



# The effect of investor origin on firm performance: Domestic and foreign direct investment in the United States<sup>☆</sup>

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## ABSTRACT

This paper evaluates the causal relationship between the source of origin of FDI and the performance of the target firm. The empirical analysis uses new data on a comprehensive sample of public U.S. firms that received FDI between 1979 and 2006. To account for the possibility that performance differences arise due to the selection of superior target firm rather than the change in ownership, I use propensity score matching to create similar comparison groups of target firms prior to acquisitions. The analysis reveals three major findings. First, acquiring firms from industrialized countries lead to labor productivity increases of 13% in the target firm three years after the acquisition compared to targets acquired by domestic firms. Firms that received developing country firm acquisitions, on the other hand, exhibit lower labor productivity gains four years after acquisition, compared to targets acquired by domestic firms. Second, targets receiving FDI by firms from industrial and developing countries also experience increases in profits, compared with firms receiving acquisition by domestic firms from the United States. Third, compared with domestic acquisitions, foreign industrial firm acquisition FDI tends to increase their targets' employment and sales, whereas targets acquired by firms located in developing countries experience a decrease in both revenues and total number of employees. These findings suggest that target firms are subject to significantly different restructuring processes depending on the origin of the acquiring firm.

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## 1. Introduction

Historically, the majority of foreign direct investment (FDI)<sup>1</sup> flows has taken place predominantly between industrialized countries and from developed to developing countries. In recent years, however, developing country firms started engaging in outward FDI activity. The recent upsurge in cross-border mergers and acquisitions (M&As) from emerging countries such as China's Lenovo purchase of IBM Thinkpad and India's Tata Motor's acquisition of Ford's Jaguar and Landrover has raised great attention in policy circles, but yet, little is known about how these emerging market acquisitions are different from acquisitions by acquirers from developed countries.

Traditionally, the business rationale for M&A is that the new combination of assets will be more productive than the sum of its parts (Dunning, 1981; Hymer, 1976). Theories for FDI have relied on

differences in relative input costs and market access as motivations for developed-market investment flows to emerging markets (Yeaple, 2003). Helpman et al. (2004) suggest that firms that invest abroad have to overcome larger fixed costs and barriers. As a result, foreign acquiring firms have to be more productive than their peers. In addition to technology transfer, industrial country acquirers often seek lower labor costs in emerging markets. For emerging market acquirers, the rationale for cross-border M&A might be different. Endowed with a relatively larger and cheaper labor force, it is likely that emerging market acquirers may relocate (or insource) manufacturing activity while keeping existing distribution networks in the host country of the acquired business (Chari et al., 2009). Therefore, the changing composition in acquirers raises the question whether heterogeneity among acquirers has consequences for target selection, implementation of M&As, and, therefore, post-acquisition target performance. Although existing studies have shown superior performance in foreign-owned firms compared with domestically owned firms (e.g., Harris and Ravenscraft, 1991; Swenson, 1993; Doms and Jensen, 1995; Haskel et al., 2007), little is known about the differences in performance within the group of acquired firms and whether the act of acquisition improves target firm performance. This paper fills this gap by estimating the causal effects of acquirer origin heterogeneity on target firm performance.

I use a newly-constructed data set to examine whether the post-acquisition performance of U.S. target firms differs when the buyer is

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<sup>1</sup> FDI includes "Greenfield" investment in new assets in a foreign country and acquisition of pre-existing foreign assets, also termed "Brownfield" FDI. In this paper, I concentrate exclusively on brownfield FDI in the United States.

either a U.S. domestic firm, an industrial country firm, or a developing country firm. I assemble a comprehensive sample of acquired U.S. public firms by linking daily M&A transaction information from SDC Thomson to each target firm's financial statement in Compustat. The U.S. provides a particularly suitable setting in which to study M&As given its role as the world's most sought after target country, with a combined value of cross-border and domestic M&A deals of \$1.47 trillion in 2007.<sup>2</sup>

When comparing the impact of domestic and various foreign acquisitions on U.S. target firm performance, there are two main empirical challenges. First, the issue of selection arises in that better post-acquisition performance might be a result of more skillful selection (also referred to as “cherry picking” of targets) rather than the change in ownership per se. Second, one would ideally compare the performance of a target firm that is acquired by a domestic firm with the performance of the same target had it been acquired by a non-U.S. industrial country firm or a developing country firm.<sup>3</sup> However, these counterfactuals are not observable because at any given point in time a target firm experiences only one of three events – it is acquired by either (1) a domestic firm, (2) an industrial country firm, or (3) a developing country firm. This creates a missing data problem. To solve these issues, I use propensity score matching to construct a comparison group of domestically acquired target firms that is similar on a set of important observable characteristics to the group of targets acquired by industrial country firms or developing country firms. In evaluating the target firm performance after the acquisition, I use measures of labor productivity, profits, sales, and employment as outcome variables.

I find that over a period of five years following acquisition, compared to U.S. domestically acquired targets, targets acquired by industrial country firms experience a significantly higher growth rate in labor productivity of up to 13%, whereas for targets acquired by developing country firms, the growth rate in labor productivity is 23% lower. Moreover, targets acquired by industrial country firms and by developing country firms exhibit higher average profits compared with acquisitions by U.S. firms – by ten and nine percentage points, respectively. The data show that compared with domestic acquisitions, sales also tend to increase in industrial country firm acquisitions – by up to 29% compared to a similar group of domestically acquired firms, whereas sales decline by up to 20% for targets acquired by developing country firms compared to a similar group of domestically acquired firms. Finally, whereas industrial country firm acquisitions lead to an increase in employment of 24% in their targets, targets of developing country firm acquisitions reduce their total number of employees by up to 26%.

Several sensitivity analyses are performed to assess the validity of the findings. I first show that the results are robust to different propensity score specifications. Additionally, I use a small sample of announced deals that were subsequently withdrawn and find no differences in target performance between domestic withdrawn and foreign withdrawn deals. To illustrate the importance of controlling for selection and creating appropriate comparison groups, I redo the analysis without propensity score matching and show that the results are different. Lastly, I perform robustness checks on various subsamples of the data to make sure that the results are not specific to one particular feature of the data.

This paper provides some of the first findings on the differences in various aspects of target post-acquisition performance as a result of acquirer origin heterogeneity. Previous studies do not differentiate between the investor origin, since the comparison is conducted only between foreign-acquired and non-foreign-acquired firms.<sup>4</sup> There-

fore, average effects estimated across groups could mask differences in performance between each of the groups.

Examining the impacts of foreign and domestic acquisitions on target firms also reveal important policy implications. The U.S. government has sometimes taken a hostile attitude toward foreign acquirers of U.S. target firms.<sup>5</sup> Another source of concern about foreign acquisitions is the potential loss of American jobs. Domestic M&A transactions do not provoke the same sort of concerns as their cross-border counterparts.<sup>6</sup> Understanding the impacts of cross-border M&As sheds light on whether these political concerns are validated by the post-acquisition economic performance of the different types of acquisitions.

I begin with a theoretical and empirical background on why investor origin impacts target firm performance based on existing literature. Section 3 provides a description of the data. Section 4 outlines the details of the identification strategy using multiple treatment propensity score matching combined with a difference-in-differences estimator. Section 5 presents the empirical results and discusses the different ways in which gains are realized among the varying types of acquirers. Section 6 provides robustness checks, and Section 7 concludes with a discussion of the implications of these results for both future research on FDI and economic policy.

## 2. Empirical and theoretical background

A burgeoning literature in international economics has conducted causal analyses on foreign ownership and firm performance (Djankov and Hoekman, 2000; Conyon et al., 2001, 2002; Harris and Robinson, 2003; Bertrand and Zitouna, 2005; Girma, 2005; Benfratello and Sembenelli, 2006; Fukao et al., 2006; Girma and Görg, 2007a,b; Heymann et al., 2007; Arnold and Javorcik, 2009, just to name a few). These papers focus on ex-post performance changes in the target firm after foreign takeover. This literature has found mixed evidence on whether foreign-owned firms perform better than domestic-owned firms. To disentangle correlation from causality, Arnold and Javorcik (2009), for instance, create a carefully selected group of non-acquired firms using a propensity score matching technique combined with a difference-in-differences estimator.

Essentially, previous studies have treated all foreign acquirers as homogeneous when exploring the question of whether foreign acquisition leads to higher productivity.<sup>7</sup> In contrast, the present paper regroups acquired target firms by acquirer firm origin. This study asks the following: Are there differences in the target firm performance after the acquisition? And if so, how do these effects differ within the group of all acquired firms? To answer this question, I also take into account the domestically acquired targets which are usually buried in the comparison group of all non-foreign-acquired targets in other studies. Since domestic acquisitions play a dominant role, especially in the United States, previous papers might have overlooked important insights into M&As by not comparing domestic acquisitions directly with foreign acquisitions.

Broadly, acquiring additional capital may increase profits via two channels. First, the industrial organization theory of multinational firms suggests that multinationals have access to firm specific assets (Markusen, 2002) that can translate into operating with superior technology or better management strategy and know-how. Helpman et al. (2004) propose that firms that invest abroad have to overcome

<sup>5</sup> See the article “Love me, love me not” in the July, 2008 issue of *The Economist*.

<sup>6</sup> For instance, Whirlpool's bid to buy Maytag in 2005 was received with enthusiasm, while a potential buyout of the same company by a Chinese-owned firm was perceived with concern by both American politicians and media.

<sup>7</sup> Notable exceptions are Girma and Görg (2007b) who differentiate acquirers by country groups in their investigation on wage premia and recent work by Javorcik and Spatareanu (2010) that examines the impact of investor origin on vertical spillovers from foreign direct investment.

<sup>2</sup> Source: SDC Thomson.

<sup>3</sup> The same can be said of comparisons between target firms that are acquired by industrial country firms and by developing country firms.

<sup>4</sup> A notable exception is Girma and Görg (2007b).

larger fixed costs and barriers. As a result, foreign acquiring firms have to be more productive. The superior technology from the foreign acquirer coupled with the new market access made possible by the domestic target will increase profitability through cost reduction and increased sales. Empirical evidence has indeed confirmed these theories and associate foreign ownership with improvements in plant productivity (Harris and Ravenscraft, 1991; Caves, 1996; Swenson, 1993; Doms and Jensen, 1995; Aitken and Harrison, 1999; Haskel et al., 2007; Arnold and Javorcik, 2009). By comparison, acquirers that purchase a target firm at home do not have to overcome barriers that foreign acquisition would require. Therefore, unlike foreign acquirers, domestic acquirers do not have such superior technology advantages. In fact, Spearot (2010) shows in his model that foreign acquirers tend to be more productive than domestic acquiring firms.

The second channel of profit increase comes through decrease in production costs. Yeaple (2003) suggests differences in relative input and production costs as motivations for FDI. The merged firm can choose to reallocate production amongst the best assets of both firms (Spearot, 2010). This process might involve reducing output at more costly production sites, firing more expensive workers, and shifting production to plant locations that provide cheaper labor and inputs.

Given these various channels of profit increases through M&A, there are at least two reasons why one would expect investor origin to affect target post-acquisition performance. First, in terms of productivity improvements through M&A, most theoretical models and empirical work are restricted to FDI flows that have taken place between industrialized countries and from industrialized countries to developing countries. In those instances, technology transfers are more likely to happen from the foreign acquirer to its target firms. If the acquiring firm is from a developing country, however, and the target is a U.S. firm, transfer of technology from the acquirer to that target firm becomes less likely (Javorcik and Spatareanu, 2010). Foreign acquiring firms from industrialized countries, on the other hand, have much closer average productivity levels to U.S. firms to begin with, and because they have to overcome larger barriers than U.S. domestic acquirers, they are more likely to transfer superior technology to their targets. Therefore, compared to U.S. domestic acquisitions, foreign industrial acquisitions improve productivity in their targets, while developing country acquisitions are likely to fail in achieving productivity gains in their targets. Also, compared to developing country acquisitions, foreign industrial acquisitions lead to bigger productivity gains in their targets.

The second reason for investor origin effects is the relative input cost argument. In particular, emerging market acquirers are endowed with a relatively larger and cheaper labor force than acquirers in the U.S. or from industrialized countries. Therefore, emerging market acquirers are likely to relocate (or insource) manufacturing activity while keeping existing distribution networks in the host country of the acquired business (Chari et al., 2009). Hence, compared to U.S. domestic acquisitions and acquisitions by industrialized country firms, developing country acquisitions decrease employment in their U.S. target firms.

These different investor origin effects have further implications on other measures of target firm performance. As a result of productivity increases in targets acquired by foreign industrialized country firms compared to other targets, those are likely to experience increases in sales, a closely related measure of productivity. Targets acquired by developing country firms, on the other hand, experience sales decreases as well employment decreases compared to the other targets. By relocating production from the more expensive target site in the U.S. to the parent home site located in a developing country, the target firm is being cut in size and as a result, all revenues that were previously attributed to the target are also being reduced.

There are also impacts on target profits. Compared to U.S. domestic acquisitions, acquirers from foreign industrialized countries increase profits in their targets due to better technology that in turn increase sales and reduce costs. Profits behave more ambiguously in targets acquired by developing country firms. Compared to U.S. domestic acquisitions, targets acquired by developing country firms might experience a reduction in profits due to lower productivity and lower sales, but on the other hand, these targets also enjoy decreases in costs due to reallocation of labor. Thus, depending on which effect dominates, profits could either increase or decrease as a result of the M&A by a developing country firm.

It is possible to divide by investor origin in many ways.<sup>8</sup> An obvious method would be to differentiate by individual acquirer firm country. The problem with this approach is that the density of various countries represented in the data is much lower than others. Given that productivity levels are more uniform within industrialized countries and within developing countries, I have grouped the foreign acquirers into OECD countries for the first group and non-OECD countries for the second group.<sup>9</sup> The third group is the group of U.S. domestic acquirers. I conduct robustness checks within these foreign acquirer groups to show that target performances do not vary much when compared within each group, but that the variation is mostly when comparison is done across these groups.

### 3. Data description

The data sample contains M&As involving all acquisitions of public U.S. target firms that were announced and completed between January 1, 1979, and December 31, 2006, and are reported by SDC Thomson. For each transaction, the SDC database provides information about the date on which the transaction was announced and the date on which the transaction became effective or was withdrawn. The database also provides some characteristics of the target and acquiring firms such as name, nation, industry sector, North American Industry Classification System (NAICS) code and for some of the transactions, SDC also reports the percentage of shares acquired, the value of the transaction, the number of bidders, the method of payment, and whether the target firm is delisted as a result of acquisition.

Over the sample period 1979–2006, SDC reports a total of 2074 M&A transactions between foreign firms and public U.S. targets and 22,971 between U.S. acquirers and U.S. public target firms (see Table 1). Out of the 2074 foreign takeovers of public U.S. firms, 1768 (85%) are undertaken by industrial country firms (ICFs) and the rest by developing country firms (DCFs).

The summary statistics of the acquisitions are also presented in Table 1. Among the ICF acquisitions, the top five acquirer nations make up about 75% of all ICF public acquisitions and the top five DCF acquirers make up 67% of all DCF public acquisitions. The top three industries for each type of acquisition are manufacturing, finance, and real estate. The fraction of majority acquisitions are similar for ICF and U.S. domestic public acquisitions (40%), but lower for DCF public acquisitions (25%).

<sup>8</sup> The existing literature has often compared foreign-acquired to non-acquired target performance as supposed to comparing performance within a group of all acquired target firms. Chari et al. (2009) compare firms acquired by developing country firms to non-acquired firms. I also conduct robustness checks between industrial country firm-acquired vs. non-acquired target firms. The results are in line with the existing literature that has found superior performance in foreign-owned firms compared to domestic companies.

<sup>9</sup> The OECD countries in the group of industrial country firm acquirers are: Australia, Austria, Belgium, Canada, Denmark, France, Germany, Italy, Japan, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United Kingdom. The non-OECD countries in the group of developing country firm acquirers are: Algeria, Argentina, Brazil, China, Costa Rica, Ecuador, Hong Kong, India, Indonesia, Kuwait, Malaysia, Mexico, Nigeria, Papua New Guinea, Russia, Saudi Arabia, Singapore, South Africa, South Korea, Taiwan, Thailand, Uganda, Uzbekistan, and Venezuela.

**Table 1**  
Number of observations for each type of acquisition and transactions details.

	US to US	ICF to US	DCF to US
Completed M&As (publicly listed target firm)	22,971	1768	306
Involved in multiple acquisitions	4874	388	73
Number of withdrawn deals Top 5 acquiring nations	3976	256 UK Canada Japan France Germany	25 Hong Kong Singapore Mexico South Korea Taiwan
Majority control (>50%)	9206	786	76
Matched to Compustat	14,577	1209	205
Avg Acq value	\$100.6 mil	\$130.5 mil	\$69.2 mil
Top 2 industry	Finance, Manufacturing	Manufacturing,	Finance, Manufacturing
Financed with cash	10,231	943	203
Financed with stock	1916	42	5

Notes: The table summarizes the sample of transactions involving publicly listed U.S. targets announced between 1990 and 2006.

The financial statement data for the U.S. target firms come from Compustat North America.<sup>10</sup> In order to match the public U.S. target firms from SDC Thomson with the firms' financial statements in Compustat, several identifiers are used. Using the CUSIP,<sup>11</sup> ticker symbol, target name, and industry provided in SDC, each public U.S. target is matched by hand with the same firm listed in the Compustat database. During this process, some firms in SDC cannot be found in Compustat. The two main reasons are that (1) the firm has been delisted, or (2) the firm is not listed on a stock exchange that is covered by Compustat. SDC indicates that 5% of each type of acquisition results in the delisting of a target firm in the year of the acquisition. If a firm is delisted in the years after the acquisition, Compustat will change the status of the firm from active to inactive. For ICF public acquisitions, U.S. public targets from 1209 transactions (68%) were matched into Compustat and 205 transactions (67%) were matched for DCF public acquisitions. Among U.S. domestic M&As, 14,577 transactions (63%) are matched into Compustat. This matched sample consists of a total of 15,991 M&A deals.

The majority of ICF and domestic acquirers are publicly listed companies, which is not the case for acquirers from developing countries. In fact, 10% of DCF acquirers are government entities, a share that is substantially larger than those for ICF and domestic acquiring firms. The price of acquisition and payment methods across the three different groups of acquirers are also interesting. An overwhelming majority of deals are financed purely with cash when the acquirer is from a developing country, whereas the share of purely stock financed deals is the largest for U.S. domestic acquirers. The data on average price of acquisition indicates that foreign acquirers from industrialized countries pay the most, followed closely by domestic acquirers. DCF acquirers, on the other hand, pay the lowest amount.<sup>12</sup>

The availability of financial data in Compustat varies strongly by firm, by year and by variable. For instance, the employment variable is reported on a voluntary basis in Compustat, which leads to spottiness in the

<sup>10</sup> Compustat North America is compiled by Standard & Poor's and provides the annual and quarterly Income Statement, Balance Sheet, Statement of Cash Flows, and supplemental data items on over 24,000 publicly held companies in North America.

<sup>11</sup> The CUSIP is a six-character code consisting of numbers in the first three positions and either an alpha or numeric character in the fourth, fifth, and/or sixth positions. CUSIP numbers and target names can often change due to splits, mergers, and delistings and relistings. Furthermore, depending on what stock exchange a firm is listed on, the ticker symbol is generally not unique, and one firm can also have several ticker symbols. Thus, it takes several identifiers to make sure that the U.S. target firm from SDC is indeed linked to the correct one in Compustat.

<sup>12</sup> Unfortunately, SDC only reports the value of the acquisition for half of the deals, although, it does seem to be random for which deal it is reported (DiGiovanni, 2005). Therefore, this trend should be considered with caution.

**Table 2**  
Industry characteristics of target Firms.

Target NAICS	Industry	Freq.	Acquirer origin			Median		
			US	IND	DEV	Profit/asset	Sales (\$mil)	Employees (mil worker)
11	Agriculture	81	30	3	0	0.129	101.48	0.809
21	Natural resources	942	375	50	13	0.112	31.34	0.104
22–23	Utilities, construction	781	293	24	2	0.11	334.03	1.205
31–33	Manufacturing	9181	3380	442	67	0.126	94.1	0.873
42–45	Wholesale and retail trade	2142	733	60	12	0.123	303.24	2
48–49	Transportation and warehousing	536	212	18	0	0.126	298.37	1.98
51	Information	2009	682	68	9	0.101	61	0.408
52	Finance and insurance	4771	1934	88	15	0.025	96	0.9
53–56	Real Estate and Adm Services	1846	918	91	14	0.112	46.87	0.449
62–81	Recreation, food and entertainment	1354	609	33	8	0.128	88.11	1.9

Notes: The table displays the U.S. target firm financial accounting information based on the sample of transactions involving publicly listed U.S. targets announced between 1990 and 2006. Percentages in parentheses are of total number within the given category.

availability. Although individual variables might be available on their own, several variables have to be available for a given year to do the analysis. This collective lack of data shrinks the sample size. I correct this problem by using multiple imputations for several missing variables.<sup>13</sup> Table 2 lists the median values of financial characteristics of acquired public U.S. firms based on Compustat by 2-digit NAICS codes. There is a considerable variation in sales and number of workers across different 2-digit NAICS industries, whereas median return on assets (profit/assets) seems to be fairly consistent across industries.

Lastly, there are target firms that have been acquired more than once by both U.S. acquirers and foreign firms. Of the 15,991 completed deals for all three types of acquirers that are matched into Compustat, about 20% of target firms have been acquired more than once. For the main results, I include only the first occurrence of a transaction of each target firm in the data set, and in the case of a target firm acquired by a U.S. firm and by either an ICF or DCF, the first acquisition is included in the data set only if the subsequent transaction is at least five years after the first transaction.<sup>14</sup>

#### 4. Econometric strategy

In order to conduct a meaningful comparison of performance between U.S. public firms acquired by foreign investors and those acquired by domestic firms, it is necessary to establish a missing counterfactual capturing the performance of the foreign-acquired firms had they been acquired by domestic firms. The case here is complicated by the fact that foreign acquirers are from different country groups, industrial countries and developing countries. In previous studies, it has been common to use binary choice models, since there are two acquisition states, e.g., foreign-acquired or not foreign-acquired. In this paper, there are more than two possible treatments for a target firm: (1) acquisition by a domestic firm, (2)

<sup>13</sup> In particular, I use imputation by chained equations method to impute missing values for the year prior to acquisition on three variables: number of employees, debt and cash. The main results remain robust without imputation.

<sup>14</sup> In another method, all transactions are kept in the data set, and each transaction regardless of reoccurrence of the same target is regarded as a unique observation. A third method is to take out all targets that have been acquired multiple times. I conduct the same study using data from the second and third methods as a robustness check.

acquisition by an industrial country firm (ICF) other than U.S., and (3) acquisition by a developing country firm (DCF).

For tractability and interpretation, it is assumed that each target firm receives only one of the above treatments. Given the multiple treatment alternatives, the analysis focuses on pairwise average treatment effects following Gerfin and Lechner (2002) and Imbens (2000). For each pair of comparison, I could run a binary logit to estimate the propensity scores and then proceed to matching. With three treatments, however, a better way is to use a multinomial logit to estimate the propensity scores. Multiple treatment matching has several advantages. First, it allows me to estimate a number of parameters simultaneously. Another one is that I can impose a support condition that is common to all analyses.<sup>15</sup>

The three main outcome variables of interest are log of sales divided by number of employees, a proxy for labor productivity,<sup>16</sup> log sales, log employment, and profits – profits being operating income before depreciation (OIBD) scaled by total assets, also referred to as return on assets (ROA). The reason to use these four measures as outcome variables is that they are all closely related to productivity. In the Helpman et al. (2004) model, sales and profits are correlated since both are determined solely by productivity. This correlation has been generally confirmed in the data (Bernard et al., 2007). In addition, studies also find that higher productivity firms employ more workers.

Propensity score matching alone eliminates differences between the treatment and control groups based on observable characteristics included in  $X$ . In addition to the observable characteristics, there might be other systematic differences between the two groups that are due to unobservables. The difference-in-differences matching (DDM) estimator alleviates this issue by eliminating unobservable time-invariant differences between the treatment and control groups.

The comparison group is created on the basis of observable plant characteristics and the vector of control variables in  $X$  should include all factors that affect both treatment and outcome (Rosenbaum and Rubin, 1983). The three types of potential acquirers choose targets based on specific criteria that might be systematically different. All potential investors rely heavily on basic observable characteristics of firms, such as their age, size, employment, and machinery and equipment available. Future performance measures of a target firm ought to be of particular interest to potential investors. The literature has used price earnings ratios as indicators of future performance. Another variable is Tobin's  $Q$ ,<sup>17</sup> since it is a proxy for growth opportunities for a firm (e.g. Servaes, 1991; Wernerfelt and Montgomery, 1988). The level of a target firm's income and sales is an indication of its profitability and market power. Some acquirers prefer more technology intensive industries, thus requiring the use of industry-fixed effects. By using year-fixed effects, I control for time dependent macro factors such as the exchange rate (Froot and Stein, 1991). Lastly, since targets are located in different states that might have state-specific factors affecting the acquisition status, such as tax benefits, state-fixed effects are also included.

There are various matching methods available. Each scheme involves the definition of a closeness criterion, a neighborhood, and the selection of an appropriate weighting function to assign to the set of comparison observations with each treated firm. The choice relies on the trade-off between variance and bias associated with each type of matching performed. In general, increasing the neighborhood or bandwidth to construct the comparison units will reduce the variance and increase the bias resulting from using on average more, but lower

quality matches. In this case, kernel matching is applied to the comparison group.<sup>18</sup> More specifically, kernel matching assigns positive weight to comparison observations with propensity scores similar to that of each treated observation, where the weights decrease with the propensity score distance. The mean of the comparison group is calculated based on a kernel weighting function.<sup>19</sup>

There are several ways to assess how well the propensity score matching does at balancing the conditioning variables using methods suggested in Dehejia and Wahba (2002) and Smith and Todd (2005), for instance. More specifically, for each covariate, I take the average difference between the treated units and the matched (or reweighted) comparison units and normalize it by the pooled standard deviation of the covariate in the treated and comparison samples.<sup>20</sup> As the balancing test results are indicated in Table 3,<sup>21</sup> some covariates that have significant differences in means between the treated and the comparison groups do not differ significantly after being matched along the set of observables. These balancing results are an indication that this approach is capable of grouping together relatively homogeneous firms.

## 5. Results

### 5.1. Matching results based on sample of completed deals

The matching estimate indicates that on average ICF-acquired firms compared with U.S.-acquired firms that have been matched on the set of observable covariates experience a significant increase in labor productivity of up to 13% in five years following acquisition. Moreover, compared to the group of matched U.S. domestic firms, targets acquired by industrialized country firms also gain up to 10-percentage-point in their profits in year five following the acquisition relative to the year preceding the acquisition. In addition, ICF-acquired firms also experience statistically significant increases in log sales relative to the year before acquisition and compared with the matched group of domestically acquired U.S. target firms. On average, this increase in sales is about 19%. For example, if domestically acquired target firms were to increase their sales by \$10 million from the year before the acquisition, the matched group of ICF-acquired firms would experience a \$11.9 million increase in their sales relative to the year before the acquisition. Finally, when comparing ICF-acquired firms with U.S. domestically acquired target firms, the two groups do not differ significantly in terms of post-acquisition employment for the first four years after acquisition. In the fifth year, however, ICF-acquired firms show a 24-percent employment increase compared with U.S. domestically acquired targets and relative to the year before acquisition. Difference-in-differences matching estimation results are presented in Table 4 and the effects are plotted in Fig. 1.<sup>22</sup>

Developing country targets tend to experience lower labor productivity gains, albeit at low level of statistical significance, compared to U.S. domestically acquired firms. In year four after the acquisition, DCF targets experience 22.9% lower growth in labor productivity compared to the matched domestic target firms and relative to the year prior to acquisition. In terms of profits, however, targets acquired by developing country firms tend to experience

<sup>15</sup> A detailed matching protocol is provided in the online Appendix: [http://home.gwu.edu/~chenw/APPENDIX\\_online.pdf](http://home.gwu.edu/~chenw/APPENDIX_online.pdf).

<sup>16</sup> Sales over employees is a crude measure of labor productivity. Ideally, one would measure labor productivity using output per worker-hour, which is not available in this dataset.

<sup>17</sup> I follow the approach in Himmelberg et al. (1999) by calculating the market value of the firm as the sum of total liabilities, the value of the common stocks, and the estimated value of preferred stocks.

<sup>18</sup> I also impose a common support restriction in which observations were considered off support if the treated firm's propensity score lay above the maximum value or below the minimum value for the control firms.

<sup>19</sup> The function also involves the selection of a bandwidth in which I implement the "leave one out" cross-validation method following Plesca and Smith (2007). The cross-validation procedure is listed in the online Appendix.

<sup>20</sup> See Girma and Görg (2007b) for a detailed description.

<sup>21</sup> Balancing tests between DCF and U.S., and DCF and ICF are available upon request.

<sup>22</sup> The graphs are available in color in a working paper version of this article at [http://home.gwu.edu/~chenw/CountryOfOriginMA\\_110810\\_online.pdf](http://home.gwu.edu/~chenw/CountryOfOriginMA_110810_online.pdf).

**Table 3**  
Balancing tests.

ICF-Acquired (=1) and U.S.-Acquired (=0)						t-test	
Variable	Sample	Mean		%Diff	% Reduction in diff	t	p> t
		Treated	Control				
Age	Unmatched	22.807	24.135	−11.6		−1.78	<b>0.076</b>
	Matched	22.807	24.239	−12.5	−7.8	−1.43	0.153
PE ratio	Unmatched	10.702	12.924	−2		−0.33	0.744
	Matched	10.702	13.921	−2.8	−44.9	−0.33	0.742
Tobin's Q	Unmatched	2.252	1.873	14.8		2.75	<b>0.006</b>
	Matched	2.252	1.925	12.8	13.6	1.44	0.151
OIBD/Asset	Unmatched	0.031	0.074	−20.9		−3.23	<b>0.001</b>
	Matched	0.031	0.065	−16.6	20.6	−1.75	0.081
Log cash	Unmatched	1.742	1.935	−8.3		−1.32	0.188
	Matched	1.742	1.938	−8.4	−1.5	−0.96	0.335
Log sales	Unmatched	4.767	4.987	−10.4		−1.68	<b>0.094</b>
	Matched	4.767	5.063	−13.9	−34.7	−1.58	0.116
Log assets	Unmatched	5.095	5.334	−11.1		−1.78	<b>0.075</b>
	Matched	5.095	5.337	−11.3	−1.2	−1.28	0.199
Log employment	Unmatched	0.040	0.263	−11.3		−1.8	<b>0.072</b>
	Matched	0.040	0.315	−14	−23.6	−1.59	0.112
Log debt	Unmatched	2.951	3.103	−5.4		−0.85	0.394
	Matched	2.951	3.127	−6.2	−16.3	−0.71	0.479
Net income/asset	Unmatched	−0.062	−0.028	−11.7		−1.56	0.119
	Matched	−0.062	−0.034	−9.4	19.6	−1.04	0.297
Log net PPE	Unmatched	3.534	3.611	−3.3		−0.53	0.598
	Matched	3.534	3.703	−7.2	−120.3	−0.82	0.413

Notes: These tests check whether the matching approach is capable of grouping together relatively similar firms. The table presents the average difference in each of the covariates between the: (1) treated firms and the unmatched control firms, and (2) the treated firms and the matched (reweighted) control firms. Differences are normalized by a pooled standard deviation of the covariate in the two samples.

statistically significant increases compared to the matched U.S. domestic targets. The average increase in profits in year four and five after the acquisition for DCF compared with U.S.-acquired firms and to the year prior to acquisition is about 8.2 percentage points. In contrast to the industrial-country-acquired firms, sales decrease significantly for DCF-acquired firms in years one to three following

**Table 4**  
Post-acquisition performance characteristics between ICF and U.S. acquired targets (propensity score matching and difference-in-differences).

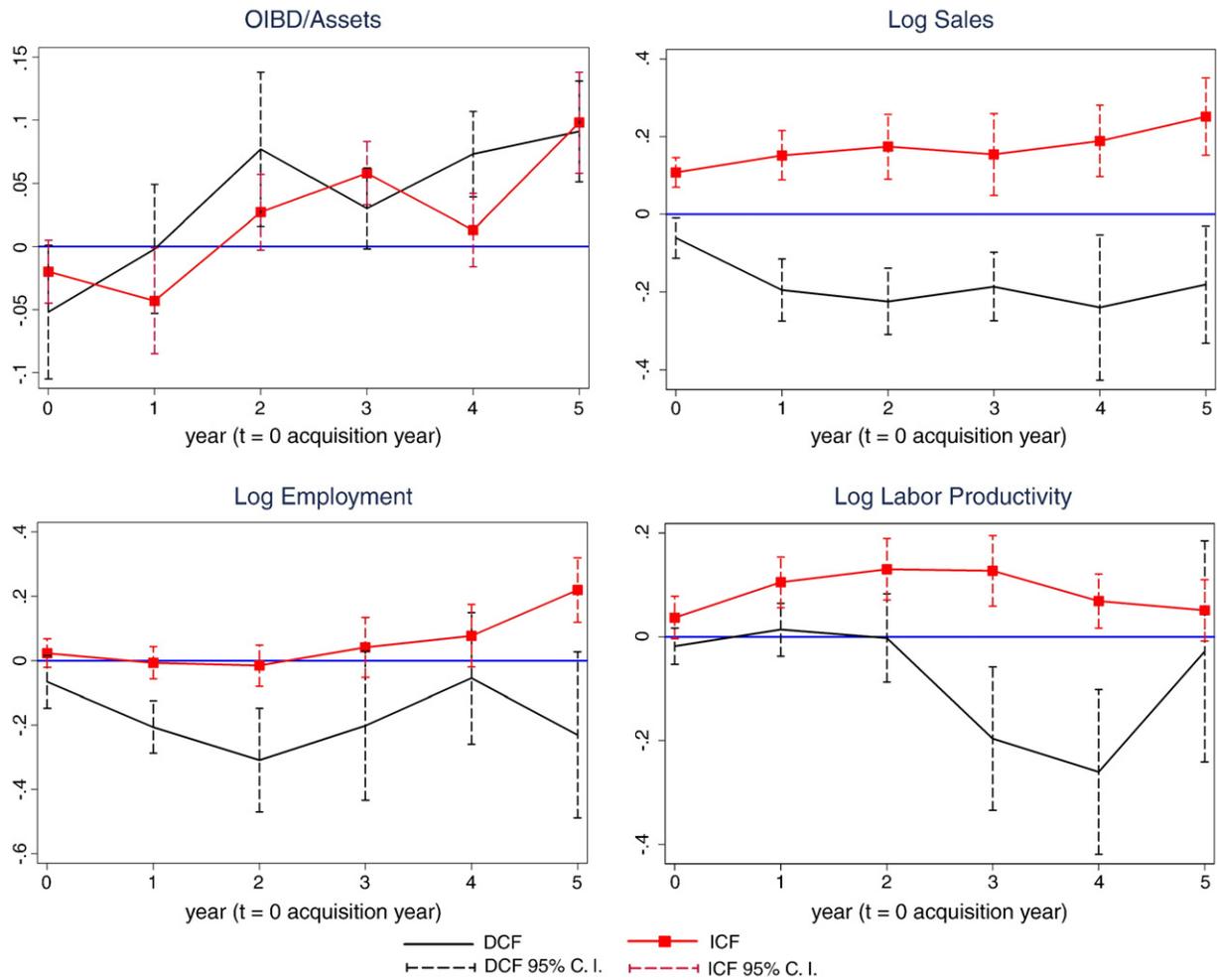
t	OIBD/asset	Log sales	Log employment	Log sales/empl
<i>Post-Acquisition Estimates between ICF (=1) and US (=0) acquired targets</i>				
0	−0.020 (0.025)	<b>0.108</b> (0.038)	0.023 (0.044)	<b>0.037</b> (0.041)
1	−0.043 (0.042)	<b>0.152</b> (0.063)	−0.007 (0.050)	<b>0.105</b> (0.049)
2	0.027 (0.030)	<b>0.174</b> (0.083)	−0.016 (0.064)	<b>0.130</b> (0.059)
3	<b>0.058</b> (0.025)	0.154 (0.105)	0.041 (0.093)	<b>0.127</b> (0.068)
4	0.013 (0.029)	<b>0.189</b> (0.092)	0.077 (0.097)	0.069 (0.052)
5	<b>0.098</b> (0.040)	<b>0.252</b> (0.099)	<b>0.219</b> (0.100)	0.051 (0.059)
<i>Post-acquisition estimates between DCF (=1) and US (=0) acquired targets</i>				
0	−0.052 (0.053)	−0.061 (0.052)	−0.066 (0.082)	−0.018 (0.035)
1	−0.002 (0.051)	<b>−0.195</b> (0.080)	<b>−0.206</b> (0.081)	0.014 (0.051)
2	0.077 (0.061)	<b>−0.224</b> (0.085)	<b>−0.309</b> (0.161)	−0.002 (0.085)
3	0.030 (0.032)	<b>−0.186</b> (0.088)	−0.202 (0.231)	−0.196 (0.138)
4	<b>0.073</b> (0.034)	−0.240 (0.187)	−0.055 (0.204)	<b>−0.260</b> (0.159)
5	<b>0.091</b> (0.040)	−0.181 (0.151)	−0.231 (0.258)	−0.028 (0.213)
<i>Post-acquisition estimates between DCF and ICF-acquired targets</i>				
0	−0.050 (0.126)	−0.126 (0.079)	−0.084 (0.094)	−0.005 (0.056)
1	0.046 (0.431)	<b>−0.126</b> (0.079)	<b>−0.179</b> (0.090)	−0.042 (0.068)
2	0.062 (0.084)	<b>−0.347</b> (0.128)	<b>−0.374</b> (0.160)	0.058 (0.079)
3	−0.035 (0.073)	<b>−0.275</b> (0.158)	<b>−0.398</b> (0.228)	−0.136 (0.139)
4	0.088 (0.138)	<b>−0.420</b> (0.250)	−0.143 (0.215)	<b>−0.300</b> (0.175)
5	0.088 (0.138)	<b>−0.357</b> (0.212)	<b>−0.562</b> (0.306)	−0.019 (0.222)

Notes: This table documents difference-in-difference estimates for the post-acquisition performance between acquired (=1) and “matched” (=0) firms. t={0,5} denotes the post-acquisition year. The second column presents the matched coefficient estimate. Estimates in bold indicate statistically significant differences in measured post-acquisition performance for treated and matched firms. The standard errors are bootstrapped.

acquisition. On average, sales decrease by 18% during those three years when firms are acquired by DCFs compared with U.S.-acquired firms. Employment declines by 23% for DCF-acquired firms in the first and second year after acquisition when compared with U.S. domestically acquired firms.<sup>23</sup> DCF-acquired firms and ICF-acquired firms also differ in labor productivity gains. In year four after acquisition, DCF-acquired firms experience a 26% lower growth rate in labor productivity compared to the matched group of ICF-acquired firms. However, they do not show significant differences in post-acquisition return on assets. They differ in sales and employment patterns after the acquisition. Firms acquired by DCFs experience on average 26% lower sales in years one to five after the acquisition than firms acquired by ICFs and relative to the year before acquisition. Moreover, DCF-acquired firms decrease employment by 31% compared to firms acquired by ICFs and relative to the year before acquisition.

Fig. 1 summarizes the dynamics of the effects by pinning down their development over time starting with the acquisition year. Each panel in the figure presents the pairwise effects on each of the four outcome variables – profits, log sales, log employment and log labor productivity – of DCF and ICF acquisition relative to the base scenario of being acquired by a U.S. domestic firm. A value larger than zero indicates that target firms by a particular acquirer type (DCF or ICF) would show an increase in the performance value compared with an acquisition by a U.S. domestic acquirer and relative to the year before acquisition. Overall, the findings suggest the following: Compared to U.S. domestic acquisitions, ICF-acquired target firms dominate in labor productivity, profits and sales, while DCF-acquired firms experience smaller labor productivity gains and employment and sales decreases.

<sup>23</sup> Note as the average treatment effect of treatments of being acquired by an industrial country firm and of being acquired by a domestic firm is calculated for the log of labor productivity, log of employment and log of sales, the percentages reported in the test are obtained by taking the exponent of the average treatment effects, i.e. the estimated differences in the outcome variables between treatment group and matched control group, and subtracting one.



**Fig. 1.** Dynamics of average effects on performance. Notes: The average effects on performance are for target firms in year  $t$  following acquisition relative to the year before acquisition and relative to U.S. domestic acquisitions as base case. The 95% confidence band around the point estimates is based on bootstrapped standard errors. Operating income before depreciation (OIBD) is the most basic level of profit measure in Compustat.

5.2. Matching results based on sample with all foreign deals combined

Instead of differentiating between acquiring firms from developing and industrialized countries, earlier studies have generally lumped the two groups of acquirers into one. The matching estimates (Table 5) based on targets acquired by all foreign firms compared to the group of targets bought by domestic acquirers indicate that foreign acquisitions lead to statistically significant increases in labor productivity one year after the acquisition and also increases in profits

**Table 5**  
 Post-acquisition performance characteristics between foreign (ICF and DCF combined) and U.S.-acquired targets (propensity score matching and difference-in-differences).

Foreign (= 1) and U.S. (= 0) (Bootstrapped standard errors based on reps = 100 in parenthesis)						
t	OIBD/asset	Log sales	Log employment	Log sales/empl		
0	-0.032 (0.027)	0.042 (0.026)	-0.004 (0.036)	-0.011 (0.024)		
1	-0.028 (0.035)	0.050 (0.045)	-0.063 (0.043)	<b>0.054</b> (0.029)		
2	0.022 (0.024)	0.022 (0.060)	-0.087 (0.067)	0.032 (0.035)		
3	<b>0.043</b> (0.017)	0.022 (0.071)	-0.011 (0.089)	-0.026 (0.054)		
4	0.045 (0.028)	0.102 (0.069)	0.078 (0.094)	-0.029 (0.055)		
5	<b>0.065</b> (0.026)	<b>0.144</b> (0.083)	0.153 (0.107)	0.006 (0.057)		

Notes: This table summarizes the difference-in-difference estimates for the post-acquisition performance between foreign-acquired (DCF and ICF) and “matched” U.S.-acquired firms.  $t = (0,5)$  denotes the post-acquisition year. Estimates in bold indicate statistically significant differences in measured post-acquisition performance for treated and matched firms. Bootstrapped standard errors are in parentheses.

in years three and five after the acquisition relative to the targets acquired by U.S. domestic firms. The estimates on sales and employment are not statistically significant except for an increase in foreign-bought target sales in year five after the acquisition. The coefficients on the estimates are also much smaller than those when performing the analysis using separate groupings of targets bought by firms from developing countries and industrialized countries. Since the ICF acquisitions outweigh the DCF acquisitions in number, the combined results are more similar to those with only ICF acquirers. The reason for the lack of statistical significance and the smaller magnitude of the coefficient estimates might be due to the fact that the two groups of acquirers have such opposing results on their own. As previous studies have combined these two types of acquirers, it would not have been possible to identify the opposite restructuring effects on the target firms.

5.3. Matching results based on sample of withdrawn deals

Along with the list of all completed M&A transactions, SDC Thomson also provides information on announced deals that are withdrawn during the course of the sample period. Over the sample period of 1979–2006, ICFs withdrew 195 deals with U.S. firms, and U.S. firms withdrew 2993 deals with other U.S. companies. The number of failed acquisitions for DCFs that have financial statement data is only 18, and therefore, too small to conduct inference on its own, therefore, I have combined the group of foreign withdrawn deals. Using this

sample of failed foreign and U.S. domestic transaction deals, I can test how domestically targeted firms compare with foreign targeted firms. If it is the change of foreign ownership that affects the target firm's post-acquisition performance relative to a change of domestic ownership, then after controlling for selection, one would expect no performance differences between foreign targeted firms and domestically targeted firms within the group of withdrawn deals. I use binary treatment propensity score matching to control for selection and compare the performance between withdrawn foreign targeted firms and withdrawn U.S. targeted firms. Results indicate that there are hardly any significant differences in their performances over a five-year period following the announcement date (Table 6), except for a decrease in profits in year five after the acquisition for the group of foreign targeted firms compared to those that were targeted by U.S. domestic firms. Also, employment in the year of acquisition announcement tends to be higher in foreign targeted firms than in domestic targets. There are no significant differences in labor productivity and sales. This finding contrasts with the results obtained in a comparison between ICF and domestic acquisitions and also between all foreign-acquired (DCF and ICF combined) and domestic acquisitions where the deals are executed. Thus, this result is a strong indication that the differences in post-acquisition performance between actual foreign-acquired and domestic-acquired targets are caused by the respective changes in ownership status.

#### 5.4. Simple difference-in-differences results

To illustrate the importance of creating the appropriate comparison group in order to control for selection, I redo the analysis with a simple difference-in-differences (DiD) approach without propensity score matching, but using similar covariates as control variables in the multinomial logit.<sup>24</sup> The underlying assumption is that the three different groups of acquirers are choosing their targets in the same random pattern. Table 7 shows that the results based on the simple DiD estimates are different from the results obtained when controlling for selection by applying propensity score matching. In fact, without creating the appropriate control groups, one might draw the misleading conclusion that there is no significant difference in the post-acquisition performance between the DCF and U.S. domestic targets in terms of profits (OIBD/total assets).

For labor productivity, employment and sales, however, the DiD estimates are larger in magnitude and statistically significant for more periods than the matching estimates, especially when comparing DCF to ICF targets. Essentially, the DiD estimation uses all acquired firms within each treated group with the same weight. The reasons why the simple difference-in-differences estimates differ from those found in propensity score matching are the following: 1) the underlying functional form is assumed to be linear, whereas the propensity score method is semi-parametric, thus not putting restrictions on functional form, and 2) they do not address the support problem. In fact, simple difference-in-differences estimation includes the full set of unmatched control firms, whereas propensity score matching ensures that far lying outliers are excluded.

#### 5.5. Discussion

The results in the study confirm the hypotheses that within the three acquirer type groups (U.S., ICF, and DCF), change in ownership by ICF compared to the other two types improves target firm performance. As expected, compared to the other two types of targets, for ICF-acquired firms, the increase in profits, scaled by total assets, is accompanied by large increases in sales, employment as well as labor productivity. These results strongly indicate that ICF acquirers

**Table 6**

Post-acquisition performance characteristics between failed u.s. deals and failed foreign (ICF and DCF) Deals (propensity score matching and difference-in-differences).

Failed Foreign (= 1) and Failed U.S. (= 0) (Bootstrapped standard errors based on reps = 100 in parenthesis)								
t	OIBD/asset		Log sales		Log employment		Log sales/empl	
0	-0.017	(0.011)	0.017	(0.026)	<b>0.062</b>	(0.028)	-0.034	(0.026)
1	0.023	(0.016)	-0.003	(0.038)	0.060	(0.043)	-0.033	(0.035)
2	0.014	(0.011)	0.005	(0.052)	0.080	(0.062)	-0.017	(0.042)
3	0.009	(0.015)	0.035	(0.063)	0.062	(0.063)	-0.004	(0.047)
4	-0.020	(0.018)	0.033	(0.078)	0.061	(0.082)	-0.013	(0.057)
5	<b>-0.018</b>	(0.011)	0.014	(0.092)	0.010	(0.081)	-0.010	(0.059)

Notes: This table summarizes the difference-in-difference estimates for the post-acquisition performance between foreign-acquired and "matched" U.S.-acquired firms, for which the deal was withdrawn.  $t = \{0,5\}$  denotes the post-acquisition year. Estimates in bold indicate statistically significant differences in measured post-acquisition performance for treated and matched firms. Bootstrapped standard errors are in parentheses.

increase profits through increased market share and through increased labor productivity. A potential explanation of this result can be found by using the implications of the Helpman et al. (2004) model. Within their framework, foreign acquirers – i.e., ICF acquirers – have lower marginal costs due to their higher productivity levels; they therefore set prices lower. Lower prices in turn make them more competitive and more able to increase output and total revenue. These predicted output and revenue increases are reflected in the data by the jump in sales in target firms after acquisition. Within a few years, these sales increases translate into higher profits. Moreover, ICF acquirers do not have significant wage differential advantages over U.S. domestic acquirers and are therefore not likely to change employment in the target firm post-acquisition compared with U.S.-acquired targets. In fact, through sales increases in the target firm, ICF acquirers are more likely in need of more workers within the target firm, which is reflected by increased employment numbers in later years after the acquisition.

DCF-acquired firms experience increases in profits compared with U.S.-acquired firms, but not in comparison with ICF-acquired firms.

**Table 7**

Post-acquisition performance characteristics (simple difference-in-differences).

t	OIBD/asset		Log sales		Log employment		Log sales/empl	
<i>ICF (=1) and U.S. (=0)</i>								
0	0.043	(0.122)	<b>0.101</b>	(0.030)	0.004	(0.026)	<b>0.050</b>	(0.029)
1	-0.013	(0.033)	<b>0.115</b>	(0.039)	-0.047	(0.034)	<b>0.127</b>	(0.031)
2	0.874	(1.790)	<b>0.087</b>	(0.044)	-0.043	(0.041)	<b>0.133</b>	(0.031)
3	<b>0.057</b>	(0.020)	0.027	(0.048)	-0.017	(0.048)	<b>0.124</b>	(0.033)
4	0.061	(0.048)	<b>0.136</b>	(0.052)	0.022	(0.049)	0.039	(0.032)
5	<b>0.102</b>	(0.051)	<b>0.191</b>	(0.060)	<b>0.192</b>	(0.056)	0.003	(0.031)
<i>DCF (=1) and U.S. (=0)</i>								
0	-0.011	(0.251)	-0.056	(0.058)	-0.079	(0.050)	0.007	(0.057)
1	0.012	(0.060)	<b>-0.217</b>	(0.073)	<b>-0.194</b>	(0.063)	-0.029	(0.058)
2	0.978	(3.472)	<b>-0.303</b>	(0.080)	<b>-0.346</b>	(0.077)	-0.032	(0.057)
3	0.027	(0.038)	<b>-0.285</b>	(0.087)	<b>-0.243</b>	(0.089)	<b>-0.243</b>	(0.061)
4	0.101	(0.093)	<b>-0.389</b>	(0.099)	-0.086	(0.093)	<b>-0.438</b>	(0.064)
5	0.132	(0.094)	<b>-0.272</b>	(0.109)	<b>-0.261</b>	(0.105)	<b>-0.167</b>	(0.060)
<i>DCF (=1) and ICF (=0)</i>								
0	-0.047	(0.065)	<b>-0.149</b>	(0.070)	-0.084	(0.082)	-0.036	(0.056)
1	0.033	(0.071)	<b>-0.316</b>	(0.091)	<b>-0.147</b>	(0.072)	<b>-0.141</b>	(0.068)
2	<b>0.067</b>	(0.034)	<b>-0.383</b>	(0.108)	<b>-0.296</b>	(0.096)	<b>-0.152</b>	(0.079)
3	-0.027	(0.031)	<b>-0.316</b>	(0.131)	<b>-0.231</b>	(0.137)	<b>-0.346</b>	(0.094)
4	0.042	(0.042)	<b>-0.524</b>	(0.129)	-0.119	(0.124)	<b>-0.467</b>	(0.083)
5	0.042	(0.031)	<b>-0.462</b>	(0.121)	<b>-0.455</b>	(0.131)	<b>-0.165</b>	(0.081)

Notes: This table summarizes the simple difference-in-difference estimates without propensity score matching for the post-acquisition performance between treated and "matched" firms.  $t = \{0,5\}$  denotes the post-acquisition year. Estimates in bold indicate statistically significant differences in measured post-acquisition performance for treated and matched firms.

<sup>24</sup> For more details on the difference-in-difference estimation method, see the online Appendix.

Target firms that are acquired by DCFs suffer large decreases in sales as well as decreases in number of workers compared with the other two types of acquired firms following M&A. Furthermore, DCF-acquired target firms exhibit lower growth rate in labor productivity than domestically acquired firms. Some of these performance patterns are puzzling and at odds with the simple insourcing story, in which DCF-acquired firms exploit wage differences by relocating labor in the U.S. target firm back to the acquirer's home country.

As hypothesized earlier, DCF-acquired targets are likely to suffer decreases in employment compared with domestically and ICF-acquired targets. Thus, when employment decreases in DCF-acquired targets, the firm itself becomes smaller. The downsizing in the target firm leads to decrease in sales activity, and thus explains the lower sales growth in DCF-acquired targets compared to the other acquired targets. The lower growth rate in labor productivity implies that sales fall more than employment. This pattern contradicts the insourcing story, since the latter would imply a greater fall in employment than sales. One possibility is to look in the literature on divestment for an alternative explanation. For instance, Conyon et al. (2001) suggest, that divestment following M&As need not be beneficial for the target firm, although it might increase the merged firm's overall efficiency. However, limited data on the acquiring firms and the divested units makes it difficult in this paper to assess the overall restructuring and efficiency effects on the combined firm. Future work will hopefully overcome these limitations and shed more light on the various performance patterns uncovered in this paper.

## 6. Robustness Checks

In the five years after acquisition, the sample size decreases from year to year by about 15% on average. Part of the attrition is due to the long period of investigation. In particular, firms acquired after 2001 do not have the full five-year period after the acquisition, since the current acquisition data is available only through December 2006. Another reason for the attrition that affects a smaller portion of the firms is delisting of the firm or even bankruptcy. Once the firm leaves Compustat it is not possible to track its financial statement data, and the reasons for delistings are generally not specified. Thus, an alternative way to analyze the data is to concentrate only on the sample of firms that are listed in Compustat for at least the five years following their acquisition. In the online Appendix, Table A.4.1 presents the matching estimates using this sample without firm attrition, and the results are similar in magnitude to those using the whole sample.

As mentioned in the *Empirical and theoretical background* section, there are multiple ways to order the various groups of acquirers. The existing grouping is largely based on data availability and country rankings by technology measures as well as firm rankings by using performance measures.<sup>25</sup> Regardless of the groupings, however, the goal should be to ensure that performance differences are limited to across group comparisons rather than within groups. For instance, within the group of ICF acquirers, the sample divides almost evenly between acquirer firms from EU and non-EU countries. For the group of DCF acquirers, the sample divides into acquiring firms from East Asia and non-East Asia. Using these natural divides within the groups, I conduct within group comparisons for ICF and DCF acquirers. The results for comparisons between firms in non-EU vs EU countries that make up the group of ICF acquirers as well as those for comparisons between acquirer firms in East Asia vs non-East Asia that make up the group of DCF acquirers are shown in Table A.4.2 of the online Appendix. They indicate that differences in target post-acquisition performance between the split samples are generally not statistically significant.

Further robustness checks using the following samples can be found in the online Appendix: horizontal M&A in which the target and acquiring firms are in the same industry, majority or minority acquisitions, U.S. acquiring firms with and without foreign affiliations, and acquisitions where target firms are never acquired more than once throughout the sample period. The results remain qualitatively the same when using these various samples.

## 7. Conclusion

This paper measures the performance of U.S. target firms after acquisition by firms from a broad range of countries over a five-year period using daily announced M&A information and firm level financial statement data between 1979 and 2006. In contrast to previous studies that lump all acquisitions by foreign firms together, I differentiate those acquisitions made by industrial country firms from those made by firms from developing countries. In order to control for non-random selection, I use multiple treatment propensity scores to match similar firms between comparison groups.

Consistent with the predictions of the Helpman et al. (2004) model, targets acquired by firms from industrial countries exhibit the best post-acquisition performance. Targets acquired by non-U.S. firms from industrialized countries experience an increase in labor productivity of up to 13% and an increase in profitability that is greater by 10 percentage points compared with targets acquired by domestic firms. This improvement in performance is driven by increases in sales. Acquirers from developing countries lead to 23% lower labor productivity gains in their targets compared to targets acquired by domestic firms, but they improve the post-acquisition profit of their targets by 8 percentage points more than U.S. domestic acquirers do. In contrast to acquisitions by non-U.S. industrial country firms, acquisitions by developing country firms tend to result in lower labor productivity gains and decreases in employment and sales in U.S. targets. These results are robust to different propensity score specifications as well as to sample classifications.

The study provides some of the first evidence that acquirer origin matters for target post-acquisition performance. The findings also highlight how accounting for heterogeneity in acquirer types reveals different channels by which post-acquisition performance is improved. The use of multiple treatment propensity score matching and detailed firm level data in this paper provides a methodology for controlling possible selection issues that could be employed in other studies of acquisition types where selection is non-random. In fact, I show that when not controlling for selection, the estimation yields different results that do not separate causality from correlation. Finally, even though an overall welfare assessment is not possible here due to the lack of data on the acquirers, the results suggest that U.S. public target firms benefit more from foreign acquisitions than from domestic M&As in terms of overall performance measured as profitability, with the largest improvements stemming from non-U.S. industrial country firms. If assessing performance using labor productivity, however, being acquired by a non-U.S. industrial country firm has positive effects on the target's productivity, whereas being acquired by a developing country firm results in lower productivity gains, when compared with domestic acquisition. At the same time, workers in U.S. public target firms that are acquired by developing country firms are more likely to lose their jobs, whereas there are employment gains in acquisitions made by non-U.S. industrial country firms, compared to U.S. domestic acquisitions.

These findings provide new insights into the workings and consequences of domestic and cross-border M&As. In particular, for governments that are devising policies toward FDI, these results suggest that not all types of foreign investments should be treated in the same way. By building on this paper's approach to differentiating acquirer types, future studies can use more detailed data on the acquirer firms to help evaluate the overall impact of M&A deals. For instance, do acquirers perform differently after purchasing target

<sup>25</sup> These rankings are available upon request.

firms? Do productivity, revenue and employment also change differently in the acquirers depending on the type of target? The methodology in this paper allows for the study of the effect on acquirers by differentiating the types of targets. Specifically, it enables us to identify how post-acquisition performance changes when targets are located in different parts of the world. Complementing the results in this paper, such future studies will increase our general understanding of the effect of M&As on both acquirers and targets in a variety of locations around the globe.

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## Appendix A. Supplementary Results

Supplementary results to this article can be found online at doi:[10.1016/j.jinteco.2010.11.005](https://doi.org/10.1016/j.jinteco.2010.11.005).

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