The Perfect Match: Assortative Matching in International Acquisitions

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Abstract

This paper empirically characterizes the matching between firms in domestic and cross-border mergers and acquisitions (M&A). The analysis is guided by a theoretical framework constructed following the premises of the new trade theory. It assumes that firms are heterogeneous, within the industry and country of origin, in two characteristics: productivity and size. By a revealed preference argument, if an acquisition takes place, it signals the existence of synergies between the characteristics of two firms. We estimate the sources of synergies between merged firms based on data on domestic and international M&A for five large European countries, France, Germany, Italy, U.K., and Spain, collected by Zephyr between 1997 and 2011. The estimated model is used to compute the effect of FDI on the resulting host country productivity and size distribution of firms.

Multinational production is arguably the main source of economic interdependency across countries. This type of global production not only is of crucial importance in the international exchange of physical goods; it is also a key mechanism through which countries share ideas and technologies: source-countries technologies end up being used abroad and are reflected in the overall productivity of the host economy.

Among developed economies, which account for 64% of the (inward) stock of multinational capital (UNCTAD, 2011), Foreign Direct Investment (FDI) mostly takes in the form of mergers or acquisitions (M&A): 89 percent of FDI flows in developed countries (Barba Navaretti and Venables, 2004). Despite the importance of cross country M&A in FDI, little is know about its patters and motivations. In this paper we add to this literature by empirically characterizing the match of local firms with multinational corporations and theoretically addressing the sorting decision of target and acquiring firms.

Our analysis is guided by a theoretical framework constructed following the premises of the new trade theory. It assumes that firms are heterogeneous, within the industry and country of origin, in two dimensions: productivity and size. This modeling choice is motivated directly by the data: larger firms are on average more productive, but there is substantial heterogeneity of productivities for a given size (measured by total assets or sales). Firms decide whether to acquire a foreign affiliate and choose the characteristics of the acquired firm. By a revealed preference argument, if an acquisition takes place, it signals the existence of synergies between the two firms. That is, the joint surplus function from the matching between the target and the acquirer involves complementarities between at least some of the characteristics of the involved firms, which makes the value of the combined firm larger than the sum of the two stand-alone.

We analyze the characteristics of the matched firms based on data on domestic and international mergers and acquisition for five large European countries, France, Germany, Italy, U.K., and Spain, collected by Zephyr between 1997 and 2011. These data allow us

to characterize the acquired and acquiring firms in terms of output, labor, total assets and main industry of operations (at 4 digits NAICS), from which we estimate the firm productivity of the *size residual*—i.e., size heterogeneity not explained by the firm productivity.

We use the empirical method developed in Galichon and Salanie (2012) to characterize the surplus function of the acquisition based on the actual matches observed in the data. This approach recognizes that firms are heterogeneous not only in characteristics observable to us—i.e, size and productivity– but also other, non-observable, dimensions that may enter in the matching function. Under some assumptions on the distribution of unobservables, this approach consistently estimates the surplus function from the matching based on observables only. That is, under these assumptions, the matches observed in data are the ones that maximize the surplus function defined only on the observable characteristics of the firm.

The evidence strongly suggests the existence of *within-characteristic* complementarities. That is, more productive acquirers tend to match with more productive targets and, especially, M&As tend to happen between firms of similar size relative to their own home market.

We also find some evidence of existence of the *cross-characteristic* complementarities. That is, more productive acquirer tend to match with larger target firms and viceversa. However, this source of complementary is not as important as the one found between firms of the same size or productivity.

Literature on the patterns and motivations of cross-border M&A is still scarce. Empirically, it has so far focussed on determining the characteristics of firms participating in different modes of international production: exports, cross-border M&A, or *greenfield* FDI. However, the framework used to interpret those patterns often includes assumption with respect to the synergies between merged firms. Nocke and Yeaple (2007, 2008) and Blonigen et al. (2012), for example, propose a model of cross-country M&A where the

newly-acquired firms adopt the productivity of the foreign parent.[1] There, the motive for the acquisition is to gain access to the target-firm's market. Contrary to our empirical findings, these models predict that firms with better productivity will acquire larger but relatively unproductive subsidiaries.

Our results are consistent and complementary to those in Guadalupe et al. (forthcoming). In their model, scale, productivity, and productivity-upgrading on acquisition are complements and jointly increase the profits of the target firm. To their results we add that the productivity and size of the acquirer also interact positively with those of the target firm in the resulting joint surplus of the match. Intuitively, the newly-acquired firm is more receptive to new practice brought by the acquirer if it initially had a higher productivity level. In other words, the cost of adaptation to the new productivity level depends on the distance between target and acquirer firms' initial productivities. David (2012) also finds, consistent with our results, positive assortative matching between domestic target and acquirer firms, but in there firms are heterogeneous in a single dimension: size and productivity are one-to-one mapped.

Finally, our analysis also uncovers some differences between the patterns of firms involved in cross-border M&A relative to the ones participating in domestic deals. First, for all the five countries, cross-border M&A involve larger target and, especially, substantially larger acquirer firms, measured by their total revenues. There are no substantial differences in the distribution of labor productivities of firms participating in domestic versus cross-border M&A.

The effect of multinational ownership on technology adoption and technology transfer across international borders has proved crucial in evaluating FDI welfare implications (McGrattan and Prescott, 2010; Burstein and Monge-Naranjo, 2009; and Ramondo and

[1]The assumption that productivity freely transferrable within the corporation upon paying a fixed cost is also in Helpman et al. (2004) for the case of *greenfield* FDI.

Rodriguez-Clare, forthcoming). This evaluation depends on the effect of such transmission on the overall distribution of firm productivities in the destination market. We use our estimated matching function to estimate the effect of FDI on the resulting host country productivity and size distribution of firms. The existence of complementarities between acquirer and target firms implies that the productivity of the newly acquired firm is higher than the original stand alone. However, since acquired firms were already high-performing firms, the impact of this type of FDI on the host country total productivity is much lower than the one predicted by models of *greenfield* FDI.

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