Are Internal Capital Markets Smart? Evidence of Efficient "Winner Picking"

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Abstract

Current literature shows that groups allocate capital based on prior performance, consistent with the "winner picking" hypothesis. While this capital allocation practice is consistent with performance-based capital allocation, prior research has not examined how these "winners" perform subsequent to receiving internal capital. We extend the literature by providing empirical evidence that "winners" who receive internal capital continue their relatively high performance, consistent with efficient winner picking.

Keywords: Internal Capital Markets, Capital, Insurance, Reinsurance, Winner Picking

JEL classification: G22; G32

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Abstract

Current literature shows that groups allocate capital based on prior performance, consistent with the "winner picking" hypothesis. While this capital allocation practice is consistent with performance-based capital allocation, prior research has not examined how these "winners" perform subsequent to receiving internal capital. We extend the literature by providing empirical evidence that "winners" who receive internal capital continue their relatively high performance, consistent with efficient winner picking.

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Introduction

Research on internal capital markets has focused on two broad questions: Do internal capital markets (ICMs) exist and, if so, are they efficient? ICMs are a product of conglomerate structure and provide an avenue through which firms can direct capital toward different segments in order to maximize firm value. For example, over several decades Berkshire Hathaway has allocated hundreds of millions of dollars in earnings from See's Candies to other wholly-owned subsidiaries and investments in order to capitalize on investment opportunities in other lines of business.[1]

The ability of firm managers to allocate capital to projects generating the most value coincides with managerial incentives to maximize shareholder value. Moreover, ICMs offer a number of advantages over external capital sources, such as reduced agency costs, fewer monitoring constraints, and overall greater efficiency. To determine the existence and extent of ICM efficiency, we use the U.S. property-casualty insurance industry to examine if segments receiving capital subsequently earned relatively higher returns compared to other group members, or if those segments experienced mean-reverting underperformance, potentially suggesting a misallocation of capital.

The efficacy of internal capital markets is important to investors, regulators, and policyholders. Research on ICMs relates to fundamental questions regarding how firms fund internal projects (e.g., Stein, 1997; Shin and Stulz, 1998). The question of whether internal capital markets create or destroy value is particularly important to investors, as internal capital markets potentially provide an avenue for managers to exploit information asymmetry inherent in the structure of the firm (Jensen and Meckling, 1976). Specifically examining the insurance industry, internal capital markets are of interest to regulators and policyholders

[1]Warren Buffett stated to shareholders that "Berkshire's value is maximized by our having assembled the (group members) into a single entity. This arrangement allows us to seamlessly and objectively allocate major amounts of capital, eliminate enterprise risks, avoid insularity, fund assets at exceptionally low cost, occasionally take advantage of tax efficiencies, and minimize overhead (Buffett, 2019)."

who are sensitive to firm insolvency risk which is directly tied to capital strength (Sommer, 1996; Epermanis and Harrington, 2006).

We show that ICMs are "smart" in the sense that prior-year ICM transactions are positively associated with current-year operating performance, that performance persists for subsequent reporting periods, and that firms receiving relatively more capital outperform firms that receive relatively less capital. These results indicate that ICM efficiency is not limited to a one-time "winner picking" strategy, but is efficient in that firms shift capital to segments who generally continue to experience positive performance.

Our research leads to several contributions to the literature. First, we investigate the extent to which these winners continue this trend of high performance following internal capital allocation. Second, we provide evidence to suggest that not all ICM transactions are created equal by examining three distinct internal market instruments within our data, as winner picking is only related the internal capital source with the lowest amount of information asymmetry. Finally, we follow the performance of the picked winners *ex-post* and find results consistent with performance based internal capital allocation, in that these winners go on to outperform other group members.

The remainder of this paper proceeds as follows. The "Background" section provides an overview of prior literature on internal capital markets and winner picking across financial firms, as well as the institutional details of our sample. We then develop our hypotheses and empirical predictions in the "Hypothesis Development" section. The "Empirical Strategy" section discusses our data and models. We then discuss our results and conclude the paper with the "Summary and Conclusions" section.

Background

Internal Capital Market Activity: Theory and Empirical Evidence

Prior studies generally find empirical evidence of active internal capital markets within conglomerates (e.g., Lamont, 1997; Shin and Stulz, 1998; Powell, Sommer, and Eckles, 2008). The ICM literature has subsequently examined questions related to the potential costs and benefits of ICMs relative to external capital financing. Williamson (1975) introduces the idea of internal markets as a motivation for the existence of diversified firms and also proposes a number of advantages of group associations. He identifies an internal market structure where cash flows may be dispersed to other segments of the firm at the owner's discretion based on performance. He argues that the ability of the parent company to internally shift capital across segments is a benefit of diversification and, therefore, adds value.

Previous theoretical literature documents several potential advantages to firms having active internal capital markets. Gertner, Scharfstein, and Stein (1994), for example, suggest that internal capital markets allow managers to better monitor capital and more easily redeploy capital relative to bank lending–a form of external capital. Moreover, Stein (1997) proposes that by shifting funds from one project to another, headquarters can engage in "winner picking" by moving capital to those affiliates or projects that show more promise based on past performance. As such, the rationale and theory behind the implementation, existence, and usage of internal markets is well supported.

The existence of active ICMs has been supported empirically across conglomerate firms. Shin and Stulz (1998) note the existence of ICM activity across a number of multi-segment firms in the 1980s and early 1990s. Evidence of ICM activity in financial institutions is also well supported, specifically in the banking and insurance industries. Houston, James, and Marcus (1997) observe that banks utilize ICMs to manage liquidity from parent to

subsidiary, while more recently Ben-David, Palvia, and Spatt (2017) note ICMs are used as a method to reallocate funding to promising loan markets. For the insurance industry, Powell and Sommer (2007) note the expansive use of internal reinsurance transactions by property-casualty insurers, and Niehaus (2018) finds similar utilization across life insurers and life insurer holding companies.

Internal Capital Markets: Efficiency

Prior literature traditionally considers an efficient internal capital market to be value-maximizing and free of pet projects and the silo mentality (Gertner, Scharfstein, and Stein, 1994). In fact, Stein (1997) proposes that winner picking is evidence of efficient internal capital allocation. Other studies follow suit and identify efficiency as a positive relation between prior performance and ICM capital transfers, and test accordingly. The existing literature, however, only tests if managers are actively moving capital to projects with promising returns solely based on past performance, and in no way analyzes performance following the internal investment.

Empirical work has found some support for the advantages related to efficient internal capital markets proposed by Williamson (1975) and further in Gertner, Scharfstein, and Stein (1994). Internal market structure may offer firms a way to mitigate larger financial shocks and other market risks. Matvos and Seru (2014) observe that while weaker subsidiaries tend to overcapitalize, internal markets act as a buffer against financial market crises. Almeida, Kim, and Kim (2015) note firms with active internal markets were able to mitigate the negative shocks of the Asian crisis of 1997.[2] Additionally, Powell, Sommer, and Eckles (2008) find a positive relation between firm investment and prior year returns, supporting the notion of winner picking.

[2] Almeida, Kim, and Kim (2015) note that firms with favorable growth prospects received internal capital following the 1997 Asian crisis.

Several studies, however, have proposed theories related to the "dark side" of internal capital markets (e.g., Inderst and Laux, 2005), which describes internal capital activity that is not value maximizing for the the firm. For example, Scharfstein and Stein (2000) propose a theoretical model where division managers attempt to extract greater compensation—particularly in the form of capital allocation—from corporate headquarters. The authors note that this behavior can be value-destroying if headquarters allocates capital to weaker divisions, due to the opportunity cost of not being able to use resources elsewhere. Scharfstein and Stein (2000) refer to this as a form of socialism in internal capital allocation.

There exists evidence of this dark side of ICMs, as well. Shin and Stulz (1998) observe that affiliated firm's cash flows are not related to the division's investment opportunities. They conclude, therefore, that capital is not allocated efficiently, as firms with better investment opportunities are not receiving higher capital allocations. Gertner, Powers, and Scharfstein (2002) examine corporate spin-offs and test the effect of removing a firm from access to internal capital. The authors find that spun-off firms see more performance-based investment than when they were part of a conglomerate structure. Both empirical findings are consistent with inefficient capital allocation within ICMs. Ozbas and Scharfstein (2009) note evidence that segments are less sensitive to growth opportunities in their industry relative to stand-alone firms. The authors find evidence that this is driven by firms with managers with low ownership stakes, suggesting that agency issues drive inefficient capital allocation within conglomerate firms. Additionally, Graham, Harvey, and Puri (2015) document a form of corporate socialism where CEOs of conglomerates allocate capital based on "gut feel" and the reputation of the manger in charge of a division.

The missing piece in current research relates to the outcomes of ICM transactions. Empirical results of efficiency via winner picking in ICMs offers no evidence on how accurate managers are at picking future winners, only that internal investment is allocated to group members who have outperformed their contemporaries in the past. If these winners then

go on to underperform relative to other group members, the merits of allocating capital to previous winners via ICMs are questionable. These outcomes remain untested, and are the missing components in the ICM efficiency literature.[3] We posit that for ICMs to be efficient, winners picked must maximize firm value by continuing to win. Our goal is to extend the research by examining whether positive returns follow internal capital investment, a result that to our knowledge has neither been tested nor verified.

Institutional Background: The U.S. Property-Casualty Insurance Industry

We focus on the U.S. property-casualty (P-C) insurance industry which provides an excellent laboratory to examine firm behavior in ICMs. One reason for this is that most insurers organize into groups, largely due to state regulation (Petroni and Shackelford, 1995). Groups typically consist of a parent firm, acting as the corporate headquarters, with numerous affiliates acting as coordinated, but separate, entities. Financial transactions between each of these affiliated entities are then internal capital market transactions. Additionally, the insurance industry provides an ideal setting to study internal capital markets due to the statutory reporting requirements established for insurance firms. Detailed financial statements must be filed with state regulators on an annual basis. One component of these statutory filings is detailed reporting on insurer internal capital market transactions.

Given that firms in the property-casualty insurance industry are required to present such detailed statutory accounting records and filings at the affiliate level, we then are able to examine transactions among group members. These detailed data allow us to take a granular look at internal capital market transactions not possible when using other datasets. In our most recent year of data, 2016, nearly two-thirds of property-casualty insurers operating in the U.S. were organized as part of a group. This includes a total of 1,868 firms organized

[3]Extant research on the extent of winner picking are all *ex-ante* analyses following segment performance (Stein, 1997; Powell, Sommer, and Eckles, 2008; Fier, McCullough, and Carson, 2013; Niehaus, 2018).

into 187 groups and collectively accounting for 92 percent of total property-casualty industry assets at year-end 2016. The prevalence of the group structure persists throughout our entire sample, and does not change significantly from year to year.

Internal Capital Transactions in the Property-Casualty Insurance Industry

The three most predominant types of internal capital transactions between group members are reinsurance, capital contributions, and dividends.[4] Figure 1 provides a summary of the relative proportion of each type of ICM transaction from 2000 to 2016.[5] In addition to representing the largest dollar amount of transactions, reinsurance is also the most prevalent type of ICM transaction with respect to the number of transactions. Accordingly, and consistent with prior research (e.g., Powell and Sommer, 2007; Powell, Sommer, and Eckles, 2008; Fier, McCullough, and Carson, 2013), we focus the majority of our empirical tests on internal reinsurance transactions, although we provide some evidence on the utilization of capital contributions and dividend transactions.[6]

The detailed listing of capital and dividend transfers is required by the NAIC via Schedule Y, which is intended to capture internal asset shifts among insurance holding company system members. While Schedule Y demonstrates the direction of funds and surplus within the group, it is not intended to capture direct investment to that subsidiary (NAIC, 2012,

[4]Specifically, data on internal reinsurance transactions are from the Underwriting and Investment Exhibit Part 1B–Premiums Written, while data on capital contributions and dividends are from Schedule Y Part 2—Summary of Insurer's Transactions with any Affiliates. External capital for insurers are compiled in balance sheet line items 48, 50.1, and 51.1. New capital issuances include stock offerings, bonds, short term borrowing, reserve account transfers, and surplus notes.

[5]To put the numbers in Figure 1 in perspective, the U.S. P-C insurance industry produced a total of $582 billion direct premiums written in 2016 across the total 2,623 operating insurers and affiliates, when including U.S. territories. Total premiums written values are before reinsurance transactions.

[6]Though direct capital and dividends are intra-group transactions, we focus on reinsurance shifts across segments in returns following internal transfers. Reinsurance provides a more direct measurement of capacity shifts within the insurance industry. In our sample, results for the determinants models of total ICM activity are not significantly different than those for reinsurance. Moreover, as seen in Figure 1, reinsurance transactions comprise the bulk of all internal capital transactions in our sample.

p.118). In fact, capital transfers across affiliates are quite varied and can include any asset transfer (e.g., cash, bonds, stocks, real estate). Not only does the type of asset transfer vary, but so does the transferring group member. Internal capital transactions can be between non-insurance affiliates within the company holding system, weakening the assumption of less information asymmetry across affiliates required in an efficient capital market (Gertner, Scharfstein, and Stein, 1994; Stein, 1997; Scharfstein and Stein, 2000).[7] This is unlike reinsurance markets, which have been shown to result in reduced information asymmetry (Jean-Baptiste and Santomero, 2000).

Dividend transfers are flows of shareholder dividends to affiliates that are owners of the transferring firm's stock. Dividend payouts are generally standardized agreements that do not adequately represent managerial decisions, but are contractual obligations to all shareholders. With dividend payouts, managers cannot always select which affiliates get dividends and which do not, resulting in an internal transaction that is not directly linked to managerial choice or performance of the affiliate (Fier, McCullough, and Carson, 2013). Similar to internal capital, dividend transactions across affiliates include transactions from all group members – insurers and non-insurers alike – weakening the assumption of reduced information asymmetry. Again, this is the case for all internal transactions across group members with one exception – internal reinsurance.

For affiliated insurers, internal reinsurance is utilized to expand capacity for the ceding firm.[8] Using reinsurance provides the ceding company capacity to invest – that is to write more premiums, and is the expected outcome should winner picking prevail (Powell, Sommer, and Eckles, 2008). Unlike capital and dividend transfers, internal reinsurance by

[7]The NAIC requires groups list each intra-group relationship in Part 1A of Schedule Y. The relationships can be the parent firm, downstream subsidiaries, insurance affiliates, or non-insurance affiliates.

[8]For external reinsurance other explanations of utilization exist – namely reinsurer expertise, underwriting stabilization, and catastrophic loss protection. Internal reinsurance is considered a part of the firm's internal underwriting and investment strategy as it is collected in Exhibit 1B – Underwriting and Investment, separate from external reinsurance.

definition will be from another insurer rather than any group member in the holding company. As such, internal reinsurance transactions will suffer less information asymmetry, as the assuming company has access to similar underwriting competency and knowledge as the ceding firm. Therefore we focus on internal reinsurance and underwriting performance in our examinations of ICM activity and efficiency.[9,10]

There is the possibility non-U.S. owned subsidiaries transfer internal capital, dividends, and/or reinsurance to a group member. The NAIC requires all insurance firms to file their group structure, affiliates, and parent company, including any firms operating outside of the U.S. and/or its territories. Though the relationships must be detailed via Schedule Y, the non-U.S. firms themselves are not required to file with the NAIC. This could result in a missing complement at the group level for some transactions, in that we are not able to observe both parties in the ICM transfer. Additionally, this creates some noise in the net transaction amounts across the holding group as well (Niehaus, 2018). Fortunately, the internal capital flows are net at the firm level, lessening the effects of these non-U.S. based transactions.

Figure 2 provides a summary of internal capital transactions throughout our sample period, and further provides internal capital transactions for each of our three types of transactions: reinsurance, capital contributions, and dividends. We also report the total dollar value across all transactions. Figure 2 documents active internal capital markets in the U.S. property-casualty industry. To further emphasize the scale of internal reinsurance, Figure 3 provides a visual over the same period of total ICM transactions. Throughout the sample period, internal reinsurance remains the most utilized ICM instrument for property-casualty insurers.

[9]In fact, we find that capital and dividend contributions across affiliates are consistent with the models presented by Niehaus (2018), in that the flow if internal funds are negatively associated with performance rather than associated with winner picking.

[10]We also point to the reduced information asymmetry exhibited by external reinsurance markets, and reinsurance contracts in general (Jean-Baptiste and Santomero, 2000).

Outcomes of Internal Capital Market Transactions

There are a number of possible outcomes of ICM transactions in the property-casualty insurance industry. First and foremost ICM activity provides managers an avenue in which to invest in subsidiaries with favorable NPV projects. In this vein, transfers are to provide capacity to a profitable firm, or foster potential growth in new markets (i.e., winner picking). Second, since there exist tax incentives to shift income, state taxation variation motivates firms to shift capital to those affiliates operating in more tax friendly environments regardless of performance (Gramlich, Limpaphayom, and Rhee, 2004; Markle, 2016). Finally, insurers could transfer capital to improve the financial position of the receiving affiliate in the wake of regulatory scrutiny (Niehaus, 2018), or to improve leverage (Fier, McCullough, and Carson, 2013).

In the competitive property-casualty insurance industry, maintaining presence in a dense market may be a viable long-term strategy, but may not always lead to favorable underwriting returns. For example, in 2017 State Farm increased net premiums written in personal auto policies even after a record underwriting loss of $7 billion the prior year, citing market growth and financial strength as their strategy (Simpson, 2017). This is not a lone anomaly for State Farm, as a number of other large property-casualty insurers have seen similar losses over the past few years.[11] Therefore, firms pursuing growth or even operating in competitive markets may utilize internal shifts from other affiliates to offset losses resulting in a negative *ex-ante* relation between capital transfers and returns.

Taxation differences across affiliates can also drive internal investments and firm decisions (Petroni and Shackelford, 1995). Taxes on insurance operations are collected at the federal, state, and sometimes municipal level. Beyond federal income taxation, however, insurers are not taxed on profits at the state and local level but rather on gross premiums

[11] GEICO, Allstate, and Travelers Insurance saw combined ratios above 100 in personal auto policies for 2016.

(Burstein, 2007). Though federal taxes are consistent across group members, the variation in state and local taxation can drive headquarters to consider after-tax income with respect to internal transfers. Therefore the motivation for ICM transactions can be influenced by favorable tax environments, and may have little to do with shifting capacity based on expected performance.[12,13]

From a regulatory perspective, insurers aim to maintain strong financial ratios, and insurers have been shown to utilize ICMs to maintain leverage ratios (Fier, McCullough, and Carson, 2013). Moreover, risk based capital (RBC) standards are commonly used by regulators as a metric to determine insurer insolvency risk. Research shows that increased internal market activity is associated with low RBC for life insurers, and that negative capital shocks can lead to an influx of capital from the holding firm, in order to maintain solvency (Niehaus, 2018). Therefore, ICMs can be a way to transfer capital to weaker segments, rather than to pick winners.

The purpose of our study is to identify the final result of ICM transactions, not necessarily the intention, to assess the efficiency of winner picking. Specifically we identify the relation between prior internal reinsurance transactions and subsequent underwriting performance.

Hypothesis Development

Prior theoretical literature has proposed that internal capital markets can improve firm value when headquarters efficiently allocates capital among subsidiaries (Gertner, Scharfstein, and Stein, 1994; Stein, 1997). Stein (1997), in particular, proposes a model where managers allocate capital towards "winners." Unlike external capital markets, managers have superior information when allocating capital since firms are operating under a com-

[12]In all models we control for state effects, but are unable to control for local taxation variance. Additionally we can not observe the source of internal transactions, limiting any tests for tax differences across ceding and assuming firms.

[13]For a more detailed look into the world of insurer taxation and issues therein, see Grace, Sjoquist, and Wheeler (2007) and Neubig and Vlaisavljevich (1992), respectively.

mon ownership structure. The expectation is that these winners will continue their high performance in subsequent years with additional capital, thus further improving overall firm value.

Scharfstein and Stein (2000), on the other hand, propose that there is a dark side to internal capital markets. This theory relates to managers allocating capital inefficiently to rent-seeking divisional managers who are competing for resources within the conglomerate. This misallocation results in under-performing segments receiving relatively high amounts of capital, or at the very least an internal market with no significant relation between performance and capital transfers, consistent with corporate socialism.

While theoretical work suggests tension between the positive and negative attributes of internal capital markets, empirical work—particularly empirical work examining the property-casualty insurance industry—observe evidence consistent with winner picking (e.g., Powell, Sommer, and Eckles, 2008). Therefore, we expect to see results similar to those presented in prior empirical work. We present the following hypothesis:

> *H1: Winner Picking Hypothesis. Groups allocate capital to subsidiaries having higher past performance.*

The *Winner Picking Hypothesis* stems from the benefits of internal capital allocation within a conglomerate structure. Compared to external markets, the advantages of internal allocation include reduced information asymmetry, lower monitoring and transaction costs, as well as reduced agency problems. These advantages, collectively or individually, demonstrate a distinct advantage available to managers, but not to external markets. Therefore, managers would face less uncertainty when comparing projects, and pick winners based on previous performance, with the expectation the segment will continue to perform in the following year.

Given prior research, we do not expect to observe evidence of corporate socialism in the property-casualty insurance industry.[14] Corporate socialism could be the result of managerial discretion, pet projects, information asymmetries, or some combination of these internal forces. In this scenario the advantages of conglomerate structure are not fully realized - either due to managerial risk aversion, segment division, and/or a silos mentality. This does not mean that managers are actively aware of poor investments *ex-ante*, only that value-maximizing subsidiaries are not always rewarded *ex-post*. Further, we broadly categorize any form of silos mentality, pet projects, and inter-segment divisiveness as corporate socialism and within the realm of the dark side of ICMs.

If the theory of internal market efficiency and winner picking holds, we expect not only a positive relation between last year's performance and current capital contributions, but also relatively higher future underwriting returns for affiliates that received capacity in the previous year. Conversely, if corporate socialism holds, then we expect to find a negative relation between last year's performance and internal capital allocations, and relatively lower future accounting returns to firms who receive capital in the previous reporting period.

Following our test of the necessary condition of H1, we further investigate the efficiency of winner picking to determine if the winners receiving internal capital continue to win in terms of higher relative performance following internal reinsurance transactions. The competing hypotheses regarding these outcomes of a group's internal capital allocation decisions are formally stated as:

> *H2a: Efficient Winner Picking Hypothesis. Subsidiaries receiving internal capital outperform their fellow group members in subsequent periods.*
>
> *H2b: Mean Reversion Hypothesis. Subsidiaries receiving internal capital do not outperform their fellow group members in subsequent periods.*

[14] Specifically we cite the findings of Powell, Sommer, and Eckles (2008) in regards to internal reinsurance allocation.

The *Efficient Winner Picking Hypothesis* predicts a positive relation between previous capital transactions and next-period performance. Conversely, if the *Mean Reversion Hypothesis* holds, we expect no strong positive correlation between previous internal capital transactions and next-period performance. These two competing hypotheses provide testable predictions, and resolving this tension empirically extends our understanding of the efficiency and effectiveness of insurer ICM decisions. By analyzing both the determinants and outcomes of direct ICM transactions, we contribute to the literature by providing evidence not only on whether firms engage in winner picking, but also on whether they do so in an efficient and value maximizing manner. Table 1 provides summaries of our hypotheses and their empirical predictions.

Empirical Strategy

We test our hypotheses in two steps. First, we examine the determinants of internal capital market transactions in order to test whether there is a positive relation between previous performance and internal capital transactions. These empirical tests will provide evidence as to whether the *Winner Picking Hypothesis* (H1) is supported empirically, as has been shown in prior research. The second step of our empirical strategy involves examining whether "winners" keep winning, which has not been examined in prior research. In order to see whether the *Efficient Winner Picking Hypothesis* (H2a) or the *Mean Reversion Hypothesis* (H2b) is supported, we test whether firms receiving internal capital continue to outperform their fellow group members that did not receive internal capital or whether their performance reverts to the mean.

Testing the Winner Picking Hypothesis

For our first hypothesis (H1), we examine the determinants of internal capital market transactions. We specify the model as:

$$\textit{Internal Capital Market Transactions}_{i,t} = \beta_0 + \beta_1 \textit{UnderwritingROA}_{i,t-1} + \beta_2 X_{i,t} + \epsilon_{i,t} \quad (1)$$

where $\textit{Internal Capital Market Transactions}_{i,t}$ is separately proxied by either net internal reinsurance, capital, or dividends. To control for transactions relative to size, each internal transfer is scaled by total assets for firm i in year t.[15] A positive value for net internal reinsurance, capital, or dividends represents an increase in internal capacity, relative to each transaction, for the affiliate, while negative values indicate the segment provided capacity to other groups. We also combine each proxy for a $\textit{Total ICMT}_{i,t}$ metric in order to capture the entirety of a firm's internal capital received. $\textit{Underwriting ROA}_{i,t}$ is calculated as net underwriting income in year t divided by assets in year $t-1$ for firm i.[16] $X_{i,t}$ is a vector of control variables. $\epsilon_{i,t}$ is a random error term. For subsequent analyses, we focus on underwriting income and internal reinsurance due to reduce information asymmetries in reinsurance contracts. Additionally internal reinsurance is by far the most common ICM transaction, as referenced in Figure 3.

In order to isolate the statistical relation between internal capital market transactions and firm performance, we include a set of control variables consistent with prior literature (e.g., Powell, Sommer, and Eckles, 2008; Niehaus, 2018). Larger group members may be less reliant on internal capital, as they have easier access to external capital markets. We control for this incentive by including controls for a firm's size via total assets, as well as a

[15] The results of our specifications are consistent when transactions are scaled by net premiums written, surplus, as well as group ICM activity (e.g., firm internal reinsurance as a proportion of total group internal reinsurance).

[16] Underwriting income is net of internal reinsurance from losses and loss adjustment expenses.

firm's size relative to other group members.[17] A firm's capitalization can influence whether a firm needs to access internal capital markets in order to invest in new projects. A firm that has a larger buffer between its assets and liabilities (i.e., surplus) has a greater capacity to invest in new projects and, therefore, may not require internal capital. We, therefore, include the ratio of surplus to assets to control for capitalization. We include three measures that control for a firm's business mix. Different lines of business carry varying amounts of uncertainty. These differing factors could result in an insurer needing to hold relatively more or less capital. Thus we include controls for an insurer's line-of-business diversification, geographic diversification, and the percentage of business in long-tailed lines. Finally, we control for a firm's organizational structure as mutual firms have limited access to external capital markets which could change their reliance on internal capital markets. All models include year, group, and state fixed effects.[18]

For model (1), evidence that firms with relatively higher prior-year performance tend to receive more net reinsurance (capital) from affiliates will be indicated by a positive coefficient estimate β_1 in equation (1). Such an empirical result would support the *Winner Picking Hypothesis*.[19]

ICM Efficiency: Efficient Winner Picking vs. Mean Reversion

For our second set of hypotheses (H2a and H2b), we examine multiple specifications to analyze the outcomes of internal capital market transactions. Our specifications use ordinary least squares (OLS) to examine the relation between previous period ICM activity and subsequent performance. The model is as follows:

[17] The proxy for relative size is firm assets scaled by total group assets.

[18] See Appendix A for detailed descriptions of all control variables.

[19] Though we focus on underwriting returns, our results based on investment returns are consistent with those presented in Powell, Sommer, and Eckles (2008).

$$Underwriting\ ROA_{i,t} = \alpha_0 + \alpha_1 Internal\ Reinsurance_{i,t-j} + \alpha_2 X_{i,t-1} + \upsilon_{i,t} \quad (2)$$

where $Underwriting\ ROA_{i,t}$, the firm's net underwriting income in year t divided by assets in year $t-1$ for firm i. $Internal\ Reinsurance_{i,t-j}$ ($j \in [0,1,2,3]$) is net internal reinsurance ceded to affiliates scaled by total assets for firm i.[20] $X_{i,t}$ is a vector of control variables. Finally, $\upsilon_{i,t}$ is a random error term.

Our analyses focus on underwriting income as it is the metric most under the direct control of the individual group members. In particular, since underwriting returns are often zero or negative (i.e., combined ratios greater than 100 are common), the primary role of insurance subsidiaries is to provide funds, at as low of a cost as possible, for profitable investment.[21] Of course, any underwriting gains further contribute to underwriting return on assets. Since corporate headquarters typically controls investments (as opposed to investment control residing at the subsidiary group member level), Underwriting ROA is the measure that is directly within the control of the group member and therefore the most relevant measure on which to focus, with internal reinsurance as the most likely ICM to be tied to underwriting performance.[22]

One issue with Model 2 is that it only presents results based on the average *ex-post* outcomes of internal capital transfers. A positive coefficient estimate for α_1 is consistent with efficiency in winner picking, but does not identify whether or not the winners selected

[20]Results are consistent when scaled by group internal reinsurance, net premiums written, firm surplus, as well as using gross reinsurance premiums rather than net.

[21]Within the insurance industry, evidence suggests that some firms are persistently good (or bad) at underwriting and focus on their comparative advantage (Ivantsova and Leverty, 2019). More broadly, Gertner, Scharfstein, and Stein (1994) argue segment managers own no residual rights to capital, and headquarters is more actively involved in asset management.

[22]For example, Gertner, Scharfstein, and Stein (1994) argue segment managers own no residual rights to capital, and headquarters is more actively involved in asset management. This is not the case with internal reinsurance, as contracts are formulated between specific group members based on investments and losses.

in prior periods actually outperformed their peers, and only identifies the average affect of internal reinsurance on future performance. Therefore, in order to follow the performance of these picked winners we propose the following equation:

$$Underwriting\ ROA_{i,t} = \theta_0 + \theta_1 Internal\ Reinsurance_{i,t} * Winner_{i,t-1} + \theta_2 X_{i,t-1} + \gamma_{i,t} \quad (3)$$

where *Winner* is a binary equal to 1 if the firm had higher than average performance relative to their group members.[23] $Underwriting\ ROA_{i,t}$ is the firm's net underwriting income in year t divided by assets in year $t-1$ for firm i. $Internal\ Reinsurance_{i,t}$ is internal reinsurance ceded less assumed to affiliates, scaled by total assets for firm i. $X_{i,t}$ is a vector of control variables. Finally, $\gamma_{i,t}$ is a random error term.

Model 3 allows us to test the relation between current year performance and winner picking, offering a more direct test of the performance of the winner that receives internal capital. Specifically the interaction between current *Internal Reinsurance* and prior *Winner* is positive if and only if the firm was a winner and was subsequently given relatively higher amounts of capital than their peers. A positive coefficient estimate for θ_1 is therefore consistent with winner picking efficiency.

In all models we attempt to isolate the influence of internal capital market transactions on firm performance by controlling for other factors related to firm performance based on prior literature analyzing the property-casualty insurance industry (e.g., Liebenberg and Sommer, 2008; Berry-Stölzle, Hoyt, and Wende, 2013). We control for size, relative size within the group, leverage, geographic diversity, product diversity, organizational form, and business line risk. Descriptions of our control variable definitions are available in Appendix A.

[23] We compare firms to the 50th, 75th, 90th, and 95th percentiles within their group, as well as the calculating a separate indicator equal to 1 if the firm had the absolute highest underwriting returns in the group (i.e. the winner).

Sample and Data

The sample consists of firm-level observations for property-casualty group insurers from 1997-2016 from annual statutory filings to the National Association of Insurance Commissioners (NAIC). We exclude firms that are unaffiliated with a group since our study is focused on intra-group transactions. Our sample selection procedure omits observations with negative values for surplus, premiums written, or assets. We also winsorize all continuous variables at the 1st and 99th percentiles. The data include a total of 23,214 firm-year observations for 2,072 unique affiliated firms. By total assets, this represents 81.22% of the property-casualty insurance industry on average across our sample.[24] Table 2 provides an overview of the sample, along with descriptive statistics at the firm level. Additionally, Table 3 provides univariate correlations between all of our variables. These correlations do not account for other potentially confounding factors that our multivariate tests will address.

Empirical Results

Winner Picking Results

The empirical results from our ICM determinants model (equation (1)) are presented in Table 4. The dependent variable, $Total\ ICMT_{i,t}$ represents total net internal capital contributions to the firm within the year. $Internal\ Reinsurance_{i,t}$, $Capital_{i,t}$, and $Dividends_{i,t}$ are net reinsurance, net capital, and net dividends scaled by total assets for firm i in year t, respectively. We provide results using underwriting return on assets ($Underwriting\ ROA_{i,t}$) as our primary measure of firm performance. Year, group, and state fixed effects are included in both models. Standard errors are clustered at the firm level and presented below each coefficient estimate.

[24] Total assets for our sample period average $1.47 trillion annually, while total industry assets average $1.81 trillion.

For our test of whether insurers engage in winner picking by allocating capital based upon past performance, the results in Table 4 indicate that prior underwriting performance (*Underwriting* $ROA_{i,t}$) is positively and significantly related to internal reinsurance only, while being negatively associated with prior-year capital and dividends.[25] The estimates represented in Table 4 are consistent with internal reinsurance cessions being associated with firm underwriting performance, suggesting that as prior-year underwriting performance improves, the amount of internal reinsurance received in the following year also improves, consistent with winner picking.

Overall, Table 4 is consistent with the (H1) *Winner Picking Hypothesis* with respect to internal reinsurance utilization and underwriting returns. Specifically, we note evidence of insurance groups transferring capital through internal capital market transactions–primarily as reinsurance–to firms that have higher prior-year underwriting performance. Given these results supporting the *Winner Picking Hypothesis*, we turn to the important, but unaddressed issue in the literature, of whether the winners who received internal capital keep winning.

Winner Picking Efficiency Results

Table 5 presents the empirical results from our estimations of equation (2). The dependent variable is our measure of firm performance (*Underwriting* $ROA_{i,t}$). Because internal reinsurance transactions are consistent with winner picking, and since they comprise the vast majority of ICM activity, *Internal Reinsurance* will serve as our primary focus for further analyses.[26] For Table 5, Column (1) presents the results of internal reinsurance from the current reporting period using OLS with group, year, and state fixed effects, while (2), (3),

[25] With regards to internal capital and dividends, our results are consistent with those of Niehaus (2018), in which internal capital usage in the U.S. life insurance industry is negatively associated with firm performance.

[26] Given the overwhelming volume of internal reinsurance transactions compared to dividends and capital as shown in Figure 3, we focus on the outcomes of internal reinsurance transactions. Additionally, internal reinsurance is guaranteed to be transferred from an insurer as opposed to a non-insurer (e.g., a bank), reducing the likelihood of information asymmetries across different segments. For our models, winner picking efficiency results based on total ICM activity are consistent with results based on net internal reinsurance.

and (4) provide the results for *Internal Reinsurance* that was provided to group members in earlier periods. Standard errors are clustered at the firm level.

The results presented in Table 5 provide evidence that firms effectively allocate capital to prior winners who go on to continue their high performance in future periods. Specifically, the estimated coefficient on *Gross Internal Reinsurance*$_{i,t-1}$ and *Net Reinsurance*$_{i,t-1}$ is positive and significant. This result indicates that affiliates who receive internal reinsurance tend to experience higher performance in the same period. More importantly, we find evidence of long-term efficient winner picking. Specifically, the coefficient estimates of *Internal Reinsurance*$_{i,t-j}$ at times $t-1$, $t-2$, and $t-3$ are also positive and significant, indicating that receiving internal reinsurance in previous reporting periods is also associated with higher future performance.

Tables 6 and 7 present the results of our estimations of equation 3 based on performance rank and percentiles, respectively. In Table 6 we note the interaction between *Winner* and *Internal Reinsurance* is positive and significant, indicating that when picked, winners go on to outperform their peers. We also interact the picked winner variable with a binary equal to 1 if the firm received the highest amount of internal reinsurance and note similar outcomes. For a more fluid estimation of winner picking efficiency, Table 7 creates rankings based on percentiles and includes comparisons for winners and underperformers alike. Interestingly enough, we see weak evidence of underperformers worsening their underwriting performance *ex-post* internal reinsurance cessions. More importantly, however, we note that firms that performed above average and subsequently received internal reinsurance (i.e., were picked winners) see greatly improved underwriting returns when they receive capital from the group.

Ultimately our results provide evidence in support of efficient winner picking when comparing internal reinsurance and underwriting returns in the property-casualty insurance industry. We document a positive and statistically significant link between internal reinsurance transfers and underwriting returns, consistent with managers being able to identify group

member firms with strong potential performance, and that these firms translate their additional capacity into future superior underwriting performance. More importantly, we identify a positive relation between the winners being picked and their subsequent performance. Overall, our internal reinsurance results allow us to reject the *Mean Reversion Hypothesis*, ultimately supporting the *Efficient Winner Picking Hypothesis*, as "winners" continue their experience of superior underwriting performance after receiving further internal capital market transfers.

Summary and Conclusions

Internal capital market transactions provide an avenue through which insurer groups can transfer capital and provide additional capacity to certain group members. A large body of research has shown insurers utilize ICMs extensively in their operations. For example, evidence shows managers allocate capital based on past performance (Powell, Sommer, and Eckles, 2008), capital shocks (Niehaus, 2018), and leverage restrictions (Fier, McCullough, and Carson, 2013). We first confirm results from prior research (the Winner Picking Hypothesis) that insurers engage in winner picking in that they allocate additional capital to group members who have performed well in the past. We then extend prior literature and provide the first evidence on whether winners continue to win in the future. We show that ICMs are smart in the sense that winners continue their relative outperformance following these capital transfers, in support of the *Efficient Winner Picking Hypothesis*.

Our findings are important in that allocating capital to previous "winners" does not guarantee strong relative future performance, nor does it directly suggest ICM efficiency per se. Indeed, the mean reverting tendencies and managerial limitations of picking last year's top performing mutual funds, for example, have been widely shown in the investment literature (e.g., Miller, Muthuswamy, and Whaley, 1994; Bessembinder et al., 1995; Gruber, 1996; Carhart, 1997; Wachter, 2002; Zheng, 2002).

Our results indicate managers are able to efficiently allocate capital such that group members who receive additional capital then go on to outperform their fellow group members who received relatively less capital. Such efficient capital allocation via internal capital markets benefits policyholders and investors in terms of increased firm performance and financial strength. Future research may benefit from examining the relation between internal capital market activity and insurer ratings, further identifying the outcomes of all internal capital transactions, as well as analyzing the relative efficiency of ICMs in firms with enterprise risk management programs in place.

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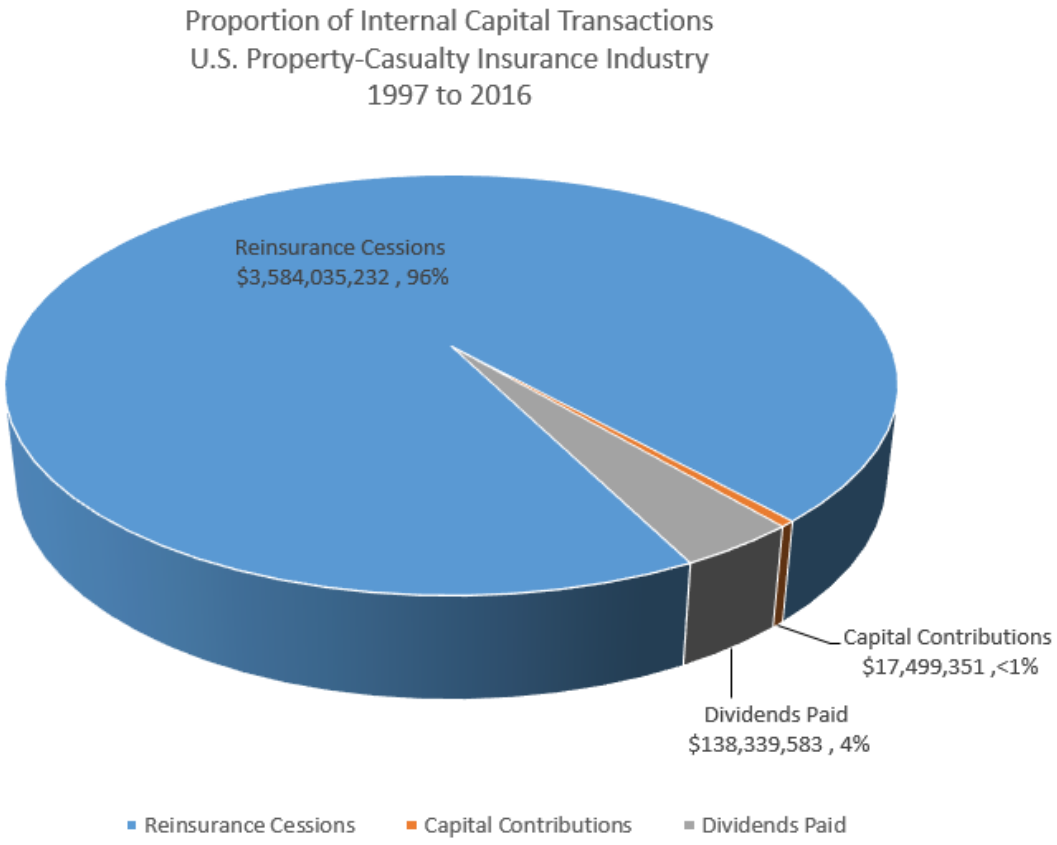
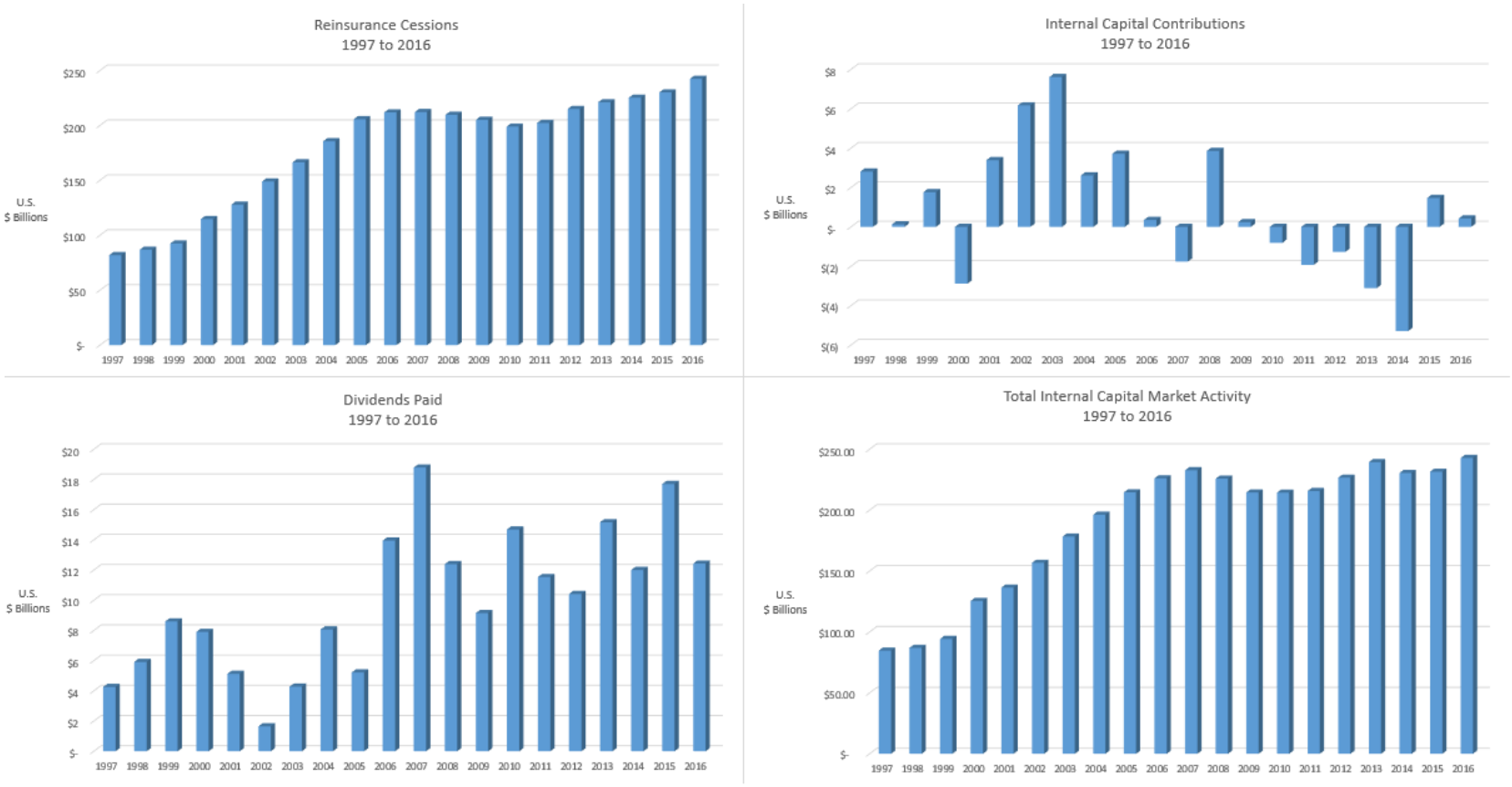
Figure 1: Internal Capital Market Activity



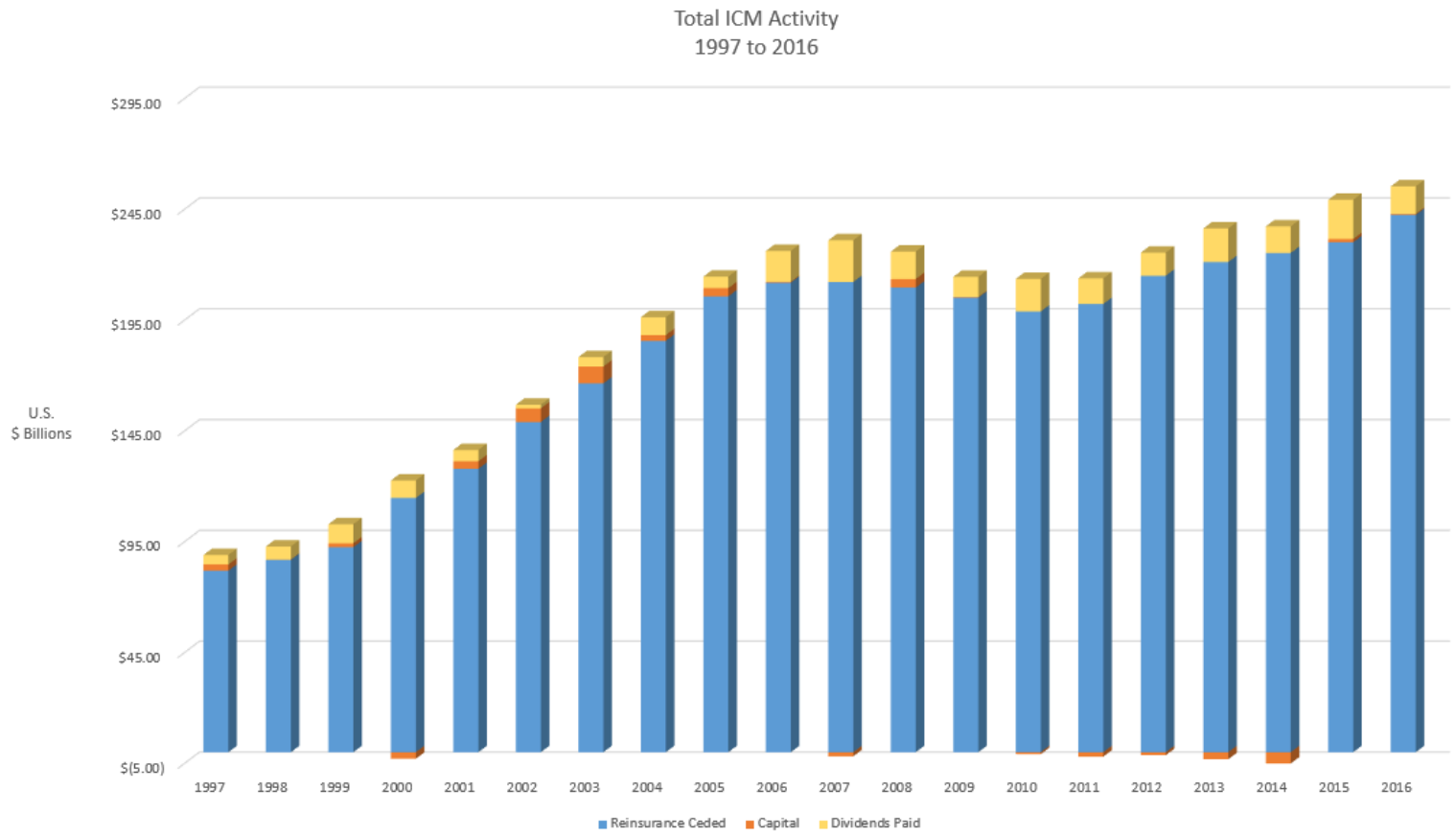
Note: This figure reports the dollar amount and percentage of the total of each internal capital line item from 1997 to 2016 within the Property-Casualty insurance industry, as a proportion of total internal transactions. Reinsurance is calculated as total ceded internal reinsurance to affiliates and is collected from Schedule DB: Underwriting and Investment. Capital contributions represent direct contributions across group members, while Dividends are the dividends paid out at the firm level. Capital and Dividends are collected from Schedule Y.

Figure 2: Internal Capital Market Activity by Transaction and Year



Note: This figure reports the levels of each internal capital transaction from 1997 to 2016 within the U.S. Property-Casualty insurance industry. Reinsurance is calculated as total ceded internal reinsurance. Capital contributions represent direct contributions across group members. Dividends are the absolute value of internal dividend reimbursements (dividends paid out). Total Internal Capital Market Activity is the aggregate of the previous three internal market line items. Amounts are listed in U.S. billions for each year.

Figure 3: Total Internal Capital Market Activity by Year



Note: This figure reports the relative levels of each internal capital transaction from 1997 to 2016 within the U.S. Property-Casualty insurance industry. Reinsurance is calculated as total ceded internal reinsurance. Capital contributions represent direct contributions across group members. Dividends are the absolute value of internal dividend reimbursements (dividends paid out). Amounts are listed in U.S. billions for each year.

Table 1: Summary of Hypotheses

Hypotheses	Capital Allocation After Positive Returns	Relative Performance After Investment
H1: Winner Picking	Relative Increase	
H2a: Efficient Winner Picking		Outperform Group Members
H2b: Mean Reversion		Underperform Group Members

Note: This table summarizes the hypothesized effects associated with each of our hypotheses. The first column (Hypotheses) represents our competing hypotheses concerning performance and segment capital transfers. The latter columns specify our predictions in a two-series model regarding internal investment changes and subsequent returns.

Table 2: Descriptive Statistics

				Percentiles					
Variable	Mean	Std.	Min	10^{th}	25^{th}	50^{th}	75^{th}	90^{th}	Max
Total ICMT	0.9110	2.5951	-0.9020	-0.1883	-0.0280	0.0554	0.7186	2.4515	19.8217
Capital	0.0107	0.0550	-0.0909	0.0000	0.0000	0.0000	0.0000	0.0131	0.4013
Dividends	-0.0142	0.0482	-0.3677	-0.0411	0.0000	0.0000	0.0000	0.0000	0.0232
Internal Reinsurance	0.9406	2.6546	-0.5343	-0.1643	-0.0021	0.0395	0.7317	2.5345	19.4204
Underwriting ROA	-0.0114	0.0466	-0.2416	-0.0579	-0.0244	-0.0063	0.0070	0.0303	0.1372
Assets	18.4312	1.8794	14.1832	16.0589	17.0549	18.3180	19.6556	21.0022	23.1998
Geographic HHI	0.5179	0.3827	0.0421	0.0646	0.1310	0.4340	1.0000	1.0000	1.0000
Longtail	0.7456	0.2936	0.0000	0.2094	0.6513	0.7974	1.0000	1.0000	1.0000
Mutual	0.1170	0.3214	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000
Product Diversity	0.4507	0.3303	0.0000	0.0000	0.0461	0.5324	0.7325	0.8314	1.0000
Relative Size	0.2453	0.3408	0.0000	0.0015	0.0066	0.0534	0.3887	0.9083	1.0000
Surplus/Assets	0.4972	0.2488	0.0756	0.2332	0.3065	0.4251	0.6647	0.9304	0.9998

Note: This table reports descriptive statistics for the years 1997 to 2016. The final data used in our models contain 31,434 firm-year observations and 1,851 unique surviving firms. *Total ICM* is the total *Internal Reinsurance*, *Capital*, and *Dividends*. *Internal Reinsurance*, is internal reinsurance ceded minus internal reinsurance assumed, scaled by current year assets. *Capital* is the net internal capital transferred by firm scaled by assets. *Dividends* is the total internal dividends ceded less assumed, scaled by firm assets. *Underwriting ROA* is underwriting income divided by prior-year total assets. *Assets* is the natural log of total assets. *Geographic HHI* is a geographic Herfindahl index based on premiums written across the 50 U.S. states and D.C. *Longtail* is the percentage of premiums written in long-tailed lines. *Mutual* is a binary variable equal to 1 if a firm is a mutual and 0 otherwise. *Product Diversity* is 1 minus a line-of-business Herfindahl index. *Relative Size* is a firm's assets divided by group assets. *Surplus/Assets* is surplus divided by total assets.

Table 3: Correlation Matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
(1) *Total ICMT*		*0.1675*	*0.1256*	*0.9608*	-0.0132	*-0.0749*	*-0.2487*	*-0.2944*	*0.0797*	*-0.0503*	*-0.0506*	*-0.0802*	0.0123	*-0.0228*
(2) *Capital*	*0.0636*		0.0144	*0.0735*	*-0.1047*	*-0.1178*	*-0.0745*	*-0.0629*	*-0.0822*	-0.0058	*-0.0419*	*-0.1386*	0.0035	*0.0902*
(3) *Dividends*	0.0125	*0.0398*		0.0005	*-0.2111*	*-0.2225*	*-0.0646*	*0.1342*	*0.0743*	*0.1164*	*-0.0458*	*0.2713*	*0.0640*	*0.0991*
(4) *Internal Reinsurance*	*0.9982*	*0.0203*	*-0.0306*		*0.0455*	-0.0134	*-0.2411*	*-0.3215*	*0.0901*	*-0.0692*	*-0.0468*	*-0.1071*	-0.0043	*-0.0355*
(5) *Underwriting ROA*	0.0015	*-0.2204*	*-0.2025*	*0.0191*		*0.8364*	*0.0361*	*-0.0486*	*0.2167*	-0.0039	*-0.0701*	*-0.0659*	*-0.1086*	-0.0045
(7) *Size*	*-0.1715*	*-0.0491*	-0.0095	*-0.1692*	*0.0279*	*0.0653*		*0.2628*	*-0.2988*	*-0.4614*	*0.3057*	*0.0851*	*0.0291*	*-0.1184*
(8) *Relative Size*	*-0.2150*	*-0.0298*	*0.0786*	*-0.2173*	*-0.0179*	*-0.0258*	*0.2096*		*-0.0471*	*-0.0176*	*-0.0284*	*0.3185*	-0.0014	*0.0363*
(9) *Surplus/Assets*	*0.0818*	0.0115	*-0.0300*	*0.0826*	*0.1944*	*0.2073*	*-0.3609*	*-0.0304*		*0.1602*	*-0.2005*	*0.1019*	*-0.1743*	*-0.0368*
(10) *Geographic HHI*	*-0.0430*	-0.0084	*0.0766*	*-0.0459*	0.0068	*-0.0316*	*-0.4146*	*0.0269*	*0.1709*		*-0.3044*	*0.1334*	*0.0794*	*0.0959*
(11) *Product Diversity*	*-0.0254*	*-0.0312*	*0.0377*	*-0.0257*	*-0.0588*	-0.0070	*0.2957*	-0.0166	*-0.1980*	*-0.2713*		*0.0684*	*0.1335*	*-0.1439*
(12) *Mutual*	*-0.0619*	*-0.0702*	*0.1383*	*-0.0648*	*-0.0408*	*-0.0647*	*0.0678*	*0.3702*	*0.0632*	*0.1241*	*0.1035*		*0.0804*	*-0.0617*
(13) *Longtail*	0.0077	*-0.0293*	*0.1037*	0.0047	*-0.1009*	*-0.1123*	*0.0701*	*-0.0725*	*-0.2477*	*0.0656*	*0.1561*	*0.0820*		*-0.0544*

Note: This table presents pairwise correlations years 1997 to 2016. Pearson correlations are shown below the diagonal and Spearmen correlations shown above the diagonal. *Total ICM* is the total *Internal Reinsurance*, *Capital*, and *Dividends*. *Internal Reinsurance*, is internal reinsurance ceded minus internal reinsurance assumed, scaled by current year assets. *Capital* is the net internal capital transferred by firm scaled by assets. *Dividends* is the total internal dividends ceded less assumed, scaled by firm assets. *Underwriting ROA* is underwriting income divided by prior-year total assets. *Assets* is the natural log of total assets. *Geographic HHI* is a geographic Herfindahl index based on premiums written across the 50 U.S. states and D.C. *Longtail* is the percentage of premiums written in long-tailed lines. *Mutual* is a binary variable equal to 1 if a firm is a mutual and 0 otherwise. *Product Diversity* is 1 minus a line-of-business Herfindahl index. *Relative Size* is a firm's assets divided by group assets. *Surplus/Assets* is surplus divided by total assets. Coefficients in italics indicate significance at the 0.05 level.

Table 4: Regression Results for Winner Picking Models
Determinants of Internal Capital Transactions

	(1)	(2)	(3)	(4)
		Internal		
	Total ICMT	*Reinsurance*	*Capital*	*Dividends*
Underwriting ROA$_{i,t-1}$	-0.0364	0.2966**	-0.1755***	-0.1719***
	(0.1528)	(0.1507)	(0.0393)	(0.0240)
Size$_{i,t-1}$	-0.2432***	-0.2323***	-0.0115**	-0.0039**
	(0.0252)	(0.0269)	(0.0046)	(0.0020)
Relative Size$_{i,t-1}$	0.0898	0.0954	0.0230**	0.0042
	(0.0848)	(0.0910)	(0.0091)	(0.0087)
Surplus/Assets$_{i,t-1}$	-0.4288***	-0.2826***	-0.0506	-0.0530***
	(0.0961)	(0.0901)	(0.0313)	(0.0105)
Geographic HHI$_{i,t-1}$	-0.4089***	-0.4225***	-0.0004	0.0022
	(0.0692)	(0.0705)	(0.0043)	(0.0057)
Product Diversity$_{i,t-1}$	-0.1892**	-0.1890**	0.0094	-0.0039
	(0.0780)	(0.0880)	(0.0068)	(0.0073)
Mutual$_{i,t-1}$	0.1781***	0.1690***	-0.0008	0.0120***
	(0.0617)	(0.0600)	(0.0035)	(0.0032)
Longtail$_{i,t-1}$	-0.0463	0.0007	-0.0105	0.0157*
	(0.0665)	(0.0706)	(0.0093)	(0.0095)
Intercept	5.2156***	5.0892***	0.1815*	-0.0446
	(0.4502)	(0.4736)	(0.0985)	(0.0366)
Year FE	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Observations	20,331	21,383	20,331	20,331
R^2	0.2237	0.2252	0.0264	0.0645

Note: This table reports results from ordinary least squares (OLS) regressions. The dependent variable, *Total ICMT*, is the total of the variables in columns (2-4). *Internal Reinsurance* is internal reinsurance ceded minus internal reinsurance assumed, scaled by current year assets. *Capital* is the net internal capital transferred by firm, scaled by firm assets. *Dividends* is the total internal dividends ceded less assumed, scaled by firm assets. *Underwriting ROA* is underwriting income divided by prior-year total assets. *Size* is the natural log of assets. *Relative Size* is a firm's assets divided by group assets. *Surplus/Assets* is surplus divided by total assets. *Geographic HHI* is a geographic Herfindahl index based on premiums written across the 50 U.S. states and D.C. *Product Diversity* is 1 minus a line-of-business Herfindahl index. *Mutual* is a binary variable equal to 1 if a firm is a mutual and 0 otherwise. *Longtail* is the percentage of premiums written in long-tailed lines. All regressions include year indicators and group indicators. Standard errors are listed beneath each coefficient estimate and are clustered at the firm level. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively. Results are consistent using ceded (gross) internal reinsurance.

Table 5: Regression Results for Winner Picking Efficiency Models

	Dependent Variable: *Underwriting* $ROA_{i,t}$			
	(1)	(2)	(3)	(4)
Internal Reinsurance$_{i,t}$	0.0012***			
	(0.0004)			
Internal Reinsurance$_{i,t-1}$		0.0007**		
		(0.0004)		
Internal Reinsurance$_{i,t-2}$			0.0006*	
			(0.0003)	
Internal Reinsurance$_{i,t-3}$				0.0006*
				(0.0003)
Size$_{i,t-1}$	0.0020***	0.0025***	0.0019***	0.0014**
	(0.0005)	(0.0006)	(0.0006)	(0.0006)
Relative Size$_{i,t-1}$	0.0006	0.0005	0.0006	-0.0002
	(0.0025)	(0.0025)	(0.0026)	(0.0026)
Surplus/Assets$_{i,t-1}$	-0.0021	-0.0011	-0.0013	-0.0019
	(0.0032)	(0.0032)	(0.0034)	(0.0035)
Geographic HHI$_{i,t-1}$	0.0040**	0.0039**	0.0035**	0.0032*
	(0.0017)	(0.0017)	(0.0018)	(0.0018)
Product Diversity$_{i,t-1}$	0.0074***	0.0074***	0.0066**	0.0062**
	(0.0026)	(0.0026)	(0.0027)	(0.0028)
Mutual$_{i,t-1}$	-0.0006	-0.0008	-0.0007	-0.0004
	(0.0015)	(0.0015)	(0.0015)	(0.0016)
Longtail$_{i,t-1}$	-0.0096***	-0.0096***	-0.0083***	-0.0063**
	(0.0026)	(0.0026)	(0.0026)	(0.0026)
Intercept	-0.0139	-0.0230	-0.0094	-0.0058
	(0.0156)	(0.0160)	(0.0123)	(0.0126)
Year FE	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Observations	23,214	23,214	21,383	19,572
R^2	0.2598	0.2604	0.2731	0.2874

Note: This table reports results from ordinary least squares (OLS) regressions. The dependent variable, *Underwriting ROA*, is underwriting income divided by prior-year total assets. *Internal Reinsurance* is calculated as internal reinsurance ceded less assumed, scaled by firm assets in the OLS specification. *Size* is the natural log of assets. *Relative Size* is a firm's assets divided by group assets. *Surplus/Assets* is surplus divided by total assets. *Geographic HHI* is a geographic Herfindahl index based on premiums written across the 50 U.S. states and D.C. *Product Diversity* is 1 minus a line-of-business Herfindahl index. *Mutual* is a binary variable equal to 1 if a firm is a mutual and 0 otherwise. *Longtail* is the percentage of premiums written in long-tailed lines. Standard errors are listed beneath each coefficient estimate and are clustered at the firm level. Year fixed effects are included in all models. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 6: Regression Results for Winner Picking Efficiency Models
Performance Rankings

	Dep. Variable.: *Underwriting ROA*$_{i,t}$	
	(1)	(2)
Winner$_{t-1}$ **Internal Reinsurance*$_t$	0.0211***	
	0.0065	
Winner$_{t-1}$ **Max Internal Reinsurance*$_t$		0.0817***
		0.0053
Size$_{i,t-1}$	0.0016***	0.0016***
	(0.0006)	(0.0006)
Relative Size$_{i,t-1}$	0.0005	0.0009
	(0.0025)	(0.0025)
Surplus/Assets$_{i,t-1}$	-0.0017	-0.0007
	(0.0032)	(0.0032)
Geographic HHI$_{i,t-1}$	-0.0000	0.0001
	(0.0027)	(0.0027)
Product Diversity$_{i,t-1}$	0.0081***	0.0082***
	(0.0025)	(0.0026)
Mutual$_{i,t-1}$	0.0000	-0.0004
	(0.0015)	(0.0015)
Longtail$_{i,t-1}$	-0.0093***	-0.0096***
	(0.0026)	(0.0026)
Intercept	0.0020	0.0060
	(0.0121)	(0.0123)
Year FE	Yes	Yes
Group FE	Yes	Yes
State FE	Yes	Yes
Observations	23,214	23,214
R^2	0.2627	0.2761

Note: This table reports results from ordinary least squares (OLS) regressions. The dependent variable, *Underwriting ROA*, is underwriting income divided by prior-year total assets. *Internal Reinsurance* is calculated as internal reinsurance ceded, scaled by firm assets. *Winner* indicates the firm with the highest Underwriting ROA in their group. *Max Internal Reinsurance* is an binary indicating the firm that received the highest net internal reinsurance in their group. *Size* is the natural log of assets. *Relative Size* is a firm's assets divided by group assets. *Surplus/Assets* is surplus divided by total assets. *Geographic HHI* is a geographic Herfindahl index based on premiums written across the 50 U.S. states and D.C. *Product Diversity* is 1 minus a line-of-business Herfindahl index. *Mutual* is a binary variable equal to 1 if a firm is a mutual and 0 otherwise. *Longtail* is the percentage of premiums written in long-tailed lines. Standard errors are listed beneath each coefficient estimate and are clustered at the firm level. Year fixed effects are included in all models. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 7: Regression Results for Winner Picking Efficiency Models
Performance Percentiles

	Dependent Variable: *Underwriting ROA*$_{i,t}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
10th Perc$_{i,t-1}$ **Internal Reinsurance*$_{i,t}$	0.0007						
	(0.0008)						
25th Perc$_{i,t-1}$ **Internal Reinsurance*$_{i,t}$		-0.0008*					
		(0.0004)					
40th Perc$_{i,t-1}$ **Internal Reinsurance*$_{i,t}$			-0.0008*				
			(0.0004)				
50th Perc$_{i,t-1}$ **Internal Reinsurance*$_{i,t}$				0.0032***			
				(0.0008)			
75th Perc$_{i,t-1}$ **Internal Reinsurance*$_{i,t}$					0.0049***		
					(0.0010)		
90th Perc$_{i,t-1}$ **Internal Reinsurance*$_{i,t}$						0.0050***	
						(0.0011)	
95th Perc$_{i,t-1}$ **Internal Reinsurance*$_{i,t}$							0.0042***
							(0.0012)
Firm Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Group FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	23,214	23,214	21,214	23,214	23,214	21,214	23,214
R^2	0.2618	0.2618	0.2619	0.2635	0.2641	0.2632	0.2635

Note: This table reports results from ordinary least squares (OLS) regressions. The dependent variable, *Underwriting ROA*, is underwriting income divided by prior-year total assets. *Internal Reinsurance* is calculated as internal reinsurance ceded, scaled by firm assets. *10th Perc*, *25th Perc*, *40th Perc* are binary variables equal to 1 if the firm is ranked at or below the 10th, 25th, or 40th percentile in their group by *Underwriting ROA* at (*t-1*), respectively. *50th Perc*, *75th Perc*, *90th Perc*, and *95th Perc* are binary indicators equal to 1 if the firm is at or below the 50th, 75th, 90th, or 95th percentile in their group by *Underwriting ROA*. Firm Controls are as follows: *Size* is the natural log of assets. *Relative Size* is a firm's assets divided by group assets. *Surplus/Assets* is surplus divided by total assets. *Geographic HHI* is a geographic Herfindahl index based on premiums written across the 50 U.S. states and D.C. *Product Diversity* is 1 minus a line-of-business Herfindahl index. *Mutual* is a binary variable equal to 1 if a firm is a mutual and 0 otherwise. *Longtail* is the percentage of premiums written in long-tailed lines. Standard errors are listed beneath each coefficient estimate and are clustered at the firm level. Year fixed effects are included in all models. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

Appendix A: Details on Variable Construction

Variable	Definition
i,t	Firm i in year t;
Internal Reinsurance$_{i,t}$	Firm i's internal reinsurance ceded minus internal reinsurance assumed, scaled by assets, all measured in year t;
Dividends$_{i,t}$	Firm i's total internal dividends ceded less internal dividends assumed in year t;
Capital$_{i,t}$	Firm i's internal capital received minus internal capital paid in year t;
Total ICMT$_{i,t}$	The sum of *Internal Reinsurance*$_{i,t}$, *Dividends*$_{i,t}$, and *Capital*$_{i,t}$ for firm i in year t;
Underwriting ROA$_{i,t}$	Firm i's underwriting income divided by total assets in year $t-1$;
Assets$_{i,t}$	The natural log of firm i's total assets in year t;
Relative Size$_{i,t}$	Firm i's assets divided by the total assets of firm i's group in year t;
Surplus/Assets$_{i,t}$	The ratio of firm i's policyholder surplus to total assets in year t;
Geographic HHI$_{i,t}$	A geographic Herfindahl index based on direct premiums written in the fifty U.S. states and Washington D.C. in year t;

Product Diversity$_{i,t}$	1 minus a Herfindahl index based on firm i's net premiums written across 24 lines of business in year t. We use net premiums written data from the Underwriting and Investment Exhibit (Part 1B-Premiums Written) in the annual statutory filings, we make the following adjustments as described in Berry-Stölzle et al. (2012). Fire and Allied Lines is defined as the sum of "Fire" and "Allied Lines." Accident and Health is defined as the sum of "Group Accident and Health," "Credit Accident and Health," and "Other Accident and Health." Medical Malpractice is defined as the sum of "Medical Malpractice—Occurrence" and "Medical Malpractice—Claims Made." Products Liability is defined as the sum of "Products Liability—Occurrence" and "Products Liability—Claims Made." Auto is defined as the sum of "Private Passenger Auto Liability," "Commercial Auto Liability," and "Auto Physical Damage." Reinsurance is defined as the sum of "Nonproportional Assumed Property," "Nonproportional Assumed Liability," and "Nonproportional Assumed Financial Lines." After these combinations we are left with 24 lines of business from which we construct the Herfindahl Index: Accident and Health, Aircraft, Auto, Boiler and Machinery, Burglary and Theft, Commercial Multi Peril, Credit, Earthquake, Farmowners', Financial Guaranty, Fidelity, Fire and Allied lines, Homeowners, Inland Marine, International, Medical Malpractice, Mortgage Guaranty, Ocean Marine, Other, Other Liability, Products Liability, Reinsurance, Surety, and Workers' Compensation;
Mutual$_{i,t}$	A binary variable equal to 1 if firm i was organized as a mutual in year t and 0 otherwise;
Longtail$_{i,t}$	The percentage of firm i's net premiums written in long-tailed lines of business in year t. We define the following lines as long-tailed lines of business: Farmowners, Homeowners, Commercial Multi Peril, Medical Malpractice, Workers' Compensation, Products Liability, Auto Liability, and Other Liability;
Winner$_{i,t}$	A binary variable equal to 1 if firm i had the highest *Underwriting ROA* in their group at time t;
Max Internal Reinsurance$_{i,t}$	A binary variable equal to 1 if firm i received the highest amount of *Internal Reinsurance* in their group at time t;