The Q-Theory of Mergers: International and Cross-Border Evidence

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Abstract

The main implications of the Q-theory of mergers are tested for United States and seven continental European countries in both the domestic and cross-border cases. I find that European firms, much like those in the United States, tend to use mergers and acquisitions to make large increases in their capital stocks, that this choice is more sensitive to the acquirer's Tobin's Q than its direct investment, and that mergers raise the efficiency of target assets. Data from cross-border mergers between U.S. acquirers and European targets support the theory most emphatically.

How to promote technological transfers most effectively within and across countries, and especially between the United States and members of the European Union, is a question of increasing interest among both academics and policymakers. Jovanovic and Rousseau (2002a, 2002b) show that mergers and acquisitions (M&A) are a way of completing such transfers quickly and offer evidence that technological shocks underlie most of the merger waves experienced in the U.S. economy over the 20th century. This paper suggests that the scope of such reallocative activity is worldwide.

The policy implications of placing technology at center stage in motivating M&A in both the domestic and cross-border cases are relatively simple. If mergers effectively transfer technologies among frontier sectors and across national borders, and these technologies enhance productivity and growth, there should be little need to restrict such transactions. If, on the other hand, M&A is not clearly linked to cross-border technological transfers, it may make more sense for researchers to pursue frameworks that model cross-border mergers as attempts to exploit established organizational structures with an eye to gaining "footholds" and ultimately substantial

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market shares in targeted foreign sectors. When the nature of cross-border mergers is largely extractive as the latter case suggests, some restrictions on the activity may be justifiable.

The Q-theory of mergers as formulated by Jovanovic and Rousseau proposes that the same forces driving firms' direct investments also drive their decisions about merging with other firms, and views mergers in a macroeconomic sense as devices for solving an economy-wide problem of reallocating capital. Reallocation is needed as new technologies emerge with the potential to transform fundamentally the ways in which firms do business. Readying the existing capital stock (both physical and human) for use in a new technological climate is less costly if new firms, as they gain experience with new technologies, are able to acquire older firms while keeping their organization capital intact. When this happens, the management skills and technological adaptability of the acquirer are passed to the target's assets, facilitating their transition back to the technological frontier.

A key implication is that firms with high values of Tobin's Q (defined as the ratio of a firm's market value to the replacement cost of its assets), and therefore greater potential to raise the value of target assets, will use acquisitions more intensely than purchases of more costly new capital. Indeed, using exchange-listed U.S. firms from Standard and Poor's *Compustat* database for 1970 to 2000, Jovanovic and Rousseau (2002a) find that M&A investments are more sensitive – by a factor of 2.6 – to Tobin's Q than are direct investments. Since transactions costs (i.e., brokerage, legal, etc.) associated with M&A are considerable, however, firms must weigh these costs against the advantages of M&A over direct capital investment. This implies that high-Q firms, being the ones with the best technologies, seek proportionate increases in their capital stocks that are large enough to overcome the transactions costs associated with mergers, and again the U.S. data bear this out.

At the same time, the United States arguably has the world's most developed capital markets – venues where the battle for corporate control is increasingly waged. It is also among the world's technological leaders, which when combined with an active stock market makes for an environment that is particularly conducive to the domestic transfer of technologies. To the extent that high Q's are associated with such leadership and innovation, it is therefore not surprising that we observe firms with high Q's merging with lower Q partners in the U.S. data. Andrade, Mitchell, and Stafford (2001), for example, report that in more than two-thirds of all mergers since 1973, the acquirer's Q exceeded the target's Q. And Servaes (1991) finds that total takeover returns (defined as the abnormal increase in the combined values of the merging parties) are larger when the target's Q is low and the bidder's Q is high. The question that I pose here is whether such a mechanism also operates domestically within the major continental European economies, and whether such technology transfers appear to be central to cross-border mergers as well.

The paper begins with a review of the key features of the Q-theory of mergers. Next I describe the data used to extend the empirical investigation of the theory

to the domestic and cross-border cases of the United States and a set of European countries. I then present evidence that acquisitions remain a preferred mechanism of reallocation for high-Q firms in the cross-border context.

1. Theoretical Overview

There is a close parallel between the Q-theory of mergers and the Q-theory of standard investment, but with one key difference: where the standard Q-theory holds that a firm's direct investment depends on its own Q, the Q-theory of mergers holds that a firm's M&A activity depends on the difference between its Q and the Q's of its potential targets. Denoting the latter by q, this section outlines conditions under which direct investment is a function Q and acquisitions are a function of $Q-q$. The remaining sections subject these restrictions to tests with U.S. and European data on domestic and cross-border mergers. Following the partial equilibrium framework developed in Jovanovic and Rousseau (2002a),[1] output is given by

$$\text{output} = zK, \tag{1}$$

where z is the firm's technology and K is its capital stock, both physical and human. Of course, z could stand not just for technology, but generally for the quality of organization capital (Jovanovic and Rousseau, 2001), the quality of other intangibles such as proprietary inventions (Czarnitzki, Hall and Oriani, 2005), or simply its management skill (Lucas, 1978). In any case, the firm-specific shock follows the Markov process

$$\Pr\left\{z_{t+1} \leq z' \mid z_t = z\right\} = F\left(z', z\right). \tag{2}$$

The firm must accept whatever draw of z that nature endows it with each period. Firms can buy new capital at a price of unity. An exiting firm can disassemble its capital and recover a salvage value of s per unit or can sell it in the M&A market at a common price of q per unit. The price of new capital is normalized to unity, and it is thus assumed that $s < 1$. To have both the salvage and M&A markets open, as observed in the data, it is necessary to assume that $q = s$.

The capital stock evolves as

$$K' = (1-\delta)K + X + Y, \tag{3}$$

where X is the firm's direct investment in capital and Y is its acquisitions of bundled (i.e., merger) capital. The firm also faces the following cost of raising its capacity:

$$C\left(x, y\right)K, \quad \text{where } x = \frac{X}{K}, \text{ and } y = \frac{Y}{K}. \tag{4}$$

[1] See Jovanovic and Rousseau (2002b) for a general equilibrium exposition of the Q-theory of mergers.

Like the production function, the adjustment cost is homogeneous of degree one in K, X, and Y.

The firm transfers its efficiency, z, to *all* new and used capital that it buys.[2] The largest joint gains to a merger occur when the target is inefficient and the bidder is efficient. Because returns to scale in production and growth are constant, the return to capital does not depend on the firm's size, K, but only on its efficiency, z. Profit per unit of capital is $z - C(x, y) - x - qy$, and the firm's value per unit of capital is

$$Q(z) = \max_{x \geq 0, y \geq 0} \{z - C(x, y) - x - qy + (1 - \delta + x + y) Q^*(z)\}, \tag{5}$$

where $Q^*(z)$ is the firm's discounted expected present value of capital tomorrow given today's realization of z:

$$Q^*(z) = \frac{1}{1+r} \int \max\{q, Q(z')\} dF(z', z). \tag{6}$$

This expression reflects the firm's option of selling its capital in the next period on the merger market at a price of q dollars per unit.

At an interior maximum, the optimal x and y would satisfy the first order conditions

$$c_1(x, y) = Q^* - 1. \tag{7}$$

and

$$c_2(x, y) = Q^* - q. \tag{8}$$

The only firm-specific variable in these conditions is $Q^* = Q^*(z)$. If z is positively autocorrelated, then Q^* is increasing in z, and more productive firms will grow faster and use both margins, x and y, to achieve that growth. Neither the firm's x, nor its y, nor its survival depends on firm size, K, after controlling for Q^*. Thus, a large firm grows as easily as a small one; no optimal firm size exists, just optimal growth.

The model implies $y = 0$ for low-Q^* firms if there is a fixed cost, ϕ, of acquiring the capital of other firms:

$$C(x, y) = \begin{cases} c(x, y) + \phi & \text{if } y > 0, \\ c(x, 0) & \text{if } y = 0. \end{cases}$$

This is cost incurred per unit of K, and therefore returns to scale remain constant. Let $i = x + y$ be the gross investment rate in *efficiency* units. A low-i firm will then want to avoid the cost ϕ and will set $y = 0$, whereas a high-i firm will use both

[2] There is considerable evidence for U.S. firms that mergers raise the productivity of targets' plants (McGuckin and Nguyen, 1995; Schoar, 2002) and there is reason to expect that the same would be true in cross-border mergers. Lichtenberg and Siegel (1987), Maksimovic and Phillips (2001), and Harris, Siegel and Wright (2005) also offer evidence that firm productivity rises after a merger.

margins. The value of i, call it i^*, at which the firm is indifferent between buying in the acquisitions market and staying out of it, solves for i the equation

$$i + c(i, 0) = \phi + \min_y \{(i - y) + qy + c(i - y, y)\}. \tag{9}$$

The left-hand side of (9) is lower when i is small, and the right-hand side is lower when i is high. Of course, i itself depends on the firm's z.

Firms may either exit and disassemble their capital, or they may be acquired. Either way, they get $q < 1$ per unit of capital. Let z_e be the point at which the firm is indifferent between staying in business and exiting:

$$Q(z_e) = q.$$

Consider a steady state in which the distribution of $Q(z)$ replicates itself period after period, roughly as in Hopenhayn (1992). Each period, firms with z's below z_e dissolve or are acquired. For higher levels of z (and thus higher levels of Q), firms make only direct investments because the fixed costs of M&A deter them from entering that market, while at still higher levels of $Q(z)$ firms both invest directly and acquire capital through mergers. Beyond the critical productivity level z^* (the value of z corresponding to i^* and implying even higher levels of Q) they also invest in acquisitions y, and after z reaches the "overtaking" level z_O, acquisitions outpace direct investments.

Fig. 1 depicts how investment in x and y varies with the size of the total investment, i,with the schedules for x and y adding up to the 45^o line. At the critical investment rate i^*, x suddenly drops from i^* to x^*, and y jumps from zero to $y_{\min}$ Thereafter, y is the more elastic of the two modes of investment (i.e., the figure is drawn on the assumption that c_y is small relative to c_x). When the investment rate reaches i_O, y overtakes x because of the lower marginal adjustment cost that the accumulation of y is assumed to impose on the firm at high levels of investment.

2. Evidence

In this section I present evidence on the Q-theory of mergers for the United States and seven continental European nations in both the domestic and cross-border cases. Data are from the Security Data Corporation (SDC) Thompson's International Mergers and Acquisitions database and cover the period from 1994 to the end of April 2005. To be included in the analysis, the available data for each acquirer must allow for the computation of Tobin's Q and the ratios of capital expenditures and merger values to the firm's total assets. This limits the number of observations since many M&A transactions in the SDC database do not contain information other than the names and nations of the acquirers and targets. Even so, there is adequate data

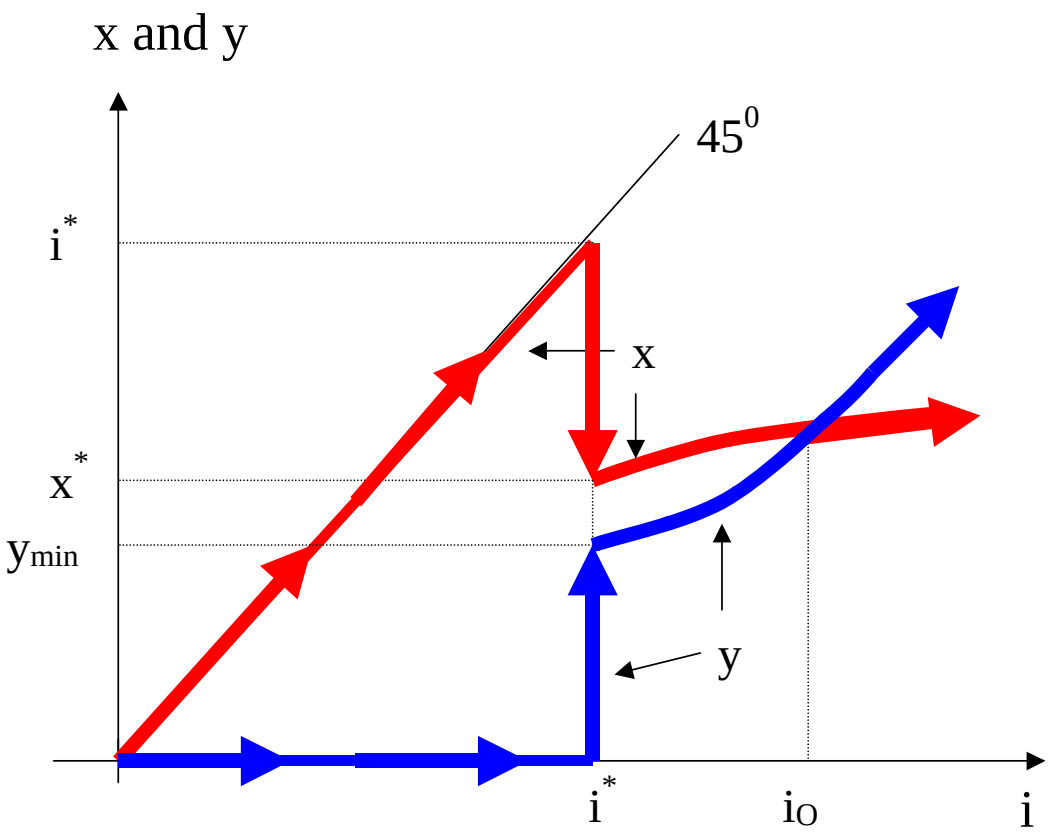


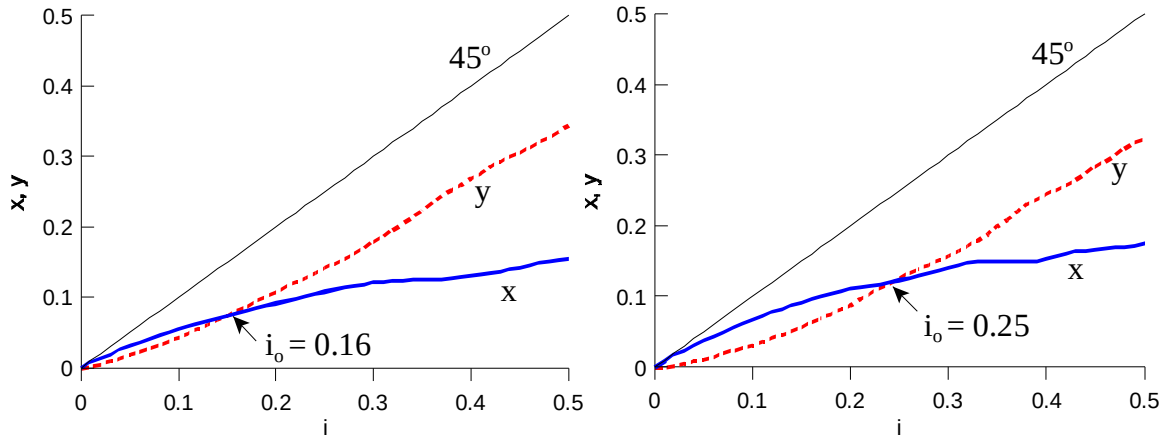
Figure 1: *The Point of Overtaking,* i_O

for more than 7,900 domestic and 1,700 cross-border acquirers for the United States. There were fewer mergers involving the seven continental European nations that I will usually consider (i.e., Austria, Belgium, France, Germany, Italy, the Netherlands, and Switzerland), with only 367 domestic and 561 cross-border acquisitions represented over the same time period.[3]

2.1. Do firms making large capital stock adjustments choose M&A?

The first implication of the Q-theory considered is whether firms making large adjustments to their capital stocks prefer M&A to standard expenditures on new and used capital. In other words, do capital stock adjustments both within and across countries conform roughly with the pattern in Fig. 1?

[3] All of these countries are part of the Eurozone with the exception of Switzerland, which I include in the analysis because of its important position in the European capital markets. The other countries were chosen based on the amount of merger activity recorded for them in the SDC database.



(a) U.S. domestic M&A (b) U.S. cross-border M&A

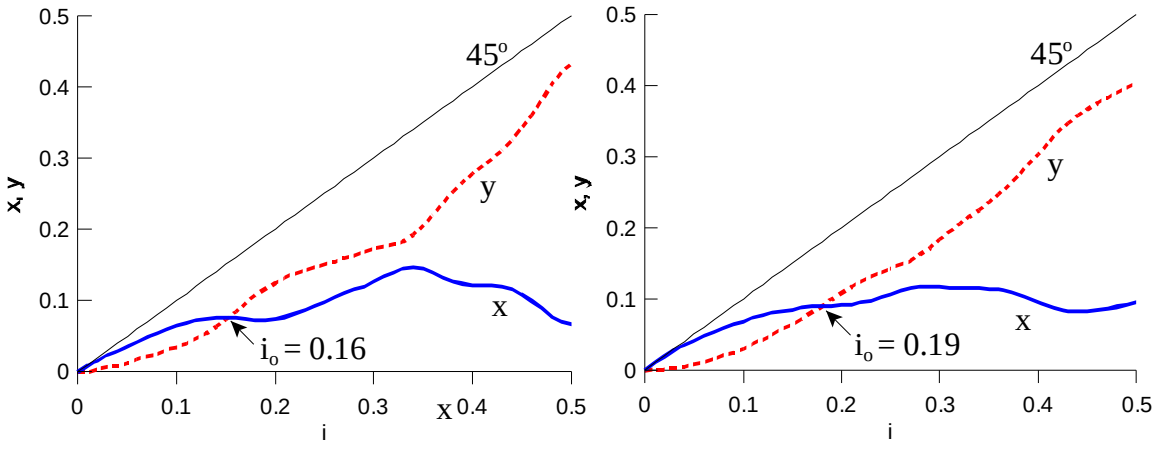
Figure 2: *Direct Capital Purchases, x, and Acquired Capital, y, by Investment Ratio, $i = x + y$, United States 1994-2005*

Fig. 2 is the empirical counterpart to Fig. 1 for the United States. The size of the expansion, i, is given on the horizontal axis, while the vertical axis plots the HP-filtered means of x and y for firms that fall within each percentage point of the range of i.[4] Panel (a), which considers domestic M&A only, shows turning points that are not as sharp as those suggested by the model, though standard investment does dominate M&A for smaller adjustments of the capital stock (i.e., when $i < i_o$). The point of overtaking occurs at $i = 0.16$, or when the adjustments involve increasing the stock of capital by about 16 percent.

The point of overtaking is lower than that found by Jovanovic and Rousseau (2002a) for U.S. domestic mergers in 1998, which was about 50 percent. There are at least two possible reasons for this. First, i_o has been falling rapidly over time, presumably due to U.S. stock market development and innovation, so that the values obtained for 1994 to 2005 could well be realizations of a process with a downward trend.[5] Second, the SDC database includes firms that have had at least one merger

[4] Fig. 2 pools 7,951 observations from 1994-2005 in panel (a), and 1,716 observations from the same years in panel (b). Since the sample gets thinner as i^* gets large, the figure shows only adjustments from 1 to 50 percent. I use a firm's average total assets over the 12 months preceding its merger (SDC data item TASS) to proxy for K. Merger value, Y, is the recorded value of the transaction in either stock or cash (SDC data item VAL), while investment, X, is given by total capital expenditure over the past 12 months (SDC data item ACAPEX). When a firm records multiple mergers in a given year, all are combined when generating a single y observation for that firm-year. I linearly interpolate between occasional missing percentage points in the range of i^* before applying the H-P filter.

[5] Jovanovic and Rousseau (2002a, p. 201) report an i_o of 1.12 for the 1971-2000 period, but also note that it had fallen from 1.43 in 1980 to 1.09 in 1989 before reaching 0.5 in 1998.



(a) European domestic M&A (b) European cross-border M&A

Figure 3: *Direct Capital Purchases, x, and Acquired Capital, y, by Investment Ratio, $i = x + y$, Seven European Nations 1998-2005*

in a given year, meaning that all firms reflected in panel (a) of Fig. 2 are already on the segment of the cost function $C(x, y)$ for which $y > 0$ and have thus absorbed the costs of entering the merger market. In other words, panel (a) reflects only that part of Fig. 1 that is to the right of i*. This differs from Fig. 5 of Jovanovic and Rousseau (2002a, p. 201), which by using all exchange-listed firms in the Compustat database, including those that did not have a merger, reflects the full range of Fig. 1. Since the theory assumes a proportional fixed cost of entry to the merger market, meaning that there are no scale economies associated with being an acquirer, i_o should be unaffected by this difference in the sample, yet the data in Fig. 2 indicate a lower i_o. This may reflect the presence of umodeled scale economies associated with having already gained experience as an acquirer and forming the requisite brokerage and legal relationships needed to act efficiently on the merger market.

Panel (b) of Fig. 2 shows that the overtaking point for U.S. cross-border M&A occurs at about 25 percent, considerably higher than that observed for domestic mergers. This may reflect higher costs associated with cross-border mergers, perhaps involving the processing of information about the prospects of various non-domestic targets. At the same time, the first implication of the Q-theory is confirmed – firms prefer mergers to direct investment for larger adjustments of their capital stocks.

Fig. 3 shows the overtaking point for a group of seven continental European countries with active merger markets.[6] Panel (a) shows that domestic M&A activity

[6]In Fig. 3, data from 367 firms were used to construct panel (a), while panel (b) used observations from 561 firms. The coverage begins in 1998 because this is when the SDC begins to have adequate data on European acquirers and targets to compute the investment rates plotted in the figure.

(defined as transactions within individual European countries) begins to dominate direct investment at the same adjustment size (i.e., about 16 percent) found for the United States. The overtaking point for cross-border M&A, shown in panel (b), is higher than i_O for domestic transactions, but is also lower for this selection of European countries than for the United States. This may reflect M&A costs that are generally lower for European acquirers, but more likely large gains to the transfer of technologies in the Eurozone. In light of this finding, it is even reasonable to ask why there is so little domestic and cross-border merger activity in these countries compared to that in the United States.[7]

2.2. Are M&A transactions more responsive to $Q-q$ than direct investment is to Q?

In this section I take an OLS regression approach to determining the sensitivity of both types of investment to the level of the acquirer's Tobin's Q. Recalling (7) and (8), a firm's x and y depend only on its Q^*. There are thus functions of one variable f and g such that $x = f(Q^*)$, and $y = g(Q^* - q)$. If $c(x, y)$ is additively separable, q enters g, but not f. Linearizing (7) and (8), a set of regressions emerges with the same form as Eq. (30) of Hayashi (1982):

$$\begin{aligned} x_{j,t} &\equiv \frac{X_{j,t}}{K_{j,t-1}} = \alpha_0^x + \alpha_1^x Q_{j,t-1} + \alpha_2^x t \text{ , and} \\ y_{j,t} &\equiv \frac{Y_{j,t}}{K_{j,t-1}} = \alpha_0^y + \alpha_1^y \left(Q_{j,t-1} - \bar{q}_{t-1}\right) + \alpha_2^y t, \end{aligned} \tag{10}$$

where t is a set of year dummies with α_2^x and α_2^y vectors of coefficients on them. The model predicts that α_1^x and α_1^y should be positive. Table 1 presents regression results for U.S. firms that engaged in domestic mergers between 1994 and 2005, and a set of European firms that engaged in domestic mergers between 1998 and 2005. The unit of observation is a firm-year. The market-to-book ratio of a firm's financial liabilities serves as a proxy for Q.[8] $\bar{q}$ is given by the average Q in each year of target firms in each subgroup.

The results for U.S. investment (left panel of Table 1) are consistent with the Q-theory. Direct investment by acquirers (i.e., the x_j) responds to their respective

[7] For example, the European Commission launched a study in April 2005 aimed at determining the obstacles to cross-border merger activity in the financial sector of the European Union. The study was motivated by the widespread belief that financial integration across EU nations would be beneficial, and the presumption that regulatory burdens imposed by various European governments presented the most severe obstacles.

[8] To compute market values from the SDC files, I start with the value of common equity at share prices four weeks prior to the merger, and then add in the book value of preferred stock and short and long-term debt. Book values are computed similarly, but use the book value of common equity rather than the market value.

Table 1
Q−Regressions for Domestic Investment

	United States				7 European Countries			
	$100x_{j,t}$	$100x_{j,t}$	$100y_{j,t}$	$100y_{j,t}$	$100x_{j,t}$	$100x_{j,t}$	$100y_{j,t}$	$100y_{j,t}$
$Q_{j,t-1}$	0.122	0.123			0.116	-0.075		
	(3.94)	(4.20)			(0.76)	(0.44)		
$Q_{j,t-1} - \bar{q}_{t-1}$			5.343	4.443			2.116	0.626
			(3.94)	(3.12)			(2.40)	(0.72)
industry effects	no	yes	no	yes	no	yes	no	yes
R^2	.01	.20	.01	.10	.02	.23	.14	.55
N	7951	7951	5402	5402	367	367	169	169

Note: The table presents estimates for Eq. 10 with t-statistics in parentheses. The dependent variable for each regression appears in the column heading. The regressions for the 7 European countries include dummy variables for each country, and all regressions include yearly dummy variables (not reported).

Qs with coefficients that are statistically significant at the one percent level, whether dummy variables for two-digit Standard Industry Classification (SIC) codes are included in the regression or not. The proportionate capital stock adjustments executed through mergers (i.e., the y_j) are even more responsive, as the theory implies, with the coefficients on $Q_j - \bar{q}$ about forty times larger than those on Q_j. This difference is greater than Jovanovic and Rousseau (2002a) found for Compustat firms over the 1971-2000 period, with the coefficients on $Q_j - \bar{q}$ itself more than twice as large and the coefficients on Q_j about six times smaller than they found. These differences probably arise for the same reasons that the overtaking point in Fig. 2(a) was lower with the SDC sample.

For the seven European countries, the response of direct investment to Q among firms that are already participants in the domestic merger market is not statistically significant. The size of M&A adjustments also appears unaffected by $Q_j - \bar{q}$ when dummies for SIC codes are included in the regression, but the coefficient is significant at the five percent level when the SIC codes are omitted. This suggests that while there is some evidence in favor of the Q-theory of mergers for domestic M&A activity within Eurozone countries, unmodeled industry-specific forces might also explain why high-Q firms prefer mergers over direct investments.

2.3. Are M&A transactions driven mainly by excess cash of the acquirer?

A firm's manager may sometimes be able to pursue his own objectives – the size of his firm, for example – at the expense of shareholders' wealth. Jensen (1986) argues that managers of firms with excess cash are more likely to apply that cash towards acquisitions than return it to shareholders in the form of dividends, even if an acquisition may have a negative net present value. The purchase of new and disassembled used-capital does not expand the span of control as widely as a merger might, and thus free cash is also more likely to go towards wasteful acquisitions than internal growth.

Table 2
Q−Regressions for Domestic Investment with Cash

	United States				7 European Countries			
	$100x_{j,t}$	$100x_{j,t}$	$100y_{j,t}$	$100y_{j,t}$	$100x_{j,t}$	$100x_{j,t}$	$100y_{j,t}$	$100y_{j,t}$
$Q_{j,t-1}$	0.124	0.121			0.111	-0.066		
	(3.94)	(4.08)			(0.71)	(0.39)		
$Q_{j,t-1} - \bar{q}_{t-1}$			4.147	3.604			2.223	0.664
			(3.02)	(2.52)			(2.51)	(0.77)
cash_{t-1}	-0.004	0.009	3.337	3.240	0.006	-0.030	-0.298	-0.338
	(0.23)	(0.58)	(5.16)	(4.72)	(0.14)	(0.67)	(1.03)	(1.13)
industry effects	no	yes	no	yes	no	yes	no	yes
R^2	.01	.20	.01	.20	.02	.23	.15	.56
N	7951	7951	5402	5402	367	367	169	169

See note to Table 1.

The regressions in Table 2 address the question of whether excess cash is directed towards mergers rather than dividends by adding cash balances (SDC data item ACASH, including cash and marketable temporary investment vehicles) normalized by total assets to the baseline specifications described in (10). Again the focus is on domestic M&A activity. Cash has virtually no effect on x for either U.S. or European firms, but has a positive effect on y for U.S. acquirers that is significant at the five percent level. That is, when a U.S. manager has extra money to invest, he spends

it on acquisitions and not on direct capital purchases. Interestingly, the coefficient on cash balances is not statistically significant for firms in the seven continental European countries. It thus appears that European firms are less interested in or more constrained in their ability to expand their span of control through M&A than U.S. firms. At the same time, the coefficients on Q_j and $Q_j - \bar{q}$ are for the most part unaffected by the inclusion of cash balances for either group.

2.4. Do $Q - q$ and excess cash drive cross-border M&A?

Table 3 reports results from the y equation for cross-border mergers. In contrast to the domestic regressions in Tables 1 and 2, the coefficients on $Q_j - \bar{q}$ are statistically significant at the five percent level or less in all cases. The coefficients on $Q_j - \bar{q}$ are smaller, however, for U.S. cross-border mergers than they were for domestic mergers. This once again probably reflects the higher information and brokerage costs that U.S. firms face in pursuing cross-border M&A. There is also some evidence that U.S. firms use excess cash to fund cross-border M&A as readily as it funds domestic mergers this way.

Table 3
Q−Regressions for Cross-Border Mergers

	Dependent variable: $100y_{j,t}$							
	United States				7 European Countries			
$Q_{j,t-1} - \bar{q}_{t-1}$	1.278	1.190	1.164	1.125	2.011	1.718	2.067	1.667
	(3.90)	(3.44)	(3.52)	(3.23)	(2.63)	(2.51)	(2.65)	(2.39)
cash_{t-1}			0.314	0.246			-0.065	0.078
			(2.30)	(1.66)			(0.38)	(0.43)
industry effects	no	yes	no	yes	no	yes	no	yes
R^2	.02	.06	.02	.07	.06	.51	.06	.56
N	948	948	948	948	223	223	223	223

See note for Table 1.

What is most striking about Table 3, however, is that the coefficients for the European cross-border acquirers are larger than those for U.S. cross-border mergers.

Table 4
Q−Regressions Restricted to U.S. Acquirers and European Target Pairs

	Dependent variable: $100y_{j,t}$			
$Q_{j,t-1} - \bar{q}_{t-1}$	6.052	5.788	5.985	5.748
	(6.18)	(5.09)	(6.12)	(5.05)
cash_{t-1}			0.342	0.293
			(1.30)	(0.97)
industry effects	no	yes	no	yes
R^2	.19	.23	.20	.27
N	196	196	196	196

See note for Table 1.

This opens the possibility that M&A activity, operating through the Q-theory, has promoted the transfer of technologies among countries in the Eurozone and beyond.

Table 4 presents results from the y equation for U.S. acquirers and European targets with an eye to determining more specifically whether technology transfer from the United States to Europe is accomplished through cross-border mergers. In this case, I use the $\bar{q}$'s from targets of European domestic mergers as a proxy for q. The responses of M&A investment to $Q - q$ are consistently positive and significant at the one percent level, and are even larger than those obtained for U.S. domestic mergers. Unlike the domestic and overall cross-border results, however, U.S. firms do not appear to waste cash on acquiring European firms. Perhaps this is because the potential for efficiency gains in European targets is so high.

2.5. Do acquiring firms have higher Q's than target firms?

The final implication of the Q-theory of mergers considered here is perhaps the most basic, namely that the Q-values of acquiring firms on average exceed those of targets. Though the SDC generally have less data for targets than acquirers that would enable the computation of Tobin's Q, a preliminary investigation is still possible.

The left panel in Table 5 shows the unconditional means of acquirer and target Q-values for M&A involving U.S. and European acquirers and their domestic and foreign targets. There are many more observations available to compute these summary

Table 5
Comparison of Acquirer and Target Q's

	unmatched		matched		
	Acquirer	Target	Acquirer	Target	Acq. > Target
U.S. domestic	3.10	2.74	3.42	2.28	70.8%
	(13,135)	(2,648)	(1,229)	(1,229)	
U.S. cross-border	2.96	2.62	3.50	2.25	70.2%
	(2,421)	(347)	(178)	(178)	
7 European domestic	2.14	1.72	1.78	1.75	54.9%
	(573)	(178)	(51)	(51)	
7 European cross-border	2.56	2.54	3.51	2.59	53.8%
	(639)	(164)	(65)	(65)	

Note: The table presents average values of Tobin's Q for acquirers and targets in the SDC sample, with the number of firms used to compute each average in parentheses.

statistics than were available for the regression analyses of Sections 2.2 - 2.4 because several other objects (i.e., direct investment, merger values, cash balances, and total assets) are not needed to simply calculate Q. The acquirers and targets represented in the left panel are also unmatched, which admits the largest possible number of observations. For U.S. mergers, acquirer Q-values on average exceed those of targets in both the domestic and cross-border subsets, and though the findings are not as striking for the European countries, the findings remain consistent with the Q-theory.

The right panel of Table 5 presents unconditional means of acquirer and target Q-values drawn from transactions in which the Q of both counterparties are known. This restricts the number of observations available even more than the regression analysis, since the latter does not require that the targets' Qs be known. At the same time, focusing on matched pairs of merging entities allows the implication of technology transfer through Q to be more directly investigated through the statistic provided in the final column of the Table 5, i.e., the percentage of cases where the acquirer's Q exceeds that of the target.

With the matched M&A transactions, the dominance of acquirer Q-values over those of targets is even more pronounced for U.S. firms than in the unmatched analysis, with the Q of the acquirer exceeding that of the targets over seventy percent of the time in both the domestic and cross-border cases. These figures are slightly larger than those obtained by Andrade, Mitchell, and Stafford (2001) for U.S. mergers from

1973 to 1999, and suggest that the Q-based motivation for mergers may be more applicable now than ever. Acquirer Q-values exceed those of targets more often than not for the seven European countries in the sample, but the findings in this much smaller sample are not as emphatic as those obtained for the United States.

3. Conclusion

The Q-theory of mergers offers a framework for understanding M&A activity that operates through fundamentals and in a neoclassical context. It also generates clear implications for empirical testing. The tests executed here demonstrate that: 1) firms prefer M&A to standard investment when making large adjustments to their capital stocks; 2) large adjustments through M&A are more likely to occur for high-Q firms; 3) firms with excess cash on their balance sheets seem more likely to become acquirers; 4) acquirer Q-values exceed those of targets more often than not; and 5) these results extend beyond the domestic M&A market in the United States, applying as well to domestic and cross-border mergers among a set of seven European countries.

Perhaps most striking, however, is the confirmation of the theory for cross-border mergers between U.S. acquirers and European targets. Indeed, U.S. firms with high Q-values seem quite willing to search for targets in Europe with which to execute large increases in their capital stocks. At the same time, there is less cross-border merger activity between the United States and continental Europe than there is between the United States and other areas of the world. If, as the evidence indicates, the Q-theory of mergers does operate for cross-border mergers as readily as for U.S. domestic M&A and mergers with U.S. firms seem to be a viable mechanism for transferring technologies to countries in the Eurozone, the minimization of obstacles to such transactions would seem to deserve a place at the forefront of current discussions on European corporate policy.

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