การประชุมทางวิชาการ “*ศาสตราจารย์สังเวียน อินทรวิชัย*
ด้านตลาดการเงินไทย” ครั้งที่ 22 ประจำปี 2557

การนำเสนอผลงานวิจัยเรื่อง

**“A Trade-Off in Corporate Diversification”**

โดย ผู้ช่วยศาสตราจารย์ ดร.มนพล เอกโยคะ

วันพฤหัสบดีที่ 13 พฤศจิกายน 2557 เวลา 15.00 – 15.50 น.
ห้อง 201 คณะพาณิชยศาสตร์และการบัญชี
มหาวิทยาลัยธรรมศาสตร์ ท่าพระจันทร์

# A trade-off in corporate diversification

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*THAMMASAT FINANCE CONFERENCE*
*NOVEMBER 13, 2014*



## motivation and what we do (1 of 3)

Is corporate diversification good or bad for shareholders ??

- Can firms create value (risk-adjusted return) by diversifying into different business ??
- Do shareholders earn more from conglomerates than from specialized firms ??

Still a largely unsettled debate – either theoretically or empirically

- Empirical evidence: as a whole, remains inconclusive
- Theoretical works: as a whole, no clear-cut prediction on value impact (Stein 2003)

### facts

More than half of goods and services in U.S. economy is delivered by *conglomerates* (Maksimovic & Phillips 2007)

### some current beliefs

Diversification is inefficient (due to agency problems) vs. not sure

## motivation and what we do (2 of 3)

A step forward in understanding how diversification affects wealth .. .

To identify when costs exceed benefits and vice versa (Hadlock et al. 2001)

For corporate finance, a primary question about diversification is . … .

When and how diversification affects value is (Maksimovic & Phillips 2007)



## motivation and what we do (3 of 3)

**WHAT WE DO**:

Examine *when* the benefits of corporate diversification exceed the costs, and vice versa

**framework for analysis**

Marginal benefits of diversification exceed marginal costs at a decreasing rate, and costs will exceed benefits if firms diversify beyond the optimal level

This cost-benefit trade-off facing shareholders predicts:

An inverted U-relation between shareholder wealth and the degree to which a firm operates in different industrial segments

## trade-off proposition (1 of 3)

We rely on existing theoretical insights in suggesting the trade-off proposition

TWO strands of diversification literature

Diversification benefits shareholders and *improves* wealth

**benefits**: scope economies; coinsurance; reduction in systematic risk; efficient winner-picking and loser-sticking; survival of profitable projects; search for new growth opportunities

Diversification is costly and *destroys* shareholder wealth

**costs**: bottlenecks in accessing scope economies (due to bounded rationality); uncorrelated valuation errors in picking winners; agency problems making internal allocation inefficient (politics among and surplus poaching by divisional managers, free cash flow problem, entrenchment)



## trade-off proposition (2 of 3)

Characterization of inefficient conglomerates

Firms with many related divisions

WE ARGUE:

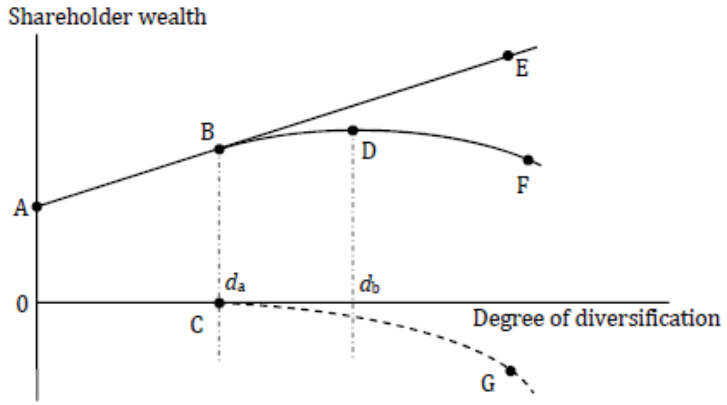
Such characterization implies material and increasingly large costs for highly diversified firms

With increasingly large offsetting costs, there is a trade-off predicting an inverted U-relation between wealth and degree of diversification

If assuming no offsetting costs, shareholder wealth would strictly increase in diversification

## trade-off proposition (3 of 3)

figure 1




The trade-off predicts curve ABDF (inverted U-relation)



## empirical design (1 of 5)

**a direct test of the trade-off prediction – inverted-U shape**

To observe $\Delta W$ as firms diversify (make an increase in diversification)

General expression of ABDF (quadratic): $W_m = W_s + b(d) + c(d^2)$

As a firm diversifies:

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

Defining $\delta = d_1 - d_0$

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

Trade-off predicts **a positive value for *b* and negative value for *c***

## empirical design (2 of 5)

We test the trade-off prediction by estimating variants of a regression model:

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

*Conditional on making a diversification attempt*, the trade-off predicts a **positive sign for $\widehat{\beta}_2$ and negative sign for $\widehat{\beta}_3$**

We use *diversifying* acquisitions as a proxy for diversification attempts

Firms commonly diversify through acquisitions
(Graham et al. 2002; Maksimovic & Phillips 2007)

$\Delta W_i$ ≡ *announcement-period excess return* [−2, +2] (Masulis et al 2007)

Excess return = market-adjusted excess return [ $r_i - r_m$ ] (e.g., Fuller et al 2002)



## empirical design (3 of 5)

**identifying diversification attempts**

Diversification attempt ≡ a diversifying acquisition / deal

Diversifying deal defined as:

(i) acquirer and target not sharing same 2-digit primary SIC code; and

(ii) degree of vertical relatedness (using IO tables as in Fan & Lang, 2000) between acquirer and target primary industries not greater than 5%

2-digit level because 3- or 4-digit level likely to be too detailed to identify industry structure (Servaes, 1996; Maquieira et al., 1998) and can be misleading (Kahle & Walkling, 1996)

SIC codes come from SDC as we need historical SIC codes. Compustat reports latest codes. Anyway, code definitions between the two sources are identical at the 2-digit level (cf: Schlingemann et al., 2002)

## empirical design (4 of 5)

**measuring degree of diversification**

Given equation (4), we need to empirical estimates of $d_{0,i}$ and $\delta_i$ around bid announcements from *actual* data

The *directly applicable* approach is to use the number of 2-digit SIC codes (i.e., segments)

$d_{0,i}$ ≡ no. of segments of acquirer *i* observed before bid announcement

$\delta_i$ ≡ no. *new* segments added to corporate portfolio of acquirer *i* through the acquisition it makes (i.e., no. of target's segments observed before bid announcement that are not the same as any of acquirer's segments)

Potentially noisy measure, and will tilt our results towards being *insignificant*



## empirical design (5 of 5)

**data and sample**

Domestic deals announced between January 1990 and December 2010

SDC, CRSP, Compustat

Targets can be listed or unlisted (private and subsidiary)

Usual data screen: e.g., completed deals; DV ≥ $1 million; acquirer holds less than 50% before announcement; acquirer a listed firm on CRSP and Compustat

In total, 16,455 deals remain in final sample

**4,621 (28%) diversifying deals**; 1,944 vertically related deals; 9,890 focused deals

# descriptive statistics (1 of 2)

| | 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 |



# descriptive statistics (2 of 2)

*Number of segments in diversifying acquisitions*

| Number of segments | Acquirer pre-acquisition | | | Target pre-acquisition | | | New segments added | | | Acquirer post-acquisition | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | | |

# empirical results (1 of 9)

| Explanatory variables | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| $\delta_i$ | 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 |



# empirical results (2 of 9)

| Explanatory variables | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| $\delta_i$ | 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) |
| Control variables | | | | ✓ | | ✓ |
| 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 |

Strong empirical support for the trade-off prediction

- Diversification significantly increases wealth at a decreasing rate, and diversifying beyond the optimal level will hurt shareholders
- Diversification can turn out *both* the bright side and dark side

*(continued)*

## empirical results (3 of 9)

*(continued)*

Implied optimum $\left[-\frac{\beta_2}{2\beta_3}\right]$ of about 6 to 7 segments

Intriguingly, in line with classification in Shin and Stulz (1998)

Given sample distributions:

| Number of segments | Acquirer pre-acquisition | | | Target pre-acquisition | | | New segments added | | | Acquirer post-acquisition | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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** |

Diversifiers in our sample appear *under-diversified*

Comforting as it is in line with irreversibility of diversifying decisions
(Denis et al., 1997; Gomes and Livdan, 2004)

Diversifying decisions not costlessly reversible



## empirical results (4 of 9)

How much do firms gain from optimal diversification and lose from diversifying beyond the optimal level ??

| 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) |

Firms diversify cautiously and stop diversifying before the marginal benefits are completely offset by the increasing costs

Also consistent with trade-off prediction, gains monotonically decrease in $d_0$

## empirical results (5 of 9)

Are the results above chance results ?? That is, is the trade-off prediction refutable ??

| Explanatory variables | 1<br>Focused | 2<br>Vertically related |
|---|---|---|
| $\delta_i$ | 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) |
| Control variables | ✓ | ✓ |
| Year fixed effects | ✓ | ✓ |
| Firm fixed effects | ✓ | ✓ |
| $R^2$ (%) | 21.26 | 49.51 |
| No. of usable observations | 9,890 | 1,944 |

Trade-off prediction (inverted U-relation) holds only for diversifying deals
Results above unlikely chance results, and trade-off proposition refutable

Our measure of degree of diversification unlikely to be overly noisy



## empirical results (6 of 9)

We now subject the trade-off prediction to a further test . ..

If a robust description of how diversification affects wealth, value of the same firms should exhibit the inverted U-behavior when the firms make diversifying deals at some time, but do not do so when they make non-diversifying deals at other times.

| Explanatory variables | 1<br>Diversifying | 2<br>Focused | 3<br>Vertically related |
|---|---|---|---|
| $\delta_i$ | **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) |
| Control variables | ✓ | ✓ | ✓ |
| Year fixed effects | ✓ | ✓ | ✓ |
| Firm fixed effects | ✓ | ✓ | ✓ |
| $R^2$ (%) | 27.39 | 53.63 | 33.83 |
| No. of usable observations | 1,193 | 592 | 1,445 |

## empirical results (7 of 9)

Acquisitions essentially our empirical lab

*Listing effect* as one important stylized fact from recent M&As literature

> Acquirers suffer a small announcement-period loss when the target is a publicly listed firm, but a significant gain when the target is an unlisted entity (e.g., Faccio et al., 2006; Netter et al., 2011)

86% of our sample diversifying attempts involves an unlisted target

We address a fundamental implication of the listing effect

> The negative wealth of choosing a listed target may well eat up all of the net benefits of diversification even when a diversification attempt, *in and of itself*, is wealth-maximizing



## empirical results (8 of 9)

| | 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)** | |

Listing effect also does exist among diversifying acquisitions

## empirical results (9 of 9)

| | Diversifying | | Vertically related | | Focused | |
|---|---|---|---|---|---|---|
| Explanatory variables | Listed | Unlisted | Listed | Unlisted | Listed | Unlisted |
| $\delta_i$ | 0.548 | **1.476** | 3.530 | −1.621 | 1.415 | 0.712 |
| | (0.548) | **(0.016)** | (0.402) | (0.320) | (0.193) | (0.324) |
| $(2d_{0,i}\delta_i + \delta_i^2)$ | −0.035 | **−0.138** | −0.193 | 0.065 | −0.147 | −0.089 |
| | (0.438) | **(0.003)** | (0.632) | (0.712) | (0.195) | (0.321) |
| Control variables | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 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 |

No reliable gain from diversifying by acquiring a listed target

Trade-off explains only the diversification gains from acquisitions of unlisted targets – common means through which firms diversify (Graham et al. 2012)

In contrast, trade-off does not explain gains from non-diversifying acquisitions of *unlisted* targets – confirming refutability of trade-off prediction despite the listing effect



## conclusion (1 of 1)

At low levels of diversification, marginal benefits exceed costs at a decreasing rate, and costs exceed benefits if firms diversify beyond the optimal level

Firms in general cautiously diversify and stop diversifying before the benefits are completely offset by the costs

First to provide evidence on when benefits of corporate diversification exceed costs and vice versa, thereby addressing the fundamental, but as yet unsettled, issue of how diversification affects wealth

Importantly, our evidence also indicates that diversification is an efficient corporate strategy, and offers an understanding of the large prevalence of conglomerates in the U.S. economy

Trade-off framework can be applied to investigate benefits and costs of diversification in economies with different institutional features (e.g., capital market and/or product market competition)