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# *Wages and International Rent Sharing in Multinational Firms*

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WAGES AND INTERNATIONAL RENT SHARING IN MULTINATIONALS FIRMS


**Abstract**

We use a unique firm-level panel data set of multinational parents and their foreign affiliates to analyze whether profits are shared across borders within multinational firms. Using both fixed-effects and generalized method-of-moments estimators, affiliate wage levels are estimated to respond to both affiliate and parent profitability. The elasticity of affiliate wages to parent profits per worker is approximately 0.03, which can explain over 20 percent of the observed variation in affiliate wages. These results reveal a previously ignored aspect of labor-market rent sharing. They also reveal an important micro-level linkage with potential macro-level implications. International rent sharing can transmit economic conditions across national borders, and can thereby provide an implicit cross-country risk-sharing mechanism.



**Key Words:** Wages, Profit Sharing, Multinational Firms
**JEL Codes:** F23, J30

## *1. Introduction*

The economic implications of increased globalization have been widely conjectured and researched. One prominent concern has been how foreign competition, trade protection, and foreign ownership affect the level and distribution of wages.[1] Largely overlooked, however, has been the issue of whether international linkages condition how firms share profits with their workers.

A large literature has found that economic rents are often shared with workers: profits and wages move together.[2] With the exception of Budd and Slaughter (2000), however, this rent-sharing literature has an explicitly domestic focus: industry, firm, or establishment wages in a specific country are regressed on profit measures for operations in that same country. Yet with increased globalization, this implicitly closed-economy perspective may miss important international aspects of wage setting.

Consider, for example, the United Auto Workers. This U.S. labor union agreed to major concessions in the early 1980s to help save the then-U.S.-owned Chrysler. More recently, however, the UAW has reportedly been unwilling to grant concessions because while the U.S. operation is struggling financially, its German parent Daimler-Chrysler is profitable.[3] As an

[1] Foreign ownership has been studied by Aitken, Harrison, and Lipsey (1996) and Feliciano and Lipsey (1999) trade protection by Gaston and Trefler (1995), and Haskel and Slaughter (2001); and foreign competition by Borjas and Ramey (1995), and Freeman and Katz (1991). These are representative examples, as the trade-and-wages literature has grown very large. Many representative studies can be found in the volumes of Abowd and Freeman (1991) and Feenstra (2000).

[2] Analyses of inter-industry wage differentials (e.g., Katz and Summers, 1989) revealed positive correlation between these differentials and industry profitability. A number of subsequent studies, whether using industry wages and profits (Blanchflower, Oswald, and Sanfey, 1996), union contract wages with company profits (Abowd and Lemieux, 1993; Currie and McConnell, 1992; Svejnar, 1986), union contract wages with industry profits (Christofides and Oswald, 1992; Budd and Slaughter, 2000), or company wages with company profits (Hildreth and Oswald, 1997), all find that wages depend on ability to pay.

[3] The December 18, 2000 issue of *Business Week* reported, "He's [Chrysler Group President Dieter Zetsche] not likely to get much of a hearing from UAW President Stephen P. Yokich. After winning the richest contract terms in years in 1999, union members have little reason to start giving money back. That's in part because, despite Chrysler's deepening problems--it's expected to lose some $1 billion in the fourth quarter--the German parent remains exceedingly profitable." More recently, a similar cross-border wage dispute has arisen in multinational steel producer Corus. The February 12, 2002 edition of *The Times* reported, "Corus, the Anglo-Dutch steel maker, could face industrial action in a clash with unions for imposing a pay freeze in the U.K. while increasing salaries of Dutch workers … A spokesman for the [British] union said, 'We all work for the same company, and we should all get the same deal.'"

example of international rent sharing as an explicit compensation strategy of multinational firms, in 1989 PepsiCo implemented a global employee stock ownership plan in which all employees worldwide were granted shares of stock equivalent to 10 percent of their pay. Numerous other companies have implemented similar strategies (Irwin, 1998). Lastly, Mexican law mandates cross-border profit-sharing: Mexican employees must receive 10 percent of the worldwide profits of their employer, not just of the employer's profits earned in Mexico (Meyers, 2000).

These examples all demonstrate how cross-border flows of capital, labor, goods, and information may exert strong influences on the nature of profit sharing between firms and workers. Budd and Slaughter (2000) consider whether wages in one country may depend on profit conditions outside of that country. Empirically, they found that union wage contracts in Canadian manufacturing industries depend not just on Canadian industry profits but also on U.S. industry profits—and also that the nature of this profit sharing depends on the nationality of the firm and union.

This paper builds on this theme of international rent sharing by examining whether profits are shared across borders within multinational firms. We do this using a rich firm-level panel data set on multinationals with parents and affiliates operating in Europe. This panel we assembled from the Amadeus Database, which reports detailed financial and operational data for both parents and affiliates in multinationals.[4] The panel spans 1993 through 1998, with a total of 865 parents and 1919 foreign affiliates. With this panel we can ask whether affiliate wages vary not just with affiliate profits but also with parent profits, and similarly whether parent wages vary not just with parent profits but also with affiliate profits.

[4] In other contexts, Budina, Garretsen, and de Jong (2000) and Konings, Van Cayseele, and Warzynski (2001) use this same data source. It is available from Bureau van Dijck Electronic Publishing.

Our main empirical finding is that parents share profits with majority-owned foreign affiliates. For affiliates owned at least 50 percent by the controlling parent, foreign-affiliate wages are correlated with parent profits per worker. This correlation is both statistically and economically significant, and appears across a range of specification and estimation choices addressing various measurement and endogeneity issues. The degree of multinational ownership appears to condition the degree of intra-firm profit sharing, with many specifications indicating parents share profits only with majority-owned affiliates, and even more strongly with fully-owned affiliates. Our central estimates indicate that a doubling of parent profitability raises affiliate wages by somewhere between 1 and 5 percent. Affiliate wages are also positively correlated with affiliate profits per worker, consistent with the closed-economy perspective of previous rent-sharing studies. The same is true of parent wages and parent profits per worker; however, we find no evidence that parent wages are correlated with affiliate profits per worker.

For a number of reasons, we consider this explicitly international focus on profit sharing to be an important innovation on earlier research. First, within the rent-sharing literature it broadens the understanding of how firms relate to workers. Budd and Slaughter's (2000) cross-border focus was limited to unionized wage negotiations in manufacturing for a single country using industry-level profit measures. Our panel extends their focus along many important dimensions—many parent and affiliate countries, firms in all industries, wages for all employees—and therefore takes a much broader look at the relevance of international profit sharing. The need to examine profit sharing in an international context is underscored by rising foreign direct investment, which has been a central aspect of globalization in recent years.

Indeed, it has been reported that by the end of our sample period, in Europe nearly 20 percent of all manufacturing employees worked in foreign-owned affiliates (Barba, et al, 2000).[5]

Second, our paper extends the research on globalization and labor markets. Many studies have found that establishments owned by multinational firms pay higher wages than do domestically owned establishments, even controlling for a wide range of worker and/or plant characteristics such as worker occupation and plant capital intensity.[6] This "multinational" wage premium is sometimes seen to be a puzzle. But if multinationals are, on average, more profitable than domestic firms, then international rent sharing with multinationals could explain this wage premium. Within the globalization-and-wages literature, other studies have examined whether multinationals alter the mix of activities within parent and host countries.[7] One point of contrast is that much of the empirical work in this literature has followed from the perfectly competitive Heckscher-Ohlin trade model in which all sectors earn zero profits and all workers earn their marginal revenue products. Our focus on profit sharing extends this literature to consider important non-competitive wage issues.[8]

Finally, our findings on international rent sharing carry implications for the international-macro literature on cross-country movements in macro aggregates. In international macro and real business cycle models, the standard mechanism by which national income shocks are transmitted and smoothed across countries is by trading risk in international capital markets (e.g.,

[5] UNCTAD (2000) reports that from 1979 to 1999, the ratio of world FDI stock to world gross domestic product rose from 5% to 16% and the ratio of world FDI inflows to global gross domestic capital formation rose from 2% to 14%. One consequence is that an increasing share of country's output is accounted for by foreign affiliates of multinational firms. The foreign-affiliate share of world production is now 15% in manufacturing and other tradables (Lipsey, Blomstrom, and Ramstetter, 1998).

[6] For example, Howenstine and Zeile (1994) and Doms and Jensen (1998) document these wage differentials among U.S. manufacturing plants. Globerman, Ries, and Vertinsky (1994) present similar evidence for Canada; Aitken et al. (1996) for Mexico and Venezuela.

[7] Examples here include Konings and Murphy (2001) and Slaughter (2000).

[8] Our non-competitive approach is closer to studies such as Borjas and Ramey (1995), who investigate whether import competition squeezes rents paid to U.S. less-skilled workers in imperfectly competitive industries, and Gaston and Trefler (1995), who examine the effect of U.S. tariffs on industry wage premia.

Stockman and Tesar, 1995). However, many researchers have documented that the extent of international asset diversification is less than the standard models predict (Lewis, 1999; Obstfeld and Rogoff, 2001). Our finding of international rent sharing in multinational firms provides a micro-level linkage, very different from risk sharing in international financial markets, which is an implicit risk-sharing mechanism that can also transmit economic conditions across countries.

The paper is organized as follows. Section 2 motivates the empirical analysis with a discussion of the underlying theory of profit sharing, with an extension to the multinational context. It then discusses our empirical framework. Section 3 presents a description of the data and Section 4 the empirical results. Section 5 concludes.

## *2. Theoretical Background and Empirical Framework*

### *Theoretical Background*

Baily (1974) and Azariadis (1975) developed implicit-contract models in which wages provide insurance against demand shocks for risk-averse workers (see Rosen, 1985 for a survey). Blanchflower et al. (1996) showed that if these models are generalized to allow firms to be risk averse, then wages will be positively correlated with profits. We extend this idea to multinational firms that, by definition, operate in multiple countries.

Consider a multinational firm that operates in a parent country p and an affiliate country a. Without loss of generality, assume that demand shocks $\tau$ have a distribution function $g(\tau)$ that affect both countries equally so that profits $\pi$ are defined as

$$\pi = \pi^p + \pi^a = \tau f(n^p) + \tau f(n^a) - w^p n^p - w^a n^a$$

where w denotes the wage, n is employment, $f(\cdot)$ is the production function, and superscripts indicate parent or affiliate. The firm maximizes over wages and employment utility function $v(\cdot)$:

$$\text{(1)} \qquad \text{maximize} \int v(\pi) g(\tau) \partial\tau$$

subject to satisfying the minimum-utility constraints of its employees:

$$(2) \qquad \int [n^p u(w^p) + (1-n^p)u(b^p)]g(\tau)\partial\tau \geq \underline{u}^p$$

$$(3) \qquad \int [n^a u(w^a) + (1-n^a)u(b^a)]g(\tau)\partial\tau \geq \underline{u}^a$$

where u(·) is the workers' utility function, b is some exogenous alternative (such as an unemployment benefit), and $\underline{u}$ is a minimum utility level.

To see cross-border profit sharing within this multinational firm, consider affiliate wages. The first-order condition derived from differentiating equation (1) with respect to $w^a$ is:

$$(4) \qquad -v'(\pi^p + \pi^a) + \lambda^a u'(w^a) = 0$$

where $\lambda^a$ is the Lagrange multiplier for equation (3) in the constrained maximization problem. Ignoring corner solutions, equation (4) implies that $\lambda^a > 0$ and defines an implicit wage function for the affiliate wage.[9]

Differentiating (4) with respect to $\pi^p$ yields:

$$(5) \qquad \frac{\partial w^a}{\partial \pi^p} = \frac{v''(\pi^p + \pi^a)}{\lambda^a u''(w^a)} \quad .$$

If the firm is risk neutral, then this derivative equals zero and wages do not respond to firm profitability. But if both firms and workers are risk averse, then both v(·) and u(·) are concave and the derivative in equation (5) is positive: affiliate wages respond to parent profits as a form of risk sharing.[10] By similar logic, it can be shown that parent wages can vary with affiliate

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[9] In this simple form, the model does not prevent a corner solution in which the firm chooses to conduct all of its production in the country with the lower minimum utility level. We believe it is reasonable to consider the interior-solution cases with production in both countries. These cases can result from plausible reasons including sunk fixed capital investment in each country, a desire to maintain entry to multiple markets, or access to materials and other primary factors. These cases also accord with the data set for our empirical analysis.

[10] Greenwald and Stiglitz (1993) support the plausibility of risk averse firms; see also Dufey and Srinivasulu (1983). Examples of models with risk averse firms include Hart (1983) for implicit contracts and Goldberg and Kolstad (1995) for multinational production decisions.

profitability. Thus, within multinational firms cross-border rent sharing can stem from implicit contracts between risk-averse firms and workers.[11]

Profit sharing is also predicted by other models. One is union bargaining over the firm's economic rents. Bargaining over parent as well as affiliate profits by unions representing affiliate employees is a straightforward extension in a Nash bargaining framework (Budd and Slaughter, 2000). Alternatively, employee bargaining power need not stem from unionization: in Lindbeck and Snower's (1988) insider-outsider model, current employees (insiders) derive the power to extract economic rents from the employer via their ability to not cooperate with new employees if they are hired at a lower wage. This framework can yield international rent sharing if insiders at an affiliate use their power to extract parent as well as affiliate profits. Finally, international rent sharing can also result from models of fairness in which not sharing parent profits is perceived to be somehow unjust, or from models of corporate strategy in which multinationals share parent profits with affiliate workers to generate positive goodwill, or even prevent government seizure, in the affiliate country.

*Empirical Framework*

Equation (5), or similar predictions from these other models, suggests the following regression equation for empirical analysis using panel data on affiliate wages:

$$\text{(6)} \qquad w_{at} = \beta_1 \frac{\pi_{at}}{n_{at}} + \beta_2 \frac{\pi_{pt}}{n_{pt}} + \beta_3 Z_{at} + \varepsilon_{at}$$

[11] This result, of course, depends on the firm's utility function $v(\pi^p, \pi^a)$ being a non-separable function of both $\pi^p$ and $\pi^a$. If the firm is risk averse but $v(\pi^p, \pi^a)$ is separable, then the model predicts domestic but not international rent sharing. Also, the assumption that the demand shock $\tau$ equally affects domestic and foreign production is simply to keep the model straightforward. The key prediction of interest in equation (5) stems from $v(\pi^p, \pi^a)$, not the functional form of $\tau$.

where subscripts a, p, and t index affiliates, parents, and time t; w is wages; $\pi$ is profits; n is employment; Z is a set of other regressors that can vary by affiliate, time, country, and/or industry; $\varepsilon$ is an error term we discuss below; and $\beta$s are parameters to be estimated. Our innovation is to consider the role of profitability outside the country where wages are paid; that is, we are interested in estimating not just $\beta_1$ but in particular $\beta_2$ as well. Equation (6) forms the basis of our empirical analysis, with an analogous equation for parent wages. We next address some important specification, measurement, and endogeneity issues.

Important specification issues include how to indicate profitability and what controls to include as $Z_{at}$ regressors. It is standard in the rent-sharing literature to normalize profitability in per-worker terms, a method which we follow here. In Z we include a full set of unobservable affiliate fixed effects, $\alpha_a$. These account for unobserved time-invariant affiliate heterogeneity that influences wages: worker quality, firm technology, or outside wage options. We also include a full set of time effects, $\eta_t$. These account for unobserved heterogeneity over time common to all affiliates, such as skill-biased technological change. In $Z_{at}$ we also experiment with affiliate-time varying measures of capital stock per worker and R&D expenditures per worker, as directly observable wage controls. We also try a full set of country-year effects, to account for national influences such as unemployment rates and benefits, and of industry-year effects, to account for industry influences such as bargaining institutions. Our baseline estimates will be for equation (6) using a standard fixed-effects estimator.

There may be issues of endogeneity and measurement that stem from the use of contemporaneous profits in equation (6). If wage outcomes affect profitability, then the use of current-period wages and profits can bias estimates in the fixed-effects regression. In terms of measurement, as discussed below, affiliate wages and affiliate profits are constructed using some of the same quantities such as total wage bill and employment. Measurement error in these quantities can introduce spurious correlation between the dependent and independent variables in (6). Note, however, that we are particularly interested in the relationship between affiliate wages and parent profits. These two quantities are constructed independently. Thus, while affiliate wages and affiliate profits may be affected by measurement error, this is not the case for affiliate wages and parent profits. Accordingly, there is less reason to expect spurious correlation between affiliate wages and parent profits because of measurement issues.[12]

To address these potential endogeneity and measurement issues, consider a first-differenced version of equation (6):

$$(7) \qquad \Delta w_{at} = \beta_1 \Delta\left(\frac{\pi^a_{at}}{n_{at}}\right) + \beta_2 \Delta\left(\frac{\pi_{pt}}{n_{pt}}\right) + \beta_3 \Delta Z_{at} + \Delta\varepsilon_{at}$$

First-differencing controls for affiliate fixed effects $\alpha_a$, and if there is no serial correlation then lagged profits are not correlated with the differenced error term and are therefore valid instruments for current profits. Lack of serial correlation provides a moment restriction, so that equation (7) can be estimated using generalized method of moments (GMM) (Arellano and Bond, 1991). Relative to conventional instrumental variables estimators, this moment restriction provides additional instruments so this GMM estimator is more efficient (Arellano and Bond, 1991). For example, for 1998 profits in equation (7), valid instruments are the level of profits in 1996 and earlier years, since lagged profit levels are not correlated with the differenced error term between 1997 and 1998. As the panel progresses an increasing number of instruments can be used, which increases the efficiency of the estimates.

[12] This is an important measurement difference between our estimation and the domestic rent-sharing literature.

To test the validity of these instruments we use a Sargan test of overidentifying restrictions, which asymptotically has a $\chi^2$ distribution. Because the model is estimated in first differences, the equation will be characterized by the presence of first-order serial correlation. But the validity of the GMM estimator relies on the moment restriction stemming from the absence of second-order serial correlation. It is therefore important to test for second-order serial correlation, and we report Arellano and Bond's (1991) test which asymptotically has a N(0,1) distribution. Since the model is estimated in first differences and since lagged values (dated at least t-2 and before) of the endogenous variables are used, we need to observe affiliates for at least 3 consecutive time periods. In the empirical results, then, our sample sizes are smaller when we estimate equation (7) via GMM than when we estimate equation (6) as a standard fixed-effects regression.

*3. Data Description and Sample Statistics*

Our data are derived from a commercial database collected by Bureau van Dijck, a software and consulting company, marketed under the name of Amadeus. The database consists of company accounts reported to national statistical offices for European companies for which at least one of the following criteria is satisfied: total turnover or assets of at least $12 million, or total employment of at least 150. The database is organized by country with records for firms within each country. The company records include information on whether the company has an ownership stake in a foreign affiliate, and identify affiliates by name and a unique identification number. It is therefore possible to determine if a firm operates as part of a multinational group and to link parent firms to foreign affiliates anywhere in Europe via the unique identifiers.

Financial and operational information is available for 1993 through 1998, and we retrieve all companies for which unconsolidated accounts were available separately for the parent and its affiliates. Due to variation in national reporting requirements, all companies in some countries—in particular Great Britain, Greece, and Finland—lack basic information (e.g., wage bills) that are essential for our analysis. Otherwise, we include companies in the data set simply on the basis of data availability and the ability to link parents with foreign affiliates. Companies in all industries are included, with primary industry for each parent and affiliate reported at the two-digit level of the NACE system.

The available ownership information refers to the year 1998, and we assume that the parent-affiliate ownership structure for 1998 applies to the earlier years. While we cannot follow ownership changes during the sample period, we do not believe that this is a serious problem. To the extent that we are potentially including a few affiliates who were not affiliated in earlier years, we are introducing measurement error that may bias our results towards zero.

Matching parent companies to foreign affiliates yields an unbalanced panel of 865 parents and 1,919 affiliates over six years. Table 1 shows the country distribution of parents and affiliates in our panel, where each parent has an average of 2.2 affiliates. The parents are concentrated in Western Europe with significant numbers in France, Germany, Italy, and Belgium. Smaller numbers of parent firms locate in Austria, Luxembourg, the Netherlands, Portugal, and Spain. Affiliates are found in these countries as well as the Eastern and Central European countries of Bulgaria, the Czech Republic, Hungary, Poland, and Romania. The pattern of location of parents and affiliates looks broadly consistent with multinational investment patterns that respond to labor costs. For example, high-wage Germany has relatively few affiliates whereas low-wage Spain has a significant number of affiliates.

Summary statistics for the data are presented in Table 2. There are 5,758 affiliate-year observations, which represents the 1,919 affiliates appearing in the panel an average of about three times each. The key variables in Table 2 are wages and profits. Again, with the unconsolidated accounts in Amadeus we can calculate wages and profits separately for parents and affiliates. Wages are constructed as the reported wage bill divided by total number of employees, which is standard for corporate data in the profit-sharing literature (e.g., Hildreth and Oswald, 1997). The wage bill includes wage and salary payments to employees as well as mandated employer contributions to government social-insurance funds. As discussed below, we also try log-level wages. Profits are constructed as value added (i.e., sales minus materials costs) minus the wage bill, all divided by total employment. This profit measure follows that of several other studies (e.g., Blanchflower et al., 1996), and corresponds to the economic concept of rents available for sharing with workers. We constructed the capital-to-labor ratio as reported capital stock divided by employment, and constructed R&D intensity as reported R&D expenditures divided by employment. All monetary measures are reported in Amadeus in home currencies; we converted to dollars using International Monetary Fund annual exchange rates.

The average wage for affiliates is $46,367 and for parents is $55,868. Unfortunately, Amadeus reports no skill indicators (e.g., occupation or educational attainment). But this average-wage difference accords with standard trade models of multinational firms in which parents concentrate on skill-intensive production of firm-wide knowledge assets (e.g., Carr, Markusen, and Maskus, 2001). Per-employee profits are higher, on average, in the affiliates than in their parents. Note that wages exhibit significantly less variability than profits. The standard deviations for wages are only 30 to 40 percent of the mean, whereas the standard deviations for profits are 2.8 to 4.4 times greater than the mean. Moreover, both wages and profits are more variable in the affiliates than in their parents. The correlation between parent and affiliate wages is 0.25 while the correlation between parent and affiliate profits is 0.05. The higher wage correlation than profit correlation is suggestive of cross-border rent sharing.

Over 90 percent of the observations involve affiliates that are majority-owned by the parents, and 32 percent are fully-owned.[13] The last four rows of Table 2 reveal that parents are, unsurprisingly, much larger than affiliates both in terms of sales and employment. Also, as the Amadeus data are limited to medium and large firms, average affiliate employment is 382.

*4. Estimation Results for Fixed-Effects and GMM Estimates*

Table 3 reports our initial fixed-effects estimates of equation (6), where in this table $Z_{at}$ includes a full set of affiliate and year fixed effects, $\alpha_a$ and $\eta_t$. As discussed earlier, these control for many time-constant determinants of wages (e.g., worker quality) and for time effects (e.g., technological change), respectively. In all estimation tables, each column reports for each regressor a coefficient estimate and its robust standard error that accounts for cases where multiple affiliates share the same parent. For the profits regressors, we also report the implied wage-profits elasticity.

Column 1 reports results for the full sample. The standard closed-economy rent-sharing result is evident: affiliate profits are positively correlated with affiliate wages, significantly so with a very low p-value. The implied elasticity is 0.0087. The coefficient on parent profits is positive, but is imprecisely estimated and so offers little support for international rent sharing.

The specification in column 1, however, pools both minority and majority-owned affiliates. It seems reasonable to expect international rent sharing to be stronger for majority and fully-owned affiliates. In our Section 2 discussion of within-firm cross-border risk sharing, parents

[13] There are a large number of missing values for the ownership shares in Amadeus. For U.S.-headquartered multinationals in recent years, approximately 80 percent of affiliates are majority-owned, so in our data we assume that an affiliate is majority-owned if its ownership share is missing. The results are robust to excluding these observations from the majority-owned

with only a minority ownership stake may play a negligible role in the multinational firm being considered. Alternatively, it may be that only the majority-owning parent engages in bargaining with affiliate workers. In this case the profitability of minority-owning parents may be irrelevant. Or in situations of fairness, in firms with multiple minority owners the identity of these minority parents may simply be unknown to affiliate workers during wage discussions. For all these reasons, it seems plausible to expect any profit sharing from parents to affiliates to be stronger the higher is the ownership stake in the affiliate.

Column 2 reports fixed-effects results of restricting the sample to only majority-owned affiliates (which includes those fully owned). The affiliate-profit coefficient is virtually unchanged, but there is now strong statistical support for international rent sharing within multinational firms. The parent-profit coefficient is 0.0033, with a t-statistic of 2.71 and a p-value of 0.007. The implied elasticity is 0.0073.

Evidence of both standard within-country rent sharing and international rent sharing is even stronger in column 3, in which the sample is further restricted to only fully-owned affiliates. Despite a 65 percent reduction in the sample size relative to column 1, both the affiliate and parent profits estimates are now larger and more precisely estimated. The elasticities in columns 2 and 3 are also within the range generally found in the literature on domestic rent-sharing, between 0.006 (Christofides and Oswald, 1992) to about 0.05 (Blanchflower et al., 1996).

Table 3 shows evidence that parent profits are shared across borders with majority-owned affiliates, and that this profit sharing may be even stronger among fully-owned affiliates. Two concerns about these results, however, may be the lack of additional controls and any

analysis. We define fully-owned affiliates as those owned at least 99 percent owned by the parent; this definition does not include affiliates with missing ownership-share information.

endogeneity or measurement issues stemming from the use of contemporaneous profits. These two important issues are addressed in Tables 4 and 5.

Table 4 reports results of repeating the analyses of Table 3 but expanding the $Z_{at}$ controls from just affiliate and time effects to also include affiliate capital intensity, affiliate R&D intensity, and country-year effects. The qualitative pattern of profit sharing is the same, although the statistical significance of the international rent sharing effect becomes more marginal.

Of greater concern than the specific set of controls may be issues of endogeneity and measurement related to the use of contemporaneous profits. As discussed in Section 2, to account for endogeneity and measurement error, we use a generalized method of moments (GMM) estimator that instruments for current-period profits using lagged values of profits, all on time-differenced data to capture affiliate effects $\alpha_a$.

Column 1 of Table 5 reports GMM results estimating equation (7) for majority-owned affiliates. This sample is narrowed further to only fully-owned affiliates in column 2. These GMM estimates provide strong support for our international rent-sharing hypothesis. In both columns, parent rent sharing is evident and statistically significant at the five-percent level. The implied elasticities are also larger than in the previous fixed-effects estimates, with the fully-owned elasticity slightly larger than the majority-owned elasticity. The Sargan test of overidentification indicates that the instruments are valid, while the serial-correlation test fails to reject the hypothesis of no second order serial correlation. These tests indicate that GMM estimation is appropriate.

Columns 3 through 6 of Table 5 add to equation (7) the additional $Z_{at}$ regressors of affiliate capital intensity, affiliate R&D intensity, and either industry-year or country-year effects.[14] Because these specifications include the largest set of controls and also instruments for profits, they are our preferred specifications. The international rent sharing result is again evident at standard significance levels. The elasticities indicate that a ten-percent increase in parent profitability increases affiliate wages by between 0.3 and 0.5 percent.

We checked the robustness of our findings in Tables 3 through 5 to a number of measurement and specification issues. One is the functional form for wages. We have measured wages in levels, but much of the domestic rent-sharing literature uses log wages. We use wage levels because the theoretical motivation in Section 2 does not necessarily imply that log wages are related to profits, and also because the wage distribution in our data appears more normal than log-normal (unlike the distribution of wages across people in individual-level data sets). Nevertheless, given the prevalence of log-wage analyses in the previous literature, Appendix Table 1 reports fixed-effects and GMM estimates in which the dependent variable is the log wage. The pattern of results is unchanged, with statistically significant estimates (marginally so in column 1) and with implied elasticities in the same range as in Tables 3 through 5. Because of the distribution of wages in our data, we prefer our wage-levels specifications but note that results are consistent in log-wage specifications.

Another important consideration is whether parent and industry profits are sufficiently independent to allow identification of separate wage effects of each. This may be of particular concern for parents and affiliates classified in the same primary industry. To account for this possibility, we repeated our analyses on a sub-sample that excluded any affiliate observation

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[14] GMM estimation failed when using the full set of two-digit industries reported in the data. Accordingly, we aggregated up to 19 industries, a grouping that lies between the one-digit and two-digit NACE classifications.

whose primary industry was the same as that of its parent. Appendix Table 2 reports fixed-effects and GMM estimates on this sub-sample. The results are qualitatively unchanged from Tables 3 and 5, with statistically significant estimates and with implied elasticities in the same range as before. If anything, on balance the parent-affiliate elasticity now looks larger.

We also performed a number of other robustness checks that, for brevity, have not been reported. One was how we measured profits. As discussed earlier, our profit measure follows that of several other studies, and corresponds to the economic concept of rents available for sharing with workers. In the underlying Amadeus data, firms in some countries report accounting measures of gross profits. These may vary across countries with differences in national accounting standards, or with any transfer-pricing considerations for firms.[15] The sample correlation between our profit measure and this accounting measure was over 0.9, and our estimation results were robust to using this alternative.

Another check we tried was to use lagged rather than contemporaneous profit measures in our fixed-effects estimates. Many rent-sharing studies use lagged profit measures to control at least partially for endogeneity concerns. We prefer our GMM estimation to address endogeneity, but we still tried fixed-effects estimates using profit measures lagged one year. We obtained results qualitatively identical to those reported here.

A final check was to interact profit measures with geographic distance between the parent and affiliate countries, and also with a dummy variable indicating adjacency of parent and affiliate countries. It might be the case that the extent to which multinationals share profits

[15] Transfer pricing is the practice whereby multinationals can manipulate reported profits of parents and affiliates by choosing the prices used to record intra-firm transfers of, e.g., intellectual property. Many countries' tax laws explicitly try to minimize this practice, but to the extent that it occurs then measured parent and affiliate profits may differ from true parent and affiliate profits. Our constructed profit measure may be less prone to transfer-pricing concerns than are accounting profits, but it may still contain transfer-pricing issues, e.g., if firms manipulate intra-firm input prices. That said, we think this practice may bias us away from finding our link of interest between parent profits and affiliate wages. If positive shocks to affiliate wages lower true

internally depends on information flows, for which physical location might be a proxy. We found no substantial variation in profit sharing from distance and/or adjacency.

Having established parent-to-affiliate rent sharing, we next reverse focus to look for evidence of affiliate-to-parent rent sharing. As discussed in Section 2, in principle the international aspects of wage setting could be symmetrical. Just as affiliate workers might risk-share over parent profitability, so, too, might parent workers risk-share over affiliate profitability.

To look for covariation in parent wages and affiliate profits, we reconfigure our panel from affiliate-year observations to parent-year observations. In this reconfigured panel, each parent in each year can have any number of foreign affiliates. One way to treat this multi-affiliate aspect of our data would be to treat each parent-affiliate-year combination as a separate observation. An alternative would be to average the profitability of all affiliates for each parent-year observation. We tried both methods and obtained qualitatively similar results either way. For brevity, we report results for just the latter approach, where profits per worker across all affiliates are averaged using affiliate sales as weights. Given the suggestive evidence in earlier tables that parents share profits more strongly with affiliates the larger the ownership stake, we also tried averaging affiliate profitability using only majority-owned and then only fully owned affiliates.

Table 6 reports some baseline fixed-effects estimates of equation (6) for parent wages on both parent and affiliate profits per worker. As indicated, each column uses a different set of affiliates for each parent-year observation for constructing affiliate profitability. The standard domestic rent-sharing result is evident in the significantly positive correlation between parent profitability and parent wages, with the implied wage-profits elasticity of about 0.01 or 0.02. However, Table 6 shows no evidence of international rent sharing: the coefficient estimates on

affiliate profits, then multinationals may have more scope to transfer true parent profits to the affiliate. This will tend to lower measured parent profits, and thus impart a negative correlation between affiliate wages and measured parent profits.

affiliate profitability are all close to zero with low t-statistics. We obtained very similar results for specifications (not reported for brevity) that added additional regressors, as in Table 4, or that treated all parent-affiliate-year observations separately, as described above.

Issues of endogeneity may be obscuring some link between affiliate profits and parent wages. To test this we re-estimated the specifications of Table 6 using GMM estimation techniques as in equation (7). As with our earlier GMM estimates, we instrument for parent and affiliate profits using their lagged values and other regressors. Table 7 reports these GMM estimates for calculations of affiliate profits using all affiliates and just majority-owned affiliates (similar calculations using just fully owned affiliates yielded less-reliable GMM estimates due to the reduced number of observations, and thus are not reported). The diagnostics of the Sargan and serial-correlation tests indicate these GMM equations are well specified. But as in Table 6, here there is no significant correlation between parent wages and affiliate profitability.

Based on the results in Tables 6 and 7, we find no evidence that affiliate profits are shared with parent workers. This lack of profit sharing from affiliates to parent workers may reflect a number of issues. For example, if affiliates are quite small relative to parents, and/or are minority owned and thus perhaps not known, then wage setting in parents may simply ignore affiliate activity. We consider this to be an area for future research.

*5. Conclusions*

The large literature on profit sharing is almost exclusively focused within single countries. Against a backdrop of increased globalization, in this paper we extend Budd and Slaughter's (2000) international rent sharing idea to multinational firms. Budd and Slaughter's (2000) relatively limited data can examine only international rent sharing between the United States and Canada in unionized manufacturing firms using industry-level profits. In the present paper, we construct and examine a unique firm-level panel to examine whether profits are shared across borders within multinational firms for a much wider array of industries and countries.

Our central finding is a positive, statistically significant relationship between parent profits per worker and foreign wages in majority and fully-owned affiliates. This relationship is robust to a number of specification and estimation choices, including using GMM estimation to address possible endogeneity and measurement issues. Our estimates of the profit elasticity of wages vary between about 0.01 and 0.05, which falls in the range estimated by the domestic profit sharing literature. If we take our average elasticity to be 0.03, then Lester's (1952) range of wages calculation implies that the cross-section variability of parent profits explains about one-fifth of the cross-section variability in affiliate wages.[16]

Our results are an important addition to the literature on rent sharing. But equally importantly, our results document important effects of globalization on local economic outcomes. This carries important implications for both policy and theory, and underscores the increasingly global nature of labor markets. For example, international rent sharing may help explain why multinational affiliates tend to pay higher wages than do purely domestic firms.

Finally, we believe our findings are relevant for the international macro literature on real business cycles and correlated international movements in macro aggregates. This literature has focused on the transmission of national income shocks through explicit risk sharing in international capital markets. Our findings suggest an additional linkage – international profit sharing between parents and affiliates in multinational firms – that can transmit economic conditions across national borders. In the labor literature, one standard explanation for rent

[16] For Lester's (1952) range-of-wages calculation, we follow Blanchflower et al. (1996) and Hildreth and Oswald (1997). Assuming a distribution of profits that is four standard deviations wide, then the range of parent profits is roughly 1200 (four times 307.223 from Table 2), or, relative to the mean of 108.203, a factor of 12 times the mean. Multiplying 12 times the elasticity of 0.03 yields a range of 36 percent of the mean wage stemming from international rent sharing. The mean and

sharing in a domestic context is implicit risk sharing between firms and workers. Our findings suggest that risk sharing across countries can also occur implicitly through multinational firms.

In our data, the average within-firm standard deviation of parent profits is 34.5. Within-firm profits therefore vary year to year by an average of 30 percent. Our central wage-parent profits elasticity of 0.03 then implies that average year-to-year variation in parent profits causes affiliate wages to vary by nearly one percent each year. Considering that average annual wage growth is often less than five percent, a one-percent change that stems solely from variability in parent profitability in a foreign country is striking. This back-of-the-envelope calculation suggests that international rent sharing is sufficiently strong for its implications to extend beyond understanding individual wage outcomes. Future work in labor economics, international economics, and macroeconomics might benefit from incorporating this phenomenon.

standard deviation of affiliate wages implies that the range of wages is approximately 1.6 times the mean, which implies that profit variability can explain (0.36/1.6), or about 20 percent, of the variability in wages.

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Table 1
Country Distribution of Parents and Affiliates

| | Affiliates (1) | Parents (2) |
|---|---|---|
| Austria | 60 | 16 |
| Belgium | 208 | 148 |
| Bulgaria | 5 | 0 |
| Czech Republic | 4 | 0 |
| France | 592 | 271 |
| Germany | 64 | 215 |
| Hungary | 17 | 0 |
| Italy | 284 | 155 |
| Luxembourg | 24 | 3 |
| Netherlands | 21 | 5 |
| Poland | 33 | 0 |
| Portugal | 64 | 2 |
| Romania | 33 | 0 |
| Spain | 510 | 50 |
| Total | 1,919 | 865 |

*Notes*: Sample of European multinational parents and affiliates, 1993 through 1998, taken from Amadeus Database. See text for details.

Table 2
Multinational Parents and Affiliates: Summary Statistics

| Variable | Mean<br>(1) | Standard Deviation<br>(2) |
|---|---|---|
| Average Wage, Affiliates<br>[= wage bill ÷ employment] | 46.367 | 18.439 |
| Average Wage, Parents<br>[= wage bill ÷ employment] | 55.868 | 16.710 |
| Profits per Employee, Affiliates<br>[= (sales – materials cost - wage bill) ÷ employment] | 126.471 | 553.324 |
| Profits per Employee, Parents<br>[= (sales – materials cost - wage bill) ÷ employment] | 108.203 | 307.223 |
| Indicator of Majority-Owned Affiliate | 0.919 | 0.272 |
| Indicator of Fully-Owned Affiliate | 0.322 | 0.467 |
| Capital-Labor Ratio, Affiliates<br>[= capital stock bill ÷ employment] | 64.113 | 450.507 |
| R&D Intensity, Affiliates<br>[= R&D expenditures ÷ employment] | 8.067 | 50.622 |
| Sales, Affiliates | 110,826.2 | 432,223.5 |
| Sales, Parents | 1,376,961 | 3,379,460 |
| Employment, Affiliates | 382.868 | 1701.407 |
| Employment, Parents | 4,411.355 | 8,323.11 |

*Notes*: Summary statistics are calculated for the sample of 5758 affiliates used in the first regression of Table 3. These cover all affiliates with sufficient data for the full six years of the sample, 1993 through 1998. All monetary variables are denominated in thousands of U.S. dollars. Employment is number of bodies. The two indicator variables are categorical variables coded 1 if the ownership criterion is met and 0 otherwise. See text for details.

Table 3
Profit Sharing With Affiliate Wages
Fixed-Effects Estimates

| Sample of Affiliates | All Affiliates (1) | Majority-Owned Affiliates (2) | Fully-Owned Affiliates (3) |
|---|---|---|---|
| Affiliate Profits | 0.0032 | 0.0031 | 0.0138 |
| | (0.0008) | (0.0008) | (0.0023) |
| Implied Wage-Profit Elasticity | [0.0087] | [0.0085] | [0.0310] |
| Parent Profits | 0.0011 | 0.0033 | 0.0060 |
| | (0.0010) | (0.0012) | (0.0020) |
| Implied Wage-Profit Elasticity | [0.0027] | [0.0073] | [0.0124] |
| Year Effects | Yes | Yes | Yes |
| No. Observations | 5758 | 5296 | 1852 |
| No. Affiliates | 1919 | 1760 | 582 |
| R-Squared Within | 0.15 | 0.15 | 0.20 |
| R-Squared Between | 0.01 | 0.01 | 0.05 |

*Notes*: These are estimation results for equation (6) in the text. Dependent variable is affiliate average wage. Robust standard errors are reported in parentheses under coefficient estimates. The sub-sample of majority-owned affiliates consists of those affiliates in which the parent firm maintains at least a 50% controlling interest. The sub-sample of fully-owned affiliates further narrows the majority-owned sub-sample to consist of those affiliates in which the parent firm maintains at least a 99% controlling interest. See text for details.

## Table 4
## Profit Sharing With Affiliate Wages
## Fixed-Effects Estimates

| Sample of Affiliates | All Affiliates (1) | Majority-Owned Affiliates (2) | Fully-Owned Affiliates (3) |
|---|---|---|---|
| Affiliate Profits | 0.0031 | 0.0030 | 0.0127 |
| | (0.0008) | (0.0008) | (0.0024) |
| Implied Wage-Profit Elasticity | [0.0083] | [0.0082] | [0.0291] |
| Parent Profits | 0.0003 | 0.0023 | 0.0032 |
| | (0.0011) | (0.0013) | (0.0020) |
| Implied Wage-Profit Elasticity | [0.0007] | [0.0048] | [0.0066] |
| Affiliate Capital Intensity | -0.0005 | -0.0005 | 0.0379 |
| | (0.0003) | (0.0003) | (0.0067) |
| Affiliate R&D Intensity | 0.0039 | 0.0037 | 0.0231 |
| | (0.0060) | (0.0063) | (0.0118) |
| Year-Country Effects | Yes | Yes | Yes |
| No. Observations | 5243 | 4828 | 1774 |
| No. Affiliates | 1703 | 1561 | 545 |
| R-Squared Within | 0.19 | 0.18 | 0.26 |
| R-Squared Between | 0.02 | 0.02 | 0.03 |

*Notes*: These are estimation results for equation (6) in the text. Dependent variable is affiliate average wage. Robust standard errors are reported in parentheses under coefficient estimates. The sub-sample of majority-owned affiliates consists of those affiliates in which the parent firm maintains at least a 50% controlling interest. The sub-sample of fully-owned affiliates further narrows the majority-owned sub-sample to consist of those affiliates in which the parent firm maintains at least a 99% controlling interest. See text for details.

Table 5
Profit Sharing With Affiliate Wages
GMM Estimates

| Sample of Affiliates | Majority-Owned Affiliates (1) | Fully-Owned Affiliates (2) | Majority-Owned Affiliates (3) | Fully-Owned Affiliates (4) | Majority-Owned Affiliates (5) | Fully-Owned Affiliates (6) |
|---|---|---|---|---|---|---|
| Affiliate Profits | 0.0173 | 0.0202 | 0.0125 | 0.0303 | 0.0164 | 0.0246 |
| | (0.0086) | (0.0093) | (0.0086) | (0.0126) | (0.0089) | (0.0100) |
| Implied Wage-Profit Elasticity | [0.0404] | [0.0464] | [0.0291] | [0.0696] | [0.0382] | [0.0565] |
| Parent Profits | 0.0168 | 0.0187 | 0.0148 | 0.0180 | 0.0238 | 0.0228 |
| | (0.0085) | (0.0048) | (0.0072) | (0.0045) | (0.0107) | (0.0048) |
| Implied Wage-Profit Elasticity | [0.0352] | [0.0407] | [0.0310] | [0.0392] | [0.0498] | [0.0497] |
| Affiliate Capital Intensity | | | 0.0006 | 0.0513 | 0.0006 | 0.0546 |
| | | | (0.0005) | (0.0189) | (0.0006) | (0.0153) |
| Affiliate R&D Intensity | | | -0.0071 | 0.0105 | -0.0151 | 0.0084 |
| | | | (0.0153) | (0.0091) | (0.0163) | (0.0098) |
| Additional Controls | Year | Year | Year-Industry | Year-Industry | Year-Country | Year-Country |
| No. Observations | 2971 | 1134 | 2939 | 1112 | 2971 | 1134 |
| No. Affiliates | 1007 | 379 | 996 | 371 | 1007 | 379 |
| Sargan Test Statistic (dof = 10) | 12.44 | 18.42 | 14.62 | 18.73 | 12.99 | 16.72 |
| Serial-Correlation Test Statistic | -1.156 | -1.668 | -0.874 | -1.254 | -1.395 | -1.378 |

*Notes*: These are estimation results for equation (7) in the text. Dependent variable is affiliate average wage. Standard errors are reported in parentheses under coefficient estimates. The sub-sample of majority-owned affiliates consists of those affiliates in which the parent firm maintains at least a 50% controlling interest. The sub-sample of fully-owned affiliates further narrows the majority-owned sub-sample to consist of those affiliates in which the parent firm maintains at least a 99% controlling interest.

Table 6
Profit Sharing With Parent Wages
Fixed-Effects Estimates

| Sample of Affiliates | All Affiliates (1) | Majority-Owned Affiliates (2) | Fully-Owned Affiliates (3) |
|---|---|---|---|
| Affiliate Profits | 0.0002 | 0.0002 | -0.0019 |
| | (0.0006) | (0.0006) | (0.0034) |
| Implied Wage-Profit Elasticity | [0.0006] | [0.0006] | [-0.0041] |
| Parent Profits | 0.0091 | 0.0107 | 0.0044 |
| | (0.0015) | (0.0018) | (0.0022) |
| Implied Wage-Profit Elasticity | [0.0189] | [0.0206] | [0.0083] |
| Year Effects | Yes | Yes | Yes |
| No. Observations | 2618 | 2340 | 1233 |
| No. Parents | 825 | 736 | 389 |
| R-Squared Within | 0.17 | 0.17 | 0.17 |
| R-Squared Between | 0.02 | 0.02 | 0.01 |

*Notes*: These are estimation results for equation (6) in the text. Dependent variable is parent average wage. Robust standard errors are reported in parentheses under coefficient estimates. The sub-sample of majority-owned affiliates consists of those affiliates in which the parent firm maintains at least a 50% controlling interest. The sub-sample of fully-owned affiliates consists of those affiliates in which the parent firm maintains at least a 99% controlling interest. See text for details.

Table 7
Profit Sharing With Parent Wages
GMM Estimates

| Sample of Affiliates | All Affiliates (1) | Majority-Owned Affiliates (2) |
|---|---|---|
| Affiliate Profits | -0.0004 | -0.0014 |
| | (0.0003) | (0.0016) |
| Implied Wage-Profit Elasticity | [-0.0006] | [-0.0010] |
| Parent Profits | 0.0084 | 0.0113 |
| | (0.0041) | (0.0073) |
| Implied Wage-Profit Elasticity | [0.0168] | [0.0214] |
| Year Effects | Yes | Yes |
| No. Observations | 1822 | 1641 |
| No. Parents | 593 | 534 |
| Sargan Test Statistic (dof = 10/7) | 8.30 | 6.24 |
| Serial-Correlation Test Statistic | -1.171 | -0.969 |

*Notes*: These are estimation results for equation (7) in the text. Dependent variable is parent average wage. Standard errors are reported in parentheses under coefficient estimates. The sub-sample of majority-owned affiliates consists of those affiliates in which the parent firm maintains at least a 50% controlling interest. See text for details.

## Appendix Table 1
## Profit Sharing With Affiliate Wages in Logs
## Fixed Effects and GMM Estimates

| Sample of Affiliates | Majority-Owned Affiliates (1) | Fully-Owned Affiliates (2) | Majority-Owned Affiliates (3) | Fully-Owned Affiliates (4) |
|---|---|---|---|---|
| Affiliate Profits | 0.00007 | 0.00031 | 0.00051 | 0.00038 |
| | (0.00002) | (0.00005) | (0.00019) | (0.00018) |
| Implied Wage-Profit Elasticity | [0.0095] | [0.0347] | [0.0511] | [0.0414] |
| Parent Profits | 0.00006 | 0.00010 | 0.00037 | 0.00033 |
| | (0.00004) | (0.00005) | (0.00019) | (0.00010) |
| Implied Wage-Profit Elasticity | [0.0060] | [0.0103] | [0.0373] | [0.0360] |
| Year Effects | Yes | Yes | Yes | Yes |
| No. Observations | 5296 | 1852 | 2971 | 1134 |
| No. Affiliates | 1760 | 582 | 1007 | 379 |
| R-Squared Within | 0.07 | 0.16 | | |
| R-Squared Between | 0.01 | 0.03 | | |
| Sargan Test Statistic (dof = 10) | | | 11.70 | 16.88 |
| Serial-Correlation Test Statistic | | | -0.791 | -1.204 |

*Notes*: These are estimation results for equations (6) and (7) in the text. Dependent variable is log affiliate average wage. Standard errors are reported in parentheses under coefficient estimates.

## Appendix Table 2
## Profit Sharing With Affiliates and Parents in Different Industries
## Fixed Effects and GMM Estimates

| Sample of Affiliates | Majority-Owned Affiliates (1) | Fully-Owned Affiliates (2) | Majority-Owned Affiliates (3) | Fully-Owned Affiliates (4) |
|---|---|---|---|---|
| Affiliate Profits | 0.0023<br>(0.0008) | 0.0163<br>(0.0028) | 0.0168<br>(0.0066) | 0.0124<br>(0.0050) |
| Implied Wage-Profit Elasticity | [0.0064] | [0.0331] | [0.0392] | [0.0285] |
| Parent Profits | 0.0041<br>(0.0017) | 0.0175<br>(0.0031) | 0.0122<br>(0.0055) | 0.0219<br>(0.0054) |
| Implied Wage-Profit Elasticity | [0.0085] | [0.0325] | [0.0256] | [0.0477] |
| Year Effects | Yes | Yes | Yes | Yes |
| No. Observations | 3711 | 1251 | 1643 | 722 |
| No. Affiliates | 1261 | 409 | 557 | 241 |
| R-Squared Within | 0.16 | 0.27 | | |
| R-Squared Between | 0.01 | 0.02 | | |
| Sargan Test Statistic (dof = 10) | | | 16.91 | 14.57 |
| Serial-Correlation Test Statistic | | | -1.123 | -0.508 |

*Notes*: These are estimation results for equations (6) and (7) in the text. Dependent variable is affiliate average wage. Standard errors are reported in parentheses under coefficient estimates. This sub-sample excludes any affiliate observation whose primary industry is the same as that of its parent. See text for details.

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