Bid-Ask Spread and Liquidity Searching Behaviour of Informed Investors in Option Markets

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Abstract

We show evidence of a liquidity searching behaviour of informed investors in option listings, which was also found by Collin-Dufresne and Fos (2015) using stock markets. Nevertheless, and differently from Collin-Dufresne and Fos (2015), we find that the option bid-ask spread may be still a good proxy for informed trading, despite of the liquidity searching behaviour of informed agents. We show an upward trend in the option bid-ask spread after option introductions (as informed traders avoid trading in initial periods after listing dates due to the low liquidity environment), which is steeper for options with high chances of information asymmetries.

Keywords: Stock options; option listings; informed trading.
JEL Codes: D82; G10; G14.

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1. Introduction

A number of studies have suggested that the bid-ask spread should increase when there are more informed investors in the market (see, e.g., Glosten and Milgrom, 1985; and Kyle, 1985; and Easley and O'Hare, 1987). Recently, however, Collin-Dufresne and Fos (2016) developed a theoretical model, where they suggest that the relationship between the bid-ask spread and informed trading is not as straightforward as previously thought. This is due to a strategic behaviour that is often adopted by informed agents. They argue that informed investors may wait to use their additional information until there is an environment characterised by low levels of illiquidity (i.e. high liquidity), and hence where there are more chances to find noise traders who will behave as the counterpart of the informed trading strategies. As we know the bid-ask spread not only has an adverse selection component, but also an illiquidity component.[1] Therefore, informed investors may trade in the market when the value of the illiquidity component of the bid-ask spread is low, which can make the bid-ask spread not a good proxy for informed trading. This is consistent with the empirical evidence presented in the Collin-Dufresne and Fos (2015) study, which shows that informed investors trade more when there is increased liquidity in the stock market.

Differently to Collin-Dufresne and Fos (2015), who analyse the relationship between bid-ask spread and informed trading using stock market data, we want to examine such relationships in the option market. This analysis is interesting, as informed investors should use the option market, since it provides a cheaper way in which additional information may be translated into profits (e.g., see Easley *et al.*, 1998; Lee and Yi, 2001). The high leverage that characterises option markets, and thus the low capital requirements, is particularly attractive to better informed investors who can use here their superior information rather than directly using the underlying asset market.

In particular, we analyse the relationship between the bid-ask spread and informed trading in *newly listed equity options*. Informed investors may be eager for the stocks on which they have access to superior information to be optioned. However, informed investors may not use their informational advantages through option trading immediately after the listing date. This is because on the first days after option listings there is a low option liquidity (e.g. a low option trading volume). Thus, informed investors may wait until there are higher levels of liquidity where there are more noise traders in the option market, who are part of the option trading activity.

[1] As standard in the literature, the relative bid-ask spread is often used as a measure of illiquidity, among others see Amihud and Mendelson (1986) and Conroy *et al.* (1990).

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Consequently, informed investors should follow a liquidity searching behaviour to exploit their information advantages, as suggested Collin-Dufresne and Fos (2015, 2016).

The question that we want to answer in our study is, given that informed investors may still have a liquidity searching behaviour after option listings, does the bid-ask spread decrease in new options with more chances of having investors with additional information? In other words, we want to analyse whether the results obtained by Collin-Dufresne and Fos (2015) in the stock market are still valid in option markets, in terms that the bid-ask spread is not a good proxy for informed trading.

In the study from Collin-Dufresne and Fos (2015), they use as a proxy of informed trading transactions from Schedule 13D filings by activist investors with the SEC. In the Schedule 13D filings, activist investors have to report within 10 days of acquiring more than 5% of any class of securities, if such investors have an interest in influencing the management of the company. Thus, Schedule 13D filings represent a proxy of 'private' information, in term that the agents in the Schedule 13D filings should have 'confidential' knowledge of the firm. However, agents with 'private' information are not the only ones with informational advantages. Agents with informational advantage can be also sophisticated investors, who have a large group of experts developing advanced quantitative tools to extract in a more effective way information from the publicly available market signals (which does not necessarily imply the use of 'confidential' information). Therefore, the use of Schedule 13D filings may narrow the analysis to only a subset of informed investors (i.e. investors with 'private' information), without considering 'sophisticated' agents.

Differently to Collin-Dufresne and Fos (2015), we use as a proxy for the level of asymmetric information, the number of analysts following the company that issued the underlying stock involved in an option listing. The use of the number of analysts is based on the premise that it is easy to detect informed strategies in trades when many trained and specialised people are looking at and analysing the market activity; this circumstance should decrease informational asymmetries. For instance, Easley *et al.* (1998a) stated in their conclusion, "*high analysts stocks face a lower probability of information-based trading*'" (p. 200).[2] This proxy should be able to capture the long-term activity of investors with 'private' information and 'sophisticated' investors with more developed tools to extract information from publicly available signals. The number of analysts as a

[2] We also use the total market capitalization of the underlying asset as a proxy for the level of informed trading, in the robustness checks in the supplementary Appendix.

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proxy of asymmetric information has already been used in previous studies (e.g. Roll *et al*. 2009; Bernales, 2017).

In line with the traditional literature of informed trading, and contrary to Collin-Dufresne and Fos (2015), we find evidence that the bid-ask spread is still a good proxy for informed trading in the new introduced equity options. We show that in the first year after option listings, the option bid-ask spread is larger for option with higher chances of having informed trading. Our results are robust after including year fixed effects, using all option contracts and a subset of at-the-money one-month-to-maturity option contracts, and controlling for option liquidity, stock liquidity and option price levels.

We also find that, in the initial months immediately following an option listing, the option relative bid-ask spread is lower than in future periods. Such a low starting value for the relative bid-ask spread, followed by an upward trend, is somewhat surprising because the early 'life' of an option should be marked by a relatively low liquidity, so that comparatively *high* and not *low* bid-ask spreads should be expected (due to the illiquidity component of the bid-ask spread). The low initial values observed for the option relative bid-ask spread, just after option listing, can be explained by a modest level of early participation by informed investors in the new option market (from the adverse selection component of the bid-ask spread). It is the low volumes in the market of newly listed options that discourages informed traders, and hence may cause relatively low bid-ask spreads immediately after the option listing. This is sensible because the early stages after option listings are characterised by a reduced trading volume in which: i) there are not many noise traders in the option market to be the counterpart in informed trades; and ii) even small transactions are important, and thus the use of additional information in trades from informed investors may be discovered by other agents (which implies that informational advantages disappear before being fully exploited). Therefore, informed investors have incentives to wait until there are higher levels of liquidity in the option market.

We also show that the upward trend in the option relative bid-ask spreads is more pronounced for option listings characterised by high chances of having asymmetric information. In summary, on the one hand, our results are consistent with the liquidity searching behaviour of informed investors suggested by Collin-Dufresne and Fos (2015, 2016). However, on the other hand (and differently from Collin-Dufresne and Fos, 2015, 2016), we find evidence that the bid-ask spread is still a good proxy for informed trading, in spite of the strategic behaviour of informed investors in terms of liquidity searching.

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We consider three possible explanations for the difference of our results compared with the findings in Collin-Dufresne and Fos (2015). First, as we mentioned previously, the bid-ask spread has an illiquidity component and an adverse selection component. Thus, it may be the case that the adverse selection component is more important (relative to the illiquidity component) in option markets than in stock markets. This is sensible since the non-linear features of options (i.e. which are reflected in the high leverage that characterises option contracts) can induce larger damage to counterparts of informed investors in options than would occur in stocks. Secondly, given the intrinsic features of option contracts, which have a time-to-maturity, there are time limits to profit from informational advantages. Thus, the optimal time for informed investors to step in (to exploit their additional information) is constrained, which may be the reason that the option bid-ask spread can still reveal the presence of informed trading. Third, we use a different proxy for asymmetric information. Collin-Dufresne and Fos (2015) use Schedule 13D filings which capture informed trading coming from agents with 'private' information'. Instead, our proxy for asymmetric information is not only a proxy for investors with 'private' information, but also it is a proxy for the long-term average behaviour of 'sophisticated' investors with more developed tools and skills to analyse and capture information from public data.

In terms of the literature review, the analysis of informed trading in option markets has been investigated in a number of theoretical and empirical studies. For instance, in the group of theoretical studies, researchers have analysed the effect of option introductions on the underlying asset price process (Back, 1992), the effect of options on information acquisition (Cao, 1999; Massa, 2002), and the impact of asymmetric information on option demand and option volume (Brennan and Cao, 1996; Vanden, 2008). In the group of empirical studies, there are analyses in terms of information advantages and stealth trading (Anand and Chakravarty, 2007), asymmetric information and the success of option introductions (Bernales, 2017), the effect of informed trading on price discovery (Chakravarty *et al*., 2014), and the analysis of adverse selection signals contained in the option trading activity (Easley *et al*., 1998; Lee and Yi, 2001; and Pan and Poteshman, 2006; Ordu and Schweizer, 2015, 2017).[3]

This research letter is organized as follows. Section 2 describes the data, while Section 3 documents the relationship between relative bid-ask spreads and informed trading activity in option markets after new option listings. Section 4 concludes.

[3] There are other studies related to information flows in option markets in terms of the effect of option introduction on the market quality of the underlying asset (Conrad, 1989; De Jong *et al*. 2006; and Kumar *et al*. 1998) and ambiguity in option markets (Cumming *et al*., 2017), amongst others.

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2. The data

We use data from option listings on the U.S. equity option market in the period 1996-2009. We use the OptionMetrics database, which contains daily information, including volume and closing bid and ask prices for call and put option contracts. Since our objective is to observe the adoption process as a homogeneous picture, we fix the listing date as the 'date one' for all option listings (i.e., our empirical analysis is developed in event time where the event is the option listing). We apply some exclusionary criteria to filter the dataset. First, similar to Bernales and Guidolin (2014, 2015), we delete observations that violate basic no-arbitrage bounds. Second, similar to Dumas *et al.* (1998), Cao and Wei (2010) and Bernales and Guidolin (2014, 2015), we drop all option contracts with maturities too short and too long. Thus, we delete option contracts with less than six trading days or with more than one year to expiration. Third, using the same arguments of Cao and Wei (2010) and Bernales and Guidolin (2014, 2015), we eliminate options with a bid price below $0.125 to avoid the effect of price discreteness due to the tick size. Fourth, all options contracts with zero option volume and zero open interest during a month are deleted.[4] Fifth, similar to Bernales (2017), we delete equity options in which their underlying stock are affected in the first year after the option listing date by the following company events: splits, mergers, spin-offs, new equity issues in the same company, rights offering and/or warrant issues. In addition, we performed the analyses using all option contracts, and the sub-set of option contracts that are of at-the-money one-month-to-maturity (the latter to avoid potential pricing structure associated with option moneyness and time-to-maturity).

As mentioned in the introduction, we use as a proxy for the level of informed trading the number of analysts (obtained from the $I/B/E/S$ database) making annual earnings forecasts for the firm that issued the underlying stock involved in an option listing. We calculate the annual average of the monthly number for the year before and the year after the listing date. Thus, the inverse of the average of the number of analysts ($InvAnlst$) is used as proxy of asymmetric information.

Consequently, after applying the filters mentioned above, a sample of 891 option listings with $InvAnlst$ is obtained for our analysis. Table 1 reports summary statistics for the relevant variables in this study. In Table 1, $BAre_{OP,1Y}$ is the average of the option relative bid-ask spread, and

[4] Cao and Wei (2010) use different criteria since they delete option contracts with five or fewer option contracts traded. Instead, we delete option contracts with zero option volume *and* zero 'open interest'. This is because the number of contracts (i.e. the open interest) is established in an endogenous process based on investors' demands; thus the bid and ask prices of option with an open interest higher than zero provide useful information of 'existing' contracts which can be potentially traded.

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$DVlm_{OP,1Y}$ is the average of the daily option dollar-volume, both calculated in the year after the option listing. The option relative bid-ask spread is defined as $BAre_{OP} = \left(Ask\ Price - Bid\ Price\right) / \left(0.5\left(Ask\ Price + Bid\ Price\right)\right)$. $InvAnlst_{0Y}$ ($InvAnlst_{1Y}$) is the inverse of the average of the number of analysts for the year prior to (after) option listings.

[Insert Table 1 here]

3. Analysing the relationship between the relative bid-ask spreads and the informed trading activity in new option listings

As a first step, we want to analyse whether the bid-ask spread is still a good proxy for informed trading in the new introduced equity options. Table 2 presents a regression analysis, in which the dependent variable is the relative bid-ask spread ($BAre_{OP,1Y}$); while the independent variable is the inverse of the average of the number of analysts for the year after option listing ($InvAnlst_{1Y}$). We control for liquidity in the option market by using the average of the daily option dollar-volume and open interest in the first year after the option introduction ($DVlm_{OP,1Y}$ and $OInt_{OP,1Y}$, respectively), while we control for liquidity in the underlying stock market by using the average of the daily dollar-volume of the underlying stock in the first year after the listing date ($DVlm_{S,1Y}$). [5] We control for the level of the option prices by using the average of the implied volatility in the first year after option introduction ($IV_{OP,1Y}$), since there is a positive relationship between option prices and their implied volatilities. In addition, we include year fixed effects, and we present results for all option contracts, and the sub-group of option contracts that are of at-the-money one-month-to-maturity.

[Insert Table 2 here]

Table 2 shows that in the first year after option listings, the relative option bid-ask spread significantly increases for option listings with high chances to have asymmetric information measured by $InvAnlst_{1Y}$. For instance, the coefficient for the $InvAnlst_{1Y}$ is 0.091 and significant at the 1% level in the regression using at-the-money one-month-to-maturity option contracts which controls for option liquidity by $DVlm_{OP,1Y}$. As a robustness check (see Table A1 in the supplementary

[5] The data used to calculate stock volumes is obtained from the *CRSP* database.

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Appendix), we also use the total market capitalisation of the underlying asset (i.e. size) as a second proxy for the level of informed trading. The use of the market capitalisation of the underlying asset is due to the fact that large firms should have low levels of asymmetric information, since they are followed by more agents in the market (Bhushan, 1989); thus informed trading activity has more chances to be discovered. In addition, large firms are more mature and, therefore, they should have efficient tools to release information to market participants (Diamond and Verrecchia, 1991). The results presented in Table A1 are consistent with Table 2, in the sense that the relative option bid-ask spread is significantly larger for option listings with higher levels of informed trading (i.e. in option listings with lower market capitalization of the underlying stock).

We also find that $BAre_{OP}$ starts at low levels but displays a tendency to increase progressively. Figure 1 shows the evolution of the daily average of the relative bid-ask spread and the option dollar-volume in each month over the first year after listing. In Figure 1, the low starting level of $BAre_{OP}$ is particularly interesting because the early 'life' of an option contract is characterised by substantial illiquidity, as one would expect of all newly created securities (see the evolution of the average option dollar volume in Figure 1). Therefore, high and not low $BAre_{OP}$ values should be expected because the inverse of the relative bid-ask spread is a standard illiquidity proxy in the literature.[6]

[Insert Figure 1 here]

We conjecture that the initial low value of $BAre_{OP}$ can be explained by a modest level of informed option trading activity in the early stages after option listings, by using the same arguments as Collin-Dufresne and Fos (2015, 2016), in terms of a liquidity search behaviour from informed investors. In the early stages after a listing, informed traders may strategically wait until there are higher levels of liquidity, in which more noise traders are part of the market (who will be the counterpart of the informed investors) and so it becomes easier to hide and exploit the informed trading strategies. Consequently, one may indeed see $BAre_{OP}$ start out low and progressively increase as volumes pick up.

To analyse this potential behaviour of agents, we perform a regression analysis in Table 3 with the growing rate of relative bid-ask spread $\Delta Bare = BAre_{OP,13M} / BAre_{OP,1}$, where

[6] In Table A2 of the supplementary appendix, we test if the increase in the relative bid ask spread is significant using all option contracts and the sub-sample of at-the-money one-month-to-maturity option contracts.

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$BAre_{OP,1M}\left(BAre_{OP,13M}\right)$ is the average relative bid-ask spread in the first (thirteenth) month after the listing date. In the regression, the dependent variable is $\Delta Bare$ and the independent variable is the average of the number of analysts for the year before option listing ($InvAnlst_{0Y}$).

[Insert Table 3 here]

The intuition behind the analysis in Table 3 is that a high growth rate of the relative bid-ask spread, *ΔBare*, should be observed in option listings with higher chances of having asymmetric information prior to option listings. This is because the relative bid-ask spread should increase more in option listings with higher asymmetric information, since many informed agents prefer to wait for future periods until there are more option liquidity. This is exactly what a rational market maker would anticipate, thus resulting in a further widening of the relative bid-ask spreads over time for option listings in which there are more informed agents in the market.

Similar to Table 2, in Table 3 we control for market liquidity in the option market by using $DVlm_{OP,1Y}$ and $OInt_{OP,1Y}$, while we control liquidity in the underlying stock market by using $DVlm_{S,1Y}$. We also control for the level changes of option prices by using the ratio $IV_{OP,13M} / IV_{OP,1M}$, where $IV_{OP,1M}\left(IV_{OP,13M}\right)$ is the average of the implied volatility in the first (thirteenth) month after option introduction because, as explained before, there is a positive relationship between option prices and their implied volatilities. We also include year fixed effects, and we present results for all option contracts, and the sub-group of option contracts that are at-the-money one-month-to-maturity.

Table 3 shows that option listings characterised by high levels of information asymmetries experience larger changes in the option relative bid-ask spread than the listings with less asymmetric information. For instance, the coefficient for the $InvAnlst_{0Y}$ is 0.074 and significant at the 5% level in the regression using at-the-money one-month-to-maturity option contract and controlling for option liquidity by $OInt_{OP,1Y}$.[7]

Consequently, on the one hand, the results presented in Figure 1 and Table 3 are in line with the strategic behaviour of informed agents in terms of liquidity searching, as suggested by Collin-Dufresne and Fos (2015, 2016). On the other hand, and contrariwise to Collin-Dufresne and Fos'

[7] As robustness check, in Table A3 in the supplementary appendix, we use a different econometric approach (i.e. a matched sample analysis) to verify that the growing rate of relative bid-ask spread is significantly larger for options with higher levels in $InvAnlst_{0Y}$.

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(2015, 2016) findings, Figure 1, Table 2 and Table 3 shows evidence that the bid-ask spread is still a good proxy for informed trading, in spite of the liquidity searching behaviour of informed investors.

3. Conclusion

Our study examines the liquidity searching behaviour of informed agents in option markets, and how this behaviour potentially makes the bid-ask spread not a good proxy for informed trading. In this research letter, we show evidence of a liquidity searching behaviour of informed investors in new option listings, which was also found by Collin-Dufresne and Fos (2015) using the stock market. However, contrary to Collin-Dufresne and Fos (2015), we find that the bid-ask spread is still a good proxy for informed trading.

Informed traders slowly enter the newly created option market, because they need sufficient liquidity in order to exploit their informational advantages optimally (which is difficult to find in the initial periods after option listings). As a result, the option relative bid-ask spread is observed to be initially low and to increase progressively as the option market takes off. We show that the upward trend in the option relative bid-ask spread after option introductions is stronger for options written on stocks characterised resulting from higher chances of having asymmetric information. Finally, it is important to notice that our analysis is simple and intuitive. Nevertheless, our study opens the doors for future research endeavours in terms of the behaviour of informed agents in derivatives markets.

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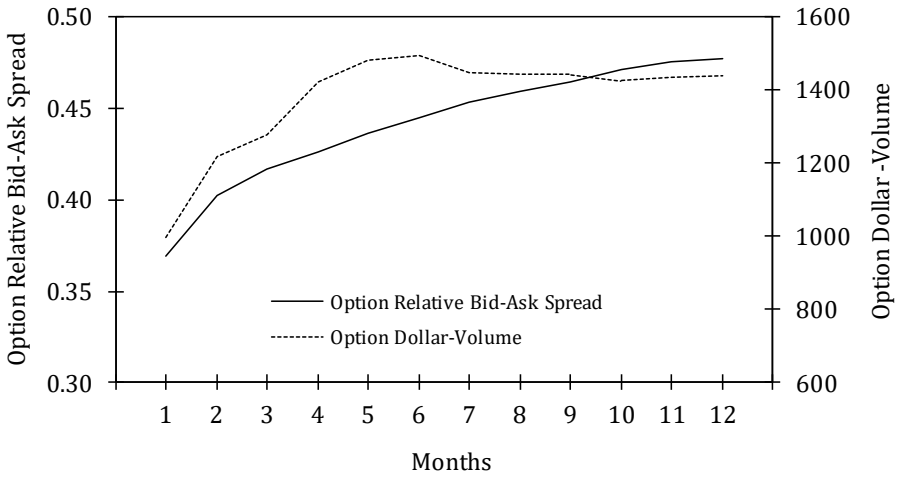

Figure 1. Evolution of the option dollar-volume and the option relative bid-ask spread. This figure presents the evolution of the cross-sectional mean in each month of the average for the daily option dollar-volume and the relative option bid-ask spread in the 12 months following the listing date. The relative bid-ask spread (*BAre*) is defined as $BAre_{OP} = \left(Ask\ Price - Bid\ Price\right) / \left(0.5\left(Ask\ Price + Bid\ Price\right)\right)$.

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Table 1. Summary statistics. This table contains summary statistics for the main variables used in this study. $BAre_{OP,1Y}$ is the average of the option relative bid-ask spread in the year following the listing date, where $BAre_{OP} = \left(Ask\ Price - Bid\ Price\right) / \left(0.5\left(Ask\ Price + Bid\ Price\right)\right)$. $DVlm_{OP,1Y}$ is the averages of the daily option dollar-volume in the first year after the option listing.. $InvAnlst_{0Y}$ ($InvAnlst_{1Y}$) is the inverse of the average of the number of analysts for the year prior to (after) option listing. In the case of option variables, the table also present values for the subgroups of call option contracts, put option contracts, out-of-the-money (OTM) option contracts, at-the-money (ATM) option contracts and in-the-money (OTM) option contracts.

	Mean	Median	Std. Dev.	Skewness	Kurtosis	Min.	Max.
				$BAre_{OP,1Y}$			
Total	0.44	0.42	0.15	0.69	3.81	0.11	1.11
Call	0.45	0.43	0.18	0.96	9.72	0.09	1.39
Putt	0.42	0.40	0.16	0.64	3.47	0.09	1.12
OTM	0.84	0.82	0.28	0.51	2.07	0.20	1.91
ATM	0.22	0.21	0.10	1.38	23.74	0.03	0.87
ITM	0.29	0.25	0.17	0.79	3.49	0.04	0.92
				$DVlm_{OP,1Y}$			
Total	1335.79	124.44	31064.85	35.57	832.56	0.28	9012509.12
Call	779.13	81.59	16109.41	35.18	820.07	0.17	4658194.39
Putt	556.66	34.26	14979.18	35.82	840.80	0.13	4354314.72
OTM	119.58	7.46	2793.10	35.42	827.76	0.03	809158.70
ATM	656.87	74.94	13825.93	35.33	824.79	0.16	4003317.09
ITM	559.33	38.51	14459.67	35.73	837.75	0.11	4200033.32
				$InvAnlst_{0Y}$			
Total	0.33	0.27	0.23	1.35	4.30	0.04	1.00
				$InvAnlst_{1Y}$			
Total	0.25	0.20	0.18	2.46	10.11	0.04	1.00

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Table 2. Regression analysis of the relationship between the option relative bid-ask spread and a proxy for informed trading. The table presents a regression analysis of the option relative bid-ask spread and the inverse of the average of the number of analysts for the year after option listing ($InvAnlst_{1Y}$), which is used as a proxy for informed trading. The dependent variable is the option relative bid-ask spread ($BAre_{OP,1Y}$), which was defined in Table 1. $DVlm_{OP,1Y}$ and $OInt_{OP,1Y}$ are the daily averages of the option dollar-volume and open interest in the first year after the option listing, respectively. $DVlm_{S,1Y}$ is the average of the monthly dollar-volume of the underlying stock in the first year after the option listing. $IV_{OP,1Y}$ is the average of the implied volatility in the first year after option introduction. We calculate option variables using all option contracts and using only at-the-money one-month-to-maturity options contracts. We include in the regressions year fixed effects. ***, **, and * denote significance at 1%, 5%, and 10%, respectively (t-statistics are in parentheses).

	Dependent Variable: $BAre_{OP,1Y}$			
	All option contracts		*At-the-money one-month-to-maturity option contracts*	
$InvAnlst_{1Y}$	0.086	0.100	0.091	0.102
	(3.88)***	(4.36)***	(3.88)***	(4.25)***
$Ln\ (DVlm_{OP,1Y})$	-0.050		-0.041	
	(-16.97)***		(-12.06)***	
$Ln\ (OInt_{OP,1Y})$		-0.050		-0.039
		(-14.43)***		(-9.77)***
$Ln\ (DVlm_{S,1Y})$	0.016	0.014	0.011	0.009
	(2.89)***	(2.55)**	(1.91)*	(1.52)
$IV_{OP,1Y}$	-0.038	-0.065	0.002	-0.019
	(-2.99)***	(-3.35)***	(0.07)	(-0.90)
Const.	0.455	0.644	0.424	0.571
	(7.41)***	(10.4)***	(6.40)***	(8.52)***
R^2	0.138	0.114	0.068	0.049

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Table 3. Regression analysis of the impact of asymmetric information on the growing rate of the option relative bid-ask spread including controls and year fixed effects. The table presents a regression analysis of the impact of asymmetric information on the growing rate of the option relative bid-ask spread. The dependent variable is the growing rate of the option relative bid-ask spread $\Delta Bare = BAre_{OP,13M} / BAre_{OP,1}$, where $BAre_{OP,1M}\left(BAre_{OP,13M}\right)$ is the average relative bid-ask spread in the first (thirteenth) month after option listing. Our proxy of asymmetric information is the inverse of the average of the number of analysts for the year prior to option listing ($InvAnlst_{0Y}$). $DVlm_{OP,1Y}$, $OInt_{OP,1Y}$ and $DVlm_{S,1Y}$ are defined in Table 2. $IV_{OP,1M}\left(IV_{OP,13M}\right)$ is the average of the implied volatility in the first (thirteenth) month after option introduction. We calculate option variables using all option contracts and using only at-the-money one-month-to-maturity options contracts. We include in the regressions year fixed effects. ***, **, and * denote significance at 1%, 5%, and 10%, respectively (t-statistics are in parentheses).

	Dependent Variable: $\Delta BAre = BAre_{OP,13M}/BAre_{OP,1M}$			
	All option contracts		*At-the-money one-month-to-maturity option contracts*	
$InvAnlst_{0Y}$	0.061	0.061	0.073	0.074
	(2.07)**	(2.07)**	(1.99)**	(2.02)**
$Ln\ (DVlm_{OP,1Y})$	0.002		-0.005	
	(0.48)		(-0.66)	
$Ln\ (OInt_{OP,1Y})$		0.003		-0.007
		(0.45)		(-0.85)
$Ln\ (DVlm_{S,1Y})$	0.023	0.023	0.022	0.023
	(2.42)**	(2.37)**	(1.81)*	(1.89)*
$IV_{OP,13M}/IV_{OP,1M}$	-0.057	-0.057	-0.020	-0.019
	(-2.49)**	(-2.49)**	(-0.67)	(-0.66)
Const.	-0.100	-0.109	-0.072	-0.058
	(-0.89)	(-1.01)	(-0.51)	(-0.42)
R^2	0.045	0.044	0.028	0.033

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