The Economic and Social Review, Vol. 33, No. 1, Spring, 2002, pp. 93-100

Why are Productivity and Wages Higher in Foreign Firms?*

SOURAFEL GIRMA
University of Nottingham
STEVE THOMPSON
University of Leicester
PETER W. WRIGHT**
CEPR and University of Nottingham

Abstract: This paper uses a panel data framework to examine whether foreign firms in the UK have higher levels of productivity and set higher wage rates than domestic ones *ceteris paribus*, or whether this is due to unmeasured characteristics. Its main finding is that foreign firms are more productive, by between 8 and 15 per cent, being particularly efficient in their use of capital. These advantages feed through into the wage levels of their employees, whose wages are higher as a result, effects that are particularly pronounced for firms from the United States.

I INTRODUCTION

It is a stylised fact of the multinational enterprise literature that, on average, foreign-owned companies outperform domestic firms (Dunning, 1989; Caves, 1996; Doms and Jensen, 1998). It is, furthermore, a proposition that is very widely accepted among policy makers and one that provides the major justification for national or regional industrial policy in countries, such as Ireland and the UK, respectively, that offer major incentives to secure foreign direct investment. However, there remains a strand within the FDI

*An earlier and more extensive version of this paper ("The Productivity and Wage Effects of Foreign Acquisition in the UK", available from the authors) was presented at the 28th Annual Conference of the European Association for Research in Industrial Economics in Dublin, September 2001. The authors are indebted to several participants at the Conference, especially John Sutton, for comments on the likely intrinsic differences between foreign and domestic acquisitions and in this brief paper have tried to address some of these. Financial support from the ESRC, under grant R00221779, and the Leverhulme Trust, under programme grant F114/BF, is acknowledged with gratitude.
**Contact Author: e-mail Peter.Wright@nottingham.ac.uk

literature that suggests a less sanguine assessment of foreign-owned firms may be appropriate. On this view most, if not all, of the apparent superiority of these firms is explained by industry selection biases and unobservable input differences – see below – that are not controlled for in the typical cross sectional comparisons. This brief paper reports some results from a study that seeks to circumvent the usual measurement difficulties by considering the effects of *changes* in ownership, including moves to foreign ownership, on productivity and wages. The paper then offers a brief preliminary analysis of the *causes* of the productivity and wage changes that have been isolated.

The current research uses an unbalanced panel of 1,102 UK firms, over the period 1989-1994. Among the sample, 460 experienced acquisition, foreign or domestic, over the period while ownership of the rest, again domestic or foreign, remained unchanged across the same interval. The derivation of our sample and a description of the data sources are given in Section II below. However, at the outset we note that the sample's summary statistics appear to be entirely consistent with the conventional wisdom on the apparent superiority of foreign-owned firms. For example, Table 1 contrasts employment, wages and labour productivity across foreign and domestic owned companies in the sample. It can be seen immediately that the foreign firms are larger than domestic firms, pay a higher average wage (10.3 per cent) and exhibit greater levels of labour productivity (28.8 per cent).

Observed productivity/wage differentials in favour of foreign-owned firms, such as those shown above, have been interpreted in the literature as supportive of the "technology transfer" interpretation of FDI. Incoming multinationals are assumed to bring with them certain, largely intangible, assets that are then used to offset any advantages of incumbency possessed by domestic firms. These assets may include technological knowledge, brand name capital and superior organisational capabilities. These productivity advantages then feed through into wage rates by increasing any surplus that might be available for distribution through bargaining. Although this might be partially counteracted by the firm's multinational status, which may move the bargaining outcome in favour of the company, the former effect is supposed to dominate.

These propositions, although widely accepted, encounter problems when subjected to econometric testing. Observable differences in foreign and domestically owned enterprise performance appear to be matched by other large differences at the plant, firm and industry levels. There is also good reason to expect that foreign and domestic firms differ in unobservable characteristics such as capital vintage, which may generate performance differences but are not attributable to multinational ownership *per se*. Further, multinational entrants may select into more productive industries

Table 1: *Sample Characteristics of Domestic and foreign-owned Firms in UK Manufacturing Industry: Average Employment, Wages, and Labour Productivity*

Variables	*1989*		*1994*	
Domestic				
Employment	414	(1,650)	327	(1,369)
Wage rate	11.35	(3.87)	13.29	(4.31)
Labour Productivity	72.45	(163.77)	74.48	(96.77)
Foreign				
Employment	549	(1,641)	434	(1,098)
Wage rate	12.71	(3.90)	15.22	(4.40)
Labour Productivity	104.68	(137.67)	118.28	(154.24)

Notes:

(i) Variables are in real terms with standard deviation in parentheses. Wage rate and labour productivity are in £000.

(ii) The wage rate is defined as the wage bill per worker and labour productivity is sales per worker.

leading to bias in parameter estimates (Tybout, 2000). While the inclusion of additional controls would help to ameliorate these problems, the specification of appropriate control variables is normally problematic (Griffith, 1999), generally requiring information not included in the standard data sets. This can lead to bias in estimated coefficients.

The use of data that contains information on take-overs offers a potential solution to this problem. If foreign take-over leaves most industry and plant characteristics unchanged, at least in the medium run, then any productivity and wages subsequent to an acquisition can be attributed to the change in ownership status. Firms subject to domestic acquisition, and those subject to no ownership changes, can also serve as useful controls in such an analysis.

II DATABASE CONSTRUCTION AND ECONOMETRIC METHODOLOGY

The source of information relating to acquisitions and other firm level variables in this paper is the *OneSource* database of private and public companies in the UK from 1989-1994. A firm is identified as being acquired at year t if its status changes from being independent to being a subsidiary of another firm. The sample consists of 331 domestic and 129 foreign acquisitions, comprising 36 by American multinationals, 64 by EU-based firms and 29 by acquirers from other countries, including Japan. An industry-stratified random control sample of 642 firms was drawn from the population

of foreign and domestic subsidiaries that did not experience a change in ownership during the sample period.[1]

In order to estimate the *ceteris paribus* impact of ownership change on the level of productivity the following equation was estimated:

$$q_{it} = \alpha'_t + \beta'_1 k_{it} + \beta'_2 l_{it} + \beta'_3 m_{it} + f'_i + \delta'_1 D_{it} + \delta'_2 F_{it} + \varepsilon_{it} \quad (1)$$

Where i and t index firms and time periods respectively, q, k, l, m are the logarithm of output, capital, labour and intermediate inputs.[2] In addition, year dummies (α'_t) are included to control for aggregate shocks, and firm-specific fixed effects (f') for permanent differences across firms. Separate dummies for take-overs by foreign (F) and domestic (D) companies are included to allow for the possibility that domestic and foreign acquisitions may have differing impacts on total factor productivity.

Similarly, we estimate an equation of the following form for wages:

$$w_{it} = \alpha_t + \beta X_{it} + f_i + \delta_1 D_{it} + \delta_2 F_{it} + \varepsilon_{it} \quad (2)$$

Where X is a vector that controls for observable changes that are correlated with wage rates such as firm size,[3] four-digit industry average wages and productivity.

III EMPIRICAL RESULTS

Table 2 reports panel regression results for the total factor productivity equations. After controlling for firm fixed effects and autonomous technical changes (via time dummies), we find an 8 per cent difference in total factor productivity due to foreign acquisition.

Column 2 investigates the effect on production further, by allowing foreign acquisition to additionally impact on the marginal productivity of the factors of production. The results indicate that the marginal productivity of capital has doubled in the post foreign acquisition period. This is in contrast to the impact of the marginal productivity of labour, which has if anything slightly decreased, though this effect falls short of conventional significance levels. Note that this less constrained equation indicates even larger total factor productivity effects for foreign take-overs of some 14 per cent.

[1] Full details of the sample and control firms are available from the authors on request.
[2] Capital (fixed assets) is defined as net (of depreciation) book value of equipment, plant and machinery, fixtures and fittings and vehicles.
[3] Proxied by fixed assets.

Table 2: *The Impact of Ownership on Marginal Factor and Total Factor Productivity*

	Fixed Effect no Interaction (1)	*Fixed Effect with Interaction (2)*	*Fixed effect IV no Interaction (3)*	*Fixed effect IV with Interaction (4)*	*Fixed effect IV with Interaction (5)*
TFP effects					
Horizontal	0.011	0.113	0.024	0.165	0.147
	(0.80)	(1.37)	(1.64)	(1.85)	(1.63)
Non-Horizontal	–0.026	0.092	–0.016	0.128	0.112
	(2.77)**	(1.94)	(1.63)	(2.52)*	(2.18)*
Foreign	0.082	0.140	0.086	0.146	
	(6.81)**	(2.37)*	(6.28)**	(2.11)*	
USA					.148
					(4.75)**
Non-USA					.065
					(4.09)**
Labour	0.511	0.516	0.510	0.517	0.515
	(59.72)**	(58.99)**	(59.64)**	(58.85)**	(40.70)**
Acquisition Interactions					
Horizontal		–0.034		–0.042	–0.043
		(1.79)		(2.12)*	(2.17)*
Non-Horizontal		–0.025		–0.042	–0.043
		(1.94)		(3.01)**	(3.05)**
Foreign		–0.050		–0.040	
		(2.77)**		(1.88)	
USA					0.072
					(0.43)
Non-USA					0.001
					(0.00)
Capital	0.027	0.025	0.027	0.025	0.020
	(5.69)**	(5.03)**	(5.76)**	(4.97)**	(3.36)**
Acquisition Interactions					
Horizontal		0.009		0.008	0.010
		(0.64)		(0.53)	(0.69)
Non-Horizontal		–0.001		0.006	0.008
		(0.08)		(0.66)	(0.87)
Foreign		0.025		0.017	
		(2.21)*		(1.33)	
USA					0.10
					(2.11)*
Non-USA					0.041
					(0.55)
Intermediate Inputs	0.383	0.382	0.382	0.382	0.384
	(73.61)**	(73.57)**	(73.51)**	(73.47)**	(73.14)**
Hausman Test p-value			.7402	.6452	
Observations	9,648	9,648	9,648	9,648	9,648
Number of firms	1,102	1,102	1,102	1,102	1,102
R-squared	0.76	0.76			

Notes: (i) Absolute values of t-statistics are given in parentheses. * Significant at 5 per cent; ** significant at 1 per cent.
(ii) Capital intensity is measured as fixed assets per worker.
(iii) Coefficients on acquisition dummies in the level and growth equations are percentage and percentage point differentials respectively.

In column 3, the possible endogeneity of the acquisitions dummies[4] in the production function is controlled for by using a fixed effects instrumental variables (IV) estimator. In this procedure,[5] instruments for acquisition are generated using a multinomial logit model that predicts the probability of take-over. The results show that the "standard" and IV fixed effect approaches yield remarkably similar estimates, confirming the finding that foreign take-overs lead to increases in total factor productivity and in the marginal productivity of capital. In the IV model, however, no discernible change in the marginal productivity of labour is found. The Hausman tests find no systematic differences in the coefficient estimates between the standard and IV fixed effect models, and we find no evidence that foreign companies systematically acquire higher/lower total factor productivity firms.

Finally, since Conyon *et al.* (2001) suggest that horizontal acquisitions may impact differentially on performance to vertical or diversifying acquisitions we also distinguish domestic acquisitions according to whether they are *horizontal* or *non-horizontal*. Non-horizontal acquisitions appear to lead to productivity increases of 12 per cent, an improvement that is not matched by horizontal acquisitions.

Table 3 presents the results from the fixed effects panel estimation of the wage equations. Controlling for firm size, industry wages, firm fixed and industry fixed effects (column 1) indicates that companies acquired by foreign firms experience an increase in wages of 3.44 per cent, which is in contrast to the fall of 2.11 per cent in those acquired by domestic companies. However once labour productivity is added to the vector of control variables (column 2), the wage premium due to foreign acquisitions disappears. This would seem to indicate that the impact of foreign acquisitions on wages is entirely driven by superior levels of productivity associated with foreign ownership.

The experience of firms acquired by domestic firms is markedly different. Column 2 indicates that wages are reduced following acquisition *ceteris paribus* which, in conjunction with the previous table that shows no positive impacts on efficiency from domestic acquisitions, indicates a transfer of surplus away from workers to shareholders as suggested by Shleifer and Summers (1988). Looking at the type of domestic acquisitions, *horizontal* mergers are followed by a significant *ceteris paribus* pay cut, an effect that survives controlling for productivity.

[4] "Excluded" instruments used to predict probability of acquisitions were lagged (relative) wages and profits, sectoral concentration and foreign direct investment and firm size.

[5] Vella and Verbeek (1999) have recently shown that this type of instrumental variable approach generates estimates comparable to Heckman's (1978,1979) endogeneity bias corrected OLS estimator.

Table 3: *The Impact of Ownership Changes on Wage Rates by Type of Acquisition*

			Endogeneity Corrected	
	(1)	*(2)*	*(3)*	*(4)*
Industry wage	.09 (7.92)	.05 (4.93)	.05 (5.03)	.065 (3.77)
Fixed assets	.004 (1.84)	.01 (3.75)	0.01 (3.91)	.019 (3.37)
Domestic	– 2.10 (3.13)	– 2.17 (3.79)		
Foreign	3.38 (3.42)	0.00 (0.00)		
USA			0.00 (0.00)	1.60 (0.52)
EU			–1.50 (1.18)	–1.28 (0.51)
Other Foreign			.10 (.51)	1.60 (1.05)
Horizontal			–3.50 (4.48)	–3.20 (1.83)
Non-horizontal			–.80 (1.29)	.40 (0.32)
Labour Prod.		.30 (5.42)	0.29 (52.30)	0.29 (11.44)
Employment			–.019 (3.96)	–.020 (1.58)
Year Dummies	Y	Y	Y	Y
No. of observations	9648	9648	9648	9648

Notes: (i) The coefficient on acquisition dummies gives the percentage change in wage rates following ownership change.
(ii) Absolute values of t-stats are given in parentheses.

Since it has been mooted that multinationals of some nationalities are more strongly associated with the transfer of work practices than others, Tables 2 and 3 also distinguish by whether the foreign acquirer originates in the US. Table 2 column 5 indicates that although the increase in total factor productivity is observed across all types of foreign acquisition, the greatest increase is observed for US firms.

Turning to wage changes, once labour productivity is controlled for the wage effects of acquisition remain insignificant regardless of the country of origin of the acquirer. This again suggests that the wage premiums observed, especially in US (4.7 per cent) and other foreign firms (3.9 per cent), is primarily because of productivity differentials rather than because of internal redistributions of income.

V CONCLUSION

This short paper presents some results from a study that looks at the question of why foreign firms have higher levels of productivity and set higher wage rates than domestic ones. By using a panel framework it has controlled for unobserved factors that might lead to measured productivity and wage differentials unrelated to ownership. Its main finding is that foreign firms are

more productive than domestic ones, by between 8 and 15 per cent, being particularly productive in their use of capital. These advantages feed through into the wage levels of their employees, whose wages are higher by 4-5 per cent, a differential that is entirely explained by the greater levels of productivity. These effects are particularly pronounced for firms from the United States. We observe, without further comment, the irony that the foreign acquisition of UK companies is often fiercely denounced in the British press, whilst its consequences appear to be thoroughly beneficial!

REFERENCES

CAVES, R. E., 1996. *Multinational Enterprise and Economic Analysis,* Cambridge: Cambridge University Press.

CONYON, M., S. GIRMA, S. THOMPSON and P. WRIGHT, 2001. "The Impact of Mergers and Acquisitions on Company Employment", *European Economic Review*, (forthcoming).

DOMS, M and J. JENSEN, 1998. "Comparing Wages, Skills and Productivity Between Domestically and Foreign-owned Manufacturing Establishments in the United States" in Robert E. Baldwin, Robert E. Lipsey, and J. David Richardson (eds.), *Geography and Ownership as Bases for Economic Accounting*, Chicago: University of Chicago Press.

DUNNING J. H., 1989. *International Production and the Multinational Enterprise*, Allen and Unwin.

GRIFFITH R., 1999. "Using the ARD Establishment Level Data to Look at Foreign Ownership and Productivity in the United Kingdom". *The Economic Journal*, Vol.109, No. 456, pp. 416-442.

HAUSMAN, J. and D. MCFADDEN, 1984. "Specification Tests for the Multinomial Logit Model", *Econometrica*, Vol. 52, pp. 1219-1240.

HECKMAN J. J., 1978. "Dummy Endogenous Variables in a Simultaneous Equation System". *Econometrica*, Vol. 46, pp. 931-959.

HECKMAN J J., 1979. 'Sample Selection Bias as a Specification Error.' *Econometrica*, Vol. 47, pp. 153-162.

SHLEIFER, A. and L. H. SUMMERS, 1988. "Breach of Trust in Hostile Take-overs", in A. J. Auerbach, (ed.), *Corporate Take-overs: Causes and Consequences,* Chicago: National Bureau of Economic Research.

TYBOUT, J., 2000. "Manufacturing Firms in Developing Countries: How Well Do They Do, and Why?", *Journal of Economic Literature,* Vol. 38, pp. 11-44.

VELLA, F. and M. VERBEEK, 1999. "Estimating and Interpreting Models with Endogenous Treatment Effects", *Journal of Business and Economic Statistics*, Vol. 17, pp. 473-478.