

Options listing and corporate resource commitments

Abstract

Existing literature suggests that options trading helps mitigate information asymmetry between managers and external investors of the underlying firm. Building on prior studies, this paper examines whether the presence of options trading influences the firm's resource commitments and how. Our baseline results indicate that firms with options listed on stock exchanges exhibit greater commitment in fixed resources to support operations, as reflected by less responsive expenditures to revenue changes. This effect is stronger in firms whose short-sale constraints are greater, whose SG&As generate higher future value, and whose demand is more uncertain. Additional analysis indicates that the impact of options listing on resource commitments is consistent with the reduced information asymmetry as a channel. Lastly, we provide results showing that optioned firms become more long-term oriented towards operating and investment decisions.

Keywords: options listing; resource commitments; information asymmetry

JEL Classifications: D24; G31; M41

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1 Introduction

Options markets have been increasingly influencing the decision-making of investors and corporations. From the perspective of investors, the low trading cost and high leverage make options trading ideal for informed investors to profit from trading with uninformed investors (Black, 1975; Diamond and Verrecchia, 1987; Mayhew, Sarin, and Shastri, 1995), which creates incentives for informed investors to collect information (Cao, 1999; Cao, Goyal, Ke, and Zhan, 2024). As options prices and underlying stock prices are theoretically linked, options trading delivers a sizeable enhancement effect on information flows in addition to stock trading (Chakravarty, Gulen, and Mayhew, 2004), improving the information transparency of underlying firms.

High information costs are a fundamental friction in financial markets, constraining firms' financing and investments. Options trading fosters a more transparent information environment, enabling investors to assess the underlying firms' performance based on the long-term implications of decisions, rather than focusing solely on short-term profit fluctuations (Wurgler, 2000; Durnev, Morck, and Yeung, 2004). The resulting lower information asymmetry also reduces the underlying firm's cost of capital in external equity financing (Naiker, Navissi, and Truong, 2013).

In this study, we examine whether and how options listings change underlying firms' resource commitments as reflected by their reliance on fixed expenses in operations. While operating expenses are usually considered to fund operations and affect firms' short-term performance from the accounting perspective, recent studies contend that part of them also have long-term financial impacts. In particular, firms spend selling, general, and administrative expenses (SG&As) to build up long-term resources (e.g., process improvement, hiring and training personnel, customer acquisition, and brand development) (Lev, Radhakrishnan, and Zhang, 2009; Eisfeldt and Papanikolaou, 2014; Peters and Taylor, 2017; Chen, Harford, and

Kamara, 2019; Ewens, Peters, and Wang, 2025; Iqbal, Rajgopal, Srivastava, and Zhao, 2025). Besides, when demand uncertainty is high, firms strategically set their operating costs to reduce congestion costs upon positive demand surprises, thereby capturing the upside potential (Banker, Byzalov, and Plehn-Dujowich, 2014). Nevertheless, a firm that relies on fixed resources is subject to additional financial risk for negative demand shocks. If options trading enhances information flows, thereby reducing frictions in external fundraising, then the underlying firms can devote more long-term resources to capture positive demand surprises and other future opportunities.

The above arguments assume that options trading is informative. However, some previous studies suggest that options trading may be uninformative because equity options are largely traded by individual investors (Wei, Poon, and Zee, 1997; Lemmon and Ni, 2014) who tend to be noise traders. If options trading is largely speculative, stock prices will be clouded by noisy options prices and investors would also be more likely to evaluate and discipline managers based on short-term profits. To safeguard themselves from being penalized for transitory negative short-term performance, managers stabilize corporate earnings by variabilizing operating costs based on sales levels.

To test these two competing hypotheses, we evaluate how the initial exchange options listing affects underlying firms' resource commitments with the staggered difference-in-differences (DiD) design. We examine the impact of the initial exchange options listing because the exchange options listings across firms are staggered and decided by options exchanges, which is relatively external to managerial decisions. Therefore, options listing is a plausibly quasi-natural experiment setting to examine the impact of options trading on corporate decisions as argued by Brockman, Subasi, Wang and Zhang (2024), Hsu, Ke, Ma, and Ruan (2024), and Bernile, Hu, Li, and Michaely (2025). Nevertheless, we conduct a battery of robustness checks for our baseline results to mitigate the concern that options listing can be endogenous to firm characteristics.

We collect a sample of U.S.-listed firms for the sample period of 1996-2022 from the CRSP/Compustat Merged database. We measure the degree of resource commitments as the sensitivity of change in operating costs to a change in sales, with a lower sensitivity reflecting higher resource commitments. Our baseline result indicates that options listing is associated with a lower sensitivity of a change in operating costs to a change in sales, i.e., more resource commitments. This result is robust to the inclusion of other firm characteristics. The economic significance is that options listing is associated with a reduction in the sensitivity of operating costs to sales by 0.083, or 10%, from a base value of 0.83. This finding indicates that firms exhibit higher resource commitments when they have options traded on the exchanges, consistent with the informative options trading story.

Robustness tests show that our main result is insensitive to alternative definitions of resource commitments and model specifications. Specifically, we find that the commitment of SG&As (rather than COGS), which are more likely fixed, increases after options listing (Chen, Harford, and Kamara, 2019). We also find that proxies for operating leverage (Novy-Marx, 2011; Chen, Chen, Li, and Li, 2022) increase after options listing. Besides, we address endogeneity concerns in our baseline results with a parallel-trend test, the inclusion of additional controls and high-dimensional fixed effects in the model, propensity score matching, an entropy-balancing model, and a stacked DiD regression.

We perform mediation tests to show that the impact of options listing on resource commitments works through its impact on information asymmetry. Specifically, options listing results in lower information asymmetry as shown by a lower probability of informed trading (*PIN*) and a smaller bid-ask spread in the stock market. Consistent with the financing consequences of an improved information environment, optioned firms also exhibit a lower cost of equity and weaker debt financing constraints. Collectively, the findings support our argument that options listing improves the information environment and thereby facilitates greater resource commitments. The results from cross-sectional tests show that the impact of

options listing on resource commitments is stronger for firms that are subject to larger short-sale constraints, for firms that rely more on SG&As to create value, and for firms facing greater demand uncertainty, where options listing should have played a greater role in alleviating information asymmetry.

Several additional results show that the firms become long-term oriented in their operation and investment decisions following the options listing. We find that the levels of capital expenditures, SG&As, organization capital, and knowledge capital increase significantly, while firms rely less on outsourcing contracts and shift away from leasing toward asset ownership after the listing of their options. These findings are consistent with the notion that resource commitments help reduce congestion cost, leading to more long-term orientation in operations and investments (Banker, Byzalov, and Plehn-Dujowich, 2014).

Our study contributes to the literature in two ways. First, our study is related to research on how options listing affects corporate decision-making. Recent empirical studies find that options listing is associated with higher investment efficiency (Anagnostopoulou, Trigeorgis, and Tsekrekos, 2023; Hsu, Ke, Ma, and Ruan, 2024), more corporate innovation outcomes (Blanco and Wehrheim, 2017), and greater external financing (in terms of both equity and debt) (Bernile, Hu, Li, and Michaely, 2025). On top of these studies, we show that optioned firms rely more on fixed expenditures, speaking directly to how optioned firms adjust their internal operations. In addition, we document that options listing affects firms' long-term investment decisions in several ways (such as the accumulation of organization capital and knowledge capital, and the reduced utilization of outsourcing and leases). Overall, our findings suggest that options listing encourages underlying firms to make more fixed resource commitments in operations, resulting in greater risk-taking and long-term orientation (Banker, Byzalov, and Plehn-Dujowich, 2014; Chen, Harford, and Kamara, 2019).

Second, our study sheds light on the literature on cost behavior. While previous studies have shown that product market attributes, such as demand uncertainty, contribution margin

variance, industry competition, and product fluidity affect firms' reliance on fixed resources,¹ few studies have examined the impact of financial market activities (especially in the derivative market). Our study deviates from the traditional perspectives by predicting and demonstrating that options listings affect underlying firms' resource commitments. In particular, the mediation analysis shows that options listing increases resource commitments by reducing information asymmetry.

2. Literature Review

A body of academic research posits that options markets exert a growing influence on investors and corporate decision-making. The combination of low transaction costs and high leverage provides an efficient channel for informed investors to trade on their private information (Black, 1975; Diamond and Verrecchia, 1987; Mayhew, Sarin, and Shastri, 1995; Skinner, 1997; Cao, 1999; Cao, Goyal, Ke, and Zhan, 2024). This information-based trading process ensures that options prices often incorporate signals not yet present in the underlying stock market.

Numerous studies have found that options trading contains important private information about the underlying stock value and can enhance the information content of stock prices (Chakravarty, Gulen, and Mayhew, 2004; Cremers and Weinbaum, 2010; Johnson and So, 2012; An, Ang, Bali, and Cakici, 2014; Hayunga and Lung, 2014; Hu, 2014; Cao, Goyal, Ke, and Zhan, 2024). Consistent with the view that options trading improves information transparency, prior studies have documented that the presence of options trading has a significant impact on firms' decisions and performance (Blanco and Wehrheim, 2017; Anagnostopoulou, Trigeorgis, and Tsekrekos, 2023; Hsu, Ke, Ma, and Ruan, 2024; Bernile, Hu, Li, and Michaely, 2025). We extend the literature by examining how the presence of option trading affects resource commitments of the underlying firms.

¹ See, for example, Banker, Byzalov, and Plehn-Dujowich (2014), Holzhacker, Krishnan, and Mahlendorf (2015), Chang, Hall, and Paz (2021), Chang, Kwok, and Wong (2024), Chen, Kama, and Lehavy (2024), and Chen, Liang, Yang, and Zhu (2024).

Understanding cost behavior is important for investors to assess a firm's prospects because operating costs have significant impacts on firm profitability and valuation (Garrison, Noreen, and Brewer, 2023; Horngren, Datar, and Rajan, 2021). From the accounting perspective, operating costs offset revenue and therefore have direct impacts on the net profit in the near term. One of the key elements in the resource allocation decisions is the choice between fixed resources and variable resources. Beyond its accounting impact, the choice is also part of a firm's overall strategic decisions. On the one hand, substituting fixed resources for variable resources makes earnings more sensitive to changes in sales revenue. That is, relying too much on fixed resources in operations results in a sharp decline in earnings during bad times, which increases the risk of financial distress (Chen, Harford, and Kamara, 2019). On the other hand, committing more fixed resources can reserve production capacity and reduce the congestion costs the firm faces when there is an unusually positive demand shock for its products/services (Banker, Byzalov, and Plehn-Dujowich, 2014; Chang, Kwok, and Wong, 2024). Recent studies also suggest that part of the operating expenses—mainly SG&As—aims to build up intangible capital for long-term development (Lev, Radhakrishnan, and Zhang, 2009; Eisfeldt and Papanikolaou, 2014; Peters and Taylor, 2017).² Therefore, even though spending on these relatively fixed operational resources may reduce current corporate profit, it potentially improves corporate long-term sustainability and performance. Managers would choose a level of fixed resources to maximize the firm's value by balancing the benefits and costs of fixed resources (Chen, Harford, and Kamara, 2019).

Options listing may alter the underlying firm's incentives in adjusting its resource commitments by mitigating information asymmetry, thereby reducing its cost of equity capital (Naiker, Navissi, and Truong, 2013). With more accessible external financing, the underlying firm can reserve its production capacity by committing more fixed resources to prepare for

² Iqbal, Rajgopal, Srivastava, and Zhao (2025) claim that for most industries, the investment component of SG&As ranges from 70% to 85%, except those that do not spend much on intangibles (e.g., business supplies and transportation industries).

positive demand shocks with less worry about financial distress problems due to disappointing demand. Besides, enhanced information flows help external investors better understand firms' fundamental value, shielding managers from excessive short-term monitoring and reducing managers' incentive to distort reported performance (Wurgler, 2000; Durnev, Morck, and Yeung, 2004). Managers can therefore have stronger incentives to commit resources (such as SG&As) for long-term value creation.

The above arguments assume that options trading is informative. However, options trading can be speculative. Previous studies find that options trading is associated with speculative trading by uninformed investors (Wei, Poon, and Zee, 1997; Lemmon and Ni, 2014). Thus, rather than enhancing value-relevant information flows in the financial market, options trading exacerbates information asymmetry between the firm and the market (Stein, 1987; Roll, Schwartz, and Subrahmanyam, 2010; Hu, 2018), clouding investors' judgment on long-term implications of managerial decisions. The heightened information asymmetry could help investors, especially retail investors, to evaluate and discipline corporate managers based on more observable short-term operating performance. Perceiving investors' reliance on short-term performance, managers may smooth incomes by reducing resource commitments.³

Finally, it is also possible that the options market, like the stock market, is just a sideshow and does not play an important role in affecting real activities (Morck, Shleifer, and Vishny, 1990; Blanchard, Rhee, and Summers, 1993). If the options market captures information that investors already know and its main function is to offer a less costly way for investors to hedge or manage risks, then the listing of a firm's options will have an insignificant effect on the firm's decisions, including resource allocation decisions.

3. Research Design

³ Literature on income smoothing suggests that income smoothing is a way for corporate managers to convey earnings signal or even signal their ability to stakeholders. For example, customers and suppliers reward earnings smoothers with better terms of trade (Dou, Hope and Thomas, 2013; Graham, Harvey and Rajgopal, 2005). However, such an effect is weaker when firms and their stakeholders can communicate information more directly (Jung, Kim, Park and Yoon, 2025).

3.1 Sample and data

In the U.S., the main entities responsible for listing options are options exchanges such as the Chicago Board Options Exchange, Nasdaq Options, and NYSE American Options (see Blanco and Wehrheim, 2017; Brockman, Subasi, Wang, and Zhang, 2024; Hsu, Ke, Ma, and Ruan, 2024; Bernile, Hu, Li, and Michaely, 2025). These exchanges operate under the jurisdiction of the Securities and Exchange Commission (SEC) for exchange-listed options. They follow a systematic process when listing options, considering factors like trading volume, market capitalization, stock price, public float, and the shareholder base (Mayhew and Mihov, 2004; Bernile, Hu, Li, and Michaely, 2025).⁴ On the other hand, the options listing decision is not directly chosen by the underlying firms and therefore provides plausibly exogenous variation to firms' information environment (Blanco and Wehrheim, 2017; Hsu, Ke, Ma, and Ruan, 2024).

We use a firm's initial options listing to identify the impact of options trading on resource commitments. We define a firm's initial options listing date as the first date on which it appears in the OptionMetrics database (Naiker, Navissi, and Truong, 2013; Hsu, Ke, Ma, and Ruan, 2024). We exclude firms that first appeared in the OptionMetrics database in 1996 because we cannot distinguish between those listed in 1996 and those listed before 1996. Further, we drop firms that had their first options listing in 2022 and restrict the sample to a 10-year window before and after the listing to strengthen causal inference.⁵

We exclude observations from the CRSP-Compustat merged database if they are affiliated with the financial industry (SIC code 6000-6999) and the utility industry (SIC code 4900-4999). We also exclude observations with missing or non-positive total assets, sales revenue, and operating costs, as well as samples in which the stock closing price is less than \$1

⁴ Since exchanges consider options listings based on a set of criteria, delisting may occur if a firm fails to meet these standards. Oftentimes, if an underlying stock is delisted from its primary exchange or does not meet listing requirements, its options are phased out.

⁵ Alternatively, if we set this time window to [-3, 3] or [-5, 5] or do not impose any restrictions on the time window at all, our baseline results do not show any adverse changes.

(Chen, Lu, and Sougiannis, 2012). Following Banker, Byzalov, and Chen (2013), we drop observations with extreme operating costs lower than 50% or higher than 200% of sales for the current or prior years.⁶ Finally, we exclude observations with missing variable values in the baseline model.

We obtain a final sample of 42,108 firm-year observations covering 43 industries in the 48 Fama–French industries from 1996 to 2022. Table 1 presents the year and industry distributions of the final sample.⁷ To control for inflation, we convert the financial variables into their equivalent 1996-dollar values by applying the GDP deflator. To mitigate the influence of outliers, we winsorize all continuous variables at the bottom and top one percentiles.

[Insert Table 1 here]

3.2 Model specification

Following previous studies (Banker, Byzalov, and Plehn-Dujowich, 2014; Chang, Hall, and Paz, 2021; Chen, Liang, Yang, and Zhu, 2024), we adapt the cost-behavior model used in prior research to estimate the effect of options listing on firms' resource commitment:

$$\Delta \ln OPR_{i,t} = \alpha_0 + \alpha_1 \Delta \ln Sales_{i,t} + \alpha_2 OPList_{i,t} + \alpha_3 OPList_{i,t} * \Delta \ln Sales_{i,t} + \alpha_4 Controls_{i,t} + \alpha_5 Controls_{i,t} * \Delta \ln Sales_{i,t} + Year\ FEs * \Delta \ln Sales + Industry\ FEs * \Delta \ln Sales + Year\ FEs + Firm\ FEs + \varepsilon_{i,t} \quad (1)$$

$\Delta \ln OPR_{i,t}$ refers to the change in the log value of operating costs of firm i in year t relative to year $t-1$, where operating costs include the cost of goods sold, SG&As and depreciation. $\Delta \ln Sales$ is the change in the log value of sales revenue. $OPList$ is a variable that takes the value of 1 in the year of the initial listing of options and all subsequent years and takes the value of 0 otherwise. In model (1), a lower α_1 indicates that changes in operating costs are less responsive to variations in sales (i.e., higher resource commitments), and furthermore, if α_3 is significant and negative (positive), it indicates that options listing increases (decreases) firms'

⁶ Our results remain robust even if we remove these data filtering processes.

⁷ Our sample size declines over time in the sample period, possibly caused by the decline in the overall number of listed firms in the U.S. (Doidge, Karolyi and Stulz, 2017).

resource commitments.

Controls include firms' basic characteristics that may determine their cost behavior in the first place, such as firm size, firm age, and market-to-book value. Following Anderson, Banker, and Janakiraman (2003), we control for the adjustment costs in firms' cost decisions, proxied by asset intensity and employee intensity. Furthermore, to isolate the incremental information effect of options trading relative to stock trading, we control for stock volatility in the model. In addition, Chen, Lu, and Sougiannis (2012) argue that managerial empire-building incentives may also influence firms' cost behaviors. Therefore, we control for free cash flows to account for possible managerial empire-building incentives. Standard errors in all the regressions are computed by two-way clustering at the firm and year level.⁸ Appendix A provides detailed definitions and data sources for all variables.

In the model, in addition to year- and firm-fixed effects, we further include *Year FEs* $\Delta \ln Sales$* and *Industry FEs* $\Delta \ln Sales$* to capture cross-industry and cross-year differences in resource commitments that are unrelated to the treatment. We implement this research design following Byzalov and Basu (2024). While it is possible to include the firm-specific slope on $\Delta \ln Sales$, we utilize the industry-specific slopes on $\Delta \ln Sales$ to avoid reducing test power too much.

3.3 Descriptive statistics

Table 2 presents descriptive statistics of the main variables in the baseline model. On average, the variation in operating costs is roughly equivalent to the variation in sales (the mean of $\Delta \ln OPR$ is slightly lower than that of $\Delta \ln Sales$). The mean value of *OPList* is 0.497, indicating that firm-years before and after options listing are relatively balanced in terms of sample size. In our sample, the average total assets of the firms are \$1,370 million (before log transformation) and the average firm age is 18 years (218 months, before log transformation).

⁸ Regardless of whether we cluster standard errors at the firm, industry, firm-year, or industry-year level, our results remain highly robust.

On average, the sample firms' market value is three times their book value. The distributions of stock volatility, asset intensity, employee intensity, and free cash flows are also similar to those in previous studies (e.g., Chang, Dai, Lohwasser, and Chiu, 2022).

[Insert Table 2 here]

4. Empirical Results

4.1 Options listing and resource commitments

Table 3 reports the baseline regression results. In Column 1, we do not include any control variables and control only for the fixed effects. The regression coefficient of $\Delta \ln Sales$ is significant and positive ($p < 0.01$), while the regression coefficient of $OPList * \Delta \ln Sales$ is significant and negative ($p < 0.01$), indicating that firms' operating costs become less sensitive to sales volatility after options listing, i.e., more committed. In Column 2, we further include all control variables and their interactions with $\Delta \ln Sales$. The significant and negative ($p < 0.01$) regression coefficient of $OPList * \Delta \ln Sales$ lends strong support to the conjecture that options listing increases the underlying firms' resource commitments. According to the result in Column 2, firms' operating costs become 10% ($= 0.083/0.830$) less sensitive to sales after the initial listing of their options.

[Insert Table 3 here]

4.2 Robustness Tests

4.2.1 Options listing and commitments of different cost components

Table 4 reports robustness checks for the baseline result. Aboody, Levi, and Weiss (2018) and Chen, Harford, and Kamara (2019) document that although both COGS and SG&As are the core cost components expected to respond to revenue shocks, SG&As (i.e., resources consumed for marketing and advertising, distribution, and information technology) are less related to the production level and therefore more discretionary. If options listing is associated with more committed operating costs, such an impact should be stronger on SG&As than on COGS.

Therefore, we run separate regressions with $\Delta \ln COGS$ (change in the log value of the cost of goods sold) and $\Delta \ln SG\&A$ (change in the log value of SG&As) as separate dependent variables. The regression results in Panel A of Table 4 show that only the commitment of SG&As increases after options listing ($p < 0.05$) whereas the commitment of COGS does not change significantly, although the difference between the two coefficients is not statistically significant. Therefore, the change in overall resource commitments after options listing mainly stems from the increased commitments of SG&As.

We then further remove research and development expenses from the overall SG&As to obtain $\Delta(\ln SG\&A - R\&D)$ and re-run our baseline model.⁹ Blanco and Wehrheim (2017) show that options trading volume is positively associated with firms' R&D investment and corporate innovation. Therefore, our baseline result may be driven by increased commitments of R&D expenses after the options listing. Column 3 indicates that non-R&D SG&As become more committed after options listing ($p < 0.05$). The result suggests that options listing also increases the underlying firm's commitments of non-R&D expenditures.

4.2.2 Alternative measures for change in resource commitments

We further check the robustness of the baseline result with alternative measures of resource commitments. Specifically, we adopt two proxies for operating leverage, *BookOL* and *NMOL*, based on Chen, Chen, Li, and Li (2022) and Novy-Marx (2011), and regress the proxies on *OPList* together with control variables and fixed effects. Theoretically, a firm's operating leverage is higher when it substitutes fixed resources for variable resources. A direct consequence is that the firm's operating costs will be less sensitive to sales, i.e., resource commitments will increase. Columns 1 and 2 of Panel B show that operating leverage increases after options listing ($p < 0.01$), consistent with our baseline results that options listing increases the underlying firm's resource commitments.

⁹ We assume the value of R&D expenses to be zero if it is missing. The result is robust to dropping observations with missing R&D expenses from the regression.

4.2.3 Options trading volume and resource commitments

In general, more active options trading should be associated with higher resource commitments by enhancing information flows.¹⁰ More active options trading suggests that options traders make more effort to collect information for trading profits. The information collected and revealed by options traders reduces the uncertainty of trading on information by stock traders (Goldstein and Yang, 2015), which induces more informed stock trading, thereby increasing underlying stock price informativeness (Cao, Goyal, Ke, and Zhan, 2024).

In Panel C, in addition to the options listing variables, we include common measures of options trading volume used in previous studies and interact them with $\Delta \ln Sales$ to examine the impact of options trading volume on the firms' resource allocation decisions. In Column 1, we use the natural logarithm of 1 plus the annual dollar options trading volume ($\ln Volume$) (Naiker, Navissi, and Truong, 2013; Blanco and Wehrheim, 2017; Chen, Ng, and Yang, 2021) as the variable to capture the effect of options volume on resource commitments. The regression results show that $\ln Volume * \Delta \ln Sales$ is significantly negative ($p < 0.05$), indicating that an increase in options trading volume further increases resource commitments. In Column 2, the measure of options volume is relative options trading volume (OtS), defined as the ratio of annual options trading volume to annual stock trading volume (Roll, Schwartz, and Subrahmanyam, 2010; Johnson and So, 2012; Hu, 2014). This result is similar to that shown in Column 1 ($p < 0.01$).

In Column 3, we examine the event, the Penny Pilot Program (PPP), which lowers trading costs by reducing tick sizes for selected options classes. PPP boosts trading volume and liquidity of options and improves informational efficiency (Anagnostopoulou, Trigeorgis, and Tsekrekos, 2023; Cao, Goyal, Ke, and Zhan, 2024). Following previous studies, we construct a DiD estimator (PPP), which takes the value of one in the post-program years for pilot firms

¹⁰ Options trading volume could reflect informed trading based on fundamentals, volatility trading, or uninformed trading. We are agnostic about the source of options trading in this study, while the presence of volatility trading and uninformed trading will weaken our results.

and zero otherwise.¹¹ Again, the regression results show that when options trading volume increases due to the Penny Pilot Program, firms' resource commitments increase significantly ($p < 0.10$). Collectively, the results in Panel C support our claim that options listing can encourage firms to employ more fixed resources and such an effect is stronger when options trading volume is greater.

4.2.4 Is change in resource commitments asymmetric?

The observed rise in resource commitments could be asymmetric. Therefore, after options listing, underlying firms increase costs in response to an increase in sales as before but are more reluctant to reduce costs when sales revenue declines. Overall, their costs still appear to be more committed. To check this possibility, we include *DEC* (1 if sales decline year-over-year, and 0 otherwise) $\ast \Delta \ln Sales$ and the triple interaction $OPList \ast DEC \ast \Delta \ln Sales$ in the baseline model to detect possible asymmetric change in sensitivity of operating cost adjustment to revenue change. Columns 1–2 of Panel D yield significantly negative coefficients on $OPList \ast \Delta \ln Sales$ ($p < 0.05$) but insignificant coefficients on $OPList \ast DEC \ast \Delta \ln Sales$, suggesting that the increase in resource commitments is not asymmetric.¹²

[Insert Table 4 here]

4.3 Tests to mitigate endogeneity concerns

Prior research has shown that options listing decisions are made through options exchanges and not directly chosen by the underlying firms (Blanco and Wehrheim, 2017; Bernile, Hu, Li, and Michaely, 2025; Brockman, Subasi, Wang, and Zhang, 2024; Hsu, Ke, Ma, and Ruan, 2024). Therefore, in the baseline model, we treat firms' options listing as quasi-

¹¹ This program was initiated by the SEC in early 2007 and ran until 2020, with new firms being added annually as pilot firms. We obtain the list of firms added to the program each year from CBOE announcements, and manually match them with our sample based on their ticker symbols. A total of 201 pilot firms are matched, which is consistent with Anagnostopoulou, Trigeorgis, and Tsekrekos (2023). See the following sources for references: https://www.cboe.com/us/options/market_statistics/historical_data/penny_class/; https://www.cboe.com/us/options/notices/product_update/.

¹² Compared with Zadeh and Jalali (2024), we control for cross-industry and time-series differences in asymmetric cost adjustment by including $Year FE \ast \Delta \ln Sales$, $Industry FE \ast \Delta \ln Sales$, $Year FE \ast DEC \ast \Delta \ln Sales$, and $Industry FE \ast DEC \ast \Delta \ln Sales$ in our regressions (Byzalov and Basu, 2024), which attenuates the effect of options listing on asymmetric cost adjustment.

natural experiments and construct the DiD estimator to strengthen identification. To further mitigate endogeneity concerns, we conduct additional tests and report the results in Table 5.

4.3.1 Parallel trends assumption

For the DiD research design, an underlying assumption is a parallel trend between the treatment group and the control group; that is, there should be no significant difference in the choices between fixed and variable resources of firms with and without options listing before treatment. We conduct an event study to test this assumption. Specifically, we replace the indicator *OPList* in the baseline model with six indicator variables: *pre_3*, *pre_2*, *pre_1*, *post_1*, *post_2*, and *post_3*—which represent three or more years before, two years before, and one year before the year of options listing, and one year after, two years after, and three or more years after the initial listing of options. The regression results in Column 1 indicate no significant increase in resource commitments for the treatment group (options listing firms) relative to the control group (no options listing firms) before the initial listing of options. After the initial listing of options, however, resource commitments of the treatment group samples begin to significantly increase compared with the control group (the regression coefficients of the post-listing indicators* $\Delta \ln Sales$ are all significantly negative at the 1% level), a change illustrated in Figure 1. Therefore, the absence of differential pre-trends strengthens our interpretation that the documented change is associated with options listing rather than pre-existing trends.

[Insert Table 5 here]

4.3.2 Additional control variables and fixed effects

Managerial incentives are important determinants of firms' cost behavior (e.g., the empire-building incentive in Chen, Lu, and Sougiannis, 2012), and compensation structures largely shape these incentives. Following Coles, Daniel, and Naveen (2006), in Column 2, we add two compensation-related controls (and their interactions with $\Delta \ln Sales$): *delta* (the sensitivity of managers' compensation to stock price changes) and *vega* (the sensitivity of

managers' compensation to changes in firm risk).¹³ Fewer observations and additional control variables do not significantly weaken the baseline results. Further, the regression coefficient on $vega * \Delta \ln Sales$ is significant and negative ($p < 0.01$), indicating that when the compensation structure encourages managers to take risks, firms exhibit higher resource commitments.

Though we have controlled for year- and firm-fixed effects in the baseline model, some industry characteristics, such as the industry life cycle, may be time-varying and cannot be captured by static firm fixed effects. Therefore, in Column 3, we add $Year * Industry$ high-dimensional fixed effects to control for more unobservable factors that vary with time and industry. The regression coefficient of $OPList * \Delta \ln Sales$ remains significant and negative ($p < 0.01$), indicating that our baseline result remains valid after controlling for more potentially omitted variables.

4.3.3 Propensity score matching (PSM) and entropy balancing (EB)

Firms with options listing could be significantly different from those with no options listing in various firm characteristics, which may also influence firms' resource commitments. Therefore, following Blanco and Wehrheim (2017) and Hsu, Ke, Ma, and Ruan (2024), we adopt two matching methods to control for the observed differences between firms with and without options listed.

Our first method is PSM. For each firm receiving an options listing in year t , we construct a treated observation in its initial listing year and identify potential control firms that have never received an options listing and are observed in the same year. Importantly, all variables used to estimate the propensity score are measured in year $t-1$, ensuring that they temporally precede the options-listing event. As Mayhew and Mihov (2004) show that stock trading volume, stock return volatility, and market capitalization are important determinants of options listing, the propensity-score model includes those variables together with the control

¹³ We do not include $delta$ and $vega$ in the baseline model because matching them to our sample leads to substantial sample loss.

variables from the baseline model, including firm age, market-to-book ratio, asset intensity, labor intensity, and free cash flow. We estimate the probability of receiving an options listing using a pooled logit model that also includes listing-year and industry indicators. Panel A of Appendix B reports the propensity-score estimation results. Younger firms and firms with higher market valuation, higher market-to-book ratio, higher asset intensity, stronger free cash flows, and more stock trading volume are likely to have options listed, and firms with higher stock return volatility are less likely to have options listed.

With the logit regression result, we match each newly listed firm to its nearest control firm within the same listing year and two-digit SIC industry. The matching is conducted one-to-one with replacement, and we impose a caliper equal to 0.20 standard deviations of the logit of the estimated propensity score. Panel B of Appendix B presents the covariate-balance diagnostics. Following matching, the differences between the treatment and control groups in the pre-listing covariates are reduced, indicating that the matched firms are more comparable in terms of observable pre-treatment characteristics. This helps alleviate endogeneity concerns arising from the non-random nature of options listing. Finally, we assign each matched control firm the listing year of its matched treated firm as a pseudo-event year, reconstruct the firm-year panel around the listing event, and re-estimate the baseline model using the matched sample. Column 4 reports the resulting estimates.

Unlike PSM, we do not drop any observations with the EB method but give each observation an entropy balancing weight to obtain a near-perfect covariate balance. We divide the samples into treatment and control groups and then use EB with the first-order moment (i.e., mean) of all control variables in the baseline model to calculate the entropy balancing weights.¹⁴ Column 5 reports the regression results for the weighted sample. The coefficients of $OPList * \Delta \ln Sales$ remain significant in Columns 4 and 5, suggesting that our baseline result is

¹⁴ Untabulated results indicate that EB significantly reduces the differences in the mean, variance, and skewness of the control variables between the two groups. We observe similar results if we use EB with the second-order moment (i.e., variance) or the third-order moment (i.e., skewness) of all control variables to calculate the weights.

robust after accounting for observable differences between firms with options listing and firms without.¹⁵

4.3.4 Stacked DiD

Baker, Larcker, and Wang (2022) argue that in conventional staggered DiD designs, two-way fixed-effects estimators can produce biased results when treatment effects are heterogeneous, as they may assign negative weights to certain treatment cohorts. They propose that the stacked DiD approach circumvents this issue by constructing separate analysis samples for each treatment cohort, where each treated unit is matched with a clean control group consisting of never-treated units. This ensures all comparisons are valid and prevents contamination from early-treated units. Thus, we implement a stacked event study approach as a robustness check for the main results.

Specifically, we construct a stacked sample consisting of several cohorts, with each cohort made up of firms that list options in the same year and firms that never list options during the sample period (i.e., clean control groups). We then stack these cohorts and add Cohort*Year and Cohort*Firm fixed effects to the baseline model to test the effect of options listing on firms' resource commitments. Results in Column 6 stay intact after alleviating concerns about bad controls.

4.4 Mediation analysis – Information asymmetry as a channel

In the previous sections, we conclude that options listing increases underlying firms' resource commitments. This result remains consistent across a series of robustness checks and after addressing endogeneity concerns. In this section, we further examine whether the impact of options listing on firms' resource commitments aligns with our proposed mechanism:

¹⁵ Although PSM and EB help to reduce observable differences between the treatment group and the control group, matching based on covariates cannot eliminate differences in the other unobservable characteristics. A more direct test is to regress with only observations of firms with options listings, as these samples are likely to be more similar in both observable and unobservable characteristics. In this case, there is no firm whose options are never listed during the sample period (i.e., no "never-treated" group). Instead, the later-listed firms serve as the control group for the earlier-listed firms. Untabulated results show that our baseline result is robust to this subsample.

information asymmetry.

To explore the information asymmetry mechanism, we follow prior studies in conducting mediation analyses (e.g., Hsu, Ke, Ma, and Ruan, 2024). Specifically, we estimate the following two regression models:

$$\begin{aligned} Mediators_{i,t} = & \beta_0 + \beta_1 \Delta \ln Sales_{i,t} + \beta_2 OPList_{i,t} + \beta_3 OPList_{i,t} * \Delta \ln Sales_{i,t} + \\ & \beta_4 Controls_{i,t} + \beta_5 Controls_{i,t} * \Delta \ln Sales_{i,t} + Year\ FEs * \Delta \ln Sales + \\ & Industry\ FEs * \Delta \ln Sales + Year\ FEs + Firm\ FEs + \varepsilon_{i,t} \end{aligned} \quad (2)$$

$$\begin{aligned} \Delta \ln OPR_{i,t} = & \gamma_0 + \gamma_1 \Delta \ln Sales_{i,t} + \gamma_2 OPList_{i,t} + \gamma_3 OPList_{i,t} * \Delta \ln Sales_{i,t} + \gamma_4 \\ & Mediators_{i,t} + \gamma_5 Mediators_{i,t} * \Delta \ln Sales_{i,t} + \gamma_6 Controls_{i,t} + \gamma_7 Controls_{i,t} * \\ & \Delta \ln Sales_{i,t} + Year\ FEs * \Delta \ln Sales + \\ & Industry\ FEs * \Delta \ln Sales + Year\ FEs + Firm\ FEs + \varepsilon_{i,t} \end{aligned} \quad (3)$$

In Models (2) and (3), *Mediators* represent different measures of information asymmetry, while all other variables are defined as in Model (1). Model (2) estimates the effect of options listing on firms' information asymmetry, as captured by the coefficient β_2 . Model (3) further examines the effect of information asymmetry on resource commitments, as captured by the coefficient γ_5 . Accordingly, the mediating effect of options listing on resource commitments through information asymmetry is calculated as $\beta_2 * \gamma_5$,¹⁶ while the direct effect of options listing on resource commitments is captured by the coefficient γ_3 in Model (3).

We use two proxies for information asymmetry: probability of informed trading (*PIN*) and stock bid-ask spread (*Spread*). Higher values of *PIN* and *Spread* indicate higher information asymmetry (Brown and Hillegeist, 2007; Ardia, Guidotti, and Kroencke, 2024). Panel A of Table 6 reports the regression results. In the mediator-stage regressions (Columns 1 and 3), the coefficients on *OPList* are both significant and negative ($p < 0.01$), indicating that information

¹⁶ Because the indirect effect is the product of two estimated coefficients, its sampling distribution may be asymmetric and non-normal even when the individual coefficient estimates are approximately normal. We therefore assess statistical significance using a nonparametric bootstrap. In each replication, we re-estimate both the mediator equation (Model (2)) and outcome equation (Model (3)) and calculate the product $\beta_2 * \gamma_5$. The indirect effect is considered statistically significant when its bootstrap confidence interval excludes zero.

asymmetry declines after options listing. In the outcome stages (Columns 2 and 4), the coefficients on $PIN*\Delta\ln Sales$ and $Spread*\Delta\ln Sales$ are both significant and positive ($p < 0.05$), implying that higher (lower) information asymmetry is associated with lower (higher) resource commitments. Using 1,000 bootstrap resamples and bias-corrected 95% confidence intervals (see Bailey, 2015 for a similar approach), we find that the mediating effects are significant for both mediators (PIN and $Spread$, $p < 0.05$ and $p < 0.01$, respectively), accounting for 11.54% and 9.17% of the total effect, respectively. Overall, Panel A provides evidence that options listing increases resource commitments by reducing information asymmetry.

Information asymmetry is closely related to financial constraints. Prior studies show that options trading lowers firms' cost of equity capital (Naiker, Navissi, and Truong, 2013) and alleviates financial constraints. We next examine cost of equity capital (COC ; Chen, Huang, and Wei, 2013)¹⁷ and debt financing constraints (FC ; Linn and Weagley, 2024) as complementary outcomes of reduced information asymmetry. Higher values of COC and FC indicate higher financial constraints.

In Panel B, Columns 1 and 3 show that the coefficients on $OPList$ are both significant and negative ($p < 0.01$), indicating that options listing reduces both equity financing costs and debt constraints. More importantly, in Columns 2 and 4, the interaction terms $COC*\Delta\ln Sales$ and $FC*\Delta\ln Sales$ are significant and positive ($p < 0.05$ and $p < 0.01$, respectively), implying that lower (higher) financial constraints are associated with higher (lower) resource commitments. For both mediators, the mediating effects are both significant ($p < 0.05$ and $p < 0.01$, respectively), accounting for 10.53% and 4.05% of the total effect, respectively. Taken together, Panel B provides consistent evidence—using both equity- and debt-based measures—that options listing alleviates financing constraints and induces firms to exhibit higher resource

¹⁷ We estimate the cost of equity capital (net of risk-free rate) as implied in the current stock price and analysts' earnings forecasts based on four different models (Gebhardt, Lee and Swaminathan, 2001; Claus and Thomas, 2001; Ohlson and Juettner-Nauroth (2005) implemented by Gode and Mohanram (2003); Easton, 2004). We use the average estimates from these models as our measure of the cost of equity capital (net of risk-free rate) to mitigate the measurement errors associated with one particular model.

commitments.

[Insert Table 6 here]

4.5 Cross-sectional analysis

4.5.1 Short-sale constraints

In this section, we test how options listing affects resource commitments in different subsamples of firms, where the informational effect of options listing can be differential. Specifically, we examine whether short-sale constraints affect managers' incentives to adjust their resource commitments after options listing, because options listing should have a greater effect in reducing information asymmetry and relaxing financial constraints in these firms (Easley, O'Hara, and Srinivas, 1998; Johnson and So, 2012; Ramachandran and Tayal, 2021). If managers choose more variable resources to achieve a more stable performance result, they are more likely to do so in firms with higher short-sale constraints, where private negative information is more difficult to reveal by those firms' stock prices. However, when stock prices become more informative in the optioned firms, managers should have lower incentives to hoard bad news in short-term performance by stabilizing their earnings, but are more likely to incur expenditures that provide long-term benefits. In sum, if options listing increases resource commitments, such an effect should be stronger in firms with *ex ante* higher short-sale constraints.

We measure short-sale constraints in two ways. First, we use *Institutional_Ownership* (the ratio of total shares owned by institutional investors to total shares outstanding) because lower institutional ownership indicates a lower supply of lendable stock, and therefore, higher short-sale constraints (Nagel, 2005; Phillips, 2011; Hu, 2014). Second, short-sale constraints may be exacerbated if short-sale demand increases, given the limited supply. Therefore, we define our second measure of short-sale constraints, *Short-sale constraints*, as the gap between short interest (the annual average ratio of shares sold short for a given firm in a given month to the monthly shares outstanding) and institutional ownership. A larger gap indicates that

lendable stock is more in short supply and that short-sale constraints are more severe (Chen, Hong, and Stein, 2002; Asquith, Pathak, and Ritter, 2005).¹⁸ The results, presented in Table 7, indicate that options listing significantly increases resource commitments for firms that are subject to relatively large short-sales constraints, as reflected by the positive and significant coefficient of *Institutional_Ownership*OPList*ΔlnSales* (Column 1) ($p < 0.05$) and the negative and significant coefficient of *Short-sale_Constraints*OPList*ΔlnSales* (Column 2) ($p < 0.05$).

[Insert Table 7 here]

4.5.2 Value creation from SG&As

Our findings so far suggest that options listing creates incentives for the underlying firm to increase its commitments of SG&As. Beyond impacts on current performance, operating costs have significant impacts on firm prospects and valuation over longer horizons (Garrison, Noreen, and Brewer, 2023; Horngren, Datar, and Rajan, 2021). In particular, SG&As are part of the inputs for intangible capital formation, which can enhance innovation (Francis, Mani, Sharma, and Wu, 2021), mergers and acquisitions (Li, Qiu, and Shen, 2018), improve market valuation (Banker, Huang, Natarajan, and Zhao, 2019), and reduce climate change exposure (Zheng and Sun, 2025). However, value creation from SG&As varies across firms and industries. For example, Iqbal, Rajgopal, Srivastava, and Zhao (2025) document large cross-industry variations in the investment proportion of SG&As that can create firm value. If the improved information environment following options listing facilitates firms' ability to undertake long-term resource commitments, the effect should be particularly pronounced when such commitments generate greater future value.

To test this prediction, we first adopt industry-level estimates of the investment portion of SG&As following Iqbal, Rajgopal, Srivastava, and Zhao (2025). The investment portion of

¹⁸ We do not use short interest alone as an alternative measure because higher short interest without considering the supply of lendable stock does not reliably indicate higher short-sale constraints (Chen, Hong, and Stein, 2002; Asquith, Pathak, and Ritter, 2005).

SG&As is the part of the expenditures associated with future revenues, with a higher value suggesting greater reliance on SG&A expenses to build up intangible capital. We partition the sample into two groups based on the sample median of the investment portion of SG&A expenses. We define an indicator, *High_investSG&A*, which takes the value of one for firms with above-median values on the investment portion of SG&As. The regression results in Column 1 of Table 8 show that the effect of options listing on resource commitments is more prominent for firms that rely more on SG&As to build up intangible capital, as indicated by the negative and significant coefficient for *High_investSG&A*OPList*ΔlnSales* ($p < 0.01$).

Second, we adopt industry-level estimates of value creation by SG&As (VSGA) computed by Banker, Huang, and Natarajan (2011). The VSGA captures the impact of changes in SG&As on current and future profitability. Therefore, an industry with a higher VSGA relies more on SG&As to create value, and we expect resource commitments in such an industry to be more affected by options listing. We categorize the sample into two groups based on the sample median of the VSGA and assign the indicator *High_VSGA* for firms with above-median VSGA values. Column 2 shows that the coefficient of *High_VSGA*OPList*ΔlnSales* is negative and significant ($p < 0.01$). Again, the result suggests that options listing increases resource commitments more for firms that rely more on SG&As to create value.

[Insert Table 8 here]

4.5.3 Demand uncertainty

Banker, Byzlov, and Plehn-Dujowich (2014) show that greater demand uncertainty increases the likelihood of unusually high demand realizations and, consequently, the potential congestion costs associated with insufficient capacity. Managers therefore have stronger incentives to keep fixed resources *ex ante* to preserve sufficient capacity for favorable demand realizations. At the same time, these commitments expose firms to greater downside risk when demand turns out to be weak. Thus, demand uncertainty increases both the potential benefit of keeping fixed resources and the financial risk associated with doing so.

Options listing can alter this tradeoff. By improving the information environment and facilitating external financing, options markets can reduce the informational and financing frictions associated with maintaining committed capacity. These benefits should be particularly valuable when demand uncertainty is high, because the potential congestion costs from insufficient capacity are greater in such firms. Therefore, options listing is expected to have a stronger effect on resource commitments when firms face greater demand uncertainty.

Column 1 of Table 9 confirms the impact of demand uncertainty on resource commitments as documented by Banker, Byzalov, and Plehn-Dujowich (2014), by showing a negative and significant coefficient on $DemandVOL * \Delta \ln Sales$ ($p < 0.01$). Therefore, firms facing greater demand uncertainty deploy more fixed resources to accommodate favorable demand realizations. More importantly, Column 2 shows a significantly negative coefficient on $DemandVOL * OPList * \Delta \ln Sales$ ($p < 0.01$), indicating that the increase in resource commitments following options listing is greater among firms facing higher demand uncertainty. Taken together, these findings suggest that options listing facilitates resource commitments particularly when the economic value of maintaining committed capacity is high.

[Insert Table 9 here]

4.6 The impacts of options listing on long-term investment decisions

Table 6 shows that after the initial listing of options, information asymmetry and financial constraints of the underlying firm significantly decrease. Reduction in information asymmetry and financial constraints generally leads to more investments, and this should be especially so for long-term ones that rely on long-term financing that is more information-sensitive. In the following analysis, we provide more evidence that options listing can promote long-term decision-making with different investment proxies. More importantly, these findings will triangulate our findings on resource commitments, as the committed resources reflect firms' choice of a higher capacity level *ex ante* and therefore firms' long-term orientation.

Panel A of Table 10 reports the regression results for the impact of options listing on

underlying firms' capital investment. First, we regress capital expenditures (*lnCAPX*) on *OPList* together with other control variables and report the result in Column 1. The coefficient on *OPList* is significant and positive ($p < 0.01$), indicating that capital investments increase following options listing.

We then examine the impact of options listing on two specific strategies that indicate a shift to long-term orientation in physical investment decisions. The extant literature has suggested that firms can outsource in-house activities to free up resources for other productive purposes (Choi, Ju, Trigeorgis, and Zhang, 2021) and to respond to demand uncertainty and financial risk when they are financially constrained (Holzhacker, Krishnan, and Mahlendorf, 2015; Moon and Phillips, 2021). At the same time, firms can gain operating flexibility by leasing instead of purchasing equipment because leases are less costly compared with other forms of financing (Williamson, 1988) and help firms expand their credit capacity (Lim, Mann, and Mihov, 2017). Besides, leases, especially operating leases, allow firms to meet a temporary increase in demand for products/services (Gavazza, 2011) at a relatively low cost. If options listing relaxes the underlying firm's financial constraints, then after options listing, the firm can commit more resources to purchasing or upgrading tangible fixed assets and internal production and rely less on outsourcing and leasing for financial flexibility.

To test our predictions, we use *PC OPC* (a firm's estimated payment amount of the purchase contracts normalized by the operating costs) based on the outsourcing data of Moon and Phillips (2021) to proxy for a firm's reliance on outsourcing contracts.¹⁹ The result in Column 2 shows that after options listing, manufacturing firms' estimated intensities of outsourcing activities significantly decrease ($p < 0.10$). We then examine the changes in firms' decisions to lease versus purchase assets after options listing, as given by *LeasevsBuy*, which is defined as the sum of lease and rental costs divided by the sum of depreciation/amortization,

¹⁹ The test is performed on a small sample of manufacturing firms, because Moon and Phillips (2021) include only manufacturing firms in their study. We thank the authors for making the data available.

and lease and rental costs. The result in Column 3 shows that after options listing, firms prefer purchasing to leasing equipment ($p < 0.05$). In sum, Panel A indicates that options listing is associated with greater capital expenditure and a shift toward more committed forms of tangible-resource deployment, including greater reliance on internal production and asset ownership.

Panel B reports the regression results for the impact of options listing on underlying firms' intangible investments. We use levels of SG&As ($\ln SG\&A$) as a measure of firms' intangible capital investments, as the literature generally argues that part of SG&As contribute to building intangible capital for long-term value (Peters and Taylor, 2017; Banker, Huang, Natarajan, and Zhao, 2019; Chen, Harford, and Kamara, 2019; Ewens, Peters and Wang, 2025; Iqbal, Rajgopal, Srivastava, and Zhao, 2025). The regression result in Column 1 shows that the coefficient on *OPList* is significant and positive ($p < 0.01$), indicating that SG&As increase following options listing. To check the robustness of the result, we use the measures of organization capital ($\ln ORGC$) and knowledge capital ($\ln KNOWC$) developed by Ewens, Peters, and Wang (2025) as dependent variables. Results in Columns 2 and 3 show that options listing significantly raises levels of both organization capital and knowledge capital ($p < 0.01$ and $p < 0.05$, respectively).

Collectively, Table 10 provides additional evidence that, beyond firms' cost decisions, options listing is associated with higher tangible and intangible investments of the underlying firms.

[Insert Table 10 here]

5. Conclusions

In this study, we use options listing as a test setting and find that firms increase the proportion of fixed resources relative to variable resources when they have options listed on the stock exchange. This relation is consistent with the view that options listing improves firms' information environment and thereby facilitates greater resource commitments. Cross-sectional

tests suggest that the effect of options listing is stronger in firms that are subject to higher short-sale constraints, rely more on SG&As to create value and face greater demand uncertainty. In more general contexts, we find that options listing is associated with higher tangible and intangible investments. Overall, our findings suggest that options listing enhances firms' commitments of resources, due to its informational role in the financial market.

Highlighting the implications that options listing can have for the underlying firms' operations, our results are important to managers and stakeholders of the firms. The firms with options trading may pursue strategies that could lead to higher rewards by building up production capacities and intangible assets. While those investments could pay off in the long run, they expose the firms to significant downside risks. It is crucial for managers and stakeholders to recognize the dynamics that influence firms' prospects.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work, the author(s) used ChatGPT in order to proofread the manuscript. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

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Appendix A: Definitions of Variables

Variables	Definition	Data source
Dependent variables		
$\Delta \ln OPR$	Change in the natural logarithm of operating costs in year t relative to year $t-1$. Operating costs equal the sum of COGS, SG&As, and depreciation.	CRSP/Compustat Merged
$\Delta \ln COGS$	Change in the natural logarithm of COGS in year t relative to year $t-1$.	CRSP/Compustat Merged
$\Delta \ln SG\&A$	Change in the natural logarithm of SG&As in year t relative to year $t-1$.	CRSP/Compustat Merged
$\Delta \ln (SG\&A - R\&D)$	Change in the natural logarithm of SG&As minus R&D costs in year t relative to year $t-1$.	CRSP/Compustat Merged
$bookOL$	Operating leverage calculated as the ratio of SG&As (including depreciation) to total assets, following Chen, Chen, Li, and Li (2022).	CRSP/Compustat Merged
$NMOL$	Operating leverage calculated as the ratio of the sum of cost of goods sold and SG&A costs (include depreciation) to total assets, following Novy-Marx (2011).	CRSP/Compustat Merged
PSM_Treat	An indicator variable equal to one if firm i receives its initial options listing in year t , and zero for an eligible never-listed control firm observed in the same calendar year.	OptionMetrics
$\ln CAPX$	Natural logarithm of capital expenditures.	CRSP/Compustat Merged
PC_OPC	A firm's estimated payment amount within the closest fiscal year under all of the purchase contracts normalized by the operating costs.	Moon and Phillips (2021)
$LeasevsBuy$	Lease and rental costs divided by the sum of depreciation/amortization and lease and rental costs.	CRSP/Compustat Merged
$\ln SG\&A$	Natural logarithm of SG&As (including depreciation).	CRSP/Compustat Merged
$\ln ORGC$	Natural logarithm of the accumulated stock of the capitalizable portion of SG&As, measured via a perpetual-inventory approach developed by Ewens, Peters, and Wang (2025).	Ewens, Peters, and Wang (2025)
$\ln KNOWC$	Natural logarithm of the accumulated stock of a firm's past R&D investment, measured via a perpetual-inventory approach developed by Ewens, Peters, and Wang (2025).	Ewens, Peters, and Wang (2025)
Independent variables		
$\Delta \ln Sales$	Change in the natural logarithm of sales revenue in year t relative to year $t-1$.	CRSP/Compustat Merged
$OPList$	An indicator variable that takes the value of 1 in the post-options-listing years for firms with listed options and 0 otherwise. We define a firm's options listing date as the first date on which it appears in the OptionMetrics database.	OptionMetrics
$\ln Volume$	Natural logarithm of 1 plus the annual dollar options trading volume. We multiply the daily trading volume with the midpoint of the end-of-day bid and ask prices for each options contract on a stock. Then, we aggregate all listed options on a stock across all trading days annually to get the annual dollar options trading volume.	OptionMetrics
OtS	Annual options trading volume to annual stock trading volume.	OptionMetrics; CRSP
PPP	An indicator variable that takes the value of 1 in the post-PPP (Penny Pilot Program) years for the pilot firms and 0 otherwise.	CBOE announcements

<i>DEC</i>	An indicator variable that takes the value of 1 if sales in year t are lower than sales in year $t-1$, and 0 otherwise.	CRSP/Compustat Merged
<i>PIN</i>	Probability of informed trading.	Brown and Hillegeist (2007)
<i>Spread</i>	Annual average of monthly effective bid-ask spread computed with respect to the quoted midpoint as described in Holden and Jacobsen (2014).	Ardia, Guidotti, and Kroencke (2024)
<i>COC</i>	Annual average of monthly cost of equity capital estimated following Chen, Huang, and Wei (2013) minus the risk-free rate measured as the yield on the 10-year Treasury bonds.	Chen, Huang, and Wei (2013)
<i>FC</i>	Debt-focused constraint estimates using machine learning on firms' 10-Ks, developed by Linn and Weagley (2024)	Linn and Weagley (2024)
<i>Institutional_Ownership</i>	Ratio of total shares owned by institutional investors to beginning shares outstanding.	Thomson Reuters Institutional (13f) Holdings
<i>Short-sale_Constraints</i>	The difference between annual average of shares sold short for a given firm in a given month divided by the monthly shares outstanding and <i>Institutional_Ownership</i> .	Thomson Reuters Institutional (13f) Holdings; Compustat
<i>High_investSG&A</i>	An indicator variable that takes the value of 1 if the industry-specific investment portion of SG&As is above the sample median and 0 otherwise. Investment portion is the part of the SG&As that is associated with future revenues.	Iqbal, Rajgopal, Srivastava, and Zhao (2025)
<i>High_VSGA</i>	An indicator variable that takes the value of 1 if the industry-specific value creation of SG&As is above the sample median and 0 otherwise.	Banker, Huang, and Natarajan (2011)
<i>DemandVOL</i>	Standard deviation of the log changes in sales across all valid observations for firm i .	CRSP/Compustat Merged
Control variables		
<i>Size</i>	Natural logarithm of a firm's total assets.	CRSP/Compustat Merged
<i>Age</i>	Natural logarithm of the months between the current month and the first month that a stock appears in CRSP.	CRSP/Compustat Merged
<i>MtB</i>	Market value (shares outstanding*closing price) to book value (stockholders' equity + deferred taxes + investment tax credit - preferred stock).	CRSP/Compustat Merged
<i>RETVOL</i>	Standard deviation of daily stock returns over the past year.	CRSP
<i>AI</i>	Asset intensity, calculated as the ratio of total assets to sales revenue.	CRSP/Compustat Merged
<i>EI</i>	Employee intensity, calculated as the total number of employees scaled by sales revenue.	CRSP/Compustat Merged
<i>FCF</i>	Free cash flows, calculated as cash flows from operating activities minus common and preferred dividends scaled by the total assets.	CRSP/Compustat Merged
<i>delta</i>	Dollar change in executives' wealth associated with a 1% change in the firm's stock price (in \$000s).	Coles, Daniel, and Naveen (2006)
<i>vega</i>	Dollar change in executives' wealth associated with a 1% change in the standard deviation of the firm's returns (in \$000s).	Coles, Daniel, and Naveen (2006)
<i>MKTCAP</i>	Natural logarithm of a firm's market capitalization.	CRSP/Compustat Merged
<i>StockVolume</i>	Natural logarithm of a firm's total daily stock trading volume (share) over the year.	CRSP/Compustat Merged

<i>LEV</i>	The ratio of total liabilities to total assets.	CRSP/Compustat Merged
<i>ROA</i>	The ratio of income before extraordinary items to total assets.	CRSP/Compustat Merged
<i>Tangibility</i>	The ratio of net property, plant, and equipment to total assets.	CRSP/Compustat Merged

Appendix B: Logit regression results and matching quality of PSM

This table presents the logit regression results and matching quality of PSM. Appendix A provides detailed definitions of the variables. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Panel A: Logit regression results				
			(1)	
			PSM Treat	
<i>MKTCAP</i>			0.234***	
			(7.67)	
<i>Age</i>			-0.732***	
			(-16.04)	
<i>MtB</i>			0.068***	
			(9.01)	
<i>RETVOL</i>			-5.683**	
			(-2.49)	
<i>AI</i>			0.065**	
			(2.55)	
<i>EI</i>			-1.359	
			(-0.59)	
<i>FCF</i>			0.803***	
			(3.18)	
<i>StockVolume</i>			0.605***	
			(21.96)	
Constant			-1.383**	
			(-2.15)	
Year FEs			YES	
Industry FEs			YES	
N			12,007	
Pseudo R ²			0.31	
Panel B : Matching quality				
Variable	Unmatched/Matched	Mean-Treated	Mean-Control	Absolute value and significance of the difference
<i>MKTCAP</i>	Unmatched	5.764	4.078	1.686***
	Matched	5.465	5.490	0.025
<i>Age</i>	Unmatched	4.726	5.109	0.383***
	Matched	4.792	4.728	0.064*
<i>MtB</i>	Unmatched	4.659	2.444	2.215***
	Matched	4.243	4.433	0.190
<i>RETVOL</i>	Unmatched	0.038	0.042	0.004***
	Matched	0.039	0.040	0.001
<i>AI</i>	Unmatched	1.528	1.186	0.343***
	Matched	1.501	1.454	0.047
<i>EI</i>	Unmatched	0.008	0.009	0.001***
	Matched	0.009	0.009	0.000
<i>FCF</i>	Unmatched	0.059	0.046	0.013***
	Matched	0.054	0.057	-0.003
<i>StockVolume</i>	Unmatched	5.613	3.473	2.141***
	Matched	5.316	5.221	0.095*

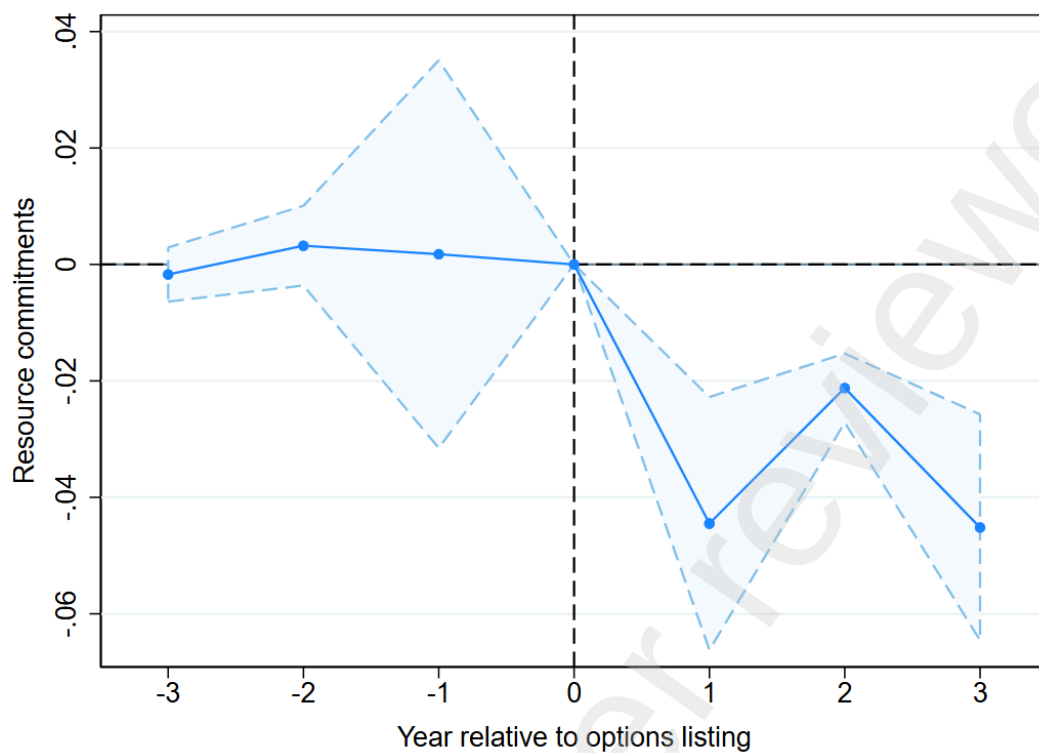


Figure 1: Parallel trend test

This figure shows the results of the parallel trend test. The horizontal axis represents the interval of sample years relative to the firms' options listing years, whereas the vertical axis represents the event-time coefficients on $\Delta \ln Sales$ (or the dynamics of the firms' resource commitments). We treat year 0 as the baseline group, and the periods before -3 (after 3) are grouped to period -3 (3). The dashed area represents the 95% confidence interval.

Table 1: Sample distribution

This table presents the sample distribution. Panels A and B detail the distribution of the sample by fiscal year and Fama–French 48 industries, respectively.

Panel A: Sample distribution by fiscal year					
Fiscal year	Frequency	Percent	Fiscal year	Frequency	Percent
1996	1,850	4.39	2010	1,466	3.48
1997	2,239	5.32	2011	1,376	3.27
1998	2,279	5.41	2012	1,284	3.05
1999	2,233	5.3	2013	1,267	3.01
2000	2,012	4.78	2014	1,256	2.98
2001	1,971	4.68	2015	1,178	2.8
2002	1,965	4.67	2016	1,117	2.65
2003	1,984	4.71	2017	1,074	2.55
2004	2,051	4.87	2018	989	2.35
2005	2,058	4.89	2019	928	2.2
2006	2,018	4.79	2020	894	2.12
2007	1,934	4.59	2021	900	2.14
2008	1,586	3.77	2022	733	1.74
2009	1,466	3.48			
Total				42,108	100
Panel B: Sample distribution by Fama–French 48 industries					
Industry code	Industry name		Frequency	Percent	
1	Agriculture		207	0.49	
2	Food Products		889	2.11	
3	Candy and Soda		119	0.28	
4	Beer and Liquor		209	0.5	
5	Tobacco Products		44	0.1	
6	Recreation		419	1	
7	Entertainment		692	1.64	
8	Printing and Publishing		302	0.72	
9	Consumer Goods		679	1.61	
10	Apparel		747	1.77	
11	Healthcare		1,044	2.48	
12	Medical Equipment		1,756	4.17	
13	Pharmaceutical Products		1,767	4.2	
14	Chemicals		840	1.99	
15	Rubber and Plastic Products		435	1.03	
16	Textiles		188	0.45	
17	Construction Materials		979	2.32	
18	Construction		729	1.73	
19	Steelworks		691	1.64	
20	Fabricated Products		186	0.44	
21	Machinery		1,827	4.34	
22	Electrical Equipment		843	2	
23	Automobiles and Trucks		720	1.71	
24	Aircraft		314	0.75	
25	Shipbuilding, Railroad Equipment		150	0.36	
26	Defense		81	0.19	
27	Precious Metals		281	0.67	
28	Non-metallic and Industrial Metal Mining		266	0.63	
29	Coal		126	0.3	
30	Petroleum and Natural Gas		1,763	4.19	
32	Communication		1,579	3.75	
33	Personal Services		698	1.66	
34	Business Services		6,961	16.53	
35	Computers		1,729	4.11	
36	Electronic Equipment		2,970	7.05	
37	Measuring and Control Equipment		1,023	2.43	
38	Business Supplies		535	1.27	
39	Shipping Containers		122	0.29	

40	Transportation	1,520	3.61
41	Wholesale	1,918	4.55
42	Retail	2,286	5.43
43	Restaurants, Hotels, Motels	1,022	2.43
48	Almost Nothing	452	1.07
Total		42,108	100

Table 2: Summary statistics

This table presents descriptive statistics of the key variables (uncentered) in the baseline model. $\Delta \ln OPR$ is the change in the natural logarithm of operating costs in year t relative to year $t-1$. Operating costs are equal to the sum of the cost of goods sold, SG&A costs and depreciation. $\Delta \ln Sales$ is the change in the natural logarithm of sales revenue in year t relative to year $t-1$. $OPList$ is an indicator variable that takes the value of one in the post-options-listing years for firms with listed options, and zero otherwise. $Size$ is the natural logarithm of the firm's total assets. Age is the natural logarithm of the months between the current month and the first month, in which a stock appears in the CRSP. MtB is the firms' market value divided by its book value. $RETVOL$ is the standard deviation of daily stock returns over the past year. AI is asset intensity, calculated as the ratio of total assets to sales revenue. EI is employee intensity calculated as the total number of employees scaled by sales revenue. FCF is free cash flows, calculated as the cash flows from operating activities minus the common and preferred dividends scaled by total assets. Appendix A provides detailed definitions of the variables.

	Obs	Mean	SD	P25	Median	P75
$\Delta \ln OPR$	42,108	0.087	0.265	-0.025	0.061	0.179
$\Delta \ln Sales$	42,108	0.093	0.300	-0.032	0.065	0.193
$OPList$	42,108	0.497	0.500	0.000	0.000	1.000
$Size$	42,108	5.445	1.781	4.177	5.326	6.553
Age	42,108	5.146	0.700	4.564	5.124	5.704
MtB	42,108	3.050	3.898	1.137	1.876	3.332
$RETVOL$	42,108	0.036	0.018	0.023	0.032	0.044
AI	42,108	1.453	2.955	0.688	1.037	1.644
EI	42,108	0.008	0.011	0.004	0.006	0.009
FCF	42,108	0.061	0.117	0.017	0.070	0.119

Table 3: Baseline regression results

This table presents the baseline results. $\Delta \ln OPR$ is the change in the natural logarithm of operating costs in year t relative to year $t-1$. $\Delta \ln Sales$ is the change in the natural logarithm of sales revenue in year t relative to year $t-1$. $OPList$ is an indicator variable that takes the value of one in the post-options-listing years for firms with listed options, and zero otherwise. Appendix A provides detailed variable definitions. Industries are defined with 2-digit SIC codes. Standard errors are two-way clustered by firm and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. t -statistics are reported in parentheses.

	(1)	(2)
	$\Delta \ln OPR$	$\Delta \ln OPR$
$\Delta \ln Sales$	0.824*** (54.46)	0.830*** (10.91)
$OPList$	0.027*** (6.35)	0.009** (2.67)
$OPList * \Delta \ln Sales$	-0.128*** (-5.43)	-0.083*** (-4.97)
$Size$		0.035*** (9.79)
$Size * \Delta \ln Sales$		0.045*** (7.53)
Age		-0.049*** (-7.01)
$Age * \Delta \ln Sales$		0.023** (2.54)
MtB		-0.000 (-0.53)
$MtB * \Delta \ln Sales$		-0.005*** (-4.16)
$RETVOL$		-0.350** (-2.58)
$RETVOL * \Delta \ln Sales$		-0.464 (-1.28)
AI		0.001 (1.54)
$AI * \Delta \ln Sales$		-0.002*** (-4.61)
EI		0.670*** (3.35)
$EI * \Delta \ln Sales$		0.540* (1.85)
FCF		-0.110*** (-6.20)
$FCF * \Delta \ln Sales$		0.052 (1.09)
Constant	0.004 (1.46)	0.018*** (9.83)
Year FEs* $\Delta \ln Sales$	YES	YES
Industry FEs* $\Delta \ln Sales$	YES	YES
Firm FEs	YES	YES
Year FEs	YES	YES
N	42,108	42,108
Adj. R ²	0.78	0.82

Table 4: Robustness checks

This table presents the results of the robustness checks. *Controls* in Panel A and Panel C include all control variables and their interactions with $\Delta \ln Sales$ in the baseline model. *Controls* in Panel B include determinants of firm's operating leverage, such as firm size, leverage, market to book ratio, free cash flow, ROA and tangibility (Novy-Marx, 2011). *Controls* in Panel D include some common determinants of asymmetric cost adjustment, such as asset intensity, employee intensity, and free cash flow (Chen, Lu, and Sougiannis, 2012). Appendix A provides detailed variable definitions. Industries are defined with 2-digit SIC codes. Standard errors are two-way clustered by firm and year. We obtain the p -value for the difference in $OPList * \Delta \ln Sales$ between the groups using a Z-test. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. t -statistics are reported in parentheses.

Panel A: Different cost components as alternative dependent variables			
	(1)	(2)	(3)
	$\Delta \ln COGS$	$\Delta \ln SG\&A$	$\Delta \ln (SG\&A - R\&D)$
$\Delta \ln Sales$	0.848*** (10.36)	0.461*** (5.73)	0.449*** (5.07)
$OPList$	0.007 (1.33)	0.008 (1.21)	0.009 (1.28)
$OPList * \Delta \ln Sales$	-0.010 (-0.45)	-0.047** (-2.76)	-0.053** (-2.67)
<i>Controls</i>	YES	YES	YES
Year FEs* $\Delta \ln Sales$	YES	YES	YES
Industry FEs* $\Delta \ln Sales$	YES	YES	YES
Firm FEs	YES	YES	YES
Year FEs	YES	YES	YES
p -value of coefficient difference	0.183		/
N	39,531	39,536	39,438
Adj. R ²	0.72	0.57	0.42
Panel B: Operating leverage as alternative dependent variables			
	(1)	(2)	
	$BookOL$	$NMOL$	
$OPList$	0.019*** (4.07)	0.044*** (3.04)	
<i>Controls</i>	YES	YES	
Firm FEs	YES	YES	
Year FEs	YES	YES	
N	39,635	41,983	
Adj. R ²	0.87	0.85	
Panel C: Options trading volume as additional independent variable			
	(1)	(2)	(3)
	$\Delta \ln OPR$	$\Delta \ln OPR$	$\Delta \ln OPR$
$\Delta \ln Sales$	0.840*** (11.10)	0.833*** (10.66)	0.616*** (8.15)
$OPList$	0.000 (0.10)	0.019*** (5.65)	0.017*** (4.03)
$OPList * \Delta \ln Sales$	-0.063*** (-3.47)	-0.074*** (-4.41)	-0.125*** (-5.12)
$\ln Volume$	0.011*** (7.29)		
$\ln Volume * \Delta \ln Sales$	-0.018** (-2.42)		
OtS		0.160*** (5.62)	
$OtS * \Delta \ln Sales$		-0.305*** (-3.10)	
PPP			-0.001 (-0.06)
$PPP * \Delta \ln Sales$			-0.126* (-1.98)

<i>Controls</i>	YES	YES	YES
Year FEs* $\Delta \ln Sales$	YES	YES	YES
Industry FEs* $\Delta \ln Sales$	YES	YES	YES
Firm FEs	YES	YES	YES
Year FEs	YES	YES	YES
N	42,108	42,108	19,055
Adj. R ²	0.82	0.82	0.77
Panel D: Asymmetric cost adjustment			
	(1)	(2)	
	$\Delta \ln OPR$	$\Delta \ln OPR$	
$\Delta \ln Sales$	0.666*** (6.48)	0.720*** (8.45)	
<i>DEC</i>	0.009** (2.46)	0.015*** (4.20)	
<i>DEC</i> * $\Delta \ln Sales$	0.273 (1.40)	0.208 (1.20)	
<i>OPList</i>	0.026*** (5.63)	0.027*** (5.99)	
<i>OPList</i> * $\Delta \ln Sales$	-0.053** (-2.06)	-0.054** (-2.16)	
<i>OPList</i> * <i>DEC</i>	-0.016*** (-3.66)	-0.021*** (-5.24)	
<i>OPList</i> * <i>DEC</i> * $\Delta \ln Sales$	0.012 (0.30)	-0.000 (-0.00)	
<i>Controls</i>	NO	YES	
Year FEs* $\Delta \ln Sales$	YES	YES	
Industry FEs* $\Delta \ln Sales$	YES	YES	
Year FEs* <i>DEC</i> * $\Delta \ln Sales$	YES	YES	
Industry FEs* <i>DEC</i> * $\Delta \ln Sales$	YES	YES	
Firm FEs	YES	YES	
Year FEs	YES	YES	
N	42,108	42,108	
Adj. R ²	0.81	0.81	

Table 5: Additional robustness checks to mitigate endogeneity concerns

This table presents the results of additional robustness tests to mitigate endogeneity concerns. The dependent variable in all the columns is $\Delta \ln OPR$. In Column 1, *pre_3*, *pre_2*, *pre_1*, *post_1*, *post_2*, and *post_3* represent three or more years before, two years before, and one year before the year of options listing, and one, two, and three or more years after options listing, respectively. *Controls* include all control variables and their interactions with $\Delta \ln Sales$ in the baseline model (*Controls* in Columns 2 include additional variables related to managerial incentives, such as compensation *delta* and *vega*). Appendix A provides detailed variable definitions. Industries are defined with 2-digit SIC codes. Standard errors are two-way clustered by firm and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. *t*-statistics are reported in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
	Parallel trend	Additional controls (<i>delta/vega</i>)	High-dimensional FEs	PSM-DiD	Entropy balancing	Stacked DiD
$\Delta \ln Sales$	0.850*** (11.50)	0.941*** (8.85)	0.851*** (14.32)	0.824*** (10.84)	0.825*** (10.69)	0.733*** (82.26)
<i>OPList</i>		0.014*** (3.74)	0.010*** (3.00)	0.012 (1.41)	0.007* (2.02)	-0.002 (-0.83)
<i>OPList</i> * $\Delta \ln Sales$		-0.067** (-2.53)	-0.083*** (-5.16)	-0.040* (-1.78)	-0.089*** (-3.52)	-0.092*** (-30.19)
<i>vega</i>		0.000*** (3.05)				
<i>vega</i> * $\Delta \ln Sales$		-0.001*** (-3.62)				
<i>delta</i>		0.000 (0.05)				
<i>delta</i> * $\Delta \ln Sales$		0.000 (0.43)				
<i>pre_3</i>	0.005 (1.32)					
<i>pre_2</i>	0.007 (1.65)					
<i>pre_1</i>	-0.012* (-2.01)					
<i>post_1</i>	0.018*** (4.42)					
<i>post_2</i>	-0.002 (-0.45)					
<i>post_3</i>	-0.014*** (-3.31)					
<i>pre_3</i> * $\Delta \ln Sales$	-0.002 (-0.76)					
<i>pre_2</i> * $\Delta \ln Sales$	0.003					

<i>pre_1*ΔlnSales</i>	(0.97) 0.002 (0.11)					
<i>post_1*ΔlnSales</i>	-0.044*** (-4.21)					
<i>post_2*ΔlnSales</i>	-0.021*** (-7.35)					
<i>post_3*ΔlnSales</i>	-0.045*** (-4.78)					
<i>Controls</i>	YES	YES	YES	YES	YES	YES
Year FEs*ΔlnSales	YES	YES	YES	YES	YES	YES
Industry FEs*ΔlnSales	YES	YES	YES	YES	YES	YES
Firm FEs	YES	YES	YES	YES	YES	NO
Year FEs	YES	YES	NO	YES	YES	NO
Year*Industry FEs	NO	NO	YES	NO	NO	NO
Cohort*Firm FEs	NO	NO	NO	NO	NO	YES
Cohort*Year FEs	NO	NO	NO	NO	NO	YES
N	42,108	11,620	41,979	16,540	42,108	395,508
Adj. R ²	0.82	0.80	0.83	0.76	0.82	0.85

Table 6: Mediation analyses

This table presents the mediation tests (Baron and Kenny, 1986) on how options listing affects resource commitments via information asymmetry (Panel A) and financial constraints (Panel B). *Controls* include all control variables and their interactions with $\Delta \ln Sales$ in the baseline model. Appendix A provides detailed variable definitions. Industries are defined with 2-digit SIC codes. Standard errors are two-way clustered by firm and year. The significance of the mediating effect is estimated using bootstrapping with 1,000 replications. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. *t*-statistics are reported in parentheses.

Panel A: Information asymmetry				
	(1) <i>PIN</i>	(2) $\Delta \ln OPR$	(3) <i>Spread</i>	(4) $\Delta \ln OPR$
$\Delta \ln Sales$		0.941*** (11.35)		0.631*** (6.25)
<i>OPList</i>	-0.041*** (-8.45)	0.006 (1.18)	-0.004*** (-12.04)	0.007 (1.71)
<i>OPList</i> * $\Delta \ln Sales$		-0.046** (-2.33)		-0.099*** (-4.38)
<i>PIN</i>		-0.063*** (-3.69)		
<i>PIN</i> * $\Delta \ln Sales$		0.141** (2.46)		
<i>Spread</i>				-0.950*** (-3.88)
<i>Spread</i> * $\Delta \ln Sales$				2.729** (2.77)
<i>Controls</i>	YES	YES	YES	YES
Year FEs* $\Delta \ln Sales$	YES	YES	YES	YES
Industry FEs* $\Delta \ln Sales$	YES	YES	YES	YES
Firm FEs	YES	YES	YES	YES
Year FEs	YES	YES	YES	YES
Mediating effect		-0.006**		-0.010***
Direct effect		-0.046**		-0.099***
% Total effect mediated		11.54%		9.17%
N	28,041	28,041	25,728	25,728
Adj. R ²	0.67	0.84	0.78	0.78
Panel B: Financial constraints				
	(1) <i>COC</i>	(2) $\Delta \ln OPR$	(3) <i>FC</i>	(4) $\Delta \ln OPR$
$\Delta \ln Sales$		0.871*** (5.02)		0.858*** (14.53)
<i>OPList</i>	-0.006*** (-5.29)	0.010*** (3.20)	-0.060*** (-3.64)	0.008** (2.44)
<i>OPList</i> * $\Delta \ln Sales$		-0.034* (-1.92)		-0.071*** (-4.43)
<i>COC</i>		-0.020 (-0.33)		
<i>COC</i> * $\Delta \ln Sales$		0.723** (2.16)		
<i>FC</i>				-0.001 (-0.42)
<i>FC</i> * $\Delta \ln Sales$				0.056*** (5.86)
<i>Controls</i>	YES	YES	YES	YES
Year FEs* $\Delta \ln Sales$	YES	YES	YES	YES
Industry FEs* $\Delta \ln Sales$	YES	YES	YES	YES
Firm FEs	YES	YES	YES	YES
Year FEs	YES	YES	YES	YES
Mediating effect		-0.004**		-0.003***
Direct effect		-0.034*		-0.071***
% Total effect mediated		10.53%		4.05%
N	19,537	19,537	41,670	41,670

Adj. R²

0.70

0.86

0.60

0.82

Table 7: Cross-sectional tests: the effect of short-sale constraints

This table presents the cross-sectional results on how the effect of options listing on resource commitments varies in firms that are subject to different short-sale constraints. *Controls* include all control variables and their interactions with $\Delta \ln Sales$ in the baseline model. Appendix A provides detailed variable definitions. Industries are defined with 2-digit SIC codes. Standard errors are two-way clustered by firm and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. *t*-statistics are reported in parentheses.

	(1)	(2)
	$\Delta \ln OPR$	$\Delta \ln OPR$
$\Delta \ln Sales$	0.803*** (11.12)	0.760*** (11.29)
<i>OPList</i>	0.007** (2.54)	0.007** (2.41)
<i>OPList</i> * $\Delta \ln Sales$	-0.059*** (-4.64)	-0.067*** (-4.94)
<i>Institutional_Ownership</i>	-0.003 (-0.68)	
<i>Institutional_Ownership</i> * <i>OPList</i>	0.003 (0.66)	
<i>Institutional_Ownership</i> * $\Delta \ln Sales$	-0.021* (-2.05)	
<i>Institutional_Ownership</i>*<i>OPList</i>*$\Delta \ln Sales$	0.037** (2.20)	
<i>Short-sale_Constraints</i>		0.003 (0.64)
<i>Short-sale_Constraints</i> * <i>OPList</i>		-0.002 (-0.36)
<i>Short-sale_Constraints</i> * $\Delta \ln Sales$		0.019** (2.05)
<i>Short-sale_Constraints</i>*<i>OPList</i>*$\Delta \ln Sales$		-0.042** (-2.51)
<i>Controls</i>	YES	YES
Year FEs* $\Delta \ln Sales$	YES	YES
Industry FEs* $\Delta \ln Sales$	YES	YES
Firm FEs	YES	YES
Year FEs	YES	YES
N	34,024	26,389
Adj. R ²	0.86	0.85

Table 8: Cross-sectional tests: the effect of value creation by SG&A expenses

This table reports the cross-sectional results of how the effect of options listing on resource commitments varies in firms whose SG&As contribute differently to value creation. *Controls* include all control variables and their interactions with $\Delta \ln Sales$ in the baseline model. Appendix A provides detailed variable definitions. Industries are defined with 2-digit SIC codes. Standard errors are two-way clustered by firm and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. *t*-statistics are reported in parentheses.

	(1)	(2)
	$\Delta \ln OPR$	$\Delta \ln OPR$
$\Delta \ln Sales$	0.823*** (10.98)	0.973*** (27.85)
<i>OPList</i>	0.006 (1.58)	0.008** (2.20)
<i>OPList</i> * $\Delta \ln Sales$	-0.055*** (-3.02)	-0.056*** (-3.70)
<i>High_investSG&A</i> * <i>OPList</i>	0.009 (1.50)	
<i>High_investSG&A</i> * $\Delta \ln Sales$	-0.065* (-2.00)	
<i>High_investSG&A</i>*<i>OPList</i>*$\Delta \ln Sales$	-0.062*** (-2.87)	
<i>High_VSGA</i> * <i>OPList</i>		0.001 (0.25)
<i>High_VSGA</i> * $\Delta \ln Sales$		-0.135* (-1.79)
<i>High_VSGA</i>*<i>OPList</i>*$\Delta \ln Sales$		-0.066*** (-2.88)
<i>Controls</i>	YES	YES
Year FEs* $\Delta \ln Sales$	YES	YES
Industry FEs* $\Delta \ln Sales$	YES	YES
Firm FEs	YES	YES
Year FEs	YES	YES
N	41,656	42,108
Adj. R ²	0.82	0.82

Table 9: Cross-sectional tests: the effect of demand uncertainty

This table reports the cross-sectional results of how the effect of options listing on resource commitments varies in firms facing different demand uncertainty. *Controls* include all control variables and their interactions with $\Delta \ln Sales$ in the baseline model. Appendix A provides detailed variable definitions. Industries are defined with 2-digit SIC codes. Standard errors are two-way clustered by firm and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. t -statistics are reported in parentheses.

	(1)	(2)
	$\Delta \ln OPR$	$\Delta \ln OPR$
$\Delta \ln Sales$	0.872*** (13.91)	0.820*** (11.33)
$OPList$		0.005 (1.49)
$OPList * \Delta \ln Sales$		-0.039** (-2.54)
$DemandVOL * OPList$		0.018 (0.77)
$DemandVOL * \Delta \ln Sales$	-0.084*** (-2.83)	0.008 (0.36)
$DemandVOL * OPList * \Delta \ln Sales$		-0.166*** (-4.08)
<i>Controls</i>	YES	YES
Year FEs* $\Delta \ln Sales$	YES	YES
Industry FEs* $\Delta \ln Sales$	YES	YES
Firm FEs	YES	YES
Year FEs	YES	YES
N	42,108	42,108
Adj. R ²	0.82	0.82

Table 10: Options listing and firm's long-term investments

This table reports the impacts of options listing on firms' long-term investments. *Controls* variables in Panel A (Column 1) and Panel B include several determinants of firms' long-term investments, such as firm size, leverage, market-to-book ratio, free cash flow, ROA, and tangibility (Gustafson and Kotter, 2023). *Controls* variables in Panel A (Columns 2-3) include the baseline control variables as well as additional determinants of firms' outsourcing decisions, such as sales growth, Tobin's Q, and profit margin (Moon and Phillips, 2021). Appendix A provides detailed variable definitions. Industries are defined with 2-digit SIC codes. Standard errors are two-way clustered by firm and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. t -statistics are reported in parentheses.

Panel A: Long-term tangible investments			
	(1)	(2)	(3)
	<i>lnCAPX</i>	<i>PC OPC</i>	<i>LeasevsBuy</i>
<i>OPList</i>	0.066*** (2.99)	-0.008* (-1.83)	-0.008** (-2.21)
<i>Controls</i>	YES	YES	YES
Firm FEs	YES	YES	YES
Year FEs	YES	YES	YES
N	41,764	7,110	38,026
Adj. R ²	0.92	0.65	0.84
Panel B: Long-term intangible investments			
	(1)	(2)	(3)
	<i>lnSG&A</i>	<i>lnORGC</i>	<i>lnKNOWC</i>
<i>OPList</i>	0.048*** (4.23)	0.099*** (3.75)	0.058** (2.73)
<i>Controls</i>	YES	YES	YES
Firm FEs	YES	YES	YES
Year FEs	YES	YES	YES
N	39,635	38,226	38,435
Adj. R ²	0.98	0.95	0.95

Options listing and corporate resource commitments

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Abstract

Existing literature suggests that options trading helps mitigate information asymmetry between managers and external investors of the underlying firm. Building on prior studies, this paper examines whether the presence of options trading influences the firm's resource commitments and how. Our baseline results indicate that firms with options listed on stock exchanges exhibit greater commitment in fixed resources to support operations, as reflected by less responsive expenditures to revenue changes. This effect is stronger in firms whose short-sale constraints are greater, whose SG&As generate higher future value, and whose demand is more uncertain. Additional analysis indicates that the impact of options listing on resource commitments is consistent with the reduced information asymmetry as a channel. Lastly, we provide results showing that optioned firms become more long-term oriented towards operating and investment decisions.

Keywords: options listing; resource commitments; information asymmetry

JEL Classifications: D24; G31; M41

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