Internet Appendix for Institutional Allocations in the Primary Market for Corporate Bonds

Stanislava Nikolova[a,*], Liying Wang[a], Juan (Julie) Wu[a]

[a] *College of Business, University of Nebraska-Lincoln, Lincoln, NE 68588, USA*

Abstract

This Internet Appendix examines the robustness of our main findings and presents estimation results that are referenced but not included in the main paper. In Section I we report summary statistics for the corporate bond offerings analyzed in the main paper. We assess the robustness of our main findings when we exclude offerings with possible underpricing measurement error in Section II or when we use an alternative information production proxy in Section III. We discuss the correlations among our independent variables in Section IV. We examine whether our findings are robust in an alternative sample of insurers with potential demand for new offerings in Section V. We repeat our main tests for all insurers, rather than for only those that are active primary market participants, in Section VI and for noninvestment-grade offerings, rather than for investment-grade offerings, in Section VII. In Section VIII we investigate whether an insurer's information production and trading relationship with an offering's lead underwriters impact the probability of receiving an allocation in the offering and the magnitude of that allocation. We assess the robustness of our main findings to alternative standard-error clustering and fixed-effect controls in Section IX, and to including in the set of explanatory variables proxies for other insurer-underwriter relationships in Section X. We account for potential multicollinearity in Section XI. We conduct various subsample analyses in Section XII. Lastly, we consider alternative proxies for the severity of the issuer-underwriter agency problem in Section XIII.

I. Offering summary statistics

In this section we present summary statistics for the 5,341 investment-grade (IG) and 714 noninvestment-grade (nonIG) corporate bond offerings, analyzed in the main paper. These statistics, reported in Table A1 of this Internet Appendix, indicate that insurers are less likely to participate in nonIG offerings. As a result of insurers' larger allocations in IG than nonIG offerings, the average aggregate first-day profits from IG offerings are also larger ($308 thousand versus $211 thousand per offering), despite IG

*Corresponding author. E-mail address: snikolova2@unl.edu. Phone: 402-472-6049. Fax: 402-472-5140.

offerings being underpriced less (32.08 bps versus 75.47 bps).[1] The statistics in Table A1 also show that IG offerings, compared to nonIG offerings, have longer maturity (12 years versus 9 years) and larger offering amount ($659 million versus $545 million). About 4% (6%) of IG (nonIG) offerings are issued by first-time bond issuers and 28% (29%) are issued by private firms.

II. Excluding offerings with possible underpricing measurement error

An offering's underpricing is meant to reflect the difference between the price at which the offering is sold to investors in the primary market, and the offering's true value and thus fair offering price. Measures of underpricing typically use a secondary market price as a proxy for the fair offering price. As described in the main paper, we follow this approach and estimate a corporate bond offering's underpricing as in Cai, Helwege, and Warga (2007). In particular, we use the volume-weighted average flat price from the secondary market on the first day (within a week of issuance) on which the bond trades as the proxy for the bond's fair offering price. However, this approach may result in underpricing measurement error under two circumstances. First, 21% of IG bond offerings in our sample do not trade on the offering date. While we adjust these bonds' secondary market price for market-wide movements from the offering date to the first trading date, the price may still reflect changes in issuer fundamentals in the few days following the offering, and may therefore be a noisy proxy of the fair offering price. Second, even when a bond trades on the offering date, if that date is characterized by large interest-rate changes then the bond's secondary market price will reflect these market-wide movements and may again be a noisy proxy for the bond's fair offering price.

In this section, we assess the robustness of our main findings to excluding from the sample offerings for which underpricing may be measured with error for the two reasons above. The results from an OLS estimation of our baseline specification are reported in Table A2 of this Internet Appendix. In column (1) we exclude from the sample bonds with no secondary market trading on the offering date. In columns (2) and (3) we exclude bonds issued on days characterized by large interest-rate changes. We define these as days when the daily change of the ten-year Treasury yield is outside the 5–95 percentile or 1–99 percentile, respectively, of the yield-change distribution over the 7/1/2002–12/31/2014 period. The results in Table A2 are very similar to those reported in column (1) of Table 5 in the main paper and suggest that possible underpricing measurement errors do not affect our main findings.

III. Alternative information production proxy

In this section, we assess the robustness of our findings when we use an alternative information production proxy. In the main paper, our proxy is based on an insurer's industry expertise. As an alternative, we construct a measure of the insurer's issuer

[1] The magnitude of underpricing is large when compared to the 51 and 81 bps average monthly returns of IG and nonIG corporate bonds during our 2002–2014 sample period. These averages are based on the monthly returns of the Barcalys US Corporate Investment Grade Index and the Barclays US Corporate High Yield Index, respectively, obtained from Thomson Reuters' Datastream.

rather than industry expertise. In particular, we identify all other bonds of the issuer of the new offering using data from Mergent's FISD. We then calculate the percent of an insurer's corporate-bond holdings of the same issuer at the year-end prior to the offering. We use the resultant variable, *InfoProdIssuer*, instead of or in addition to *InfoProd* in the OLS estimation of our baseline specification. The estimation results, presented in Table A3 of this Internet Appendix, suggest that an insurer's issuer expertise is economically a less important determinant of its first-day profits than its industry expertise. More importantly, the joint economic impact of both the insurer's industry and issuer expertise is still smaller than that of the insurer's trading relationship with the underwriters.

IV. Correlations among independent variables

In Table A4 we report the Pearson correlations among the independent variables included in our baseline specification, Eq. (3) in the main paper. The table indicates that the correlation between our proxies for information production and trading relationship, *InfoProd* and *TrdRel,* is low (-0.024). Since the correlation between *TrdRel* and *Ln(Hldg)* is high, in Section XI of this Internet Appendix we examine the robustness of our findings to orthogonalizing *TrdRel* on *Ln(Hldg)*.

V. Insurers with revealed demand

In the main paper we focus our analyses on the subset of insurers that are regular primary market participants. One reason for this empirical choice is that we have no information on insurers' indications of interest (IOIs) in an offering, so we are unable to unambiguously determine whether an insurer without an allocation did not request one or requested one but did not receive an allocation. Presumably, insurers who regularly receive allocations are more likely to have participated in the bookbuilding process and submitted an IOI. An alternative way to identify the subset of insurers who have likely submitted an IOI is to focus on those with revealed demand for the offering, i.e., insurers who receive an allocation in the primary market or purchase the bond in the secondary market in the 30, 60, or 90 days after the offering.

We estimate our baseline specification in these alternative samples and present the results in Table A5 of this Internet Appendix. The results are broadly similar to those reported in column (1) of Table 5 in the main paper. Thus, our findings appear robust to the approach used to identify the likely participants in the bookbuilding process for an offering.

VI. Including all insurers

In this section, we assess the robustness of our main findings to including in the sample all insurers interested in investing in corporate bonds rather than only those that are regular primary market participants. We identify insurers interested in investing in corporate bonds based on insurers' holdings and purchases. Specifically, we expand the sample to insurers that hold at least \$1 million of corporate debt securities and at least 50 fixed-income securities at the beginning of the offering year, and purchase (in the primary or secondary market) at least \$1 million of corporate bonds during the

offering year. This sample construction approach produces 3,952,499 insurer-offering observations. We replicate the analyses, whose results are presented in Table 5 in the main paper, using this alternative sample. We cannot replicate the quantile regression analysis at the 90th percentile, since now only 2.6% of the observations are of insurers with non-zero allocations.

The estimation results are presented in Table A6 of this Internet Appendix. As in Table 5 in the main paper, in column (1) of Table A6 both *InfoProd* and *TrdRel* carry positive and statistically significant coefficients, and the coefficient of *TrdRel* is multiple times that of *InfoProd*. The coefficients of both proxies are smaller than in the sample of regular primary market participants, likely because this alternative sample includes many insurers that never receive an allocation but also never request one. The estimation results for underpriced and overpriced offerings, reported in columns (2) and (3) of Table A6 respectively, are again consistent with those presented in columns (3) and (4) of Table 5 in the main paper. Even in this larger sample, investors who produce more information and have a stronger trading relationship cannot manage to avoid first-day losses from overpriced offerings, but their gains are still larger than their losses. Finally, as in the main paper, controlling for unobservable insurer characteristics though insurer fixed effects in column (4) of Table A6, leaves our conclusions unchanged.

VII. Analyses of noninvestment-grade offerings

In the main paper, we focus our analyses on insurers' allocations in IG corporate bond offerings, because as a group insurers are not major investors in nonIG bonds. Indeed, Table A1 of this Internet Appendix shows that lead underwriters allocate to insurers only 6.35% of the par value in nonIG offerings compared to 17.36% of the par value in IG offerings. This makes it difficult to generalize our findings about lead underwriters' allocation practices of nonIG bonds among insurers to their allocation practices of nonIG bonds among institutional investors as a whole.

Nonetheless, for completeness, in this section we examine the determinants of first-day profits among the 714 nonIG offerings that pass our sample selection criteria. The baseline results for these offerings are reported in column (1) of Table A7. While both *InfoProd* and *TrdRel* carry positive and statistically significant coefficients, the coefficient of *TrdRel* is ten times that of *InfoProd*. In column (2) we present the estimation results from a quantile regression. For an insurer at the 90th percentile of the first-day profits distribution, we find support only for the trading relationship hypothesis. The coefficient on *TrdRel* is 6.280 in column (2) compared to 2.332 in column (1), which suggests that an insurer, whose profits from underpriced nonIG offerings are already significant, can benefit much more from strengthening its trading relationship with an offering's lead underwriters than the average insurer in our sample. The estimation results for underpriced and overpriced offerings are reported in columns (3) and (4) of Table A7, respectively. *TrdRel* remains significant in both samples and *InfoProd* loses its significance in overpriced nonIG offerings. The estimation results with insurer fixed effects, reported in column (5), suggest that even when controlling for unobservable insurer characteristics, an increase in an insurer's trading relationship with the offering's lead underwriters brings more profitable allocations. The overall conclusion from the nonIG analyses in this section is the same as from the IG analyses in the main paper –

a strong trading relationship with the offering's lead underwriters, and to a lesser extent information production, importantly impact the first-day profits an insurer receives.

VIII. Determinants of primary market allocations

In this section we examine whether an insurer's information production and trading relationship with an offering's underwriters impact the probability that the insurer receives an allocation in the offering and the magnitude of that allocation. To do so, we specify the following models:

$$\begin{aligned} HasAllocation_{ijt} = \alpha_0 + \alpha_1 InfoProd_{ij,t-1} + \alpha_2 TrdRel_{ij,t-1} \\ + \alpha_3 Ln(Hldg_{j,t-1}) + \alpha_4 Affl_{ij} + \boldsymbol{\theta}\mathbf{X_i} + \eta Y_t + \mu Z_k + \varepsilon_{ijt}, \end{aligned} \tag{A1}$$

and

$$\begin{aligned} Allocation_{ijt} = \beta_0 + \beta_1 InfoProd_{ij,t-1} + \beta_2 TrdRel_{ij,t-1} \\ + \beta_3 Ln(Hldg_{j,t-1}) + \beta_4 Affl_{ij} + \boldsymbol{\theta}\mathbf{X_i} + \eta Y_t + \mu Z_k + \varepsilon_{ijt}, \end{aligned} \tag{A2}$$

where i is a bond, j is an insurer, t is a year, and k is the bond issuer's industry. *HasAllocation* is an indicator variable equal to one if an insurer receives an allocation from an offering's lead underwriters, and zero otherwise. *Allocation* is the fraction (in bps) of an offering's par value allocated to an insurer from the offering's lead underwriters. We estimate Eq. (A1) using a probit model and Eq. (A2) using a tobit model.

The estimation results, reported in columns (1) and (2) of Table A8 respectively, indicate that *InfoProd* and *TrdRel* are important determinants of whether an insurer receives a primary market allocation and how large that allocation is. The estimated coefficients on both variables are positive and strongly significant, which suggests that the probability and magnitude of an insurer's primary market allocation increase with more information production during the bookbuilding process and stronger trading relationship with an offering's lead underwriters. The economic impact of a stronger trading relationship is larger than that of information production. These findings closely parallel those in the main paper, where we show that an insurer's first-day profits are more closely related to its trading relationship with the lead underwriters than with its information production.

IX. Alternative standard-error clustering and fixed-effect controls

In this section, we investigate whether our main findings are robust to alternative standard-error clustering and to alternative fixed-effect controls. In all estimations in the main paper we cluster the standard errors at the offering level. Since a large number of issuers have multiple offerings in the sample, to account for the possibility that observations for the same issuer may not be independent, as an alternative we cluster the standard errors at the issuer level. The results are reported in column (1) of Table A9 in this Internet Appendix and are very similar to those reported in column (1) of Table 5 in the main paper. To control for unobservable offering or issuer characteristics that may affect our findings, we estimate Eq. (3) in the main paper with offering fixed effects or issuer fixed effects. When we control for offering fixed effects, we exclude from the

specification all static offering characteristics (*Ln(Maturity*, *Ln(Amount)*, *DIPO*, *Private*, *Rating FE*, *Year FE*, and *Industry FE*), and when we control for issuer fixed effects we exclude static issuer characteristics (*Industry FE*). The results, presented in columns (2) and (3) of Table A9 in this Internet Appendix, again remain largely unchanged from those reported in column (1) of Table 5 in the main paper.

X. Other insurer-underwriter relationships

In the main paper, we focus our analyses on whether insurers' prior trading with an offering's lead underwriters helps them obtain more profitable allocations. In this section, we investigate whether first-day profits are also related to other insurer-underwriter relationships. First, we examine if underwriters award some insurers more profitable allocations as a way of attracting these insurers' future trading business. In particular, we explore whether an insurer's first-day profits increase with its future, in addition to its past, proportional trading with an offering's underwriters. To do so, we construct *TrdRelFuture* as the dollar trading volume of an insurer with an offering's lead underwriters in the year after the offering, scaled by the dollar trading volume of these underwriters with all insurers over the same period. Because of the high correlation between *TrdRel* and *TrdRelFuture* (0.77), we use *TrdRelFutureResid,* the residuals from an OLS regression of *TrdRelFuture* on *TrdRel*, as our proxy for an insurer's future trading relationship with the underwriters. We then include both *TrdRel* and *TrdRelFutureResid* in the estimation of Eq. (3) in the main paper. The estimation results, presented in column (1) of Table A10 of this Internet Appendix, reveal that the coefficients on *TrdRelFutureResid* are positive and statistically significant in all columns, but of smaller magnitude compared to those of *TrdRel*. This suggest that underwriters give some investors more profitable allocations not only to reward them for past trading business but also, to a lesser extent, to win their future trading business. This finding is consistent with that of Jenkinson, Jones, and Suntheim (2018) for the equity IPO market.

Next, we examine whether underwriters use profitable allocations to reward insurers for their underwriting business. Specifically, we investigate whether insurers, whose own bonds have been underwritten by an offering's underwriters, obtain more of the offering's first-day profits. We construct two indicator variables, *TrdRelUW1Y* and *TrdRelUW3Y*, equal to one if an offering's lead underwriters have brought to the market a bond offering of the insurer in the prior one or three years respectively, and zero otherwise. We then estimate Eq. (3) in the main paper with either of the indicators included and present the results in columns (2) and (3) of Table A10 in this Internet Appendix. The coefficients on *TrdRelUW1Y* and *TrdRelUW3Y* are positive and statistically significant, which indicates that when insurers are former underwriting clients of the underwriters, their first-day profits from the offering are larger.

XI. Potential multicollinearity

As discussed in Section IV of this Internet Appendix, the correlation between *TrdRel* and *Ln(Hldg)* is relatively high (0.53). To ensure the robustness of our main findings, we replace *TrdRel* with the residuals from an OLS regression of *TrdRel* on *Ln(Hldg)*. The results are reported in column (1) of Table A11 in this Internet Appendix and are broadly similar to those in column (1) of Table 5 in the main paper.

We also investigate whether our main findings are sensitive to our choice of proxy for an insurer's demand for corporate bonds. Instead of portfolio holdings, the proxy we use in the main paper, we use the insurer's overall dollar trading volume in the year prior to an offering, which we refer to as *TrdVol*. Again, since the correlation between *TrdRel* and *Ln(TrdVol)* is relatively high (0.55), when estimating our baseline specification we replace *TrdRel* with the residuals from an OLS regression of *TrdRel* on *Ln(TrdVol)*. The estimation results, presented in column (2) of Table A11, show that our main findings remain largely unchanged when *Ln(Hldg)* is replaced with *Ln(TrdVol)*.

XII. Subsample robustness

In this section, we investigate whether our main findings are robust in various subsamples. First, we examine whether the recent global financial crisis drives our results. Following Bessembinder et al. (2019) and Bao, O'Hara, and Zhou (2019), we define the crisis period as 7/1/2007–4/30/2009. Column (1) in Table A12 of this Internet Appendix reports estimation results when observations from this period are excluded from the sample. These results are broadly similar to those in column (1) of Table 5 of the main paper and indicate that the recent global financial crisis is not responsible for our main findings.

Second, since a small number of insurers account for the majority of the industry's trading activity, we investigate whether these active traders are driving our results. Because our trading relationship proxy reflects the importance of an insurer's trading to an offering's underwriters relative to that of other insurers, active traders' *TrdRel* might simply be higher for all offerings. Indeed, the average *TrdRel* of the ten insurers with the largest trading volume every year is 357 bps, while for the remaining insurers it is only 38 bps. Thus, active traders might be responsible for the strong correlation between an insurer's first-day profits and its trading relationship with underwriters documented in Table 5. To assess whether this is the case, we estimate Eq. (3) after excluding from the sample the ten most active traders. The results are presented in column (2) of Table A12 in this Internet Appendix. The coefficients on *InfoProd* and *TrdRel* remain statistically significant and of similar relative magnitude to those reported in column (1) of Table 5 in the main paper, which suggests that our main findings are not limited to the subset of active insurer traders.

Third, we examine whether corporate bond offerings that are relatively more difficult for underwriters to place are responsible for our findings. Underwriting extremely large bond offerings (mega bonds) or offerings issued on a compressed timeline (accelerated offerings) may be challenging because it requires finding a large number of bond investors to absorb the offerings (Helwege and Wang, 2019) or finding enough interest in the new bonds within a short time frame, respectively. Underwriters may underprice such offerings more in an attempt to attract a sufficient number of investors. They may also attempt to minimize their investor search costs by placing a larger proportion of an offering with their best clients. This reasoning may explain the positive association between an insurer's first-day profits and its trading relationship with underwriters documented in the main paper.

To investigate whether mega bonds and accelerated offerings are driving our results, we exclude them from the sample and reestimate our baseline specification. We classify

as mega-bonds the largest 5% of sample bonds based on offering amount.[2] We identify accelerated offerings using two approaches. We begin by searching through the SEC's EDGAR system for registration statements (Form S-1, S-1/A, S-3, S-3/A, or S-3ASR) that include debt securities and that are filed during the three years prior to each offering's issuance date.[3] We then retrieve the latest filing date among these registration statements for each offering. Our first definition of an accelerated offering follows Gao and Ritter (2010) and classifies a bond offering as accelerated if its issuance date is within three days of the latest filing date. Our second approach to identifying accelerated offerings relies on the existence of an active Form S-3ASR prior to the offering's issuance. Registration statements of well-known seasoned issuers filed on Form S-3ASR, commonly referred to as automatic shelf registrations, become effective immediately upon filing without an SEC review. Thus, automatic shelf registrations allow issuers to raise bond financing on a significantly compressed timeline (Musto and Popadak, 2016). Our second definition of accelerated offerings accounts for the possibility that bond issuers take advantage of automatic shelf registrations' immediate effectiveness and assumes that all bond offerings of issuers with an active Form S-3ASR are accelerated even if the issuance date is not within three days of the latest filing date. While our first definition may underestimate the number of accelerated offerings in our sample, our second definition may overestimate it. By assessing the robustness of our findings using both definitions, we are able to identify the range of the effect of interest among non-accelerated offerings.

The results for the subsample excluding the largest 5% of offerings are reported in column (3) of Table A12 of this Internet Appendix. The coefficients on *InfoProd* and *TrdRel* are comparable to those reported in column (1) of Table 5 in the main paper, which confirms that our findings are not driven by the largest offerings in the sample. When we exclude from the sample accelerated offerings, in columns (4) and (5) of Table A12 in this Internet Appendix, we similarly find that the coefficients on *InfoProd* and *TrdRel* remain positive and significant. Thus, our findings are not driven by the accelerated offerings in our sample either.

XIII. Alternative agency problem severity proxies

In this section, we investigate the robustness of our findings to using alternative proxies for the severity of the issuer-underwriter agency problem. In the main paper, our two proxies are based on the issuer's number of bonds and par value issued in the five years prior to the offering. As an alternative, we construct indicator variables based on the issuer's number of bonds and par value issued in the one or three years prior to the offering. We then reestimate Eq. (5) using each of these four alternative *LowAP* indicators. The estimation results, presented in Table A13 of this Internet Appendix, are very similar to those reported in Table 7 in the main paper. Thus, our finding that

[2] Consistent with Helwege and Wang (2019), we show that extremely large bond offerings are significantly more underpriced than smaller ones. The 245 offerings that are among the largest 5% based on offering amount have average underpricing of 42 bps and average offering amount of $2.6 billion. This implies that these large offerings account for 24% ($=(0.0042 \times 2.6 \times 245)/(0.0032 \times 0.659 \times 5,341)$) of first-day profits in our sample.

[3] We are able to find registration statements for 4,332 offerings in our sample.

underwriters' desire to win frequent corporate bond issuers' underwriting business tempers the severity of the issuer-underwriter agency problem, appears robust to alternative proxies for the severity of this problem.

References

Bao, J., O'Hara, M., Zhou, X. A., 2019. The Volcker rule and market-making in times of stress. Journal of Financial Economics 130, 95–113.

Bessembinder, H., Jacobsen, S., Maxwell, W., Venkataraman, K., 2019. Capital commitment and illiquidity in corporate bonds. Journal of Finance 73, 1615–1661.

Cai, N., Helwege, J., Warga, A., 2007. Underpricing in the corporate bond market. Review of Financial Studies 20, 2021–2046.

Gao, X., Ritter, J. R., 2010. The marketing of seasoned equity offerings. Journal of Financial Economics 97, 33–52.

Helwege, J., Wang, L., 2019. Liquidity and price pressure in the corporate bond market: evidence from mega-bonds. Unpublished working paper. University of California, Riverside and University of Nebraska-Lincoln.

Jenkinson, T., Jones, H., Suntheim, F., 2018. Quid pro quo? What factors influence IPO allocations to investors? Journal of Finance 73, 2303–2341.

Musto, D., Popadak, J., 2016. Who benefits from bond market modernization? Unpublished working paper. University of Pennsylvania and Duke University.

Table A1
Offering summary statistics

This table presents summary statistics for the 5,341 investment-grade (IG) and 714 noninvestment-grade (NonIG) corporate bond offerings issued during 2002–2014. *AggrAllocation* is the aggregate par value of an offering allocated to insurers from the lead underwriters. *AggrProfits* is the sum of *Profits* across all insurers in an offering, where an insurer's *Profits* is defined as the product of an offering's par value allocated to the insurer from the lead underwriters and the offering's *UP*. *UP* is an offering's underpricing calculated as its index-adjusted return during the first week of trading following Cai, Helwege, and Warga (2007). *Maturity* is an offering's time to maturity. *Amount* is an offering's par value issued. *DIPO* is an indicator variable equal to one if the offering is the first public debt offering of the issuer, and zero otherwise. *Private* is an indicator variable equal to one if the issuer has no publicly traded equity at the time of the offering, and zero otherwise. N is the number of offerings.

	IG		NonIG	
	Mean	SD	Mean	SD
AggrAllocation (%)	17.36	13.40	6.35	5.45
AggrProfits ($000)	308.02	685.25	210.98	334.78
UP (bps)	32.08	50.06	75.47	74.27
Maturity (yrs)	11.93	9.96	9.12	5.22
Amount ($M)	659.50	614.66	545.21	389.31
DIPO	0.04	0.19	0.06	0.23
Private	0.28	0.45	0.29	0.45
N	5,341		714	

Table A2

Determinants of first-day profits - excluding offerings with possible underpricing measurement error

This table presents the results from an analysis of first-day profits from investment-grade corporate bond offerings. The methodology is identical to that used to generate column (1) of Table 5 in the main paper, but the sample differs. In column (1), we remove offerings that do not trade in the secondary market on the offering date. In columns (2) and (3), we remove offerings issued on days when the daily change of the ten-year Treasury yield is outside the 5–95 percentile or 1–99 percentile, respectively, of the yield-change distribution over the sample period.

	Traded on offering date	Yield change inside 5–95%	Yield change inside 1–99%
	(1)	(2)	(3)
InfoProd	0.338***	0.378***	0.378***
	(0.032)	(0.033)	(0.032)
TrdRel	1.812***	1.751***	1.788***
	(0.091)	(0.090)	(0.086)
Ln(Hldg)	0.931***	0.939***	0.958***
	(0.037)	(0.035)	(0.034)
Affl	0.013	0.123	0.326
	(0.227)	(0.242)	(0.257)
Ln(Maturity)	1.409***	1.374***	1.367***
	(0.110)	(0.104)	(0.100)
Ln(Amount)	1.463***	1.271***	1.380***
	(0.247)	(0.214)	(0.220)
DIPO	1.165***	1.373***	1.070***
	(0.422)	(0.395)	(0.370)
Private	-0.523***	-0.537***	-0.397***
	(0.150)	(0.152)	(0.151)
Rating FE	YES	YES	YES
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
N	499,383	521,759	573,767
R^2	0.037	0.034	0.033

Table A3
Determinants of first-day profits - alternative information production proxy

This table presents the results from an analysis of first-day profits from investment-grade corporate bond offerings. The sample and methodology are identical to those used to generate column (1) of Table 5 in the main paper, but we use an alternative proxy for information production, *InfoProdIssuer*, instead of or in addition to *InfoProd*. *InfoProdIssuer* is the proportion of an insurer's prior-year dollar value holdings of bonds of the same issuer as the offering.

	(1)	(2)
InfoProd		0.370***
		(0.029)
InfoProdIssuer	0.110***	0.058
	(0.040)	(0.040)
TrdRel	1.823***	1.824***
	(0.086)	(0.086)
Ln(Hldg)	0.969***	0.977***
	(0.034)	(0.034)
Affl	0.438*	0.423
	(0.260)	(0.260)
Ln(Maturity)	1.422***	1.422***
	(0.101)	(0.101)
Ln(Amount)	1.373***	1.381***
	(0.206)	(0.206)
DIPO	1.124***	1.113***
	(0.366)	(0.366)
Private	-0.432***	-0.434***
	(0.151)	(0.151)
Rating FE	YES	YES
Year FE	YES	YES
Industry FE	YES	YES
N	611,515	611,515
R^2	0.033	0.033

Table A4
Correlations among independent variables

This table presents the Pearson correlations among the independent variables included in Eq. (3) in the main paper for investment-grade corporate bond offerings. The variables are defined in Table 5 in the main paper.

	InfoProd	TrdRel	Ln(Hldg)	Affl	Ln(Maturity)	Ln(Amount)	DIPO
TrdRel	-0.024	1.000					
Ln(Hldg)	-0.043	0.528	1.000				
Affl	0.000	-0.017	-0.016	1.000			
Ln(Maturity)	-0.068	0.002	0.006	0.001	1.000		
Ln(Amount)	-0.056	-0.003	-0.002	0.006	-0.093	1.000	
DIPO	-0.022	-0.003	-0.001	-0.001	-0.030	-0.021	1.000
Private	0.047	0.000	0.001	-0.003	0.121	-0.138	0.008

Table A5
Determinants of first-day profits - insurers with revealed demand

This table presents the results from an analysis of first-day profits from investment-grade corporate bond offerings. The independent variables and methodology are identical to those used to generate column (1) of Table 5 in the main paper, but the sample includes only insurers who receive an allocation in the primary market or purchase the bond in the secondary market in the 30, 60, or 90 days after issuance.

	30 days	60 days	90 days
	(1)	(2)	(3)
InfoProd	1.024***	0.998***	0.975***
	(0.138)	(0.130)	(0.125)
TrdRel	1.163***	1.176***	1.216***
	(0.208)	(0.199)	(0.193)
Ln(Hldg)	3.312***	3.177***	3.068***
	(0.120)	(0.115)	(0.111)
Affl	-0.690	-0.508	-0.468
	(0.977)	(0.952)	(0.935)
Ln(Maturity)	5.415***	5.086***	4.857***
	(0.470)	(0.449)	(0.435)
Ln(Amount)	6.170***	5.808***	5.518***
	(1.137)	(1.078)	(1.035)
DIPO	5.108***	4.985***	4.913***
	(1.511)	(1.462)	(1.429)
Private	-1.569**	-1.420**	-1.338**
	(0.635)	(0.605)	(0.584)
Rating FE	YES	YES	YES
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
N	155,097	163,270	169,907
R^2	0.080	0.077	0.075

Table A6
Determinants of first-day profits - all insurers

This table presents the results from an analysis of first-day profits from investment-grade corporate bond offerings. The independent variables and methodology are identical to those used to generate columns (1), (3), (4), and (5) of Table 5 in the main paper, but the sample includes all insurers interested in investing in corporate bonds rather than only those that are regular primary market participants.

	All offerings Baseline	Underpriced offerings Baseline	Overpriced offerings Baseline	All offerings Insurer FE
	(1)	(2)	(3)	(4)
InfoProd	0.091***	0.107***	0.023***	0.078***
	(0.006)	(0.008)	(0.006)	(0.006)
TrdRel	1.077***	1.432***	0.404***	0.228***
	(0.039)	(0.046)	(0.049)	(0.033)
Ln(Hldg)	0.239***	0.285***	0.105***	0.045***
	(0.009)	(0.010)	(0.009)	(0.012)
Affl	-0.126	-0.168	-0.149	-0.010
	(0.111)	(0.130)	(0.146)	(0.125)
Ln(Maturity)	0.231***	0.268***	0.102***	0.231***
	(0.017)	(0.018)	(0.020)	(0.017)
Ln(Amount)	0.246***	0.520***	0.036***	0.244***
	(0.036)	(0.069)	(0.009)	(0.036)
DIPO	0.191***	0.235***	-0.012	0.192***
	(0.061)	(0.066)	(0.062)	(0.061)
Private	-0.071***	-0.089***	-0.019	-0.073***
	(0.025)	(0.028)	(0.040)	(0.025)
Rating FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
N	3,952,499	3,296,446	466,574	3,952,499
R^2	0.027	0.038	0.022	0.042

Table A7
Determinants of first-day profits - noninvestment-grade offerings

This table presents the results from an analysis of first-day profits. The dependent variable, independent variables, and methodology are identical to those used to generate Table 5 in the main paper, but the sample is of noninvestment-grade instead of investment-grade corporate bond offerings.

	All offerings Baseline	All offerings QR 90%	Underpriced offerings Baseline	Overpriced offerings Baseline	All offerings Insurer FE
	(1)	(2)	(3)	(4)	(5)
InfoProd	0.221***	0.004	0.258***	0.046	0.198***
	(0.052)	(0.003)	(0.062)	(0.033)	(0.048)
TrdRel	2.332***	6.280***	2.667***	0.511***	0.551***
	(0.209)	(0.373)	(0.231)	(0.144)	(0.198)
Ln(Hldg)	0.418***	-0.036***	0.471***	0.185***	0.645*
	(0.044)	(0.006)	(0.049)	(0.050)	(0.331)
Affl	0.026	-0.061	-0.034	0.029	0.392*
	(0.186)	(0.083)	(0.209)	(0.118)	(0.224)
Ln(Maturity)	0.245	0.008	0.343	0.581	0.242
	(0.254)	(0.013)	(0.276)	(0.400)	(0.253)
Ln(Amount)	1.392***	0.040***	1.797***	0.249	1.398***
	(0.307)	(0.011)	(0.339)	(0.304)	(0.307)
DIPO	2.070***	0.062*	1.985***	-	2.044***
	(0.689)	(0.032)	(0.701)		(0.689)
Private	-0.265	0.001	-0.230	0.589	-0.267
	(0.241)	(0.011)	(0.253)	(0.581)	(0.241)
Rating FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
N	83,662	83,662	75,657	6,393	83,662
R^2/Pseudo R^2	0.034	0.057	0.040	0.040	0.072

Table A8
Determinants of primary market allocations

This table presents the results from an analysis of primary market allocations in investment-grade corporate bond offerings. The sample and independent variables are identical to those used to generate column (1) of Table 5 in the main paper, but the dependent variable and econometric technique differ. In column (1), the results are from a probit model, in which the dependent variable is an indicator equal to one if an insurer receives an allocation in an offering from the lead underwriters, and zero otherwise. In column (2), the results are from a tobit model, in which the dependent variable is the fraction (in bps) of an offering's par value allocated to an insurer from the lead underwriters.

	HasAllocation	Allocation
	(1)	(2)
InfoProd	0.093***	27.781***
	(0.004)	(1.288)
TrdRel	0.155***	35.811***
	(0.003)	(0.770)
Ln(Hldg)	0.109***	41.913***
	(0.002)	(0.800)
Affl	0.376***	85.219***
	(0.031)	(10.410)
Ln(Maturity)	0.050***	17.320***
	(0.007)	(1.963)
Ln(Amount)	0.318***	53.078***
	(0.009)	(2.314)
DIPO	0.064**	9.989
	(0.025)	(7.287)
Private	-0.023*	-12.506***
	(0.013)	(3.632)
Rating FE	YES	YES
Year FE	YES	YES
Industry FE	YES	YES
N	611,515	611,515
Pseudo R^2	0.083	0.029

Table A9

Determinants of first-day profits - alternative standard-error clustering and fixed-effect controls

This table presents the results from an analysis of first-day profits from investment-grade corporate bond offerings. The dependent and independent variables are identical to those used to generate column (1) of Table 5 in the main paper, but the methodology differs. In column (1) we cluster the standard errors at the issuer level rather than at the offering level. In columns (2) and (3), we include offering and issuer fixed effects, respectively.

	Issuer clustering	Offering FE	Issuer FE
	(1)	(2)	(3)
InfoProd	0.386***	0.401***	0.394***
	(0.040)	(0.028)	(0.029)
TrdRel	1.824***	1.818***	1.823***
	(0.132)	(0.086)	(0.085)
Ln(Hldg)	0.975***	0.978***	0.976***
	(0.048)	(0.035)	(0.034)
Affl	0.419	0.362	0.483*
	(0.293)	(0.259)	(0.259)
Ln(Maturity)	1.422***		1.364***
	(0.115)		(0.104)
Ln(Amount)	1.387***		2.155***
	(0.502)		(0.372)
DIPO	1.096***		0.177
	(0.398)		(0.604)
Private	-0.436**		-1.647***
	(0.214)		(0.504)
Rating FE	YES	NO	YES
Year FE	YES	NO	YES
Industry FE	YES	NO	NO
N	611,515	611,515	611,515
R^2	0.033	0.098	0.047

Table A10
Determinants of first-day profits - other insurer-underwriter relationships

This table presents the results from an analysis of first-day profits from investment-grade corporate bond offerings. The methodology is identical to that used to generate column (1) of Table 5 in the main paper, but we add proxies for other insurer-underwriter relationships. In column (1), *TrdRelFutureResid* is the residual from an OLS regression of *TrdRelFuture* on *TrdRel*, where *TrdRelFuture* is the dollar trading volume of an insurer with an offering's lead underwriters in the year after the offering, scaled by the dollar trading volume of the underwriters with all insurers over the same period (in bps). We exclude observations for which this variable is not available. In columns (2) and (3), *TrdRelUW1Y* and *TrdRelUW3Y* are indicator variables equal to one if the offering's lead underwriters have underwritten a corporate bond offering of the insurer in the one or three years prior to the offering respectively, and zero otherwise.

	Future trading relationship	Underwriting relationship in prior 1 year	Underwriting relationship in prior 3 years
	(1)	(2)	(3)
InfoProd	0.397***	0.389***	0.388***
	(0.038)	(0.030)	(0.030)
TrdRel	1.996***	1.713***	1.732***
	(0.094)	(0.084)	(0.084)
TrdRelFutureResid	0.588***		
	(0.064)		
TrdRelUW1Y		1.518***	
		(0.204)	
TrdRelUW3Y			1.097***
			(0.132)
Ln(Hldg)	0.981***	0.942***	0.930***
	(0.038)	(0.033)	(0.034)
Affl	0.520*	0.468*	0.490*
	(0.298)	(0.261)	(0.260)
Ln(Maturity)	1.549***	1.421***	1.420***
	(0.117)	(0.101)	(0.101)
Ln(Amount)	1.948***	1.377***	1.375***
	(0.274)	(0.205)	(0.205)
DIPO	1.075**	1.094***	1.091***
	(0.450)	(0.367)	(0.367)
Private	-0.355**	-0.431***	-0.431***
	(0.173)	(0.151)	(0.151)
Rating FE	YES	YES	YES
Year FE	YES	YES	YES
Industry FE	YES	YES	YES
N	518,075	611,515	611,515
R^2	0.035	0.034	0.034

Table A11
Determinants of first-day profits - potential multicollinearity

This table presents the results from an analysis of first-day profits from investment-grade corporate bond offerings. The methodology is identical to that used to generate column (1) of Table 5 in the main paper, except that *TrdRel* is replaced with *TrdRelResid*. In column (1), *TrdRelResid* is the residual from an OLS regression of *TrdRel* on *Ln(Hldg)*. In column (2), *TrdRelResid* is the residual from an OLS regression of *TrdRel* on *Ln(TrdVol)*. *Ln(TrdVol)* is the natural logarithm of an insurer's overall dollar trading volume in the year prior to the offering (in $ million).

	(1)	(2)
InfoProd	0.386***	0.319***
	(0.030)	(0.031)
TrdRelResid	1.824***	1.997***
	(0.086)	(0.090)
Ln(Hldg)	1.489***	
	(0.044)	
Ln(TrdVol)		1.248***
		(0.039)
Affl	0.419	0.667**
	(0.261)	(0.263)
Ln(Maturity)	1.422***	1.422***
	(0.101)	(0.101)
Ln(Amount)	1.387***	1.392***
	(0.205)	(0.206)
DIPO	1.096***	1.095***
	(0.367)	(0.367)
Private	-0.436***	-0.433***
	(0.151)	(0.151)
Rating FE	YES	YES
Year FE	YES	YES
Industry FE	YES	YES
N	611,515	611,515
R^2	0.033	0.031

Table A12
Determinants of first-day profits - subsample robustness

This table presents the results from an analysis of first-day profits from investment-grade corporate bond offerings. The independent variables and methodology are identical to those used to generate column (1) of Table 5 in the main paper, but the sample differs. In column (1), we exclude observations during the global financial crisis period, 7/1/2007–4/30/2009. In column (2), we exclude the ten most active traders based on insurers' annual trading volume with any of the sample underwriters. In column (3), we exclude the 5% largest offerings based on the par value issued. In column (4), we exclude offerings with issuance date within three days of the issuer's latest debt securities' registration filing date. In column (5), we exclude offerings if their issuance date is within three days of the issuer's latest debt securities' registration filing date, or on their issuance date the issuer has an active debt securities' automatic shelf registration.

	Excluding financial crisis	Excluding 10 most active traders	Excluding 5% largest offerings	Excluding accelerated offerings (filing date)	Excluding accelerated offerings (filing date/ASR)
	(1)	(2)	(3)	(4)	(5)
InfoProd	0.345***	0.328***	0.404***	0.401***	0.373***
	(0.030)	(0.024)	(0.030)	(0.041)	(0.064)
TrdRel	1.584***	1.506***	1.694***	1.862***	1.363***
	(0.080)	(0.090)	(0.080)	(0.106)	(0.158)
Ln(Hldg)	0.845***	0.871***	0.881***	1.019***	0.585***
	(0.031)	(0.030)	(0.027)	(0.044)	(0.053)
Affl	-0.167	0.536**	0.212	0.540	-0.783***
	(0.184)	(0.258)	(0.217)	(0.332)	(0.286)
Ln(Maturity)	1.289***	0.856***	1.226***	1.229***	1.210***
	(0.096)	(0.071)	(0.082)	(0.115)	(0.201)
Ln(Amount)	1.146***	0.994***	0.871***	3.130***	1.335***
	(0.205)	(0.160)	(0.100)	(0.479)	(0.338)
DIPO	1.268***	0.741***	1.094***	1.857***	2.941**
	(0.388)	(0.241)	(0.369)	(0.624)	(1.352)
Private	-0.311**	-0.371***	-0.299**	-0.089	0.275
	(0.144)	(0.116)	(0.146)	(0.199)	(0.389)
Rating FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES
N	532,687	559,116	583,485	433,933	106,534
R^2	0.033	0.024	0.036	0.036	0.030

Table A13

First-day profits and the issuer-underwriter agency problem - alternative agency problem severity proxies

This table presents the results from an analysis of first-day profits from investment-grade corporate bond offerings. The sample and methodology are identical to those used to generate Table 7 in the main paper, but we use alternative proxies for the severity of the issuer-underwriter agency problem, *LowAP*. In column (1), *LowAP* is an indicator variable equal to one if the issuer's number of bonds issued in the year prior to the offering is in the top quartile for the sample, and zero otherwise. In column (2), *LowAP* is an indicator variable equal to one if the issuer's par value of bonds issued in the year prior to the offering is in the top quartile for the sample, and zero otherwise. In column (3), *LowAP* is an indicator variable equal to one if the issuer's number of bonds issued in the three years prior to the offering is in the top quartile for the sample, and zero otherwise. In column (4), *LowAP* is an indicator variable equal to one if the issuer's par value of bonds issued in the three years prior to the offering is in the top quartile for the sample, and zero otherwise.

	Prior 1-year number of bonds	Prior 1-year par value of bonds	Prior 3-year number of bonds	Prior 3-year par value of bonds
	(1)	(2)	(3)	(4)
InfoProd×LowAP	0.094	0.018	0.112	-0.080
	(0.079)	(0.078)	(0.077)	(0.082)
TrdRel×LowAP	-0.881***	-0.546***	-0.939***	-0.542***
	(0.192)	(0.197)	(0.189)	(0.197)
InfoProd	0.321***	0.373***	0.310***	0.432***
	(0.061)	(0.058)	(0.058)	(0.060)
TrdRel	2.202***	2.048***	2.206***	2.039***
	(0.120)	(0.113)	(0.123)	(0.115)
LowAP	-0.565***	-0.660***	-0.622***	-0.666***
	(0.166)	(0.180)	(0.165)	(0.181)
Ln(Hldg)	0.968***	0.971***	0.967***	0.971***
	(0.034)	(0.034)	(0.034)	(0.034)
Affl	0.426	0.414	0.422	0.409
	(0.261)	(0.260)	(0.260)	(0.261)
Ln(Maturity)	1.408***	1.408***	1.412***	1.411***
	(0.100)	(0.100)	(0.100)	(0.100)
Ln(Amount)	1.415***	1.444***	1.417***	1.450***
	(0.207)	(0.212)	(0.208)	(0.213)
DIPO	0.900**	0.875**	0.901**	0.880**
	(0.374)	(0.373)	(0.374)	(0.373)
Private	-0.404***	-0.415***	-0.410***	-0.435***
	(0.152)	(0.152)	(0.151)	(0.151)
Rating FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES
N	611,515	611,515	611,515	611,515
R^2	0.034	0.034	0.034	0.034