly exogenous, unobserved heterogeneity, heteroscedasticity and within-firm autocorrelation. We build sets of instruments following the Holtz-Eakin *et al.* (1988)-approach which avoids the standard two-stage least squares trade-off between instrument lag depth and sample depth by including separate instruments for each time period and substituting zeros for missing observations. To avoid instrument proliferation, we only use the 2- and 3-year lags of the instrumented variables as instruments in the first-differenced equation and the 1-year lag of the first-differenced instrumented variables as instruments in the original equation. We use the two-step SYS-GMM estimator which is asymptotically more efficient than the one-step SYS-GMM estimator and robust to heteroscedasticity, and the finite-sample correction to the two-step covariance matrix developed by Windmeijer (2005).

The consistency of the SYS-GMM estimator depends on the validity of the instruments and the absence of serial correlation in the error term. To address these concerns, we report two diagnostic tests suggested by Arellano and Bond (1991): tests on the validity of the instruments and a test on lack of second-order serial correlation in the first-differenced residuals.

The validity of GMM crucially hinges on the assumption that the instruments are exogenous. We report both the Sargan and Hansen test statistics for the joint validity of the overidentifying restrictions since the Sargan tests do not depend on an estimate of the optimal weighting matrix and are hence not so vulnerable to instrument proliferation. On the other hand, they require homoskedastic errors for consistency which is not likely to be the case. As documented by Andersen and Sørensen (1996) and Bowsher (2002), instrument proliferation might weaken the Hansen test of instrument validity to the point where it generates implausibly good p-values (see Roodman, 2009 for a discussion). In addition to the Hansen test evaluating the entire set of overidentifying restrictions/instruments, we provide difference-in-Hansen statistics to test the validity of subsets of instruments.

The assumption that there is no serial correlation in the error terms of the levels equation can be tested by testing for serial correlation in the first-differenced residuals. If the error terms of the levels equation are not serially correlated, the first-differenced residuals should exhibit negative first-order serial correlation but no second-order serial correlation. The reported *m1*- and *m2*-tests test for respectively first-order and second-order serial correlation in the first-differenced error terms.

3.1 Estimates from a reduced-form model of productivity

We estimate the following reduced-form model of productivity for each industry $I \in \{1, \ldots, 25\}$: $q_{it} = \mu \left[s_N \left(n_{it} - k_{it} \right) + s_M \left(m_{it} - k_{it} \right) \right] + \mu\gamma [s_N \left(k_{it} - n_{it} \right)] + \lambda k_{it} + \omega_{it} + \alpha_i + \alpha_t + \epsilon_{it}$, where i is a firm subscript and t a year subscript. The variables q_{it}, n_{it}, m_{it} and k_{it} are respectively for each year the logarithms of output Q_{it}, labor N_{it}, material input M_{it} and capital K_{it}. s_N and s_M are the average shares of labor costs and material costs in total revenue. The parameters μ, $\gamma = \frac{\phi}{1-\phi}$ and λ

are respectively the parameters of price-cost markup, relative extent of rent sharing and elasticity of scale. ω_{it} is an index of "true" total factor productivity, or productivity for short, α_i a firm-specific effect, α_t a year effect and ϵ_{it} an idiosyncratic error term.

Table 2 reports the computed input shares, estimates of output elasticities $\left(\widehat{\varepsilon}_N^Q, \widehat{\varepsilon}_M^Q, \widehat{\varepsilon}_K^Q\right)$ and scale elasticities, joint market imperfection parameters $\left(\widehat{\psi} = \widehat{\mu\gamma}\right)$, price-cost markups and extent of rent sharing, and diagnostic tests generated by the reduced-form productivity model using the SYS-GMM estimator. We denote the relative and absolute extent of rent-sharing parameters $\left(\widehat{\gamma} \text{ and } \widehat{\phi}, \text{ respectively}\right)$ obtained by the reduced-form productivity regression by superscript "*prod*". The industries in Table 2 are ranked according to $\widehat{\gamma}_I^{prod}$.

Data limitations precluded us from using exogenous firm demand shifters as a source of variation in input demands. We follow a common instrumentation strategy in the literature, which is using lagged internal values. More specifically, we use the 2- and 3-year lags of the inputs as instruments in the first-differenced equation and the 1-year lag of the first-differenced inputs as instruments in the original equation for identification. Table 2 shows that the Sargan test statistic fails to confirm the joint validity of the moment restrictions, which might be due to the existence of heteroscedasticity. In 5 out of the 25 industries (ind. $I = 2, 4, 5, 19, 23$), the Hansen test also rejects the joint validity of the identifying restrictions. For industry $I = 2, 5, 23$, the difference-in-Hansen tests reject the exogeneity of the 1-year lagged first-differenced inputs as instruments in the levels equation.

<Table 2 about here>

3.2 Estimates from a reduced-form model of wage determination

We recover two sets of rent-sharing estimates from a reduced-form model of wage determination for each industry $I \in \{1, \ldots, 25\}$. The *first* set is obtained by estimating the regression model $w_{it} = \beta_0 + \beta_1 \overline{w}_{it} + \beta_2 (\pi_{it} - n_{it}) + \beta_3 (k_{it} - n_{it}) + \alpha_i + \alpha_t + \epsilon_{it}$, where i is a firm subscript and t a year subscript. The variables w_{it}, $\overline{w}_{it}$, π_{it}, k_{it} and n_{it} are respectively for each year the logarithms of the firm labor cost per worker or average wage W_{it}, the average workers' alternative wage or reservation wage $\overline{W}_{it}$, the firm profits Π_{it}[7], the firm capital K_{it}, and the firm number of employees N_{it}. α_i is the firm effect, α_t the year effect and ϵ_{it} an idiosyncratic error. In this specification, we do not take into account that high-profit firms may pay higher wages because they employ high-skilled workers, not because their wages are higher for workers of a given ability. We only indirectly control for differences in firms' labor composition through including capital intensity as a regressor.

The *second* set is obtained by estimating the regression model $w_{j(i)t} = \beta_0 + \beta_1 \overline{w}_{it} + \beta_2 (\pi_{it} - n_{it}) + \beta_3 (k_{it} - n_{it}) + \alpha_{j(i)} + \alpha_i + \alpha_t + \epsilon_{it}$, where $j(i)$ is a subscript of worker j in firm i. The variable $w_{j(i)t}$

[7] The firm profits (Π_{it}) is simply the widely used measure of gross operating profit computed as value added minus labor costs, smoothed over four or five years if possible from year $t-3$ or $t-4$ to current year t (taking advantage of the availability of three year pre-sample accounting firm observations when necessary). Such smoothing, often done in practice, is useful to control for the high volatility of profits.

is for each year the logarithm of the net earnings of worker j in firm i or the net wage $W_{j(i)t}$, and $\alpha_{j(i)}$ is the worker-firm effect. In this specification, we control for interfirm differences in workers' skills.

The parameter of interest in both regression models is β_2, which is the elasticity of wages with respect to profit per employee. In addition to this estimated elasticity, Table 3 also reports estimated elasticities of wages with respect to (*i*) the alternative wage $\left(\widehat{\beta}_1\right)$ and (*ii*) capital intensity $\left(\widehat{\beta}_3\right)$, and diagnostic tests generated by the reduced-form models of wage determination. In Table 3, we denote the estimated elasticities obtained by the first regression model by superscript "*wage,f*" (see first part of Table 3) and the ones obtained by the second regression model by superscript "*wage,w*" (see second part of Table 3). We use the same ranking as in Table 2, i.e. the industries are ranked according to $\widehat{\gamma}_I^{prod}$.

Similar to the reduced-form model of productivity, we lack exogenous firm demand shifters as a source of variation of profits that do not impact directly upon wages. Therefore, we also follow common practice and use lagged values of firm profitability as instruments. More specifically, we use the 2- and 3-year lags of the smoothed profits-per-employee variable as instruments in the first-differenced equation and the 1-year lag of the first-differenced smoothed profits-per-employee variable as instruments in the original equation for identification. Table 3 shows that for both sets of estimates, the Sargan test rejects the null of exogeneity of the instruments in all industries.

Focusing on the first set of estimates (using w_{it} as the dependent variable) reveals that the Hansen test only fails to confirm the joint validity of the identifying restrictions in 3 out of the 25 industries (ind. $I = 12, 13, 19$). The difference-in-Hansen tests suggest that the 1-year lagged first-differenced smoothed profits-per-employee variable as instruments in the levels equation may be to blame (exogeneity rejected).

Focusing on the second set of estimates (using $w_{j(i)t}$ as the dependent variable) shows that the Hansen test rejects the joint validity of the moment conditions in 23 out of the 25 industries. For 3 out of these 23 industries (ind. $I = 14, 21, 25$), the difference-in-Hansen tests reject the exogeneity of the 1-year lagged first-differenced smoothed profits-per-employee variable as instruments in the levels equation. The difference-in-Hansen tests additionally reject the validity of (*i*) the 2-year lags of the smoothed profits-per-employee variable as instruments in the first-differenced equation for 2 industries (ind. $I = 5, 24$), (*ii*) the 3-year lags of the smoothed profits-per-employee variable as instruments in the first-differenced equation for 2 industries (ind. $I = 17, 18$) and (*iii*) the 2- and 3-year lags of the smoothed profits-per-employee variable as instruments in the first-differenced equation for 7 industries (ind. $I = 1, 4, 7, 10, 13, 19, 20$). For 6 out of these 23 industries (ind. $I = 2, 6, 9, 11, 22, 23$), only the use of the 2- and 3-year lags of the smoothed profits-per-employee variable as instruments in the first-differenced equation does not prove informative.

<Table 3 about here>

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Table 1: Industry repartition in the comparative analysis sample (IC-EB regime)

Ind. I	Code	Name	# firms (# obs.)	% firms	# workers (# obs.)	% workers
1	B05-B06	Other food products	767 (8,346)	5.14	5,095 (29,986)	4.90
2	C11	Clothing and skin goods	790 (7,665)	5.29	4,245 (23,999)	4.08
3	C12	Leather goods and footwear	312 (3,422)	2.09	1,876 (12,555)	1.80
4	C20	Publishing, (re)printing	1,037 (10,936)	6.95	5,367 (31,459)	5.16
5	C41	Furniture	505 (5,658)	3.38	3,173 (20,979)	3.05
6	E11-E12, E14	Shipbuilding, construction of railway rolling stock, bicycles, motorcycles, transport equipment n.e.c.	96 (996)	0.64	808 (5,099)	0.78
7	E13	Aircraft and spacecraft	63 (658)	0.42	1,923 (11,917)	1.85
8	E21	Metal products for construction	216 (2,360)	1.45	1,040 (6,425)	0.10
9	E22	Ferruginous and steam boilers	398 (4,365)	2.67	1,965 (12,118)	1.89
10	E27-E28	Other special purpose machinery	361 (3,990)	2.42	2,027 (13,832)	1.95
11	F34	Medical and surgical equipment and orthopaedic appliances	96 (941)	0.64	489 (2,629)	0.47
12	F11-F12	Mining of metal ores, other mining n.e.c.	237 (2,883)	1.59	973 (6,024)	0.94
13	F14	Earthenware products and construction material	528 (6,109)	3.54	3,586 (22,679)	3.45
14	F21	Spinning and weaving	374 (4,014)	2.51	2,748 (16,415)	2.64
15	F23	Knitted and crocheted fabrics	126 (1,313)	0.84	1,341 (8,391)	1.29
16	F32	Pulp, paper and paperboard	82 (935)	0.55	1,007 (6,979)	0.97
17	F33	Articles of paper and paperboard	362 (4,358)	2.43	2,633 (18,624)	2.53
18	F45	Rubber products	123 (1,488)	0.82	1,403 (9,866)	1.35
19	F46	Plastic products	877 (10,010)	5.88	4,899 (32,192)	4.71
20	F51	Basic iron and steel	102 (1,243)	0.68	1,806 (12,327)	1.74
21	F52	Production of non-ferrous metals	67 (738)	0.45	923 (5,649)	0.89
22	F53	Ironware	188 (2,253)	1.26	1,394 (10,165)	1.34
23	F54	Industrial service to metal products	1,301 (14,949)	8.72	4,620 (9,970)	0.44
24	F55	Metal fabrication	663 (8,024)	4.44	3,748 (26,112)	3.60
25	F62	Electronics	159 (1,545)	1.07	1,152 (6,110)	1.11
Total			9,849 (109,199)	100.0	60,294 (382,501)	100.0

Table 2: Reduced-form productivity model: Industry-specific input shares (s_{NI}, s_{MI}, s_{KI}), output elasticities $\left(\left(\widehat{\varepsilon}_N^Q\right)_I, \left(\widehat{\varepsilon}_M^Q\right)_I, \left(\widehat{\varepsilon}_K^Q\right)_I\right)$, scale elasticity $\left(\widehat{\lambda}_I\right)$, joint market imperfections parameter $\left(\widehat{\psi}_I\right)$, and corresponding price-cost markup $(\widehat{\mu}_I)$ and relative and absolute extent of rent sharing $\left(\widehat{\gamma}_I^{prod} \text{ and } \widehat{\phi}_I^{prod}\text{, respectively}\right)$

Comparative analysis sample

Ind. I	s_{NI}	s_{MI}	s_{KI}	$(\widehat{\varepsilon}_N^Q)_I$	$(\widehat{\varepsilon}_M^Q)_I$	$(\widehat{\varepsilon}_K^Q)_I$	$\widehat{\lambda}_I$	$\widehat{\psi}_I$	$\widehat{\mu}_I$	$\widehat{\gamma}_I^{prod}$	$\widehat{\phi}_I^{prod}$	*Sargan*	*Hansen*	*Dif-Hansen (lev)*	*Dif-Hansen (L2-dif)*	*Dif-Hansen (L3-dif)*	*m1*	*m2*
17	0.249	0.538	0.212	0.251 (0.035)	0.602 (0.035)	0.109 (0.063)	0.962 (0.011)	0.109 (0.192)	1.118 (0.066)	0.115 (0.196)	0.103 (0.158)	0.000	0.057	0.108	0.580	0.571	-3.87	-6.84
19	0.269	0.558	0.174	0.280 (0.021)	0.639 (0.020)	0.070 (0.035)	0.989 (0.009)	0.104 (0.105)	1.146 (0.037)	0.141 (0.138)	0.124 (0.106)	0.000	0.025	0.540	0.130	0.430	-1.53	-12.23
8	0.276	0.593	0.131	0.281 (0.045)	0.670 (0.039)	0.005 (0.069)	0.955 (0.020)	0.112 (0.204)	1.129 (0.066)	0.210 (0.372)	0.173 (0.254)	0.000	0.877	1.000	0.852	0.655	-1.27	-7.11
13	0.290	0.485	0.225	0.294 (0.028)	0.600 (0.024)	0.082 (0.045)	0.975 (0.014)	0.222 (0.131)	1.236 (0.050)	0.231 (0.129)	0.188 (0.085)	0.000	0.065	0.543	0.378	0.600	-1.05	-9.40
4	0.336	0.483	0.181	0.344 (0.023)	0.571 (0.020)	0.075 (0.040)	0.989 (0.009)	0.162 (0.105)	1.183 (0.042)	0.255 (0.157)	0.203 (0.099)	0.000	0.038	0.306	0.348	0.200	-2.08	-12.95
12	0.267	0.502	0.231	0.254 (0.025)	0.634 (0.028)	0.119 (0.047)	1.007 (0.010)	0.313 (0.137)	1.264 (0.056)	0.286 (0.115)	0.223 (0.069)	0.000	0.714	0.830	0.992	0.997	-0.52	-7.38
21	0.191	0.612	0.197	0.154 (0.058)	0.707 (0.045)	0.098 (0.080)	0.959 (0.033)	0.346 (0.345)	1.154 (0.073)	0.291 (0.279)	0.225 (0.168)	0.000	1.000	1.000	1.000	1.000	-0.12	-3.61
16	0.204	0.599	0.197	0.179 (0.077)	0.758 (0.056)	0.042 (0.125)	0.979 (0.023)	0.387 (0.460)	1.265 (0.093)	0.316 (0.354)	0.240 (0.204)	0.000	1.000	1.000	1.000	1.000	-1.23	-3.53
11	0.395	0.370	0.235	0.476 (0.143)	0.550 (0.080)	0.030 (0.200)	1.055 (0.052)	0.280 (0.548)	1.485 (0.215)	0.317 (0.578)	0.241 (0.333)	0.000	0.996	1.000	1.000	1.000	0.59	-3.25
20	0.230	0.598	0.172	0.200 (0.040)	0.683 (0.044)	0.070 (0.052)	0.953 (0.017)	0.272 (0.196)	1.142 (0.074)	0.319 (0.220)	0.242 (0.127)	0.000	1.000	1.000	1.000	1.000	0.67	-4.65
1	0.282	0.535	0.184	0.246 (0.025)	0.615 (0.023)	0.139 (0.042)	1.000 (0.013)	0.277 (0.120)	1.150 (0.043)	0.369 (0.150)	0.269 (0.080)	0.000	0.242	0.854	0.677	0.644	-1.57	-9.05
3	0.337	0.487	0.177	0.313 (0.040)	0.562 (0.039)	0.085 (0.071)	0.960 (0.015)	0.226 (0.182)	1.155 (0.080)	0.373 (0.278)	0.272 (0.147)	0.000	0.208	0.496	0.840	0.745	-0.54	-6.93
18	0.331	0.491	0.178	0.311 (0.058)	0.591 (0.052)	0.078 (0.082)	0.980 (0.022)	0.266 (0.237)	1.205 (0.106)	0.411 (0.341)	0.291 (0.171)	0.000	1.000	1.000	1.000	1.000	-1.47	-4.67
6	0.323	0.521	0.156	0.294 (0.064)	0.596 (0.071)	0.063 (0.119)	0.953 (0.021)	0.232 (0.310)	1.143 (0.137)	0.421 (0.519)	0.296 (0.257)	0.000	1.000	1.000	1.000	1.000	0.54	-4.42
7	0.384	0.456	0.161	0.395 (0.099)	0.583 (0.052)	0.010 (0.127)	0.988 (0.027)	0.251 (0.324)	1.279 (0.114)	0.469 (0.577)	0.319 (0.267)	0.000	1.000	1.000	1.000	1.000	-2.18	-3.66
5	0.309	0.532	0.159	0.296 (0.037)	0.675 (0.030)	0.010 (0.059)	0.980 (0.012)	0.311 (0.162)	1.268 (0.057)	0.478 (0.231)	0.323 (0.106)	0.000	0.045	0.052	0.073	0.402	-2.67	-10.28
25	0.364	0.473	0.163	0.334 (0.049)	0.553 (0.028)	0.101 (0.054)	0.988 (0.024)	0.252 (0.165)	1.169 (0.059)	0.479 (0.300)	0.324 (0.137)	0.000	0.923	0.898	0.929	0.991	-1.96	-3.80
22	0.337	0.500	0.163	0.330 (0.037)	0.639 (0.025)	0.005 (0.053)	0.975 (0.011)	0.298 (0.145)	1.278 (0.049)	0.482 (0.220)	0.325 (0.100)	0.000	0.430	0.651	0.284	0.874	-1.34	-7.41
10	0.360	0.489	0.151	0.327 (0.052)	0.577 (0.042)	0.082 (0.088)	0.985 (0.017)	0.273 (0.219)	1.180 (0.086)	0.550 (0.405)	0.355 (0.169)	0.000	0.118	0.098	0.048	0.323	0.05	-9.01
9	0.401	0.479	0.120	0.404 (0.031)	0.589 (0.023)	0.020 (0.048)	1.013 (0.013)	0.220 (0.115)	1.229 (0.047)	0.599 (0.292)	0.374 (0.114)	0.000	0.135	0.316	0.194	0.378	-0.66	-8.99
15	0.367	0.486	0.148	0.305 (0.039)	0.549 (0.040)	0.099 (0.068)	0.953 (0.019)	0.300 (0.164)	1.131 (0.082)	0.657 (0.321)	0.397 (0.117)	0.000	1.000	1.000	1.000	1.000	-2.03	-5.08
24	0.326	0.460	0.213	0.255 (0.033)	0.649 (0.029)	0.072 (0.056)	0.976 (0.013)	0.631 (0.153)	1.410 (0.063)	0.685 (0.140)	0.406 (0.049)	0.000	0.115	0.222	0.497	0.786	-2.25	-12.52
14	0.318	0.527	0.156	0.242 (0.042)	0.665 (0.028)	0.023 (0.065)	0.931 (0.013)	0.502 (0.177)	1.264 (0.054)	0.809 (0.256)	0.447 (0.078)	0.000	0.199	0.528	0.811	0.986	-2.62	-7.11
23	0.376	0.454	0.170	0.310 (0.025)	0.592 (0.018)	0.055 (0.039)	0.957 (0.009)	0.478 (0.100)	1.304 (0.040)	0.810 (0.147)	0.447 (0.045)	0.000	0.000	0.028	0.329	0.080	-3.17	-18.03
2	0.442	0.399	0.159	0.332 (0.039)	0.505 (0.019)	0.100 (0.045)	0.936 (0.018)	0.515 (0.114)	1.265 (0.047)	1.130 (0.223)	0.531 (0.049)	0.000	0.001	0.034	0.415	0.698	-3.06	-10.12

Notes: Robust standard errors in parentheses. Time dummies are included but not reported. *Sargan, Hansen, Dif-Hansen*: tests of overidentifying restrictions, asymptotically distributed as χ^2_{df}. p-values are reported. *Dif-Hansen (lev)* tests the validity of the 1-year lag of the first-differenced inputs as instruments in the levels equation while *Dif-Hansen (L2-dif)/(L3-dif)* tests the validity of the 2-/3-year lags of the inputs as instruments in the first-differenced equation. *m1* and *m2*: tests for first-order and second-order serial correlation in the first-differenced residuals, asymptotically distributed as *N(0,1)*. Industries are ranked according to $\widehat{\gamma}_I^{prod}$.

Table 3: Reduced-form model of wage determination: Industry-specific elasticities of wages with respect to profits per employee $\left(\left(\widehat{\beta}_2\right)_I^{wage,f/w}\right)$, the reservation wage $\left(\left(\widehat{\beta}_1\right)_I^{wage,f/w}\right)$ and capital per employee $\left(\left(\widehat{\beta}_3\right)_I^{wage,f/w}\right)$

Comparative analysis sample										
Dep. var.	Firm wage w_{it}									
Ind. I	$\left(\widehat{\beta}_2\right)_I^{wage,f} = \left(\frac{\partial w_{it}}{\partial(\pi_{it}-n_{it})}\right)_I$	$\left(\widehat{\beta}_1\right)_I^{wage,f} = \left(\frac{\partial w_{it}}{\partial \overline{w}_{it}}\right)_I$	$\left(\widehat{\beta}_3\right)_I^{wage,f} = \left(\frac{\partial w_{it}}{\partial(k_{it}-n_{it})}\right)_I$	*Sargan*	*Hansen*	*Dif-Hansen (lev)*	*Dif-Hansen (L2-dif)*	*Dif-Hansen (L3-dif)*	*m1*	*m2*
17	-0.023 (0.034)	-0.063 (0.062)	0.145 (0.034)	0.00	0.493	0.690	0.219	0.181	-6.73	-1.12
19	-0.021 (0.029)	0.029 (0.054)	0.213 (0.042)	0.00	0.027	0.022	0.668	0.458	-10.49	-1.30
8	0.030 (0.035)	0.168 (0.071)	0.072 (0.049)	0.00	0.479	0.427	0.350	0.719	-5.63	-0.99
13	0.075 (0.035)	-0.031 (0.067)	0.048 (0.049)	0.00	0.001	0.007	0.339	0.068	-6.43	-0.25
4	0.042 (0.040)	-0.020 (0.040)	-0.184 (0.048)	0.00	0.102	0.106	0.901	0.874	-10.45	-1.87
12	0.048 (0.064)	-0.045 (0.071)	0.087 (0.047)	0.00	0.002	0.028	0.119	0.014	-3.66	-0.29
21	0.027 (0.061)	0.109 (0.120)	0.181 (0.072)	0.00	0.545	0.609	0.571	0.662	-2.33	1.34
16	0.047 (0.047)	0.007 (0.086)	0.139 (0.045)	0.00	0.416	0.621	0.391	0.281	-2.77	-0.37
11	0.047 (0.057)	0.064 (0.087)	-0.014 (0.074)	0.00	0.520	0.807	0.813	0.870	-3.73	0.51
20	0.001 (0.052)	0.052 (0.075)	0.077 (0.053)	0.00	0.852	0.526	0.897	0.877	-3.98	0.29
1	0.055 (0.037)	-0.012 (0.038)	0.125 (0.042)	0.00	0.154	0.680	0.083	0.265	-10.57	-2.99
3	0.095 (0.031)	0.070 (0.070)	0.100 (0.035)	0.00	0.274	0.354	0.207	0.234	-6.35	0.35
18	0.087 (0.037)	-0.053 (0.078)	0.047 (0.076)	0.00	0.619	0.454	0.560	0.640	-4.80	-1.30
6	0.124 (0.033)	-0.060 (0.082)	0.020 (0.055)	0.00	0.751	0.886	0.658	0.889	-3.15	-0.53
7	0.016 (0.070)	0.080 (0.090)	0.224 (0.063)	0.00	0.275	0.632	0.278	0.401	-2.91	-0.58
5	0.038 (0.035)	0.070 (0.058)	0.064 (0.043)	0.00	0.328	0.241	0.896	0.539	-8.62	-0.26
25	0.065 (0.053)	0.050 (0.099)	0.101 (0.050)	0.00	0.065	0.642	0.084	0.119	-4.43	-2.40
22	0.047 (0.033)	-0.026 (0.076)	0.082 (0.055)	0.00	0.549	0.433	0.116	0.131	-5.41	-2.24
10	0.031 (0.050)	0.153 (0.041)	0.094 (0.061)	0.00	0.764	0.888	0.385	0.736	-6.48	-0.95
9	0.057 (0.067)	0.025 (0.073)	-0.060 (0.045)	0.00	0.258	0.048	0.291	0.497	-6.17	-1.29
15	0.050 (0.050)	-0.007 (0.050)	0.204 (0.063)	0.00	0.483	0.381	0.750	0.775	-3.46	0.72
24	0.046 (0.028)	0.010 (0.051)	0.117 (0.040)	0.00	0.349	0.857	0.412	0.726	-9.34	-1.10
14	0.027 (0.035)	0.084 (0.045)	0.020 (0.035)	0.00	0.529	0.395	0.894	0.658	-6.90	-0.57
23	-0.001 (0.040)	0.192 (0.041)	0.050 (0.034)	0.00	0.726	0.668	0.740	0.836	-14.49	-3.70
2	0.142 (0.037)	0.106 (0.062)	0.082 (0.056)	0.00	0.586	0.734	0.523	0.688	-6.77	-0.41

Table 3 - Continued: Reduced-form model of wage determination: Industry-specific elasticities of wages with respect to profits per employee $\left(\left(\widehat{\beta}_2\right)_I^{wage,f/w}\right)$, the reservation wage $\left(\left(\widehat{\beta}_1\right)_I^{wage,f/w}\right)$ and capital per employee $\left(\left(\widehat{\beta}_3\right)_I^{wage,f/w}\right)$

Dep. var.	Worker wage $w_{j(i)t}$									
Ind. I	$\left(\widehat{\beta}_2\right)_I^{wage,w} = \left(\frac{\partial w_{j(i)t}}{\partial(\pi_{it}-n_{it})}\right)_I$	$\left(\widehat{\beta}_1\right)_I^{wage,w} = \left(\frac{\partial w_{j(i)t}}{\partial \overline{w}_{it}}\right)_I$	$\left(\widehat{\beta}_3\right)_I^{wage,w} = \left(\frac{\partial w_{j(i)t}}{\partial(k_{it}-n_{it})}\right)_I$	*Sargan*	*Hansen*	*Dif-Hansen (lev)*	*Dif-Hansen (L2-dif)*	*Dif-Hansen (L3-dif)*	*m1*	*m2*
17	0.035 (0.031)	0.108 (0.042)	0.127 (0.032)	0.00	0.000	0.000	0.107	0.001	-5.30	-1.53
19	0.042 (0.019)	0.087 (0.045)	0.080 (0.025)	0.00	0.000	0.008	0.008	0.001	-7.94	-2.53
8	0.049 (0.025)	0.109 (0.040)	0.001 (0.047)	0.00	0.004	0.807	0.414	0.151	-3.90	-0.04
13	0.050 (0.025)	0.155 (0.032)	0.043 (0.034)	0.00	0.000	0.000	0.040	0.000	-6.90	0.62
4	-0.034 (0.022)	0.125 (0.036)	-0.007 (0.033)	0.00	0.000	0.000	0.000	0.001	-7.85	0.82
12	0.039 (0.033)	0.065 (0.047)	0.053 (0.042)	0.00	0.001	0.141	0.410	0.244	-2.70	-1.10
21	0.005 (0.038)	0.288 (0.054)	0.127 (0.033)	0.00	0.000	0.003	0.130	0.255	-6.11	0.96
16	0.088 (0.033)	0.254 (0.055)	0.118 (0.027)	0.00	0.168	0.607	0.480	0.932	-5.38	-2.18
11	0.040 (0.032)	0.170 (0.059)	-0.007 (0.054)	0.00	0.006	0.097	0.007	0.003	-2.42	-1.09
20	-0.012 (0.012)	0.157 (0.047)	0.053 (0.013)	0.00	0.000	0.000	0.001	0.000	-4.62	-0.83
1	0.022 (0.021)	0.130 (0.043)	0.106 (0.031)	0.00	0.000	0.000	0.041	0.028	-8.33	-3.31
3	0.036 (0.025)	0.112 (0.038)	0.054 (0.031)	0.00	0.012	0.086	0.688	0.455	-7.76	-2.06
18	0.000 (0.014)	0.207 (0.051)	0.035 (0.021)	0.00	0.000	0.018	0.066	0.000	-4.85	-2.32
6	0.061 (0.031)	0.146 (0.061)	0.132 (0.057)	0.00	0.000	0.314	0.000	0.000	-4.09	-1.21
7	-0.028 (0.015)	0.417 (0.060)	0.095 (0.023)	0.00	0.000	0.000	0.000	0.000	-4.24	-2.88
5	0.049 (0.027)	0.142 (0.041)	0.160 (0.030)	0.00	0.000	0.000	0.009	0.063	-5.63	-2.29
25	0.109 (0.029)	0.123 (0.067)	-0.013 (0.041)	0.00	0.007	0.002	0.224	0.430	-3.85	0.20
22	0.003 (0.023)	0.178 (0.065)	0.091 (0.027)	0.00	0.000	0.100	0.000	0.000	-5.96	-1.65
10	-0.001 (0.027)	0.274 (0.044)	0.020 (0.031)	0.00	0.000	0.000	0.001	0.004	-5.84	-1.14
9	-0.007 (0.024)	0.204 (0.044)	-0.012 (0.026)	0.00	0.000	0.284	0.004	0.000	-7.57	-1.26
15	-0.009 (0.026)	0.090 (0.058)	0.084 (0.042)	0.00	0.414	0.331	0.701	0.498	-5.72	-1.59
24	0.013 (0.027)	0.249 (0.042)	0.013 (0.037)	0.00	0.000	0.032	0.046	0.159	-11.66	-1.18
14	0.064 (0.025)	0.123 (0.038)	0.042 (0.028)	0.00	0.000	0.044	0.478	0.605	-7.87	-3.07
23	0.019 (0.031)	0.479 (0.052)	0.079 (0.028)	0.00	0.000	0.074	0.000	0.004	-10.65	-3.81
2	0.106 (0.032)	0.179 (0.043)	0.016 (0.040)	0.00	0.005	0.189	0.030	0.002	-9.14	-4.28

Notes: Robust standard errors in parentheses. Time dummies are included but not reported. *Sargan, Hansen, Dif-Hansen*: tests of overidentifying restrictions, asymptotically distributed as χ^2_{df}. p-values are reported. *Dif-Hansen (lev)* tests the validity of the 1-year lag of the first-differenced smoothed profits-per-employee variable as instruments in the levels equation while *Dif-Hansen (L2-dif)/(L3-dif)* tests the validity of the 2-/3-year lags of the smoothed profits-per-employee variable as instruments in the first-differenced equation. *m1* and *m2*: tests for first-order and second-order serial correlation in the first-differenced residuals, asymptotically distributed as *N(0,1)*. Industries are ranked according to $\widehat{\gamma}_I^{prod}$.