A trade-off in corporate diversification

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Abstract

The marginal benefits of diversification exceed the costs by a decreasing margin, and diversifying beyond the optimal level will produce a wealth loss. This trade-off facing shareholders predicts an inverted U-relation between wealth and the degree of diversification. We empirically examine, and find evidence in support of, this trade-off proposition, thereby addressing the debate on how diversification affects wealth. Consistent with the trade-off, firms that diversify do so cautiously and stop diversifying before the marginal benefits are offset by the costs. Our evidence is also consistent with efficient diversification and the large prevalence of conglomerates in the U.S. economy.

Key words: Corporate diversification, optimal diversification, non-linear wealth effect, acquisitions

JEL Classification: G31; G32; G34

1. Introduction

Over 50% of production in the U.S. economy is delivered by conglomerates (Maksimovic and Phillips, 2007). Such prevalence neither is consistent with the view that diversification is ex ante inefficient nor can be explained by the agency problems associated with conglomerates (Gomes and Livdan, 2004). Either theoretically or empirically, the value of corporate diversification remains a largely unsettled debate.[1] As Stein (2003, p. 145) remarks, "after all, taken as a whole, the theoretical work does not lead to a clear-cut prediction that diversification . .. is on average good or bad", and greater attention should be paid to a cross-section of the value of diversification. In a similar vein, Hadlock et al. (2001, p. 614) point out that when trying to understand how diversification affects wealth, it is important to "identify when the costs are likely to exceed the benefits, and vice versa".

In this paper, we examine when the benefits of corporate diversification exceed the costs, and vice versa. Relying on the existing theoretical insights, we propose, as the framework for our analysis, that at low degrees of diversification the marginal benefits of diversification exceed the costs yielding a wealth increase, and that the wealth increase becomes smaller as firms diversify further and turns into a wealth loss once firms diversify beyond an optimal level. Beyond the optimum, the increasingly large costs exceed the benefits. This cost-benefit trade-off facing shareholders predicts an inverted U-relation between shareholder wealth and the degree of diversification.

[1] The conglomerate discount widely reported in earlier studies (e.g., Lang and Stulz, 1994) has been challenged by recent evidence. Several recent studies report that the value discount is attributable to the choice of methodology (e.g., Campa and Kedia, 2002) or fundamental factors other than diversification itself (e.g., Graham et al., 2002). There is also growing evidence that the internal capital market in conglomerates is active and can be beneficial to firm performance (e.g., Billett and Mauer, 2003; Duchin, 2010). However, Lamont and Polk (2002) find that an exogenous increase in diversity reduces excess firm value, supporting the view of inefficient internal capital markets. Mitton (2012) reports a negative relation between diversification and labor productivity, and attributes this negative effect of diversification to resource misallocation in the internal capital market. We review relevant theoretical arguments in section 2. For an insightful review of the literature, see Maksimovic and Phillips (2007).

In examining the trade-off proposition, we employ diversifying acquisitions as a proxy for diversification attempts. Acquisitions are the most common means through which firms diversify (Graham et al., 2002; Maksimovic and Phillips, 2007). Diversifying acquisitions represent 28% of our sample acquisitions made by U.S. listed firms during 1990 and 2010. We measure the wealth change due to a diversification attempt as the announcement-period excess return to a diversifying acquirer. We find reliable empirical support for the trade-off proposition. Conditional on making a diversification attempt, the predicted inverted U-relation between wealth and the degree to which a firm operates in different industrial segments provides a robust description of how corporate diversification affects the wealth of shareholders in a diversifying acquirer.

We find that, over a low range of diversification, diversifying acquisitions significantly increase the wealth of acquirer shareholders at a decreasing rate. Shareholders will suffer a wealth loss if firms make a diversifying acquisition, i.e., diversify, beyond the optimal level of diversification. Our empirical design allows the optimal level of diversification to be estimated, and the estimates imply the optimum of around six segments for an average diversifying acquirer. The estimates remain stable after accounting for unobserved firm-specific factors. Moreover, the inverted U-relation is unique only to diversifying acquisitions, i.e., not observed among non-diversifying acquisitions, indicating refutability of the trade-off proposition. The relation prevails even if the same diversifier also pursues a non-diversifying acquisition(s). This evidence of the inverted U-relation also implies that corporate diversification can turn out a bright side as well as a dark side on shareholder wealth.

To further understand the trade-off facing shareholders, we also examine the extent to which shareholders gain from optimal diversification and lose from diversifying beyond the optimal level. Data reveals that 88% of diversifying acquirers in

the sample end up with five or fewer segments after acquisition, and 5% with six segments. These patterns indicate that firms that diversify typically do not diversify beyond the optimal level. Diversifiers that operate below the implied optimal level of diversification before making a diversifying attempt earn a significant announcement-period gain. Although the gain significantly shrinks by several folds for the small group of diversifiers that operate beyond the optimal level before diversifying, it remains significantly positive. Diversifier gains also monotonically and significantly fall in diversifiers' existing degree of diversification. These gain patterns together with a very small number of firms that diversify beyond the implied optimum are consistent with the view that firms diversify cautiously and stop diversifying before the marginal benefits are offset by the increasing costs.

While these positive gains are consistent with value creation from optimal diversification, the observation that a large number of diversifiers operate at levels below the implied optimal level of diversification could be interpreted to suggest that firms generally are not sufficiently diversified. However, a diversifying decision involves significant costs and is not costlessly reversible (Denis et al., 1997; Gomes and Livdan, 2004). Such irreversibility represents constraints that inhibit firms from moving to the optimal level of diversification in a given attempt. Thus, the observation that most diversifiers appear under-diversified is in line with the existence of material frictions inherent in corporate decisions.

Since acquisitions are essentially our empirical lab and the listing effect is one important stylized fact from the recent M&As literature, we also investigate a fundamental implication of the effect on the benefits and costs of diversification. It is now well established that acquirers suffer a small announcement-period loss when the target is a publicly listed firm, but earn a significant gain when the target is an unlisted

entity (e.g., Faccio et al., 2006; Netter et al., 2011). The listing effect implies that the negative wealth effect associated with acquiring a listed target may well eat up all of the net benefit of diversification even when a diversification attempt in and of itself is wealth-maximizing. Consistent with the recent M&As studies, the listing effect is persistently significant in our sample. Diversifiers earn significant gains when acquiring an unlisted target, but small losses when their target is a listed firm. Importantly, the inverted U-relation is significant only when diversifiers acquire an unlisted target. Together, these results suggest that when firms diversify through acquisitions of listed targets, shareholders bear additional cost that is large enough to offset the net benefit of diversification. Also importantly, the differences in result related to the target listing status indicate that the negative wealth effect of conglomerate acquisitions observed in several earlier studies (e.g., Morck et al., 1990; Chevalier, 2004) may well be the listing effect in disguise. Nevertheless, the prediction of an inverted U-relation remains refutable after accounting for the listing effect.

Our study contributes to the vast literature on corporate diversification by examining when the benefits of corporate diversification are likely to exceed the costs, and vice versa. By testing the empirical validity of the inverted U-relation between shareholder wealth and the degree of diversification, our study offers a new and intuitive insight into the question of how diversification affects value. As Maksimovic and Phillips (2007) remark, for corporate finance this question is the primary question about diversification. Our analysis of the wealth effects of diversification attempts also extends the literature that studies the average value of diversification. At variance with several prior studies, our evidence suggests that diversification is an efficient corporate strategy, and firms that diversify do so cautiously and optimally. This evidence is consistent with the large prevalence of conglomerates in the U.S. economy.

In the next section, we review the existing theoretical insights, and discuss the trade-off proposition and its empirical prediction. In section 3, we describe our empirical design and data. Empirical results are reported and discussed in section 4. Section 5 concludes our study.

2. A trade-off in corporate diversification

Building on the existing insights, we propose that, for firms operating at low levels of diversification, the marginal benefits of diversification exceed the costs at a decreasing rate thereby increasing shareholder wealth, but diversification destroys wealth for firms that diversify beyond the optimal level of diversification. In this section, we review the benefits and costs of diversification, and discuss a testable prediction of the trade-off proposition.

Despite little or no potential for increasing returns to scale, diversification allows firms to exploit scope economies. To the extent that a firm's comparative advantage is feasible in terms of capabilities, value creation can arise from application of fungible knowhow and tacit knowledge across different products, and services of physical assets as common input (Teece, 1982). Elimination of redundancies across different activities enables multi-segment firms to benefit from savings on the aggregate fixed cost of production (Gomes and Livdan, 2004).

Coinsurance of corporate debt and the resulting increase in borrowing capacity provide financial rationale for diversification (e.g., Lewellen, 1971). Fluck and Lynch (1999) show that, through such risk reduction, diversification allows firms to obtain financing for their marginally profitable projects to survive a period of distress and subsequently improve in profitability. To the extent that coinsurance alleviates countercyclical deadweight losses such as costly external finance and investment

distortions during economic downturns, diversification can reduce firms' systematic risk and cost of capital (Han et al., 2013). This form of financial synergy is in line with efficient resource allocation in an internal capital market. By becoming multi-segment, firms can bypass the external capital market frictions and achieve more efficient investment decisions (e.g., Gertner et al., 1994; Stein, 1997). Diversification can also improve access to the external capital market by alleviating the adverse selection problem typically facing single-segment firms (Hadlock et al., 2001).[2]

Regardless of trading frictions, the benefits discussed above require common ownership and cannot be replicated by individual investors. Without offsetting costs, shareholder wealth, as depicted by line ABE in figure 1, would strictly increase as firms diversify.[3] However, another strand of the literature suggests that the conglomerate form of organization has significant costs and destroys shareholder wealth. Theories demonstrating costs of diversification typically, though implicitly, characterize conglomerates as firms with a number of unrelated divisions. That is, diversification costs become material and increasingly large as firms become highly diversified, i.e., large conglomerates.

Due to bounded rationality as in March and Simon (1958), diversifying intensively can inflict constraints on headquarters' cognitive ability in coordination and resource allocation.[4] As Teece (1982, p. 53) points out, a large degree of diversification gives rise to "bottlenecks in the form of over-extended scientists, engineers and managers" in accessing scope economies. Moreover, Stein (1997) shows that extensive

[2] Assuming imperfectly correlated valuation errors across different industrial segments, the magnitude of underpricing of the overall firm due to adverse selection should be smaller for a multi-segment firm than for a single-segment firm. Hadlock et al. (2001) find evidence in support of this hypothesis.
[3] The marginal benefits need not be constant for an optimal level of diversification to exist. The benefits can be decreasing in the amount of diversification.
[4] Due to reliance on the services provided by the existing managerial group, hiring more managers does not give a solution in the short run (Penrose, 1959).

diversification can cause uncorrelated project evaluation errors, which in turn lead to errors in winner picking and resource allocation by headquarters. Consequently, as multi-segment firms pursue further diversification, inefficiencies in their internal coordination and resource allocation arise and become increasingly large.

The complexity of conglomerates also nurtures agency problems and ensuing costs in the internal capital market.[5] Scharfstein and Stein (2000) demonstrate inefficient cross-subsidies in conglomerates due to headquarters' attempt to curb rent-seeking by divisional managers. Rajan et al. (2000) argue that because profits generated by divisions with large growths are up for grabs by other divisions with poorer prospects, diversity in investment opportunities creates disincentives to make optimal investments for the large-growth divisions. To improve investment incentives, headquarters transfers funds from higher-growth segments to lower-growth segments. As Rajan et al. further show, the greater the diversity within a conglomerate the greater is the extent of such suboptimal cross-subsidization.

Graphically, curve CG in figure 1 depicts the wealth effect of increasing costs of diversification. Diversification costs become material and start to produce a non-trivial wealth effect once firms diversify to some degree (point d_a). As firms diversify further, diversification costs become larger producing an increasingly large counterweight to the marginal benefits.

Taken in isolation, theories demonstrating benefits and theories demonstrating costs of diversification might be viewed as making conflicting predictions. The existing insights are formulated to shed light on different aspects of corporate diversification. We propose that, when viewed together, the two strands of existing insights jointly

[5] For a sample of relatively large firms (i.e., Value Line firms), Denis et al. (1997) report evidence consistent with significant agency problems inherent in large conglomerates.

imply that the marginal wealth effect of diversification is dominated by the benefits at low levels of diversification, and by the increasingly large offsetting costs as firms become highly diversified. Curve ABDF in figure 1 illustrates this trade-off facing shareholders. Diversification yields a decreasing wealth gain up to point d_b, i.e., the optimal level of diversification. Once firms diversify beyond point d_b, the increasingly large costs more than offset the marginal benefits, leading to an increasingly large wealth loss as depicted by the downward sloping contour DF. Thus, the trade-off proposition predicts *an inverted U-relation between shareholder wealth and the degree to which a firm operates in different industrial sectors*.

Given that the marginal benefits and costs of diversification facing firms are known to their managers, one would expect wealth-maximizing firms, on average, to operate at, or close to, the optimal level of diversification. To this extent, diversification attempts towards point d_b might be taken to suggest that firms are under-diversified. However, the dynamics of a firm's life cycle can create an opportunity for the firm to profitably exploit the diversification strategy, or diversify further (Bernardo and Chowdhry, 2002). For instance, diversification reflects a strategy by which firms search for new profit opportunities in response to an expected decline in the prospects of their current activities (Matsusaka, 2001; Gomes and Livdan, 2004). Knowing their trade-off also implies that firms on average should carefully diversify and stop diversifying before suffering a wealth loss. For at least two broad reasons, however, firms may diversify beyond point d_b despite the resulting wealth loss. First, diversification allows managers to reduce their employment risk (e.g., Amihud and Lev, 1981). Second, managers derive private benefits, e.g., entrenchment, from diversification (e.g., Shleifer and Vishny, 1989; also Aggarwal and Samwick, 2003). In addition, inefficient diversification may also result from managers' overconfidence in their ability to extract gain from operating

multiple businesses (see Roll, 1986). Inefficient diversification is more likely in large conglomerates. It is the complexity of a large internal capital market that shelters wasteful investments, due to either managerial objectives or hubris, from the external market discipline.

The literature distinguishes between related and unrelated diversification. The key idea of the trade-off proposition rests simply on there being a material difference in the nature of business operation, on either the production or sales side, or both. Therefore, we view the proposition as speaking to unrelated rather than related diversification. To the extent that investment motives differ between related and unrelated diversification, we conjecture that the trade-off prediction is unlikely to hold for related diversification.

3. Empirical design

The focus of our empirical analysis is to examine whether the trade-off proposition describes how corporate diversification affects shareholder wealth. In this section, we present our empirical design and the sample used in testing the proposition.

3.1 Testing the trade-off prediction – the inverted U-relation

One direct test of the predicted inverted U-relation between shareholder wealth and the degree of diversification in Figure 1 is to observe a change in wealth as a firm diversifies. Since the relation is quadratic and point A can be viewed as the level of wealth in a single-segment firm (W_s), wealth in a multi-segment firm (W_m) can be generally expressed as:

(1) $W_m = W_s + b(d) + c(d^2)$,

where d is the degree of diversification, and b and c are model parameters. For a single-segment firm, $d = 0$. A wealth change (ΔW) due to a diversification attempt is then the difference between wealth before $(W_{m,0})$ and after $(W_{m,1})$ diversification:

(2) $\Delta W = W_{m,1} - W_{m,0} = W_s + b(d_1) + c(d_1^2) - W_s - b(d_0) - c(d_0^2)$,

where d_0 and d_1 are the degree of diversification before and after the firm diversifies, respectively. Defining $\delta = d_1 - d_0$, equation (2) becomes:

(3) $\Delta W = b(\delta) + c(2d_0\delta + \delta^2)$.

The trade-off proposition predicts that *b* and *c* from equation (3) have a positive and negative empirical value, respectively.

To test this prediction, we estimate variants of the regression model in (4):

(4) $\Delta W_i = \beta_1 + \beta_2(\delta_i) + \beta_3\left(2d_{0,i}\delta_i + \delta_i^2\right) + \varepsilon_i$.

ΔW_i is the wealth change due to a given diversification attempt by firm *i*. $d_{0,i}$ is the firm's degree of diversification before diversifying, and δ_i the degree of diversification the firm adds to its corporate portfolio through its diversification attempt. Conditional on making a diversification attempt, the trade-off proposition predicts a positive sign for $\hat{\beta}_2$ and negative sign for $\hat{\beta}_3$.

Since acquisitions are the common means through which firms diversify, we estimate equation (4) using diversifying acquisitions as a proxy for diversification attempts. We measure ΔW_i as market-adjusted excess return to diversifying acquirer *i*, i.e., acquirer return minus return on the CRSP value-weighted index, over the five-day period (−2, +2) surrounding the announcement date.[6] We use the market-adjusted model because the conventional approach to estimating announcement-period excess

[6] For a random sample of 500 deals, Fuller et al. (2002) observe that the announcement dates recorded by the SDC are correct for 92.6% of the sample. The recorded dates that are inaccurate are off by no more than two days. The (−2, +2) window should therefore capture the announcement effect without causing considerable noise. As reported below, we draw our sample from the SDC.

returns (see Brown and Warner, 1985) requires a long pre-event period for estimating the model parameters. As reported below, a large number of our sample firms make a prior acquisition in periods immediately preceding their current acquisition. Hence, a substantial portion of our sample firms lacks a sufficiently long estimation period that is free from the event under analysis. For the same reason, our approach has been adopted by several others (e.g., Fuller et al., 2002). Brown and Warner (1980) show that for short windows, adjusting for the systematic (beta) risk does not improve precision of abnormal return estimates.

3.1.1 Identifying diversification attempts

One common way to identify a diversifying, or unrelated, acquisition is to observe a deal in which the acquirer and target have different primary 2-digit SIC codes.[7] However, two different 2-digit industries may be related, especially vertically (see, e.g., Fan and Lang, 2000; Ozbas and Scharfstein, 2010). An acquisition involving firms from different 2-digit industries may be an upstream or downstream integration rather than an attempt to achieve unrelated diversification. To address this concern, we define a diversifying acquisition as (i) a deal in which the acquirer and target have different primary 2-digit SIC industries where (ii) the degree of vertical relatedness between the acquirer and target primary industries is no greater than 5%.

We calculate a measure of vertical relatedness as in Fan and Lang (2000).[8] This measure is based on the industry input-output (IO) data provided by the Bureau of

[7] We adopt the 2-digit level as the literature suggests that the 3- or 4-digit level may be too detailed to identify the industrial structure of the firm (e.g., Servaes, 1996; Maquieira et al., 1998).
[8] Hoberg and Phillips (2010) propose a text-based measure of relatedness between a pair of firms using product descriptions in the 10-K filings. Thus, this measure is not applicable to acquisitions involving unlisted targets, which are the common means through which firms diversify. Also importantly, Hoberg and Phillips (p. 3784) note that their algorithms "are not able to separate the text associated with each

Economic Analysis (BEA).[9] Although our 5% cut-off appears small and is much stricter than the 10% cut-off adopted by Ozbas and Scharfstein (2010), our cut-off should be viewed as the lower bound of true relatedness. As pointed out by Fan and Goyal (2006), because the IO data is based on the value of shipments, a relatedness measure would be much larger if it was based on production costs. Nevertheless, we repeat all of our tests using the 10% cut-off, and find qualitatively similar results (untabulated). All of our untabulated results are available on request.

3.1.2 Measuring the degree of diversification

The formal test of the trade-off prediction in equation (4) requires empirical estimates of $d_{0,i}$ and δ_i around the bid announcement. Using the number of 2-digit SIC codes (henceforth, segments) is the directly applicable approach. This is because it allows both $d_{0,i}$, and crucially, δ_i, to be estimated from actual data around the time of a bid announcement. Thus, we use the number of segments of acquirer *i* observed before the bid announcement as a proxy for $d_{0,i}$. Our proxy for δ_i is the number of new segments added through an acquisition to the existing segments of acquirer *i*. Thus, δ_i is the number of the target's segments, observed before the bid announcement, that are not the same as any of the acquirer's existing segments.

We recognize that the number of segments is an imperfect measure of diversification as it weights large and small segments equally. This equal-weighting may

segment of conglomerate firms". Though innovative and useful in several other contexts, their measure is not applicable to tests involving diversifying acquisitions by multi-segment firms in our study.

[9] The BEA updates its survey and IO data every five years, and the industry definitions change from update to update. Therefore, in calculating a measure of relatedness for each deal, we match the IO definitions in the 1987 survey to the sample deals made between 1990 and 1991: our sample period begins in 1990. Similarly, the 1992 definitions are matched to deals made between 1992 and 1996, the 1997 definitions to deals made during 1997 and 2001, and so on. The BEA adopts NAICS codes for its 1997 survey onwards. We use SIC codes for matching IO definitions to deals made between 1990 and 1996, and NAICS codes, as provided by the SDC, for deals made in 1997 onwards.

introduce noise to our diversification measure. However, this is not of serious concern as the effect of such noise would be to bias our analysis away from finding significant results. Alternative to the use of the number of segments is a Herfindahl index, which takes into account segment size. However, using the index would require δ_i to be estimated using annual change in the reported segment data. This is not practical because it is common that firms make multiple acquisitions within a year. As reported in section 3.2, such multiple acquisitions are also common in our sample. Nevertheless, we repeat the analysis in Table 4 using an asset-based Herfindahl index as a proxy for $d_{0,i}$ with sample partitioning as in Table 2 of Lang and Stulz (1994). The results, reported in Table A.I, exhibit a pattern similar to, though less discernible than, the pattern observed in Table 4.[10] This suggests that the assumption of equal weights is unlikely to render the use of the number of segments overly noisy in our application.

In estimating $d_{0,i}$ and δ_i in diversifying acquisitions, we do not adjust for vertical relatedness between a pair of segments. Treating two vertically related segments of a firm as one segment would likely understate both the benefits (e.g., debt coinsurance) and costs (e.g., inefficiencies arising from intensive internal coordination) associated with operating multiple segments. To the extent that a typical firm stops diversifying before the costs become material or exceed the benefits as implied by the trade-off proposition, the adjustment would understate the benefits more than the costs, thereby imposing a downward bias on the estimate of ΔW (i.e., the net benefit from diversification). If this non-adjustment for vertical relatedness introduces non-trivial noise to our analysis, it will tilt our results towards being insignificant.

[10] The trade-off predicts that gains to diversifying acquirers (ΔW) decline in $d_{0,i}$. In both mean and median, Table 4 shows that the gains monotonically decline in the diversifier number of segments. When using the Herfindahl index, such a monotonic pattern is less pronounced, especially in the median. The less discernible pattern associated with the use of the index may be attributable to the noise introduced by multiple acquisitions made within a year. The median results are not tabulated.

3.2 Data and sample

Our sample is drawn from the completed transactions reported in the Thomson Financial (SDC Platinum) U.S. Mergers and Acquisitions database with the initial bid announced between January 1, 1990 and December 31, 2010. Since the focus of our study is on industrial diversification, we examine only domestic acquisitions.[11] We require that the acquiring firm is a publicly traded firm listed on the Center for Research in Security Prices (CRSP) and Compustat files during the period of 11 days before through two days after the announcement date. We also require that acquirers have non-negative total assets. Target firms can be a publicly traded firm, subsidiary company, or privately held entity. To ensure that our sample consists of material transactions that are not transactions to clean up the remaining interests, we further require that (i) the deal value (excluding fees and expenses) is at least $1 million and (ii) the acquirer holds less than 50% of the shares in the target before the bid announcement.

In identifying diversification attempts, we use the SIC codes reported by the SDC. As pointed out by Kahle and Walkling (1996), SIC codes change over time for many firms, thereby making the codes provided by Compustat, which are the latest codes and ones accessible to researchers, an inaccurate description of the firm's industrial structure in prior years. As noted by Schlingemann et al. (2002), the SIC coding in the SDC may differ from that in Compustat. We check at the 2-digit level and find that the coding is identical between these two sources. When identifying diversification attempts in 1997 onwards, we also use the SDC as a source for NAICS codes.

[11] Acquisitions of foreign targets can be considered international diversification at the corporate level. Although the general tenor of the trade-off proposition is applicable to international diversification, we limit our analysis to domestic acquisitions to make its scope manageable. Examining the proposition in the context of international diversification should yield fruitful future research.

A total of 18,460 acquisitions survive the above initial sample criteria: 8,184 of which are acquisitions involving an acquirer and target from different primary 2-digit industries. Among these 8,184 deals, 5,127 deals meet our 5% cut-off criterion to qualify as a diversifying acquisition. For a large number of deals, data required for estimating free cash flow (an important control variable) is missing. This reduces our final sample to 16,455: 4,621 (from 5,127) diversifying deals; 1,944 (from 3,057) deals that have an acquirer and target from different 2-digit industries with vertical relatedness above 5% (henceforth, vertically related deals); and 9,890 (from 10,276) deals involving firms in the same primary 2-digit industry (henceforth, focused deals).[12] In this final sample, acquirers in 40% (1,848) of diversifying deals make at least one prior deal within the preceding year. For vertically related and focused deals, this proportion is 41%. Out of 5,248 unique acquirers in the final sample, 1,682 make diversifying and non-diversifying (either vertically related or focused, or both) deals during the sample period. Thus, it is not uncommon for the same firms to diversify, pursue vertical integration, and refocus during their life cycle.

Table 1 reports distributions of the final sample. As shown in Panel A, the number of deals in the full sample fluctuates across years peaking in the second half of 1990s and dropping after 2000, reflecting the wave of the 1990s. The third column reveals that diversifying acquisitions form a substantial portion (4,621 deals or 28%) of the M&A activities, which is generally persistent across the sample period. Hence, firms still diversify. The fourth column shows that when firms make an acquisition outside of their core industry, vertical integration (1,944 or 12%) is much less common than unrelated diversification. Panel A also shows that acquirers earn positive and

[12] Although our tabulated results are based on deals with complete data (i.e., the reduced sample), we rerun all of our tests using the larger sample (i.e., omitting free cash flow) and find very similar results that would lead to the same conclusion.

comparable announcement-period excess returns from diversifying (1.76%), vertically related (1.83%), or focused (1.75%) acquisitions. All of these gains are significant and indistinguishable from each other. Similar to vertically related and focused acquisitions, excess returns from diversifying acquisitions are positive for every year and significant in most years. This result is inconsistent with the widely held view that corporate diversification is ex ante inefficient, but indicates that diversification generally enhances wealth and is in line with the observation that firms still diversify.

Panel B describes the distributions of the numbers of segments for diversifying acquisitions in the final sample. In 24% (1,125) of the acquisitions, the diversifier is a single-segment firm before acquisition. In 65% (2,985) of the deals, diversifiers already operate in two to four segments. In terms of the grouping by the degree of diversification in Shin and Stulz (1998), almost 90% of the sample diversifiers are therefore either focused or moderately diversified firms.[13] Most of the targets operate in only one or two segments: 60% of them are a single-segment firm, and 28% have two segments. In about one-third (1,392) of the deals, there is no new segment added to the diversifier's business portfolio.[14] The sheer volume of these acquisitions suggests that a large number of firms that diversify do not diversify into a completely new territory. Fifty-two percent of diversifiers add only one segment to their corporate portfolio, and 14% of them add two segments. About three quarters of diversifiers end up being moderately diversified firms (i.e., operating in four or fewer segments) following a given diversification attempt. These statistics suggest that firms appear to diversify cautiously, in line with the positive gains to diversifiers observed in Panel A.

[13] Shin and Stulz (1998) categorize their sample firms into single-segment, moderately diversified (two to four segments) and highly diversified (five or more segments) firms.
[14] Acquirers in these deals already operate in their target's primary segment or one of its segments, but their primary segment is different from their target's primary segment.

3.3 Sample characteristics and control variables

Because we use acquisitions as a lab for testing the trade-off prediction, we also incorporate into equation (4) as control variables the known determinants of acquirer announcement-period gain (see Moeller et al., 2004).[15] The predicted inverted U-relation is a function of both d_0 and δ. Therefore, we report in Table 2 statistics for diversifying acquisitions across different levels of existing diversification and added diversification. We know of no theoretical guidance on how to distinguish between moderately and highly diversified firms, and as a result, divide the sample diversifying deals into three groups based on the diversifier pre-acquisition number of segments as in Shin and Stulz (1998). Given the distribution of new segments added observed in Panel B of Table 1, we also divide the sample deals into three groups: 0; 1; and 2 or more segments added.

First, we control for firm size. Moeller et al. (2004) report that acquirer gain varies with acquirer size (book total assets). As shown in Panel A, in both mean and median, diversifiers' size monotonically increases in the degree to which they are diversified. Thus, diversifier size may, at least partially, explain the predicted relation between diversification and wealth. Extant evidence suggests that Tobin's q has an ambiguous effect on acquirer gains. For the sample diversifiers, q decreases monotonically in both mean and median, and is smallest for highly diversified acquirers. This pattern is also consistent with the association between diversified firms and low valuation reported in earlier studies (e.g., Lang and Stulz, 1994). The free cash flow hypothesis posits that large free cash flow facilitates empire-building or wasteful investments by managers, and that leverage subjects managers to the disciplinary role

[15] In the interest of parsimony, we refer readers to the references cited in Moeller et al. (2004). For the definitions of acquirer and deal characteristics, see notes to Table 2.

of debt. In both mean and median, free cash flow and leverage monotonically rise in the diversifier number of segments. Although none of these monotonic patterns is systematically observed across the number of added segments, the variations are statistically significant in most cases.

Panel B presents statistics for deal characteristics. Recent studies report that acquirer gain is larger when the target is an unlisted firm (either a private entity or subsidiary) than when it is a publicly traded firm. The frequencies of subsidiary and public targets monotonically rise in the diversifier number of segments while the opposite holds for the frequency of private targets. Although these frequencies do not monotonically vary across the number of added segments, the variations are significant for private and public targets. Existing evidence shows that acquirer gain is more positive with pure cash financing than with pure equity financing when targets are public firms, and the relation reverses when targets are unlisted firms. Pure cash financing is monotonically more frequent as the diversifier number of segments increases, and the opposite holds for pure equity financing. However, the financing patterns are much less discernible across the number of added segments. Ample evidence suggests that larger deals produce a greater impact on acquirer gain. In both mean and median, the relative size of a deal monotonically decreases in the diversifier number of segments. Although the variations are monotonic only in the median, relative size generally increases in the number of added segments reflecting multi-segment targets being generally larger than single-segment targets. As a measure of competition for the target, we adopt an index of target industry liquidity and calculate it following Schlingemann et al. (2002). Moeller et al. (2004) report a negative relation between acquirer gain and the index. Although the index exhibits no discernible pattern across either the diversifier number of segments or the number of added segments, the

variations in the index are significant in both mean and median. Overall, the variations in deal characteristics are indicative of their potential influence on acquirer gains from diversifying acquisitions.

An alternative proxy for competition for targets is the observed presence of multiple bids. Less than 1% of the sample targets receives multiple bids as reported in the SDC. The literature suggests that acquirer gains vary between tender offers and mergers, and between hostile and friendly transactions. Only 3.6% of our sample diversifiers make a tender offer, and less than 1% of them make a hostile bid. This is not surprising as the vast majority (86%) of our sample diversifiers acquire an unlisted target. Although we do not include these known determinants in our main analysis, untabulated results show that including them makes virtually no change to the key findings.

4. Empirical evidence on the trade-off

In the following subsections, we present evidence on the trade-off proposition, including refutability of the proposition. Since we use diversifying acquisitions as a proxy for diversification attempts, we also address an implication of the listing effect, one important stylized fact from the recent M&As literature, on the net benefit of diversification.

4.1 The inverted-U relation in diversifying acquisitions

Conditional on making a diversification attempt, the trade-off proposition predicts a positive sign for $\hat{\beta}_2$ and negative sign for $\hat{\beta}_3$ in equation (4). Table 3 reports regression results from estimating variants of equation (4) for acquirers in diversifying acquisitions. Model (1) is the baseline model, which does not include any control

variables. Consistent with the prediction, both $\hat{\beta}_2$ (1.319) and $\hat{\beta}_3$ (−0.103) not only have the correct signs, but also are significant. These coefficient estimates together provide evidence that acquirer gains from diversifying acquisitions follow an inverted U-relation between wealth and the degree to which a firm operates in different industrial sectors. Specifically, the positive sign of $\hat{\beta}_2$ indicates that there is an important marginal benefit from diversifying. As reflected by the negative sign of $\hat{\beta}_3$, however, if firms diversify to achieve some very high degree of diversification, significant costs will arise and become increasingly large to eventually more than offset the benefits. These findings support the proposition that the marginal benefits of diversification exceed the costs at relatively low levels of diversification, and the opposite holds as firms diversify beyond some optimal level.

Given the fluctuations in the number of diversifying deals across years observed in Panel A of Table 1, model (2) incorporates year fixed effects. Both $\hat{\beta}_2$ and $\hat{\beta}_3$ remain significant with the correct signs. The magnitude of both coefficients remains virtually unchanged. To address the potential industry effects, we also include industry fixed effects in model (3). The results for both coefficients remain practically unchanged, suggesting that the trade-off prediction is robust to both year and industry specific effects. In model (4), we add the control variables discussed in section 3.3. Both $\hat{\beta}_2$ and $\hat{\beta}_3$ still remain significant with the correct signs. However, it is possible that some of the firm and deal characteristics are endogenously determined.[16] Importantly, these characteristics may also be correlated with the extent to which firms are diversified and/or further diversify. If firms diversify in response to an expected decline in their current activities, for example, δ_i and $d_{0,i}$ are likely to be correlated with Tobin's q as a

[16] For example, the choice of payment method can be constrained by the amount of free cash flow, and leverage can be chosen in response to expected growth prospects which are reflected in Tobin's q.

proxy for growth prospects. Such correlations, if present, could bias the values and significance of $\hat{\beta}_2$ and $\hat{\beta}_3$. Since both of the coefficients remain significant and have the correct signs either with or without the control variables, it is unlikely that our key results are driven by correlations among the covariates.

Nevertheless, one potential inference problem remains in models (1) through (4). Different firms diversify for different reasons. That is, some firms may gain more or less from diversifying acquisitions than others due to their firm-specific characteristics. Indeed, as mentioned in section 2, diversification motives can vary depending on how diversified firms already are, which is firm-specific. To this extent, the results from models (1) through (4) may well be biased by unobserved firm-specific factors. To address the potential effects of such factors in estimating the wealth effects of marginal diversification, we incorporate firm fixed effects.

Model (5) includes firm and year fixed effects. Notably, the adjusted R^2 of 32% in model (5) is substantially larger than those in models (1) through (4), which are less than 4%. Thus, firm-specific factors account for a relatively large proportion of variation in the gain from diversification attempts: much larger than the industry and year specific effects as well as the control variables do together. Such a large improvement in the adjusted R^2 is in line with the results reported in prior cross-sectional studies (see Campa and Kedia, 2002; Aggarwal and Samwick, 2003). In model (6), we rerun model (5) by including the control variables. In both models, both $\hat{\beta}_2$ and $\hat{\beta}_3$ remain significant with the correct signs. Moreover, these coefficient estimates have comparable magnitude to their counterparts in models (1) through (3), and to a somewhat lesser extent, model (4). These results indicate that the inverted U-relation predicted by the trade-off is also robust to the effects of unobserved firm-specific factors. To further address the endogeneity problem discussed above, we rerun model (6) including one

control variable at a time. The results for both $\hat{\beta}_2$ and $\hat{\beta}_3$ (untabulated) remain similar and would yield the same conclusion regardless of the included control variable.

Considering the persistently significant estimates of $\hat{\beta}_2$ and $\hat{\beta}_3$, one naturally ensuing question would be what the optimal level of diversification might empirically be in general. Although the trade-off proposition implies existence of an optimum, the proposition is admittedly silent on what should be the value of d_b in Figure 1. Our empirical design allows us to estimate an empirical value of d_b. The estimates of $\hat{\beta}_2$ and $\hat{\beta}_3$ without accounting for firm-specific factors imply, for an average diversifier in the full sample, an optimal degree of diversification that is around 6.5 segments: with a small exception of the model (4) estimates, which imply 7.6 segments. The estimates remain largely stable after accounting for firm-specific factors, i.e., around six segments as implied by the values of $\hat{\beta}_2$ and $\hat{\beta}_3$ in models (5) and (6). Thus, firms that already operate in six or more different segments prior to acquisition are likely to suffer losses from further diversification.

Given the implied optimum of around six segments, the distribution of the post-acquisition number of segments for diversifiers reported in Panel B of Table 1 could be interpreted to suggest that firms that diversify through acquisitions are systematically under-diversified. Eighty-eight percent of the sample diversifiers operate in five or fewer segments following a given diversifying attempt, with almost 60% operating in only three or fewer segments. This interpretation is rather comforting as it is compatible with frictions inherent in corporate decisions. If the decision to diversify was costlessly reversible, one would expect to observe many more diversifiers operating in six segments, or thereabout, after their diversification attempt. However, a diversifying decision is not costlessly reversible (Denis et al., 1997; Gomes and Livdan,

2004). Such irreversibility may well restrain firms from moving to the known optimum in a given attempt.

Turning to the control variables, which are included in models (4) and (6), the results are broadly in line with the existing literature (see Moeller et al., 2004). Acquirer size is negatively related to diversifier gains in both models although the relation is significant only in model (4). Though insignificantly, Tobin's *q* is negatively related to diversifier gains in both models. Consistent with the disciplinary role of debt, the coefficient of leverage is positive in both models, but significant, albeit marginally, in only one model. In line with the free cash flow theory, free cash flow has a persistent and significantly negative coefficient. The coefficient of the private target dummy variable is insignificant in both models, indicating that diversifier gains are comparable between acquisitions of private and subsidiary companies. The persistently and significantly negative coefficient of the public target dummy is consistent with the recent evidence that acquirer gains are smaller when targets are listed firms (e.g., Moeller et al., 2004; Netter et al., 2011; also Faccio et al., 2006 for non-U.S. acquirers). The all-cash dummy variable has a significantly positive coefficient in both models. The coefficients of the all-stock dummy variable and its interaction term with the public target dummy variable have the signs consistent with the existing evidence (e.g., Faccio et al., 2006), but are significant only when firm-specific effects are not accounted for. Relative size has a significantly positive coefficient in both models, though marginally in model (6). Given the extant evidence that acquirer gain is positive when targets are unlisted firms and that our sample is made up mostly of unlisted-target acquisitions, the positive coefficient of relative size should be expected. Broadly in line with Moeller et al. (2004), the intensity of M&A activities in the target's industry has a negative, albeit insignificant, impact on diversifier gains in both models. Although all of the control

variables have a coefficient sign that is consistent between the models and in line with the existing literature, several of them have a coefficient that varies in significance between the models. Such variations confirm the importance of accounting for firm-specific factors. Since the specification of model (6) by definition is most robust as a test of the trade-off prediction, we focus on this specification in the rest of our regression analyses.[17]

In sum, the results in Table 3 provide strong empirical support for the trade-off prediction and intuitive evidence on when the marginal benefits of diversification exceed the costs, and vice versa. Diversification increases wealth when firms operate at low levels of diversifications. The wealth gain decreases as firms continue to diversify. If firms pursue diversification beyond the optimal level, they will hurt their shareholders. These findings are also in line with corporate diversification having both the bright side and the dark side on shareholder wealth.

4.2 Unconditional estimates of diversification gains and losses

While the evidence reported in Table 3 provides an important understanding of how diversification affects wealth, it does not tell us the magnitude of the gains from diversifying towards the optimal level or losses from diversifying beyond the optimal level. We now address this fundamental issue. Given the implied optimal diversification level of around six segments from the estimates in Table 3, we report announcement-period excess returns for three groups of diversifiers: single-segment; already operating in two to five segments; and already operating in six or more segments before

[17] In the remaining regression analyses, the results (untabulated) for $\hat{\beta}_2$ and $\hat{\beta}_3$ based on the specifications in models (1) through (5) are similar. To save space, we tabulate only the results based on the model (6) specification.

diversifying. For each group, we also report gains across different degrees of added diversification: 0; 1; and 2 or more segments added. Results are reported in Table 4.

In the full sample, as shown in the second column, single-segment diversifiers (2.49%) and diversifiers already operating in two to five segments (1.60%) both earn a significant average announcement-period excess return. Looking across the numbers of new segments added, both groups of diversifiers consistently earn significant gains whether or not they diversify into a new territory. Since these diversifiers are firms operating below the implied optimal number of segments, these results are consistent with value creation from optimal diversification.

Interestingly, diversifiers already operating in six or more segments do not suffer a loss, but instead, earn a marginally significant gain of 0.66% (at the 10% level). At variance with the other two groups that operate below the implied optimum before acquisition, however, the gain to these highly diversified firms appears to be driven by the gain from deals that do not add a new segment to their portfolio. When highly diversified firms add new segments to their portfolio, their gain drops to being small and insignificant. Considering that very few highly diversified firms pursue further diversification and that most firms add no more than two new segments to their portfolio as observed in Panel B of Table 1, these results are consistent with the view that firms generally diversify cautiously and stop diversifying before suffering losses. Careful diversification attempts are consistent with firms trading off between the benefits and costs of diversification facing shareholders.

One prima facie implication of the trade-off proposition visible from Figure 1 is that the wealth gain (ΔW) from diversification attempts should strictly decrease in diversifiers' existing degree of diversification. In the full sample, diversifier gains monotonically drop in the diversifier number of segments. The *F*-statistic (6.69) rejects

the null hypothesis that these gains are equal to each other. Untabulated results confirm that the gain to single-segment diversifiers (2.49%) is significantly higher than the gain to diversifiers operating in two to five segments (1.60%), and both of these gains are significantly higher that the gain to the group with the highest degree of diversification (0.66%). Such monotonic pattern persists when diversifiers add either one or two or more new segments to their portfolio. When there is no new segment added, the gains do not differ across diversifier numbers of segments. It should be noted that, in these deals, diversifiers do not move into a new territory. Overall, this pattern of wealth gains supports the trade-off implication. Also importantly, this gain pattern extends the existing literature that reports that firm value drops as firms become multi-segment from being single-segment but that the discount does not become larger as the number of segments increases beyond two (see Lang and Stulz, 1994; Servaes, 1996). The evidence in Table 4 shows that the wealth effect of diversifying through acquisition is generally positive and declines in the degree to which firms already operate in different industrial sectors. The median results (untabulated) are very similar and would yield the same conclusion.

4.3 Focused and vertically related acquisitions

The findings reported above provide strong empirical support for the trade-off proposition. We next assess refutability of the proposition: that is, whether the findings are chance results. To do so, we rerun the analysis in Table 3 for non-diversifying deals. These deals are acquisitions in which (i) the acquirer and target share the same primary 2-digit segment, or (ii) the acquirer and target have different but vertically related primary segments. In focused deals, the term δ_i in equation (4) by definition is the number of newly added segments that is the target's non-core or peripheral business. In

vertically related deals, the term δ_i is not an outcome of a diversification attempt as the acquirer is a firm seeking upstream or downstream integration. Hence, the inverted U-relation should not describe gains from acquisitions that do not increase the degree of diversification in an economically important way, i.e., when firms do not intend to diversify. Results are reported in Table 5. To save space, we discuss only the key results, i.e., estimates of $\hat{\beta}_2$ and $\hat{\beta}_3$, in this and remaining analyses.

Focused deals are analyzed in model (1). Both $\hat{\beta}_2$ (0.732) and $\hat{\beta}_3$ (−0.074) are insignificant and smaller in magnitude than their counterparts in Table 3. Model (2) shows that both $\hat{\beta}_2$ (−1.592) and $\hat{\beta}_3$ (0.073) for vertically related deals are also insignificant although their signs are opposite to the trade-off prediction. Given that acquirers and their target have different primary segments in both diversifying deals and vertically related deals, the model (2) results stand in sharp contrast to their counterparts in Table 3. Taken together, the inverted U-relation between wealth and the degree of diversification persistently observed in Table 3 does not describe gains from either focused or vertically related acquisitions. The relation is unique only to diversifying acquisitions. Acquirer gains from non-diversifying acquisitions are not a function of the benefits and costs of diversification that form the trade-off proposition.

The values of $\hat{\beta}_2$ and $\hat{\beta}_3$ for focused deals suggest that additional diversification that comes from the target's non-core business(es) is unlikely to reflect a diversification attempt. Given the significant evidence for diversifying deals, the results for vertically related deals confirm the importance of accounting for vertical relatedness between the acquirer and target in identifying an acquisition that is a proxy for the decision to diversify. The variations in result between diversifying and non-diversifying (either vertically related or focused) acquisitions also indicate that our measure of the degree of diversification is unlikely to be overly noisy.

4.4 Firms making both diversifying and non-diversifying acquisitions

As reported in section 3.2, about one-third of unique acquirers in the sample make both diversifying and non-diversifying deals. Such co-existence of different capital investment strategies by the same firms allows us to subject the trade-off proposition to a further test. If the proposition is a robust description of how diversification affects shareholder wealth, the value of the same firms should exhibit the inverted U-behavior when the firms make a diversifying deal at some time, but does not exhibit this behavior when the firms make a non-diversifying deal at some other time. To test this hypothesis, we analyze diversifying deals in which the acquirer makes at least one non-diversifying deal, either vertically related or focused, during the preceding three-year period. For comparison, we also analyze vertically related and focused deals in which the acquirer makes a prior deal of different type. Results are reported in Table 6.

Model (1) shows the estimates for diversifying deals. Both $\hat{\beta}_2$ (2.455) and $\hat{\beta}_3$ (−0.152) are significant, and have the signs consistent with the trade-off prediction. For vertically related deals, as shown in model (2), $\hat{\beta}_2$ (−2.184) and $\hat{\beta}_3$ (0.047) are insignificant although both of them have the wrong sign. The estimates for focused deals are reported in model (3). Although both $\hat{\beta}_2$ (−2.009) and $\hat{\beta}_3$ (0.072) are insignificant, they, too, have the wrong sign. For all models, the key results (untabulated) remain very similar when we adopt a five-year window preceding the current deal or no time restriction in identifying a prior deal. Together, these findings suggest that even for firms that pursue different investment strategies at different points in time, the inverted U-relation between wealth and the degree of diversification describes only gains from the diversification strategy. The inverted U-relation prevails despite the presence of

non-diversifying investments by the same firm, consistent with the trade-off proposition being a robust description of how corporate diversification affects wealth.

4.5 Listing status of target firms

One important stylized fact from the recent M&As literature is the listing effect: firms suffer a small announcement-period loss when acquiring a publicly listed target, but a significant gain when acquiring an unlisted target (e.g., Faccio et al., 2006; Netter et al., 2011).[18] Earlier acquisition studies of corporate diversification mostly employ a sample of acquisitions of publicly listed targets and report losses to acquirers of targets from a different industry (e.g., Morck et al., 1990; Chevalier, 2004). If these losses are attributable to the listing effect, one fundamental issue facing diversifier shareholders is that even when diversification in and of itself offers a net benefit, they may not gain, and can suffer losses, from diversifying attempts through acquisition of a listed target. To this extent, an immediate implication of the listing effect on the trade-off prediction is that $\hat{\beta}_2$ should be zero when firms diversify through acquisitions of listed targets and remain significantly positive only for diversifying acquisitions of unlisted targets.

In trying to understand the implication of the listing effect, we first gauge how diversifier shareholders fare in acquisitions of listed targets relative to acquisitions of unlisted targets. We know of no prior study that comparatively analyzes acquirer announcement-period gains from diversifying acquisitions of listed and unlisted targets. Panel A of Table 7 shows that diversifiers acquiring a listed target suffer an insignificant average loss (−0.50%) whereas diversifiers acquiring an unlisted target earn a significant gain (2.12%). The difference between these two excess returns is also

[18] While the evidence in Officer (2007) suggests that the listing effect may be related to the liquidity premium firms pay when buying a listed target relative to an unlisted target, Faccio et al. (2006, p. 197) conclude from their analysis that "[t]he fundamental factors that give rise to this listing effect, .. . , remain elusive".

significant.[19] As reported in Panel B, this listing effect also persists across diversifier numbers of segments. These results suggest that it is difficult for shareholders to reap any expected diversification gain by acquiring a listed target. When acquiring an unlisted target, on the contrary, diversifier shareholders enjoy a significant net benefit. This finding is in line with the insight that firms commonly diversify through private acquisitions (Graham et al., 2002). In relation to the trade-off implication, consistently, only for unlisted-target acquisitions do diversifier gains monotonically decline in the diversifier number of segments in a statistically reliable fashion.

Table 8 reports the implication of the listing effect on the relation between wealth and the degree of diversification. For diversifying acquisitions of listed targets, as shown in model (1), $\hat{\beta}_2$ is insignificant, confirming that shareholders do not gain from diversification when the target is a listed firm. $\hat{\beta}_3$ is also insignificant. However, this result is not necessarily a complete surprise. Given that firms typically do not diversify beyond the optimal level as indicated by the findings reported above, $\hat{\beta}_3$ is likely to become insignificant if the benefit from marginal diversification (i.e., δ) is eaten up by the cost associated with acquiring a publicly listed target. These insignificant results suggest that the trade-off proposition does not describe gains to firms that diversify through acquisitions of listed targets. This finding is in line with the stylized fact that there is no reliable gain available to acquirer shareholders when the target is a publicly traded company.

In sharp contrast, model (2) shows that both $\hat{\beta}_2$ (1.476) and $\hat{\beta}_3$ (−0.138) are significant and have the signs as predicted by the trade-off proposition. These results are consistent with the significant gains to diversifiers acquiring an unlisted target

[19] Untabulated results show that this significant listing effect also exists for vertically related and focused deals. For diversifying as well as non-diversifying acquisitions, results for the medians are very similar.

observed in Table 7. Thus, the trade-off proposition explains diversification gains from acquisitions of unlisted targets, the common means through which firms diversify. Also importantly, this deviation from the model (1) results and the differences in result with respect to the target listing status observed in Table 7 together raise the possibility that the negative wealth effect of diversifying acquisitions reported in several earlier studies is driven by the listing effect.

We also assess whether the inverted U-relation describes acquirer gains from non-diversifying acquisitions of listed or unlisted targets. For vertically related acquisitions, models (3) and (4) display results for acquisitions of listed and unlisted targets, respectively. Both $\hat{\beta}_2$ and $\hat{\beta}_3$ are insignificant in both models, and have the wrong sign in model (4).[20] As shown in models (5) and (6), both $\hat{\beta}_2$ and $\hat{\beta}_3$ for focused acquisitions are also insignificant whether the target is listed or unlisted. Regardless of the target listing status, the inverted U-relation does not describe acquirer gains from either type of non-diversifying acquisitions. In particular, the insignificant results for unlisted targets in both types of non-diversifying acquisitions are in sharp contrast with the significant results for diversifying acquisitions of unlisted targets. These findings confirm refutability of the trade-off proposition despite the listing effect.

5. Conclusion

Amid voluminous research, one central question about corporate diversification remains: how does diversification affect shareholder wealth? We propose that at low levels of diversification the marginal benefits of diversification exceed the costs yielding a wealth increase, and that the wealth increase becomes smaller as firms diversify

[20] The coefficient of free cash flow in model (3) is extremely large, pointing out to the presence of outliers. We therefore rerun model (3), as well as all other models in Table 8, without free cash flow. The key results (untabulated) remain unaffected.

further and turns into a wealth loss once firms diversify beyond an optimal level. This trade-off facing shareholders predicts an inverted U-relation between shareholder wealth and the degree of diversification.

Using diversifying acquisitions as a proxy for diversification attempts, we find strong empirical support for the trade-off proposition. At low levels of diversification, diversifying acquisitions significantly increase the wealth of acquirer shareholders at a decreasing rate, implying a wealth loss if firms diversify beyond the optimal level of diversification. Thus, the inverted U-relation predicted by the trade-off proposition describes how corporate diversification affects wealth. Our analysis further shows that diversification gains monotonically and significantly decline in diversifiers' existing degree of diversification. Regardless of their existing degree of diversification, however, diversifiers typically gain from their diversification attempts. Data also reveals that most diversifiers do not diversify beyond the optimal level. These additional findings together suggest that firms diversify cautiously and stop diversifying before the marginal benefits are offset by the costs.

Our study provides evidence on when the benefits of corporate diversification are likely to exceed the costs and vice versa, thereby addressing the debate on how diversification affects shareholder wealth. In addition, the evidence in our study indicates that diversification is an efficient corporate strategy. This is in line with the effects of target listing status observed in our sample, which suggest that the negative wealth effect of diversifying acquisitions reported in much of the earlier literature may well be the listing effect in disguise. Thus, our work also offers an understanding of the large prevalence of conglomerates in the U.S. economy.

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Table 1
Sample distributions

The sample consists of acquisitions made by firms that make acquisitions during 1990-2010. Diversifying acquisitions are deals in which the acquirer and target have different primary 2-digit SIC industries where the degree of vertical relatedness between the acquirer and target primary industries is no greater than 5%. Vertically related acquisitions are deals in which the acquirer and target have different primary 2-digit SIC industries but the degree of vertical relatedness between their primary industries is greater than 5%. Focused acquisitions are deals in which the acquirer and target share the same primary 2-digit SIC industry. Panel A reports distributions of the sample acquisitions and percentage excess returns across announcement years during the sample period. Panel B reports the cumulative distribution statistics for acquirers and targets in diversifying acquisitions: the pre-acquisition number of segments for acquirers and targets, the number of new segments added through a given acquisition, and the total number of segments acquirers have following a given acquisition.

Panel A: Distributions across sample period

	Number of acquisitions				Excess returns (%)			
Year	Entire sample	Diversifying	Vertically related	Focused	Entire sample	Diversifying	Vertically related	Focused
All	16,455	4,621	1,944	9,890	1.76	1.76	1.83	1.75
1990	206	55	34	117	1.21	1.67	−0.21	1.40
1991	339	93	34	212	3.43	5.01	0.10	3.27
1992	481	138	50	293	3.52	3.70	3.61	3.43
1993	676	186	89	401	2.74	2.38	2.68	2.93
1994	776	244	96	436	2.48	2.48	2.38	2.50
1995	891	260	85	546	1.62	1.42	0.53	1.88
1996	1,174	329	151	694	2.34	2.56	3.35	2.02
1997	1,438	410	184	844	1.99	1.90	1.99	2.03
1998	1,405	390	198	817	1.33	1.34	1.28	1.33
1999	1,205	338	133	734	2.95	2.51	2.07	3.31
2000	1,125	357	97	671	0.48	0.79	3.20	−0.09
2001	715	199	72	444	1.52	1.18	2.50	1.51
2002	712	205	70	437	1.64	1.53	1.70	1.68
2003	689	204	71	414	1.77	1.73	3.69	1.46
2004	765	199	95	471	1.23	1.87	0.51	1.10
2005	829	214	111	504	1.34	0.93	0.55	1.68
2006	823	232	98	493	0.96	0.96	1.00	0.95
2007	781	210	107	464	1.33	1.14	1.83	1.30
2008	567	129	67	371	0.90	0.18	2.12	0.93
2009	427	117	55	255	1.64	1.85	0.61	1.76
2010	431	112	47	272	1.36	1.73	0.25	1.40

(*continued*)

Table 1 – *continued*

Panel B: Number of segments in diversifying acquisitions

Number of	Acquirer pre-acquisition			Target pre-acquisition			New segments added			Acquirer post-acquisition		
segments	Count	%	Cum. %	Count	%	Cum. %	Count	%	Cum. %	Count	%	Cum. %
0							1,392	30.1	30.1			
1	1,125	24.3	24.3	2,788	60.3	60.3	2,414	52.2	82.4			
2	1,419	30.7	55.1	1,301	28.2	88.5	634	13.7	96.1	1,364	29.5	29.5
3	1,040	22.5	77.6	362	7.8	96.3	129	2.8	98.9	1,338	29.0	58.5
4	526	11.4	88.9	109	2.4	98.7	36	0.8	99.7	874	18.9	77.4
5	221	4.8	93.7	39	0.8	99.5	6	0.1	99.8	501	10.8	88.2
6	88	1.9	95.6	9	0.2	99.7	5	0.1	99.9	213	4.6	92.8
7	98	2.1	97.7	7	0.2	99.9	4	0.1	100.0	149	3.2	96.1
8	39	0.8	98.6	4	0.1	100.0	0	0.0	100.0	78	1.7	97.7
9	34	0.7	99.3	1	0.0	100.0	0	0.0	100.0	44	1.0	98.7
10	28	0.6	99.9	0	0.0	100.0	1	0.0	100.0	25	0.5	99.2
11	3	0.1	100.0	1	0.0	100.0				20	0.4	99.7
12										9	0.2	99.9
13										0	0.0	99.9
14										5	0.1	100.0
15										0	0.0	100.0
16										1	0.0	100.0
Total count	4,621			4,621			4,621			4,621		

Table 2
Diversifier and deal characteristics

The sample consists of the 4,621 diversifying acquisitions made during 1990-2010. The sample deals are divided into groups of diversifier pre-acquisition numbers of segments (single segment, 2 to 4 segments, and 5 or more segments), and into groups of numbers of new segments (0, 1, and 2 or more segments) that are added per deal to the diversifier's corporate portfolio. Panels A and B report diversifier and deals characteristics, respectively. Total assets are book total assets for year ending before the announcement date (day 0). A proxy for Tobin's *q* is firm market value divided by book total assets, where firm market value is calculated as book total assets minus book value of common equity plus market cap. Market cap is the market value of common equity observed 11 days before day 0. Free cash flow is the ratio of earnings before interests, taxes and depreciation minus capital expenditure to firm market value. Leverage is book total assets minus book value of common equity scaled by firm market value. Relative size is the ratio of transaction value (excluding fees and expenses) to market cap of the diversifier. The target industry liquidity index is calculated following Schlingemann et al. (2002): the value of all corporate control transactions made within the target's 2-digit SIC code industry and year of acquisition divided by the total book value of assets of all firms in the same industry and year. The statistics reported for target listing status and payment methods are proportions. Private, subsidiary and public targets are, respectively, independent private companies or assets, subsidiaries of a listed parent, and publicly traded companies. All cash (all stock) deals are deals financed with 100% cash (common stock). ***, **, and * denote the means, medians (in *italics*) or proportions being significantly unequal, across diversifier pre-acquisition numbers of segments or the numbers of new segments added, at the 1%, 5% and 10% levels, respectively.

		Diversifier no. of segments			No. of new segments added		
	All deals	Single	2 to 4	5 or more	0	1	2 or more
Panel A: Diversifier characteristics							
Total assets ($ mil)	2,349	1,458	1,628	8,522***	2,325	1,688	4,347***
	153	*54*	*162*	*858****	*187*	*125*	*193****
Tobin's *q*	5.55	8.70	4.96	2.05***	5.24	5.97	4.82***
	1.96	*2.13*	*1.98*	*1.61****	*2.00*	*1.98*	*1.81****
Free cash flow (%)	0.58	−0.67	0.72	2.47***	0.89	0.34	0.75
	1.85	*1.01*	*1.90*	*2.84****	*1.90*	*1.70*	*2.10****
Leverage (%)	28.46	25.49	27.91	38.22***	28.05	27.60	31.72***
	24.28	*19.97*	*23.39*	*35.95****	*24.78*	*22.74*	*27.83****
Panel B: Deal characteristics							
Private target (%)	53.97	61.42	53.94	37.77***	53.52	56.84	46.26***
Subsidiary target (%)	32.20	28.62	32.46	38.55***	32.40	32.56	30.80
Public target (%)	13.83	9.96	13.60	23.68***	14.08	10.60	22.94***
All cash (%)	27.74	23.02	27.84	37.57***	28.38	25.93	32.02***
All stock (%)	14.82	17.69	14.74	9.00***	16.38	14.46	13.25
Relative size (%)	26.30	51.73	18.71	14.68***	17.22	32.90	22.28***
	5.92	*8.12*	*5.72*	*3.64****	*5.58*	*5.93*	*7.08****
Target industry liquidity	0.105	0.097	0.110	0.093**	0.100	0.101	0.124***
	0.058	*0.057*	*0.063*	*0.049****	*0.070*	*0.058*	*0.049****

Table 3
Regression analysis of gains to diversifying acquirers

Results from estimating variants of equation (4) for acquirers in diversifying acquisitions are reported. In all models, the dependent variable is the acquirer announcement-period gain. δ_i is the number of new segments added through an acquisition by acquirer i, and $d_{0,i}$ the acquirer's pre-acquisition number of segments. Acquirer size is book total assets. The private target and public target dummy variables are 1(0) if the target is an independent private target, and publicly traded target, respectively (otherwise). The all cash and all stock dummy variables are 1(0) if the deal is financed purely, respectively, with cash and with stock (otherwise). All other explanatory variables are defined as in Table 2. In parentheses is p-value based on the White standard errors that are robust to clustering at the acquirer level.

Explanatory variables	1	2	3	4	5	6
δ_i	1.319	1.365	1.398	0.857	0.894	1.221
	(0.000)	(0.000)	(0.000)	(0.007)	(0.070)	(0.018)
$(2d_{0,i}\delta_i + \delta_i^2)$	−0.103	−0.103	−0.111	−0.057	−0.075	−0.101
	(0.000)	(0.000)	(0.000)	(0.033)	(0.046)	(0.016)
Acquirer size				−0.327		−0.720
				(0.008)		(0.181)
Tobin's q				−0.371		−0.475
				(0.321)		(0.529)
Leverage				1.808		4.203
				(0.175)		(0.098)
Free cash flow				−8.128		−14.419
				(0.011)		(0.001)
Private target				−0.495		−0.010
				(0.171)		(0.983)
Public target				−1.737		−1.700
				(0.000)		(0.003)
All cash				0.584		0.836
				(0.064)		(0.031)
All stock				2.272		0.941
				(0.002)		(0.309)
Public target × all stock				−3.449		−1.777
				(0.001)		(0.139)
Relative size				0.472		0.275
				(0.000)		(0.094)
Target industry liquidity				−0.021		−0.102
				(0.875)		(0.582)
Constant	1.163	1.022	1.743	4.385	2.075	4.476
	(0.000)	(0.445)	(0.214)	(0.000)	(0.345)	(0.247)
Year fixed effects		✓	✓	✓	✓	✓
Industry fixed effects			✓	✓		
Firm fixed effects					✓	✓
R^2 (%)	0.33	0.58	0.66	3.92	31.83	32.99
No. of usable observations	4,621	4,621	4,621	4,621	4,621	4,621

Table 4
Announcement-period gains to diversifying acquirers

Average percentage announcement-period gains to acquirers in diversifying acquisitions are reported. Diversifying acquirers (diversifiers) are divided into groups based on their pre-acquisition number of segments: single-segment; 2 to 5 segments; and 6 or more segments. For each group, results are also reported by the number of new segments added through a given acquisition: 0; 1; and 2 or more segments. The *F*-statistics allowing for unequal variances are reported for the null hypothesis of acquirer gain being equal across acquirer groups. In parentheses is *p*-value. In brackets is sample size.

Diversifier number of segments	All	Number of new segments added		
		0	1	2 or more
Single-segment	2.49	na	2.18	3.57
	(0.000)	(na)	(0.000)	(0.000)
	[1,125]	[na]	[875]	[250]
2 to 5 segments	1.60	1.23	1.74	2.13
	(0.000)	(0.000)	(0.000)	(0.000)
	[3,206]	[1,249]	[1,440]	[517]
6 or more segments	0.66	1.22	0.34	−0.38
	(0.065)	(0.009)	(0.560)	(0.742)
	[290]	[143]	[99]	[48]
F-statistic	6.691	0.000	3.485	3.988
	(0.001)	(0.997)	(0.032)	(0.021)

Table 5
Regression analysis of gains to non-diversifying acquirers

Results from estimating a variant of equation (4) for acquirers in non-diversifying acquisitions are reported. The dependent variable is the acquirer announcement-period gain. All explanatory variables are defined as in Tables 2 and 3. Models (1) and (2) report results for acquirers in focused and vertically related acquisitions, respectively. In parentheses is *p*-value based on the White standard errors that are robust to clustering at the acquirer level.

Explanatory variables	1	2
δ_i	0.732	−1.592
	(0.181)	(0.118)
$\left(2d_{0,i}\delta_i + \delta_i^2\right)$	−0.074	0.073
	(0.226)	(0.440)
Acquirer size	−1.570	−0.996
	(0.000)	(0.217)
Tobin's q	−1.169	−1.113
	(0.011)	(0.369)
Leverage	0.522	1.586
	(0.741)	(0.722)
Free cash flow	−4.307	−34.076
	(0.212)	(0.030)
Private target	0.204	−0.602
	(0.496)	(0.337)
Public target	−2.388	−1.454
	(0.000)	(0.140)
All cash	0.377	−0.225
	(0.145)	(0.685)
All stock	0.350	0.327
	(0.610)	(0.801)
Public target × all stock	−3.176	0.800
	(0.001)	(0.746)
Relative size	0.363	0.195
	(0.001)	(0.368)
Target industry liquidity	0.241	0.568
	(0.256)	(0.099)
Constant	13.774	10.656
	(0.000)	(0.021)
Year fixed effects	✓	✓
Firm fixed effects	✓	✓
R^2 (%)	21.26	49.51
No. of usable observations	9,890	1,944

Table 6
Regression analysis of gains to acquirers that make both diversifying and non-diversifying acquisitions

Results from estimating a variant of equation (4) for acquirers that make both diversifying and non-diversifying acquisitions are reported. The dependent variable is the acquirer announcement-period gain. All explanatory variables are defined as in Tables 2 and 3. Model (1) reports results for diversifying acquisitions. Models (2) and (3) report results for focused and vertically related acquisitions, respectively. In parentheses is *p*-value based on the White standard errors that are robust to clustering at the acquirer level.

Explanatory variables	1	2	3
δ_i	2.455	−2.184	−2.009
	(0.021)	(0.237)	(0.192)
$\left(2d_{0,i}\delta_i + \delta_i^2\right)$	−0.152	0.047	0.072
	(0.037)	(0.770)	(0.570)
Acquirer size	−2.136	−1.264	−2.239
	(0.115)	(0.424)	(0.029)
Tobin's q	−1.505	0.030	−0.753
	(0.402)	(0.985)	(0.652)
Leverage	0.598	−8.028	1.747
	(0.934)	(0.231)	(0.821)
Free cash flow	−15.701	−2.584	−34.864
	(0.377)	(0.944)	(0.068)
Private target	1.900	−0.299	1.330
	(0.182)	(0.856)	(0.214)
Public target	−0.591	1.484	0.655
	(0.643)	(0.474)	(0.609)
All cash	1.334	1.363	0.685
	(0.153)	(0.265)	(0.458)
All stock	2.240	1.429	−3.102
	(0.306)	(0.593)	(0.117)
Public target × all stock	−1.526	−1.993	1.606
	(0.561)	(0.638)	(0.636)
Relative size	−0.129	0.629	−0.022
	(0.777)	(0.174)	(0.952)
Target industry liquidity	0.359	0.944	−0.079
	(0.440)	(0.211)	(0.899)
Constant	18.178	10.423	16.771
	(0.053)	(0.257)	(0.033)
Year fixed effects	✓	✓	✓
Firm fixed effects	✓	✓	✓
R^2 (%)	27.39	53.63	33.83
No. of usable observations	1,193	592	1,445

Table 7
Announcement–period gains to diversifying acquirers and target listing status

Average percentage announcement–period gains to acquirers in diversifying acquisitions of listed targets and diversifying acquisitions of unlisted targets are reported. Diversifying acquirers (diversifiers) are divided according to the listing status of their target. For each target listing status, results are also reported by the diversifier pre–acquisition number of segments: single–segment; 2 to 5 segments; and 6 or more segments. Significance of the difference in gain between acquirers of listed and unlisted targets is based on an independent–samples *t*–test allowing for unequal variances. The *F*–statistics allowing for unequal variances are reported for the null hypothesis of acquirer gain being equal across acquirer groups. In parentheses is *p*–value. In brackets is sample size.

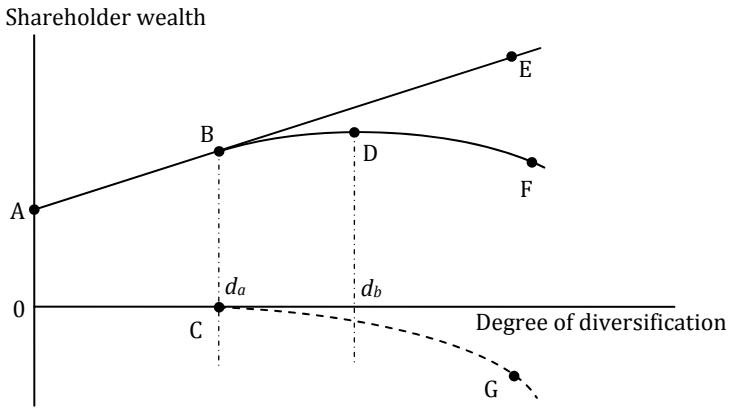
	Listed targets	Unlisted targets	Listed vs. unlisted
Panel A: Full sample			
All diversifiers	−0.50	2.12	−2.62
	(0.118)	(0.000)	(0.000)
	[639]	[3,982]	
Panel B: Subsamples by diversifier number of segments			
Single–segment	−0.34	2.80	−3.14
	(0.711)	(0.000)	(0.002)
	[112]	[1,013]	
2 to 5 segments	−0.49	1.94	−2.42
	(0.196)	(0.000)	(0.000)
	[443]	[2,763]	
6 or more segments	−0.80	1.25	−2.05
	(0.294)	(0.002)	(0.017)
	[84]	[206]	
F–statistic	0.092	4.142	
	(0.913)	(0.016)	

Table 8
Regression analysis of gains to acquirers and target listing status

Results from estimating a variant of equation (4) for acquirers in diversifying acquisitions, vertically related acquisitions, and focused acquisitions are reported. The dependent variable is the acquirer announcement−period gain. All explanatory variables are defined as in Tables 2 and 3. Models (1), (3) and (5) report results for acquisitions of listed targets. Models (2), (4) and (6) report results for acquisitions of unlisted targets. In parentheses is *p*−value based on the White standard errors that are robust to clustering at the acquirer level.

	Diversifying		Vertically related		Focused	
Explanatory variables	1	2	3	4	5	6
δ_i	0.548	1.476	3.530	−1.621	1.415	0.712
	(0.548)	(0.016)	(0.402)	(0.320)	(0.193)	(0.324)
$\left(2d_{0,i}\delta_i + \delta_i^2\right)$	−0.035	−0.138	−0.193	0.065	−0.147	−0.089
	(0.438)	(0.003)	(0.632)	(0.712)	(0.195)	(0.321)
Acquirer size	2.272	−1.011	−6.107	−0.816	−2.924	−1.227
	(0.081)	(0.113)	(0.385)	(0.383)	(0.004)	(0.000)
Tobin's *q*	4.927	−0.791	−14.883	−1.792	−3.396	−0.557
	(0.081)	(0.385)	(0.068)	(0.148)	(0.076)	(0.262)
Leverage	19.778	3.272	−29.149	−0.562	−2.695	0.494
	(0.058)	(0.255)	(0.689)	(0.905)	(0.681)	(0.774)
Free cash flow	17.640	−16.857	−476.375	−41.901	−24.014	−2.724
	(0.367)	(0.001)	(0.013)	(0.005)	(0.059)	(0.432)
All cash	0.892	0.588	−1.338	−0.526	0.765	−0.186
	(0.344)	(0.174)	(0.846)	(0.361)	(0.350)	(0.521)
All stock	0.529	1.172	0.357	0.061	2.214	−0.041
	(0.711)	(0.232)	(0.937)	(0.967)	(0.052)	(0.954)
Relative size	−0.203	0.555	−0.768	0.324	−1.025	0.823
	(0.596)	(0.009)	(0.457)	(0.153)	(0.000)	(0.000)
Target industry liquidity	−0.881	−0.070	1.036	0.464	0.551	0.300
	(0.051)	(0.742)	(0.528)	(0.232)	(0.419)	(0.218)
Constant	−28.748	4.919	66.404	10.449	32.590	12.353
	(0.028)	(0.285)	(0.004)	(0.036)	(0.007)	(0.000)
Year fixed effects	✓	✓	✓	✓	✓	✓
Firm fixed effects	✓	✓	✓	✓	✓	✓
R^2 (%)	35.40	32.06	49.38	49.44	30.67	20.96
No. of usable observations	639	3,982	242	1,702	1,456	8,434

Figure 1
An inverted U−relation between shareholder wealth and degree of diversification



Appendix

Table A.I
Announcement–period gains to diversifying acquirers using a Herfindahl index

Average percentage announcement–period gains to acquirers in diversifying acquisitions are reported. Diversifying acquirers (diversifiers) are divided into groups based on their pre–acquisition asset–based Herfindahl index (H): $H = 1$; $0.8 < H < 1$; $0.6 < H < 0.8$; $0.4 < H < 0.6$; and $0.0 < H < 0.4$. For each group, results are also reported by the number of new segments added through a given acquisition: 0; 1; and 2 or more segments. The F–statistics allowing for unequal variances are reported for the null hypothesis of acquirer gain being equal across acquirer groups. In parentheses is p–value. In brackets is sample size.

		Number of new segments added		
Diversifier H index	All	0	1	2 or more
$H = 1$	2.16	1.16	2.32	3.56
	(0.000)	(0.004)	(0.000)	(0.000)
	[2,437]	[720]	[1,364]	[353]
$0.8 < H < 1$	2.16	2.95	1.85	1.68
	(0.000)	(0.003)	(0.023)	(0.162)
	[247]	[76]	[122]	[49]
$0.6 < H < 0.8$	1.54	0.98	1.33	3.01
	(0.001)	(0.090)	(0.068)	(0.001)
	[472]	[141]	[242]	[89]
$0.4 < H < 0.6$	1.53	1.70	1.33	1.77
	(0.000)	(0.004)	(0.001)	(0.030)
	[866]	[239]	[421]	[206]
$0.0 < H < 0.4$	0.48	0.48	0.68	0.02
	(0.052)	(0.088)	(0.064)	(0.984)
	[599]	[216]	[265]	[118]
F–statistic	6.542	2.274	2.866	3.295
	0.000	0.061	0.023	0.012