Foreign Acquisition and the Performance of New Zealand Firms

Richard Fabling and Lynda Sanderson

NEW ZEALAND TREASURY

WORKING PAPER 11/06

DECEMBER 2011

New Zealand Government

NZ TREASURY WORKING PAPER 11/06

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MONTH/YEAR

December 2011

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ISBN (Online)

978-0-478-37887-0

URL

Treasury website at December 2011:
http://www.treasury.govt.nz/publications/research-policy/wp/2011/11/06

Persistent URL: http://purl.oclc.org/nzt/p-1425

JOINT PUBLICATION

This paper is jointly published as Reserve Bank of New Zealand Discussion Paper 2011/08.

ACKNOWLEDGEMENTS

The authors wish to thank Statistics New Zealand for access to the data, and Arthur Grimes, Jacques Poot and an anonymous referee for valuable suggestions.

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Abstract

This paper examines the firm-level determinants of foreign acquisitions of New Zealand companies, and the consequences for both the purchased firms and the workers within those firms. We follow a combined propensity score matching and difference-in-differences approach to identify and address endogenous selection of acquisition targets. The results suggest that foreign firms tend to target high-performing New Zealand companies. Acquired firms then exhibit higher growth in average wages and output, relative to similar domestic firms, but do not appear in general to increase their productivity or capital intensity. We find no evidence of differential survival rates for recently acquired foreign firms.

JEL CLASSIFICATION D22
F23

KEYWORDS Firm performance, foreign direct investment (FDI)

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1 Motivation

Despite its geographic isolation, New Zealand is ranked ninth in the OECD in terms of inward foreign direct investment (FDI) as a percentage of gross domestic product (GDP) (OECD 2010). While a substantial body of international literature shows that foreign-owned firms outperform local firms on a wide range of metrics, and many countries have explicit policies designed to attract foreign investment, public opinion on the value of FDI to the New Zealand economy is divided. Media accounts regularly draw attention to negative aspects of foreign investment, focussing on stories of downsizing by foreign owners, bemoaning the loss of promising New Zealand companies and technologies, and emphasising public fears of a loss of control of New Zealand's natural resources to offshore owners. Anecdotally, however, the owners and directors of New Zealand-based firms extol the benefits of foreign investment, including not only improved access to capital but also access to the new owners' stock of technology, networks and management experience (Simmons 2002).

This paper provides an empirical analysis of cross-border mergers and acquisitions (M&As) using data for the population of companies operating in New Zealand between 2000 and 2009. We examine the firm-level factors which attract foreign investors and the performance of firms after foreign acquisition. We build on the existing literature by considering a range of performance measures including both outcomes for acquired firms and for the workers within those firms. In this way, our paper is similar to that of Arnold and Javorcik (2009) who consider post-acquisition performance of Indonesian manufacturing plants and find evidence of both positive selection and post-acquisition performance gains. We provide a small, distant, developed country perspective on this question, while also extending the analysis to include non-manufacturers and by allowing for the effects of foreign acquisitions to differ according to the characteristics of the target firm.

By including a range of outcome measures we consider not only whether firm outcomes improve following foreign acquisition, but also whether the benefits of any performance improvements are shared with workers or, conversely, come at the expense of the local workforce. Firm performance outcomes considered include labour and multi-factor productivity, capital intensity, and gross output. Worker outcomes include total employment and average wage. Finally, we consider whether survival rates differ between domestic and recently acquired firms.

We find that acquired New Zealand firms tend to be larger, pay higher wages, and have higher capital intensity and labour productivity than other domestic firms. Although recently acquired firms appear to increase both average wages and gross output compared with firms which remain in domestic ownership, there is no evidence to suggest that acquisition improves either labour or multi-factor productivity performance.

Splitting the sample into initially high- and low-performance firms indicates limited heterogeneity in post-acquisition outcomes. Outcomes for each sub-population broadly mirror the aggregate outcomes outlined above, but suggest that aggregate increases in average wage and gross output may be unevenly distributed, with stronger and more precisely estimated increases in gross output among acquisitions with relatively low initial performance and wage growth concentrated among smaller and more productive acquisition targets. We also see weak evidence of post-acquisition capital deepening, but only among the subsample of initially lower capital intensity acquisitions.

In the next section we outline the existing literature on FDI, focussing on cross-border M&As. Section 3 describes the data and empirical methodology, while Section 4 presents the results. Section 5 summarises the findings and suggests avenues for further work.

2 Literature review

Theoretical and empirical studies of the determinants of FDI abound, reflecting the complexity of real world investment decisions. The decisions ultimately taken by heterogeneous firms reflect a confluence of firm, industry, and country characteristics. In this section we briefly review the main theoretical accounts of FDI, focussing on motivations for international M&As. Understanding the factors which drive cross-border acquisitions motivates the choice of explanatory variables in our selection model. We then discuss the literature on plant- and firm-level outcomes following foreign acquisition.[1]

A wide range of empirical literature shows that foreign affiliates outperform domestic firms (eg, Doms and Jensen 1998; Bernard and Sjöholm 2003; Bellak 2004; Greenaway and Kneller 2007). Comparisons between foreign-owned firms, locally owned multi-nationals and purely domestic firms suggest that the difference is driven by the performance gap between domestic and multi-national enterprises, rather than a “foreign premium” per se (Bellak 2004; Criscuolo and Martin 2009). It is commonly asserted that in order for foreign firms to be competitive they must have some firm-specific advantages – such as proprietary brands or product lines, high performance production processes or managerial expertise – to compensate for the market-specific knowledge and networks of their local competitors and the additional costs of doing business abroad (Markusen 1995; Melitz 2003; Dunning and Lundan 2008). Empirical evidence suggests a productivity hierarchy in which only the highest productivity firms engage in outward direct investment, while less productive firms export, and the least productive firms retain a purely domestic focus (Greenaway and Kneller 2007).

However, positive self-selection into FDI does not necessarily imply positive selection of acquisition targets. Harris and Robinson (2002) contrast two theories of M&A: managerial discipline and operating efficiency. The theory of managerial discipline suggests that M&As are a form of natural selection, in which inefficient plants are bought out by new owners and undergo some form of managerial change or restructuring to improve their

[1] The data we use are at the firm level, while much of the existing empirical literature uses plant-level data. The theoretical literature does not make a distinction. In the discussion that follows we use the terms interchangeably.

efficiency. In contrast, the operating efficiency theory suggests that M&As occur when the acquiring firm sees a complementarity between their existing operations and those of the target plant. In this case, the acquiring firm will be more likely to target high-performing plants. Post-acquisition performance may decline if there is difficulty assimilating the new plants into the firm's existing operations, or increase if the new parent introduces complementary assets or processes. Harris and Robinson (2002) find support for the operating efficiency hypothesis for cross-border acquisitions, with foreign firms tending to target "good" plants, but note significant differences between industries and across acquiring firms from different countries. Guadalupe *et al* (2010) take a similar approach in considering whether foreign targets are positively or negatively selected. They attribute observed positive selection on performance to an imperfect ability on the part of owners to transfer managerial or production technologies to the local subsidiary.

While relative firm-level performance provides one lens with which to view cross-border M&A decisions, industry-, country-, and other firm-specific factors have also been shown to influence the FDI decision. Dunning and Lundan (2008) provide a comprehensive review of the main motivations for offshore investment, using the Ownership-Location-Internalisation (OLI) or "eclectic" framework (Dunning 1977). Under this framework, the decision to invest abroad is driven by a combination of the firm-specific attributes of the investing firm which provide them with an advantage over local competitors such as managerial or technological capabilities, reputation and brand ownership (ownership advantages); country-specific motivations such as lower production or transport costs, access to protected markets or favourable tax treatments (location advantages); and the benefits to ownership and internalisation over outsourcing and market-based transactions such as minimising spillovers of proprietory technology or methods to local firms, reducing transactions and contracting costs, and allowing the acquiring firm greater control of management process and quality control (internalisation advantages).

Empirical support for the concept of ownership and internalisation advantages comes from observed patterns of the industry distribution of investment. Multinationals tend to be more prevalent in industries and firms where intangible assets are important. This includes industries with high levels of product differentiation and advertising, products that are new or technically complex, high R&D intensity, and high shares of professional and technical workers (Markusen 1995). Intangible assets are likely to encourage FDI because of their non-rival nature[2] which allows firms to duplicate production in several locations. As many intangible assets are only semi-excludable[3] and, in the case of brand names and reputation, there is potential for degradation of the asset, firms with these assets may be less willing to undertake arms-length market transactions.

Dunning and Lundan (2008) identify four main types of offshore investment, which they classify as resource-seeking, market-seeking, efficiency-seeking and strategic asset- or capability-seeking.[4] Resource-seeking investments are those designed to access the specific location advantages available in the target country – physical resources such as primary products or manufactured inputs, low-cost labour, or proximity to technological, management or marketing expertise (eg, research "listening posts" in advanced countries). Market-seeking investment is designed to increase the firm's reach, while providing it with better knowledge about local tastes, or the ability to reduce production, transport or transactions costs through proximity. Efficiency-seeking investment allows

2 They can be used in multiple locations simultaneously without reducing their effectiveness.

3 Once another firm learns the technology it is very difficult to stop them from using it for their own purposes.

4 They also note three additional investment possibilities – escape (eg, strategies designed to avoid home country taxes or regulations), support (eg, wholesale and retail distribution and marketing) and passive (eg, investments in real estate or portfolio investments in existing companies).

firms to take advantage of economies of scale and scope and to benefit from risk diversification, by concentrating production in a limited number of locations to supply multiple markets, while taking advantage of differing factor costs and local supply capabilities. Finally, capability-seeking FDI generally involves M&As with existing firms, as acquirers seek to access specific competitive advantages held by those firms such as technology, market power and distribution channels, or to create R&D synergies or production economies through streamlining and sharing facilities and knowledge.

Given the diversity of FDI motivations, the selection mechanisms and consequences of cross-border M&As remain very much an empirical question. As noted by Harris and Robinson (2002), negative selection on performance may occur if offshore acquirers identify firms which are underperforming and invest with the intention of improving their performance, while positive selection is likely if acquirers seek to integrate the target within their own production system. Meanwhile, offshore owners seeking to gain technological advantages may be inclined towards purchasing small firms, while those seeking marketing networks may be more inclined to target larger organisations (Grimpe and Hussinger 2008).

The summary above suggests that the selection model for target firms should control for measures of firm size and performance, but does not give a clear prediction for the sign of coefficients, suggesting flexible functional forms may be desirable.

Similarly, outcomes for both performance and labour markets may depend on the motivation for acquisition. If managerial discipline is considered an issue, acquisition may be followed by a period of restructuring, leading to job losses or a change in the focus of the target firm. In contrast, if foreign owners provide access to new sales opportunities and networks, output and employment may increase.

In keeping with this ambiguity, empirical results have been mixed. The literature examines a range of different outcome metrics, including those related to productivity performance (Arnold and Javorcik 2009), labour market impacts (Almeida 2007), innovation and R&D behaviour (Bertrand 2009), and effects on plant survival (Bandick and Görg 2010). As well as considering the average effect of all FDI, various authors have also considered differences according to the origin country of the acquiring firm (Chen 2011), whether the acquisition was horizontal or vertical (Conyon *et al* 2002), and the characteristics of the target firm (Girma 2005).

Broadly speaking, the empirical literature suggests that most FDI is positively selected – that is, that target firms tend to be larger, more productive, and to pay higher wages than firms which remain under domestic ownership (eg, Harris and Robinson 2002; Almeida 2007; Heyman *et al* 2007; Guadalupe *et al* 2010). This finding is not unanimous – for example, Conyon *et al* (2002) find that foreign acquisitions of UK firms target smaller firms and those with relatively low productivity – but suggests that in general, at least part of the observed higher performance of foreign-owned firms can be attributed to selection of already-successful targets.

Empirical studies of post-acquisition effects show little consensus. Some studies suggest that this may reflect differences in the characteristics of the acquiring and acquired firms or plants. Arnold and Javorcik (2009) provide a comprehensive study of a wide range of firm-level outcomes for Indonesian manufacturers following foreign acquisition. Their results are indicative of both positive selection of acquisition targets and also improvements in performance following acquisition, with productivity, output, employment, investment and average wages all increasing relative to non-acquired plants. They also

note that foreign acquisition appears to improve plants' connections to the international economy, with increases in both exports and imported inputs. In contrast, using data from the UK, Harris and Robinson (2002) find negative effects on productivity, at least in the first few years after acquisition, which they attribute to difficulties assimilating these plants into the broader organisation.

On the labour market side, Huttunen (2007) finds that foreign acquisition of Finnish plants leads to increases in wage rates for both high- and low-skill worker groups, but as this is accompanied by a fall in the share of highly-skilled workers in employment, it does not necessarily translate to an increase in average wage rates. Heyman *et al* (2007) find small positive effects on average wages in Swedish target firms but that, at the individual level, workers who remain with the newly acquired firm show lower wage growth than those in similar, non-acquired firms.

Existing New Zealand empirical evidence on the reasons for foreign acquisitions and the impact on domestic firms is limited. Based on a survey of 516 foreign-owned companies, Scott-Kennel (2010) concludes that market-seeking investment is the dominant motivation for foreign firms investing in New Zealand, although many foreign-owned firms are also involved in exporting and R&D. This survey also suggests a number of mechanisms through which foreign parents may raise the performance of their local affiliates, including technical assistance, staff training, and provision of information about markets, suppliers and contacts.

Cartwright (2001) examines the motivations and activities of foreign multinational enterprises (MNEs) in New Zealand, focussing on the industry groups which account for the greatest turnover. He identifies three main types of foreign investors in New Zealand. The majority of large foreign firms operating in New Zealand seem to be focussed on supplying the domestic market, providing distribution and marketing services for their foreign parent. A second group of MNEs are resource-based producers (eg, forestry and wood processing, food processing), set up to access the physical resources available in New Zealand. Finally, Cartwright notes an emerging tendency for foreign firms to target relatively small New Zealand companies with sophisticated capabilities in areas such as electronics, IT and engineering. These abilities may then either be fostered onshore, in conjunction with the MNE network, or the intellectual capital relocated offshore.

In a small scale longitudinal study of successful manufacturing exporters, Gawith (2002) finds that the outcomes that foreign acquired firms experience differ dramatically and depend heavily on the motivation of the acquirer. Among recent acquisitions, there has been a tendency to target firms which can provide strategic assets or capabilities, such as patents and R&D ability. In some cases, the acquired firms expect to see a decline in manufacturing output, as they focus on providing R&D and product development services for the overseas owner. Further, while some New Zealand firms saw foreign acquisition as a means to international expansion, providing access to existing distribution and marketing channels, not all the foreign-acquired firms in the study were satisfied with the outcomes. Some felt that the requirements to fit into the new parent companies' networks meant they lost direct control over their distribution channels and missed out on knowledge of their markets and customers.

Overall, the New Zealand research echoes the theoretical ambiguity discussed above – while foreign acquisitions generate potential for positive effects on domestic firms, these positive outcomes are not guaranteed and depend heavily on the motivation of the new foreign parent.

3 Empirical Strategy

In order to examine the selection and outcomes of foreign acquisitions in New Zealand, we use the prototype Longitudinal Business Database (LBD), a collection of administrative and survey data held by Statistics New Zealand.[5] The LBD is based around Statistics New Zealand's Longitudinal Business Frame, which provides basic information on all economically significant firms in New Zealand from 1999/00 to 2008/09.[6]

We consider six firm outcomes which may be affected by foreign investment. Firm performance measures (labour and multifactor productivity, gross output, and the capital-labour ratio) are derived from Inland Revenue Department and Annual Enterprise Survey data following the method in Fabling and Maré (forthcoming). Average wages and total employment (which includes working proprietors) are sourced from the Linked Employer-Employee Dataset (LEED), which is based on pay-as-you-earn (PAYE) tax data and other tax records. All outcome variables are expressed as deviations from the industry-year mean and firms are assigned to permanent industries based on employment shares.[7] A full list of the variables used, their definitions and summary statistics for the population included in the selection model can be found in Appendix A. Finally, we consider whether foreign acquisition affects survival, defined as continuing employment in the years following acquisition.

In keeping with the international literature, foreign-owned firms in New Zealand outperform domestic firms on almost all firm outcomes (Figure 1). They are larger (in terms of both output and employment), more capital intensive, pay higher average wages, and have higher labour productivity. However, Figure 2 suggests that at least part of this difference is due to positive selection of FDI targets. Dividing the population of domestically-owned firms according to their future ownership status – whether or not they will be acquired by a foreign owner in the following year – suggests that pre-acquisition firm characteristics more closely mirror the patterns for foreign-owned firms shown in Figure 1 than those of other non-acquired domestic firms. That is, foreign owners seem to "cherry pick" high performing firms.

To examine the firm-level factors influencing acquisition and subsequent performance, we follow the recent literature and use a combined difference-in-difference and propensity score matching (PSM) approach. This methodology draws heavily on the programme evaluation literature (eg, Smith 2004; Imbens and Wooldridge 2008) and considers foreign acquisition as a "treatment." The basic principle of propensity score matching is that as long as there are no unobserved characteristics which affect both the potential outcome and the probability of treatment ("unconfoundedness") and suitable control cases can be found for each treated case ("overlap"), conditioning on the propensity score is sufficient to remove the bias associated with differences in pre-treatment characteristics between the treated and untreated groups. Thus, all systematic differences in outcomes between the treated and control firms are attributable to the treatment.[8] Our implementation of this method closely follows Fabling and Sanderson (2010), who examine New Zealand exporter performance.

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5 See Fabling (2009) for more detail on the database.

6 Economic significance is defined as employing or having an annual turnover of at least NZD40,000.

7 Industry defined as (primarily) two-digit industries from the Australia New Zealand Standard Industrial Classification (ANZSIC). Firms with implausible year-on-year changes in values are dropped.

8 See Caliendo and Kopeinig (2008) for a practical discussion of matching methods.

Figure 1 – Comparing domestic and foreign-owned firms

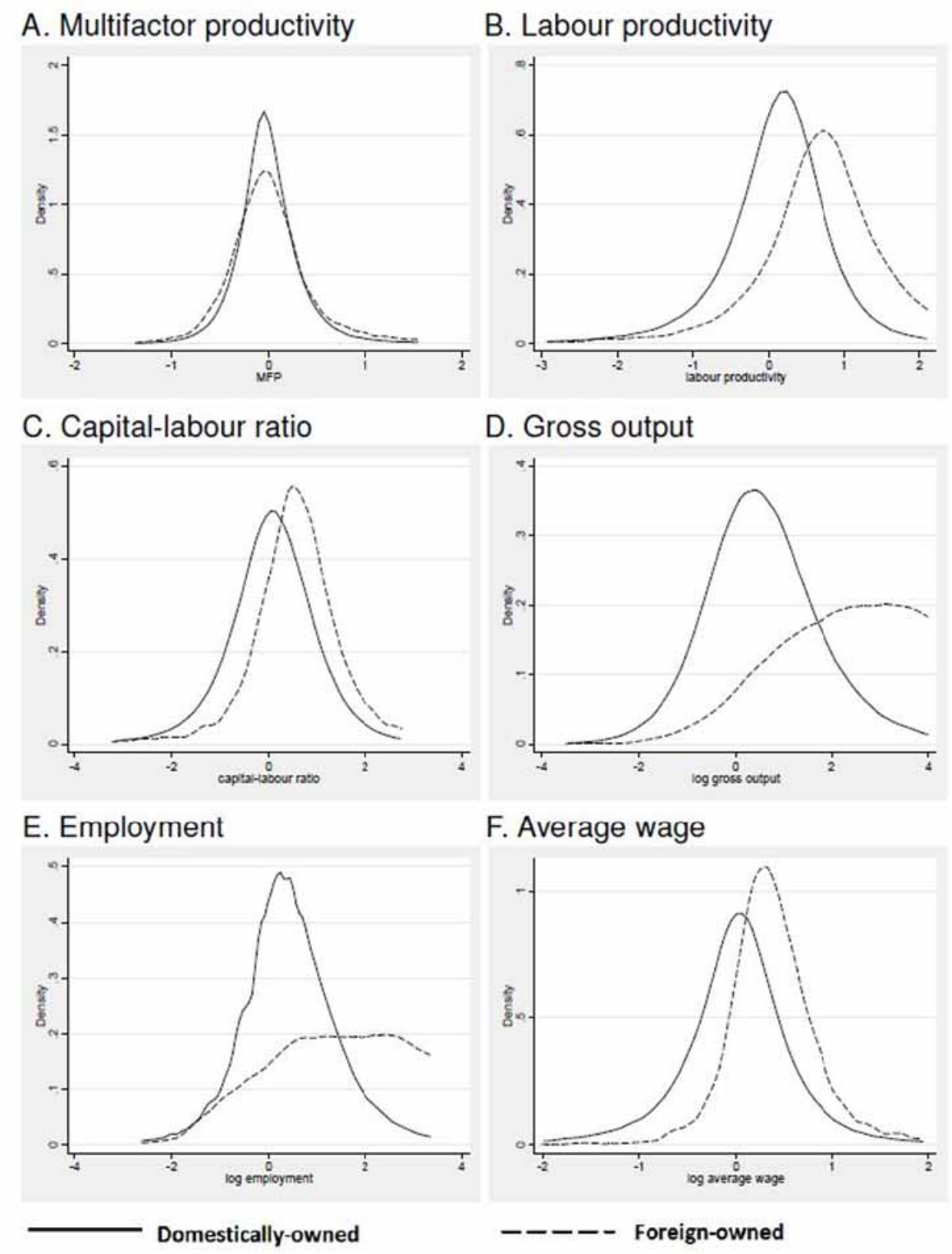
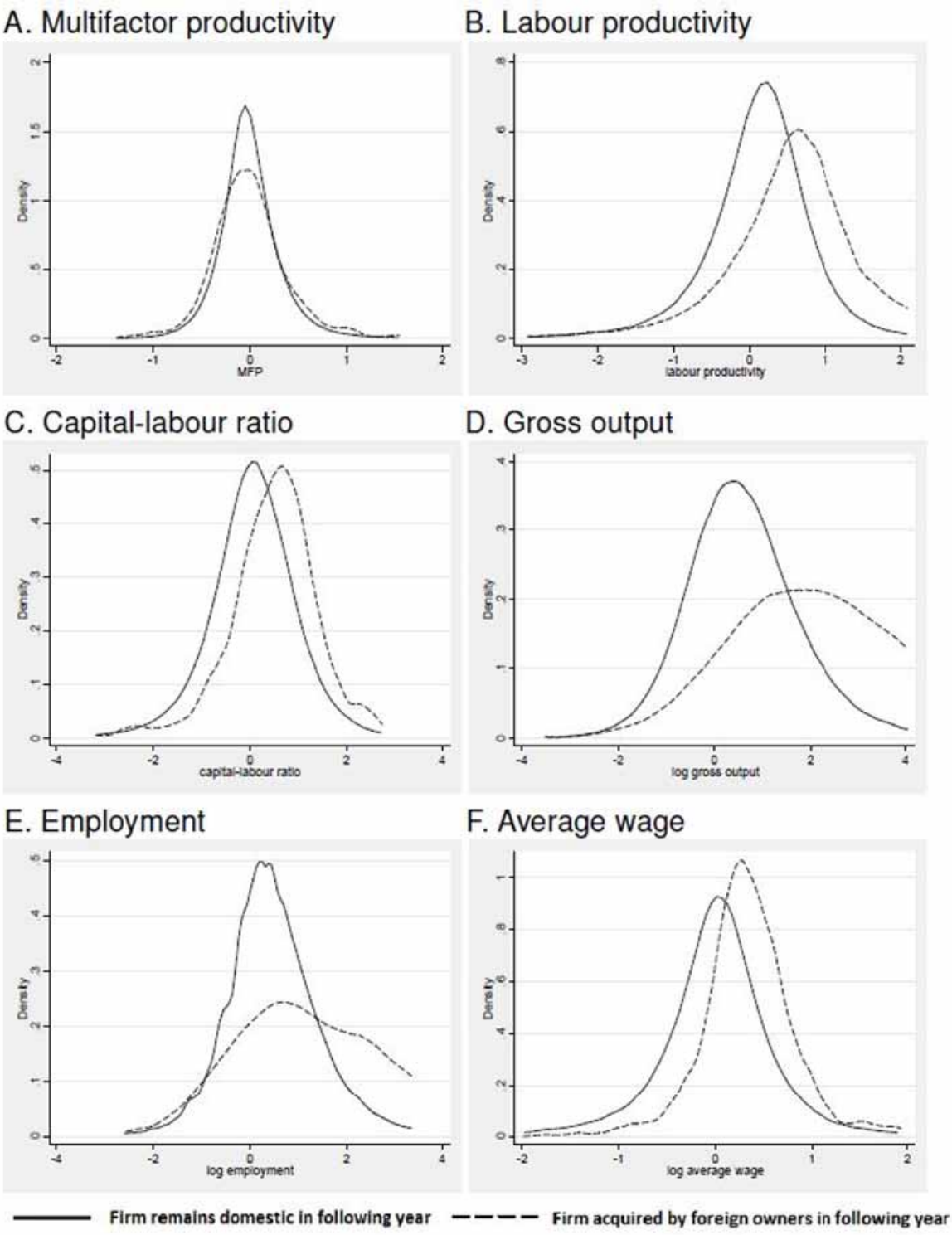


Figure 2 – Comparing future acquired and non-acquired firms



The PSM methodology involves two steps. The first step is to establish a suitable control group. A probit model is estimated to determine which pre-acquisition firm characteristics predict foreign acquisition (treatment). Based on the probit results, the predicted probability of acquisition (the propensity score) is calculated and each acquired (treated) firm is matched to one or more firms which have similar probability of acquisition based on their observed characteristics but which are not acquired. We match within industry and preclude self-matches (matching a treated firm to itself in a previous year), using radius matching with a caliper of 0.001.[9] Balancing tests are then carried out to ensure that the treated sample and the matched control group are sufficiently similar on all observed characteristics.

In the second stage, outcomes are compared between treated and control firms. To mitigate any remaining unobserved time-invariant differences between the two groups we follow a difference-in-difference approach, comparing outcomes in terms of changes relative to the pre-acquisition year. Finally, standard errors are estimated by bootstrapping across both stages to account for uncertainty in the matching equation.

Treatment is defined as a transition from domestic to foreign ownership, based on the answer to the disclosure statement: "Is the company controlled or owned by non-residents?" from annual company tax returns. This limits the population to employing, limited liability companies which were initially domestically owned. Table 1 shows the overall level of foreign ownership, employment in foreign firms, and the transition rate from domestic to foreign ownership by industry over the period 2000-2009. This suggest substantial differences in foreign ownership rates across industries, with relatively high rates in Mining (B) and Wholesale Trade (F), and low rates in Agriculture, Forestry and Fishing (A), Construction (E), Retail Trade (G) and Personal and Other Services (Q). Across all industries, the tendency for foreign firms to be larger than domestically-owned firms shows through clearly. Table 2 shows the share of foreign firms, and employment in foreign firms, by year. Falling foreign-ownership rates between 2000 and 2009 reflect increases in the total number of firms, with higher entry rates of domestic than foreign firms.

Figure 3 sets out the timeline for the analysis. Firms are tracked over a six year period.[10] The first two years *(t = -1, 0)* of data provide the explanatory variables for the propensity score matching. *t = 1* is the treatment year. We provide estimates of the average treatment effect for the treatment year and the following three years, out to *t = 4.* The selection (probit) model is estimated across all firms which can provide the control and treatment variables, and the outcome analysis uses all firms which additionally have a full set of outcome variables for the relevant year.

[9] Where a treated firm is matched to N control firms within the caliper, each control firm is given a weight of 1/N in the difference-in-difference comparison. Treated firms for which no suitable control can be found are dropped from the analysis.

[10] Statistics New Zealand's enterprise identifiers can be broken by changes in legal structure, which would be particularly problematic for studies involving ownership change. We repair these breaks using permanent plant-level identifiers following Fabling (2011).

Table 1 – Average foreign ownership share and acquisition rate, by industry 2000-2009

	Firm share	Employment share	Treatment rate
A — Agriculture, Forestry and Fishing	0.004	0.014	0.001
B — Mining	0.102	0.301	0.009
C — Manufacturing	0.024	0.202	0.004
E — Construction	0.003	0.124	0.000
F — Wholesale Trade	0.071	0.295	0.010
G — Retail Trade	0.005	0.101	0.001
H — Accommodation, Cafes and Restaurants	0.009	0.131	0.002
I — Transport and Storage	0.023	0.170	0.004
J — Communication Services	0.039	0.549	0.004
K — Finance and Insurance	0.048	0.610	0.006
L — Property and Business Services	0.015	0.207	0.003
P — Cultural and Recreational Services	0.011	0.111	0.002
Q — Personal and Other Services	0.006	0.151	0.002

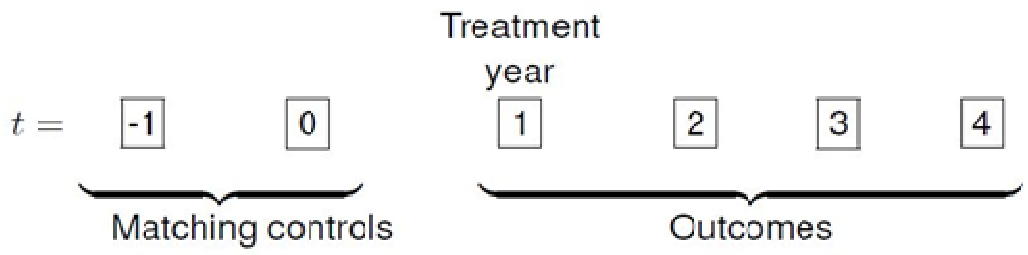
Underlying firm counts have been random rounded base three and employment counts rounded base 100 in accordance with Statistics New Zealand confidentiality requirements. Electricity, Gas and Water (D) is suppressed.

Table 2 – Average foreign ownership share, by year

	Firm share	Employment share
2001	0.024	0.219
2002	0.023	0.217
2003	0.022	0.211
2004	0.020	0.178
2005	0.018	0.184
2006	0.016	0.172
2007	0.014	0.159
2008	0.015	0.179
2009	0.015	0.182

Underlying firm counts have been random rounded base three and employment counts rounded base 100 in accordance with Statistics New Zealand confidentiality requirements.

Figure 3 – Timeline



The variables used in the probit equation reflect firm-level factors which may attract prospective foreign buyers. Initial assessments of functional form showed up substantially non-linear relationships between firm performance variables and the probability of acquisition, consistent with the theoretical literature. We therefore include performance variables – log total employment (*lntotemp*), the capital-labour ratio (*klratio*), labour productivity (*lp*), log average wages (*lnavg_wage*) and multifactor productivity (*mfp*) – as four piecewise linear segments, allowing for both intercepts and slopes to differ across quartiles. This specification reflects a compromise between two objectives – a parsimonious specification of the relationship between firm performance and acquisition, and sufficient flexibility to generate a quality – high R2 and balanced – match between treated and control firms.[11]

In addition to quantiles of performance levels, we include variables capturing recent input dynamics: one-year growth rates of total employment (Δ*totemp*), average wages (Δ*avg_wage*), and the capital-labour ratio (Δ*klratio*), alongside dummies for firms with missing values of the relevant variable in the previous year (either because the firm was non-employing δ(*entrant*), δ(*non-employing*$_{t=-1}$), or because of missing capital data in the previous year δ(*missing_mfp*$_{t=-1}$). Including dynamics in the selection model (and requiring that matched and control firms balance on this dimension) reduces the potential of matching treated firms to control firms with similar current performance levels but which are on a different growth trajectory, which would confound interpretation of post-acquisition growth differences.

We also include a dummy for whether the firm exported in year t = 0 (*exporter*), and the intensity of exporting (*export_intensity*), defined as the share of sales which are exempt from goods and services tax (GST) as a share of total sales.[12] Export activity may affect both the perceived performance of the firm but also its international visibility, eg, foreign companies may be more likely to notice firms which are already trading in their existing markets. We also include a dummy indicating subsidiary firms within enterprise groups with domestic parent companies δ(*subsidiary*).

A full set of regional council dummies is included as some geographic locations may be more attractive to foreign owners than others (eg, cities with an international airport will be more accessible for foreign executives). Finally, we include a full set of year and industry dummies to capture differences over time and across industries.

Balancing tests are performed to ensure that the matching procedure is sufficient to provide a suitable group of control firms against which we can benchmark the post-acquisition performance of the treated group, at least with respect to observable characteristics. There are no significant differences in the mean of each of the outcome and matching variables between the treated firms and the matched controls in either the unbalanced or the balanced panels reported in Table 4.[13]

In addition to the full population, we consider sub-populations of firms separately based on their pre-acquisition levels of MFP, employment, capital intensity and average wages. These subsets are chosen because the acquisition of different types of firm may be driven

[11] Balancing tests are conducted on all outcome variables. Gross output is excluded from the probit because of its high correlation with employment. Other highly correlated outcome variables cannot be dropped without compromising the balancing of the matched sample.

[12] Although zero-rated GST sales is an imperfect proxy for exports, it has the benefit of being available for all industries. The GST-based export intensity measure is strongly correlated with export measures available for a sample of firms from the Business Operations Survey, giving us confidence that they provide at least a reasonable indication of firms' actual export intensity (correlation coefficient of 0.59 for export intensity, tetrachoric correlation of 0.79 for the exporter dummy).

[13] Based on a two-sided test with significance level of 10%.

by different motivations on the part of the foreign owner and may therefore exhibit different post-acquisition performance trajectories. We maintain the same matched sample used in the full population across all four splits, and divide the population of treated firms at the median value of the relevant performance measure, so as to have approximately equal numbers of treated firms in each sub-sample.[14]

4 Results

Table 3 reports selection equation results for the full population. Panel A gives the estimated coefficients of the five performance variables which are included in piece-wise linear form. Panel B provides the coefficients for the remainder of the matching variables.

The inclusion of multiple measures of firm performance makes it difficult to separately interpret the coefficients (eg, the average wage level captures elements of skill composition which are correlated with measured MFP and labour productivity). Overall, Panel A suggests positive selection of target firms, although often only the top quantile of performance has a coefficient significantly different from the lowest quantile. Exploration of alternative specifications of the model show that the inclusion of multiple correlated measures is indeed affecting the estimated coefficients, but the core patterns remain robust and reiterate the broader impression gained from Figure 2 – foreign acquisition targets appear to be strongly positively selected on almost all performance metrics.[15] The exception is MFP, where further examination suggests a bi-modal impact – after controlling for other observable firm characteristics, foreign targets tend to be concentrated in both extremes of the MFP distribution, perhaps suggesting a role for managerial discipline alongside selection based on operating efficiency (Harris and Robinson 2002).

Foreign acquisition is also positively associated with lagged employment growth, export status and export intensity. Firms are much more likely to be acquired by foreign owners if they are subsidiaries of an existing enterprise group, rather than independent enterprises. Finally, there appears to be a regional element to target selection, with firms which have locations in Auckland, Wellington and Hawkes Bay being more likely to be targeted for acquisition, and firms on the West Coast less likely.

Post-acquisition performance growth comparisons between acquired firms and matched domestically-owned firms are reported in Table 4. The upper table presents results using the unbalanced panel, in which firms are included in any year for which they have a full set of outcome variables. The lower table restricts attention to firms which have a full set of outcome variables in all four outcome years. Differences between the two populations reflect a combination of firm survival, data availability and right-censoring of outcome years.

Acquired firms exhibit a gradual increase in gross output, relative to similar domestic firms, which becomes statistically significant by $t = 3$. This increase in output appears to be achieved via relatively strong employment growth, rather than increases in either capital investment or multi-factor productivity.[16] Acquired firms also raise average wages

[14] Minor balancing issues arise for some sub-populations as indicated in table notes.

[15] As noted earlier, matching models excluding one or more of these outcomes fail to balance.

[16] In (unreported) robustness tests we exclude control firms which are treated in future years, up to and including the outcome year. These estimates generate qualitatively similar results, with the main difference being that employment growth estimates are statistically significant in $t=3,4$.

between two and eight percentage points more than similar non-acquired firms. Stronger effects are observed among the balanced panel consistent with, for example, foreign owners investing more in skills or management capabilities where they anticipate a long-term involvement. However, we see no evidence for differential survival rates between domestic and acquired firms (Table 5).

Differences in acquisition motives or in acquired firm characteristics may alter post-acquisition outcomes. For example, if firms are targeted due to perceived under-performance relative to their peers we might expect to see improvements in productivity following acquisition. Similarly, it may be that high-performing firms suffer from dislocation following acquisition and take time to return to normal or, alternatively, that these firms experience large inflows of investment from the new parents which allows them to expand. If there are significant differences between groups, these may average out in aggregate results. Therefore, Table 6 presents outcome comparisons for eight sub-populations, according to whether treated firms are in the top or bottom half of acquired firms in terms of MFP, employment, average wage or capital intensity.

In general, each sub-population mirrors the aggregate picture of higher subsequent growth in average wages, output, and employment in acquired firms. Differences in the estimated treatment effects across sub-populations imply some heterogeneity in outcomes. Specifically, post-acquisition growth in average wages is concentrated in smaller firms and those with relatively high initial MFP, not larger or less productive firms. Increases in output are concentrated among initially smaller and lower productivity targets, while employment growth is observed primarily among initially high-wage firms. However, few sub-populations display significantly different outcomes between high and low groups. There is only one area in which the sub-population results imply a significant deviation from the broad results found for the full population – post-acquisition capital deepening is observed only in those firms which were relatively capital-shallow prior to foreign acquisition.

Table 3 *– Selection equation*

Panel A: Selection on performance measures					
	mfp	klratio	lntotemp	lnavg_wage	lp
_q2_intercept	-0.144	0.060	-0.037	0.194*	-0.016
	[0.092]	[0.077]	[0.067]	[0.100]	[0.062]
_q3_intercept	-0.170**	0.045	-0.088	0.127	-0.076
	[0.073]	[0.094]	[0.132]	[0.104]	[0.116]
_q4_intercept	-0.189***	0.173**	-0.196***	0.382***	-0.007
	[0.073]	[0.082]	[0.074]	[0.093]	[0.075]
_q1_slope	-0.140	-0.060	-0.075	0.054	-0.033
	[0.137]	[0.046]	[0.051]	[0.098]	[0.042]
_q2_slope	-0.087	0.209	0.100	0.819*	-0.039
	[0.701]	[0.211]	[0.224]	[0.418]	[0.320]
_q3_slope	0.580	0.012	0.256	0.456	0.372
	[0.582]	[0.183]	[0.175]	[0.306]	[0.287]
_q4_slope	-0.005	0.033	0.257***	0.003	0.261***
	[0.157]	[0.061]	[0.056]	[0.107]	[0.063]

Panel B: Additional selection variables		Coeff	Std dev
Δklratio		0.102	[0.076]
Δtotemp		0.254***	[0.095]
Δavg_wage		-0.028	[0.089]
δ(entrant)		0.143	[0.337]
$\delta(\text{non-employing}_{t=-1})$		-0.082	[0.108]
$\delta(\text{missing\_mfp}_{t=-1})$		-0.156	[0.359]
δ(exporter)		0.185***	[0.035]
export_intensity		0.200***	[0.068]
δ(subsidiary)		0.949***	[0.030]
Regional council dummies:	Northland	-0.059	[0.098]
	Auckland	0.310***	[0.032]
	Waikato	-0.084	[0.059]
	Bay of Plenty	-0.040	[0.067]
	Gisborne	-0.181	[0.172]
	Hawkes Bay	0.129*	[0.069]
	Taranaki	0.004	[0.097]
	Manawatu/Wanganui	0.089	[0.067]
	Wellington	0.143***	[0.040]
	West Coast	-0.459*	[0.241]
	Canterbury	0.051	[0.040]
	Otago	0.009	[0.064]
	Southland	-0.047	[0.096]
	Tasman	-0.246	[0.212]
	Nelson/Marlborough	0.040	[0.090]
	Observations	322,722	
	Pseudo R^2	0.290	

Significant at: * 10%, ** 5%, *** 1%. F-tests of joint significance passed at 10% level for each piece-wise linear performance metric. Regression also includes a full set of (primarily) two-digit industry and year dummies (unreported). See Appendix A for variable definitions and summary statistics.

Table 4 – Difference-in-difference estimates of average treatment effect

Full population	t=1	t=2	t=3	t=4
mfp	-0.024	-0.005	-0.023	0.011
	[0.016]	[0.021]	[0.026]	[0.030]
lp	-0.029	0.027	0.005	0.044
	[0.032]	[0.049]	[0.051]	[0.055]
klratio	-0.018	0.040	0.003	0.017
	[0.027]	[0.037]	[0.044]	[0.058]
lngo	0.025	0.039	0.094**	0.107*
	[0.024]	[0.033]	[0.042]	[0.061]
lntotemp	0.011	0.009	0.065*	0.064
	[0.019]	[0.029]	[0.038]	[0.049]
lnavg_wage	0.026**	0.018	0.033	0.062**
	[0.011]	[0.014]	[0.020]	[0.026]
N	274,605	206,673	154,713	113,034
N(treated)	729	558	438	339
Proportion dropped:				
Treated	0.128	0.151	0.178	0.221
Control	0.166	0.251	0.332	0.406

Balanced Panel	t=1	t=2	t=3	t=4
mfp	0.002	-0.016	-0.016	-0.009
	[0.029]	[0.035]	[0.035]	[0.036]
lp	0.017	0.004	-0.021	0.036
	[0.049]	[0.057]	[0.063]	[0.061]
klratio	0.009	-0.003	0.006	0.023
	[0.050]	[0.055]	[0.052]	[0.060]
lngo	0.008	0.045	0.116**	0.139**
	[0.041]	[0.045]	[0.053]	[0.059]
lntotemp	-0.024	0.019	0.054	0.068
	[0.027]	[0.039]	[0.047]	[0.056]
lnavg_wage	0.060***	0.049*	0.058**	0.081**
	[0.023]	[0.025]	[0.029]	[0.033]
N	88,947	88,947	88,947	88,947
N(treated)	267	267	267	267
Proportion dropped:				
Treated	0.270	0.270	0.270	0.270
Control	0.438	0.438	0.438	0.438

Difference-in-difference (DID) estimator, from t=0 to outcome year, applied to matched sample. Radius matching (caliper 0.001, with replacement) with observations pooled across years and matched within two-digit industry (precluding self-matches). Bootstrapped standard errors in brackets (significant at * 10%; ** 5%; *** 1%). Bootstrapping encompasses both probit and DID stages (100 repetitions) and is stratified on treatment and the existence of future outcomes to maintain approximately constant (weighted) population size (*N*) across estimates. The table also reports the number of treated firms and the proportion of treated (control) firms dropped because there is no control (treated) firm within the caliper distance. All balancing tests (equivalence of weighted means of matching variables across treated and controls) passed at the 10% level.

Table 5 – Difference in probability of survival

	t=2	t=3	t=4
Survival probability	-0.016	-0.022	-0.028
	[0.012]	[0.018]	[0.021]
N	271,410	222,297	175,296
N(treated)	786	657	525
Proportion dropped:			
Treated	0.115	0.132	0.154
Control	0.120	0.169	0.230

See Table 4 for notes. Population includes all firms with full set of matching variables at t=0.Outcome variable is a dummy equal to one if the firm has non-zero employment (including working proprietors) in the relevant outcome year. Balancing tests passed at the 10% level except for klratio in t=4.

Table 6 – Difference-in-difference estimates for firms initially above and below median performance for acquired firms

	High MFP (a)				Low MFP			
	t=1	t=2	t=3	t=4	t=1	t=2	t=3	t=4
mfp	-0.021	-0.024	-0.057	0.011	-0.025	0.031	0.030	0.015
	[0.024]	[0.031]	[0.037]	[0.042]	[0.023]	[0.030]	[0.036]	[0.041]
lp	-0.009	-0.015	-0.020	0.064	-0.045	0.104	0.060	0.030
	[0.042]	[0.065]	[0.072]	[0.084]	[0.058]	[0.067]	[0.069]	[0.097]
klratio	-0.019	0.015	-0.040	-0.014	-0.016	0.070	0.055	0.052
	[0.040]	[0.058]	[0.070]	[0.072]	[0.035]	[0.051]	[0.054]	[0.076]
lngo	0.061**(‡)	0.024	0.045	0.072	-0.014(‡)	0.057	0.153**	0.145**
	[0.027]	[0.045]	[0.059]	[0.087]	[0.041]	[0.042]	[0.065]	[0.071]
lntotemp	0.024	0.001	0.024	0.040	-0.004	0.009	0.103**	0.089
	[0.028]	[0.047]	[0.054]	[0.065]	[0.026]	[0.037]	[0.052]	[0.060]
lnavg_wage	0.033**	0.030	0.061**	0.078*	0.018	0.007	0.004	0.045
	[0.014]	[0.019]	[0.029]	[0.042]	[0.012]	[0.020]	[0.028]	[0.034]
N	274,233	206,406	154,497	112,866	274,245	206,385	154,488	112,866
N(treated)	360	288	225	171	369	270	213	171
Proportion dropped:								
Treated	0.092	0.115	0.147	0.175	0.171	0.189	0.211	0.263
Control	0.564	0.608	0.648	0.683	0.600	0.642	0.682	0.721

	High employment				Low employment			
	t=1	t=2	t=3	t=4	t=1	t=2	t=3	t=4
mfp	-0.001	0.010	-0.001	0.068	-0.038*	-0.015	-0.036	-0.022
	[0.034]	[0.034]	[0.056]	[0.067]	[0.020]	[0.024]	[0.029]	[0.035]
lp	-0.054	0.020	0.040	0.092	-0.014	0.032	-0.015	0.016
	[0.058]	[0.058]	[0.078]	[0.099]	[0.047]	[0.063]	[0.074]	[0.085]
klratio	-0.048	-0.008	0.003	0.052	-0.001	0.069	0.004	-0.002
	[0.043]	[0.051]	[0.072]	[0.094]	[0.029]	[0.049]	[0.058]	[0.068]
lngo	-0.010	0.012	0.059	0.016	0.047*	0.056	0.114**	0.158**
	[0.044]	[0.053]	[0.074]	[0.102]	[0.028]	[0.050]	[0.056]	[0.067]
lntotemp	0.012	0.012	0.042	0.009	0.013	0.008	0.078	0.094
	[0.023]	[0.041]	[0.053]	[0.071]	[0.024]	[0.039]	[0.052]	[0.059]
lnavg_wage	-0.001(‡)	0.007	0.021	0.031	0.041**(‡)	0.025	0.040	0.080**
	[0.011]	[0.013]	[0.019]	[0.03]	[0.018]	[0.022]	[0.031]	[0.033]
N	274,200	206,370	154,476	112,851	274,275	206,421	154,512	112,878
N(treated)	324	252	204	156	402	303	237	183
Proportion dropped:								
Treated	0.250	0.298	0.338	0.404	0.022	0.020	0.038	0.082
Control	0.924	0.928	0.932	0.938	0.241	0.323	0.400	0.468

Continued on next page

Table 6 continued

	High average wage (b)				Low average wage (c)			
	t=1	t=2	t=3	t=4	t=1	t=2	t=3	t=4
mfp	-0.040**	-0.010	0.003	0.030	-0.009	-0.002	-0.047	-0.009
	[0.002]	[0.033]	[0.043]	[0.051]	[0.028]	[0.026]	[0.036]	[0.038]
lp	-0.036	0.004	0.033	0.079	-0.023	0.048	-0.020	0.010
	[0.045]	[0.076]	[0.079]	[0.098]	[0.047]	[0.054]	[0.082]	[0.080]
klratio	0.016	0.038	-0.048	-0.066	-0.049	0.041	0.052	0.099
	[0.037]	[0.056]	[0.065]	[0.085]	[0.034]	[0.044]	[0.058]	[0.070]
lngo	0.028	0.007	0.099	0.140	0.022	0.069*	0.089	0.073
	[0.035]	[0.048]	[0.077]	[0.095]	[0.034]	[0.042]	[0.065]	[0.077]
lntotemp	0.007	0.021	0.099**	0.114*	0.015	0.001	0.033	0.013
	[0.028]	[0.043]	[0.048]	[0.062]	[0.026]	[0.037]	[0.043]	[0.062]
lnavg_wage	0.049***(†)	0.026	0.036	0.068	0.004(†)	0.009	0.031	0.060**
	[0.019]	[0.024]	[0.031]	[0.043]	[0.011]	[0.017]	[0.024]	[0.025]
N	274,233	206,388	154,491	112,872	274,242	206,400	154,494	112,857
N(treated)	360	270	216	177	369	288	222	162
Proportion dropped:								
Treated	0.150	0.178	0.194	0.271	0.106	0.125	0.162	0.185
Control	0.790	0.806	0.820	0.840	0.376	0.445	0.513	0.566

	High capital intensity				Low capital intensity			
	t=1	t=2	t=3	t=4	t=1	t=2	t=3	t=4
mfp	-0.017	0.008	-0.019	0.061	-0.029	-0.017	-0.027	-0.038
	[0.027]	[0.040]	[0.039]	[0.049]	[0.022]	[0.026]	[0.036]	[0.041]
lp	-0.027	-0.009	-0.042	0.098	-0.029	0.065	0.062	0.002
	[0.059]	[0.084]	[0.092]	[0.111]	[0.051]	[0.054]	[0.063]	[0.072]
klratio	-0.066*(‡)	0.007	-0.048	-0.049 (‡)	0.029 (‡)	0.083*	0.089	0.122*(‡)
	[0.040]	[0.055]	[0.064]	[0.069]	[0.035]	[0.049]	[0.065]	[0.065]
lngo	0.025	-0.015	0.070	0.122	0.024	0.086*	0.120**	0.090
	[0.038]	[0.049]	[0.071]	[0.084]	[0.037]	[0.046]	[0.054]	[0.076]
lntotemp	0.002	-0.031	0.053	0.051	0.017	0.039	0.064*	0.059
	[0.031]	[0.044]	[0.063]	[0.069]	[0.024]	[0.038]	[0.038]	[0.056]
lnavg_wage	0.028 *	0.016	0.012	0.074*	0.024	0.021	0.057**	0.053*
	[0.015]	[0.021]	[0.025]	[0.042]	[0.015]	[0.020]	[0.026]	[0.028]
N	274,227	206,385	154,494	112,872	274,251	206,406	154,491	112,857
N(treated)	351	267	222	180	375	291	219	162
Proportion dropped:								
Treated	0.154	0.157	0.176	0.250	0.104	0.144	0.178	0.185
Control	0.789	0.811	0.834	0.852	0.376	0.439	0.498	0.554

See Table 4 for notes. Estimated treatment effects for high and low subsamples significantly different from each other at the (†) 5%; (‡) 10% level. Balancing tests passed at the 10% level except for specifications as indicated in the table: (a) capital-labour ratio (t=3,4): (b) 2005 dummy (t=2), Canterbury dummy (t=3); (c) log gross output (t=1), Auckland dummy (t=1,2), Wellington dummy (t=1), dummies indicating missing lagged variables (t=3).

5 Conclusion

This paper examines the impact of foreign direct investment on firm performance and worker outcomes in recently acquired firms. Following recent literature we use combined propensity score matching and difference-in-difference estimation to control for selection effects in acquisition. We find that the main factor underlying observed performance premia for foreign-owned firms in New Zealand is related to positive target selection. Foreign acquisition targets tend to be firms which were already larger, more productive, and more likely to be exporting than their competitors.

We also find limited evidence of positive post-acquisition effects on performance, with recently acquired firms exhibiting stronger growth in average wages, output, and employment than might otherwise be expected. We find no evidence of increased closures in acquired firms. However, these positive effects do not extend to productivity growth, one area where we might have most naturally expected to see benefits associated with foreign investment. Tentative evidence of post-acquisition capital deepening is limited to target firms which were initially relatively capital-shallow (for an acquired firm).

One firm outcome which has not been considered in the current study is the role of foreign ownership in firm-level export performance. In a survey of firms, Simmons (2002) finds that a key reason why domestic firms pursue foreign investment is in order to access the offshore distribution networks controlled by their new owners. Thus, foreign ownership may lead to expansion of export markets. Future work could restrict the sample to manufacturing firms and focus on the development of further exporting capability, as evidenced by both the value and volume of exports, and by firm-level entry into new markets and products.

6 References

Almeida, R (2007) "The labor market effects of foreign owned firms." *Journal of International Economics* 72(1): 75–96.

Arnold, J and B Javorcik (2009) "Gifted kids or pushy parents? Foreign direct investment and plant productivity in Indonesia." *Journal of International Economics* 79(1): 42–53.

Bandick, R and H Görg (2010) "Foreign acquisition, plant survival, and employment growth." *Canadian Journal of Economics* 43(2): 547–573.

Bellak, C (2004) "How domestic and foreign firms differ and why does it matter?" *Journal of Economic Surveys* 18(4): 483–514.

Bernard, A and F Sjöholm (2003) "Foreign owners and plant survival." National Bureau of Economic Research, Working Paper No 10039.

Bertrand, O (2009) "Effects of foreign acquisitions on R&D activity: Evidence from firm-level data for France." *Research Policy* 38(6): 1021–1031.

Caliendo, M and S Kopeinig (2008) "Some practical guidance for the implementation of propensity score matching." *Journal of Economic Surveys* 22(1): 31–72.

Cartwright, W (2001) "Multinational enterprise engagement and development in New Zealand." in J Yeabsley ed *Global player? Benchmarking New Zealand's competitive upgrade.* Research Monograph 67 (NZ Institute of Economic Research: Wellington): 41–47

Chen, W (2011) "The effect of investor origin on firm performance: Domestic and foreign direct investment in the United States." *Journal of International Economics* 83(2), 219–228.

Conyon, M, S Girma, S Thompson, and P Wright (2002) "The productivity and wage effects of foreign acquisition in the United Kingdom." *Journal of Industrial Economics* 50(1): 85–102.

Criscuolo, C and R Martin (2009) "Multinationals and U.S. productivity leadership: Evidence from Great Britain." *The Review of Economics and Statistics* 91(2): 263–281.

Doms, M and J B Jensen (1998) "Comparing wages, skills, and productivity between domestically and foreign-owned manufacturing establishments in the United States." in R Baldwin, R Lipsey, and J D Richards eds *Geography and Ownership as Bases for Economic Accounting* (National Bureau of Economic Research: Cambridge MA): 235–258.

Dunning, J (1977) "Trade, location of economic activity and the MNE: A search for an eclectic approach," in B Ohlin, P-O Hesselborn, and P Wijkman eds *The International Allocation of Economic Activity* (Macmillan: London)

Dunning, J and S Lundan (2008) *Multinational Enterprises and the Global Economy*. (Edward Elgar: Cheltenham, UK).

Fabling, R (2009) "A rough guide to New Zealand's Longitudinal Business Database." Institute of Economic Research, Hitotsubashi University, Global COE Hi-Stat Discussion Papers, No. 103.

Fabling, R (2011) “Keeping it together: Tracking firms in New Zealand’s Longitudinal Business Database.” Motu Economic and Public Policy Research, Working Paper 11-01.

Fabling, R and D Maré (forthcoming), “Production function estimation using New Zealand’s Longitudinal Business Database.” Motu Economic and Public Policy Research, Working Paper.

Fabling, R and L Sanderson (2010) “Exporting and performance: Market entry, expansion and destination characteristics.” Reserve Bank of New Zealand, Discussion Paper DP2010/07.

Gawith, A (2002) “Firm-level manufacturing export study.” Report to the Ministry of Economic Development, the Treasury, and Trade New Zealand.

Girma, S (2005) “Safeguarding jobs? Acquisition FDI and employ- ment dynamics in U.K. manufacturing.” *Review of World Economics (Weltwirtschaftliches Archiv)* 141(1): 165–178.

Greenaway, D and R Kneller (2007) “Firm heterogeneity, exporting and foreign direct investment.” *Economic Journal* 117(517): F134–F161.

Grimpe, C and K Hussinger (2008) “Market and technology access through firm acquisitions: Beyond one size fits all.” Center for European Economic Research, ZEW Discussion Paper 08-037.

Guadalupe, M, O Kuzmina, and C Thomas (2010) “Innovation and foreign ownership.” National Bureau of Economic Research, Working Paper 16573.

Harris, R and C Robinson (2002) “The effect of foreign acquisitions on total factor productivity: Plant-level evidence from U.K. manufacturing 1987-1992.” *Review of Economics and Statistics* 84(3): 562–568.

Heyman, F, F Sjöholm, and P Tingvall (2007) “Is there really a foreign ownership wage premium? Evidence from matched employer-employee data.” *Journal of International Economics* 73(2): 355–376.

Huttunen, K (2007) “The effect of foreign acquisition on employment and wages: Evidence from Finnish establishments.” *The Review of Economics and Statistics* 89(3): 497–509.

Imbens, G and J Wooldridge (2008) “Recent developments in the econometrics of program evaluation.” National Bureau of Economic Research, Working Paper 14251.

Markusen, J (1995) “The boundaries of multinational enterprises and the theory of international trade.” *Journal of Economic Perspectives* 9(2): 169–89.

Melitz, M (2003) “The impact of trade on intra-industry reallocations and aggregate industry productivity.” *Econometrica* 71(6): 1695–1725.

OECD (2010) *OECD Factbook 2010.* (Organization of Economic Cooperation and Development: Paris).

Scott-Kennel, J (2004) “Foreign direct investment in New Zealand.” *University of Auckland Business Review* 6(2): 41–49.

Simmons, G (2002) “Growing pains: New Zealand qualitative evidence on hurdles to exporting growth.” New Zealand Treasury, Working Paper 02/10.

Smith, J (2004) “Evaluating local economic development policies: Theory and practice,” in S Arzeni, A Nolan, and G Wong eds *Evaluating local economic and employment development: How to assess what works among programmes and policies* (Organisation for Economic Co-operation and Development: Paris): 287–332

Appendix Table 1 – Variable definitions and summary statistics for selection equation

Variable	Definition	Treated		Untreated	
		Mean	Std Dev	Mean	Std Dev
lngo	Log gross output (Y)	2.194	1.784	0.612	1.198
lntotemp	Log total employment (ln L) where L is working proprietors (WP) plus average monthly employees (E)	1.449	1.696	0.489	1.004
lp	(ln(Y-M) – ln L) where M is intermediate consumption	0.580	0.941	0.122	0.733
klratio	Capital labour ratio (ln K – ln L) where K is capital services	0.512	1.000	0.060	0.955
mfp	Multi-factor productivity, ε, from OLS regression: ln Y = α ln L +β ln K + γ ln M + c + ε with industry-specific α, β, γ, c	-0.001	0.424	0.005	0.347
lnavg_wage	ln (W/E) where W is total wages	0.355	0.528	0.020	0.646
export_intensity	Zero-rated GST sales / Total GST sales	0.153	0.292	0.032	0.140
ΔX	Bounded change in X, ie $(X_t – X_{t-1}) / (X_{t-1} + X_t)$				
Δklratio		0.009	0.219	-0.003	0.212
Δtotemp		0.138	0.320	0.127	0.323
Δavg_wage		0.019	0.101	0.017	0.147
δ(entrant)	Dummy = 1 if $L_{t=-1} = 0$ (ie, firm had no labour input at t=-1)	0.091		0.088	
δ(non-employing$_{t=-1}$)	Dummy = 1 if $E_{t=-1} = 0$ (ie, firm had no employees at t=-1, but may have had one or more working proprietors)	0.107		0.128	
δ(missing_mfp$_{t=-1}$)	Dummy = 1 if Y, L, K or M missing at t=-1	0.094		0.093	
δ(exporter)	Dummy = 1 if zero-rated GST sales > 0	0.516		0.150	
δ(subsidiary)	Dummy = 1 if the enterprise is a subsidiary of another domestic enterprise	0.623		0.045	
Regional council dummies:					
Northland		0.032		0.035	
Auckland		0.718		0.336	
Waikato		0.094		0.097	
Bay of Plenty		0.071		0.069	
Gisborne		0.010		0.010	
Hawkes Bay		0.065		0.043	
Taranaki		0.036		0.023	
Manawatu/Wanganui		0.071		0.050	
Wellington		0.211		0.098	
West Coast		0.003		0.010	
Canterbury		0.221		0.160	
Otago		0.078		0.058	
Southland		0.036		0.028	
Tasman		0.006		0.012	
Nelson/Marlborough		0.042		0.028	

Means of binary variables calculated after random rounding (base 3) in accordance with Statistics New Zealand confidentiality protocols.
Performance variables follow Fabling and Maré (forthcoming). Selection equation also includes a full set of industry and year dummies (not reported).
Data sources:

L, E, W, WP	Linked Employer-Employee Dataset
Y, K, M	Annual Enterprise Survey and IR10 tax returns
GST sales	Business Activity Indicator
Subsidiary	Longitudinal Business Frame