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# **Rent Sharing with Footloose Production. Foreign Ownership and Wages Revisited.**

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# Rent Sharing with Footloose Production Foreign Ownership and Wages Revisited

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## Abstract

We present a bargaining model of wage and employment determination, where we show that foreign acquisitions might hurt the bargaining outcome of powerful unions by giving the firm a credible threat to move production abroad. Using detailed data on firms and workers in manufacturing, including information on union membership and foreign ownership, we find, in line with the predictions of our model, that foreign acquisitions negatively impact the outcome of workers in highly unionized plants.

## 1 Introduction

Deepening economic integration with the rest of the world has been a central trend for most countries over the last few decades. This has raised the debate about whether globalization has caused disruptive effects in the labor markets of developed countries.<sup>1</sup> One broad strand of literature has investigated to what extent increased globalization could affect the ability of labor unions to secure beneficial outcomes for their members when negotiating with employers.<sup>2</sup> One important feature of the globalization process has been the rapid increase in foreign direct investment (FDI), of which a large part has come in the form of cross-border mergers and acquisitions. In this paper we investigate whether foreign takeovers of domestic plants affect the ability of unions to capture their share of firm rents.

We study how the development of wages in Norwegian manufacturing plants acquired by foreign owners depend on union density at the plant level. We

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<sup>1</sup>See Freeman (1995) for an early survey of some of this literature, and Harrison, McLaren, and McMillan (2010) for an overview of more recent issues and findings.

<sup>2</sup>This strand of the literature takes as an implicit starting point that unions are able to increase wages, and considers how this ability is affected by globalization. A large empirical literature supports the notion that there is a general union wage premium, and the empirical literature typically finds union wage premia of around 10%, see e.g., Blanchflower and Bryson (2002) who reports estimated union wage premia for several countries. For a brief overview of the issues involved in establishing a union wage premium, see Bryson (2007). See Card (1996) for an analysis of how unions may affect wage structure. DiNardo and Lee (2004) question the union-wage premium literature in terms of ability to identify causal effects.

present a firm-level Nash bargaining model where we show that foreign acquisition improves the outside option of the firm relative to the outside option of the union. The effect is stronger when the bargaining power of the union in the acquired plant is high. The model predicts that the change in bargaining outcome for the union in the acquired plant is more negative if the plant has a strong union, than if the union in the acquired plant has low bargaining power. We test this empirical prediction using both plant- and worker level data from Norwegian manufacturing for the period 1996–2007. Our findings are consistent with the prediction that foreign acquisitions lead to larger negative changes in the outcome for workers in plants where unions are strong.

In a general rent sharing framework where a labor union and a firm bargain over the division of rents,<sup>3</sup> globalization could change the bargaining outcome for the union through three main channels. First, of most relevance to this paper, globalization could change the bargaining outcome by affecting the outside options of the bargaining parties.<sup>4</sup> If globalization improves the outside option of the firm relative to the union, this will reduce the share of rents that the union gets. One possibility is that the firm’s outside option could improve after becoming part of a multinational firm, regardless of whether this is a result of inward or outward FDI. The basic intuition is related to the possibility of reallocating production between plants that are located in different countries—so-called “footloose” production (see, e.g., Choi, 2001; Lommerud, Straume, and Sørsgard, 2006; Clougherty, Gugler, Sorgard, and Szucs, 2014).<sup>5</sup> Both Lommerud, Straume, and Sørsgard (2006) and Clougherty, Gugler, Sorgard, and Szucs (2014) present theoretical bargaining models of cross-border mergers where unions set wages and firms set employment. In both models the international merger improves the outside option of the firm relative to the union, and thus affects wages negatively.<sup>6</sup> A further prediction from the model in Clougherty, Gugler, Sorgard, and Szucs (2014), where a monopoly union sets wages and the firm sets employment, is that mergers are more likely to decrease wages under higher unionization rates. We get a similar prediction from our model, using a bargaining framework. We assume that the firm and the union simultaneously bargain over both wages and employment. Along similar lines, Kramarz (2008) constructs a model where the possibility for the firm to offshore part of its production acts as a threat point in the negotiations with the unions. In addition, offshoring in this model also reduces the amount of rents that can be shared between the firm and the union. Using French firm level data to test his model, Kramarz finds that firms that had high rents and faced strong unions at the time of the introduction of the single European market in the early 1990s (which increased opportunities for offshoring) increased their offshoring, while

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<sup>3</sup>Christofides and Oswald (1992) and Abowd and Lemieux (1993) are examples of studies finding evidence consistent with the existence of rent sharing in firms.

<sup>4</sup>Outside options are sometimes referred to as *threat points* or *fall-backs*.

<sup>5</sup>Several studies find evidence that is consistent with a story of footloose production without having explicit focus on unions and union bargaining power. Bernard and Jensen (2007) and Gorg and Strobl (2003) find evidence of higher probability of exit for foreign owned plants in the US and Ireland respectively. Fabbri, Haskel, and Slaughter (2003) find evidence of labor demand elasticities being positively correlated with activity of multinational enterprises for low-skilled manufacturing workers in the US and the UK.

<sup>6</sup>Choi (2001) also shows how an improvement in the outside option of the firm after FDI has a negative impact on wages in a Nash bargaining framework, although he treats the change in the outside option as exogenous.

firms with weak unions did not. “As a result, in those firms where rents were initially high, unions’ strength appears to have backfired” (Kramarz, 2008, p. 2).

Second, globalization could negatively affect the bargaining power of unions, which we could think of as a shift in the parameter in Nash bargaining models that captures relative bargaining power of the negotiation parties. One possible reason for reduced bargaining power is a reduction in union membership. The link between globalization and union membership in 17 OECD countries over the period from 1980 to 1999 is investigated by Dreher and Gaston (2007). They conclude that *economic integration* has no effect on unionization, while social integration reduces unionization.<sup>7</sup> Brock and Dobbelaere (2006) and Dumont, Rayp, and Willem (2006) estimate bargaining power at the industry-year level, and relate these estimates of bargaining power to different measures of globalization at the industry level. The Nash bargaining framework conceptually makes a clear distinction between bargaining power and outside options. However, in reduced-form empirical work where wage equations are the main source of identification, it is in general not possible to separately identify to what extent changes in outcomes are a result of changes in bargaining power or changes in threat points.

Third, globalization could reduce the rents to be shared between the firm and the union, and thereby affect wages. The main channel for reduced rents is increased import competition. Gaston and Trefler (1995) present a model of union and firm wage bargaining where international competition reduces rents. They empirically test the effect of import competition on the union wage premium using data for union workers in US manufacturing industries in 1983. They find that union wage premia are negatively affected by import competition at the industry level. Similarly, Abowd and Lemieux (1993) find that increased international competition through import price shocks was a source for reduced rents in Canadian manufacturing industries during the period from 1964 to 1983.<sup>8</sup>

Our paper is partly related to the literature on whether foreign acquisitions increase wages in acquired plants.<sup>9</sup> This literature has pointed out the possibility that a foreign acquisition through, for instance, technology transfer has the potential to increase productivity and wages in the acquired plant. As pointed out by Clougherty, Gugler, Sorgard, and Szucs (2014), this literature has mostly ignored the potentially opposing effect of the wage bargaining process. Regressions of wages on foreign ownership change without also accounting for the possibility of a negative bargaining effect will only capture the average effect. This could explain the many studies finding no effect on wages of foreign acquisitions. The reason could simply be that any potentially positive productivity effects are cancelled out by negative bargaining effects in the aggregate.

Most of the previous empirical studies on the general link between globalization and union bargaining outcomes use industry level proxies for both union

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<sup>7</sup>In the study of Dreher and Gaston (2007), economic integration is measured by an amalgam of separate indices for trade, foreign direct investments, and cross-border factor payments, as well as restrictions on trade and capital flows. Social integration is meant to capture the spread of ideas and information, and is proxied by measures on international tourism, internet users, number of radios, and the number of McDonald’s restaurants located in a country.

<sup>8</sup>Bratsberg and Ragan (2002) find a positive effect of import competition at the industry level and discuss why this could be the case.

<sup>9</sup>See for example, Heyman, Sjöholm, and Tingvall (2007) and Hijzen, Martins, Schank, and Upward (2010) and references therein.

bargaining power and globalization. For example, Abowd and Lemieux (1993); Gaston and Treffer (1995); Bratsberg and Ragan (2002) analyse how industry level imports or import competition affects unions. Brock and Dobbelaere (2006); Dumont, Rayp, and Willem (2006) use measures of imports, foreign direct investment activity and union bargaining power at the industry level in their analyses of the link between union bargaining power and globalization. Choi (2001) estimates industry level union wage premia, and relates these to the industry level stock of outward FDI. Also Clougherty, Gugler, Sorgard, and Szucs (2014) who empirically test a prediction that is similar to the prediction that we test, have data on unionization and the extent of merger activity only at the industry level. We contribute to the empirical literature by using plant level data both for the foreign ownership status of plants, and for the share of employees in the plant who are members of a trade union. By using the latter as a proxy for the bargaining power of unions, we are able to conduct a more direct test than Clougherty, Gugler, Sorgard, and Szucs (2014). We test whether the change in bargaining outcome for the union in the acquired plant is more negative if the plant has a strong union, than if the union in the acquired plant has little bargaining power.<sup>10</sup>

Using detailed Norwegian manufacturing data and matched employer-employee data, we conduct an empirical test of the main prediction from our model: that workers in plants where unions are strong have more to lose from a foreign acquisition, compared to workers in plants where unions are weak. In the model we assume efficient bargaining to take place, but our main testable implication is robust to other formulations of the bargaining process. Since our main prediction is that the impact of foreign acquisitions on wages depends on union bargaining power, we estimate wage regressions at both the plant and individual level, where the main variable of interest is an interaction term between a dummy identifying the period after foreign acquisition and our variable for the bargaining power of unions. Consistent with the predictions from the model, we find that this interaction term is negative and significant, both in the economic and statistical sense. These results are in line with the findings of Braun (2009), who uses Danish data that is similar in detail to our Norwegian data. We differ from his analysis by analyzing the effects of acquisitions both at the plant level and at the worker level.

We further contribute to the literature by contrasting the effect in plants that are acquired by foreign owners to what happens to wages in plants subject to domestic ownership change. In the model, a prerequisite for an improvement in the firm's outside option after foreign acquisition is that the unions in the domestic and foreign plants cannot coordinate.<sup>11</sup> It is reasonable to assume that in the case of a domestic merger, there is on average a larger extent of union coordination when negotiating with the firm. This implies that the improvement in the firm's outside option after domestic ownership change should be smaller than in the case of foreign ownership change. As a result, we should expect less of a negative bargaining effect in highly unionized plants after a domestic ownership change than after a foreign acquisition. Our results are consistent

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<sup>10</sup>The main focus in Clougherty, Gugler, Sorgard, and Szucs (2014) is on the wage effects of the domestic firms that are not subject to international merger activity, where they integrate the negative bargaining effect and the positive FDI-spillover effect.

<sup>11</sup>This is in line with the assumption made in both Lommerud, Straume, and Sjørgard (2006) and Clougherty, Gugler, Sorgard, and Szucs (2014).

with this argument.

In the next section we present our model. In Section 3, we describe the construction of our dataset and provide descriptive statistics. In Section 4, we briefly describe some institutional features of wage formation and the role of unions in Norway, and present our empirical approach. We present the results of our empirical analysis in Section 5, while we discuss our findings and conclude in Section 6.

## 2 Model

To motivate the notion that a foreign acquisition could change the outcome of wage bargaining at the firm level, we present a model of wage setting where the firm has market power and workers are unionized. We assume efficient bargaining where the firm and the union negotiate over both wages and employment, extending a model setup similar to the one introduced by McDonald and Solow (1981). We show that a foreign acquisition of the firm will lower union wages. Our model is also related to the bilateral oligopoly model with bargaining of Horn and Wolinsky (1988a), though we allow for bargaining over both price (wage) and quantity (employment), as well as asymmetric bargaining power.

### 2.1 Before acquisition

If the firm and the union come to an agreement in the situation where the firm consists only of a domestic plant, the firm gets  $\pi = R(L) - wL$  and the union gets  $U(w, L)$ , where  $L$  is the amount of labor employed in the plant,  $w$  is the wage rate,  $R(L)$  is revenue net of non-labor production costs, and  $U$  is the utility function of the union. In the case of disagreement, the parties get their outside options. For the firm, the outside option consists of a reservation profit  $\underline{\pi}$ , which can be interpreted as the alternative cost of operating in agreement with the union. In a short-term interpretation, the alternative cost could be the profit from temporary arrangements that keep the business running during a strike, while in a long-term interpretation, it could be the salvage value of capital bound up in the plant. The outside option for the union consists of a reservation utility  $\underline{u}$ , which could be based on unemployment benefits or alternative employment.

Let the wage bargaining be approximated by a Nash bargaining model, where  $\beta$  is the bargaining strength of the labor union, and  $1 - \beta$  is the bargaining strength of the firm. For simplicity, let the utility function of the union be given by  $U = (w - \underline{w})L$ , where  $\underline{w}$  is the reservation wage for each worker. The union thus cares about the total wage payment net of the reservation wage for each employed worker.<sup>12</sup> Also, let  $\underline{u} = 0$  such that the reservation wage  $\underline{w}$  captures the outside option of the union. The bargaining objective, often called the *Nash product*, can then be expressed as

$$O = \beta \ln((w - \underline{w})L) + (1 - \beta) \ln(R(L) - wL - \underline{\pi}). \quad (1)$$

Assuming that the parties bargain over both employment and wages, the resulting level of employment will implicitly be given by  $R'(L^*) = \underline{w}$ . The level

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<sup>12</sup>This formulation gives the strongly efficient bargaining solution directly. A formulation where unions care about benefits to unemployed workers and wages to employed workers will also give the strongly efficient solution.

of employment  $L^*$  is efficient, in the sense that it maximizes the total surplus of the relationship between the union and the firm, where the surplus is given by  $S(L) \equiv R(L) - \underline{w}L - \underline{\pi}$ . The bargaining then simplifies to dividing the fixed surplus  $S(L^*)$  by setting the wage. The resulting wage

$$w^* = \underline{w} + \beta \frac{S(L^*)}{L^*}, \quad (2)$$

has the intuitive interpretation that as the labor union gets more bargaining power, i.e.,  $\beta$  increases, the wage moves from the reservation wage towards the total surplus per worker in addition to the reservation wage. The resulting profit for the firm is simply the firm's reservation profit in addition to the remaining surplus not appropriated by the union

$$\pi^* = \underline{\pi} + (1 - \beta)S(L^*). \quad (3)$$

The efficient bargaining protocol is chosen mostly for convenience. The strongly efficient outcome allows us to abstract from inefficiencies arising when there is a trade-off between employment and wages, such that we can focus on the distributional effects in isolation.<sup>13</sup> In addition, it also allows us to obtain tractable analytical expressions without assuming particular functional forms for production technology and product market effects.

## 2.2 After acquisition

We now move to the situation after a foreign acquisition. For simplicity, assume that the firm post-acquisition consists of only two plants; one domestic ( $D$ ) and one foreign ( $F$ ). Let revenues in plant  $i \in \{D, F\}$  be given by  $R_i(\mathbf{L})$ , where  $\mathbf{L} = (L_D, L_F)$ . We assume that there is substitutability between the two plants in the sense that increased production in one plant lowers revenues of the other, i.e.,  $\frac{\partial R_i}{\partial L_j} < 0$  when  $j \neq i$ . This can for example be interpreted as a product market externality through a price effect. Substitutability will, under conditions which we return to below, give the firm a credible threat in equilibrium by increasing the firm's reservation profit.

The profit in each plant is given by  $\pi_i = R_i(\mathbf{L}) - w_i L_i$ . We assume that the firm bargains over wage and employment in separate but simultaneous negotiations with the union in each plant. Furthermore, we assume that the outcome in each plant is the solution to a bilateral Nash bargaining problem, conditional on the negotiated agreement in the other plant. This latter assumption leads to what is often called the *Nash-in-Nash bargaining* solution, first proposed by Horn and Wolinsky (1988a).<sup>14</sup> In the following, we normalize the outside option before acquisition,  $\underline{\pi}$ , to zero in order to focus on the change in the outside option arising due to the externality between the foreign and domestic plants after foreign acquisition of the domestic plant.<sup>15</sup> To keep in line with the focus

<sup>13</sup>See, e.g., McDonald and Solow (1981) for a treatment of the case with a single union and a single employer, where the union controls wages and the employer controls employment, as well the case of bargaining that does not necessarily lead to the strongly efficient solution.

<sup>14</sup>In our model, the Nash-in-Nash bargaining solution implies that the outcome—in terms of wage and employment—is both a solution to the Nash bargaining problem in each plant, as well as a Nash equilibrium to the game where independent pairs of players seek to maximize the Nash product in each pairwise Nash bargaining game.

<sup>15</sup>This does not affect the results we want to highlight.

on foreign acquisition of Norwegian manufacturing plants in our empirical analysis, the following exposition takes the perspective of the domestic plant that is acquired from abroad.

After being acquired by foreign owners, the reservation profit of the firm in the domestic plants now reflects the change in profit in the foreign plant when there is no production, i.e., conflict, in the domestic plant. It is not obvious how the profit in one plant should be determined when there is disagreement in the other plant. We assume that in the case of a disagreement in a plant, the workers there get their outside option and the firm gets zero in this particular plant ( $\pi = 0$ ), while the workers in the other plant and the firm renegotiate their contract. Since there is only one plant in operation, and thus no interaction between plants, the outcome in this subgame will simply be given by Nash bargaining between the firm and workers in the operational plant. Thus, in the case of a breakdown of negotiations in the domestic plant, the resulting profit in the foreign plant will be

$$\pi_F^0 = (1 - \beta_F)(R_F(L_F^0, 0) - \underline{w}_F L_F^0) = (1 - \beta_F)S_F^0, \quad (4)$$

where  $\beta_F$  is the bargaining power and  $\underline{w}_F$  is the reservation wage of workers in the foreign plant.  $L_F^0$  is given by  $\frac{\partial R_F}{\partial L_F}(L_F^0, 0) = \underline{w}_F$ , i.e., the efficient level of employment in the foreign plant when there is no production in the domestic plant.<sup>16</sup> The second equality is just a definition, where  $S_F^0$  denotes the maximized surplus in the foreign plant given  $L_D = 0$ .

Denote by  $\Delta\pi_F$  the difference in profit from the foreign plant between the case where all of the firms' production occurs in the foreign plant, and the case where production occurs in both plants, i.e.,  $\Delta\pi_F \equiv \pi_F^0 - \pi_F$ . We refer to  $\Delta\pi_F$  as the *stand-alone profit difference* of plant  $F$ . After foreign acquisition of the domestic plant,  $\Delta\pi_F$  constitutes the outside option of the firm in the negotiations with the union of the *domestic* plant.

The objective function for the Nash bargaining between the firm and workers in the domestic plant is then

$$O_D = \beta_D \ln((w_D - \underline{w}_D)L_D) + (1 - \beta_D) \ln(R_D(\mathbf{L}) - w_D L_D - \Delta\pi_F), \quad (5)$$

which is maximized with respect to  $w_D$  and  $L_D$  for the domestic plant. Together with the equivalent maximization problem for the foreign plant solved for  $w_F$  and  $L_F$ , this gives the level of employment  $\mathbf{L}^* \equiv (L_D^*, L_F^*)$ , such that

$$\frac{\partial R_D}{\partial L_D} \Big|_{\mathbf{L}=\mathbf{L}^*} + \frac{\partial R_F}{\partial L_D} \Big|_{\mathbf{L}=\mathbf{L}^*} = \underline{w}_D, \quad (6)$$

with an equivalent condition for the foreign plant. This is the level of employment that maximizes total surplus of the plants,  $\sum_{i \in \{D, F\}} (R_i(\mathbf{L}) - \underline{w}_i L_i)$ .<sup>17</sup> The resulting wage in the domestic plant is

$$w_D^* = \underline{w}_D + \beta_D \left( \frac{S_D(\mathbf{L}^*) - \Delta\pi_F^*}{L_D^*} \right), \quad (7)$$

<sup>16</sup>Another possibility is to assume simultaneous bargaining over contingent contracts in the two plants. In this case, the pairwise bargains will be over one contract for the case of an agreement, and one for the case of disagreement in the other plant. When each pair expect that if they disagree, the other pair will maximize their Nash product, the same equilibrium will arise.

<sup>17</sup>Note that  $\frac{\partial \Delta\pi_F}{\partial L_D} = \frac{\partial R_F}{\partial L_D}$ .



where  $S_D(\mathbf{L}^*)$  is the surplus generated in the domestic plant,  $R_D(\mathbf{L}^*) - \underline{w}_D L_D^*$ , and  $\Delta\pi_F^* \equiv \pi_F^0 - \pi_F^*$  is the stand-alone profit difference for the foreign plant evaluated at equilibrium bargaining profit.<sup>18</sup>

If the stand-alone profit difference for the foreign plant is positive in equilibrium, the outside option of the firm when bargaining with the union in the acquired domestic plant has improved relative to before the acquisition. From inspection of Equation (7), we see that for given surplus and employment in the domestic plant, an increase in the outside option through an increase in the stand-alone profit difference for the foreign plant, will reduce wages in the domestic plant. Since also employment and surplus in the domestic plant may change after acquisition, wages may not necessarily be negatively affected. This would be the case if there is a sufficiently large decrease in employment compared to the increase in the outside option of the firm. However, seeing that the relationship between the revenue functions of the plants plays a key role in determining the stand-alone profit difference, it is likely that at least some of the loss to the union will manifest itself through wages, as the opposite will require quite peculiar curvature of these functions.

We now proceed to show formally that the stand-alone profit difference for the foreign plant is positive in equilibrium under plausible conditions. Equilibrium bargaining profit in each of the plants is given by the equations

$$\pi_i^* = \beta_i \Delta\pi_j^* + (1 - \beta_i) S_i(\mathbf{L}^*), \quad i, j \in \{D, F\}, i \neq j. \quad (8)$$

From the perspective of the domestic plant, equilibrium profit  $\pi_F^*$  in the foreign plant has a negative effect on equilibrium profit in the domestic plant, as this decreases the threat point  $\Delta\pi_F^*$  of the firm when bargaining with the domestic union.

To obtain an expression for the equilibrium stand-alone profit difference in the foreign plant, subtract equilibrium profit for the foreign plant, as given by Equation (8), from  $\pi_F^0$ , as given by Equation (4). This yields

$$\Delta\pi_F^* = (1 - \beta_F) \Delta S_F^* - \beta_F \Delta\pi_D^*, \quad (9)$$

where  $\Delta S_F^* \equiv S_F^0 - S_F(\mathbf{L}^*)$  is the additional surplus created in the foreign plant when there is no production in the domestic plant, compared to the case where there is production in both plants. Note that  $\Delta S_i^*$  is guaranteed to be positive in both plants, owing to the assumption that production in the plants are substitutes. To see the intuition behind Equation (9), note that it describes the threat point of the firm when bargaining with workers in the domestic plant. On the one hand, if a larger part of the firm's profit in the plant abroad is due to *plant surplus*, this increases the firm's threat point  $\Delta\pi_F^*$  when bargaining with the domestic union. In this case, the domestic plant is *more* dispensable, as the firm can ensure a relatively high profit by producing exclusively in the plant abroad. On the other hand, if more of the firm's profit in the plant abroad is due to the *threat point* generated by the domestic plant,  $\Delta\pi_D^*$ , this lowers  $\Delta\pi_F^*$ . The reason is that the domestic plant is *less* dispensable in this case, as it contributes relatively more to the profit the firm gets abroad.

<sup>18</sup>Note that we keep the outside option of the firm separate from the plant surplus. This is to clarify the strategic importance of the outside option.

In equilibrium, the stand-alone profit difference in the foreign plant—and thus the outside option of the firm when bargaining with the domestic workers—is

$$\Delta\pi_F^* = \frac{1}{1 - \beta_D\beta_F} ((1 - \beta_F)\Delta S_F^* - \beta_F(1 - \beta_D)\Delta S_D^*). \quad (10)$$

The profit difference in Equation 10 will be positive, as long as

$$\frac{\Delta S_F^*}{\Delta S_D^*} > \beta_F \frac{1 - \beta_D}{1 - \beta_F}. \quad (11)$$

In the symmetric case, that is, where plants are equal and the bargaining power of workers is equal in both plants, it is clear that  $\Delta\pi_i^* > 0$  for both the domestic plant and the plant abroad. Further, from the right hand side of the expression, we can see that for a sufficiently low bargaining power of the workers in the foreign plant, the condition will be satisfied, as the left hand side is strictly positive. The same is true for a sufficiently high bargaining power of the domestic workers. The power of unions is highly institutionalized in Norway, also at the local level, which makes it plausible that the domestic workers will have a high bargaining power compared to workers in other plants under the firm's control.

Without specifying further restrictions on  $R_i(\mathbf{L})$ , it is not possible to make any statements about the stand-alone surplus differences in general. However, since the revenue substitution between plants can be interpreted as a product market externality operating through prices; relative size and capacity would appear to be reasonable determinants of the surplus difference. If a large producer stops producing, it would plausibly have a larger impact on the prices of a small producer than the reverse case. This would imply that the left hand side is smaller when the foreign plant is larger than the domestic plant. Though we have no way of actually checking this, we note that the acquired plants in our sample are large, both in terms of the number of employees and production, compared to the average Norwegian manufacturing plant, something we return to later when we describe the data. This does not preclude large size differences between Norwegian plants and plants abroad, but we note that Equation (11) will hold for sufficiently *high domestic* and/or sufficiently *low foreign* union bargaining power.

The case where Equation (10) is negative would reflect large asymmetry between the plants. If the workers in the foreign plant have very high, while the domestic workers have very low bargaining power, the firm could have a negative stand-alone profit difference for the foreign plant,  $\Delta\pi_F^*$ . This is because the firm would lose its outside option in the foreign plant,  $\Delta\pi_D^*$ , in the case of a disagreement with the domestic workers. Since our object of study is the outcome of workers in Norwegian plants that are acquired from abroad, and Norway has high union density compared to most countries, asymmetry in bargaining power in favour of the foreign union seems unlikely to be important.

Even though the particular features of our model might seem restrictive, the prediction of a negative bargaining effect proves quite robust to alternative specifications. The same result has been shown by Lommerud, Straume, and Sørsgard (2006), studying a *rights-to-manage* setup where a monopoly union sets wages and the firm sets employment. Horn and Wolinsky (1988b) show how a negative bargaining effect arises when the firm decides employment, but

bargains over wages with two separate groups of workers.<sup>19</sup>

### 3 Data sources and descriptives

In our analysis we use several annual data bases for the years 1996–2007. All of these data bases are censuses that can be linked together through firm or plant identifiers. All data sources are administered by Statistics Norway. One of the sources is the Norwegian Manufacturing Statistics, which is collected at the plant level. We keep only plants that are observed consecutively for at least three years during 1996–2007, and that do not have any gaps in their time series. We then drop very small plants, defined as plants with on average less than 3 employees every year or with average production value or total wage costs of less than one million NOK per year. The manufacturing statistics provides information about the value of output and input use, employment, wage costs and NACE industry classification.

We also utilize the SIFON register, which is a register of foreign ownership interests in Norwegian firms. SIFON provides information about shares of firm assets/stocks that are owned by foreign owners. With the information in the SIFON register, we define a plant as foreign owned if the foreign ownership share is above 50%.<sup>20</sup> Our definition of a foreign acquisition occurring in year  $t$  is thus that the foreign ownership share is above 50% in year  $t$ , but was below 50% in year  $t - 1$ . This definition of foreign acquisition corresponds to the discussion of foreign acquisitions in our model. It should be noted that the acquisition event itself is quite abrupt in most cases, where the foreign ownership share jumps from well below 50% to well above from one year to the next. We drop plants with more than one foreign acquisition during our sample period.

As a robustness check on our results we also include in some of our regressions a dummy variable to indicate when a plant changes owner from one domestic owner to a new domestic owner. Our definition of domestic ownership change makes use of the plant and firm identifiers in the manufacturing statistics. While the plant identifiers are connected to a specific location with production in a specific industry, the firm identifier is related to the legal owner (firm). The plant identifier does not change as long as the production is within the same industry and in the same location, while the firm identifier may change if the plant gets a new owner. Thus we identify a domestic ownership change for a plant in year  $t$  if the plant does not have the same firm identifier in year  $t$  and year  $t - 1$ . We also require that the new firm id in year  $t$  owned other plants in  $t - 1$ . Further, the plant must not ever be defined as foreign owned.<sup>21</sup>

We construct capital data at the plant level by using a database from Statistics Norway with capital values of manufacturing firms constructed from accounting data (see Raknerud, Rønning, and Skjerpen, 2004). Since the capital values in this database are at the firm level, we distribute capital values to the plants of multi-plant firms by using production-value and employment shares.

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<sup>19</sup>Though their setting is not one of foreign acquisitions, their framework easily lends itself to such an interpretation.

<sup>20</sup>The SIFON register records both direct and indirect foreign ownership shares. We do not make a distinction between direct and indirect foreign ownership in our analysis, but define a plant as foreign owned if either the direct or the indirect foreign ownership share exceeds 50%.

<sup>21</sup>We drop plants with more than one ownership change from our analysis.

We drop plants with missing, zero or negative capital values. The variable for capital input we use in our regressions is the user cost of capital. This is calculated as the full rental value of all equipment and buildings employed by the firm. This includes the expenses for rented buildings and equipment and the rental value of buildings and equipment owned by the firm. The assumed time cost for calculation of rental value of owned capital is the sum of 10-year bond rates as reported by the central bank of Norway and depreciation rates for buildings and equipment separately. Both rental expenses and calculated rental value for owned capital are deflated by the price index for buildings and equipment separately. With the exception of the 10-year bond rates, all figures going into this calculation are from the capital database of Statistics Norway (Raknerud, Rønning, and Skjerpen, 2004).

We then link the income tax files to the manufacturing plant panel using the plant identifiers. The income tax files contain information about workers and the periods they are employed by a given employer and the associated earnings over the course of this employment period or job-spell. We also use the employer-employee data for the whole population to get information about age, gender and education of the individuals that have job spells in manufacturing plants. Based on these matches, we drop plants that have one or more years without matched workers. Also, from the income tax files, we have information about claimed tax deductions for union membership, we use this as our indicator of union membership. We define a worker as a union members if the income tax files show that the paid union membership fee in a given year is above NOK 100.

With the workers and job spells we have linked to manufacturing plants at this stage, we construct plant level variables for employment and skill-shares of the work force. In doing this we record the number of workers employed by the plant at three dates for each year (10th of February, June and October), and construct a measure of the number of employees and skill shares as the average over these dates for each year. Workers recorded working part time are given a lower weight than fulltime workers.<sup>22</sup>

The final part of our cleaning procedures is related to the information in the job spell data. We drop job spells that last less than two years, and job spells where the worker each year works less than 90 days in the plant (we think of these as typical summer-jobs). We also drop workers who do not work full-time all years when they are in manufacturing plants. Based on the data on earnings during the job-spell and information about start and stop dates of the spell, we calculate our wage measure as the daily wage during the job spell in a given year. Workers that always earn less than 350 NOK per day are dropped from our sample.<sup>23</sup> Our resulting plant-panel contains about 58,000 plant-year observations from almost 6,500 different plants for the period from 1996 to 2007. These plants employ in total over the period 250,000 different workers giving rise to 1.6 million worker-year observations.

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<sup>22</sup>The data contains a categorical variable for expected weekly work hours. Workers recorded as working 30 hours or more per week, are given the weight of 1 in the calculations of skill shares and number of employees. Job spells with work hours between 20 and 30 hours are given a weight of 0.65, while shorter work hours are given a weight of 0.3.

<sup>23</sup>This is based on the earnings deflated by the consumer price index, and represents a daily wage that would be well below the expected average daily wage for a fulltime manufacturing worker in Norway.

**Table 1:** Plants and workers involved in ownership change by year

Year	Acquisitions								
	Foreign			Domestic			All plants		
	Plants	Empl.	Avg.	Plants	Empl.	Avg.	Plants	Empl.	Avg.
1996	.	.	.	.	.	.	4,212	160,102	38
1997	18	1,189	66	6	200	33	4,553	170,287	37
1998	13	1,131	87	8	139	17	4,787	178,673	37
1999	38	3,397	89	16	972	61	4,777	177,135	37
2000	39	3,265	84	11	847	77	4,883	180,000	37
2001	24	3,015	126	26	2,603	100	4,891	177,467	36
2002	29	1,322	46	13	695	53	5,049	176,896	35
2003	25	700	28	10	810	81	5,083	167,781	33
2004	18	1,274	71	8	385	48	5,135	161,217	31
2005	28	2,533	90	12	430	36	5,135	162,398	32
2006	86	7,044	82	17	503	30	5,014	167,192	33
2007	54	4,296	80	6	149	25	4,359	136,814	31
Total	372	29,166	78	133	7,733	58	.	.	.

*Note:* This table shows the number of plants, employees (Empl.), and the average number of employees per plant (Avg.) in our sample that are involved in an ownership change in each year, as well as the same figures for all plants in our sample. Totals calculated over ownership changes.

In Table 1 we show the number of plants, number of employees, and average employment for the plants becoming foreign owned and changing domestic owners in each year, as well as the same figures for all plants in the sample. The share of plants that are foreign owned increase from 4.5% in 1996 to just above 9% in 2007, the corresponding change in the foreign employment share is from a share of 14% in 1996 to 27% in 2007. We are not able to identify more than 133 domestic to domestic ownership changes during our sample period, while we have a total of 372 foreign acquisitions in our data.

Descriptive statistics for plant and individual level variables are shown in Tables 2 and 3 respectively. We see that foreign owned plants are much larger on average than the average in the population of plants. The foreign owned plants also have higher average wages, and are noticeably more unionized. Conditional on being foreign owned, i.e., having above 50% foreign ownership share, it is apparent that most plants are completely foreign owned, considering the average foreign ownership share of 97% in this group.

In our data for the manufacturing sector, the share of workers that are members of a union is relatively stable at around 60% each year, with a slightly falling trend. The share of workers that are members of a union, the union share, varies between industries and also between plants within industries. Figure 1 shows union shares at the plant level for the NACE 2-digit industry with the highest (Figure 1a) and lowest (Figure 1b) average union share over the whole sample.<sup>24</sup> The figure displays the overall union share in our sample together

<sup>24</sup>The average union shares at the 2 digit industry level were calculated only for industries

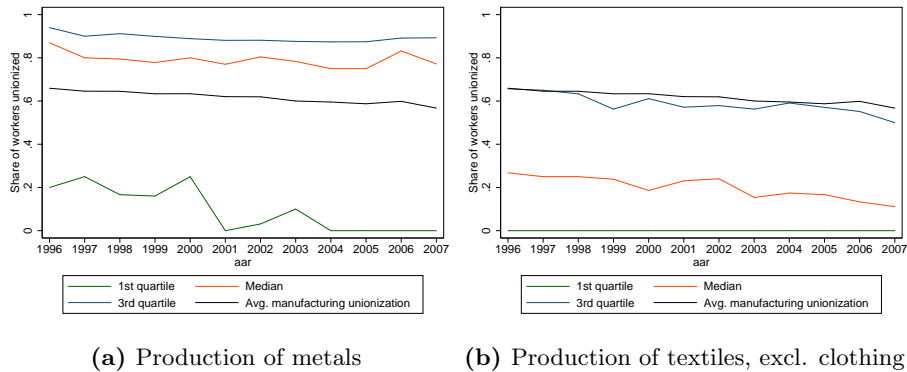
**Table 2:** Plant level descriptives

Variable	All		Foreign owned	
	Mean	(Std. Dev.)	Mean	(Std. Dev.)
Average wage	286.78	(156.49)	358.66	(284.59)
Employees	34.83	(84.91)	99.75	(145.37)
Union share	0.35	(0.34)	0.6	(0.30)
Foreign owned	0.07	(0.25)	1.00	(0.00)
Share high skilled	0.12	(0.16)	0.2	(0.20)
Share medium skilled	0.58	(0.20)	0.53	(0.17)
Share female	0.23	(0.21)	0.23	(0.18)
Foreign share	0.08	(0.25)	0.97	(0.11)
Capital user cost	4,017	(19,887)	15,819	(42,171)
Intermediates	42,978	(210,452)	172,908	(633,642)
N	57,878		3,834	

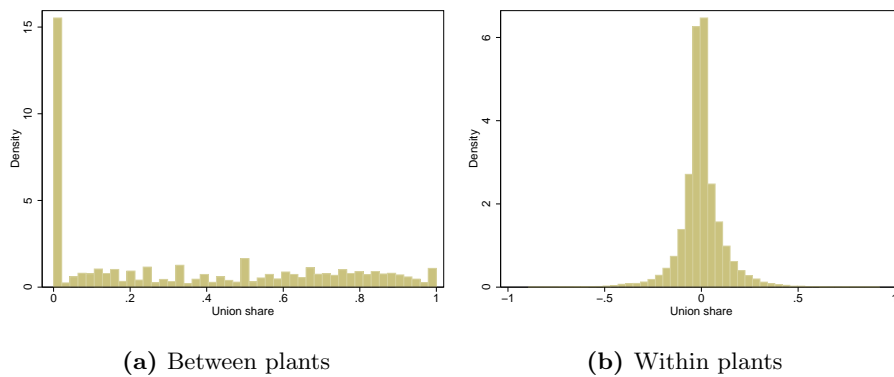
*Note:* Monetary sizes in 1000 NOK (1998 base year).

**Table 3:** Individual descriptives

Variable	All		Stayers	
	Mean	(Std. Dev.)	Mean	(Std. Dev.)
Daily wage	826.39	(335.06)	838.61	(305.75)
Union member	0.63	(0.48)	0.79	(0.41)
High skilled	0.15	(0.35)	0.12	(0.33)
Medium skilled	0.58	(0.49)	0.59	(0.49)
Age	40.91	(11.51)	43.23	(10.43)
Tenure	8.26	(6.63)	10.91	(6.48)
Foreign owned	0.20	(0.40)	0.53	(0.50)
Domestic owned	0.01	(0.11)	0.11	(0.32)
N	1,409,855		73,550	



**Figure 1:** Within-industry distribution of plant-level union shares



**Figure 2:** Variation in plant level union shares

with the 1<sup>st</sup>, 2<sup>nd</sup> (Median) and 3<sup>rd</sup> quartiles in terms of plant level union shares for each of these two industries. In the metal industry the median plant has a union share of about 80%, while in the textile industry the median plant has a union share varying around 20%.

In our empirical set-up, we use plant-level union shares as a proxy for the bargaining power of unions. In order to identify a bargaining effect of unions, we need variation not only within industries, but also within plants. The overall variation in plant-level union shares is displayed in Figure 2a, while Figure 2b depicts a histogram of the within-plant variation in union shares.

We estimate the size of the union wage premium in our data by regressing the plant-level average wage on the plant-level union share and then step-by-step adding further plant controls and fixed effects. The results are reported in Table 4. After controlling for plant-level input use, skill shares and a full set of industry-year interaction dummies, there is still an average union wage premium of about 6.7%. Other things equal, the interpretation of the coefficient is that plant-level average wages increase by almost 0.7% when the plant level union density increases with 10 percentage points. Our estimate is a plant-level union density effect, and our estimate is similar to that found by Barth, Raaum, and

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having more than 500 plant-year observations in our 12-year sample.

**Table 4:** Union premium

	(1)	(2)	(3)	(4)
Wage premium	0.086*** (0.009)	0.087*** (0.008)	0.074*** (0.008)	0.067*** (0.008)
Controls:				
Industry-year	No	Yes	Yes	Yes
Production factors	No	No	Yes	Yes
Skill composition	No	No	No	Yes
Observations	52763	52763	52763	52763
$R^2$	0.007	0.267	0.510	0.527

Standard errors in parentheses, clustering by plant

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

*Note:* Based on regression of log of average wage in plant on union share. *Industry-year* includes dummies for industry, year and their interaction, *Production factors* include log of employees, log of capital and log of intermediates, and *Skill composition* includes share of high and medium skilled workers. Plants that are subject to an ownership change during the sample period are excluded (5 115 observations).

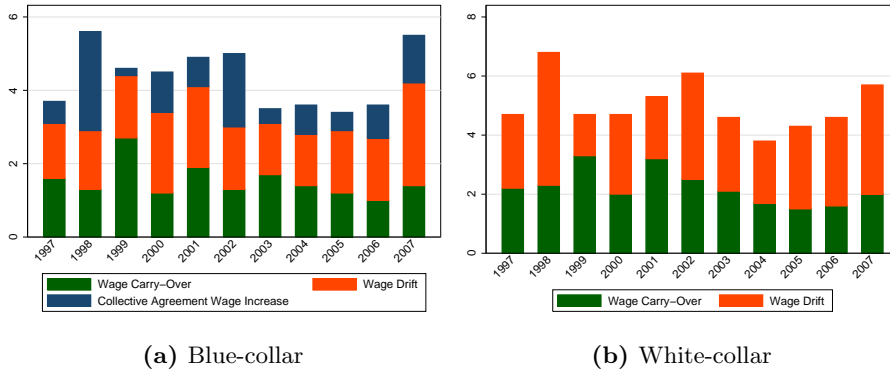
Naylor (2000) using Norwegian survey data on union membership from 1989. Barth, Raaum, and Naylor (2000) find that the wage premium from individual union membership is very similar to that of the union wage premium stemming from the plant level union share, and that the effect of individual membership disappears when plant-level union density is controlled for. Their interpretation is that the bargained wage at the plant level is a public good, which is increasing in union density. Such an interpretation is implicit in our model as well.

The evidence in Table 4 is consistent with the expectation that unions increase wages. This estimate is potentially biased upwards because a plant-level regression does not take into account the possible selection of high quality workers into plants with high union density. The estimated union wage premium reported in Table 4 is also of an order of magnitude that is consistent with previously reported union wage premia for Norway in Blanchflower and Bryson (2002, p. 19), where they report an average union wage premium for Norway of 8%.

## 4 Empirical approach

In Norway, unions play an important role in the labor market, which together with the institutional features governing wage formation make us think that a bargaining model is appropriate for interpreting the outcomes observed in the data. The share of employees who are members of a union, i.e., the union density, is above 50% for the private sector as a whole, while the share is around 60% for manufacturing (Stokke, Evju, and Frøland, 2003). Bargaining coverage is higher than union density, because firms covered by a collective agreement follow the agreement for all employees. Thus, in the private sector overall, about half of the labor force is covered by collective agreements. However, in contrast to many





**Figure 3:** Decomposition of nominal wage growth in manufacturing

*Note:* Data for these figures were collected by the authors from annual reports by The Norwegian Technical Calculation Committee for Wage Settlements.

other European countries, extension mechanisms, i.e., imposing regulations from collective agreements onto the non-unionized sectors, are not used in Norway.<sup>25</sup>

Our bargaining model captures the effect of local bargaining at the firm level. Therefore, the possible mechanism we are trying to identify relies on firm level adjustments on top of the centrally negotiated wages. Although collective agreements are important in Norway, this does not preclude local bargaining taking place at the firm level. Several facts support the argument that a model of firm level bargaining is relevant in the Norwegian case. White-collar wages are mainly set at the firm level, while the wages of blue-collar workers covered by collective agreements are determined both by central and local negotiations. The central negotiations, which take place at the national, and in some cases the industry level, concern collective agreements, wage regulations, working hours, working conditions, pensions, medical benefits, and in addition a negotiated minimum wage.<sup>26</sup> Local negotiations usually take place at the level of the firm, and determine possible local adjustments and additions to the collective agreements. Since the 1980s, there has been an increase in the share of firms that are involved in local bargaining on top of the centrally negotiated wage. Bryson and Dale-Olsen (2008) report that 70% of workplaces in Norway engaged in local bargaining in 2003.

Figure 3 provides a decomposition of the wage growth of both blue- and white-collar workers.<sup>27</sup> The centrally negotiated outcome in terms of nominal wage growth is denoted by *Collective Agreement Wage Increase*, while *Wage*

<sup>25</sup>For discussions of the Norwegian bargaining system, see, e.g., Barth, Raaum, and Naylor (2000), Stokke, Evju, and Frøland (2003) and Bryson and Dale-Olsen (2008).

<sup>26</sup>There is no national, statutory minimum wage covering all workers in Norway. Minimum wages only apply to workers covered by collective agreements.

<sup>27</sup>The Norwegian Technical Calculation Committee for Wage Settlements (in Norwegian: *Teknisk beregningsutvalg* (TBU)) is a committee appointed by the government, and has as its task to provide information about the general economic situation and the development of wages to the bargaining parties in the collective bargaining processes. The motivation for such a fact-finding committee is to “present the best possible background figures in a form that, as far as possible, helps to avoid disagreement arising between the parties”. (<http://www.regjeringen.no/en/dep/asd/topics/labour-market-policy/income-policy/tbu.html?id=439434>).

*Drift* is the overall impact of wage increases that are not part of the collective agreements. This includes local agreements within a firm or for a group of employees within a firm, as well as individual salary raises. The term *Wage Carry-Over* denotes the growth in wages from last year that would arise without any further collectively negotiated increases or wage drift. This is a technical accounting feature, which arises because wage settlements happens during the calendar year, while wage growth is measured on a calendar year basis. The figure clearly shows that firm level wage adjustments each year accounts for a large share of total nominal wage increases. Even for blue-collar workers, Wage Drift constitutes a larger part of wage growth than Collective Agreement Wage Increase for many of the years in our sample.

The model presented in Section 2 contrasts the wage outcome when the firm is a domestic entity to the wage outcome when the firm is acquired from abroad. After the foreign acquisition, the firm becomes part of a multinational enterprise with plants both in the domestic country (the home of the acquired plant) and abroad. Under plausible conditions, a foreign acquisition improves the outside option of the firm in its negotiations with the union in the domestic plant. The reason is that in the case of conflict with the union in the domestic plant, the firm's outside option now includes the possibility of increasing production in the plant it owns abroad. The key intuition and implication of our model is the following: In the situation before acquisition, if the bargaining power of the union is *high*, the firm will be forced to accept an outcome close to its outside option. On the other hand, if the bargaining power of the union is *low*, the wage will be close to the outside option of the workers. An improvement in the firm's outside option following foreign acquisition, will then have a larger impact on the bargaining outcome when the union's bargaining power is high. Thus, the main result from the model is that the negative bargaining effect on wages after foreign acquisition is strongest in plants where the bargaining power of the union is large. This is the testable implication from our model that we take to the data.

One challenge for the empirical test of the model's main prediction is the inherently unobserved nature of union bargaining power. Most previous studies have only used industry level measures of bargaining power, while our data enables us to observe this at the plant level. Our proposal is to proxy union bargaining power by union density or union share at the plant level, measured by the share of employees who are union members. Barth, Raaum, and Naylor (2000) argue that industrial action from the worker side in the event of disagreement with the employer, will be more effective when plant level union density is high.

Since our main prediction is that the impact of foreign acquisitions on wages depends on union bargaining power, we estimate wage regressions of the following type

$$\ln w_{jt} = \delta_f f_{jt} + \mu u_{jt} + \gamma f_{jt} \cdot u_{jt} + \beta' \mathbf{x}_{jt} + \varepsilon_{jt}, \quad (12)$$

where  $\ln w_{jt}$  is the (natural) log of the wage level in plant  $j$  in year  $t$ , where the wage level is defined as wage averaged over the workers in the plant,  $f_{jt}$  is an indicator that takes the value one if plant  $j$  has a foreign ownership share larger than 50% in year  $t$  and  $u_{jt}$  is our measure of union bargaining power given by the union share at the plant level. Our main interest lies in the coefficient on the interaction term between the dummy for foreign ownership and the union

share  $f_{jt} \cdot u_{jt}$ . The prediction from the model is that the coefficient on this term is negative.  $\mathbf{x}_{jt}$  is a vector of plant and industry controls, which includes plant level inputs (log of capital, log of employees, log of intermediate usage), the skill composition in the plant (the share of high skilled and medium skilled workers), and a set of dummies for NACE 2-digit industry, year, and industry-year interaction terms. Our main specifications include plant fixed effects, thus the coefficient on foreign ownership and the interaction term of interest will be identified by plants that change ownership from domestic to foreign, thus closely representing the foreign acquisitions discussed in the model.

In our model, the overall loss to the domestic union from the foreign acquisition of the plant, stems from the inability to coordinate with the union in the foreign plant. If the same union bargains on behalf of both plants, there would be no changes in the outside option of the firm following the foreign acquisition of the domestic plant. Thus, if union coordination across the two plants is possible, the negative bargaining effect in our model will disappear. We conjecture that in the case of a merger with a domestic owner, there will on average be a larger element of union coordination involved than in the case of a foreign acquisition. Since we are able to identify domestic-to-domestic ownership changes, we utilize this conjecture to test the robustness of the model's predictions. We do this by including a dummy variable that identifies plants that are acquired by new domestic owners and the interaction term between this variable and union share. In cases where unions do not manage to coordinate across domestic plants at all, the effect should be the same as for foreign acquisitions. In cases where they have perfect coordination, the effect might even be positive, if the domestic ownership change is correlated with positive product market externalities or productivity gains.<sup>28</sup> It is difficult to have a strong prior on the distribution of these cases, and it is beyond the scope of this paper to attempt to disentangle them. Our expectation is thus that the coefficient on the interaction term between domestic ownership changes and unionization should be less negative, than the interaction term between foreign acquisitions and union share.

A limitation of the plant-level wage equation specified in Equation (12) is that we do not take fully into account possible changes in the composition of workers in the plant following ownership change. Such changes could affect the impacts we see on average wages at the plant level. We therefore use our rich matched employer-employee data to estimate wage equations also at the individual level.

The reduced form approach we use does not allow us to separately identify the effect on wages or employment without additional exclusion restrictions. We estimate a log-linear version of Equation (7), which by itself can be interpreted as an equation in the size of the wage bill. To get separate identification, we would need to simultaneously estimate a labor-demand equation, which necessitates exclusion restrictions for identification.<sup>29</sup> Note that this is an inherent problem in all empirical analysis involving prices and quantities, e.g., wages and employment, and is not unique to our setting. Since our main interest lies in the possibly of heterogenous impact of foreign ownership on the distribution of firm

<sup>28</sup>For a treatment of mergers when there are differences in the scope of union coordination and product market externalities, see Lommerud, Straume, and Sørgard (2005).

<sup>29</sup>In our model, the effects are separated by the labor demand schedule given by Equation (6).

surplus, this is not necessarily a weakness in itself, but should be kept in mind when interpreting the results. It is possible to interpret a negative interaction between foreign ownership and unionization as an effect on wages specifically, but this implies the exclusion restriction that employment would be unchanged under foreign ownership if wages were held constant, i.e., a strong assumption in lack of data.

## 5 Results

The main effect we test is the differential impact of foreign acquisitions on wages depending on the bargaining power of unions at the plant level, as illustrated in our model in Section 2. The argument is that strong unions that initially have managed to capture a large share of the rents in their negotiations with the firms, have more to lose from being taken over by foreign owners. The results from fitting Equation (12) with plant fixed effects included are reported in Column (1) of Table 5. The coefficient on the interaction term in the fixed effects specification implies that becoming foreign owned is associated with a reduction in wages of roughly 7% in plants where all workers are unionized. In itself, becoming foreign owned is associated with an increase in wages of roughly 4%. The joint distribution of the estimated coefficients on foreign ownership and its interaction with union share, i.e.,  $\hat{\delta}_f$  and  $\hat{\gamma}$ , is such that the joint impact is significantly negative (in a statistical sense) for plants with roughly 80% unionization and above, while it is significantly positive for plants with unionization below approximately 20%. To get a sense of the size of this effect, we do a back-of-the-envelope calculation of the total effect of foreign ownership for the average worker in the plants that become foreign acquired in the sample period. We sum the implied change in total annual wage bill over all plants  $j$  that become foreign owned in the year  $t$  they become foreign owned, more precisely,  $\sum_j \sum_t \mathbf{1}\{f_{jt} = 1 \wedge f_{jt-1} = 0\} w_{jt} L_{jt} \cdot (\delta_f + \gamma u_{jt})$ , and divide by the number of employees in the same set, i.e.,  $\sum_j \sum_t \mathbf{1}\{f_{jt} = 1 \wedge f_{jt-1} = 0\} L_{jt}$ . This yields an implied decrease in wage of about 4,400 NOK for the average employee, which is approximately 1.2% of the average wage in foreign owned plants overall. The OLS results for the same model, i.e., omitting plant fixed effects, are shown in Column (4). The difference between the OLS and fixed effects estimates points to a strong selection in which plants become foreign owned. Plants with higher than average wages are more likely to become foreign owned, and also tend, to some extent, to be more unionized. Selection effects makes the interaction term difficult to interpret in the OLS estimates, as it depends on how foreign owned plants with high union share compare on average to both the average foreign owned plants with low unionization, and the average of plants with more unionization that are not foreign owned.

Columns (2) and (5) of Table 5 show estimates where the interaction term between foreign ownership and union share is omitted for plant fixed effects and OLS, respectively. This has important consequences for the estimated coefficient on foreign ownership, where it decreases substantially in both specifications, and disappears in the fixed effects estimates. The difference between OLS and fixed effects estimates in this case is in line with previous studies on foreign ownership and wages.<sup>30</sup> Omitting also union share in Columns (3) and (6) of Table 5 leaves

<sup>30</sup>See, e.g., Heyman, Sjöholm, and Tingvall (2007), who show a similar result going from

the estimates on the foreign dummy virtually unchanged from Columns (2) and (5), respectively. Thus, adding the interaction term makes it apparent that there is sizable heterogeneity in the foreign ownership impact according to plant level unionization.

**Table 5:** Wage regression, log wagecost per employee as dependent variable

	FE			OLS		
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign * Union	-0.067** (0.021)			-0.118*** (0.014)		
Foreign	0.037* (0.015)	-0.002 (0.008)	-0.002 (0.008)	0.128*** (0.010)	0.060*** (0.005)	0.062*** (0.005)
Union	0.023** (0.007)	0.020** (0.007)		0.036*** (0.004)	0.030*** (0.004)	
Share high skill	0.062*** (0.017)	0.061*** (0.017)	0.060*** (0.017)	0.376*** (0.008)	0.379*** (0.008)	0.380*** (0.008)
Share med. skill	0.064*** (0.010)	0.064*** (0.010)	0.063*** (0.010)	0.082*** (0.006)	0.082*** (0.006)	0.084*** (0.006)
Log employees	-0.278*** (0.003)	-0.278*** (0.003)	-0.277*** (0.003)	-0.154*** (0.002)	-0.156*** (0.002)	-0.151*** (0.002)
Log capital	0.048*** (0.002)	0.048*** (0.002)	0.048*** (0.002)	0.049*** (0.001)	0.049*** (0.001)	0.050*** (0.001)
Log intermediate	0.131*** (0.002)	0.131*** (0.002)	0.131*** (0.002)	0.109*** (0.001)	0.110*** (0.001)	0.110*** (0.001)
Observations	57,878					
$R^2$	0.418	0.418	0.418	0.454	0.454	0.453

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Controls: dummies for year, industry and industry-year, dummy for less than 10 employees, dummies for large changes in wage, employment and capital

In the model, the negative bargaining effect on wages is a result of the domestic workers indirectly competing with the workers abroad; the threat of moving production abroad lurking in the background. The firm's fallback improves more, the more bargaining power the domestic workers have in comparison to the workers abroad. In addition, the lack of union coordination across borders contributes to this. As discussed in Section 2, the improvement in outside option for the firm is expected to be smaller in the case of a plant being taken over by another domestic firm. Thus, in the case of ownership changing to new domestic owners, we do not expect the same negative bargaining effect for plants with high union shares. To test this, we estimate the model from Column (1) of Table 5, this time including a dummy variable taking the value one in

OLS estimates of firm level wages, to estimates of individual wages using fixed effects for individuals and firms.

the period after domestic ownership change, and an interaction term between the domestic ownership change dummy and union share. The result on the coefficients of interest are reported in Column (1) of Table 6. The inclusion of these two variables does not change the coefficients on the foreign ownership variables, while the variables for domestic ownership change and its interaction with union share are both insignificant. This makes us more confident that the effect we find for foreign acquisitions is related to the increase in fallback following ownership change that is specific to foreign acquisitions, and not a result of ownership change in general.

**Table 6:** Wage regression with domestic ownership changes, log wagecost per employee as dependent variable

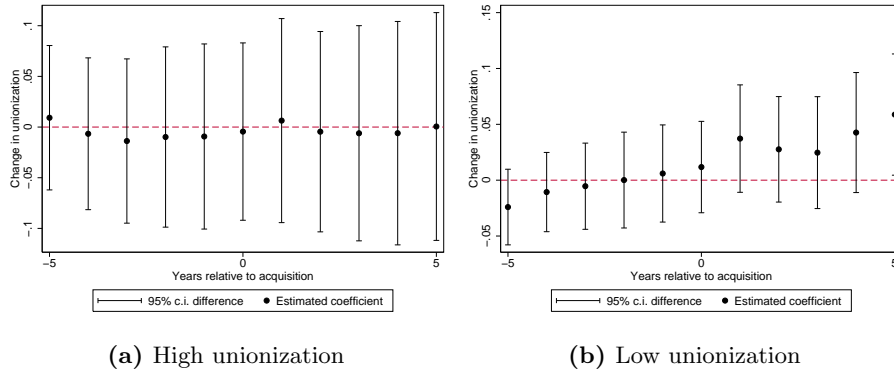
	Union share	High union	Union pre
Foreign * Union	-0.067** (0.021)	-0.033* (0.016)	-0.039* (0.016)
Domestic * Union	-0.012 (0.037)	0.003 (0.026)	0.003 (0.026)
Foreign	0.037* (0.015)	0.017 (0.012)	0.021 (0.012)
Domestic	-0.036 (0.023)	-0.044* (0.018)	-0.044* (0.018)
Union	0.023** (0.007)	.	.
Observations		57,878	
$R^2$	0.419	0.418	0.418

Standard errors in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Controls: log employees, log capital, log intermediates, skill shares, dummies for year, industry and industry-year, dummy for small firm, dummies for large changes in wage, employment and capital

The interpretation of the results in Column (1) of Table 6 is that for plants where all workers are union members, a foreign acquisition is associated with an effect that in sum is negative on wages, while in plants with a union share of zero, the wage effect of foreign acquisition is positive and in the order of 3.7%. Since union share is a variable that also varies over time within plants, this is a simplified interpretation of our results. It could be possible that the negative coefficient on the interaction term is generated by a significant decline in union share in foreign acquired plants. This would be in line with the argument by Dreher and Gaston (2007) that globalization could reduce union membership. In order to exclude the possibility that foreign acquisitions cause a reduction in the union share, we estimate the change in union share on dummies for years around foreign acquisition. The results are displayed in Figure 4 where we plot the estimated coefficients on the dummies for years around foreign acquisition. Figure 4 shows the estimated change in union share before and after foreign acquisitions, displayed separately for plants above (*High unionization*) and below (*Low unionization*) 60% union share. There is no evidence that changes in



**Figure 4:** Change in plant level unionization before and after foreign ownership change

*Note:* The plants are divided according to whether they have above or below 60% unionization on average in the sample. The figures show estimated coefficients for leads and lags of a dummy taking the value one in the year of foreign acquisition. Fixed effects for plant, year, industry and industry-year are included as controls. 95% confidence intervals for the estimated coefficients are indicated by the error bars.

union share are related to foreign acquisition for plants with high unionization. For plants with low unionization, there does seem to be a weak, positive trend in unionization, which continues from before the acquisition. However, the trend becomes less pronounced if we control for the size of plants in terms of the user cost of capital and the number of employees. This makes us believe that this trend is driven by growth in this group of plants more than anything else.

To ease the interpretation of the interaction terms in the first column of Table 6, we replace the continuous variable for union share with a dummy variable indicating whether the plant has a high union share. In the second column of Table 6 we define the high union dummy based on the average union share over time for each plant, and define plants as high union share plants if their average union share is above 60%. To assess the concern that our results are driven by changes in unionization brought about by foreign acquisition, we also define another dichotomous measure of high unionization, based on the average union share in the plant *before* acquisition being above 60%. The results using this measure are shown in the last column (*Union pre*) of Table 6. These two indicator measures both yield the result that there is a large and significant negative association between foreign ownership and wages when workers are highly unionized, and the results are basically unchanged between defining high unionization based on the average over the whole sample, or just the period before acquisition. All of the specifications in Table 6 are estimated with plant fixed effects included, which is why the union measure cannot be separately identified from the plant fixed effect in the two last columns, as the union measures in these columns are constant within plants. Wages in plants subject to domestic acquisition seem to decline after ownership change, though there is no indication that this effect depends on the union share of the plant.

A limitation of the plant-level wage regressions done so far is that it is not possible to assess how the effect arises. It could be driven both by changes in

**Table 7:** Wage regression, log daywage as dependent variable

	Union share				High union	
	All		Stayers		All	Stayers
	FE	OLS	FE	OLS	FE	FE
For. * Un.	0.004 (0.015)	-0.076*** (0.013)	-0.059** (0.022)	-0.084** (0.027)	-0.024** (0.009)	-0.029** (0.011)
Dom. * Un.	0.057 (0.047)	0.003 (0.032)	-0.080 (0.057)	-0.128** (0.042)	0.019 (0.024)	-0.046 (0.031)
Foreign	0.000 (0.011)	0.086*** (0.010)	0.024 (0.016)	0.035 (0.021)	0.023** (0.008)	0.006 (0.010)
Domestic	-0.067* (0.028)	-0.026 (0.021)	-0.008 (0.036)	0.023 (0.029)	-0.044* (0.017)	-0.022 (0.022)
Union	-0.000 (0.006)	-0.081*** (0.004)	0.145** (0.046)	0.012 (0.023)	.	.
Observations	1,409,855		73,550		1,409,855	73,550
$R^2$	0.117	0.328	0.216	0.357	0.117	0.215

Standard errors in parentheses. Clustered by plant-year.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Controls: quadratic tenure and age, plant log capital, log employees, log intermediates, female share and skill shares, dummies for year, industry and industry-year.

wages of workers already employed, or by changes in the composition of the workers within a plant following an acquisition. Our model, and indeed other models that have pointed out the possibility of a negative bargaining effect after foreign acquisition, is too stylized to have any predictions on the exact mechanism. One worry when interpreting the results as a bargaining effect, is that changes in the composition of workers might be driven by efficient restructuring of the firm's operations after acquisition more than anything else. We investigate this possibility by estimating our wage equations at the individual level. Including both observable controls for individual and plant characteristics as well as our variables of interest: the plant level union share and foreign ownership change.

In order to control for both individual and plant unobserved fixed effects, we estimate these wage regressions using spell fixed effects. Results are reported in Table 7, where we use both the whole sample of matched job-spells to our plant sample (*All*), and only spells that lasted from at least two years before an acquisition to at least two years after (*Stayers*).<sup>31</sup> The main specification includes using spell fixed effects (*FE*), while OLS estimates are provided for reference. The results in the third column of Table 7 show that individuals who are present in the firm at least two years before and after acquisition experience a reduction in wages if they work in a highly unionized plant, which is evidence that compositional changes does not drive the whole effect we find in the aggre-

<sup>31</sup>This sample restriction reduces the amount of observations dramatically, as we drop both spells where an acquisition does not occur, as well as spells that start or end too close to the acquisition.



gate data. For the full sample of workers, identification of the effect of foreign ownership and its interaction with union share will be provided by employees who either start shortly before or leave shortly after an acquisition, in addition to the stayers. As the results in the first column of Table 7 show, we do not find any significant effect of acquisitions for this group, with the exception of a negative association between wages and domestic acquisitions unrelated to unionization. This indicates that the compositional effect from people leaving shortly after or starting shortly before foreign acquisition offset the effect on the stayers. This implies that the negative effect we find in the aggregate data to some extent also reflects the effect of employees leaving before or starting after the acquisition, e.g., employees with higher salaries quitting or new hires having lower salaries, compared to the pre-acquisition average.

In the last two columns of Table 7, we change our measure of unionization to an indicator of plant level unionization averaged over the sample period being above 60%, which is the same alternative measure as previously discussed and used in the second column of Table 6. We still find a significant negative association between foreign ownership and wages in more unionized plants for the stayers, as displayed in the last column of Table 7, though the effect is now also estimated to be negative and significant for the group of all employees, as shown in the next to last column of Table 7. The most probable explanation for this discrepancy between the results when using plant level union share and using the dichotomous union measure, is the presence of non-linearities in the interaction effect which is different on average between the groups.<sup>32</sup>

The interaction term between domestic acquisition and unionization are insignificant in all of the spell fixed effect estimates of Table 7, though the estimated coefficient is large and negative for the stayers. Due to the few observed domestic ownership changes, and therefore a lack of statistical power, it is not possible to draw conclusions about how the effect of domestic acquisitions compares to foreign acquisitions in more unionized plants for the groups of individuals we have considered here.

## 6 Conclusion

In this paper, we have considered how foreign acquisitions interact with unionization in determining workers' outcome. Our proposed model shows one mechanism for endogenously generating a decrease in the bargaining outcome for the union when the firm is acquired from abroad: The new multinational status of the firm gives it a credible threat to move production abroad, thereby increasing its outside option when bargaining with the union, which has a larger impact when the union is relatively more powerful to begin with. This is in line with previous theoretical models, which have arrived at similar conclusions based on slightly different assumptions on how wages and employment are determined. Utilizing detailed data on unionization and foreign ownership for firms and individuals in Norwegian manufacturing, we obtain results that are consistent with a negative bargaining effect taking place.

In the large literature on effects of economic globalization on labor markets,

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<sup>32</sup>Specifications where we divide the union measure into more finely defined groups seems to indicate this, though we do not have the power to reject linearity due to the number of acquisitions in our sample.

there have been few studies trying to analyze directly how the wage effect of foreign acquisitions may depend on workers' ability to capture a larger share of the rents in the firm. A challenge to such an analysis is the unobservable nature of rents and bargaining power. We partly side-step some of these problems by identifying situations where workers should be able to secure a bigger share of rents, namely through the collective activity of a labor union that represents a large share of workers in the plant. Our analysis provides evidence for a negative wage effect of foreign acquisitions in firms where unions have a strong presence. This suggests that there are changes in firms that become multinational, which allows them to reduce the amount of the available surplus that goes to otherwise powerful groups of workers. Since we do not find that foreign acquisitions change union density at the plant level, we interpret our results as consistent with an improvement in the outside option of the firm after foreign ownership change. This mechanism could potentially be important not only in unionized firms and sectors, but also in situations involving other groups of employees that enjoy a strong position vis-à-vis their employers. As is apparent from our model, the employees will lose when they, in some sense, become less scarce to the firm, compared to their overall scarcity in the economy, as measured by the outside option of the employees.

The overall picture from both plant and individual wage regressions is consistent with a negative association between wage changes after foreign acquisitions and unionization. Taking a strong stand on the interpretation of the result is difficult in light of the non-random nature of acquisitions. There are two possible broad explanations for this effect. The first is that foreign acquisitions are selected on the effect we observe. Such an explanation implies that among the plants with higher levels of unionization, the acquisition targets are the plants where wages for reasons unrelated to the acquisition are going to decrease in the future. This might be due to expected changes in the economic conditions of the plants that both decrease wages and make them more attractive objects, where such joint changes are more prevalent in firms that are typically more unionized. As an example, consider an innovation in logistics planning, which both reduces the need for high salaried logistics specialists, and increases the scope of jointly managing operations between several facilities. The second explanation for our results is that foreign acquisitions cause these effects. This is consistent with a bargaining story, where workers are hurt due to multinational firms having better outside options. It is also consistent with anecdotal evidence of union resistance to foreign acquisitions. As an aside, this explanation would imply that the scope for reducing worker rents is an incentive for acquisition in itself, such that we would expect a higher number of foreign acquisitions to take place among firms where workers have a high bargaining power, everything else equal. Due to lack of plausible exogenous variation in foreign ownership, it is not possible for us to separate the two broad explanations of our results, or control for the potential selection implicit in the bargaining story. In our view, this would be a highly interesting venue for future studies.

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