

Investing in Customer Capital*

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May 2026

Abstract

Firms invest heavily in customer capital; such investment is a main source of intangible capital value. Customer capital investment is measured using sales and marketing expense from income statements, salaries paid to workers in sales and marketing, and text from SEC filings. There is large and persistent variation across industries in customer capital investment; industries investing the most are growing as a share of aggregate enterprise value. Variation in sales and marketing expense explains a large amount of industry-level variation in intangible capital value. Industries characterized by information frictions and network effects in demand invest most heavily in customer capital.

*Carlo Geat, Freddy Pinzon, Sixun Tang, and Xi Wang provided excellent research support. We are grateful to Michael Alter, Nicolas Crouzet, Andrea Eisfeldt, Sam Hanson, Steve Kaplan, Simone Lenzu, Yueran Ma, Quinn Maingi, Dimitris Papanikolaou, Leena Rudanko, Chad Syverson, Luke Taylor, Stephen Terry, Rob Vishny, two anonymous referees, and seminar participants at Chicago Booth, Columbia GSB, Harvard Business School, the Federal Reserve Bank of Richmond, the Money and Financial Research Group meeting at INSEAD and the National University Singapore, the Midwest Macro meeting at the Federal Reserve Bank of Kansas City, the NBER Corporate Finance meeting, the NBER Macroeconomics and Productivity meeting, the Mitch Daniels School of Business at Purdue University, USC Marshall, and the Western Finance Association Conference for helpful comments. We are grateful to the University of Chicago Booth School of Business and the Fama Miller Center for financial support. Contact information: He: bianca.he@chicagobooth.edu; Mostrom: lmostrom@chicagobooth.edu; Sufi: amir.sufi@chicagobooth.edu.

Firms invest to create value, but what precise investments do they undertake? Recent research focuses on the growing importance of investment in *intangible capital*—non-physical capital that is more difficult to quantify and therefore omitted from firm balance sheets. By its nature, investment in intangible capital is challenging to measure; existing research measures investment in *knowledge capital* using research and development (R&D) expenditures, and it measures investment in *organizational capital* using a fraction of selling, general, and administrative (SG&A) expense.¹

This study provides evidence that investment in *customer capital* is a quantitatively large component of total investment. Specifically, it presents a novel data set containing comprehensive measures of investment in customer capital, provides evidence that firm spending on acquiring and maintaining a customer base should be treated as an investment (not as a variable input cost or as overhead), and seeks to characterize the underlying factors driving this investment.

Conceptually, investment in customer capital centers on the idea that firms spend resources to build and maintain a customer base; this customer base is valuable because firms are able to capture part of the surplus associated with the relationships formed with existing customers.² Such investment encompasses, for example, spending on a sales force, on customer service, on boosting brand value, on advertising, and on acquiring and using data on customers.

Investment in customer capital is measured in this study using three data sources. The first source is the income statement of firms; around half of U.S. publicly traded non-financial firms directly report their spending on sales and marketing in their income statements as a sub-component of SG&A. Compustat does not systematically collect or report these data; however, another data set produced by S&P, Capital IQ, does. To the best of our knowledge, this is the first study to use the Capital IQ sales and marketing expense sub-component of SG&A, a data item which is available for half of publicly-traded firms from 1997 onward. The second source of data comes from Revelio Labs, which uses LinkedIn, job postings, and other sources to estimate the jobs and salaries at firms. The Revelio Labs data set contains firm-year level information on the salaries paid

¹The seminal study using this approach in the finance literature is [Eisfeldt and Papanikolaou \(2013\)](#); See also [Peters and Taylor \(2017\)](#) and [Crouzet and Eberly \(2023\)](#). There is also a literature, cited below, that estimates the value of customer capital from brands and trademarks, but there is less research on the investments firms make to create such value.

²There are a variety of theoretical mechanisms through which existing customer relationships generate value for a firm. For example, branding efforts may produce loyal customers, lowering volatility and risk, as in [Bronnenberg, Dubé and Gentzkow \(2012\)](#) and [Larkin \(2013\)](#). Or there may be significant search frictions in switching products once a customer is with a certain firm, as in the model of [Gourio and Rudanko \(2014\)](#). These mechanisms are discussed in more detail in Section 1.

to workers engaged in activities that fall within the sales and marketing function.

The third data source consists of the text reported by firms in annual 10-K Securities and Exchange Commission (SEC) filings. Firms often detail their investment in customer capital, including the underlying goals of their spending. This text can be efficiently processed with the advent of large language models (LLMs); we use Google’s Gemini LLM to produce quantitative data from the textual descriptions of sales and marketing efforts reported by firms in the Item 1 and Item 7 sections of their 10-Ks. Taken together, these three data sources allow us to build a comprehensive data set measuring investment in customer capital for U.S. publicly-traded firms from 1997 to 2022.

The initial part of the study shows a series of basic facts uncovered from this new data set. Investment in customer capital is large. The revenue-weighted average annual sales and marketing expense to revenue ratio across non-financial U.S. publicly traded firms is 4.2%, which is higher than R&D expenses and two-thirds of capital expenditures. Sales and marketing and R&D expenses exhibit notably smaller within-firm changes compared to capital expenditures, suggesting these investments are less lumpy than tangible investment.

Previous research focuses on advertising expenditures—a sub-component of overall spending on sales and marketing—to measure firm investment in customer capital (e.g., [Bagwell \(2007\)](#)). Advertising expenses are a small fraction of sales and marketing expenses, especially for firms with high sales and marketing to revenue ratios. For example, for firm-year observations with above median sales and marketing to revenue ratios, advertising expense is less than a quarter of the overall sales and marketing expense. Furthermore, textual analysis of business descriptions shows that a narrow focus on advertising misses the majority of what firms discuss when outlining their sales and marketing strategy. Only 25% of firm-year observations prominently discuss a focus on advertising in their business descriptions; it is more common that firms discuss their efforts in building a sales force (65%), maintaining good customer service (53%), and increasing brand value (37%). Firms are only slightly less likely to emphasize building and utilizing data sets on customers (22%).

There is a striking amount of variation across industries in the amount of investment in customer capital. Firms in agriculture, mining, and petroleum and coal product manufacturing spend almost nothing on sales and marketing, whereas the median firm in the information industry—companies specializing in software, digital platforms, and web search portals—spends more than 20% of revenue. Firms in professional service industries invest heavily in customer capital, as do firms in high tech manufacturing, such as those producing medical equipment and computer and peripheral

equipment. Industries with the highest amount of investment in customer capital experience the largest increase in the share of enterprise value over the sample period.

Variation across industries in the level of investment in customer capital is robust across time and across different measures. The variation in the sales and marketing to revenue ratio from income statements is highly correlated with the variation in the ratio of salaries of sales and marketing employees to revenue from Revelio Labs. The variation across industries is persistent over the 26 years of data we have in the analysis. The evidence suggests that the industry-level variation in investment in customer capital reflects “primitive” differences across industries in how firms generate revenues and profits. As such, the rest of the study focuses on both the implications and the determinants of this industry-level variation.³

Sales and marketing expense translates into valuable assets, a result shown using this across-industry variation. An empirical test motivated by the [Gourio and Rudanko \(2014\)](#) model shows that industries in which firms have a higher ratio of sales and marketing expenses to revenue have a higher ratio of enterprise value to physical capital (V/K^{PH}), the latter of which is referred to as Q in the literature and to which we refer as Q^{PH} . Industries with more R&D expenses also have higher Q^{PH} . These two variables alone explain nearly 70% of the variation across industries in Q^{PH} . Inclusion in the regression of residual SG&A expenses after subtracting sales and marketing expense adds limited power when explaining across-industry variation in Q^{PH} . That is, differences across industries in SG&A expenses that are not due to sales and marketing expenses have much less power in predicting Q^{PH} . This illustrates the importance of separating out sales and marketing expense from the broader SG&A line item of income statements.

Theory predicts a strong relationship between the ratio of intangible book value of assets to tangible book value of assets and Q^{PH} , a point made clear by [Crouzet and Eberly \(2023\)](#). This prediction is confirmed in the data with remarkable statistical power. The stock of intangible capital is estimated using the perpetual inventory method, as in [Eisfeldt and Papanikolaou \(2013\)](#) and [Peters and Taylor \(2017\)](#), with sales and marketing expenses and R&D expenses capitalized and externally acquired intangible capital also included. Using this new measure of the book value of intangible capital, an industry-level cross-sectional regression of Q^{PH} on the ratio of intangible book value to tangible book value yields a large positive coefficient, and the R^2 of the univariate regression is

³The focus on industry-level variation follows much of the empirical literature on intangible capital, including [Eisfeldt and Papanikolaou \(2014\)](#), [Gourio and Rudanko \(2014\)](#), [Peters and Taylor \(2017\)](#), and [Crouzet and Eberly \(2023\)](#).

0.80. As a placebo test, residual SG&A after removing sales and marketing expense is capitalized; such capital has no additional predictive power for explaining industry-level variation in Q^{PH} .

An analysis of the sources of value in acquisitions from purchase price allocations (PPA) confirms these results. These data are useful in assessing the value implications of investment in customer capital, given that they represent value paid in actual transactions for intangible assets such as customer lists and customer relationships. At both the industry level and at the individual target level, a higher ratio of sales and marketing expense to revenue is associated with a higher value of customer-related intangible capital such as brands, trademarks, customer lists, and customer relationships. The ratio of R&D expenses to revenue is associated with a higher value of non-customer-related intangible capital, such as research and technology. Residual SG&A expenses after removing sales and marketing expenses are uncorrelated with the value paid for intangible capital. Following covenant violations, all three types of investment fall, consistent with financial constraints restricting investment.

The existing literature hypothesizes that sales and marketing efforts translate into valuable assets due to a variety of product market features, such as if consumers are susceptible to persuasion, if consumers lack information about the available products, and if the product exhibits network effects in demand. To elucidate these channels, the final section explores the factors that drive the variation across industries in the amount of customer capital investment. Three variables explain a large amount of industry-level variation. The most powerful of these variables is the fraction of firms in the industry that employ a platform business model, in which the platform is designed to bring buyers and sellers together. Prominent examples of such firms include DoorDash, Inc; Ebay Inc; and Zoom Video Communications, Inc; all of which have sales and marketing expense to revenue ratios above 20%. A second powerful variable is whether firms in the industry emphasize the importance of communicating information to customers in the description of their product and strategy. Finally, industries producing technologically sophisticated products invest heavily in customer capital. These three factors explain 70% of the variation across industries in investment in customer capital. We further document that industries investing heavily in sales and marketing, particularly platform-based industries, also employ a complementary strategy to extend the duration of customer relationships: subscriptions.

Related literature

A large body of research establishes the importance of intangible capital in production (e.g., Lev (2005); Corrado, Hulten and Sichel (2009); Eisfeldt and Papanikolaou (2013); Belo, Lin and Vitorino (2014), Eisfeldt and Papanikolaou (2014); Gourio and Rudanko (2014); Peters and Taylor (2017); Alexander and Eberly (2018); Crouzet and Eberly (2019); Crouzet and Eberly (2021); Corrado, Haskel, Jona-Lasinio and Iommi (2022); Crouzet, Eberly, Eisfeldt and Papanikolaou (2022); Woepffel (2022); Crouzet and Eberly (2023)). Studies have emphasized the importance of intangible capital in the determination of markups and profits (e.g., Covarrubias, Gutiérrez and Philippon (2020); Crouzet and Eberly (2023)), firm investment (Gutiérrez and Philippon (2017); Alexander and Eberly (2018); Crouzet and Eberly (2019)), firm valuation and financial policies (e.g., Eisfeldt and Papanikolaou (2013); Dell’Ariccia, Kadyrzhanova, Minoiu and Ratnovski (2021); Dou, Ji, Reibstein and Wu (2021); Belo, Gala, Salomao and Vitorino (2022); Falato, Kadyrzhanova, Sim and Steri (2022); Woepffel (2022)), employee compensation (e.g., Sun and Xiaolan (2019)), productivity growth (e.g., McGrattan (2020); Crouzet and Eberly (2021)), and the transmission of monetary policy (e.g., Morlacco and Zeke (2021); David and Gourio (2023)).

However, measuring intangible capital is a challenge; the majority of the existing literature measures firm-level intangible investment as R&D expenses plus a fraction of overall SG&A expenses, often 30% of SG&A. A contribution of this study is to measure explicitly sales and marketing expense—a sub-component of SG&A—and to show that this sub-component is a statistically powerful determinant of the ultimate value associated with intangible capital. Residual SG&A after removing sales and marketing expense has limited statistical power in predicting intangible capital value across industries once sales and marketing expense is taken into account. Recent studies measure the value of intangible capital using estimates by accountants of the price paid for different types of intangible capital in acquisitions (e.g., He (2022); Ewens et al. (2024); Kepler et al. (2024)). This study uses these data to show a high correlation between sales and marketing expenses and customer-related intangible asset value, and a high correlation between R&D expenses and non-customer-related intangible asset value.

With regard to measurement, the most closely related studies are those that measure customer capital using alternative data sets. Larkin (2013) uses estimates of brand value from Brand Asset Consulting; Belo et al. (2014) use advertising expenditures; Feng, Morgan and Rego (2015) and Nath and Bharadwaj (2020) use measures of the presence and power of marketing executives at

firms; Bronnenberg, Dubé and Syverson (2022) use information on workers in sales and marketing occupations from the Occupational Employment and Wage Statistics and brand value estimates from BrandFinance; and Baker, Baugh and Sammon (2023) use a measure of customer churn based on credit card transaction data. There is also a literature that measures sales and marketing efforts in financial products such as mutual funds (e.g., Hastings, Hortaçsu and Syverson (2017), Roussanov, Ruan and Wei (2021)).

With regard to the specific data set constructed in this study, the two closest articles are Ptok, Jindal and Reinartz (2018) and Markovitch, Huang and Ye (2020). The former study uses data from two sources: Advertising Age and Selling Power. Advertising Age contains information on marketing expenses and Selling Power contains information on the size of the sales force. The sample size in the Ptok et al. (2018) study is approximately 500 firm-year observations. The latter study manually collects sales and marketing expense from 10-K filings to construct a sample of 704 firms for the years 2004-2012. The underlying data collected from Capital IQ and Revelio Labs in this study is similar in spirit to the data collected in these two studies, but the sample sizes in this study are larger and cover a longer time series.

A related literature focuses on the determinants of a firm's market share in its various product markets (e.g., Foster, Haltiwanger and Syverson (2008); Khandelwal (2010); Foster, Haltiwanger and Syverson (2016); Hottman, Redding and Weinstein (2016); Eslava, Haltiwanger and Urdaneta (2024); Fitzgerald, Haller and Yedid-Levi (2024)). Across a number of different settings, this literature finds that "product appeal" or "idiosyncratic demand," as opposed to differences in technical efficiency, is the most powerful determinant of product market shares across firms. This "product appeal" is modeled in this literature as a primitive in the consumer utility function: consumers tend to like some products in a given product market more than others. This is also related to the idea that acquiring new customers is important to the determination of a firm's market share, a point made in Argente, Fitzgerald, Moreira and Priolo (2021), Beaumont and Lenoir (2019), and Einav, Klenow, Levin and Murciano-Goroff (2021). Similarly, Bhandari and McGrattan (2021) estimate the 'sweat equity' accumulated in private businesses, which includes investments in building a customer base, and note that it is of similar magnitude to the fixed assets used by these firms. This study shows that firms spend substantial resources attracting new customers and maintaining a customer base, and therefore developing product appeal and attracting new customers is endogenous to firm actions.⁴

⁴This literature hints at this endogeneity: Foster et al. (2008) discusses the importance of customer-supplier relationships; Khandelwal (2010) notes that product "quality" can result from advertising; Foster et al. (2016) builds a

Another main contribution of this study relative to this literature is to show that firms in industries that sell primarily to other businesses (“B2B” industries) spend as much on sales and marketing as household-facing industries (“B2C”). This suggests a need for more empirical research on sales and marketing efforts in B2B industries.

Finally, the industrial organization literature explores concepts related to customer capital such as switching costs (e.g., [Cabral \(2016\)](#)), network effects in demand (e.g., [Katz and Shapiro \(1985\)](#), [Jullien and Pavan \(2019\)](#); [Jullien, Pavan and Rysman \(2021\)](#)), and platform economics (e.g., [Rochet and Tirole \(2003\)](#)). However, there is less research on how sales and marketing strategies may interact with these concepts. One notable exception is [Warusawitharana and Zucchi \(2022\)](#), who model digital services firms as initially investing to build a customer base, and subsequently to monetize it. Another is [Jullien and Pavan \(2019\)](#), who explore theoretically optimal marketing strategies in two-sided platform markets. This study shows empirically that industries characterized by platform-based business models have the highest investment rates in customer capital, a finding we believe is new to the literature.

The rest of this study proceeds as follows. The next section discusses the theory of customer capital. Section 2 describes the data, and Section 3 presents important facts gleaned from the constructed data set. Section 4 presents evidence that sales and marketing expense should be treated as an investment. Section 5 shows evidence on the variables that explain the cross-sectional variation across industries in customer capital investment, and Section 6 concludes.

1 Customer capital: A theory

What exactly is meant by the term “customer capital?” In order to fix ideas and guide the empirical analysis, this section discusses the model of [Gourio and Rudanko \(2014\)](#), which specifies a precise notion of investment in customer capital. In the model, in addition to a standard physical investment decision, firms also decide how much to spend on a sales force. The product market is characterized by search frictions that require a buyer to meet with a sales representative in order to become a new customer of the firm. Firms spend up front on a sales force and offer discounts to win new customers. Once there is a match between a firm and a new customer, the customer continues to buy the firm’s

model in which customers learn over time about a firm’s products, and they state that such learning “could include customer learning through ‘word of mouth’, the firm’s own advertising efforts, the blossoming of producer-customer relationships through repeated interactions or several other possibilities.” [Eslava et al. \(2024\)](#) shows that idiosyncratic demand for a firm’s products is correlated with advertising expenditures.

product as long as the present value of per-period prices does not exceed the present value of the utility flow the consumer expects to get from the goods purchased. This latter feature follows from the nature of search frictions in the product market.

In the model, s reflects the efficiency units of the sales force, $\kappa(s)$ is the (increasing and convex) cost function of the sales force, ε is the price discount provided to a new customer, $\eta(\theta)$ is the matching function for a given s which specifies the probability of a match given a queue of $\theta \equiv \frac{b}{s}$ where b is the number of buyers, and $v_n(k, n, z|u)$ is the marginal value to the firm of an additional customer given physical capital k , the total number of customers n , and physical capital productivity shock z . The firm charges price p to its existing customers, the cost of producing output is l_y , the depreciation of the customer base (which is assumed to be exogenous) is δ_n , and the discount factor is β .

As noted in [Gourio and Rudanko \(2014\)](#), the marginal value of acquiring a new customer is forward looking:

$$v_n(k, n, z|u) = p - l_y + \beta(1 - \delta_n)E_z v_n(k', n', z'|u) \quad (1)$$

In this case, given the search frictions in the product market, the firm is able to charge a price p that is equivalent to the flow utility that a customer has from consuming the product, which is u . In other words, the firm captures all of the surplus associated with the relationship after the customer has been acquired. The markup is $p - l_y$. Acquiring new customers allows firms to earn markups going forward on the customer base, at least until the customer relationship ends.

A key optimality condition of the model implies that firms choose the size of the sales force to equate the marginal cost of hiring more sales workers and the marginal benefit of the customers acquired by the increase in the sales force. The condition is presented in equation 2.8 of the study. Re-arranged slightly, the condition is:

$$\kappa'(s) = \eta(\theta)(v_n(k, n, z|u) - \varepsilon) \quad (2)$$

The size of the sales force, and the amount the firm spends on a sales force, is closely linked to the marginal value of an additional customer to the firm, which is forward looking given the markups that will be earned once the customer is acquired. Equations 1 and 2 together illustrate the notion of *investing in customer capital*; spending on a sales force allows the firm to acquire new customers and earn potentially large markups from the ongoing relationship. Hence, spending on a sales force is a dynamic, forward-looking decision. In the words of the authors: “Product market frictions turn

the customer base into a form of intangible capital, which manifests itself in increased firm value, profits, and markups.”

The [Gourio and Rudanko \(2014\)](#) study also includes assumptions on industry output demand, which then allows for a characterization of a stationary competitive search equilibrium. The key comparative static evaluated in the study is variation across industries in the degree of search frictions, which is modeled as variation across industries in a multiplicative factor on the matching function. [Gourio and Rudanko \(2014\)](#) show that the ratio of expenditures on a sales force relative to total revenue is monotonically increasing in the degree of search frictions. They use this relationship to then explore differences across industries in profits and valuation based on the ratio of SG&A to revenue.

To the best of our knowledge, the [Gourio and Rudanko \(2014\)](#) model is the most direct demonstration of the concept of customer capital investment in the literature. Firms earn markups in their framework because of search frictions in the product market, consistent with the long tradition of informative advertising models dating back to [Ozga \(1960\)](#) and [Stigler \(1961\)](#). However, it is possible for firms to earn markups on existing customers due to a variety of market frictions. For example, branding may produce loyal customers (e.g., [Bronnenberg et al. \(2012\)](#), [Larkin \(2013\)](#)), or customers may have limited attention or inertia, leading them to continue to pay even when their flow utility falls below the value of the product (e.g., [Della Vigna and Malmendier \(2006\)](#), [Einav, Klopach and Mahoney \(2025\)](#), [Miller, Sahni and Strulov-Shlain \(2025\)](#)). There may be poor product substitutes ([Dixit and Stiglitz \(1977\)](#)), or costs associated with switching to an alternative seller (e.g., [Cabral \(2016\)](#), [Menzio \(2024\)](#)). There also may be network effects in demand, allowing the firm that “wins” the market to earn substantial profits (e.g., [Katz and Shapiro \(1985\)](#), [Rochet and Tirole \(2003\)](#)). In Section 5, we present candidate measures of a few industry primitives to compare the explanatory power of three broad classes of explanations for why customer capital acts as a valuable asset.

One of the main goals of this study’s empirical analysis is to provide descriptive evidence on the industries that most heavily invest in customer capital (see Section 5). Such evidence, we believe, informs the theoretical literature on the reasons that building a customer base is valuable to the firm.

2 Data

2.1 Measuring customer capital investment

The main source used to measure investment in customer capital is sales and marketing expense from income statements. This study is the first to our knowledge to use this line item for a comprehensive sample. To address the challenge that only nonzero numbers are reported, we then use information from the narrative text of the 10-K to impute zeros for some of the observations where sales and marketing expense is missing. Finally, we incorporate a robustness measure of customer capital investment that does not depend on disclosures: total salaries paid to sales and marketing workers.

Sales and Marketing Expense. Sales and marketing expense is a frequently reported line item on firms' income statements as a subcategory of SG&A. As discussed in [Markovitch et al. \(2020\)](#), U.S. Generally Accepted Accounting Principles (GAAP) do not require firms to decompose their SG&A expenses into separate subcategories, so firms have discretion over this disclosure choice. Appendix A describes in more detail the GAAP and SEC guidance relevant to sales and marketing expense, discusses firms' incentives regarding disclosure, and presents empirical evidence on firms' propensity to disclose. We find no evidence that firm characteristics, such as total sales and marketing salaries, size, age, profitability, or market valuation, are strong predictors of a firm's likelihood to disclose (see Appendix Table A1). Therefore, selection bias arising from this disclosure choice appears to be minimal.

The data from Capital IQ come from the interactive website which offers an Excel plug-in to easily download data. For most variables, comparing the Capital IQ data to the underlying 10-K SEC filing reveals excellent coverage if the information appears in the filing. However, for the years 1997 to 2006, Capital IQ's coverage of sales and marketing expenses is inconsistent relative to how frequently these expenses are disclosed. In order to improve coverage for the early years of the sample, we supplement the Capital IQ data by fine-tuning Gemini 2.0 Flash-Lite to search the document and collect this expense, if it appears in the filing.⁵ In cases where Capital IQ is missing sales and marketing expense and Gemini could not extract a number from the text of the filing, we check to see if Capital IQ contains information on advertising expense, marketing expense, or both. Since these are subcomponents of sales and marketing expense, we add them together and include

⁵Appendix Section B.1 discusses this procedure in more detail.

the sum as sales and marketing expense.

Selective Imputation of Zeros. If the Capital IQ sales and marketing expense variable is available, it is always non-zero. Given that firms have discretion over whether to disclose this line item, it would not be reasonable to assume that sales and marketing expense is zero for all observations where it is missing.⁶ Furthermore, the representativeness of the sample is improved by imputing some observations as zeros, based on additional information.

Firms often include extensive discussion of their sales and marketing efforts in their 10-K SEC filings; this is true even for firms that do not separately report line items for sales and marketing in their income statement. An additional measurement contribution of this study is to use these textual descriptions to impute zeros for a subset of firms missing this expense, in order to more accurately capture the variation across industries.

The process of collecting information about firms' sales and marketing efforts from the narrative text of their annual filings is as follows.⁷ We start with a manual reading of the entire filing for a random sample of 150 firm-year observations. The manual reading is done with a particular focus on passages related to sales and marketing. To the degree that firms provide a detailed discussion of their sales and marketing strategy, it is almost always contained in the Item 1 Business Description section of the filing. It is often detailed in a sub-section called "Sales and Marketing," or "Marketing Strategy" under Item 1. Firms sometimes provide more limited information on their sales and marketing in the Item 7 Management Discussion and Analysis section of the 10-K, but this is less common. Appendix Section B.2 includes examples of firms describing sales and marketing efforts in their 10-K.

To systematically quantify the information discussed by the firm in the text, Google's Gemini LLM is used to process the Item 1 and Item 7 sections of the 10-K filings for all firm-year observations in the sample.⁸ The specific prompts given to Gemini are described in Appendix Table A2. The main prompt used to augment the sales and marketing expense data is the following:

We are economists conducting research on the spending done by firms on sales and

⁶Many researchers impute zeros for missing values of Compustat variables such as advertising expense, but we are unaware of research carefully justifying this decision, especially for variables for which GAAP do not require disclosure. This study imputes zero for missing values only if the text suggests minimal spending.

⁷Appendix Section B contains a detailed discussion of how text from 10-K filings is used to construct a variety of variables.

⁸We were able to feed Gemini the text from 10-K filings for 91,325 firm-year observations, which represent 85% of the sample. The reason for missing matches is most often because the text layout of the 10-K is not easily parsed given variation in section headings.

marketing. Your task is to read the following document and determine the extent to which the firm spends resources on marketing, advertising, product promotion, branding, customer service, sales force, and other closely related activities. Based on your reading of the document, please use your best judgment to classify the extent of their spending on such activities into one of three categories: minimal, moderate, or substantial. Please limit your answer to one word from the following three: minimal, moderate, or substantial. Here is the document:

The answers provided by Gemini allow us to augment the sales and marketing variable by imputing zeros for a subset of the sample for which the raw data are missing. In particular, if Gemini indicates from its reading of both Item 1 and Item 7 that spending on sales and marketing expense for a given firm-year observation is “minimal”, then we impute a zero for that observation. The logic of the exercise is the following: if a firm does not itemize sales and marketing expense on the income statement *and* a reading of the Item 1 and Item 7 section of the 10-K filing reveals no text that indicates moderate or substantial spending on sales and marketing, then we can safely assume that actual spending is near zero.

Appendix Section B.3 reports details on the relationship between Gemini’s answers and the quantitative data from Capital IQ. It also presents evidence that missing information on sales and marketing is often inconsistent with true sales and marketing being zero. Therefore, it is inaccurate to impute zeros for all observations for which sales and marketing expense is missing.

Sales and Marketing Salaries. Since firms have discretion over the choice to report sales and marketing expense as an income statement line item, we supplement this measure with the total salaries paid to the sales and marketing workforce at the company, using data from Revelio Labs. As described on their website, Revelio Labs collects data from “professional profiles, job postings, employee sentiment reviews, and layoff notices.” They also use proprietary algorithms to generate sampling weights that adjust for likelihood of representation in these sources by job title and geography.

This study uses the Revelio Labs Workforce Dynamics data set, which contains estimates of both the number and salaries of workers at the firm-month level, at different levels of seniority, for different geographies, and for different job categories. The job category estimates are used to construct the salaries of workers who work in a sales or marketing capacity at the firm-year level. Specifically, workers are grouped into the sales and marketing function if they work in the job category of “Marketing,” or if they work in the job category of “Sales” and have a role as

“Customer Service,” “Product Manager,” “Sales Associate,” or “Sales Representative.”⁹

2.2 Depreciation of customer capital

To estimate the depreciation of customer capital, we use purchase price allocation (PPA) data from M&A transactions. During business combinations, third-party valuation professionals assign values and useful lives to identifiable intangible assets of the target firm based on detailed internal information, including customer contracts, purchasing behavior, and retention patterns. These estimates are subject to audit. The PPA data come from Business Valuation Resources’ (BVR) DealStats database and have been used in prior work to measure intangible assets (He, 2022; Ewens et al., 2024; Kepler et al., 2024).¹⁰ Following He (2022), we group intangible assets into customer-related and non-customer-related categories.¹¹ We then use the useful life estimates assigned to customer-related intangibles to construct industry-level depreciation rates of customer capital.¹²

Assets can be assigned a definite useful life, where a specific number of years is provided, or an indefinite useful life, indicating that there is no foreseeable limit to the period over which the asset is expected to generate cash flows. Trademarks and brands are the customer-related assets most often designated as having an indefinite useful life; however, even within these categories, only about 20% of these are actually classified as indefinite. The remaining intangible assets, especially those categorized as customer relationships and customer contracts, all have definite useful life estimates. For assets recorded with an indefinite useful life, we adopt a baseline assumption of a 10-year useful life.

We take the average useful life of customer-related intangible assets at the two-digit NAICS level and assume straight-line depreciation over this period in order to depreciate customer capital investment. The average customer capital depreciation rate using the PPA data across industries is 13%, with a standard deviation of 3%.¹³ Appendix Figure A1 plots the depreciation rate by 2-

⁹These job titles apply to version 2 of Revelio’s job role hierarchy, at the 50-job level of granularity.

¹⁰More details on these data are in Appendix Section C.

¹¹Customer-related intangibles include brands, trademarks, customer relationships, customer lists, customer contracts, and broader business relationships. The primary category among non-customer-related intangibles is technology capital.

¹²Li, Kepler, Speros and Stewart (2026) also use useful life estimates from intangible asset valuations to construct customer capital depreciation rates.

¹³More details on the calculation of the customer capital depreciation rate are in Appendix Section C. As discussed there, customer capital depreciation can also be estimated using annual customer churn estimates from various industry reports and from Baker et al. (2023). Gourio and Rudanko (2014) use a flat depreciation rate of 15% across all industries.

digit NAICS code. These industry-level depreciation rates are used in the construction of customer capital stock via capitalization of sales and marketing expenditures in Section 2.3.¹⁴

2.3 Customer capital stock

While investment in customer capital is the main variable examined in this study, estimating the stock of customer capital is necessary for one key test in Section 4.1. To do so, a modified version of the capitalization methodology of Eisfeldt and Papanikolaou (2013), as implemented in subsequent work by Peters and Taylor (2017), is followed. A crucial difference is that Peters and Taylor (2017) uses R&D expense and 30% of overall SG&A to measure internally generated intangible capital, whereas this study uses R&D expense and sales and marketing expense directly. As shown below, a central finding of this study is that residual SG&A, once sales and marketing expense is removed, does not appear to be related to accumulated value associated with intangible investment.

A main disadvantage of using sales and marketing expense relative to 30% of SG&A is that sales and marketing expense is less likely to be available, especially historically. In order to capitalize sales and marketing expense into a measure of customer capital, we use all available data on sales and marketing expense for firms, including the data reported by firms from before they became publicly traded.¹⁵

Customer capital is constructed by capitalizing sales and marketing expenditures over time using industry-specific depreciation rates estimated from PPA data, as described in Section 2.2. The sample for the capitalization is limited to firms that have at least 5 years of sales and marketing expense available. This restriction is made to ensure that any projection of sales and marketing expense backward in time (which is necessary for the capitalization) is based on enough data to ensure a reasonable level of confidence in the projection. Once this restriction is in place, the methodology follows Peters and Taylor (2017) closely. Using this methodology, it is possible to estimate at the firm-year level the book values of knowledge capital (based on R&D expense),¹⁶ the amount of customer capital (based on sales and marketing expense), and the amount of externally

The key test of Table 6 using the capitalized value of customer capital is robust to the use of alternative customer capital depreciation rates, as shown in Appendix Table A3.

¹⁴Results robust to flat rates of 15% and 30%.

¹⁵The initial 10-K SEC filing or the S-1 initial public offering filing for firms that recently became public often includes estimates of key income statement variables from before the firm went public.

¹⁶The assumed depreciation rate for R&D follows the estimates provided in Ewens et al. (2024) which vary at the industry level but are generally in the 20 to 35% range.

purchased intangible capital (based on the balance sheet item “intangible assets”).

In addition to the capitalization-based measure, for the set of firms that were public at the time they were acquired, the market value of customer capital stock is directly observable in the PPA data. The customer capital stock from this source enables some of the tests presented in Section 4.2.

2.4 Sales and marketing activities

Given the lack of specific guidelines in GAAP, it is up to the discretion of the firm what exactly is included in the sales and marketing expense line. As a result, firms are expected to describe these choices verbally in the text of the filing, per SEC Regulation S-K.

The detailed descriptions of sales and marketing efforts in 10-K filings allow for the text to be used to describe the various sales and marketing strategies implemented by firms. Based on lessons learned from the manual reading of 10-K filings described above in Section 2.1, five strategies are measured from the text: (1) building brand value, (2) advertising, (3) employing a sales force, (4) providing customer service, and (5) using customer data to acquire and maintain a customer base. For each firm-year observation, Gemini is used to obtain a $\{0,1\}$ variable for each strategy if the firm describes using it. For the additional tests in Section 5.4, addressing whether firms employ complementary strategies for locking in customers, we also ask Gemini whether the firm describes using subscriptions or other types of recurring revenues as part of its business model. The exact prompts given to Gemini to obtain these variables are listed in Appendix Table A2.

2.5 Sample construction and firm covariates

The baseline sample for the analysis includes U.S. based firms in the Compustat data set from 1997 to 2022. The start point of the sample in 1997 is dictated by the availability of digitized SEC 10-K filings in Edgar. The Compustat sample includes all firm-year observations with a few standard exceptions. We exclude financial firms (3-digit NAICS codes from 520 to 533) and firm-year observations with missing information on total assets, revenue, end of year stock price, or operating income before depreciation. We also exclude firm-year observations with a negative value of either revenue or total book assets. Finally, given the importance of matching with SEC filings, we drop any firm observation with no central index key (CIK), which is the main identifier used by the SEC. The beginning sample covers 107,594 observations, as shown in Line 1 of Table 1.

This sample represents almost all non-financial publicly-traded firms headquartered in the United States.

The match between Capital IQ and Compustat identifiers is excellent, which is unsurprising given that both are produced by S&P. Line 2 of Table 1 shows a successful match for almost all firm-year observations. Revenue from Capital IQ and Compustat are almost identical, with a regression of one on the other giving a coefficient of 0.999 and an R^2 of 0.999. In addition to revenue, the data items retrieved from Capital IQ include costs of goods sold (COGS), SG&A, R&D, depreciation and amortization, general and administrative expense, net rental expense, and the constituent items comprising total sales and marketing expenditures: sales and marketing expense, advertising expense, and marketing expense, where available.¹⁷

As shown in Line 3 of Table 1, the specific Capital IQ sales and marketing expense variable is non-missing for approximately 37% of the firm-year observations. The average size of firms that report sales and marketing expenses is similar to the total sample, and the median size of firms that report is slightly smaller. For approximately 11% of the total sample, sales and marketing expense is missing from Capital IQ, but was successfully extracted from the text of the filing by Gemini after fine-tuning (Line 4, compared to Line 3). For an additional 6% of the total sample, sales and marketing expense is missing both from the Capital IQ and Gemini-extracted series, but Capital IQ contains information on advertising expense, marketing expense, or both, which we add together to fill in sales and marketing expense.¹⁸ This yields a nonzero sales and marketing expense variable for 55% of firm-year observations based on the contents of 10-K filings, as shown in Line 5. It is useful to compare this coverage to two variables from Compustat that are widely used in research: the variable for advertising expenditures is available for 37% of the sample, and R&D expense is available for 60%.

As described in Section 2.1, the narrative text of the 10-K enables the reclassification of sales and marketing expenses from missing to zero for approximately 9 thousand additional firm-year observations. This increases the sample of firm-year observations for which sales and marketing information is available to 68,077, which is 63% of the total sample, as shown in Line 6 of Table 1.

Similarly to sales and marketing, Items 1 and 7 of the 10-K frequently include a subsection

¹⁷While the revenue reported in Capital IQ and Compustat is almost identical, reported SG&A is not. Appendix Section D discusses the discrepancy in more detail, and it explains why the Capital IQ measure of SG&A is preferred.

¹⁸These cases are predominantly ones in which the advertising or marketing expense number was not listed in the filing itself, but was listed in a later filing that included these expenses for prior years, and this information was used by Capital IQ to back-fill the data.

detailing the firm’s R&D activities. We can therefore apply the same method to impute zeros for a subset of observations missing R&D. This leads to an increase in the sample size from 64,913 to 81,508, ultimately covering 76% of the sample. These counts are shown in Lines 7 and 8 of Table 1. If the line item is missing and Gemini indicates that spending on the item in question is moderate or substantial based on the text in either Item 1 or Item 7, then the variable remains missing in the final sample.

Line 9 of Table 1 shows that capital expenditure information is available for almost the entire sample. Line 10 of Table 1 shows the number of firm-year observations for which an estimate of the book value of intangible capital is available: about 68 thousand firm-year observations. As outlined in Section 2.1, the Revelio Workforce Dynamics dataset is used to compute total sales and marketing salaries. Using the match between the Revelio Labs firm identifier and the CIK identifier that is provided by Revelio Labs, we were able to match almost 29 thousand firm-year observations from the main dataset to the Revelio Labs dataset. As line 11 of Table 1 shows, the matched firms tend to be larger. Despite more limited coverage, this alternative source of data on investment in customer capital is useful, as it helps to test the robustness of the results shown using the income statement measure.

2.6 Empirical proxies of industry primitives

Gemini is also used to construct empirical proxies for the severity of three classes of market frictions: (i) whether the firms’ customers are susceptible to persuasive advertising, (ii) whether customers face search or information frictions, and (iii) whether the industry exhibits network effects in demand. For each firm-year observation, we ask Gemini to read the text of the business description and answer a question about the firm’s business model. To address the first, we ask whether the primary customers of the firm are households, other businesses, or the government. To address the second, we ask whether the firm needs to communicate information to potential customers in order to make a sale, and whether the firm sells high-tech products. To address the third, we ask whether the business model of the firm involves providing a platform for buyers and sellers to interact. As before, the exact prompts given to Gemini are listed in Appendix Table A2. These variables are discussed in more detail in Section 5.

3 Investing in customer capital: the facts

The data set described above allows for the establishment of a number of important facts that we believe can help guide future research on intangible capital. We present 6 such facts in this section.

Fact 1: Investment in customer capital is large: it is on the same order of magnitude as capital expenditures, and it is larger and broader than spending on R&D.

Panel A of Table 2 shows a revenue-weighted average sales and marketing expense to revenue ratio of 4.2%, which is higher than R&D and almost 2/3 of capital expenditures.¹⁹ The median sales and marketing expense to revenue ratio (I^{SM}/Rev) is 3.9%, which is close to but higher than the median amount spent by firms on capital expenditures. Both the R&D and sales and marketing distributions have more mass in the right tail; at the 90th percentile of the distribution, sales and marketing is 42% of revenue and R&D is 69%. In general, compared to sales and marketing expense, R&D expense is heavily concentrated in a relatively small set of firms and industries. Panel B of Table 2 shows these same statistics when isolating the sample to firm-year observations for which all three types of investment are available. Some of the facts are slightly different quantitatively, but qualitatively the patterns are similar. Figure 1 shows the densities of the three measures of investment for the sample of firms for which all three variables are available and the amount of all three variables relative to revenue is below 0.5. The patterns are similar to those found in Panels A and B of Table 2.

As mentioned above, a common measure of investment in organizational capital in the literature is 30% of SG&A. The revenue weighted residual SG&A to revenue ratio is 0.136, which implies a sales and marketing expense to SG&A ratio of $(0.042/(0.042 + 0.136)) = 23.6\%$. Table 2 includes summary statistics for residual SG&A, which is SG&A from Capital IQ less sales and marketing expense. Figure A2 in the appendix presents a bin-scatter of residual SG&A against sales and marketing expense; there is no monotonic relationship across firms. This highlights that sales and marketing expense and residual SG&A capture different variations across firms.

Panel C shows the distribution of salaries paid to workers in the sales and marketing function from the Revelio data, along with the corresponding sales and marketing expense for the same sample. The patterns are broadly similar. Figure A3 in the appendix shows a bin-scatter of sales and

¹⁹All ratios of variables to either revenue or book capital are winsorized at the 1% level to minimize the influence of outliers.

marketing expense against salaries paid to workers in sales and marketing using firm-year observations; there is a strong and precise positive correlation. This is notable given that the two measures come from different data sources.

The choice to scale investment by revenue instead of capital follows from theories of customer capital. For example, [Gourio and Rudanko \(2014\)](#) shows that the sales and marketing expense to revenue ratio is monotonic in search frictions, and they therefore use this measure in the calibration of their model. Alternatively, the static framework of [Bond, Hashemi, Kaplan and Zoch \(2021\)](#) explores optimal spending on a “demand shifting” input, which is measured in this study using sales and marketing expense. As shown in Appendix Section E, the key first order condition of this framework relates the sales and marketing expense to revenue ratio to two underlying primitives of consumer demand: namely, the elasticity of revenue with respect to demand and the elasticity of demand with respect to the demand-shifting input.²⁰

Panel D of Table 2 shows that the stock of customer capital is also large. The revenue-weighted average share of intangible capital in total capital is 42%, and approximately one-third of intangible capital is the capitalized value of sales and marketing expenses in particular. The median values show that the unweighted distribution is tilted even more toward intangible capital and capital based on sales and marketing. The median intangible capital to total capital ratio is 0.657, and the median sales and marketing-based capital to total capital ratio is 0.176, higher than both median R&D-based capital and externally acquired intangible capital.

Fact 2: The distribution of within-firm changes in sales and marketing has lower variance than the distribution of within-firm changes in capital expenditures.

A large literature is dedicated to understanding adjustment costs and lumpiness in investment, where investment is measured as capital expenditures (e.g., [Abel and Eberly \(1993\)](#), [Cooper and Haltiwanger \(2006\)](#)). As Panel E of Table 2 shows, the distribution of within-firm changes in sales and marketing, measured in percent, is more centered around the mean relative to capital expenditures. Capital expenditures have a percent change that is twice as large in absolute value at the 10th and 90th percentiles of the distribution. Interestingly, the distribution of within-firm changes in R&D is also more centered around the mean relative to capital expenditures. This evidence sug-

²⁰Appendix Table A4 shows the distribution of investment scaled by total capital; the patterns are qualitatively similar.

gests that investment in intangible capital is less lumpy compared to capital expenditures.²¹

Fact 3: Advertising expenses are a small part of overall sales and marketing expenses; advertising expenses do not accurately capture either the level or the distribution of investment in customer capital across industries.

Figure 2 plots I^{SM}/Rev across the distribution along with the advertising expense to revenue ratio. The sample is limited to firm-year observations for which both variables are available. For firms below the median, advertising and sales and marketing expense are tightly linked. However, above the median, advertising is a small fraction of overall spending on sales and marketing expense. In particular, above the median, advertising represents less than a quarter of overall sales and marketing expense.

Figure 3 displays the sales and marketing strategies employed by firms, according to the text in their 10-Ks as processed by Gemini. Almost 65% of firms emphasize the importance of a sales force, followed by customer service (53%), brand value (37%), advertising (25%), and the acquisition and use of customer data (22%).

Appendix Figure A4 shows an industry-level scatter plot of the median advertising expense to revenue ratio against I^{SM}/Rev . There are several industries that spend large amounts on sales and marketing but modest amounts on advertising. Such industries include high tech manufacturing, professional services, publishing industries, data processing and hosting, and information services.

Fact 4: There is a striking amount of variation across industries in customer capital investment. The pattern across industries is robust to the use of a variety of measures, and it is persistent over time.

Figure 4 shows a striking amount of variation across industries in the median ratio of sales and marketing expense to revenue (I^{SM}/Rev).²² The top three industries are all in the broader Information sector; specifically, web search portals, libraries, archives, and other information services (519);

²¹The patterns in Panel E are almost identical if we isolate the sample to firm-year observations where all three measures of investment growth are available.

²²Industries are defined as the set of firms in the same 3-digit NAICS code. The codes have changed slightly over the sample period, and so they are harmonized over time. The analysis excludes 3-digit NAICS codes that have fewer than 5 firms over the sample period with sales and marketing data available. Appendix Table A5 shows the mapping from NAICS code to industry name.

publishing industries (513 – which includes many software companies); and computing infrastructure providers, data processing, web hosting, and related services (518). The largest companies as of 2022 in each of these industries are Meta Platforms (519), Microsoft Corp (513), and Alphabet Inc (518).

Other notable industries that spend heavily on sales and marketing include educational services (611, which includes firms such as Duolingo Inc and Coursera Inc), transit and ground transportation (485, which includes both Uber Technologies Inc and Lyft Inc), professional, scientific, and technical services (541, which includes VMware Inc), and personal and laundry services (812, which includes Weight Watchers, now known as WW International Inc). The broad sectors that spend the least on sales and marketing include mining (211, 212, 213) and rail and water transportation (482, 483).

The manufacturing sector shows a large amount of variation. Manufacturing firms that primarily sell products to households have high ratios (for example, beverage and tobacco product manufacturing (312), food manufacturing (311), and leather manufacturing (316)), as do manufacturers of high-tech products (for example, medical equipment and supplies manufacturing (339) and computer and electronic product manufacturing (334)). In contrast, petroleum and coal products manufacturing (324) and primary metal manufacturing (331) have low ratios. These findings caution against treating manufacturing as a monolith when investigating the importance of customer capital.

The cross-sectional variation across industries in investment in customer capital is robust across time and alternative measures. Table 3 presents univariate regressions at the 3-digit NAICS industry level of various measures of customer capital investment on industry-median I^{SM}/Rev . Columns 1 and 2 show a high correlation of median I^{SM}/Rev with the revenue-weighted average ratio or the simple average ratio. Our preference for the industry-level median ratio is due to the fact that it is more broadly representative of the firms in the industry compared to the weighted average, and it is not influenced by extreme outliers (and therefore less sensitive to decisions about how to winsorize) compared to the simple average.

Column 3 shows the correlation of the I^{SM}/Rev with the ratio of salaries paid to workers in the sales and marketing function to revenue $(WL)^{SM}/Rev$. Recall that the numerator of the left hand side variable is calculated using salary data from Revelio Labs.²³ There is a high correlation between

²³For the specification reported in column 3 of Table 3, only industries with at least five firms with Revelio data are included, which explains the smaller sample size.

the two ratios across industries, despite being calculated using different data sets and for different underlying samples of firms. This correlation is primarily driven by the number of sales and marketing workers as a fraction of total workers, rather than by differences across industries in sales and marketing salary per worker, as shown in Appendix Figure A5.

The industry-level variation is also persistent over time. For the regression specification reported in column 4, the industry level medians are calculated for the first five years of the sample (1997 to 2001) and the last five years of the sample (2018 to 2022). The R^2 of the regression is 0.761. Column 5 shows that the industry-level variation in sales and marketing intensity is measured consistently, whether sales and marketing expense is scaled by revenue or the book value of capital, where the latter is estimated using the methodology described in Section 2.3.

Column 4 of Table 3 suggests that the level of spending on sales and marketing across industries is a permanent attribute of the industry. To test this hypothesis more explicitly, a data set is constructed at the 3-digit industry level by 5-year period (e.g., 1997-2001, 2002-2006, etc.) level. For each cell in the data set, the median I^{SM}/Rev is calculated. Table 4 presents the R^2 from regressing median I^{SM}/Rev on 3-digit industry fixed effects, time period fixed effects, and then inclusion of both fixed effects for this industry-by-period panel data set. As is clear from the table, industry-level fixed effects explain the lion's share of the industry-period variation in median I^{SM}/Rev . Inclusion of time period fixed effects increases the R^2 only modestly. The lesson is that within-industry variation over time in I^{SM}/Rev is limited relative to persistent across-industry variation. R&D and capital expenditures exhibit similar persistence in industry-level variation.

The robustness of the industry-level variation across time and measures suggests that the importance of customer capital in firm profit functions is determined by “primitives” reflecting either the nature of demand or supply across industries. The idea that industries differ on such underlying primitives is central in the seminal studies on intangible capital (e.g., Eisfeldt and Papanikolaou (2014), Gourio and Rudanko (2014), Peters and Taylor (2017), and Crouzet and Eberly (2023)). As such, much of the rest of the analysis of this study focuses on this industry-level variation.

Fact 5: There is a negative correlation across industries in physical capital investment and customer capital investment; there is a positive correlation between R&D investment and customer capital investment.

Figure 5 presents bin-scatter plots of the industry-level median capital expenditures to revenue

ratio (I^{CX}/Rev , left panel) and the industry-level median R&D expense to revenue ratio (I^{RD}/Rev , right panel) against the industry-level median I^{SM}/Rev . The plot is based on the 69 industries shown above in Figure 4.²⁴

As the left panel shows, industries with the lowest amount of I^{SM}/Rev have the highest amount of I^{CX}/Rev . These include the oil and gas industry (211), other mining (212), utilities (221), and rail transportation (482). Of the 18 industries with I^{SM}/Rev above the revenue-weighted average of the entire sample, only one has I^{CX}/Rev higher than the revenue-weighted average. That one industry is Telecommunications (517). Air transportation (481), and amusement, gambling, and recreation (713) also invest via both sales and marketing and capital expenditures. However, they are the exception rather than the norm. A lesson from the left panel of Figure 5 is that a focus on capital expenditures as the only type of firm investment ignores many industries with high investment in customer capital but low physical capital investment.

In contrast, the right panel of Figure 5 shows that I^{SM}/Rev and I^{RD}/Rev are more complementary in production for several industries. There is one exception that explains the wide standard error on the third dot in the bin-scatter: chemical manufacturing (325) which includes bio pharmaceutical companies. This one industry has by far the highest I^{RD}/Rev but low I^{SM}/Rev .²⁵

Industries that have both high I^{SM}/Rev and I^{RD}/Rev include computer and electronic product manufacturing (334), electrical equipment, appliance, and component manufacturing (335), medical equipment manufacturing (339), and three industries that belong to the broader information sector (513, 518, 519). However, there are a large number of industries that have high sales and marketing expense and almost no R&D expenses. These include non-store retailers (454), ground transportation (485), educational services (611), and personal and laundry services (812). This matches the pattern in Figure 1 that I^{SM}/Rev is more broadly distributed across the sample than I^{RD}/Rev .

Fact 6: Industries investing heavily in customer capital are a growing share of total enterprise value of U.S. publicly traded firms.

For Figure 6, industries are sorted into four groups based on the industry's median I^{SM}/Rev . The

²⁴The labeled scatter-plots for all bin-scatters shown in the main body of the text are in the Appendix.

²⁵The bio pharmaceutical industry (3254) is an interesting case study: revenue-weighted I^{SM}/Rev is quite high even though median I^{SM}/Rev is low. The largest companies in this industry, such as Pfizer Inc and Merck & Co, spend large amounts on sales and marketing, but smaller start-ups, many of whom have not yet received FDA approval and can therefore not legally engage in a heavy sales and marketing campaign, do not.

size of each group is weighted in order to have the same approximate shares of enterprise value as of 1997. The evolution of the enterprise value shares for each group over time is shown in Figure 6. Industries in the top quartile of the I^{SM}/Rev distribution experience the largest increase in the share of enterprise value over time. More specifically, these industries increase from 25% of total enterprise value to 40%, with the increase being especially strong after 2015. This evidence is complementary to research showing that customer-related intangibles and expenditures on sales and marketing are rising over time (e.g., Bronnenberg et al. (2022) and He (2022)).

4 Sales and marketing expense is an investment

Spending on sales and marketing generates firm value, and it should therefore be considered an investment. To support this view, this section presents an analysis of the market value of publicly-traded firms and an analysis of the value of assets purchased in acquisitions. Further supporting evidence based on the text of 10-K filings and evidence from the field of entrepreneurship are included in Appendix Section F.

4.1 Evidence from publicly-traded firms

As noted in Section 1, a central prediction of the Gourio and Rudanko (2014) framework is that firms in markets with greater search frictions have higher I^{SM}/Rev . Furthermore, firms in markets with greater search frictions also have a higher value of Tobin's Q , where Q (which we refer to as $Q^{PH} = V/K^{PH}$) is measured as the ratio of enterprise value to the stock of physical capital. As a result, there should be a positive correlation across industries between Q^{PH} and I^{SM}/Rev .²⁶

Table 5 tests this prediction. As column 1 shows, the industry-level median I^{SM}/Rev is strongly correlated with Q^{PH} . Column 2 shows that the industry median $(WL)^{SM}/Rev$ using the Revelio Labs data has similar explanatory power. The explanatory power shown in column 1 is augmented in column 3 when industry-level median I^{RD}/Rev is added to the specification; the R^2 using these two variables is close to 70%. Column 4 shows that the inclusion of residual SG&A adds limited

²⁶Gourio and Rudanko (2014) test this prediction by showing that industries with higher SG&A have higher Tobin's Q . See Table 4 in their study. The main contribution of Table 5 relative to their result is to use sales and marketing expense as the measure of customer capital investment instead of broader SG&A, and to show that residual SG&A after removing sales and marketing does not add incremental power in predicting Q^{PH} . The conclusion we draw is that sales and marketing expense is the more precise measure of the Gourio and Rudanko (2014) notion of customer capital investment.

explanatory power beyond these two variables. Column 5 presents a placebo test to ensure that there is nothing mechanical about including some types of expenses in the regression; the ratio of COGS to revenue adds no explanatory power when predicting Q^{PH} . The relationship between Q^{PH} and I^{SM}/Rev is also robust to alternative industry definitions at various levels of granularity. Appendix Table A6 shows the results of regressing Q^{PH} on I^{SM}/Rev and I^{RD}/Rev using the industry definitions of [Hoberg and Phillips \(2016\)](#), which are consistent with the main specification.

An alternative specification comes from the model in [Crouzet and Eberly \(2023\)](#), which relates Q^{PH} to the stock of tangible and intangible capital. Their model augments the classic [Hayashi \(1982\)](#) investment framework with two additional ingredients: (1) firms may earn rents and (2) firms may utilize intangible capital in addition to physical capital in production. The analysis here uses the balanced growth steady-state relationship between traditional measures of Q^{PH} and the underlying drivers of value for a company developed in the [Crouzet and Eberly \(2023\)](#) model.

Specifically, suppose there are two types of capital: physical (PH) and intangible (IT). Then, in the [Crouzet and Eberly \(2023\)](#) framework, there is the following relationship between Q^{PH} and intangible capital on the balanced growth path:

$$Q^{PH} - q^{PH} = \frac{\mu - 1}{r - g} R^{PH} + q^{IT} \frac{K^{IT}}{K^{PH}} + \frac{\mu - 1}{r - g} R^{IT} \frac{K^{IT}}{K^{PH}} \quad (3)$$

Here, q^n denotes the marginal effect of an additional unit of investment in capital $n \in \{PH, IT\}$ on enterprise value, μ is a measure of rents derived from the profit function, r is the external cost of capital (ignoring depreciation and adjustment costs), g is the steady state growth rate, K^n is the replacement value of capital type n , and R^n is the required rate of return on capital type n which includes depreciation and the adjustment cost.

Re-arranging terms yields:

$$Q^{PH} = [q^{IT} + \frac{\mu - 1}{r - g} R^{IT}] \frac{K^{IT}}{K^{PH}} + q^{PH} + \frac{\mu - 1}{r - g} R^{PH} \quad (4)$$

which can then be used to motivate an across-industry regression specification:

$$Q_j^{PH} = \alpha + \beta \left(\frac{K^{IT}}{K^{PH}} \right)_j + \varepsilon_j \quad (5)$$

The intuition of the [Crouzet and Eberly \(2023\)](#) model is that industries have high Q^{PH} relative to

q^{PH} for three potential reasons: they may have higher rents, they may have more intangible capital in production, and there may be an interactive effect of the two. In the context of the empirical analysis here, the goal is to see whether measures of intangible capital estimated using sales and marketing and R&D expense are correlated with Q^{PH} .²⁷

Figure 7 presents the industry-level bin-scatter of Q^{PH} against K^{IT}/K^{PH} . As noted in Section 2.3, the book value of intangible capital (K^{IT}) includes the capitalized value of sales and marketing expense, R&D expense, and externally acquired intangible capital. The remarkable statistical power of K^{IT}/K^{PH} is evident. The industries in the lowest quintile of the K^{IT}/K^{PH} distribution have a value of K^{IT}/K^{PH} of 0.08 and Q^{PH} of 1.16. For firms in these industries, the Hayashi (1982) framework fits well. For the top quintile industries, K^{IT}/K^{PH} is 4.61 and Q^{PH} is 6.28.

Column 1 of Table 6 presents the coefficient estimate of β from equation 5 that corresponds to the bin-scatter. There is strong explanatory power; K^{IT}/K^{PH} alone explains almost 80% of the variation in Q^{PH} . Column 2 of Table 6 presents a placebo test in which residual SG&A after removing sales and marketing expense is capitalized into its own “intangible” value. The inclusion of the placebo intangible value is statistically insignificant, and it adds no additional explanatory power.

Column 3 explores the effect of industry-median long-term revenue growth forecasts, risk, and industry-median age on Q^{PH} .²⁸ As equation 4 shows, the cost of capital and growth are two important variables that should also explain Q^{PH} . Both median firm age and long-term revenue growth forecasts are included to control for differences across industries in growth, and the estimated asset beta of the industry is included to control for differences across industries in the cost of capital. As shown in column 3, the coefficient estimate on the long-term revenue growth forecast is indeed positive and significant, consistent with the theory. As shown in column 4, inclusion of these three control variables does not increase the statistical power of the specification materially, and there is only a minimal effect on the coefficient estimate for K^{IT}/K^{PH} . Taken together, the results in Tables 5 and 6 are consistent with the view that sales and marketing expenses are investments that translate into firm value.²⁹

²⁷A caveat to this framework is that the Crouzet and Eberly (2023) model treats markups as exogenous, and as such the study itself notes that it is not the best model to investigate intangible investment that is designed to boost markups over time. With customer capital, the intangible capital value is inextricably linked to markups.

²⁸Age of a firm is measured as years since IPO, long-term revenue growth forecasts of a firm is measured as the average analyst forecast recorded in the I/B/E/S data set, and the asset beta of the industry is based on estimates by Aswath Damodaran of NYU Stern.

²⁹Table A3 in the Appendix shows robustness of these results when using a flat 15% or 30% for assumed depreciation

4.2 Evidence from transactions

Sales and marketing expense and R&D expense also predict value paid for intangible capital in firm acquisitions, a result shown using the PPA data described above in Section 2.3. These data are used to conduct both an industry-level and firm-level analysis. For the industry-level analysis, PPA data for all firms acquired (both public and private) are used to construct an industry-level average of the ratio of intangible asset value to revenue. The data set used to estimate this industry-level variable includes 6,761 transactions. Only industries for which there are at least 5 transactions are included in the regression analysis. The total value of intangible assets is then split between customer and non-customer-related intangible value.³⁰

With these dependent variables in hand, Table 7 reports estimates of regressions similar to the specification outlined in equation 7. The PPA data do not have information on R&D expense or sales and marketing expense for the target firms, and so the regression analysis uses the same industry-level medians calculated from Compustat and Capital IQ. The central question is: in industries where firms from Compustat/Capital IQ spend more on R&D and sales and marketing, are target firms (both public and private) paid more for intangible assets when they are acquired?

As Panel A of Table 7 shows, the answer is “yes.” Column 1 shows the correlation of the industry-level total intangible asset to revenue ratio from the PPA transactions with the industry-level median I^{SM}/Rev and I^{RD}/Rev from Compustat/Capital IQ. Both variables are positively correlated. Total intangible asset value is split into the value associated with customer-related assets (columns 3-4) and non-customer-related assets (columns 5-6). I^{SM}/Rev predicts customer-related value and I^{RD}/Rev predicts non-customer-related value. In terms of magnitudes, a one dollar increase in I^{SM}/Rev translates into a 3 to 4 dollar increase in the value paid for intangible assets, and this comes completely from intangible assets associated with customers. A similar magnitude applies to R&D expense, except the value comes from non-customer-related assets.

In columns 2, 4, and 6, the residual SG&A to revenue ratio at the industry-level is added. It has no additional explanatory power. The coefficients are insignificant, and the R^2 does not change

rate of customer capital in the capitalization. The level of K^{IT}/K^{PH} is lower using a 30% depreciation rate for customer capital, which boosts the slope coefficient of the regression. But the statistical power is unchanged.

³⁰For the PPA data, the industry-level average ratio of intangible asset value to revenue is calculated as a weighted average where the weights are the revenue of the target firms, as opposed to using the industry-level median ratio. The reason for this change is that the PPA data contain a large number of transactions for firms that are quite small relative to the public firms in Compustat/Capital IQ, and so the revenue-weighted averages are closer to the type of firms for which the right hand side variables are measured. All results are qualitatively similar if industry-level medians, as opposed to weighted averages, are calculated from the underlying PPA data.

meaningfully. As with the analysis using Q^{PH} , this supports the view that residual SG&A as a whole after removing sales and marketing expense adds minimal power in explaining across-industry variation in intangible capital value.

A firm-level analysis is also possible given that some of the firms acquired in the PPA data are publicly traded and therefore are included in the Compustat/Capital IQ sample prior to being acquired. For these targets, it is possible to relate the value paid for a specific target's intangible assets to the investment in intangible assets made by the target just prior to the acquisition.³¹ There are 607 such firms in the PPA data. The specific estimated equation relates the intangible asset value to revenue ratio (e.g., a revenue-based transaction multiple for the intangible assets) to the target-level I^{SM}/Rev and I^{RD}/Rev . Revenue, R&D, and sales and marketing are measured at the target-level from Compustat/Capital IQ for the latest time period for which the data are available, which is usually the year prior to the acquisition. The regressions are weighted by the revenue of the acquired firm.³²

Panel B of Table 7 shows the results. The target-level results are qualitatively similar to those at the industry-level. Firms that spend more on sales and marketing just prior to the acquisition have higher value paid for intangible assets associated with customers, and firms that spend more on R&D have higher value paid for other intangible assets such as those associated with research or technology. Residual SG&A after removing sales and marketing expense does not have predictive power.

4.3 Covenant violations and financial constraints

The results in Section 4.1 and 4.2 show that sales and marketing and R&D expense should be treated as investment. A large body of research in economics and finance focuses on the degree to which firm investment decisions are affected by financial constraints (e.g., [Rauh \(2006\)](#), [Whited \(1992\)](#)). Most studies in this literature use capital expenditures as the primary measure of investment. How might financial constraints affect investment in customer capital?

³¹This analysis is closely related to the analysis in [Ewens et al. \(2024\)](#) who also match PPA data for publicly traded targets to the Compustat data. The main differences are (1) the use of sales and marketing expense as opposed to overall SG&A, and (2) the emphasis on customer versus non-customer-related intangibles.

³²The firm-level regressions are weighted by revenue given that the standard deviation of the intangible asset to revenue ratio is significantly larger for targets with lower revenue, suggesting heteroskedasticity across revenue in the error term. Following the test suggested in [Solon, Haider and Wooldridge \(2015\)](#), we find that the squared predicted residuals from unweighted specifications are significantly larger for targets with lower revenue, thereby justifying a weighted specification.

To explore this question, we revisit a robust literature that shows that violation of a financial covenant in a private credit agreement leads to a causal effect of lower investment through heightened creditor control (e.g., Chava and Roberts (2008), Nini, Smith and Sufi (2009), Nini, Smith and Sufi (2012), Griffin, Nini and Smith (2026), Krockenberger, Saunders, Steffen and Verhoff (2024)). Specifically, Figure 8 shows estimates of the coefficients β_h from the following firm-year level regression:

$$\Delta I_{it} = \alpha + \sum_{h=-2}^{h=3} \beta_h \cdot Violation_{i,t-h} + \varepsilon_{it} \quad (6)$$

where ΔI_{it} is the percent change in investment in year t for firm i and $Violation_{it}$ is a new covenant violation that is reported in year t (and therefore occurred at some point strictly after year $t - 1$ and up to and including t), and h represents time relative to time t (i.e., for $h = -2$, $Violation_{i,t+2}$ reflects a covenant violation occurring two years into the future).³³ A new covenant violation is a violation at time t when there was no violation at reported at $t - 1$ or $t - 2$. Figure 8 plots the coefficient estimates for β_h around the new covenant violation.

The solid black line shows that capital expenditures experience a sharp drop of about 15% in the year immediately following the covenant violation, with no evidence of a pre-trend from $t - 2$ to $t - 1$. This confirms a well-established result in the literature. The maroon and navy lines show that both sales and marketing expense and R&D expense also experience a sharp drop immediately after a covenant violation, again with no evidence of a pre-trend. The relative magnitude of the drop in sales and marketing and R&D is about half as large as the drop in capital expenditures.

Table 8 shows coefficient estimates for β_1 for capital expenditures, sales and marketing and R&D in Panels A, B, and C, respectively. Across all nine specifications, a covenant violation leads to a sharp drop in the investment variable in question, with the relative magnitude of the effect on sales and marketing being roughly half of the effect on capital expenditures. The effect on R&D is slightly smaller than the effect on sales and marketing.

The evidence on covenant violations presented here suggests that the effect of financial constraints on firm investment also applies to investment in customer capital. This raises interesting questions about how tightened creditor control affects the accumulation of customer capital, and it suggests an alternative channel through which financial constraints could affect firm profitability. We leave further exploration of this question for future research.

³³We are grateful to the authors of Griffin, Nini and Smith (2026) for sharing their data on covenant violations.

5 Explaining industry-level variation

Customer capital constitutes a valuable intangible asset from the firm’s perspective. What is the source of this value? This section discusses three possible mechanisms from the existing literature by which sales and marketing could generate value for the firm. Using proxy measures for the strength of each corresponding mechanism across industries, we find that the strongest drivers for the value of sales and marketing are information frictions and network effects in demand.

5.1 Market frictions and their empirical proxies

Speculation on the economic mechanisms by which advertising and marketing efforts contribute to firm value date back at least to Braithwaite (1928) (for a survey, see Bagwell, 2007). We discuss three broad classes of these models and offer empirical proxies for each, in order to compare their relative predictive power of the level of sales and marketing investment across industries.³⁴

Persuasive Advertising and Utility Distortions. One way persuasive advertising could shift out the demand curve for a good is to distort consumers’ perceptions of their own utility functions (Braithwaite, 1928). The idea is to deceive consumers into thinking that their willingness to pay for the good is higher than it truly is, or that the good’s competitors are worse substitutes than they are in reality. The firm is able to extract additional surplus from the consumer by convincing them to purchase quantities of the good according to a fictional utility function that deviates from their underlying preferences.

Alternatively, advertising may enter a consumer’s utility function directly, such as in the model of Becker and Murphy (1993). In this framework, the consumption of marketing materials may act as a complement, increasing the marginal utility of consuming the good itself, and again shifting out the demand curve. Consumers may also place a higher value on a good simply because they have consumed it before, as in the habit formation model of Bronnenberg et al. (2012). In this case, due to the structure of the consumer’s utility function, there are high returns to convincing them to purchase the good the first time.

This class of explanations for why sales and marketing could contribute to firm value all center around features of the consumer’s utility function. However, they have no clear analog for discussing demand from *business customers*, who buy the good as an input, and whose objective is to maximize

³⁴Summary statistics of these empirical proxies are included in Appendix Table A7.

profits. If it is the case that these types of models explain the level differences in sales and marketing across industries, we should see that industries whose primary customers are households exhibit higher sales and marketing investments than industries that are predominantly business-to-business.

For every firm-year observation, Gemini is asked to read Item 1 of the 10-K SEC filing and answer the following question: “Does the firm primarily market its products to households, businesses, or the government?” The precise measure is the fraction of filings in an industry for which Gemini answers this question with the word “households”.

Search Frictions and Information Provision. In the presence of search frictions, consumers may not know of the existence, price, or quality of some of the goods in the market. Firms benefit from disseminating information about their products so long as (i) enough information reaches consumers who do not already know it, and (ii) the additional revenue from consumers receiving the new information is sufficient to cover its costs (Ozga, 1960; Stigler, 1961). This idea is illustrated in the first order conditions of Gourio and Rudanko (2014), where the firm hires additional sales representatives until the cost of hiring one is equal to the expected value from their matches with new customers.

The severity of search frictions in a market cannot be observed directly; however, we can infer the severity of search frictions based on the extent to which firms emphasize information transmission in their interactions with customers. To that end, our first measure of whether an industry faces search frictions is how commonly firms explicitly state that communicating information to potential customers is required in order to make a sale. If the severity of search frictions is an important driver of the value of customer capital, then it should be the case that industries that emphasize communicating information to potential customers invest most heavily in sales and marketing.

For every firm-year observation, Gemini is asked to read Item 1 of the 10-K SEC filing and answer the following question: “Does the firm explicitly discuss the necessity of providing information to the customer about the product in order to make a sale?” The precise measure is the fraction of filings in an industry for which Gemini answers this question with the word “yes”.

Further, note that there are a few additional market features that could amplify the returns to sharing information in markets with search frictions. For example, Ozga (1960) highlights that there are diminishing returns to information dissemination as the knowledge becomes more widely known. If the information is novel, on the other hand, there will be higher returns to spreading the information because very little of this effort is redundant. While there is not yet, to our knowledge, theory that explicitly links innovative activity in an industry with high returns to sales and market-

ing, it is sensible to expect that firms would invest more heavily in information dissemination if they've created an innovative new product or variety that is less known or understood by potential buyers.

To that end, our third primitive is whether the industry produces highly technical products. For every firm-year observation, Gemini is asked to read Item 1 of the 10-K SEC filing and answer the following question: “We are interested in identifying firms that sell ‘high-tech products’ as core to their business. For this analysis, a ‘high-tech product’ is defined as a proprietary product whose primary value is derived from its cutting-edge, innovative, and inherently technological nature... Your task is to read the following document and answer the following question: Does the firm sell ‘high-tech’ products?” The precise measure is the fraction of filings in an industry for which Gemini answers this question with the word “yes”.

Network Effects in Demand. As shown in the seminal work by [Katz and Shapiro \(1985\)](#), markets characterized by network effects in demand feature multiple equilibria, and as such firms can earn significant profits by successfully convincing consumers that other consumers will also use the product (see also [Farrell \(2007\)](#)). This is closely related to the idea in [Rochet and Tirole \(2003\)](#) that a crucial part of the business model based on a two-sided platform is to “get both sides of the market on board,” as succinctly put in the original article. In the platform model of [Jullien and Pavan \(2019\)](#), firms can increase their profits by communicating information to customers that increases either their expectation of take-up by the other side of the market, or the precision of this expectation. This once again amplifies a firm’s returns to sales and marketing—the firm increases profits directly through their outreach to the customer, and indirectly through influencing the customer’s expectations of behavior on the other side of the market.

Our measure of whether an industry exhibits network effects in demand is therefore the fraction of firms which operate a platform-based business model. For every firm-year observation, Gemini is asked to read Item 1 of the 10-K SEC filing and answer the following question: “A platform business model involves profiting from a platform that allows two or more groups of users to interact. Your task is to read the following document and answer the following question: Is such a platform part of the business model of the firm?” The precise measure is the fraction of filings in an industry for which Gemini answers this question with the word “yes”.

5.2 Results

Table 9 presents results from industry-level regressions of the following form:

$$(I^{SM}/Rev)_j = \alpha + \beta X_j + \epsilon_j \quad (7)$$

where $(I^{SM}/Rev)_j$ is the median sales and marketing expense to revenue ratio in industry j , and X_j includes the demand characteristics of industries explained above. The estimated coefficients β are reported in Table 9.

Perhaps surprisingly, there is no obvious relation between industry-median I^{SM}/Rev and the fraction of firms in an industry with households as the primary customer. While there are some industries that both sell primarily to households and have high amounts of sales and marketing expense (e.g., beverage and tobacco manufacturing (312), non-store retail (454), and personal services (812)), many industries with high levels of sales and marketing expense are primarily business-to-business oriented (e.g., data processing and hosting (518), medical equipment manufacturing (339), and professional services (541)). This result is worth noting because the existing literature on advertising and marketing focuses almost exclusively on consumer goods industries. The fact that business-to-business industries invest just as much in customer capital as consumer-facing industries, potentially due to different market frictions, suggests that firms' relationships with business customers warrants further research.

The most powerful determinant in the univariate specifications is the fraction of firms in the industry that operate a platform business model. This single variable explains 55% of the variation in the data in the univariate specification. A one standard deviation increase in the share of firms in an industry operating a platform business model is associated with a 4.3 percentage point higher I^{SM}/Rev . To shed more light on this result, Appendix Table A8 shows the largest 25 firms by revenue in 2022 that Gemini classifies as having a platform business model for every year they are in the sample. The sales and marketing expense to revenue ratio for 2022 is also reported for these firms, as is the industry in which they are classified. Many of these firms are in the broader information sector (two-digit NAICS code of 51), but there are also other industries represented. The average sales and marketing expense to revenue ratio for these 25 firms is 18%.

Table 9 also shows that the fraction of firms in an industry that highlight spreading information about their products has strong predictive power, as does the share selling high-tech products. When all four covariates are included in the estimation, the platform measure appears to be the strongest.

The information covariate is correlated with both high-tech products (0.44) and platform (0.37), so it is not surprising that the inclusion of all three leads to attenuation in the coefficient estimates.³⁵

One concern with the correlations in Table 9 is that they may be spuriously driven by age, growth, or risk of an industry. For example, perhaps 1997 to 2022 was an especially strong time period for growth for platform-based business models, and any industry that is growing requires large expenditures on a sales force. Column 6 of Table 9 shows the correlation between I^{SM}/Rev and the median age of firms in an industry, the median forecasted long-term revenue growth of firms in an industry, and the estimated asset beta from Aswath Damodaran. The median industry-level revenue growth forecast is positively correlated with I^{SM}/Rev , and the statistical power is strong. However, as shown in column 7, including these variables as controls does not meaningfully change the fit of the overall model nor the coefficients on the industry primitives.³⁶

5.3 Sales and marketing strategies

The specific sales and marketing strategies undertaken by firms are also systematically related to the underlying characteristics of the industry. To show these patterns, the data generated from Gemini's analysis of the specific sales and marketing strategies is used. Specifically, a regression specification similar to equation 7 is estimated, with the main difference being that the left hand side variable is changed to the fraction of firms in an industry that Gemini determines have a specific sales and marketing strategy such as advertising or a sales force.

Figure 9 summarizes the results of these 20 univariate regressions (5 strategies by 4 covariates). Each bar in Figure 9 is generated from a separate univariate regression of the strategy in question on the underlying covariate in question. The height of the bar represents how a one standard deviation change in the covariate in question affects the propensity of the firms in the industry to undertake the strategy in question. So, for example, the first bar in the figure starting from the left has a height of 0.125; this indicates that a one standard deviation increase in the fraction of firms that have households as their primary customers leads to a 12.5 percentage point increase in the share of firms that emphasize advertising as a key component of their sales and marketing strategy.

Industries that have households as their primary customers are significantly more likely to em-

³⁵Please see Appendix Figures A8 and A9 for industry-level bin-scatter plots relating industry-median I^{SM}/Rev to each of the four explanatory variables described above.

³⁶Appendix Table A9 shows the results are robust to using an alternative measure of customer capital investment on the left-hand side, defined as salaries paid to workers in sales and marketing functions from the Revelio Labs data.

phasize advertising and brand value as part of their sales and marketing strategy. They put no differential emphasis on the use of a sales force. Firms in industries with high search frictions employ all five strategies, with the most emphasis on the use of a sales force, and the least on the use of customer data. High-tech industries, on the other hand, almost exclusively emphasize the use of a sales force; they put no differential emphasis on any other strategy.

Firms in industries with platform business models also employ all five strategies, with a particular focus on customer data. A one standard deviation increase in the fraction of firms operating a platform business model leads to an 11 percentage point increase in the acquisition and use of customer data as a sales and marketing strategy. Data seems to be a critical element to the business strategy for firms in these industries (e.g., [Begenau, Farboodi and Veldkamp \(2018\)](#)).

The patterns in Figure 9 offer insight into the different ways customer capital contributes to firm value, depending on the features of the product market. One prototypical example of a customer capital-intensive industry is one in which households' consumption choices are responsive to advertising and brand value. Another prototype is the high tech manufacturing firm that employs a specialized sales force to overcome search frictions in a rapidly evolving information environment. Finally, firms that operate platform business models engage in a variety of strategies to boost customer capital, with the acquisition and use of customer data being a central component.³⁷

5.4 Subscriptions and customer capital

Under the [Gourio and Rudanko \(2014\)](#) framework, returns to customer capital investment are increasing in markups and the expected duration of the customer relationship. In reality, markups and customer relationship length are of course endogenous outcomes of industry-wide competition for customers, and are therefore beyond the scope of this paper.³⁸ However, the text of the 10-K filing enables us to test whether firms implement an additional strategy aimed at extending the duration of customer relationships: selling subscriptions.³⁹

³⁷In Appendix Table A10, measures of investment in customer capital at the industry level are regressed on measures of the industry-level technical returns to scale from production. The estimates on the returns to scale are from [McAdam, Meinen, Papageorgiou and Schulte \(2024\)](#) and [Lenzu, Rivers and Tielens \(2022\)](#). In general, there is no strong positive or negative correlation between measures of investment in customer capital and technical returns to scale.

³⁸[Hubmer and Nord \(2025\)](#), for example, construct a model which addresses these dynamics specifically.

³⁹A recent growing literature addresses the use of a subscription-based sales model in a variety of settings (see e.g. [Della Vigna and Malmendier, 2006](#); [Einav et al., 2025](#); [Miller et al., 2025](#)). See Appendix Table A2 for the exact prompt used to identify companies that use a subscription-based business model.

We find a striking correlation between industry-level sales and marketing intensity and the use of subscriptions. This result is shown in Figure 10. Furthermore, we test whether the above empirical proxies for market frictions predict the use of subscriptions by firms in that industry. As shown in Table 10, subscriptions are far more common in industries that exhibit network effects in demand. The fraction of firms in the industry that use a platform-based business model alone explains 72% of the variation across industries in the fraction of firms that use subscriptions (Column 4). Network effects in demand predict that firms both invest aggressively in sales and marketing and implement complementary strategies—subscription-based sales—to extend the natural duration of customer relationships.

6 Conclusion and future directions

This study provides evidence that firm spending on sales and marketing should be treated as an investment in customer capital. Furthermore, this investment, along with spending on R&D and externally acquired intangible assets, explains a substantial amount of the variation across industries in measures of the value of intangible capital. Using acquisition data, it is possible to link the investment directly to the value of assets created by the investment. The across-industry variation in customer capital investment is large, with industries characterized by search frictions and network effects in demand having the highest amount. The analysis suggests that customer capital is fundamental in firms' profit functions, and a recent body of research is exploring the implications (e.g., [Chiavari \(2026\)](#), [Hubmer and Nord \(2025\)](#), [Pearce and Wu \(2024\)](#)).

The data set compiled in this study is constructed from sources that are available to all researchers, and our plan is to make all of the code to build and analyze the data publicly available. As such, a primary goal of this study is to inspire more empirical and theoretical research on customer capital. There are many avenues for future research in this area. We emphasize four. First, is there a rise in investment in customer capital over time? If so, why? And what are the broader implications? [Kaplan and Zoch \(2020\)](#) and [Bronnenberg et al. \(2022\)](#) use different data sets to find that sales and marketing efforts appear to be increasing over time in the United States; [Traina \(2018\)](#) shows that SG&A has been growing as a share of operating expenditures since the 1950s. This study shows that industries that invest heavily in customer capital represent a growing share of aggregate enterprise value. More research on these questions is needed.

Second, how does investment in customer capital affect within-industry competition? This study

focuses exclusively on the across-industry variation, but the within-industry variation may help answer fundamental questions on business dynamism, market power, and market concentration. Some of the largest firms in the economy have platform business models and invest heavily in customer capital. These include household names such as Amazon, Facebook, and Google. What is the role of customer capital investment in firm growth? How does the customer capital of incumbents affect entry into markets? Are trends in markups related to trends in customer capital investment?

Third, what are the implications for finance? Is investment in customer capital riskier than investment in other types of capital? Is it easier to finance such investment with debt, equity, or some combination of the two? Anecdotally, venture capital investment disproportionately goes to firms in business services and the software industry, which this study shows are two industries that have high rates of investment in customer capital. Is this a coincidence or is it illustrative of a deeper mechanism?

Finally, what are the normative implications of customer capital investment? There is a large body of research focused on whether investment in sales and marketing is socially useful.⁴⁰ When firms invest more in customer capital, are customers better off? Is such investment complementary to investment in improving the efficiency of the production process? Can better measurement of the actual efforts undertaken by firms help resolve this debate? We look forward to more research on these questions.

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⁴⁰This historical debate is summarized in the introduction of [Bronnenberg et al. \(2022\)](#).

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Table 1: Impact of Filtering Conditions on Sample Size and Characteristics

		N	Avg Rev	Median Rev
1	Baseline Sample	107,594	2,534	181
2	With Capital IQ data	107,417	2,531	180
3	Capital IQ Sales & Marketing (SM) expense available	40,377	2,600	138
4	SM expense available, after incorporating Gemini-extracted values	52,641	2,613	169
5	SM expense available, after incorporating advertising and marketing expenses	58,661	2,669	165
6	SM expense available, after incorporating imputed zeros	68,077	2,597	152
7	Compustat R&D expense available	64,913	2,747	128
8	R&D expense available, after incorporating imputed zeros	81,508	2,697	174
9	CAPX available	107,016	2,543	181
10	Capitalization possible	68,320	2,992	205
11	Revelio data available	28,961	5,605	833

The baseline sample starts with annual data for all non-financial U.S. publicly traded firms from 1997 to 2022.

Table 2: Investment Facts

	N	Wgt Avg	p10	p25	Median	p75	p90
Panel A							
Sales and Marketing expense to revenue (I^{SM}/Rev)	68,077	0.042	0.000	0.005	0.039	0.183	0.418
R&D expense to revenue (I^{RD}/Rev)	81,508	0.033	0.000	0.000	0.024	0.161	0.685
Capital expenditure to revenue (I^{CX}/Rev)	107,016	0.066	0.005	0.015	0.034	0.083	0.254
Residual SGA to revenue (R^{SGA}/Rev)	66,786	0.136	0.056	0.105	0.194	0.361	1.205
Panel B. All investment variables available							
Sales and Marketing expense to revenue (I^{SM}/Rev)	53,734	0.043	0.000	0.006	0.044	0.209	0.451
R&D expense to revenue (I^{RD}/Rev)	53,734	0.036	0.000	0.000	0.029	0.178	0.704
Capital expenditure to revenue (I^{CX}/Rev)	53,734	0.056	0.005	0.014	0.032	0.072	0.200
Residual SGA to revenue (R^{SGA}/Rev)	53,734	0.134	0.058	0.106	0.194	0.366	1.307
Panel C. Comparison with Revelio when both are available							
Sales and Marketing expense to revenue (I^{SM}/Rev)	19,283	0.042	0.000	0.004	0.028	0.133	0.342
SM salaries to revenue ($(WL)^{SM}/Rev$)	19,283	0.029	0.007	0.021	0.052	0.121	0.276
Panel D. Components of total capital							
Physical capital (K^{PH}/K)	68,261	0.579	0.062	0.134	0.343	0.734	0.949
Intangible capital (K^{IT}/K)	68,261	0.421	0.051	0.266	0.657	0.866	0.938
Capitalized Sales and Marketing expense (K^{SM}/K)	68,261	0.153	0.000	0.026	0.176	0.477	0.685
Capitalized R&D expense (K^{RD}/K)	68,261	0.061	0.000	0.000	0.018	0.203	0.466
Externally acquired intangible capital (K^{EI}/K)	68,261	0.207	0.000	0.000	0.054	0.234	0.488
Panel E. Percent change in investment							
Sales and Marketing expense growth	49,708	0.089	-0.394	-0.111	0.051	0.252	0.718
Capital expenditure growth	91,321	0.128	-0.662	-0.327	0.037	0.508	1.539
R&D expense growth	46,836	0.073	-0.338	-0.104	0.056	0.246	0.610

Table 3: Comparing Industry-Level Measures of Investment in Customer Capital

	(1)	(2)	(3)	(4)	(5)
	I^{SM}/Rev , wgt avg	I^{SM}/Rev , avg	$(WL)^{SM}/Rev$, median	I^{SM}/Rev , median ('18 - '22)	I^{SM}/K , median
I^{SM}/Rev , median	0.689** (0.071)	1.424** (0.139)	0.509** (0.052)		0.422** (0.047)
I^{SM}/Rev , median ('97 - '01)				0.663** (0.076)	
Constant	0.016** (0.003)	0.050** (0.007)	0.022** (0.004)	0.007 (0.005)	0.015** (0.003)
Observations	69	69	61	60	66
R^2	0.733	0.712	0.543	0.761	0.642

This table presents industry-level regressions of various measures of investment in customer capital on the industry-level median ratio of sales and marketing expense to revenue. Robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table 4: Persistence of Investment Variables

	Industry FE	Period FE	Industry & Period FE
I^{SM}/Rev	0.879	0.012	0.891
I^{RD}/Rev	0.831	0.007	0.836
I^{CX}/Rev	0.930	0.005	0.935

This table presents the R^2 from regressions using a period-by-industry level panel data set, where each observation represents the median sales & marketing / R&D / capital expenditures to revenue ratio for that specific period-industry. Each period is a set of five consecutive years of the sample (e.g., 1997-2001, 2002-2006, etc), and each industry is defined at the 3-digit NAICS level. The first column shows the R^2 when including only industry FE, the second column shows the R^2 when including period FE, and the third column shows the R^2 from the inclusion of both industry FE and period FE.

Table 5: Explaining Q^{PH} with I^{SM}/Rev

	Dependent variable: Q^{PH} , median				
	(1)	(2)	(3)	(4)	(5)
I^{SM}/Rev , median	29.09** (4.10)		22.27** (4.11)	21.28** (4.17)	23.54** (4.17)
$(WL)^{SM}/Rev$, median		39.59** (10.23)			
I^{RD}/Rev , median			14.34** (1.14)	10.98** (2.57)	14.44** (1.13)
$RSGA/Rev$, median				5.12* (2.22)	
$COGS/Rev$, median					1.12 (1.22)
Constant	1.62** (0.21)	1.16** (0.35)	1.64** (0.19)	0.90** (0.26)	0.82 (0.90)
Observations	69	61	69	69	69
R^2	0.591	0.517	0.695	0.720	0.698

This table presents estimates of industry-level regressions of the enterprise value to book physical capital value ratio (Q^{PH}) on measures of intangible capital investment. $RSGA$ is residual SG&A after subtracting sales and marketing expense. Robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table 6: Explaining Q^{PH} with K^{IT}/K^{PH}

	Dependent variable: Q^{PH} , median			
	(1)	(2)	(3)	(4)
K^{IT}/K^{PH} , median	1.04** (0.15)	0.99** (0.17)		1.05** (0.09)
Placebo K^{IT}/K^{PH} , median		0.11 (0.06)		
Rev g forecast, median			29.99* (13.27)	-6.18 (10.21)
β^A , Damodaran			0.76 (0.79)	0.38 (0.38)
Firm age, median			-2.07 (1.09)	-1.65** (0.59)
Constant	1.32** (0.14)	1.20** (0.11)	0.70 (1.34)	2.02** (0.68)
Observations	69	69	69	69
R^2	0.797	0.802	0.343	0.813

This table presents estimates of industry-level regressions of the enterprise value to book physical capital value ratio (Q^{PH}) on measures of intangible capital and characteristics of firms in the industry. Rev g forecast is the analyst long-term growth forecast from I/B/E/S and β^A is the asset beta of the industry as measured by Aswath Damodaran. Robust standard errors are in parentheses.

* $p < 0.05$, ** $p < 0.01$.

Table 7: Explaining Value Paid for Intangible Assets in Acquisitions

	V^{IT}/Rev , median		V_{cust}^{IT}/Rev , median		V_{other}^{IT}/Rev , median	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Industry level						
I^{SM}/Rev , median	3.031*	2.803*	3.519**	3.365**	-0.489	-0.562
	(1.381)	(1.306)	(1.230)	(1.178)	(0.388)	(0.358)
I^{RD}/Rev , median	3.987**	3.214**	-0.285	-0.809	4.272**	4.022**
	(1.082)	(1.083)	(0.856)	(0.973)	(0.313)	(0.315)
$RSGA/Rev$, median		1.186		0.803		0.382
		(0.660)		(0.573)		(0.267)
Constant	0.283**	0.112	0.160**	0.044	0.123**	0.068
	(0.053)	(0.097)	(0.036)	(0.075)	(0.031)	(0.053)
Observations	68	68	68	68	68	68
R^2	0.426	0.449	0.278	0.299	0.569	0.576
	V^{IT}/Rev		V_{cust}^{IT}/Rev		V_{other}^{IT}/Rev	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel B. Target level						
I^{SM}/Rev	1.030*	1.050*	1.229**	1.326**	-0.222	-0.307
	(0.495)	(0.513)	(0.360)	(0.367)	(0.467)	(0.527)
I^{RD}/Rev	5.131**	5.075**	0.322	0.058	4.773**	5.006**
	(0.343)	(0.377)	(0.232)	(0.386)	(0.307)	(0.468)
$RSGA/Rev$		0.141		0.675		-0.594
		(0.461)		(0.402)		(0.667)
Constant	0.445**	0.425*	0.226**	0.133*	0.197	0.279
	(0.144)	(0.174)	(0.051)	(0.052)	(0.101)	(0.175)
Observations	607	607	607	607	607	607
R^2	0.251	0.252	0.0613	0.0792	0.288	0.290

Panel A presents estimates of industry-level regressions of the median value paid for intangible assets in acquisitions on measures of intangible capital investment from publicly traded firms. Panel B presents estimates from target-level regressions of the value paid for intangible assets on measures of intangible capital investment just prior to the acquisition. $RSGA$ is residual SG&A after subtracting sales and marketing expense. Robust standard errors are in parentheses. * $p < 0.05$, ** $p < 0.01$.

Table 8: Covenant Violations and Investment

<i>Panel A: Capital expenditure growth</i>			
	(1)	(2)	(3)
Covenant Violation _{<i>t</i>-1}	-0.190** (0.017)	-0.179** (0.022)	-0.148** (0.021)
Year FE	Yes	Yes	Yes
Controls			X
Observations	61,989	34,301	34,301
<i>R</i> ²	0.026	0.026	0.052
<i>Panel B: Sales & marketing growth</i>			
	(1)	(2)	(3)
Covenant Violation _{<i>t</i>-1}	-0.091** (0.010)	-0.084** (0.011)	-0.068** (0.011)
Year FE	Yes	Yes	Yes
Controls			X
Observations	34,769	25,385	25,385
<i>R</i> ²	0.020	0.020	0.054
<i>Panel C: R&D growth</i>			
	(1)	(2)	(3)
Covenant Violation _{<i>t</i>-1}	-0.079** (0.010)	-0.065** (0.013)	-0.051** (0.013)
Year FE	Yes	Yes	Yes
Controls			X
Observations	32,174	15,869	15,869
<i>R</i> ²	0.019	0.017	0.076

This table reports OLS estimates of the effect of lagged covenant violations on the annual growth rate of capital expenditure (Panel A), sales & marketing expense (Panel B), and R&D expense (Panel C). Growth rates are winsorized at the 5% level. Column (1) uses the full sample. Column (2) restricts to the subsample where control variables are available. Column (3) adds controls: change in operating profitability (measured as the change in the operating income before depreciation-to-sales ratio), change in debt, change in interest expense, and lagged Tobin's *Q*. Year fixed effects are included in all specifications. Standard errors are clustered at the firm level. * and ** denote significance at the 5% and 1% levels, respectively.

Table 9: Explaining Variation in I^{SM}/Rev Across Industries

	Dependent variable: I^{SM}/Rev , median						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Households	-0.013 (0.020)				0.023* (0.010)		0.022* (0.011)
Information		0.110** (0.033)			0.018 (0.017)		0.022 (0.018)
High-Tech Products			0.157** (0.051)		0.114** (0.034)		0.114** (0.035)
Platform				0.305** (0.048)	0.241** (0.030)		0.231** (0.040)
Rev g forecast, median						0.931** (0.335)	0.133 (0.165)
β^A , Damodaran						0.006 (0.024)	-0.009 (0.018)
Firm age, median						0.001 (0.030)	0.022 (0.023)
Constant	0.045** (0.014)	-0.014 (0.011)	0.016** (0.005)	0.006 (0.005)	-0.022** (0.008)	-0.033 (0.039)	-0.032 (0.026)
Observations	69	69	69	69	69	69	69
R^2	0.005	0.224	0.336	0.549	0.705	0.297	0.712

This table presents estimates of industry-level regressions of sales and marketing expense as a share of revenue (I^{SM}/Rev) on characteristics of firms in the industry. The first four covariates are the share of firms in each industry that have one of the four characteristics described in Section 5. Rev g forecast is the analyst long-term growth forecast from I/B/E/S and β^A is the asset beta of the industry as measured by Aswath Damodaran. Robust standard errors are in parentheses. * $p \leq 0.05$, ** $p \leq 0.01$.

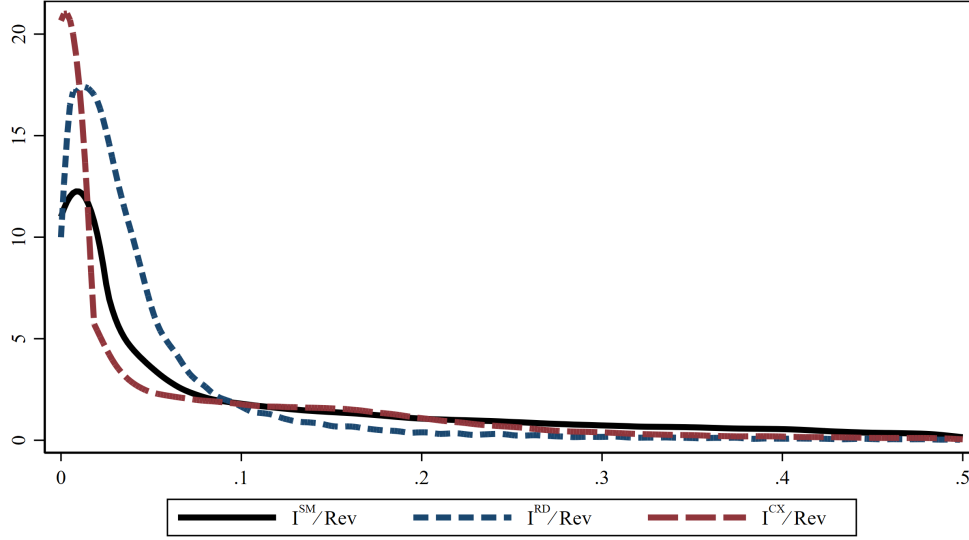
Table 10: Use of Subscriptions and Industry Characteristics

	Dependent variable: % of Firms in Industry with Subscriptions						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Households	-0.084 (0.056)				-0.068 (0.039)		-0.064 (0.038)
Information		0.242** (0.088)			0.004 (0.054)		0.015 (0.058)
High-Tech Products			0.293* (0.132)		0.032 (0.060)		0.045 (0.063)
Platform				1.084** (0.074)	1.065** (0.077)		1.031** (0.104)
Rev g forecast, median						2.341** (0.734)	-0.386 (0.399)
β^A , Damodaran						-0.071 (0.078)	-0.042 (0.058)
Firm age, median						-0.272* (0.108)	-0.163* (0.068)
Constant	0.198** (0.039)	0.044 (0.037)	0.119** (0.020)	0.042** (0.013)	0.067* (0.032)	0.162 (0.134)	0.190* (0.079)
Observations	69	69	69	69	69	69	69
R^2	0.022	0.113	0.120	0.715	0.736	0.364	0.756

This table presents estimates of industry-level regressions of the fraction of firms in the industry that use a subscriptions-based business model on characteristics of firms in the industry. The first four covariates are the share of firms in each industry that have one of the four characteristics described in Section 5. Rev g forecast is the analyst long-term growth forecast from I/B/E/S and β^A is the asset beta of the industry as measured by Aswath Damodaran. Robust standard errors are in parentheses.

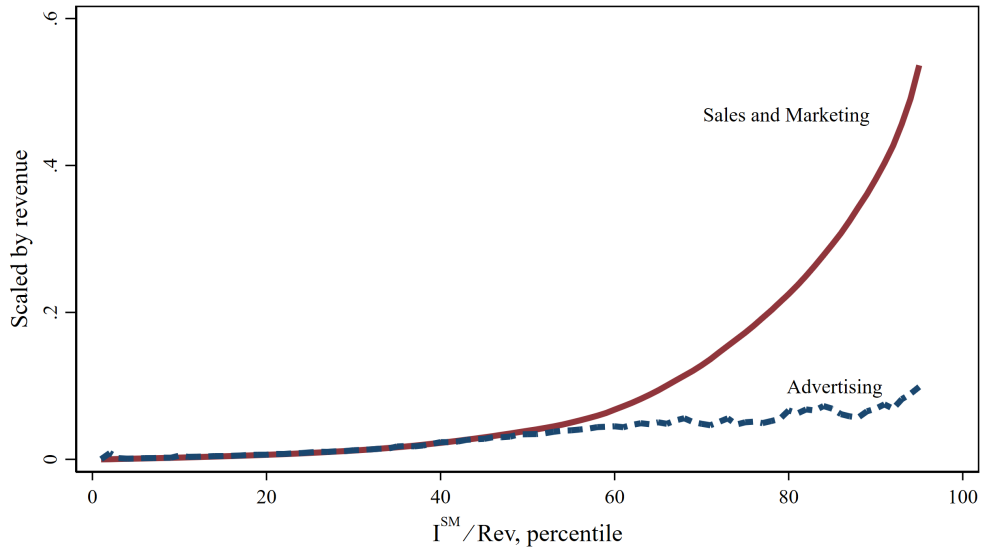
* $p \leq 0.05$, ** $p \leq 0.01$.

Figure 1: Kernel Densities for Investment Variables



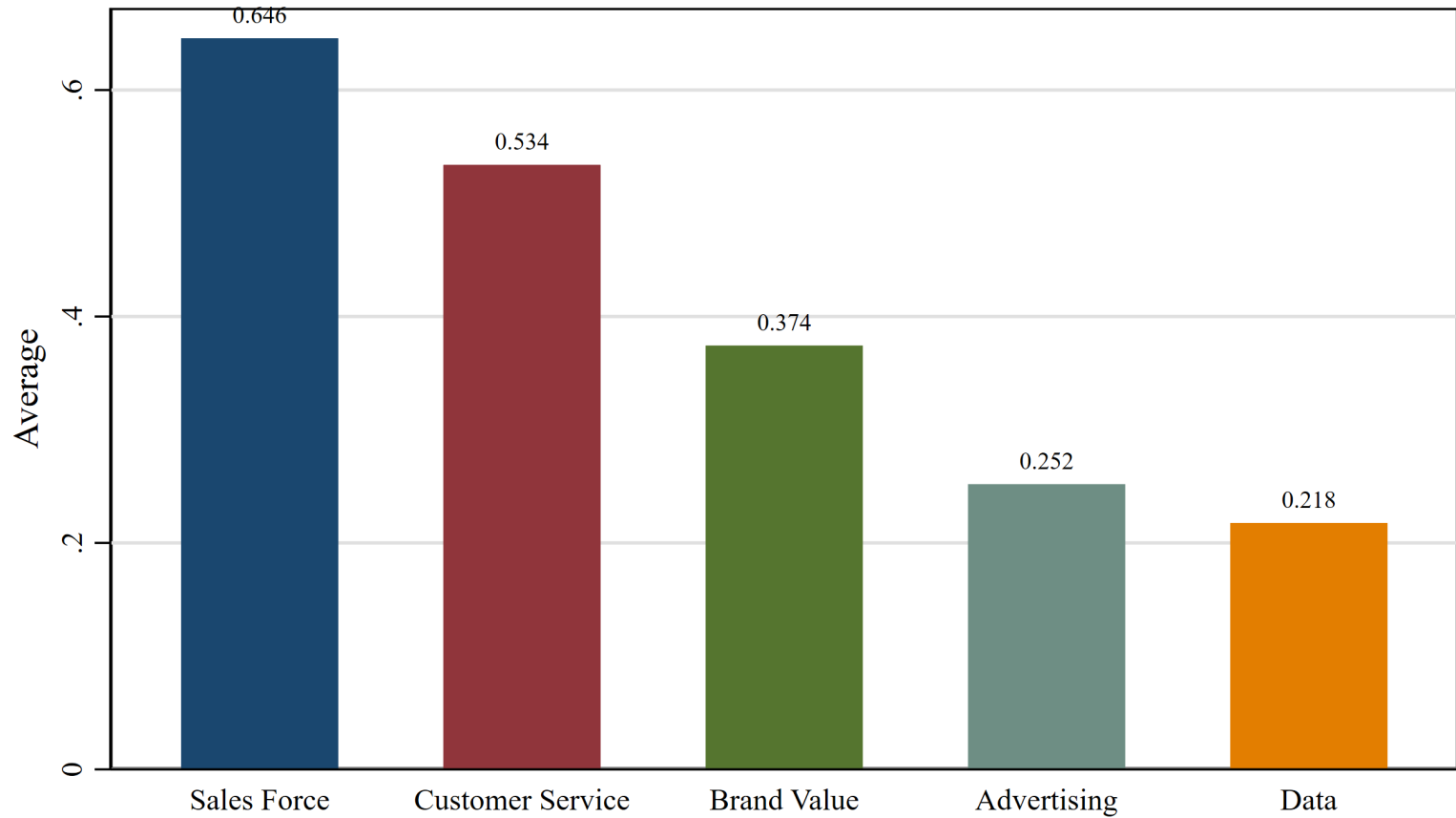
This figure shows the kernel density for three types of investment, sales and marketing expense (I^{SM}/Rev), R&D (I^{RD}/Rev), and capital expenditures (I^{CX}/Rev), each scaled by revenue.

Figure 2: Sales and Marketing and Advertising Across the Distribution



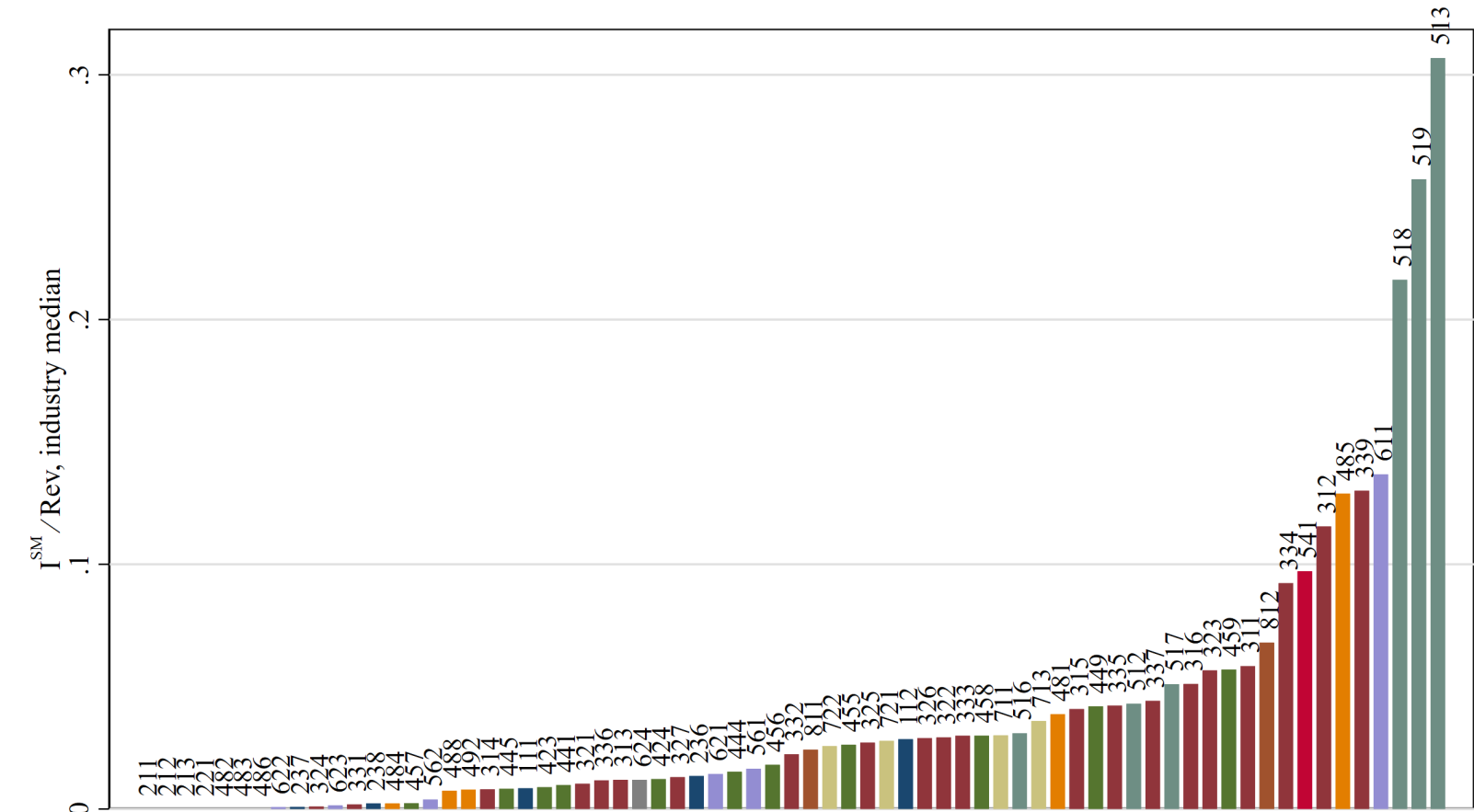
This figure plots the ratio of sales and marketing expense to revenue (I^{SM}/Rev) together with the ratio of advertising expense to revenue.

Figure 3: Fraction of firms citing each strategy



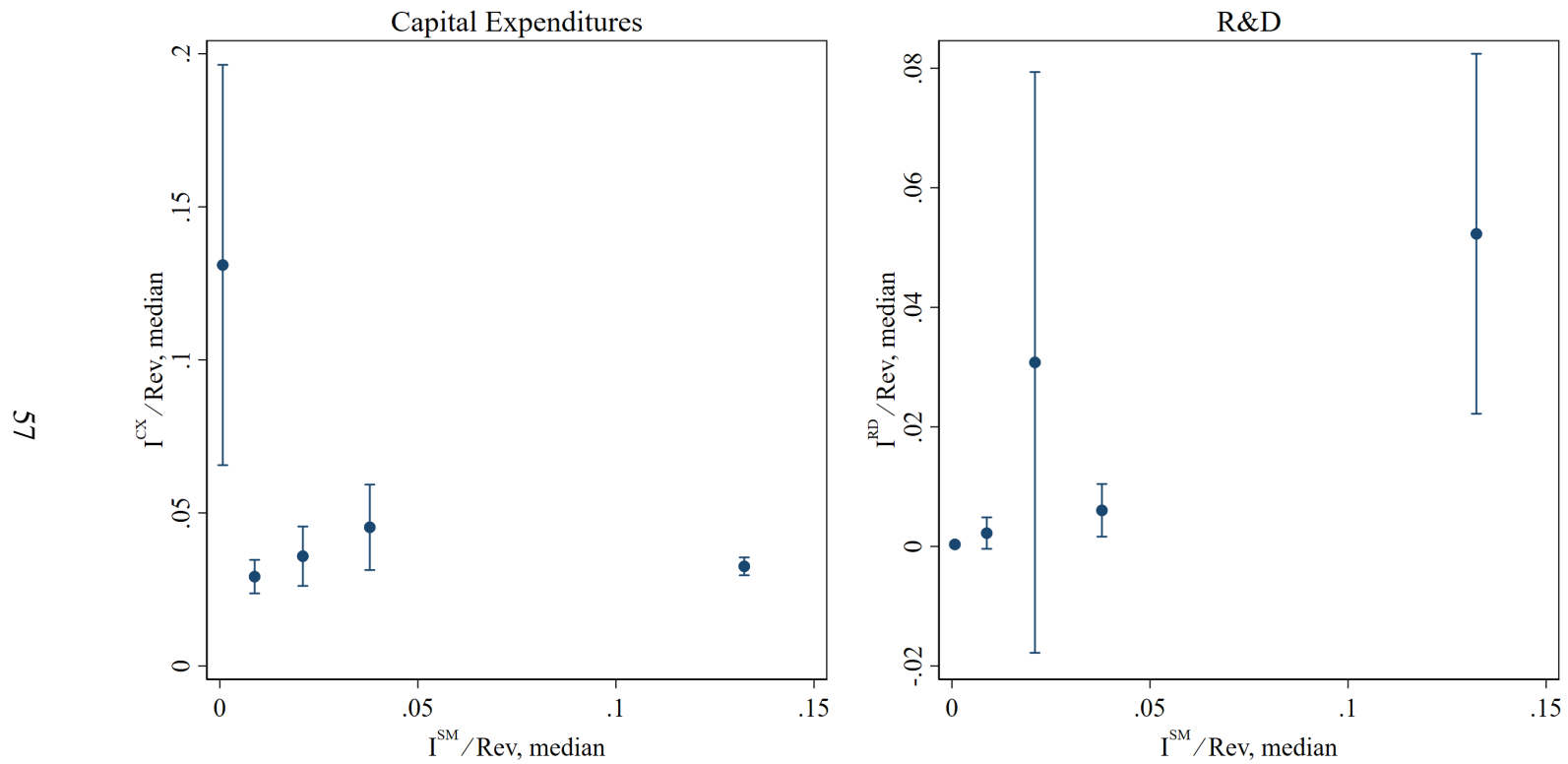
Each bar represents the fraction of firms in the sample that mention the sales and marketing strategy in question in their 10-Ks, as identified by Gemini. See Appendix Table A2 for the prompts used.

Figure 4: Median Ratio of Sales and Marketing Expense to Revenue Across Industries



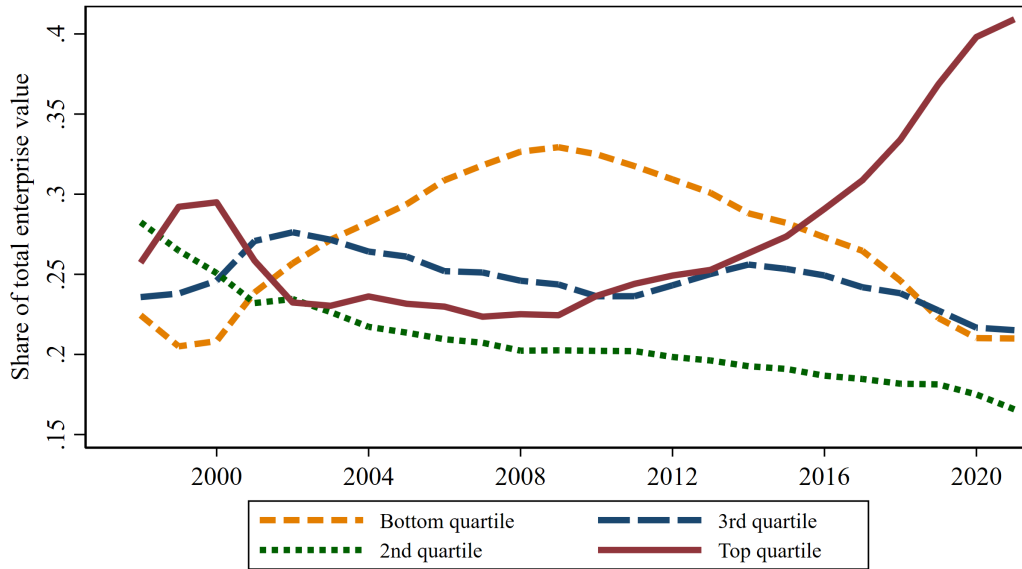
The color of the bar represents the broad category of the industry. See Appendix Table A5 for the names of each industry.

Figure 5: Comparison of I^{SM} with Capital Expenditures and R&D



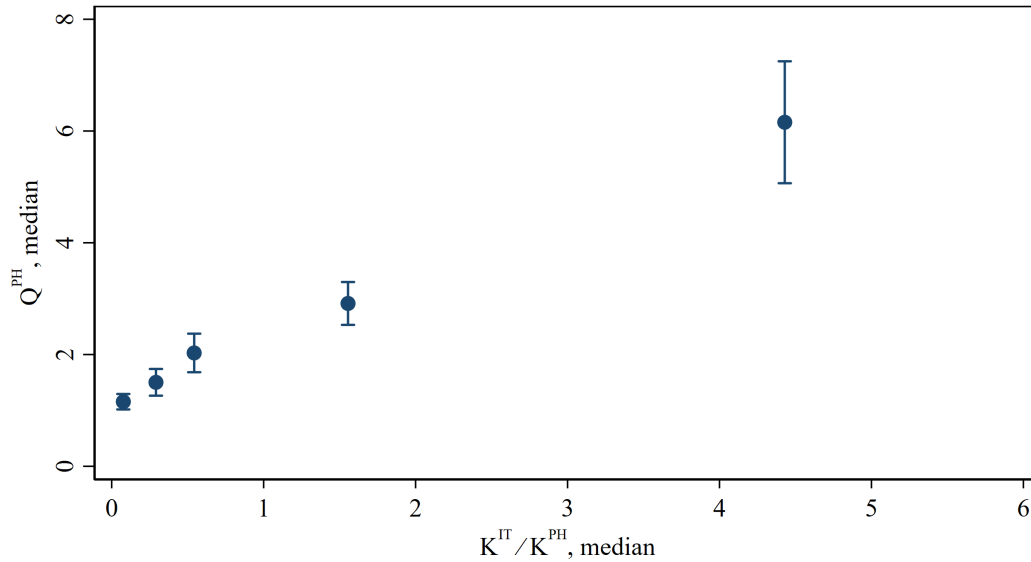
Bin-scatter plots at the industry level for capital expenditures (I^{CX}/Rev , left panel) and R&D (I^{RD}/Rev , right panel) against sales and marketing expense (I^{SM}/Rev), all scaled by revenue. Confidence bars are at the 90% level. See Appendix Figure A6 for full industry scatter plots.

Figure 6: Share of Enterprise Value, by Industry-level I^{SM}/Rev



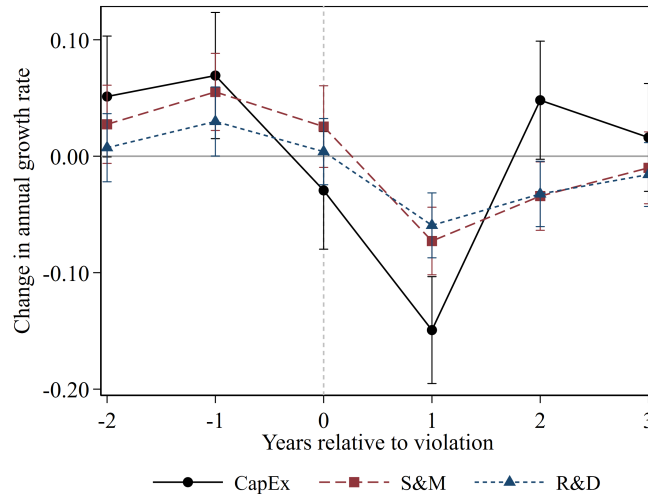
All industries are sorted into quartiles based on the industry-level median I^{SM}/Rev . This graph shows the share of total enterprise value over time for each quartile. The time series plots are weighted averages over three years centered on the year in question.

Figure 7: Explaining Q^{PH}



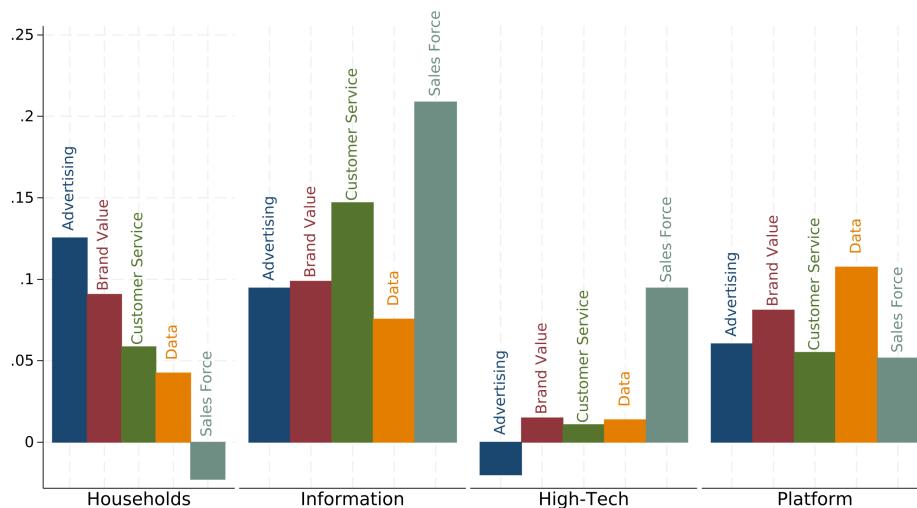
Bin-scatter plot at the industry level for the ratio of enterprise value to physical capital (Q^{PH}) against the ratio of intangible capital to physical capital (K^{IT}/K^{PH}). Confidence bars are at the 90% level. See Appendix Figure A7 for the full industry scatter plot.

Figure 8: Investment around New Covenant Violations



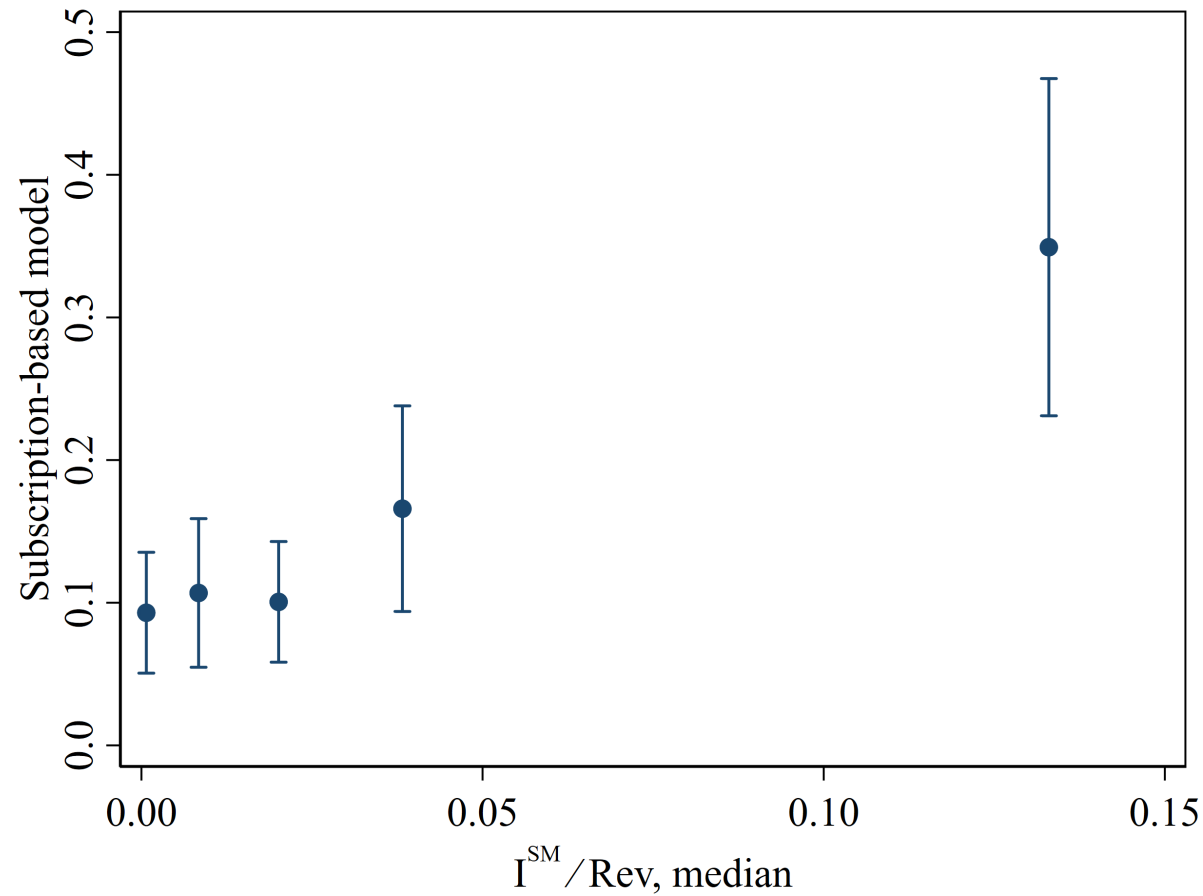
This figure plots event-study coefficient estimates around covenant violations. The dependent variables are annual growth rates of capital expenditures, sales and marketing expenses, and R&D expenses, winsorized at the 5% level. The x-axis reports fiscal years relative to the violation year, where 0 denotes the violation year. Confidence intervals are at the 95% level and are clustered at the firm level. Year fixed effects are included.

Figure 9: Explaining Sales and Marketing Strategies



Each bar in this graph represents how much a one-standard deviation change in the covariate on the horizontal axis affects the sales and marketing strategy listed at the top of each bar. For example, a one standard deviation increase in the share of firms in an industry selling to households leads to a 12 percentage point increase in that industry's share of firms emphasizing advertising as a strategy.

Figure 10: Use of Subscriptions and Sales and Marketing Intensity



Bin-scatter plot at the industry level for the fraction of companies in each industry that describe using a subscription-based business model against the industry median ratio of sales and marketing expense to revenue (I^{SM}/Rev). Confidence bars are at the 90% level. See Appendix Figure A12 for full industry scatter plots.

Internet Appendix

A On disclosure of sales and marketing expense

A.1 Disclosure rules and norms

During the period which our data span, 1997-2022, U.S. Generally Accepted Accounting Principles (GAAP) offered no explicit guidance regarding the reporting of sales and marketing expense. SEC Regulation S-X 5-03, on the other hand, requires that categories of “other operating expenses” be disaggregated on the income statement if these amounts are “material.” Rules of thumb in the industry indicate that if any category of costs is more than 10% of all costs, it should be disaggregated. While disclosure is of course not perfectly enforceable at this threshold, some firms face regulatory pressure to disaggregate sales and marketing expense in their filings. For example, resources from Deloitte indicate that if the SEC suspects a cost category is material and is not disaggregated, they may comment on the filing and ask you to amend the filing with that category disaggregated.⁴¹

In 2024, the Financial Accounting Standards Board (FASB) issued an Accounting Standards Update called *Income Statement—Reporting Comprehensive Income—Expense Disaggregation Disclosures* (ASU 2024-03). Under ASU 2024-03, effective for annual reporting periods beginning after December 15, 2026, firms will be required to disaggregate selling expenses from the rest of SG&A, and describe in the qualitative text what expenses are included. While this new rule clearly has no bearing on the data used in this study, it suggests that investors value knowing a firm’s selling expenses highly enough to petition FASB to require its disclosure.

When firms choose to disclose sales and marketing expense, it is overwhelmingly classified as a subcomponent of SG&A, rather than COGS. This is because sales and marketing are “period costs,” costs that cannot be directly associated with the production of the good, and are therefore expensed when incurred. In contrast, “product costs” which are included in COGS can be directly linked to an individual sale, and therefore can be expensed when the product is sold.

In this way, sales and marketing is similar to both advertising expenses and R&D. ASC 730-10-05-2 makes the following argument for why R&D should be expensed as incurred: “At the time most research and development costs are incurred, the future benefits are at best uncertain. In other words, there is no indication that an economic resource has been created.” The same logic applies to advertising, which is why both are required to be treated as costs and expensed as incurred, rather than allowing firms to capitalize them on the balance sheet.

Finally, SEC Regulation S-K outlines certain requirements for the content of the filing’s narrative text, with Item 101 addressing the Business Description (Item 1) and Item 303 addressing Management Discussion and Analysis (Item 7). Item 101(a) requires a “description of the general development of the business... during the past five years,” including the year and form of

⁴¹For more information, see Deloitte’s Accounting Research Tool, available [here](#).

the business’s organization, results of any bankruptcy or other receivership, any other material reclassification, any mergers or consolidations, acquisitions of material amounts of assets outside the ordinary course of business, or material changes in the mode of conducting business. Item 101(c) further requires the following 13 items be discussed in the business description: principal products produced or services rendered, new products, sources and availability of raw materials, intellectual property, seasonality, working capital practices, dependence on certain customers, backlog orders, government contracts, competitive conditions, research and development, compliance with environmental laws, and number of employees. While sales and marketing is not explicitly required under 101(c), it is likely included so widely in the text of filings because these activities offer information relevant to describing the product or services offered by the firm, the firm’s competitive position, whether it depends on particular customers, and the number of employees serving this particular function.

A.2 Disclosure incentives

As described in the main text, [Markovitch et al. \(2020\)](#) offers an excellent synthesis of the accounting literature on disclosure incentives, applied to the context of sales and marketing specifically. Their main points are summarized here, in addition to one consideration of our own.

The two primary reasons [Markovitch et al. \(2020\)](#) highlight as reasons for firms not to disclose are secrecy and reporting costs. Regarding the former, fluctuations in marketing expenditures may inform competitors that the firm is adjusting its strategy, so the firm may prefer to keep it private. Regarding the latter, a firm’s internal infrastructure for tracking and classifying expenditures may not be set up to monitor sales and marketing separately, and altering these internal systems to do so is not costless.

On the other hand, it is worth noting that SG&A is a vague cost category encompassing a wide variety of expenditures. If investors see that a firm’s SG&A is large, and do not know how much of it is truly intangible investment, they may perceive the firm as carrying around a heavy burden of overhead expenses. This could create an incentive for firms to disclose sales and marketing voluntarily, even if it is not considered material under standard thresholds.

A.3 Empirical propensity to disclose

For the reasons described above, firms’ incentives to disclose or not disclose sales and marketing are ambiguous on net. In order to mitigate concerns of potential selection bias arising from this disclosure choice, we test whether the choice to disclose is correlated with other firm characteristics. The results of these tests are shown in Appendix Table A1.

First, for the set of firms that merge successfully with the Revelio Labs data, we test whether total sales and marketing wage bill as a fraction of sales is predictive of whether the firm reports sales and marketing expense. The coefficient on sales and marketing wage bill is null both across industries (Column 1) and within industries (Column 2). This demonstrates that firms with high

and low levels of customer capital investment alike face incentives to disclose, and the firms that we observe in the data are a mix of presumed mandatory and discretionary reporters.

Next, in the full sample, we test whether reporting status is correlated with other firm characteristics, including log sales, log firm age, EBIT margin, and physical Q (Columns 3 and 4). None of these characteristics are strongly predictive of reporting status. While the coefficients on EBIT margin in both specifications and on log firm age in the within-industry specification are statistically significant, their magnitudes are economically negligible. The table presents the results of linear regressions, but logistic regressions yield results that are qualitatively and quantitatively similar.

B Data derived from filing text

This section describes the process employed in obtaining quantitative data from the text of SEC 10-K filings. Section B.1 discusses the process employed to extract sales and marketing expenses from the text and tables of the filing, which is used to supplement the Capital IQ data. Section B.2 describes the manual phase of collecting categorical variables based on the narrative text, which generated a few insights that guide our systematic data collection using Gemini. Section B.3 outlines the implementation of this process and assessments of performance quality.

B.1 Extracting sales and marketing expenses from text

In some cases, particularly prior to 2007, sales and marketing expense is reported by the firm in its 10-K, but is missing from the Capital IQ data. We therefore supplement the Capital IQ data by using Gemini to extract this number from the filing where it is included, employing a combination of prompt engineering and fine-tuning.

First, by manually searching a random sample of filings, we determine that sales and marketing expense, if it is disclosed, may be included in items 6, 7, 8, 14, or 15, and may be either in a table, the notes, or the main text. Next we proceed with prompt engineering, describing to the model where to look for sales and marketing expense, and providing it with the text of items 6, 7, 8, 14, and 15. The following prompt yields the best performance:

I am an economist studying firms' expenditures on sales and marketing. Many firms have a category of operating expenses that they call 'Marketing expense', 'Sales and marketing expense', 'Selling and marketing expense', 'Advertising and marketing expense', or another very similar name. Your task is to read the following excerpt from an SEC 10-K filing and determine whether the firm discloses this category of operating expense. Please pay special attention to the tables and 'Notes to consolidated financial statements' section. If this expense is not listed, respond only with 'NaN'. If a dollar amount for sales and marketing expenses is provided, please report the amount for the most recent year only, in millions of dollars. Here is the filing excerpt:

However, the above prompt on its own still behaves inconsistently, sometimes responding with the entire SG&A expense, the expense for the wrong year, the expense for an operating segment rather than the whole company, or even missing a very straightforward listing of sales and marketing expense in one of the main tables. To resolve these issues, we proceed with fine-tuning.

We assemble the training sample using the Capital IQ data for 240 firm-years for which Capital IQ identified a value for sales and marketing expense. We then divide these filings into sections 6, 7, 8, 14, and 15 separately, setting the correct output value to ‘NaN’ for the sections that do not contain the sales and marketing expense value. The full training sample therefore contains 1200 examples total, divided equally among the five sections and containing a mix of sales and marketing expense values and ‘NaN’s as correct outputs. The validation and testing samples were constructed similarly, comprising 80 firm-years and 400 total examples each.

The process of model tuning is conducted on Google’s Vertex AI development platform, using Gemini 2.0 Flash-Lite as the base model. Temperature is set to 0.1 and the maximum number of output tokens is set to 12. The Vertex AI platform optimizes the hyperparameters used in the tuning process based on the characteristics of the training and validation samples and the model’s performance in the task; following the guidance in Google’s documentation, we use the default settings rather than implementing our own hyperparameter tuning. The tuning process therefore uses 18 epochs, a learning rate multiplier of 1, and an adapter size of 1.

When applied to the test sample of 400 examples, the response from the tuned model deviated from the Capital IQ data in 46 cases, of which 25 were sections for which Gemini identified a sales and marketing expense number, while Capital IQ did not. For three sections, Capital IQ pulled the wrong number but the tuned model pulled the correct one, and in four sections, the tuned model pulled the wrong number but Capital IQ pulled the correct one. In the remaining fourteen sections, the sales and marketing expense did not appear in the filing, but Capital IQ was able to back-fill the expense from a later filing.

B.2 Manual data collection

We begin by manually consulting the qualitative information contained in the text of firms’ annual filings for a random sample of 150 firm-years dating back to 1997. We initially search the filings for mentions of “sales,” “marketing,” “advertising,” or “promotions,” which generates a few useful insights that we use to design our approach to systematically processing these texts using the Gemini LLM.

First, the company’s sales and marketing strategy is most prominently discussed in the Item 1 Business Description, and to a lesser extent in Item 7 Management Discussion and Analysis. It is rarely discussed elsewhere in the filing, enabling us to restrict attention to these parts of the text when working with the full sample. Item 1 frequently contains a subsection that discusses the company’s strategy for acquiring and retaining customers, often titled “Sales and Marketing” or “Marketing Strategy.” Below is an excerpt from the 2001 10-K filing for Gottschalks, Inc., a chain of department stores and specialty apparel retailers.

Marketing Strategy

The Company's marketing strategy is based on a multi-media approach, using newspapers, television, radio, direct mail and catalogs to highlight seasonal promotions, selected brand-name merchandise and frequent storewide sales events. Advertising efforts are focused on communicating branded merchandise offered by the Company, and the high levels of quality, value and customer service available in the Company's stores. In its efforts to improve the effectiveness of its advertising expenditures, the Company uses data captured through its proprietary credit card to develop segmented advertising and promotional events targeted at specific customers who have established purchasing patterns for certain brands, departments or store locations.

The Company's sales promotion strategy also focuses on special events such as fashion shows, bridal shows and wardrobing seminars in its stores and in the communities in which they are located to convey fashion trends to its customers. The Company receives reimbursement for certain of its promotional activities from some of its vendors.

Moreover, the presence of this subsection is common across a wide variety of industries, not only for firms that produce consumer products. Below is an excerpt from the 2017 10-K filing for Iteris, Inc., a producer of sensors that markets its products to government agencies and other firms.

Sales and Marketing

We currently sell our Roadway Sensors products through both direct and indirect sales channels. In the territories where we sell direct, we use a combination of our own sales personnel and outside sales organizations to sell, oversee installations and set-up issues, and support our products. Our indirect sales channel is comprised of a network of independent distributors in the U.S. and select international locations, which sell integrated systems and related products to the traffic management market. In the fourth quarter of our fiscal year ended March 31, 2018 ("Fiscal 2018"), we entered into a distribution agreement to expand our northern European sales coverage in the U.K. and Ireland. Our independent distributors are trained in, and primarily responsible for, sales, installation, set-up and support of our products, maintain an inventory of demonstration traffic products from various manufacturers, and sell directly to government agencies and installation contractors. These distributors often have long-term arrangements with local government agencies in their respective territories for the supply of various products for the construction and renovation of traffic intersections, and are generally well-known suppliers of various high-quality ITS products to the traffic management market. We periodically hold technical training classes for our distributors and end users, and maintain a full-time staff of customer support technicians throughout the U.S. to provide technical assistance when needed.

Here is an excerpt from the 2022 10-K filings of Chegg, Inc., a software company focusing on an education platform.

Sales and Marketing

Students Our direct to consumer marketing strategy focuses on brand and performance marketing. Brand marketing increases awareness of the Chegg brand and its services while performance marketing drives traffic to our site. We use several major direct marketing channels to reach students. The strength of our content flywheel drives significant organic traffic to Chegg. Our lifecycle marketing focuses on increasing activation, engagement and retention. We utilize three types of email marketing campaigns: onboarding programs to drive activation and retention, personalized cross-sell campaigns to deepen engagement, and promotional campaigns to drive sales and interests.

Brands We secure contracts with brands through direct sales by our field sales organization, which sells brand advertising services to large brand advertisers seeking to reach and engage college and high school students. This team has field sales people and marketing support.

Student Advocacy We are committed to providing a high level of customer service to our students and to fulfilling our brand promise of putting students first. We trust our students, understand the critical role our products and services have in their learning journey, and strive to resolve all problems quickly and thoroughly. Our student advocacy team can be reached directly through phone, email, and online chat during business hours. We also proactively monitor social media to identify and solve problems before we are otherwise informed of their existence. We endeavor to respond to students' concerns within five minutes.

Item 7, Management Discussion and Analysis, sometimes describes the company's sales and marketing activities that are included in either the advertising expense or selling, general, and administrative expense. One such example is this excerpt from the 2005 filing for Inventure Foods, Inc., a snack food manufacturer:

Critical Accounting Policies and Estimates

Advertising, Promotional Expenses and Trade Spending. The Company expenses production costs of advertising the first time the advertising takes place, except for cooperative advertising costs which are expensed when the related sales are recognized. Costs associated with obtaining shelf space (i.e. "slotting fees") are expensed in the period in which such costs are incurred by the Company. Anytime the Company offers consideration (cash or credit) as a trade advertising or promotion allowance to a purchaser of products at any point along the distribution chain, the amount is accrued and recorded as a reduction in revenue. Any marketing programs that deal directly with the consumer are recorded in selling, general and administrative expenses.

Second, we use the excerpts collected for this random sample of filings to assemble a taxonomy of the primary types of activities that companies identify as “sales and marketing,” or core to their strategy to retain and acquire customers. The most common activities discussed in the text are advertising, brand value, customer service, customer data, and employing a sales force. We use this taxonomy later in constructing the list of questions to ask Gemini about the text.

Third, manual readings reveal that a common reason firms describe their internal sales force as being so crucial to the success of the business is the technological sophistication of their products. Below is an example of this language from the 2012 10-K filing of Kopin Corp, a company that sells high-resolution microdisplays and optics:

We believe that the technical nature of our products and markets demands a commitment to close relationships with our customers. Our sales and marketing staff, assisted by our technical staff and senior management, visit prospective and existing customers worldwide on a regular basis. We believe these contacts are vital to the development of a close, long-term working relationship with our customers, and in obtaining regular forecasts, market updates and information regarding technical and market trends. We also participate in industry specific trade shows and conferences.

Our design and engineering staff is actively involved with a customer during all phases of prototype design and production by providing engineering data, up-to-date product application notes, regular follow-up and technical assistance. In most cases, our technical staff works with each customer in the development stage to identify potential improvements to the design of the customer’s product in parallel with the customer’s effort.

Finally, we identify a set of common false positives, discussions of activities using similar words to those in the above sales and marketing descriptions, but that are semantically different. For example, it is common in the logistics industry and for oil and gas producers to use the word “marketing” to describe the process of transporting output from the production site to the distributor, or from the distributor to the customer. Another type of false positive is particular to the pharmaceutical and biotechnology industries, where firms frequently describe the regulations they face that prohibit marketing their products before they have obtained approval to do so from the Food and Drug Administration. Third, gaming companies and other online platforms frequently earn revenues from advertising, and describe this revenue source in their business description. In our assessments of Gemini’s performance at reading and understanding the filings, we ensure it does not mistakenly interpret these types of text as “sales and marketing” for our purposes.

B.3 Text processing using Gemini

Based on our observations from reading the random sample of filings, we assemble the text for Item 1 Business Description and Item 7 Management Discussion and Analysis from the 10-K filings for

each firm and year in the sample. To do this, we use the edgar-crawler GitHub repository created by Loukas et al. (2021). These codes pull the html file for each filing from the SEC Edgar API, then clean the html text and divide it into each item using regular expressions. We pull the filings directly from the SEC’s API rather than using the edgar-corpus dataset on HuggingFace for two main reasons. First, the HuggingFace dataset ends in 2020, whereas our sample extends forward to 2022. Second, the GitHub repository contains updated bug fixes, which substantially improve the accuracy of splitting the full text of the filings into the constituent items.

We begin by ensuring that the LLM reads and understands the item text we give it similarly to our manual readings of the same text. In early iterations of our prompts, we describe to the model that sales and marketing activities are those that are aimed at acquiring and retaining customers. We then give it the Item 1 text from the filing, and ask the LLM to repeat back the sentences (if any) that discuss sales and marketing. We pose this task to Google’s Gemini 1.5 Flash and GPT’s 4o model in order to assess how well they each understand the text and the task; Gemini performs significantly better. Gemini responds with exactly the text we previously identified manually, and sometimes found additional information from the item that correctly describes sales and marketing activities but were missed in the manual reading. GPT 4o, in contrast, frequently responded with additional text from the item that was not relevant. Neither model exhibited “hallucinations,” responding with new text that did not originate from the item text we included in the prompt. Due to Gemini’s superior performance in this initial step, we proceed with prompt engineering for Gemini only. We set temperature to zero in order to minimize randomness in the model’s responses, and turn off all safety features in order to ensure that no relevant content is mistakenly omitted.

We opt to proceed with prompt engineering only, rather than employing retrieval-augmented generation (RAG) or fine-tuning techniques for this set of tasks. After only a few attempts at improving our prompts, the model performs extremely well at each task we pose. Since RAG or fine-tuning would therefore yield only modest improvements in performance but would impose additional costs and restrictions, we forego them. For all tasks besides the sales and marketing expense extraction and the prompts for “information” and “high-tech products,” we use the stable endpoint of Gemini 1.5 Flash. Since the “information” and “high-tech products” prompts were added after the retirement of the 1.5 model series, these prompts use the stable endpoint of Gemini 2.5 Flash-Lite.

In constructing our text-based variables for the full sample, we use the following system prompt for all requests: “You are a marketing consultant, specialized in reading SEC 10-K filings and understanding how firms conduct sales, marketing, and other activities associated with retaining and acquiring customers.” We then ask the LLM each of our questions in separate requests. We ask each question in a separate request to simplify the task for the model, and so that the model’s answer to each question is not contaminated by the other questions we ask or its responses to other tasks. The exact text of each task prompt, which item text we include in the prompt, and the economic concept of interest are included in Table A2. Consistent with the recommendations in Eisfeldt and Schubert (2024), we provide the model with a rubric, describing in detail what kinds of activities we consider to be “sales and marketing,” and what we mean by terms such as “platform.”

Our questions fall into three main categories: intangible investment intensity, types of sales and marketing activities, and expected determinants of sales and marketing investments. Our questions regarding sales and marketing intensity and R&D intensity are aimed at imputing zeros for a subset of the firm-years that do not report these investments. While no firms report these investments to be zero, it is clear from the text of the filing that some firms that do not report this number as a separate line item still engage in sales and marketing or R&D investments, so not all missing values can sensibly be interpreted as zero. We ask the model to read item 1 and item 7 separately and classify the intensity of sales and marketing or R&D investment into one of three categories: minimal, moderate, or substantial. If the model determines that sales and marketing or R&D investment is minimal based on both item 1 and item 7 independently, we impute that line item as zero.

There are a few tests that are conducted to ensure the sensibility of Gemini's responses. One such test is to compare Gemini's responses based on whether the firm reports sales and marketing as a non-zero expense. As a fraction of the total sample, only 1% of firm-year observations report sales and marketing as a non-zero expense and have Gemini classifying their sales and marketing expense to be minimal based on its reading of the text. It is extremely rare for a firm to report non-zero sales and marketing expenses as a line item and Gemini to classify their spending as minimal. However, conditional on Gemini reporting substantial spending on sales and marketing expense based on its reading of both Item 1 and Item 7, over 10% of firm-year observations have the income statement line-item for sales and marketing expense missing. This suggests that it would be a mistake to classify sales and marketing expense as zero if it is not detailed in the income statement.

We conducted another test that urges caution on imputing zeros for missing values of sales and marketing expense. This test exploits the availability of the Revelio Labs data for both firms with and without sales and marketing expense reported. In particular, the Revelio Labs data allows us to measure the salaries paid to sales and marketing professionals for firms with and without a line item reported for sales and marketing expenses. Using these data, we can measure the industry-level median salaries paid to sales and marketing workers to revenue ratio for both firms with and without sales and marketing expense reported in the income statement. The two measures are highly correlated across industries. In other words, the firms that do not report sales and marketing expense on their income statement have salaries paid to sales and marketing employees that is highly correlated with salaries paid to sales and marketing employees by firms that do report sales and marketing that are in the same industry. This test also helps show the robustness of the industry-level variation in sales and marketing expense.

We also ask the model to determine which types of sales and marketing activities the firm engages in based on its reading of the item 1 text. Based on the taxonomy constructed from the manual reading, we ask the model about whether the following types of activities are core to the firm's sales and marketing strategy: advertising, building the value of the brand, acquisition and use of customer data, customer service, and an internal sales force. We then ask the model a few questions about the firm's business model, in order to construct our empirical proxies for the underlying frictions present in the firm's product market. We ask whether the firm's primary customers are households, businesses, or the government, whether the firm emphasizes communicating information to its cus-

tomers, whether the firm sells high-tech products, and whether the firm operates a platform-based business model. Finally, to understand whether the firm attempts to extend the duration of customer relationships in other ways, we ask the model whether the firm uses a subscriptions-based model, or other sales model that similarly involves a contract and recurring sales.

It is well-known that LLMs are trained on an immense corpus of information, and therefore Gemini could be answering our questions using knowledge outside of the text we provide in the prompt, such as the reported sales and marketing expense amount listed elsewhere in the filing. We think the risk of this is minimal for two main reasons. First, Gemini occasionally responds that the text does not contain enough information to answer the question. If the model were easily able to reference outside information, it would likely be able to infer from other sources whether, for example, the firm’s primary customers are households, other businesses, or the government. Since it sometimes cannot find an answer to the question, this suggests the model likely restricts attention to the text provided rather than consulting all information contained in the model.

Second, we conduct an additional test, in which we compare Gemini’s response to our question with Gemini’s response when asked to explain its reasoning. When Gemini outlines its reasoning for these answers, it never cites information such as the firm’s industry, additional variables from elsewhere in the filing, news sources, or other outside information. On rare occasions, the model demonstrates making inferences from the text in order to answer the question. For example, when justifying its reasoning for why sales and marketing expenses appear to be “minimal” for George Foreman Enterprises, Inc., part of Gemini’s reasoning cited the following logic: “The 10-K highlights the company’s financial difficulties, including a severe cash shortage and default on promissory notes. This suggests limited resources available for marketing investments.” Again, these instances are rare, and it is more likely that the model makes these inferences when asked to explain its reasoning, relative to answering the question without explaining.

It should be noted that LLMs sometimes deliver different answers when asked a question outright and when asked to explain its reasoning. In order to minimize the occurrence of such disagreements, we asked the model to explain its reasoning *after* providing the answer; this leaves little room for the model to “think” too hard about the question, and potentially generate the unwanted logical inferences described above. This strategy appears to have been effective, as Gemini’s answers when asked to explain its reasoning deviated from the original answer only in rare cases. We cannot fully rule out the possibility that our text-based variables are mechanically correlated with other measures included in the regressions, but we believe the risk of this contamination is low.

C Customer capital from purchase price allocations

The purchase price allocation dataset comes from Business Valuation Resources’ (BVR) DealStats database, which tracks M&A transaction records. BVR collects information on transactions related to public firms from SEC filings, including 10-K, 10-Q, 8-K(A), S-1, and S-4(A), and private firm transactions from various national and regional brokerage associations. BVR employs a team of

financial analysts to verify the database’s accuracy. For more information on the database and purchase price allocation, refer to [He \(2022\)](#). This section focuses on the extraction process for customer relationship intangible valuations, the accounting methods used for their valuation, and how estimates of useful life can affect depreciation rate calculations.

In PPA, the types of assets and their corresponding valuations for the target firm are reported.⁴² The BVR DealStats database stores these PPA details in unstructured text fields (notes) associated with each transaction record, which reproduce the relevant disclosures from the underlying SEC filings. We apply regular expressions to these notes fields to extract asset-level valuations. For example, the notes entry for the 8-K/A filing of Men’s Wearhouse, Inc. on September 2, 2014, detailing its acquisition of Jos. A. Bank Clothiers, Inc., contains the text from which we extract “tradename: \$539.1 million” and “customer relationship: \$53 million.” In this case, no other customer-related intangible assets were recorded, so the total customer capital for this deal amounted to \$592.1 million.

We also consider other potential terms related to customer capital; for example, for customer relationships, we include valuation associated with “customer”, “client”, “loyalty program”, “user base”, “customer base”, and “membership”. For a detailed list of items we include in our analysis, refer to Table A11. Customer capital includes “customer relationship”, “customer list”, “customer contract”, “trademark/trade names”, “brands”, “business relationship”, and “domain”.

The fundamental idea behind valuing these assets is to assess the firm’s value with and without those assets. One method to achieve this is by projecting the future cash flows generated by the customer capital and discounting them to present value. In practice, accountants have developed several commonly used methods for this purpose.

The most common approach to valuing customer relationships is the Multi-Period Excess Earnings Method (MPEEM), which focuses on estimating future revenue and earnings specifically attributable to these relationships. This method uses a discounted cash flow analysis to estimate the present value of future cash flows attributable to each customer segment, factoring in customer attrition rates and excess earnings generated by these customers. The projected cash flows are then discounted to present value. Critical factors in valuing customer capital include customer retention rates and the churn rate (i.e., the rate customers leave).

Another valuation method for assets like trademarks and domain names is the Relief from Royalty Method (RRM). This method is ideal for assets tied to specific revenue streams, where data on royalty fees from comparable market transactions are available. The RRM calculates value based on the hypothetical royalty payments saved by owning the asset rather than licensing it. The logic behind this approach is that owning an intangible asset allows the entity to avoid paying royalties to use that asset.

The main analysis uses estimates of customer capital depreciation based on the useful life estimates of customer-related intangibles from the PPA data. An alternative method is to estimate rates of customer churn. [Gourio and Rudanko \(2014\)](#) cites a number of industry assumptions on

⁴²Goodwill, including synergies, is reported separately.

the turnover in the customer base to justify a depreciation rate of 15% for customer capital. We separately collect data from industry reports, and we also collect rates of customer churn from [Baker et al. \(2023\)](#). Generally, the rates of customer churn are significantly higher, in the 30 to 35% range.

Our preference for using the PPA information to estimate customer capital depreciation is three-fold. First, a disadvantage of using the rates of customer churn from industry reports or from [Baker et al. \(2023\)](#) is that they are only available for a subset of the industries in the sample. The PPA data set is large enough to allow industry-level estimates of depreciation for all 2-digit NAICS codes in the sample. Second, the industry-level reports do not contain sufficient detail as to the inputs that justify the ultimate depreciation rates; in addition, while the [Baker et al. \(2023\)](#) estimates of customer churn are a major step forward in the literature, they are based on consumer-level data obtained through credit card transactions. These data cannot be used to estimate depreciation rates on customer capital for business-to-business-focused companies. Finally, the depreciation rate calculated from useful life estimates for customer-related assets specifically is the closest conceptually to a true depreciation rate on customer capital, in our opinion.

Given the large level difference between the PPA estimates and the customer churn estimates, we conduct a robustness exercise for Table 6 where we assume a depreciation rate of 30% across all industries. This is reported in Appendix Table A3. Not surprisingly, this leads to a significantly smaller amount of the book value of customer capital. However, the industry-level variation remains similar qualitatively, and the core results using the capitalized book value are robust.

D Measuring SG&A

Compustat and Capital IQ measure SG&A differently. A regression of one on the other yields an R^2 of 0.89. As a general rule, the mapping from the information on the 10-K filing to the Capital IQ data is more transparent than the mapping to Compustat. For this reason, this study uses the Capital IQ measure of SG&A. Two adjustments to the Compustat measure of SG&A explain the discrepancy. As is well known, Compustat's measure of SG&A includes R&D expenses; Capital IQ does not include R&D in SG&A. In addition, if the firm separately reports a line item called "general and administrative" expenses, it appears that Compustat reclassifies these expenses into COGS. Several other researchers have noted the lack of clarity in the mapping of 10-K information to the actual variables in Compustat as well. See, for example, page 271 of the appendix of [Peters and Taylor \(2017\)](#) in which there is a detailed discussion on the difficulties in separating R&D expense from SG&A expense in Compustat. As a general rule, it is difficult to ascertain what exactly is included in the *xsga* variable in Compustat. Capital IQ provides a transparent definition of SG&A, and the Capital IQ interface contains hyper-links that allow one to see what information in the underlying 10-K filing generates the value recorded in Capital IQ. In particular, the definition of SG&A in Capital IQ includes: Equipment expense, salaries and other employee benefits, occupancy expense, insurance expenses, stock-based compensation (some of which is also included in sales and marketing expense based on the position of the employee being compensated), net rental expense,

selling and marketing expense, and general and administrative expense.

E A static model of sales and marketing

Following the model in the appendix of [Bond, Hashemi, Kaplan and Zoch \(2021\)](#), this appendix section presents a model in which sales and marketing expense is an input into the generation of firm revenue that works through shifting demand. Suppose a firm produces output Q using a single flexible production input X^Q .

$$Q = \mathcal{F}(X^Q)$$

where $\mathcal{F} : \mathbb{R}_+ \rightarrow \mathbb{R}_+$ and is twice continuously differentiable. D is a demand shifter that the firm can influence through a demand-shifting input, X^D .

$$D = \mathcal{D}(X^D)$$

The firm's revenue function is given by

$$\mathcal{R} \equiv \mathcal{P}(Q, D)Q$$

where the firm's revenue $\mathcal{R}$ depends on the price $\mathcal{P}(Q, D)$, which is a function of both the quantity produced Q and the demand shifter D .

The input prices of X^Q and X^D are denoted W^Q and W^D , respectively, and they are taken as given. The firm faces the following profit maximization problem:

$$\Pi = \max_{Q, D} \mathcal{P}(Q, D)Q - C_Q(Q; W^Q) - C_D(D; W^D)$$

where $C_Q(\cdot)$ is the firm's cost function for producing output, defined by

$$\begin{aligned} C_Q(Q; W^Q) &= \min_{X^Q} W^Q X^Q \\ \text{s.t. } Q &\leq \mathcal{F}(X^Q) \end{aligned}$$

and $C_D(\cdot)$ is the firm's cost function for shifting demand, defined by

$$\begin{aligned} C_D(D; W^D) &= \min_{X^D} W^D X^D \\ \text{s.t. } D &\leq \mathcal{D}(X^D) \end{aligned}$$

Let λ denote the Lagrange multiplier on the demand-shifting constraint. By the envelope theorem, this quantity captures the marginal cost of influencing demand.

$$\lambda = \frac{\partial C_D(\cdot)}{\partial D} \quad (8)$$

Likewise, let ζ denote the Lagrange multiplier on the output constraint, which captures the marginal cost of production.

$$\zeta = \frac{\partial C_Q(\cdot)}{\partial Q}$$

From the cost minimization first-order conditions, we have

$$W^D = \lambda \frac{\partial \mathcal{D}(\cdot)}{\partial X^D} \quad (9)$$

$$W^Q = \zeta \frac{\partial \mathcal{F}(\cdot)}{\partial X^Q} \quad (10)$$

Profit maximization implies

$$\frac{\partial \mathcal{P}(\cdot)}{\partial D} Q = \frac{\partial C_D(\cdot)}{\partial D} \quad (11)$$

$$\frac{1}{P} \frac{\partial C_Q(\cdot)}{\partial Q} = 1 - \eta^{-1}$$

Where η is the absolute value of the price elasticity of demand ($|\frac{P}{Q} \frac{\partial Q}{\partial P}|$). Let ρ denote the elasticity of revenue with respect to the demand shifter D .

$$\rho \equiv \frac{D}{PQ} \frac{\partial \mathcal{R}(\cdot)}{\partial D}$$

Using (11), this implies

$$\rho = \frac{D}{PQ} \frac{\partial C_D(\cdot)}{\partial D} \quad (12)$$

Let θ^D denote the elasticity of D with respect to the demand-shifting variable input X^D .

$$\theta^D \equiv \frac{X^D}{D} \frac{\partial \mathcal{D}(\cdot)}{\partial X^D} \quad (13)$$

Finally, let the share of revenue paid to the demand-shifting input be given by

$$\alpha^D \equiv \frac{W^D X^D}{PQ}$$

Using (8), (9), and (11), we can rewrite the above as

$$\alpha^D = \frac{X^D}{PQ} \frac{\partial \mathcal{P}(\cdot)}{\partial D} Q \frac{\partial \mathcal{D}(\cdot)}{\partial X^D}$$

Therefore, using (12) and (13) we can rewrite the share of revenue paid to the demand-shifting input as the product of two elasticities: the elasticity of revenue with respect to the demand shifter, and the elasticity of the demand shifter with respect to the demand-shifting variable input.

$$\alpha^D = \rho \theta^D$$

where ρ is the elasticity of revenue with respect to demand ($\frac{D}{PQ} \frac{\partial \mathcal{R}(\cdot)}{\partial D}$), and θ^D is the elasticity of demand with respect to the variable demand-shifting input ($\frac{X^D}{D} \frac{\partial \mathcal{D}(\cdot)}{\partial X^D}$). The equilibrium share of sales and marketing expense to revenue is equal to fundamental parameters of the revenue function: ρ and θ^D . It is therefore natural to use the variable I^{SM}/Rev as the key measure of a firm's spending on sales and marketing.

F Additional evidence that sales and marketing is an investment

How do firms describe their sales and marketing strategy?

As mentioned in Section 2.4, firms extensively discuss their sales and marketing strategies in their 10-K filings. To uncover whether firms describe their strategies as an investment or as a cost, Gemini is provided the following prompt:

Firms frequently describe some of their operations as ‘sales and marketing’. We are economists trying to determine whether firms conduct sales and marketing activities as a cost of doing business, where they have to spend on sales and marketing to make each sale, or as an investment in long-lived customer relationships that prove valuable to the company over time. Please read the following document and tell us whether the firm describes its sales and marketing expenses as costs of making each sale or as an investment in building and maintaining a customer base, which retains some of its value over time like a type of asset. Please provide an answer that is only a single word, either ‘cost’ or ‘investment’. Here is the document:

Gemini's answer to this question is “investment” for 74% of the firm-year observations in the sample. Furthermore, as shown in the left panel of Figure A13, firms in industries with a higher median I^{SM}/Rev use language more consistent with their sales and marketing strategy being an investment. For the industries in the top quintile of the median I^{SM}/Rev distribution, nearly 90% of firms use language more consistent with the sales and marketing strategy being an investment.

One concern is that firms engage in “cheap talk”: investors view these expenses more positively if they are described as an investment rather than a cost, and firms with high sales and marketing

expense use language that caters to this view. The right panel shows that industry-median Q^{PH} is strongly positively correlated with the fraction of firms in the industry that describe sales and marketing expenses as investments. The language firms use appears to match reality: firms that describe their sales and marketing strategy as building a valuable customer base are firms that have a higher market value attached to their intangible capital.

We also ask Gemini to explain its reasoning for its classification, and its answers elucidate how sales and marketing strategies are a long-term investment in the customer base. For example, after reading the 2014 10-K filing of Consolidated Communications Holdings Inc, a communications services company, Gemini says:

Investment. Consolidated Communications explicitly states that their sales and marketing activities aim to increase customer loyalty and retention (page 10). The company also highlights their efforts to “increase revenue per customer” through service bundles and value-added services (page 17), indicating a focus on building long-term relationships rather than simply covering the cost of each individual sale. The description of their marketing strategy as a key component of their overall business strategy further supports the interpretation of sales and marketing as an investment in customer relationships.

For the 2019 10-K filing of Dean Foods Company, a food and beverage company focused on dairy products, Gemini points to the importance of branding:

Investment. Dean Foods describes their sales and marketing as integral to their long-term strategy. The company states their strategy is “to invest and grow our portfolio of brands while strengthening our operations and capabilities to achieve a more profitable core business” (Item 1. Business, Current Business Strategy). This explicitly frames sales and marketing not as a per-unit cost, but as an investment in brand building and growth, implying a long-term return on these expenditures. Further, the description of their sales force operating on a local and regional basis, with some national accounts managed centrally, suggests a focus on building and maintaining customer relationships rather than simply making individual sales.

In contrast, Gemini views the sales and marketing efforts of HKN, Inc, an energy-based company that owns oil and gas assets in the Gulf Coast region, as more consistent with a variable input cost. After reading HKN Inc’s 2010 10-K filing, Gemini says:

Cost. The provided 10-K filing focuses heavily on the firm’s oil and gas operations, describing sales and marketing activities implicitly rather than explicitly. The document details production costs, revenue generation tied directly to production volume and commodity prices, and expenses related to maintaining and improving existing assets (e.g., upgrades to Main Pass 35). There is no mention of marketing campaigns,

advertising, customer relationship management systems, or other activities typically associated with building long-term customer relationships. The emphasis is entirely on the cost of extraction and sale of oil and gas, with revenue directly tied to production. Therefore, sales and marketing are treated as a cost of doing business, inextricably linked to the immediate act of production and sale.

Consistent with the broader pattern in Figure A13, HKN, Inc does not break out sales and marketing expense as a sub-component of SG&A, and Gemini finds “minimal” spending on sales and marketing based on its reading of the text.

Evidence from the entrepreneurship literature

A common framework used to value companies in the entrepreneurship literature and the venture capital industry is to compare the lifetime value of the customer (LTV) to the customer acquisition cost (CAC). It is difficult to pinpoint the original source of this framework, but it is commonly taught in entrepreneurship classes and discussed extensively in industry literature, especially for the Software as a Service (SaaS) sector.⁴³ This framework corresponds closely to the NPV framework taught widely in finance classes to evaluate whether an investment should be undertaken.

More specifically, the CAC includes both variable and new fixed costs to acquire a new customer. To calculate CAC, the framework advises to use total sales and marketing expense per customer and then subtract the part of the sales and marketing expense that is directed toward existing customers. This is the “investment cost” per new customer. The LTV then includes the present value of the future marginal profits per customer per year. It is crucial in this step to use marginal revenue minus marginal cost per customer per year, which corresponds closely to the idea of a markup. The flow of future profits earned per customer is then discounted using standard finance tools. The ratio of the LTV to the CAC then represents the net present value of an investment in customer capital, where a ratio above 1 would be considered a positive NPV project.⁴⁴

The professionals who developed this framework clearly interpret the expenses to acquire new customers as an investment. For example, David Skok writes:

SaaS businesses face significant losses in the early years (and often an associated cash flow problem). This is because they have to invest heavily upfront to acquire the customer, but recover the profits from that investment over a long period of time. The faster the business decides to grow, the worse the losses become. Many investors/board members have a problem understanding this, and want to hit the brakes at precisely the moment when they should be hitting the accelerator.

⁴³Two prominent examples are the [SaaS Metrics Framework by Udata Partners](#), and the [SaaS Metrics 2.0 framework by David Skok](#). The description of this framework in this section follows from the teaching slides of Steve Kaplan at Chicago Booth.

⁴⁴Professionals usually state that a good business will have an LTV to CAC ratio higher than 3. This is likely because they are considering the average of the projects undertaken by the firm, not the marginal project.

The [SaaS Metrics Framework by Updata Partners](#) concludes by describing the rCAC (Return on Total Customer Acquisition Cost) as:

rCAC is the multiple of acquisition cost provided by a customer's lifetime gross profit ($\text{rCAC} = \text{LTV}/\text{tCAC}$). rCAC provides a churn-adjusted view of unit economics by combining GMPP [Gross Margin Payback Period] with expected customer lifetime. In conventional terms, this is the ROI [Return on Investment] on the spend to acquire a customer, perhaps the most important thing to know when analyzing a business model.

Recent developments in venture capital suggest that VCs are willing to finance such investment in customer capital directly. For example, the venture capital firm General Catalyst offers a product that provides non-dilutive financing that is directly tied to a company's sales and marketing budget. The specific product provides up to 80% of the sales and marketing budget of the company, where the payment of the company back to General Catalyst depends on the growth in the customer base.⁴⁵ As General Catalyst notes:

GC created the Customer Value strategy to solve the issue of how to fund S&M/CAC [sales and marketing/customer acquisition cost] ... We did this by treating S&M/CAC as though it's an asset. With this strategy, GC pre-funds a company's S&M budget. In return, GC is entitled only to the customer value created by that spend, and GC's entitlement is capped at a fixed amount. After GC reaches that fixed amount, the remaining lifetime value of the customers is the company's to keep forever.

⁴⁵Details on this financing arrangement can be found [here](#) and [here](#). We are grateful to Sean Higgins for informing us of this product.

G Appendix tables and figures

Table A1: Propensity to Report Sales & Marketing Expense

	Dependent variable: 1/0 Reports Sales & Marketing Expense			
	(1)	(2)	(3)	(4)
SM Salaries/Sales	0.002 (0.054)	-0.019 (0.022)		
ln(Sales)			-0.003 (0.006)	-0.002 (0.004)
ln(Firm Age)			-0.037 (0.022)	-0.028* (0.014)
EBIT/Sales			0.004** (0.000)	0.003** (0.000)
Q^{PH}			0.001 (0.000)	0.000 (0.000)
Observations	28,903	28,903	80,601	80,601
R ²	0.000	0.241	0.014	0.173
FEs		NAICS 3		NAICS 3

This table presents regressions of an indicator variable for whether the firm reports sales and marketing expense on firm characteristics. For firms that merge successfully with the Revelio Labs data, we regress whether the firm reports on its total sales and marketing salaries scaled by sales. For the full sample, we regress reporter status on log sales, log age, EBIT margin, and physical Q (enterprise value divided by the book value of tangible assets).

Table A2: Questions Used for 10-K Analysis

10-K Item	Concept of Interest	Question
Item 1, 7	Sales & marketing intensity	“We are economists conducting research on the spending done by firms on sales and marketing. Your task is to read the following document and determine the extent to which the firm spends resources on marketing, advertising, product promotion, branding, customer service, sales force, and other closely related activities. Based on your reading of the document, please use your best judgement to classify the extent of their spending on such activities into one of three categories: minimal, moderate, or substantial. Please limit your answer to one word from the following three: minimal, moderate, or substantial. Here is the document:”
Item 1	Brand value	“We are economists conducting research on the spending done by firms on sales and marketing. Your task is to read the following document and determine the specific factors that the firm spends resources on in their sales and marketing strategy. Based on your reading of the document, please use your best judgement to answer the following question: Is an emphasis on increasing brand value an important element in the firm’s sales and marketing strategy? Please provide an answer that is only a single word, either yes or no. Here is the document:”
Item 1	Sales force	“We are economists conducting research on the spending done by firms on sales and marketing. Your task is to read the following document and determine the specific factors that the firm spends resources on in their sales and marketing strategy. Based on your reading of the document, please use your best judgement to answer the following question: Is an emphasis on a sales force or a sales staff an important element in the firm’s sales and marketing strategy? Please provide an answer that is only a single word, either yes or no. Here is the document:”
Continued on next page		

Table A2 – continued from previous page

10-K Item	Concept of Interest	Question
Item 1	Advertising	“We are economists conducting research on the spending done by firms on sales and marketing. Your task is to read the following document and determine the specific factors that the firm spends resources on in their sales and marketing strategy. Based on your reading of the document, please use your best judgment to answer the following question: Is an emphasis on advertising an important element in the firm’s sales and marketing strategy? Please provide an answer that is only a single word, either yes or no. Here is the document:”
Item 1	Customer data usage	“We are economists conducting research on the spending done by firms on sales and marketing. Your task is to read the following document and determine the specific factors that the firm spends resources on in their sales and marketing strategy. Based on your reading of the document, please use your best judgment to answer the following question: Is an emphasis on obtaining and using customer data an important element in the firm’s sales and marketing strategy? Please provide an answer that is only a single word, either yes or no. Here is the document:”
Item 1	Customer service	“We are economists conducting research on the spending done by firms on sales and marketing. Your task is to read the following document and determine the specific factors that the firm spends resources on in their sales and marketing strategy. Based on your reading of the document, please use your best judgment to answer the following question: Is an emphasis on customer service an important element in the firm’s sales and marketing strategy? Please provide an answer that is only a single word, either yes or no. Here is the document:”
Continued on next page		

Table A2 – continued from previous page

10-K Item	Concept of Interest	Question
Item 1	Customers	“We are economists conducting research on the spending done by firms on sales and marketing. Your task is to read the following document and determine the extent to which the firm spends resources on marketing, advertising, product promotion, branding, customer service, sales force, and other closely related activities. Your task is to read the following document and determine the primary customers of the firm in question. Specifically, does the firm primarily market its products to households, businesses, or the government? Please provide an answer that is only a single word: households, businesses, or the government. Here is the document:”
Item 1	Information	“We are economists conducting research on the nature of firms’ interactions with their customers. Specifically, we’re interested in identifying firms that need to provide detailed information to the customer in order to make a sale, which we call ‘information-intensive’ businesses. It may be necessary for the firm to provide information to the customer because (i) it is difficult for customers to find the right product or compare competing products, (ii) the product and its features may be difficult for customers to understand, or (iii) customers may not fully understand the pricing of the product. Your task is to read the following document and answer the following question: Does the firm explicitly discuss the necessity of providing information to the customer about the product in order to make a sale? Please respond with one word only: ‘Yes’ if communicating product information to the customer is important to the firm’s business model, or ‘No’ if it is not. Please use your best judgment to respond using only the text provided below, and no outside knowledge or deductive reasoning. Here is the document:”
Continued on next page		

Table A2 – continued from previous page

10-K Item	Concept of Interest	Question
Item 1	High-Tech Products	“You are a member of our team of economic analysts tasked with classifying firms based on their core product offerings. We are interested in identifying firms that sell ‘high-tech products’ as core to their business. For this analysis, a ‘high-tech product’ is defined as a proprietary product whose primary value is derived from its cutting-edge, innovative, and inherently technological nature. This type of product is engineering-intensive, rather than basic science-intensive. Your task is to read the following document and answer the following question: Does the firm sell ‘high-tech’ products? Please provide an answer that is only a single word, either yes or no. Here is the document:”
Item 1	Platform business model	“We are economists conducting research on the underlying business models used by firms. One business model involves building a platform on which individuals or other entities interact. A platform business model involves profiting from a platform that allows two or more groups of users to interact. Your task is to read the following document and answer the following question: Is such a platform part of the business model of the firm? Please provide an answer that is only a single word, either yes or no. Here is the document:”
Continued on next page		

Table A2 – continued from previous page

10-K Item	Concept of Interest	Question
Items 1,7 (combined)	Subscriptions	“We are economists conducting research on the underlying business models used by firms. One business model involves selling subscriptions to customers, so that customers continue to purchase your products on a recurring basis by default. A subscription business model involves selling products or services to customers via subscriptions, profiting from recurring payments and extending the duration of the relationship with the customer. Your task is to read the following document and answer the following question: Does the firm discuss subscriptions or other recurring revenue streams as part of the firm’s business model? Please provide an answer that is only a single word, either yes or no. Here is the document:”
Item 1, 7	R&D intensity	“We are economists conducting research on the spending done by firms on research and development. Your task is to read the following document and determine the extent to which the firm spends resources on research and development and other closely related activities. Based on your reading of the document, please use your best judgement to classify the extent of their spending on such activities into one of three categories: minimal, moderate, or substantial. Please limit your answer to one word from the following three: minimal, moderate, or substantial. Here is the document:”
Continued on next page		

Table A2 – continued from previous page

10-K Item	Concept of Interest	Question
Items 1, 7 (combined)	Cost vs. Investment	“Firms frequently describe some of their operations as ‘sales and marketing’. We are economists trying to determine whether firms conduct sales and marketing activities as a cost of doing business, where they have to spend on sales and marketing to make each sale, or as an investment in long-lived customer relationships that prove valuable to the company over time. Please read the following document and tell us whether the firm describes their sales and marketing expenses as costs of making each sale or as an investment in building and maintaining a customer base, which retains some of its value over time like a type of asset. Please provide an answer that is only a single word, either ‘cost’ or ‘investment’. Here is the document:”

Table A3: Explaining Variation in Q^{PH} across Industries, Depreciation Robustness

	Dependent variable: Q^{PH} , median			
	(1)	(2)	(3)	(4)
$K^{IT}/K^{PH}, \delta^{SM} = .15$	1.06** (0.14)		1.08** (0.10)	
$K^{IT}/K^{PH}, \delta^{SM} = .30$		1.27** (0.17)		1.29** (0.12)
Rev g forecast, median			-5.81 (9.65)	-5.58 (9.97)
Firm age, median			-1.46* (0.59)	-1.31* (0.61)
Constant	1.32** (0.13)	1.38** (0.13)	2.27** (0.83)	2.25* (0.86)
Observations	69	69	69	69
R^2	0.812	0.804	0.823	0.813

Table A4: Additional Summary Statistics

	N	Wgt Avg	p10	p25	Median	p75	p90
Panel A. Scaled by capital variables							
I^{SM}/K	60,451	0.034	0.000	0.005	0.037	0.099	0.170
I^{RD}/K	54,668	0.025	0.000	0.000	0.019	0.080	0.158
I^{CX}/K	67,992	0.053	0.003	0.010	0.027	0.058	0.111
Q^{PH}	67,806	5.112	0.648	1.193	3.222	9.882	29.854
Panel B. All investment variables available							
I^{SM}/K	48,119	0.035	0.000	0.007	0.040	0.102	0.170
I^{RD}/K	48,119	0.024	0.000	0.000	0.021	0.081	0.156
I^{CX}/K	48,119	0.052	0.003	0.009	0.024	0.052	0.099
Q^{PH}	47,845	5.430	0.679	1.378	3.764	11.102	32.684

Table A5: Industries, 3-Digit NAICS, and Median I^{SM}/Rev

		I^{SM}/Rev , median			I^{SM}/Rev , median
Agri, Mining, Const, Utilities			Transportation		
111	Crop Production	0.008	481	Air Transp	0.039
112	Animal Production & Aqua-culture	0.029	482	Rail Transp	0.000
211	Oil & Gas Extraction	0.000	483	Water Transp	0.000
212	Mining (except Oil & Gas)	0.000	484	Truck Transp	0.002
213	Mining Support Activities	0.000	485	Ground Passenger Transit	0.129
221	Utilities	0.000	486	Pipeline Transp	0.000
236	Constr of Buildings	0.013	488	Transp Support Svcs	0.007
237	Heavy & Civil Eng Constr	0.001	492	Couriers & Messengers	0.008
238	Specialty Trade Contractors	0.002			
Manufacturing			Telecom & Info Services		
311	Food Mfg	0.058	512	Film & Sound Recording	0.043
312	Bev & Tobacco Prod Mfg	0.115	513	Publishing Industries	0.307
313	Textile Mills	0.012	516	Broadcasting & Media	0.031
314	Textile Product Mills	0.008	517	Telecom	0.051
315	Apparel Mfg	0.041	518	Data Processing & Hosting	0.216
316	Leather Product Mfg	0.051	519	Other Information Svcs	0.257
321	Wood Product Mfg	0.010			
322	Paper Mfg	0.029	Professional Services		
323	Printing Support Activities	0.057	541	Professional Svcs	0.097
324	Petrol & Coal Prod Mfg	0.001			
325	Chemical Mfg	0.027	Admin & Healthcare		
326	Plastics & Rubber Prod Mfg	0.029	561	Admin & Support Svcs	0.016
327	Mineral Product Mfg	0.013	562	Waste Mgmt Svcs	0.004
331	Primary Metal Mfg	0.002	611	Educational Svcs	0.137
332	Fabricated Metal Prod Mfg	0.022	621	HealthCare Svcs	0.014
333	Machinery Mfg	0.030	622	Hospitals	0.001
334	Computer & Electronic Mfg	0.092	623	Nursing Facilities	0.002
335	Electrical Equip Mfg	0.042			
336	Transp Equipment Mfg	0.012	Performing Arts & Accomodation		
337	Furniture Mfg	0.044	711	Performing Arts & Sports	0.030
339	Medical Equip Mfg	0.130	713	Amusement & Recreation	0.036
			721	Accommodation	0.028
			722	Food Svcs & Drink Places	0.026
Wholesalers & Retail					
423	Durable Goods Whslrs	0.009	Maintenance & Personal Services		
424	Nondurable Goods Whslrs	0.012	811	Repair & Maintenance	0.024
441	Motor Vehicle Retail	0.010	812	Personal Svcs	0.068
444	Building Material Retail	0.015			
445	Food & Bev Retail	0.008			
449	Appliances & Elec Retail	0.042			
455	General Merch Retail	0.026			
456	HealthCare Retail	0.018			
457	Gas Stations & Fuel Dealers	0.002			
458	Clothing & Accs Retail	0.030			
459	Misc Retail	0.057			

Table A6: Robustness of relationship between Q and I^{SM}/Rev using Hoberg & Phillips (2016) industry classification (must have at least 5 firms to be included)

Hoberg & Phillips no. of industries:	Dependent variable: Q^{PH} , median			
	50	100	200	300
I^{SM}/Rev , median	16.44*** (4.42)	13.25*** (6.78)	17.39*** (4.57)	14.96*** (4.30)
I^{RD}/Rev , median	17.40*** (8.66)	8.682*** (8.93)	7.454*** (10.49)	7.737*** (6.02)
Constant	2.474*** (6.76)	2.805*** (9.44)	2.566*** (11.38)	2.705*** (11.29)
R^2	0.513	0.336	0.326	0.317
Observations	49	97	164	203

Table A7: Summary Statistics for Industry Level Covariates

	N	Average	Median	SD
Households	69	0.432	0.394	0.323
Information	69	0.484	0.505	0.251
High-Tech Products	69	0.145	0.043	0.214
Platform	69	0.110	0.053	0.141

Table A8: Examples of Companies with Platform Business Models

	I^{SM}/Rev	NAICS
AMAZON COM INC	0.082	459
ALPHABET INC.	0.094	518
WALGREENS BOOTS ALLIANCE, INC.	0.006	456
META PLATFORMS, INC.	0.125	519
UBER TECHNOLOGIES, INC	0.149	485
SALESFORCE, INC.	0.431	513
PAYPAL HOLDINGS, INC.	0.082	518
COUPANG, INC.	0.029	455
BLOCK, INC.	0.117	518
LIVE NATION ENTERTAINMENT, INC.	0.002	711
CARVANA CO.	0.053	441
EXPEDIA GROUP, INC.	0.523	561
EBAY INC	0.218	518
AIRBNB, INC.	0.180	721
ACTIVISION BLIZZARD, INC.	0.162	513
SERVICENOW, INC.	0.388	513
DOORDASH, INC.	0.256	519
PETCO HEALTH & WELLNESS COMPANY, INC.	0.034	459
PALO ALTO NETWORKS INC	0.391	518
ENDEAVOR GROUP HOLDINGS, INC.	0.061	711
IAC INC.	0.365	519
SNAP INC	0.236	519
ZOOM VIDEO COMMUNICATIONS, INC.	0.386	519
LYFT, INC.	0.129	485
ADVANTAGE SOLUTIONS INC.	0.000	541

This table lists the largest 25 companies by revenue as of 2022 that have a platform business model, along with I^{SM}/Rev for 2022.

Table A9: Explaining Variation in $(WL)^{SM}/Rev$ Across Industries

	Dependent variable: $(WL)^{SM}/Rev$, median						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Households	-0.005 (0.015)				0.012 (0.008)		0.010 (0.008)
Information		0.075** (0.021)			0.014 (0.017)		0.020 (0.016)
High-Tech Products			0.079** (0.027)		0.039* (0.016)		0.044** (0.015)
Platform				0.238** (0.030)	0.208** (0.041)		0.212** (0.053)
Rev g forecast, median						0.737* (0.288)	-0.061 (0.215)
β^A , Damodaran						-0.026 (0.025)	-0.019 (0.014)
Firm age, median						-0.007 (0.032)	0.006 (0.020)
Constant	0.045** (0.009)	0.006 (0.010)	0.031** (0.006)	0.017** (0.003)	0.002 (0.006)	0.019 (0.042)	0.018 (0.027)
Observations	61	61	61	61	61	61	61
R^2	0.001	0.208	0.182	0.621	0.667	0.224	0.682

This table presents estimates of industry-level regressions of firms' salaries paid to workers in sales and marketing as a share of revenue ($(WL)^{SM}/Rev$) on characteristics of firms in the industry. The first four covariates are the share of firms in each industry that have one of the four characteristics described in Section 5. Rev g forecast is the analyst long-term growth forecast from I/B/E/S and β^A is the asset beta of the industry as measured by Aswath Damodaran. Robust standard errors are in parentheses.

* $p \leq 0.05$, ** $p \leq 0.01$.

Table A10: Returns to Scale and Investment in Customer Capital

	Dependent variable: I^{SM}/Rev , median					
	(1)	(2)	(3)	(4)	(5)	(6)
RTS_{PC}	-0.267 (0.283)			-0.233 (0.148)		
RTS_{IC}		0.038 (0.074)			-0.001 (0.040)	
RTS_L			0.221 (1.372)			-1.098 (0.624)
Constant	0.302 (0.280)	0.000 (0.079)	-0.176 (1.388)	0.271 (0.146)	0.044 (0.042)	1.161 (0.635)
Observations	49	47	24	44	43	22
R^2	0.028	0.013	0.001	0.050	0.000	0.044

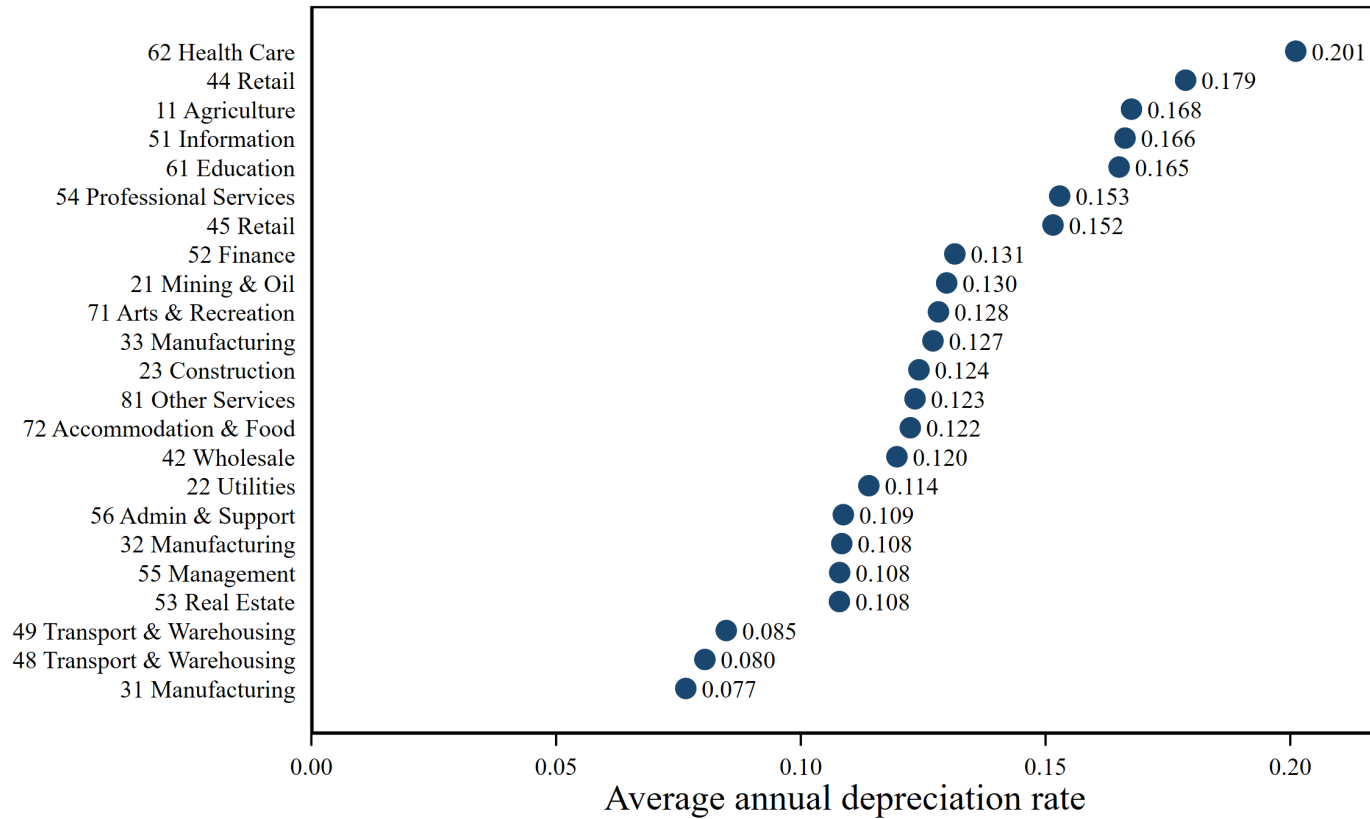
This table presents regressions of I^{SM}/Rev on measures of the returns to scale from [McAdam et al. \(2024\)](#) and [Lenzu et al. \(2022\)](#). RTS_{PC} is the measure of returns to scale assuming perfect competition and RTS_{IC} assumes imperfect competition.

Table A11: Customer Capital Categorization

Category	Key Terms
Customer relationship	customer, client, loyalty program, user base, customer base, membership
Customer list	customer list, phone number
Customer contract	customer contract, customer agreement
Trademark/trade name	trademark, masthead
Brand	name, brand, marketing related
Business relationship	business relationship, record, network, deposit intangibles
Domain	website, domain

This table lists the key terms included in the regular expressions used to extract the corresponding customer capital values.

Figure A1: Customer Capital Depreciation Rate by Industry



This figure shows the average annual depreciation rate of customer capital (δ^{SM}) by 2-digit NAICS industry, estimated from the useful-life estimates in purchase price allocations (PPAs) under a 10-year useful life assumption for indefinite-lived intangibles.

Figure A2: Investment in Sales and Marketing and Residual SG&A

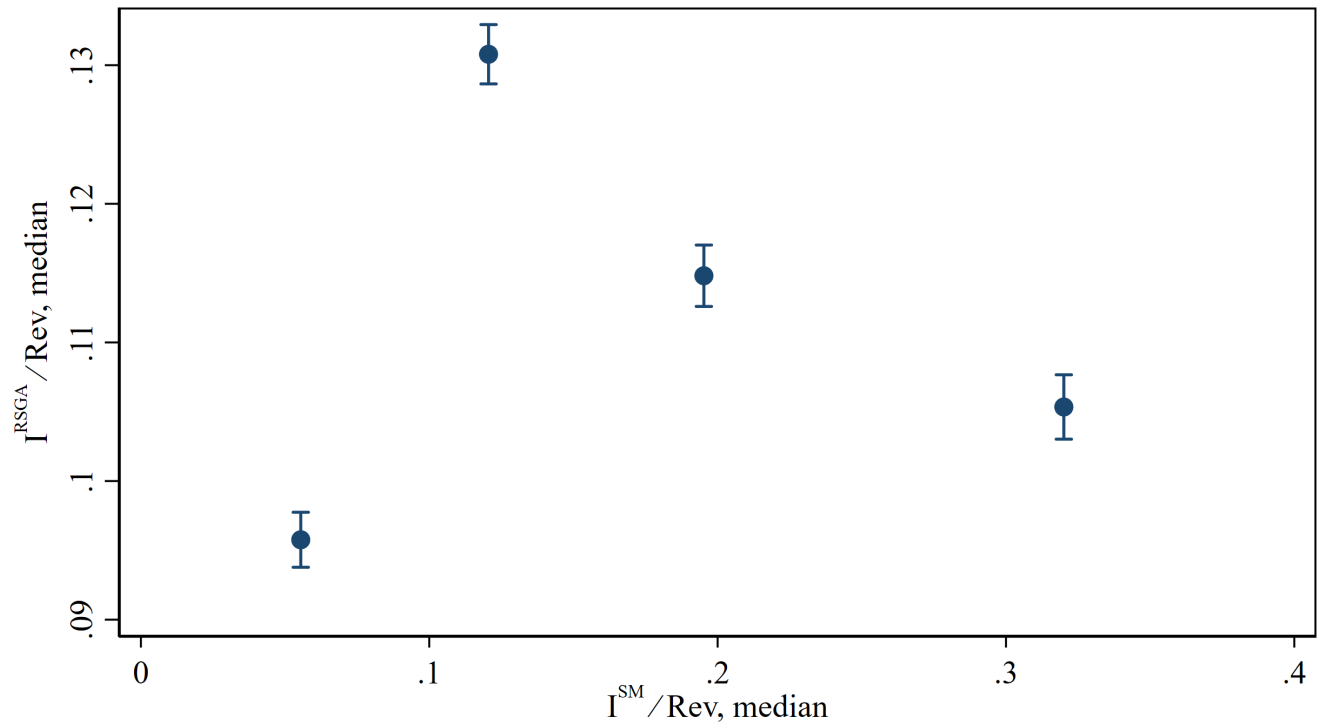


Figure A3: Sales and Marketing Investment and Salaries

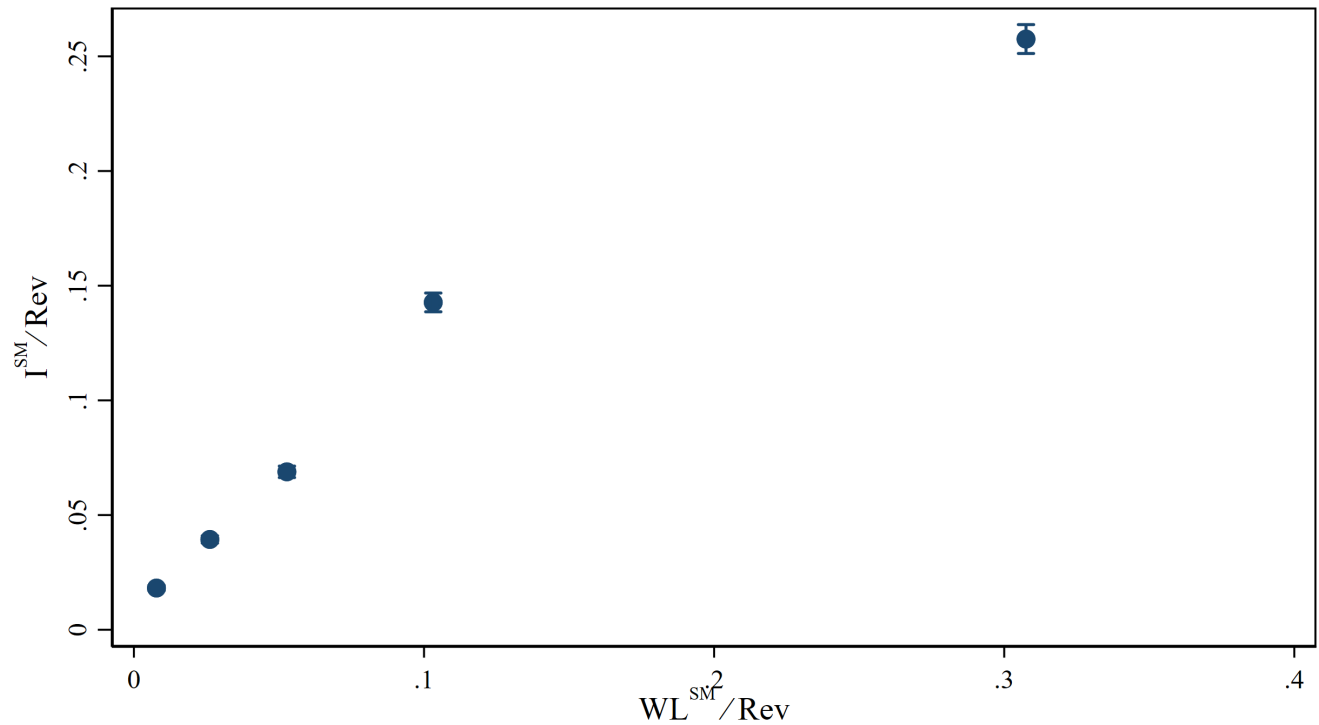


Figure A4: Sales and Marketing and Advertising at the industry level

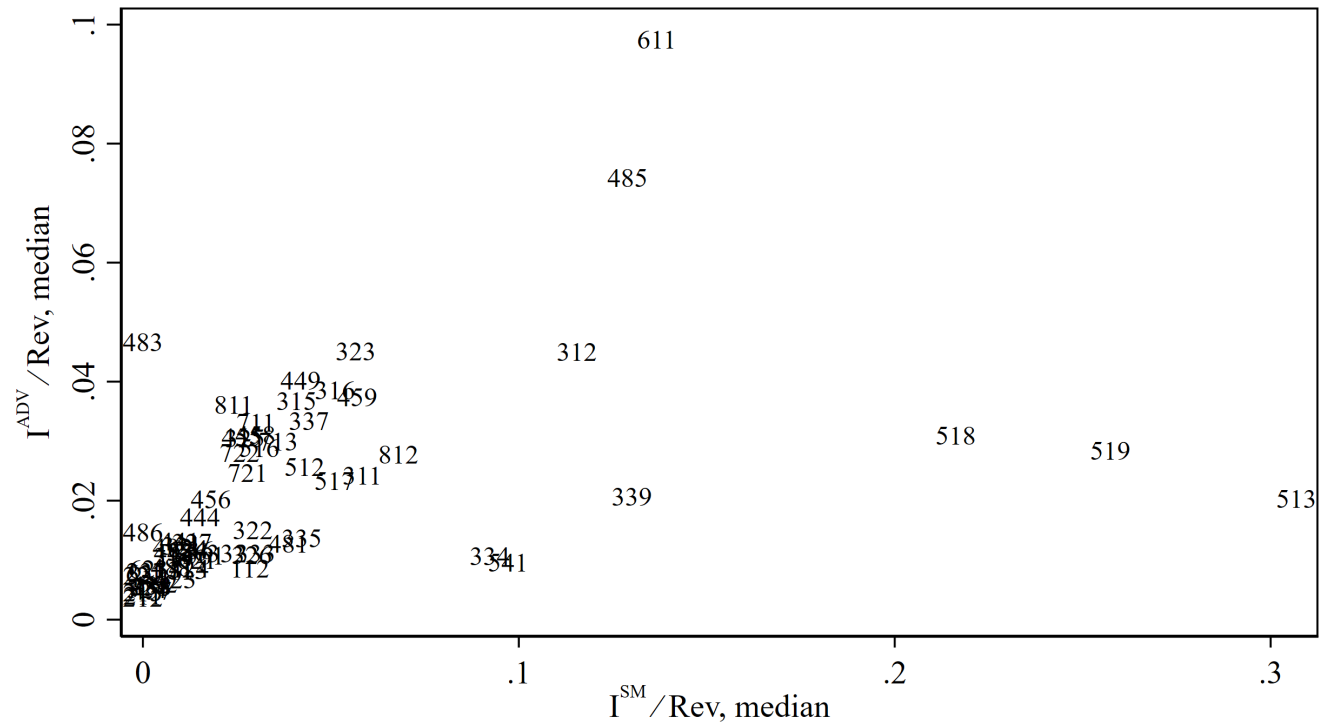


Figure A5: Sales and Marketing Investment and Employment vs. Salary Per Worker

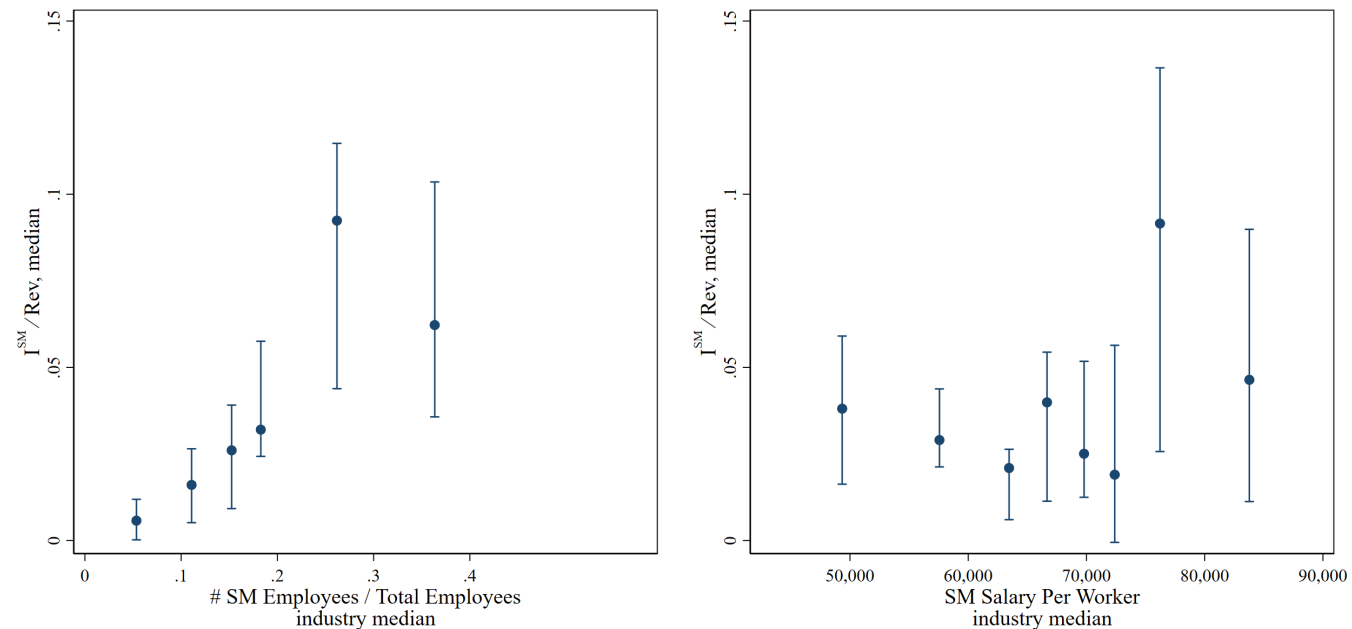


Figure A6: Comparison of I^{SM} with Capital Expenditures and R&D

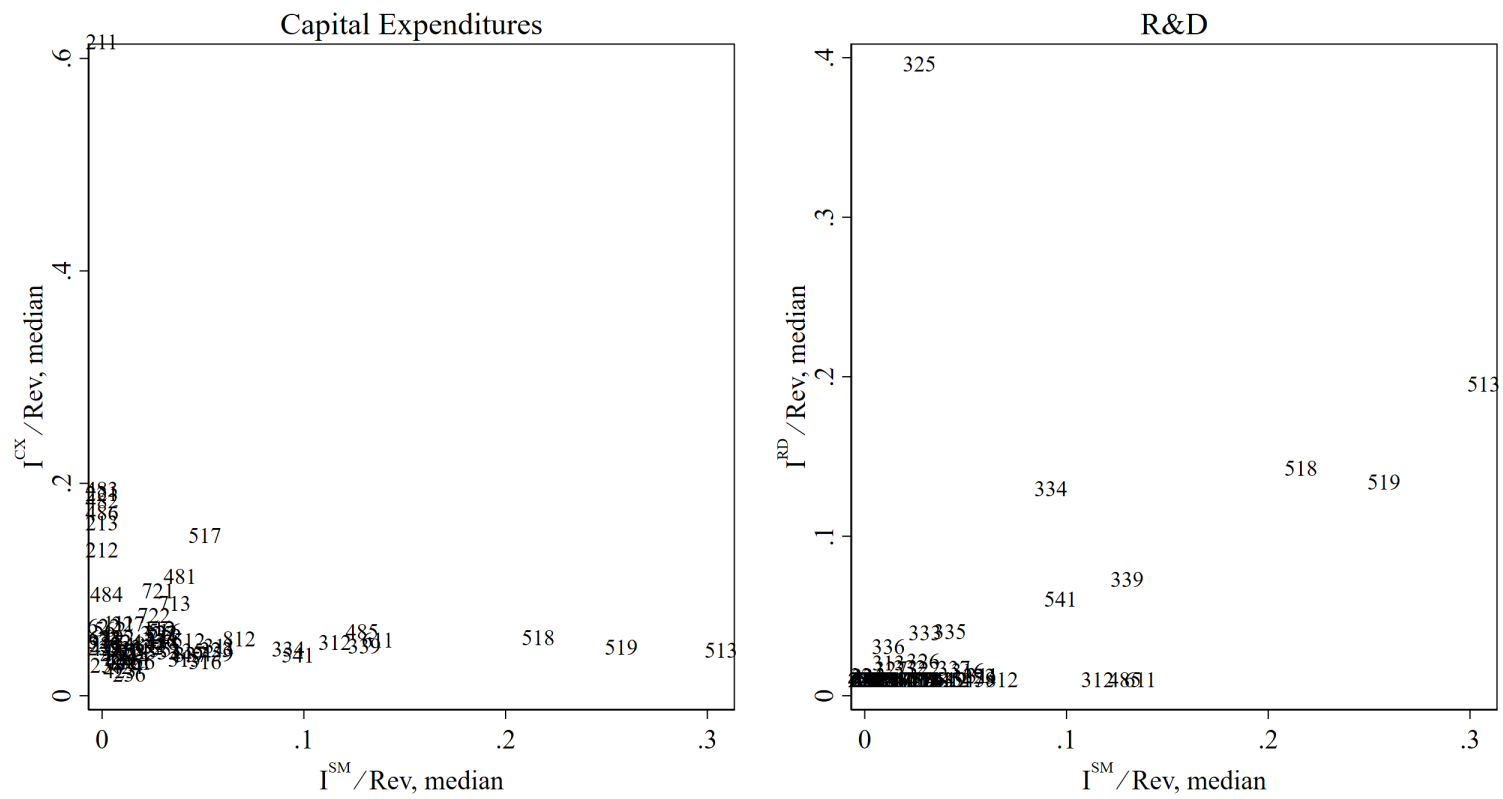


Figure A7: Explaining Q^{PH}

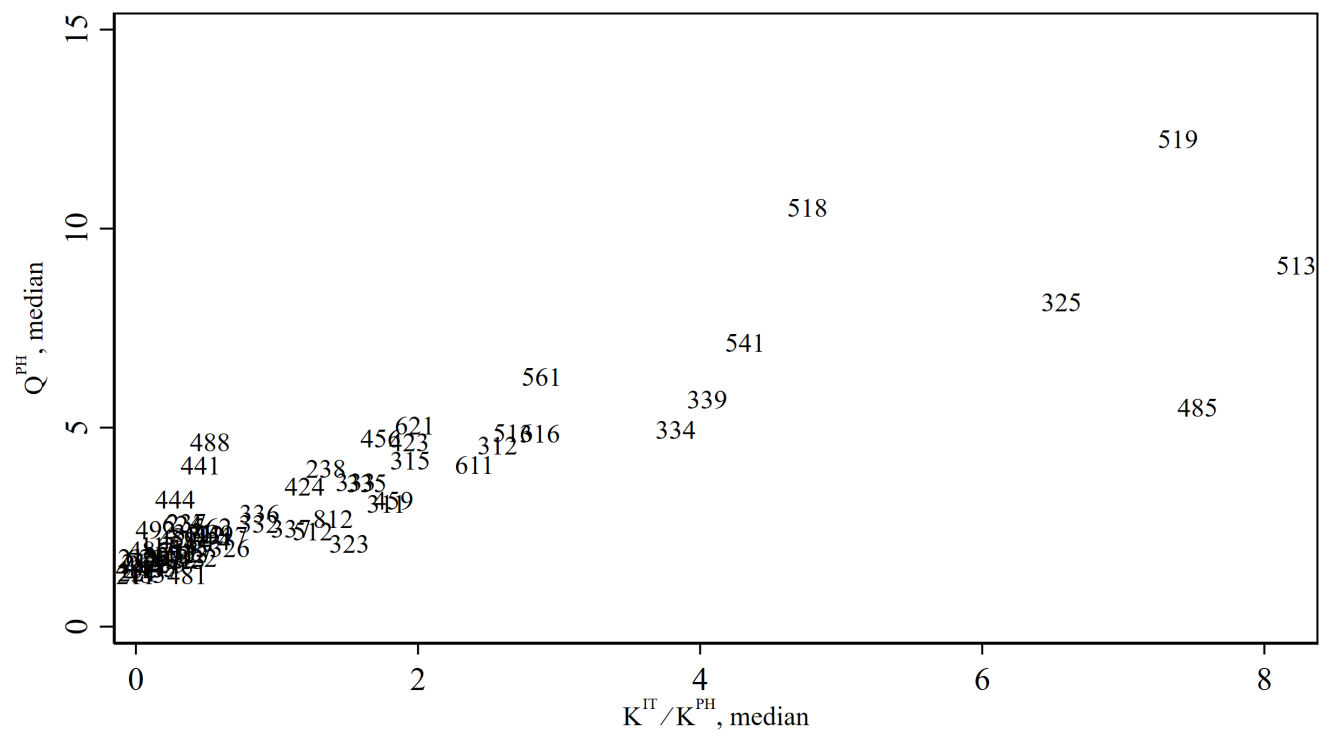
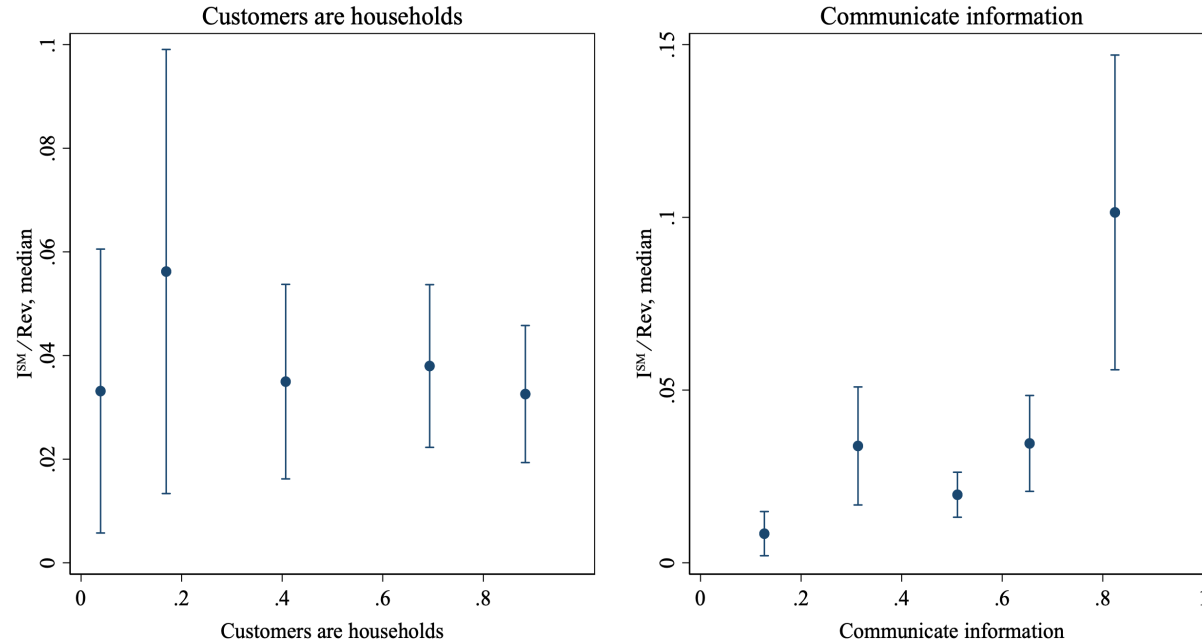
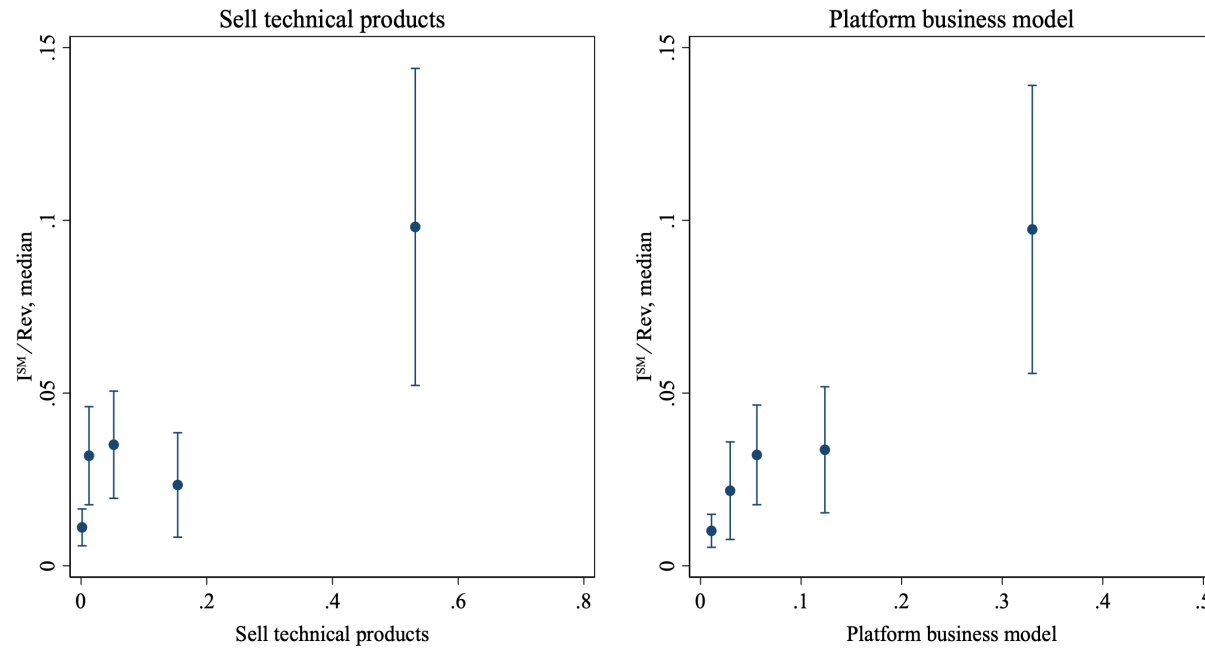


Figure A8: Explaining I^{SM}/Rev 

Bin-scatter plots at the industry level for the ratio of sales and marketing expense to revenue (I^{SM}/Rev) against the fraction of companies in each industry that primarily market their products to households (left panel) and that emphasize the importance of communicating information to customers (right panel), as identified by Gemini through textual analysis of firms' 10-Ks (see Appendix Table A2 for the prompts used). Confidence bars are at the 90% level. See Appendix Figure A10 for full industry scatter plots.

Figure A9: Explaining I^{SM}/Rev (continued)

Bin-scatter plots at the industry level for the ratio of sales and marketing expense to revenue (I^{SM}/Rev) against the fraction of companies in each industry that sell high-tech products (left panel) and that operate a platform business model (right panel), as identified by Gemini through textual analysis of firms' 10-Ks (see Appendix Table A2 for the prompts used). Confidence bars are at the 90% level. See Appendix Figure A11 for full industry scatter plots.

Figure A10: Explaining I^{SM}/Rev

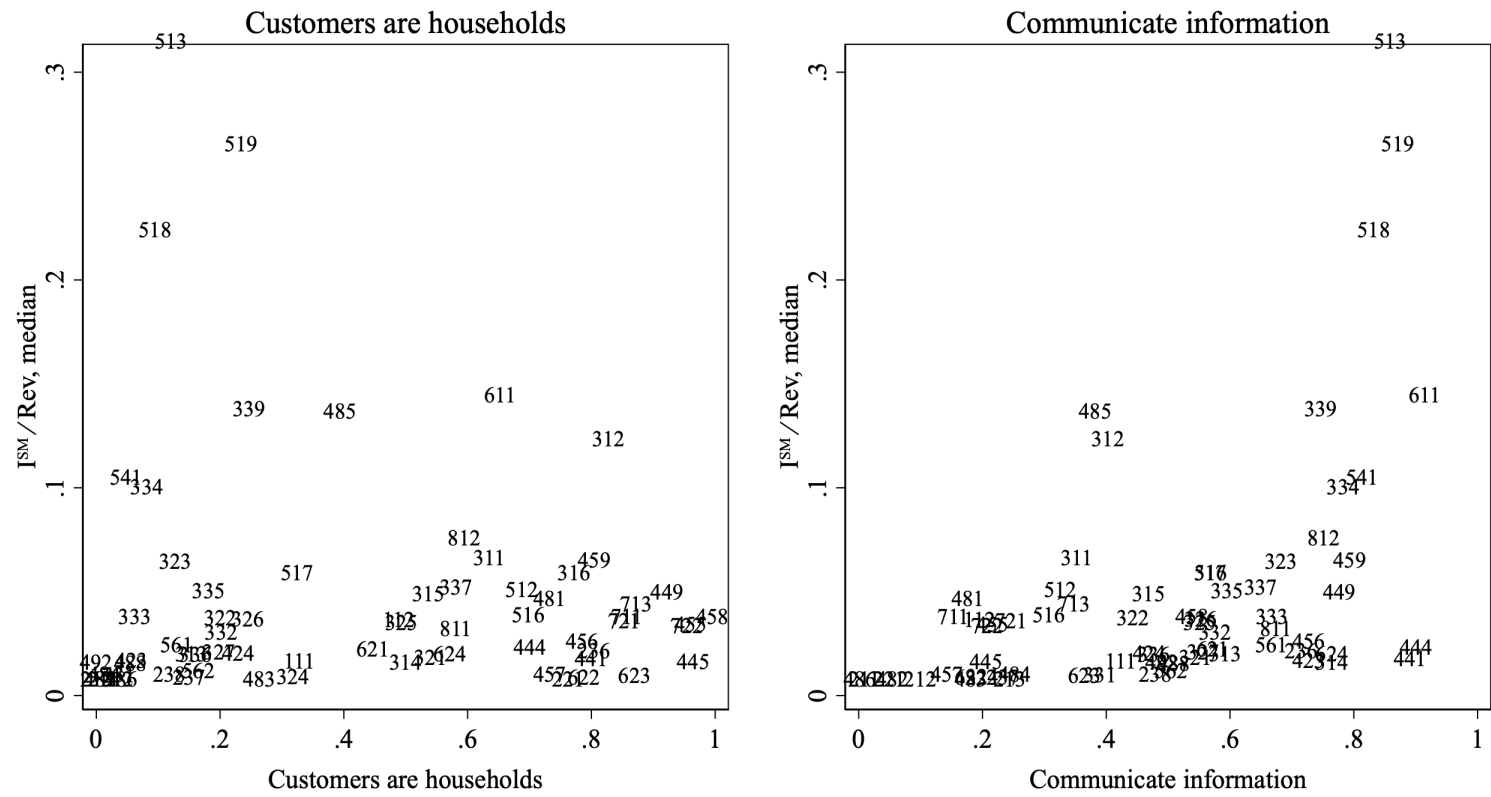


Figure A11: Explaining I^{SM}/Rev (continued)

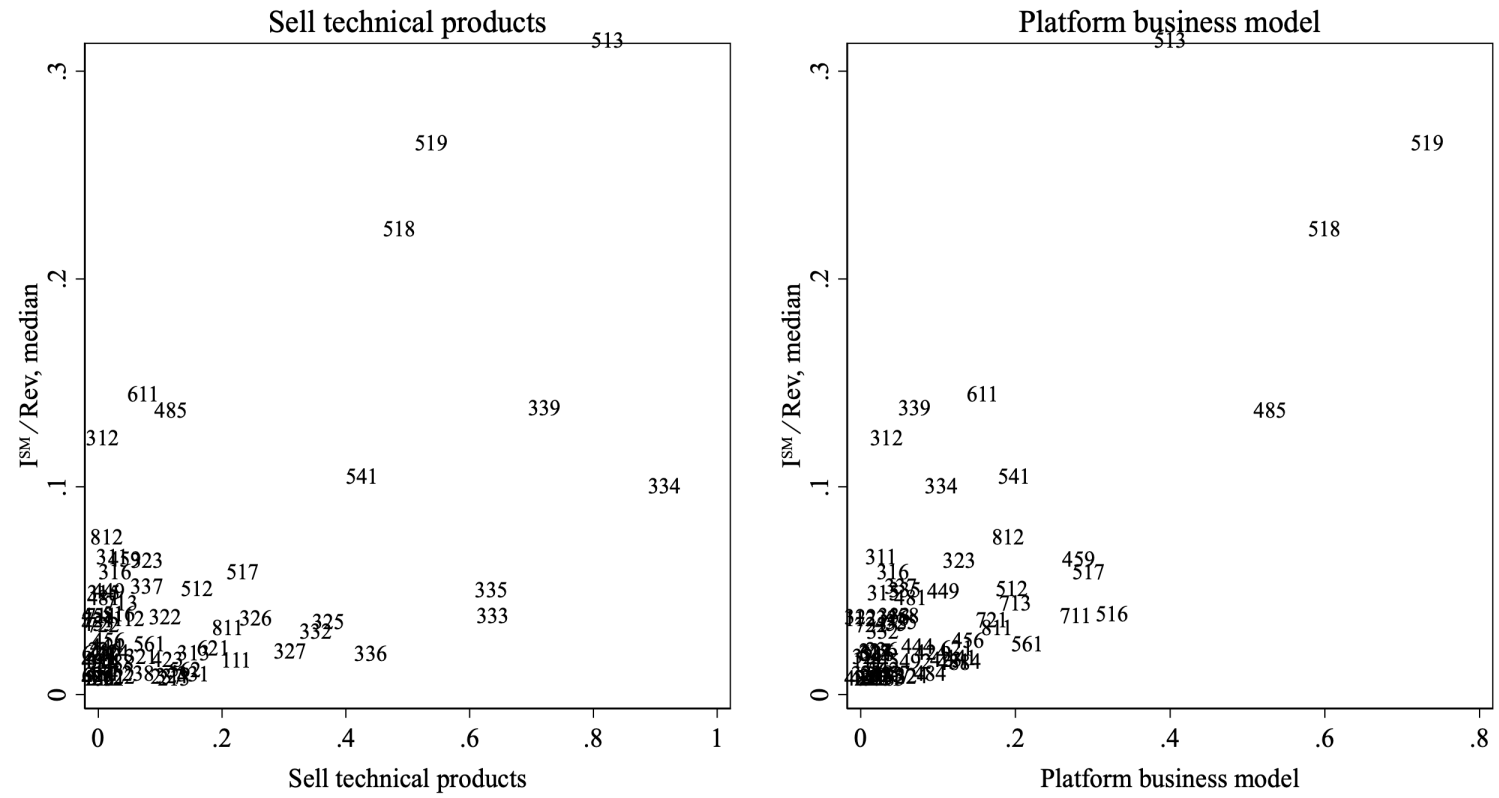
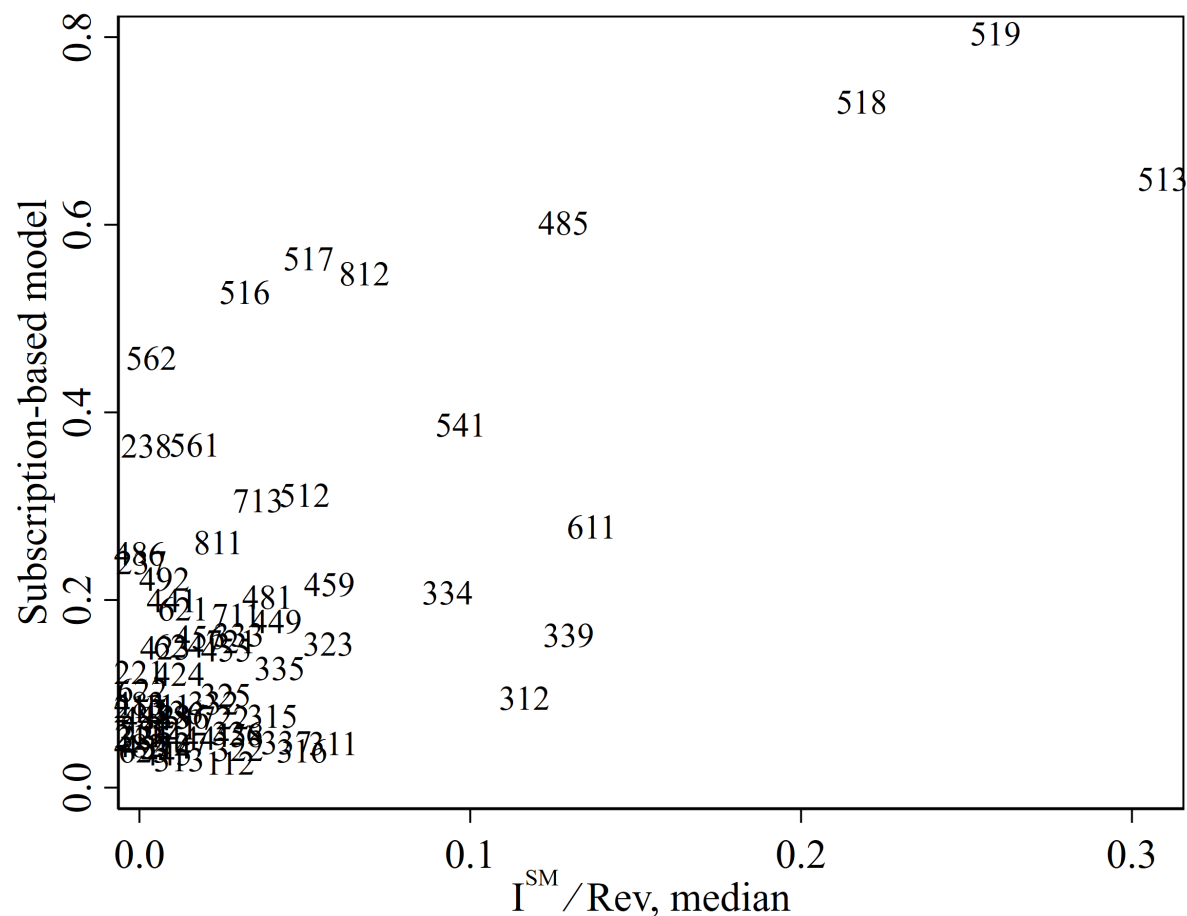
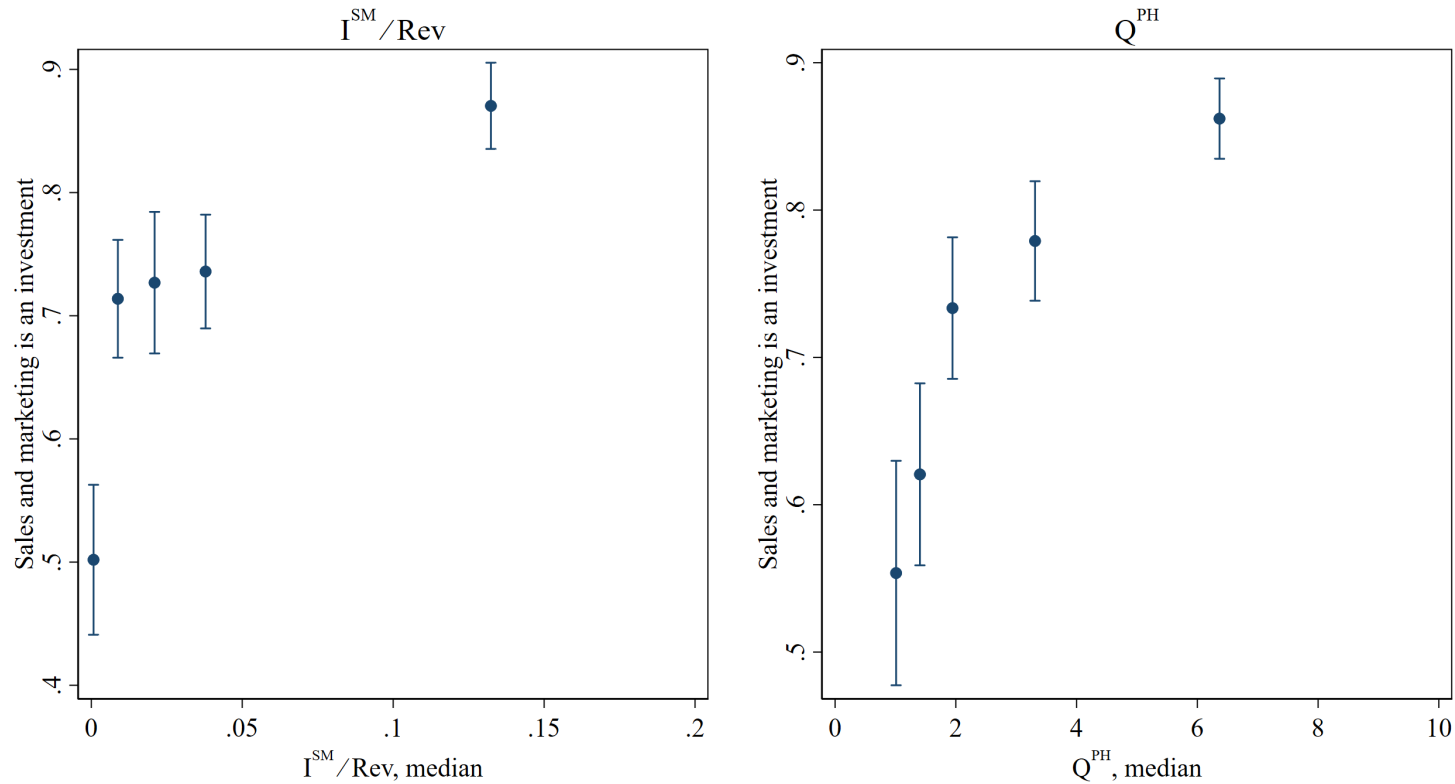


Figure A12: Subscriptions are Common in High Sales and Marketing Industries: Full Scatter Plot



Scatter plot at the industry level for the fraction of companies in each industry that describe using a subscription-based business model against the industry median ratio of sales and marketing expense to revenue (I^{SM}/Rev). Each point represents a 3-digit NAICS industry, labeled by its NAICS code. See Figure 10 for the bin-scatter version.

Figure A13: Is Sales and Marketing an Investment or Cost?



Bin-scatter plots at the industry level for the share of firms in that industry that describe their sales and marketing expense as being an investment, as identified by Gemini through textual analysis of firms' 10-Ks, against sales and marketing expense as a share of revenue (I^{SM}/Rev , left panel) and enterprise value to physical capital ratio (Q^{PH} , right panel). Confidence bars are at the 90% level. See Appendix Figure A14 for full industry scatter plots.

Figure A14: Is Sales and Marketing an Investment or Cost?

