Journal of Corporate Finance 87 (2024) 102625

Contents lists available at ScienceDirect

Journal of Corporate Finance

journal homepage: www.elsevier.com/locate/jcorpfin

Underwriter incentives and IPO pricing

Susanne Espenlaub [a,*], Abdulkadir Mohamed [b], Brahim Saadouni [a]

[a] Accounting & Finance Group, Alliance Manchester Business School, University of Manchester, Booth Street West, Manchester, M15 6PB, United Kingdom

[b] Leeds University Business School, University of Leeds, Maurice Keyworth Building, Leeds, LS2 9JT, United Kingdom

ARTICLE INFO

Editor: M Bennedsen

Keywords:
Incentive compensation
Information production
Initial public offering (IPO)
Underwriting
Partial-adjustment phenomenon
Price revision
Road show

ABSTRACT

We examine the impact of incentive fees paid to IPO underwriters at issuers' discretion on IPO pricing and short-term performance. We expect that better-incentivized underwriters produce more information required for IPO pricing reducing underwriters' reliance on investors' information production which requires compensation through IPO underpricing. Using a novel dataset, we find that incentive compensation mitigates the partial-adjustment phenomenon. IPOs with stronger incentives have more informative price ranges, higher price revisions, longer road shows and lower initial returns largely due to interaction effects between underwriters' incentives and their information-production capabilities. Using a battery of tests and addressing endogeneity, our results remain robust.

1. Introduction

Information production by lead underwriters has a significant impact on the pricing and performance of initial public offerings (IPOs). We examine this impact in the context of a market where lead underwriters are incentivized to produce information through discretionary incentive fees. The impact of incentive compensation on underwriters' information production has received little academic attention despite the growing adoption of incentive fees as part of IPO underwriter compensation. In a substantial proportion of Hong Kong IPOs, underwriter compensation includes discretionary incentive fees. In these IPOs, clauses in the underwriting agreement disclosed in the IPO prospectus stipulate that, after the IPO, underwriters are potentially paid an incentive fee at issuers' discretion. A growing proportion of IPOs in European and Asian markets use incentive-fee clauses (Espinasse, 2014; Jenkinson et al., 2018). Examples include large IPOs such as Alibaba (listing on NYSE in 2014) and the recent Deliveroo IPO in 2021. A prominent example of an IPO with an incentive-fee clause in its prospectus is the Hong Kong IPO of Prada S.p.A. in 2011. The Prada underwriting agreement stipulates that in addition to an overall gross spread of 1.20% of the aggregate gross proceeds, "*the company and selling shareholders may pay, at their sole and absolute discretion, an incentive fee of up to 0.70% of the aggregate gross proceeds from the issue or sale of the Offer Shares under the Global Offering*" (see Table A1 in the Appendix).[1] The incentive effect of the fee arises from the discretionary nature of its payment subject to issuers' satisfaction. Qualitative evidence suggests that incentive fees are paid in around 50% of cases (Espinasse, 2014; Jenkinson et al., 2018). Ritter (2011) notes the practice of paying incentive fees to underwriters and suggests that discretionary

* Corresponding author.
E-mail address: susanne.espenlaub@manchester.ac.uk (S. Espenlaub).

[1] Appendix Table A1 shows examples of incentive-fee clauses from the prospectuses of several other IPOs in our sample. It also provides a detailed overview of the institutional framework of the Hong Kong IPO market.

https://doi.org/10.1016/j.jcorpfin.2024.102625
Received 14 March 2023; Received in revised form 10 June 2024; Accepted 1 July 2024
Available online 5 July 2024

incentive fees align underwriters' interests with issuers' objectives.[2]

We hypothesize and show that incentive compensation motivates underwriters to produce more of the information they use for IPO pricing themselves through due diligence and pre-deal research and rely less on information gained from investors during bookbuilding. This increases the accuracy of IPO price ranges set by underwriters and reduces IPO underpricing as it reduces the need to compensate IPO investors through IPO underpricing for their information disclosure during bookbuilding.

We examine the use of incentive fees in the Hong Kong Stock Exchange (HKEx) which is a mature, developed IPO market with regulation comparable to the UK and U.S. The HKEx IPO market outranked the U.S. market in terms of numbers and gross proceeds of IPOs for several years after the Global Financial Crisis of 2007/8 (KPMG, 2019). Unlike in the U.S., there are no regulatory restrictions on underwriter compensation in Hong Kong. Also unlike in the U.S., pre-deal research by underwriters and their analysts is allowed (e.g., Espinasse, 2014). HKEx has strict rules on transparency and disclosure (Espenlaub et al., 2016). HKEx requires IPO issuers to provide detailed information on underwriters' compensation in the IPO prospectus, including details of any incentive fees offered to underwriters. Given the size and maturity of the Hong Kong market, the insights of our study are likely to be generalizable to many developed IPO markets.[3]

Our analysis focuses on the disclosure of incentive-fee clauses in the underwriting agreements in IPO prospectuses rather than the actual payment of incentive fees because payment is not observable at the time of the IPO. As incentive-fee payment is contingent on IPO performance, it is only determined after the completion of the IPO (Espinasse, 2014). By contrast, IPO prospectuses (which may include incentive-fee clauses) are normally available to investors two weeks prior to the first trading day.[4]

We construct a sample of 1155 Hong Kong IPOs listed over the period 2004–2019. We find that incentive-fee clauses in the prospectuses of almost half IPOs and the proportion of such 'incentive-IPOs' increases during our sample period. Incentive fees are commonly between 0.5 and 1% of gross proceeds, and they are paid over and above the gross spread, which is typically around 2.5–3.5%.

The observation that initial returns are higher in IPOs the more the offer price is revised upwards relative to the initial price range, resulting in a positive relation between price revision and initial returns is known as the partial-adjustment phenomenon. It suggests that underwriters incorporate favourable new information gained during the pre-issue period only partially in the final offer price resulting in IPO underpricing. Underwriters may underprice IPOs to compensate informed investors for disclosing their favourable private information about the issue through indications of interest in the bookbuilding period (Benveniste and Spindt, 1989; Hanley, 1993).

Unlike Benveniste and Spindt (1989), Loughran and Ritter (2002) highlight the agency problem between issuers and underwriters and argue that underwriters take advantage of issuers' behavioural biases. If investors' demand during bookbuilding is stronger than expected, issuers are willing to accept underpricing and leave money on the table because their expectations are anchored on a lower offer price. As a result, underwriters adjust the offer price only partially to favourable new information because underwriters benefit from IPO underpricing indirectly, e.g., through reduced marketing costs (Baron, 1982; Loughran and Ritter, 2002). Hanley and Hoberg (2010) recognize that, in IPO pricing, underwriters can substitute information gained through bookbuilding from investors for the information they would otherwise need to generate themselves through due diligence.

Linking Loughran and Ritter (2002) with Hanley and Hoberg (2010), we hypothesize that the agency conflict between underwriters and issuers results in suboptimal information production on the part of underwriters. We argue that incentive compensation aligns the interests of underwriters with those of issuers. Hence, while underwriters without incentive compensation rely on investors' information disclosure, we expect that better-incentivized underwriters produce more information themselves and incorporate more information in the offer price. This is because better-incentivized underwriters rely less on information disclosed by investors, so there is less need to underprice the IPO to compensate investors for their information. We recognize that in order to produce information, underwriters need to be both incentivized and capable of producing information.

We empirically model the underwriters' information production as a function of underwriters' incentives and underwriters' information-production capabilities. Our empirical analysis examines the direct impact of incentives on underwriters' information production, and also the interaction of incentives with measures of underwriters' capability to produce information. Specifically, we expect that underwriters with more relevant prior experience in underwriting IPOs, including industry-specific experience of underwriting IPOs in the same industry, will be more capable of producing information. Moreover, we expect that larger underwriting syndicates will be capable of producing more information. This is based on previous evidence linking information production capability to syndicate size showing that offer prices are more likely to be revised when syndicates are larger (Corwin and Schultz, 2005). If appropriately incentivized, we expect more capable underwriters and larger syndicates to produce more and better information.

Our analysis of incentive compensation measures the strength of underwriters' incentives by the degree to which underwriters' compensation is contingent on issuers' satisfaction with IPO performance. Empirically, we measure this by the ratio of incentive fees to

[2] See Ritter (2011) for a detailed discussion of the objectives of issuers and underwriters.

[3] See also Appendix A1 for a more detailed overview of the Hong Kong IPO market. Our results should also be generalizable to markets such as the US where pre-deal research is not allowed, as underwriters can produce information not only during pre-deal research but also during the due-diligence stage. E.g., underwriters can advise issuers to disclose more information (Hanley and Hoberg, 2010).

[4] IPO issuers in Hong Kong do not normally publicly disclose information about the actual payment of incentive fees following the IPO. According to market insiders, this is because the proposed incentive fees are disclosed in the IPO prospectus and the actual payment post-IPO are of limited financial interest to investors. This lack of payment data disclosure limits the scope of our research to the data in the incentive-fee clauses of IPO prospectuses.

gross spread, which we term the 'incentive ratio'. We base our measures of the underwriters' information-production capabilities on underwriters' experience as proxied by their market share in the overall IPO market, their industry-specific experience backing IPOs in the issuing company's industry, and on the size of the underwriting syndicate.

Our central conjecture is that incentive compensation affects IPO pricing through the channel of information production by underwriters, which eliminates the need for partial adjustment of the offer price. To test this conjecture, we examine the impact of incentive fees on the relation between price revision and initial returns which is predicted to be positive by the partial-adjustment hypothesis. Our analysis separates the sample between IPOs with and without incentive-fee clauses and addresses endogeneity due to self-selection. Consistent with our conjecture, we find that IPOs without incentive-fee clauses exhibit the partial-adjustment phenomenon but IPOs *with* incentive-fee clauses do not.

Our further results show that, consistent with our expectations, the incentive ratio significantly impacts the pricing and short-term performance of IPOs in a way that is consistent with better-incentivized underwriter producing more information. Higher incentive ratios lead to higher and narrower (more informative) price ranges, higher price revision and lower initial returns. Consistent with our predictions, incentive compensation reduces underwriters' propensity to underprice issues because better-incentivized underwriters produce more information themselves and rely less on IPO investors' information disclosure. This reduces the extent to which investors need to be compensated for information production through IPO underpricing. We use a range of methods to deal with endogeneity and our results remain robust.

Our results indicate that a significant channel through which the incentive ratio affects IPO (under-) pricing is underwriters' information production as most of the effect of incentive compensation on IPO pricing and performance is due to the interactions between the incentive ratio and underwriters' information-production capabilities. This result is robust when we deal with endogeneity due to two-sided matching between underwriters and issuers (Fang, 2005).

In addition to the impact of incentive compensation on the pricing and initial returns of IPOs, we examine its impact on underwriters' deal-specific actions and the resulting outcomes which provide direct evidence of underwriters' incentive-induced information production.[5] Specifically, we test whether better-incentivized underwriters spend longer periods of time marketing issues, and whether longer marketing periods, as reflected in the duration of the IPO roadshow, result in greater marketing success as proxied by the degree of oversubscription of the issue. During roadshows, issuers and underwriters conduct a series of presentations to potential IPO investors in a range of locations in order to stimulate and gauge investor interest for their issues. A longer roadshow duration may be interpreted as a proxy for greater underwriter efforts, both in terms of marketing and information-production efforts. Our results show that better-incentivized underwriters conduct longer roadshows, which suggests that incentive fees encourage underwriters to exert more effort on the marketing of IPOs. Our results also show that longer roadshows are associated with higher oversubscription, which suggests that greater marketing efforts by incentivized underwriters can successfully stimulate investor demand.

Our paper contributes to the literature on IPO pricing and the partial-adjustment phenomenon (Ibbotson et al., 1988; Benveniste and Spindt, 1989; Loughran and Ritter, 2002; Hanley, 1993) by showing that incentive compensation reduces the agency conflict between underwriters and issuers motivating underwriters to produce more information about the issuing firm and mitigating the partial-adjustment phenomenon. We contribute to the literature on information production (e.g., Chemmanur and Fulghieri, 1994; Hanley and Hoberg, 2010). Chemmanur and Fulghieri (1994) model the role of underwriters as producers of credible information thereby mitigating information asymmetry and reducing initial returns. Hanley and Hoberg (2010) argue that premarket information production and disclosure by underwriters and issuers can serve as a substitute for costly bookbuilding and find that IPOs with more informative prospectuses generate lower underpricing. Our paper builds on Chemmanur and Fulghieri (1994) and Hanley and Hoberg (2010) and extends their analyses by showing that incentive compensation can be used to motivate underwriters to engage in costly information production through due diligence.

Our paper also contributes to the literature on underwriter compensation, underwriter experience and certification, and competition in the underwriter market (e.g., Baron, 1979, 1982; Beatty and Ritter, 1986; Booth and Smith, 1986; Chemmanur and Fulghieri, 1994; Chen and Ritter, 2000; Jenkinson and Jones, 2009; Liu and Ritter, 2011; Jenkinson et al., 2018; Lyandres et al., 2018). Jenkinson and Jones (2009) identify discretionary incentive fees as a mechanism to incentivize IPO underwriters. Jenkinson et al. (2018) use a proprietary dataset of IPOs conducted by underwriters in the UK during 2010–2015. They find that 71% of sample IPOs involve discretionary incentive fees, and they estimate that issuers end up paying the discretionary fees in full in around half the cases. However, neither paper empirically examines the effects of incentive fees on IPO pricing and performance. Our study contributes a large-sample empirical analysis of the impact of incentive fees on IPO pricing and performance underpinned by hypotheses linking incentive compensation to information production and the partial-adjustment phenomenon. Most prior literature on underwriter compensation focuses on institutional factors such as regulation and market structure in underwriting given the clustering of underwriter gross spreads in the U.S. (e.g., Abrahamson et al., 2011), which has been interpreted as evidence of collusion among underwriters (Chen and Ritter, 2000; Lyandres et al., 2018). By contrast, our paper contributes to the literature by linking underwriter compensation (e.g., Baron, 1979, 1982) and underwriter information production (e.g., Chemmanur and Fulghieri, 1994; Hanley and Hoberg, 2010) with the partial-adjustment phenomenon (Ibbotson et al., 1988; Benveniste and Spindt, 1989; Loughran and Ritter, 2002; Hanley, 1993). Chemmanur and Fulghieri (1994) show that underwriters' reputation ensures the credibility of the information they produce and determines underwriters' compensation. We extend their insights by showing that underwriter reputation amplifies

[5] We thank the anonymous reviewer for suggesting this part of our analysis.

the effects of incentive compensation on IPO pricing and performance. We show that this is because incentive compensation affects IPO pricing and performance through the channel of underwriters' information-production capability which is related to underwriters' reputation and experience.

Finally, our study makes an original contribution to the wider literature on optimal contracting (e.g., Edmans and Gabaix, 2009) by examining the use of incentive contracts in a novel setting and demonstrating the impact of incentive compensation of underwriters on IPO pricing and performance.

The results of our study are of interest to a range of IPO players and stakeholders besides underwriters and issuers. As the inclusion of incentive-fee clauses appears to reduce the amount of money left on the table by issuers, it is of interest to the owners and managers of issuing companies. As the inclusion of incentive-fee clauses in IPO prospectuses is associated with lower initial returns, investors need to pay attention to these clauses. Our results suggest that (informed) investors should expect less compensation for information production in IPOs with incentive fees. Investors should also pay attention to the reputation of underwriters as the effect of incentives interacts with underwriters' reputation. Our findings are important for IPO markets and practitioners worldwide, as little is known about the adoption and impact of incentive-fee clauses.

The remainder of this paper is organised as follows. Section 1 motivates and outlines our hypotheses. Section 2 outlines our data and methodology. In Section 3, we present and discuss our results and analysis, and Section 4 concludes the paper.

2. Motivation and hypotheses

Baron (1979, 1982) models the effects of the conflict of interest and information asymmetry between issuers and underwriters acting as their agents. He argues that underwriters are better informed about the IPO market than issuers. Marketing and distributing the issue requires efforts that are costly to underwriters. A moral hazard problem typically arises because issuers cannot observe the underwriter's efforts. Baron (1979) predicts that one solution to the moral hazard problem is to offer the underwriter a 'bonus' linked to IPO pricing and performance. Based on this, we expect that incentive-fee clauses linking underwriters' compensation to issuer's satisfaction with IPO performance align the interests of underwriters with those of issuers. Baron (1982) predicts that self-interested underwriters underprice IPOs to reduce the amount of costly efforts they need to incur in marketing and distributing the issue. While underwriting involves various costly efforts on the part of underwriters, we focus on the underwriters' efforts in producing information, specifically by generating new, original information through due diligence and pre-deal research rather than by merely gathering information from informed investors.[6]

Following Baron (1979), we expect that underwriters whose interests are aligned with those of issuers through incentive fees, are motivated to limit underpricing. In the context of Loughran and Ritter, 2002partial-adjustment model, we expect that providing incentive-compensation to underwriters resolves the agency conflict between underwriters and issuers and reduces underwriters' incentives to underprice the IPO. Extending this agency reasoning to Hanley and Hoberg (2010) information trade-off, we hypothesize that incentive compensation motivates underwriters to limit underpricing by producing more information themselves. As they rely less on information gathered from informed investors, better-incentivized underwriters avoid the need to compensate investors for information disclosure through the partial adjustment of prices. Extending the partial adjustment argument of Hanley (1993), we argue that in the context of an IPO market with pre-deal research and investor education, partial adjustment affects not just the final offer price but also the price range. Next, we outline the timeline of the IPO process to illustrate this argument.

In the following outline of the IPO process and timeline in Hong Kong, we focus on the role played by underwriters in the production of information at different stages of the IPO process.

(1) The first phase of the IPO process includes preparation time, comprising due diligence and documentation, and typically lasts around three to six months. During the preparation period, underwriters are involved in the financial, business, and legal due diligence carried out on the IPO company by the underwriters and the other advisers, which includes compiling financial data and preparing the prospectus.
(2) Underwriters' information production also includes advising and guiding the issuing company's information disclosure in the prospectus. Hanley and Hoberg (2010) show that the more information is disclosed by issuers, the less information needs to be collected from investors reducing the need for partial adjustment to reward investors' information production. In practice, underwriters often urge issuers to include a detailed management discussion and analysis (MD&A) of the company's financial condition and the results of its operations in the prospectus (Espinasse, 2014). Pressure from underwriters to include MD&As is particularly important if MD&As are not required by regulators or the stock exchange. Although issuing companies in Hong Kong (as in the US) are required to include MD&As, the quantity and quality of information disclosed in the MD&A is likely to be influenced by underwriters. We expect that more highly motivated underwriters spend more effort and take greater care with guiding issuing companies in their information disclosure. We expect this effect to be more pronounced when underwriters have more experience with IPOs including more experience with IPOs in the same industry. As part of their role of intermediary between the issuer and investors, underwriters certify the accuracy of the information provided by the company. Hence, we expect that the information produced in this way by underwriters (i.e., by underwriters advising companies on their information disclosure) is more reliable and valuable when it is produced by more reputable underwriters.

[6] Our focus on underwriters' information production does not preclude other possible effects of incentive compensation on underwriters' decisions. Specifically, incentive compensation is likely to motivate underwriters to invest greater marketing efforts.

(3) The next stage in the IPO process is the marketing phase which includes pre-deal research and investor education (PDIE).[7] Here, the listing timeline in Hong Kong differs from the US in that pre-deal research is allowed in Hong Kong and most other countries but not in the US (Jenkinson et al., 2006). PDIE typically starts around seven weeks before the IPO listing date. Pre-deal research is conducted by the research analysts of the banks included in the underwriting syndicate based on information presented to them by the issuing company including an advanced draft of the IPO prospectus. After receiving the information, the research analysts spend around two to three weeks on conducting their research. We expect that better-incentivized underwriters will allocate more and better analysts who produce more (accurate) information at this stage. We also expect that this effect will be more pronounced for more experienced, reputable underwriters and larger syndicates. Larger underwriting syndicates are able to co-produce and share specific information (Corwin and Schultz, 2005). And analysts employed by underwriting firms with more previous experience in marketing IPOs, particularly those that have experience with IPOs in the same industry, are likely to have more specific information relevant to a given IPO, allowing them to produce more accurate information during pre-deal research.

The next phase of PDIE includes meetings between the underwriter-affiliated analysts and institutional investors during which the analysts present their research findings and gather feedback about investors' valuations and views about the IPO. The main objective of PDIE is the production of information about investor demand and their valuation of the IPO.

Pre-marketing activities including the roadshow and bookbuilding typically start 17 days before the listing date (Allen and Overy, 2022). The length of the roadshow may be determined by underwriter incentives and resulting efforts. And longer roadshows may generate not only greater information but also more investor demand for the IPO.[8] Pre-deal research reports and a near-final red-herring prospectus (which contains no offer-price range) are usually published on the same day. Around two weeks (typically 11 days) before the listing date, the final prospectus, which contains a price range, is published. Based on the information underwriters have collected by this stage, they set the price range and disclose it in the prospectus, which is then used to market the IPO to investors. We expect the accuracy (or width) of this price range to be related to the quality of information available to underwriters at this stage. If underwriters are not incentivized to produce sufficient information during the PDIE and pre-marketing phase, then information will be limited at this stage, and we expect the price range to be less accurate and hence wider. By contrast, better-incentivized underwriters will produce more information during the previous preparation and PDIE phases, and so we expect them to set more informative and accurate price ranges at this stage. Our argument builds on Hanley and Hoberg (2010), who document the trade-off between underwriters' information production through due diligence and underwriters' gathering of information from investors through bookbuilding. They argue that the greater the underwriter's information production through due diligence, the more information will be incorporated into the initial price range.

Empirically, we expect that in IPOs with higher incentive ratios, underwriters set the price range based on more information (from underwriters' due diligence), resulting in narrower price ranges. By contrast, less-incentivized underwriters (with zero or low incentive ratios) set less accurate price ranges based on less information. We test the following hypothesis:

H1a. : *There is a negative association between underwriters' incentive ratios and the width of IPO price ranges as underwriters with higher incentive ratios set narrower price ranges.*

As outlined earlier, we expect the effect of underwriters' incentives on the width of the price range as a result of underwriters' information production at the PDIE and pre-marketing stage to be more pronounced for underwriters with greater information production capability, specifically for more reputable and experienced underwriters in larger underwriting syndicates.

H1b. : *The negative association between underwriters' incentive ratios and the width of IPO price ranges will be more pronounced for more reputable and experienced underwriters with larger market share and relevant industry experience, and for larger underwriting syndicates.*

Underwriters' information production is likely to impact not only the width but also the height of the price range. Underwriters produce information during the PDIE and pre-marketing period but also gather feedback from investors. We expect that less incentivized underwriters produce less information themselves through pre-deal research and hence rely more on information generated by investors during the investor-education stage. To compensate investors for disclosing favourable information, these underwriters will need to set lower price ranges than incentivized underwriters who produce more (accurate) information themselves through pre-deal research. Hence, we expect that incentive fees increase underwriters' incentives and hence the level of the price range. We expect this effect to be more pronounced for underwriters with greater information-production capability, i.e., for more experienced, reputable underwriters in larger syndicates. We test the following hypothesis.

H2a. : *There is a positive association between underwriters' incentive ratios and the level of IPO price ranges as underwriters with higher incentive ratios set higher price ranges.*

H2b. : *The positive association between underwriters' incentive ratios and the level of IPO price ranges will be more pronounced for more reputable and experienced underwriters with larger market share and relevant industry experience, and for larger underwriting syndicates.*

After the publication of the prospectus, which includes the price range, the underwriters launch the offer and gather orders from

[7] The following outline of the PDIE process is largely based on Espinasse (2014).

[8] We thank the anonymous reviewer for suggesting this.

investors during the roadshow and bookbuilding. This period takes around two weeks during which underwriters conduct a series of presentations to investors at various locations. In IPO markets where pre-deal research is not allowed, as in the US, the roadshow is the period when information production occurs. Most previous studies have focused on information production by IPO underwriters in terms of their gathering of information from informed investors during the roadshow (Hanley, 1993). By contrast, our argument builds on Hanley and Hoberg (2010) and recognizes that information production by underwriters includes not just the gathering of information from investors but importantly also the generation of original information by underwriters and their analysts themselves. And the latter form of information production by underwriters begins well before the roadshow at the due diligence stage.

The public offer to retail investors takes place at the end of the bookbuilding period. It is during the roadshow and bookbuilding period that underwriters and issuers observe investor demand and the extent of oversubscription of the offer. At the end of this period, the underwriters close the book. The underwriters then set the offer price on the basis of all the information they produced themselves and gathered from investors. It is important to note that (unlike in the U.S.) Hong Kong regulation requires that the final offer price cannot be set above the price range published in the prospectus.[9]

We expect that better-incentivized underwriters should be more efficient in revising the offer price in response to all information. Also as better-incentivized underwriters will have produced more information themselves rather than relying on information gathered from investors. Hence, there is less need to underprice the issue to compensate informed investors for their information disclosure. As a result, we expect that more IPOs with better-incentivized underwriters will have higher price revisions and lower initial returns.[10] We expect these effects to be more pronounced for larger syndicates and for underwriters with greater industry experience and better reputations because these underwriters are more efficient at information production and revising prices in the light of new information. We test the following hypotheses:

H3a. : *There is a positive association between the underwriters' incentive ratio and the revision of the IPO offer price relative to the price range.*

H3b. : *The positive association between the underwriters' incentive ratio and the price revision will be more pronounced for more reputable and experienced underwriters with larger market share and relevant industry experience, and for larger underwriting syndicates.*

H4a. : *There is a negative association between the underwriters' incentive ratio and the initial IPO return as underwriters with higher incentive ratios underprice less by setting higher offer prices.*

H4b. : *The negative association between the underwriters' incentive ratio and the initial IPO return will be more pronounced for more reputable and experienced underwriters with larger market share and relevant industry experience, and for larger underwriting syndicates.*

While our focus is on the role of incentive compensation in reducing the conflict of interests between underwriters and issuers, we recognize that incentive compensation may benefit issuers and underwriters at IPO investors' expense. Aligning underwriters' objectives with those of issuers may aggravate the incentive conflict between underwriters and investors. When dealing with underwriters who are incentivized in this way, the underwriters' credibility with investors gains particular significance. As investors can no longer expect compensation from underwriters for their information production, they have less incentive to produce information. With less information of their own, investors would not participate in the IPO market unless they can trust underwriters not to exploit them. Underwriters' credibility with investors depends on their reputational capital linked to their equity-marketing history (Chemmanur and Fulghieri, 1994). Underwriters who have repeatedly interacted with investors without exploiting them are perceived as more credible by investors. Two of our measures of underwriter information-production capability: *Experienced Underwriter*, *High* (Industry) *Specialization*, can be interpreted as measures of underwriter credibility and trustworthiness. We expect that underwriters who are more trusted by investors will be able to set higher and more narrow price ranges and higher offer prices without deterring investors. Less trustworthy underwriters by contrast need to discount and widen their price ranges and set lower offer prices to allay investors' fears of being exploited.

We explore a further channel through which incentive compensation may affect underwriters' (pricing) decisions and IPO performance. If incentive compensation is effective in encouraging underwriters to increase their efforts in pursuit of issuers' best interests, we expect that better-incentivized underwriters are likely to spend more time marketing share issues. We expect that greater marketing efforts by underwriters are reflected in underwriters spending more time on IPO roadshows. Hence, the roadshow duration may be interpreted as a proxy for underwriters' efforts, including information-production efforts. We explicitly test whether IPOs with incentive compensation have longer roadshows than other IPOs. Next, to examine whether underwriters' greater marketing efforts are rewarded with greater success as proxied by the degree of oversubscription of the issue, we test whether longer roadshows are associated with higher oversubscription.[11]

[9] In Hong Kong, setting the price above the upper limit would require the issuer and the underwriters to postpone the listing and reissue a new prospectus.

[10] Note that our reasoning does involve the assumption that issuers' sole objective is minimizing underpricing or maximizing the offer price. We recognize that issuers may care about other aspects of underwriters' performance besides underpricing (e.g., the quality of IPO investors attracted by underwriters). Also issuers may be prepared to accept some underpricing for behavioural reasons or as a signal to investors (e.g., Ritter, 2011). However, it seems reasonable that, all else equal, most issuers would prefer lower to higher levels of underpricing.

[11] We thank the anonymous reviewer for suggesting this part of our analysis.

3. Data and methodology

3.1. Data

We collect data for all IPOs listed on the HKEx during our sample period: January 2004 to December 2019. The list of IPO firms and their listing dates are obtained from the Hong Kong Stock Exchange Annual Fact Book. We exclude introductions, private placements, fixed-price offerings, and transfers from the Growth Enterprise Market (GEM) to the Main Board, which leaves a final sample of 1155 IPOs. This final sample consists of 547 IPOs that include incentive fees clause as part of the underwriter compensation package in the IPO prospectus. The remaining 608 IPOs do not include incentive fees as part of the underwriters' compensation in the prospectus. The data relating to the lead underwriters, underwriters' syndicate size, the different components of underwriters' compensation (the gross spread and incentive fee, if any) are from the IPO prospectuses. Most prospectuses provide little information about the specific performance criteria that trigger payment of the incentive fee. Espinasse (2014) points out that the precise criteria, e.g., any link between post-IPO share-price performance and the actual payment of incentive fees, are rarely disclosed in order to prevent market abuses.

The level of oversubscription, or demand multiple, is collected from the share-allocation (allotment) data published by the Hong Kong Stock Exchange. Compared to other IPO markets, such as the US and UK, HKEx requires underwriters to disclose substantially more information on investors' demand for IPO shares and on the allocation or allotment of shares. Offer price is collected from the allotment filing available from the Hong Kong Stock Exchange. Data on issuers' characteristics such as offer size, listing date, gross proceeds, market capitalisation and the relevant pre-listing accounting information are also collected from the issuers' prospectuses. IPO prospectuses are downloaded from the Hong Kong Stock Exchange. All data from the prospectuses and the allocation details are hand collected. Finally, the first-day closing stock prices are from Datastream.

3.2. Main variables

In the first part of our analysis, we measure the impact of incentive compensation by the presence of incentive-fee clauses in the IPO prospectus. Subsequently, we use the *Incentive Ratio* defined as the ratio of the incentive fee relative to the gross spread. This ratio measures the extent to which underwriters' compensation is contingent on issuers' satisfaction with IPO performance. For instance, if the incentive fee is 0.70% of gross proceeds, and gross spread is 1.20% of gross proceeds, we calculate the incentive ratio as 0.58 (= 0.007/0.012). We hypothesize that the higher the incentive ratio, the more high-powered are the incentives of underwriters to pursue issuers' objectives. We hypothesize that incentive fees impact IPO pricing through the channel of underwriters' information production. And we expect that most of the effect of incentive fees on IPO pricing to occur through the interaction of the incentive ratio with measures of underwriters' information-production capability. We employ three measures of underwriters' capability to produce information: (i) underwriters' experience and reputation in the IPO market (based on their share of the IPO underwriting market in the three years before the IPO); (ii) underwriters' specific knowledge of the issuer's industry (based on the proportion of IPOs in the issuer's industry relative to all IPOs backed by a given underwriter in the three years before the IPO); and finally (iii) the size of the IPO underwriting syndicate.

3.3. Control variables

We control for firm and IPO characteristics that are commonly found to determine initial returns and price revisions in previous studies (e.g., Hanley, 1993). These characteristics include: Firm size measured as total assets (in HK$ million) at the time of listing; age of the IPO firms measured as the difference between the founding date and the IPO date; the gross proceeds raised during the listing; and ownership retained by pre-IPO owners at the time of listing (measured as the proportion of shares retained). We control for indicators of investor and market sentiment by including the demand multiple (Derrien, 2005), measuring oversubscription of the issue, calculated as the total number of shares applied for by investors deflated by the total number of shares on offer, the total return on the Hang Seng Index in the three months prior to the IPO date and the industry market-to-book ratio measured as the median market-to-book ratio of all stocks in the same industry as the IPO firm. We also include industry- and year-fixed effects to mitigate concerns about omitted variables that are correlated with the IPO firms and vary across industries and over time. Appendix A2 provides the variable definitions.

3.4. Methodology

We address the issue of endogeneity due to (un)observable variables in our analyses using entropy-balancing, sample-selection models, and instrumental-variable (IV) estimation. We use the entropy-balancing method to examine whether the coefficient estimates of our key variable of interest, *Incentive ratio*, and of its interaction terms with the measures of underwriters' information-production are biased as a result of observable differences between the treatment group (IPOs with incentive-fee clauses) and control group (IPOs without incentive-fee clauses). Entropy balancing achieves balanced covariates between IPOs with incentive fees (treatment group) and those without (control group) along several characteristics by re-weighting observations such that the post-weighting mean and

variance for the treatment and control groups are identical based on the selected characteristics. Entropy balancing allows us to use the full sample and has higher model efficiency and less first-stage model dependency than propensity-score matching (Hainmueller, 2012).[12] The method first determines the distributional properties (i.e., mean and variance) of the treatment observations, and these become the target distributional properties of the post-weighting control sample (known as "balancing conditions"). The algorithm assigns possible weights to control observations and then tests whether the balancing conditions have been satisfied, i.e., whether the distributional properties of treatment and post-weighted control observations are identical. This process is repeated over multiple iterations until a set of weights is found that satisfies the balancing conditions. The treatment observations are not re-weighted and retain their default weighting of one, while the control observations are assigned a positive weight that may be greater or less than one.

We address potential endogeneity due to selection bias using two-stage Heckman models. In the first stage, we estimate a Probit model of the likelihood that IPOs include incentive-fee clauses; the dependent variable is a binary indicator (*Incentive Dummy*) coded one if the IPO includes incentive-fee clauses and zero otherwise. The explanatory variables include issue and issuer's characteristics, stock-market and industry conditions, and year- and industry-fixed effects. Our identification strategy employs two instruments: (i) the proportion of IPOs with incentive-fee clauses in the previous three months prior to the IPO date and (ii) the average oversubscription multiple among prior IPOs in the previous three months. The use of the former instrument is based on herding and learning theory (e.g., Welch, 1992). If issuers and underwriters learn from previous IPOs, they may be more likely to include incentive-fee clauses when incentive fees have been more prevalent among prior issues. The second instrument is motivated by the stringent disclosure requirements in Hong Kong that result in detailed data on the (over-)subscription of IPOs to be publicly available.[13] We utilise these data to calculate the oversubscription ratio (or demand multiple) as outlined in the Data Section above. Following prior literature on IPO cycles (e.g., Yung et al., 2008) we interpret average prior oversubscription as a proxy for the hotness of investors' demand for IPOs. We expect average prior oversubscription to negatively affect the likelihood of incentives fees being offered to underwriters, as measured by *Incentive Dummy*. Higher demand for IPOs by investors is likely to reduce the amount of effort that underwriters need to expend in the marketing of IPOs. It also renders information production by investors cheaper: as investors compete among themselves, they are less able to extract rents in exchange for information production. Therefore, in periods with relatively high oversubscription among previous IPOs, there is less need for issuers to incentivize underwriters.

We also address potential endogeneity due to unobservable variables using the two-stage instrumental variables (IV) approach. The first stage estimates a model with the same explanatory variables as the selection model outlined above but the dependent variable here is the *Incentive Ratio*, which is the key explanatory variable in the second stage. We expect both instruments to be related to our second-stage explanatory variable, *Incentive Ratio*, without being correlated with the second-stage error term. Both instrumental variables are included in the first stage but excluded from the second stage of our model. We use Wu-Hausman tests to confirm the validity of the two instruments.

4. Results and analysis

4.1. Univariate analysis

Table 1 presents the univariate analysis comparing IPOs with and without incentive clauses. The *Incentive Ratio* is defined as the ratio of the incentive fee (expressed as percentage of the IPO proceeds) over the gross spread (likewise expressed as percentage of proceeds). The mean of the *Incentive Ratio* of 0.26, calculated only for IPOs including incentive-fee clauses, indicates that on average the incentive fee is roughly a quarter of the size of the gross spread. The table presents the univariate analysis investigating the differences between our treatment sample of IPOs with incentive fees and the control sample without incentive fees. The results of the univariate analysis suggest that IPOs with incentive fees are significantly different from those without in terms of their pricing and short-term performance. IPOs with incentive-fee clauses have significantly lower initial returns, higher offer prices, higher price ranges (as indicated by the higher *Midpoint* of the range), and higher price revisions. These univariate findings are consistent with our expectations.

Incentive fees have become widely adopted among Hong Kong IPOs: Of the 85 financial firms acting as underwriters in our sample companies, 57 (67%) firms are involved in IPOs with incentive-fee clauses. Table 1 shows statistically significant differences in means and medians of the binary underwriter information-production capability measures: experience (or reputation), industry specialization and the size of the underwriting syndicate. IPOs with incentive fee clauses are significantly more likely to have experienced (top-10) underwriters, large (above-median) syndicates and high (above-median) industry specialization. Almost two-thirds of IPOs with incentive-fee clauses involve experienced (top-10) underwriters compared to only just over one third of IPOs without incentive-fee clauses. In our multivariate analysis below, we employ a range of methods to address the differences between our treatment and control samples and deal with endogeneity and selection issues such as endogenous underwriter-issuer matching. The next section

[12] In unreported results, we use the propensity score matching (PSM) approach. Our main results remain robust. However, PSM reduces the sample size due to imbalances between the treatment and control groups that result in the lack of suitable matches.

[13] We thank the anonymous reviewer for suggesting this additional instrument.

Table 1
Descriptive statistics.

	With incentive fees		*Without incentive fees*			
	Mean	*Median*	*Mean*	*Median*	*T-test*	*Wilcoxon-Z-test*
Panel A: Variables						
Incentive Ratio	0.264	0.246	–	–	–	–
Initial returns	0.066**	0.047**	0.108	0.086	2.732	2.801
Offer price	4.508**	2.857**	3.087	2.054	−2.117	−2.096
M/B	2.710**	2.431**	1.886	1.667	−2.213	−2.116
Midpoint	3.561**	2.71**	2.78	1.941	−2.112	−2.092
Width of price range	0.823**	0.688**	0.710	0.442	−2.564	−2.443
Price revision	0.283**	0.125**	0.112	0.034	−2.113	−2.082
Exp. Underwriter (binary)	0.656***	1.000***	0.368	0.000	−8.845	−8.486
Large Syndicate (binary)	0.533***	1.000***	0.339	0.000	−4.111	−3.984
High Specialization (binary)	0.582***	1.000***	0.307	0.000	−4.923	−4.986
Obs.	*547*		*608*			

The table shows the descriptive statistics by means and medians for IPOs with and without incentive fees. *Incentive Ratio* is the ratio of incentive fees divided by underwriters' gross spread. *Initial returns* are the difference between first day closing price and offer price deflated by the offer price. *Offer price* is the final offer price and collected from the allotment filing available from the Hong Kong Stock Exchange annual fact book. *M/B* is the market capitalization as measured by the midpoint of the price range reported in the IPO prospectus multiplied by common share outstanding divided by book value of equity. *Midpoint* is the average of the high and low end of the offer price range reported in the IPO prospectus. *Width of Price Range* is the difference between the high and the low end of the price range. *Price revision* is the difference between the offer price and the midpoint of the price range divided by the midpoint (with the midpoint being the average of the high and low end of the price range). *Exp. underwriter* measures the IPO underwriter experience based on a ranking of underwriters' market shares; the binary variable equals 1 if the lead underwriter(s) ranks among the top 10 of underwriters in terms of both IPO numbers and proceeds in the three years prior to the IPO year. *Large Syndicate* is a dummy variable that takes a value of one if the number of underwriters involved in pricing the IPO firm is above median value and zero otherwise. *High Specialization* is a dummy variable that takes a value of one if the proportion of the companies taken public by a given underwriter in an industry similar to the IPO firm during the last three years is above median value and zero otherwise. Differences in means and medians are tested using a *t-test* and *Wilcoxon Z-test*, respectively. ***, **, * indicate 1%, 5% and 10% significance levels of the *t-test* and *Wilcoxon Z-test*.

presents our multivariate analysis.[14]

4.2. Incentive-fee clauses and partial adjustment

We test whether incentive compensation affects IPO pricing and initial returns through the channel of underwriters' information production and the partial adjustment of offer prices. We focus on the positive effect of price revision on initial returns that is attributed to partial adjustment and examine how this is affected by incentive compensation. If partial adjustment is due to the need to compensate investors for information production, we expect that the positive effect of price revision on initial returns is observed only for IPOs without incentive fees but not for those with incentive fees. We conjecture that the objectives of underwriters offered incentive fees are more closely aligned with those of issuers, and underwriters are motivated to produce more private information themselves rather than rely on investors, reducing the need for partial adjustment and IPO underpricing.

In this analysis we separate the sample into two subsamples: IPOs with and without incentive-fee clauses. As we expect that the two subsamples behave differently, there may be bias due to issuers self-selecting into adopting incentive fees. We address this by estimating a two-stage Heckman model as outlined in the Methodology section above. The key instruments included in the first stage but excluded in the second stage are average oversubscription of previous IPOs and the proportion of previous IPOs with incentive-fee clauses (both calculated over the previous three months prior to the IPO).

In Stage II of the Heckman model, we test the impact of price revision on initial returns separately for IPOs with and without incentive fees, and control for sample selection by including the Inverse Mill's Ratio derived from the estimates of Stage I. Following Hanley (1993), we measure *Price Revision* as the difference between the offer price and the midpoint of the price range deflated by the midpoint (the midpoint being the average of the high and low end of the price range disclosed in the IPO prospectus). This measures

[14] In unreported results we examine the industry distribution of IPOs in our sample and find it consistent with previous Hong-Kong IPO studies (e.g., Espenlaub et al., 2016). We observe no significant industry clustering among issuers that provide incentive fees. Table A3 in the Appendix presents the correlation matrix (Panel A) and the descriptive statistics for our control variables (Panel B). Given the low correlation among our explanatory variables of interest and a VIF of 4, we conclude that multicollinearity is not an issue.

the change in the offer price relative to the expected offer price (i.e., the midpoint).[15]

The results in Table 2 show that for the subsample of IPOs without incentive fees there is a statistically highly significant and positive relation between *Initial returns* and *Price Revision*. The size of *Price Revision* coefficient is broadly in line with the results reported by Cornelli and Goldreich (2003) and Hanley (1993). We conclude that Hong Kong IPOs without incentive-fee clauses exhibit the partial-adjustment phenomenon. By contrast, for IPOs with incentive-fee clauses, we find no significant relation between initial returns and price revision. Our results in Table 2 confirm our conjecture that the partial-adjustment phenomenon occurs only for IPOs without incentive-fee clauses but not for IPOs with incentive-fee clauses. This is consistent with our expectations and motivates the focus of our main analysis (in Sections 3.4 onwards) on the impact of incentive pay on underwriters' information production.[16]

4.3. Determinants of incentive compensation and optimal contracting

Before presenting our analysis on the impact of incentive pay on underwriter information production, we first explore the determinants of incentive-fee adoption and whether the adoption of these fees is likely to be based on optimal decision making. The selection models we employ in our analysis in Table 2 above address the non-randomness of the adoption of incentive fees. The first stage of the Heckman models in Panel A of Table 2 shows the determinants of incentive-fee adoption. IPOs that follow hot IPO periods, characterized by higher average oversubscription of prior IPOs, are less likely to adopt incentive fees given the reduced need for underwriter incentivization. The corresponding coefficient is statistically highly significant. This is consistent with our expectations outlined in the Methodology section above. Also consistent with our expectations is the highly significant positive coefficient of the proportion of prior IPOs with incentive-fee clauses indicating that the adoption of incentive fees may be driven in part by herding and learning effects, as outlined above. The adoption of incentive fees is also driven by other company and issue characteristics: incentive fees are more likely to be adopted by more profitable and larger companies (with higher *ROA* and *Size* in terms of total assets), for larger IPOs (higher *Proceeds*), and for IPOs where pre-IPO owners retain less of their ownership as shown by the significant negative coefficient on *Ownership*. These results indicate interesting patterns regarding incentive-fee adoption that may be explored in future research. For the purpose of the current analysis, the non-randomness of incentive-fee adoption is explicitly addressed here using selection analysis.

Next, we address whether the adoption of incentive fees is likely to be based on optimal contracting decisions using the approach of Dunbar (1995). Based on optimal contracting theory we would expect a given IPO to adopt incentive fees when it is optimal to do so. We compare the actual initial returns of IPOs with the hypothetical initial returns had these IPOs switched from adopting incentive fees to non-adoption, and vice versa. If issuers set incentive pay optimally, we expect to find that the hypothetical initial returns are higher than the actual initial returns we observe. Based on our baseline analysis in Table 2 (Panel A), we estimate the hypothetical initial returns for IPOs without incentive fees based on the coefficients estimated in our analysis for IPOs with incentives in Model 1 in Panel A. Conversely, we estimate the hypothetical initial returns for IPOs with incentive fees using the parameters of Model 2 in Panel B for IPOs without incentive fees. Our results show that, on average, the actual initial returns are lower than the corresponding hypothetical initial returns. This suggests that underwriter remuneration is optimally designed from the issuer's perspective.

4.4. IPO pricing and performance

Next, we test the hypotheses outlined above. Hypotheses 1a and 1b predict that (capable) underwriters who are more strongly incentivized to pursue issuers' objectives will produce more information themselves, and based on their better information, these underwriters will set more informative, narrower price ranges. We measure the *Width* of the price range as the difference between the high and the low end of the price range. We use *Width* and *Width scaled by midpoint* as alternate dependent variables in Table 3. Hypotheses 2a and 2b predict that (capable) underwriters who are more strongly incentivized to pursue issuers' objectives will set higher price ranges in addition to narrower price ranges. In Table 3, we measure the height of the price range by the *Midpoint* of the price range. As an alternate measure of price-range height, we scale *Midpoint* by the book value per share (*M/B*). In the analysis below, we measure the underwriters' incentives not just by the presence of incentive-fee clauses (using a binary indicator as in Table 2) but instead we focus on the strength of incentives using the variable *Incentive Ratio* defined as the incentive fee divided by the gross spread as outlined in the section on Data and Methodology.[17] In Table 3, we regress our indicators of price range width and height on the

[15] Our second-stage analysis includes a range of control variables including measures of investor sentiment: *Market Return* and *Industry market to book* that capture conditions in the stock market and the specific industry of the IPO company in the quarter prior to the IPO, and the demand multiple (*Multiple*) that measures oversubscription of the issue. Following Cornelli and Goldreich (2003) and Ljungqvist and Wilhelm (2002), we use an alternate measure of price revision defined as the difference between the offer price and the low end of the price range deflated by the width of the price range. This measure captures the closeness of the offer price to the top end of the price range. We rely in our analysis on Hanley (1993) measure as it is more commonly used in the literature. The results using the alternate measure are qualitatively unchanged and not reported here for brevity.

[16] As our empirical approach in Table 2 is based on previous studies of partial adjustment, it shares their limitations. While our analysis addresses endogeneity due to selection, there may still be endogeneity due to other reasons. We explicitly recognize the limitations of our approach in this part of our analysis. In later parts of our analysis below, we explicitly address endogeneity due to (un)observable factors.

[17] We also test Hypotheses 1–4 using the binary indicator *Incentive Dummy*. The results, which are not reported for brevity, are available on request from the authors and are qualitatively similar to the results using the *Incentive Ratio*.

Table 2
Effect of incentive-fee clauses on partial adjustment.

Panel A	Stage II			Stage I	
Dep = Initial Returns	Incentive	No incentive	*Dep = Incentive Dummy*		
	Model 1	*Model 2*		Coeff	*p*-values
Price revision	−0.004	0.168***	*Average Oversubscription* over *the last quarter*	−0.134***	(0.000)
	(0.271)	(0.000)	*Proportion of incentive IPOs*	0.113***	(0.000)
Experienced Underwriter (binary)	−0.017**	−0.012**	*ROA*	0.071**	(0.029)
	(0.014)	(0.017)	*Ln(Size)*	0.012**	(0.028)
Large Syndicate (binary)	−0.015**	−0.004*	*Ln(Age)*	0.001	(0.142)
	(0.016)	(0.086)	*Ln(Proceeds)*	0.058***	(0.000)
High Specialization (binary)	−0.022**	−0.006*	*Ownership*	−0.311***	(0.000)
	(0.012)	(0.076)	*Industry market to book*	0.014*	(0.060)
Ln(Size)	−0.014**	0.017**	*Market return*	0.002	(0.116)
	(0.025)	(0.032)			
Ln(Age)	−0.017	0.027			
	(0.225)	(0.079)			
Ln(Proceeds)	−0.002**	−0.001**			
	(0.024)	(0.031)			
Ownership	0.017*	0.018*			
	(0.074)	(0.082)			
Industry market to book	−0.005	−0.003			
	(0.351)	(0.204)			
Multiple	0.005*	0.008**			
	(0.073)	(0.024)			
Market-Return	0.002	0.001			
	(0.228)	(0.539)			
Inverse Mill's	0.002	−0.003			
	(0.333)	(0.412)			
Industry & Year Fixed Effects	*Yes*	*Yes*	*Industry Fixed effects*		*Yes*
Obs.	547	608	*Obs.*		1155
Adjusted R square	0.157	0.170	*Pseudo R square*		0.221

Panel B	*With incentive fees*			*Without incentive fees*		
	Actual	Hypothetical initial returns without Incentive Fees	Difference (p-values)	Actual	Hypothetical initial returns with Incentive Fees	Difference (p-values)
Under-pricing (%)	6.600	9.642	0.03**	10.80	11.211	0.08*
Obs.	*547*			*608*		

The table shows tests of our prediction that there is a positive relation between price revision and initial returns only for IPOs without incentive-fee clauses but not for those with incentive-fee clauses. A positive relation between these variables has been interpreted as evidence of partial adjustment in the offer price. Our test involves separating our sample into two subsamples with and without incentive-fee clauses. *Price Revision* is the difference between the offer price and the midpoint of the price range divided by the midpoint (with the midpoint being the average of the high and low end of the price range). We use two-stage Heckman models to deal with potential selection bias. The first stage is a Probit model with a binary dependent variable that is one if the IPO includes an incentive-fee clause, and zero otherwise. The second stage involves OLS models that are estimated separately for the two subsamples with and without incentive-fee clauses. The OLS models regress the dependent variable IPO initial returns against price revision, the explanatory variable of interest, alongside control variables and the Inverse Mill's Ratio. All other variables are as defined in the Appendix Table A2. Constant term is included in all regressions. ***, **, * indicate 1%, 5% and 10% significance levels.

incentive ratio to test Hypotheses 1a and 1b, and on the interaction terms of the incentive ratio with measures of underwriters' information-production capabilities to test Hypotheses 2a and 2b.

We expect that incentive fees motivate *capable* underwriters to use their capability and produce information. Hypotheses 1b and 2b predict interaction effects between the strength of underwriters' incentives with measures of underwriters' capability to produce information, specifically underwriter experience, industry specialization and the size of the underwriting syndicate. If the effect of incentive fees on IPO pricing occurs through the channel of underwriters' information production, we expect to observe most of the effect of underwriters' incentives through the interaction of the incentive effect with measures of underwriters' capability to produce information. We measure underwriters' capability to produce information in several ways. The first measure is underwriters' experience (or reputation), measured as an underwriter's share of the underwriting market at the time of the IPO, based on the underwriters' market share both in terms of IPO numbers and IPO proceeds. Specifically, we define a binary indicator: *Experienced Underwriter*. This is coded one if at least one of the IPO underwriters in the syndicate is among the top 10 underwriters in the IPO year

Table 3
The impact of incentive-fee clauses on IPO pricing.

	Dep: *Width of price range* Scaled by *Midpoint*		Dep: *Width of price range*		Dep: *Midpoint*		Dep *M/B*	
	OLS	ENTROPY	IV	OLS	ENTROPY	IV	OLS	OLS
Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Incentive Ratio	−0.027***	−0.028**	−0.029***	−0.125***	−0.132**	−0.118***	0.288***	0.311***
	(0.000)	(0.022)	(0.000)	(0.000)	(0.021)	(0.000)	(0.000)	(0.000)
Incentive Ratio x Exp. Underwriter	−0.027***	−0.018**	−0.026***	−0.139***	−0.092**	−0.138***	0.362**	0.359**
	(0.000)	(0.025)	(0.000)	(0.000)	(0.024)	(0.000)	(0.014)	(0.015)
Incentive Ratio x Large Syndicate	−0.030***	0.028**	0.031***	−0.128***	0.112**	0.128***	0.117**	0.116**
	(0.002)	(0.015)	(0.001)	(0.002)	(0.014)	(0.001)	(0.018)	(0.019)
Incentive Ratio x High Specialization	−0.057**	−0.038**	−0.055**	−0.278**	−0.186**	−0.276**	0.392**	0.388**
	(0.026)	(0.025)	(0.022)	(0.023)	(0.023)	(0.021)	(0.024)	(0.024)
Exp. Underwriter	−0.018**	−0.014*	−0.019**	−0.077**	−0.058*	−0.076**	0.120**	0.123**
	(0.020)	(0.081)	(0.025)	(0.018)	(0.076)	(0.022)	(0.029)	(0.030)
Large Syndicate (binary)	−0.005**	−0.005*	−0.006**	−0.029**	−0.026*	−0.026**	0.057**	0.058**
	(0.034)	(0.073)	(0.039)	(0.031)	(0.065)	(0.034)	(0.034)	(0.035)
High Specialization (binary)	−0.025**	−0.018**	−0.027**	−0.106**	−0.076**	−0.106**	0.242**	0.235**
	(0.041)	(0.028)	(0.038)	(0.043)	(0.026)	(0.035)	(0.022)	(0.023)
Ln(Size)	0.0001	0.0001	0.0001	0.002	0.001	0.002	0.001	0.001
	(0.277)	(0.223)	(0.278)	(0.252)	(0.208)	(0.244)	(0.277)	(0.280)
Ln(Age)	0.003*	0.002	0.003*	0.012*	0.001	0.014*	0.127**	0.131**
	(0.090)	(0.252)	(0.081)	(0.081)	(0.221)	(0.076)	(0.031)	(0.033)
Ln(Proceeds)	0.006***	0.003**	0.007***	0.032***	0.016**	0.034***	0.231***	0.238***
	(0.000)	(0.024)	(0.000)	(0.000)	(0.022)	(0.000)	(0.000)	(0.000)
Ownership	−0.040**	−0.010*	−0.038**	0.186***	−0.049*	−0.189**	0.164**	0.168**
	(0.029)	(0.071)	(0.034)	(0.027)	(0.066)	(0.032)	(0.024)	(0.023)
Industry market to book	0.003*	0.001	0.003*	0.013*	0.002	0.015*	0.032*	0.036*
	(0.081)	(0.149)	(0.081)	(0.073)	(0.141)	(0.088)	(0.070)	(0.080)
Industry & Year Fixed Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Obs	*1155*	*1155*	*1155*	*1155*	*1155*	*1155*	*1155*	*1155*
Adj. R-square	0.274	0.142	0.271	0.255	0.138	0.276	0.282	0.278
Wu-Hausman (p-value)			(0.153)			(0.146)		

The table examines the impact of the incentive ratio (incentive fees divided by gross spread) and underwriter reputation on the IPO price range. The models are estimated using OLS, Entropy balancing and IV models on our full sample of IPOs. The dependent variable in Models 1 to 3 is *Width of Price Range* scaled by *Midpoint* where the *Width of Price Range* is the difference between the high and the low end of the price range. In Models 4 to 6 the dependent variable is the *Width of price range*. In Model 7, the dependent variable is the *Midpoint* of the price range, and in Model 8, it is *Market-to-Book ratio* (*M/B*) defined as *Midpoint* scaled by book value of equity per share. All other variables are as defined in Appendix Table A2. Constant term is included in all regressions. ***, **, * indicate 1%, 5% and 10% significance levels.

using a ranking of underwriters based on underwriters' market shares in the three years before the IPO; otherwise, the indicator is coded zero. The second measure of information-production capability is the underwriter's industry-specific expertise. For a given IPO, we measure the proportion of all IPOs in the same industry during the previous three years that were backed by the underwriter of the given IPO. Next, we code a binary indicator, *High Specialization*, equal to one if this proportion is above the median proportion for all underwriters in a given industry and IPO year; otherwise, the indicator is coded zero. Finally, based on Corwin and Schultz (2005), we argue that larger underwriting syndicates are capable of producing more information than smaller syndicates. Corwin and Schultz (2005) provide evidence linking information production capability to syndicate size showing that offer prices are more likely to be revised when syndicates are larger. We define the third proxy measure as a binary indicator equal to one if the syndicate is above the median of syndicate size in the IPO year, and zero otherwise.

Consistent with our predictions in Hypotheses 1a and 2a, the results in Table 3 show that the higher the *Incentive Ratio* the narrower and higher the price range. *Incentive Ratio* has a statistically and economically significant negative effect on the (scaled and unscaled) width of the price range in Models 1–6. And *Incentive Ratio* has a significant positive effect on the height of the price range measured as *Midpoint* and *M/B* in Models 7 and 8, respectively. Consistent with Hypotheses 1b and 2b, we find statistically significant coefficients on the interaction terms between *Incentive Ratio* and each of the three measures of underwriters' capability to produce information.

Most (around 75–80%) of the effect of *Incentive Ratio* on price-range height and width comes through its interaction with measures of underwriters' information-production capabilities (see our discussion below).

We address the issue of endogeneity due to observable variables using entropy balancing and endogeneity due to unobservable variables using IV regressions as outlined in the Methodology section above.[18] The results are reported in Models 2–3 and Models 5–6, respectively. It is evident that the coefficients on *Incentive Ratio* and on the interaction terms of *Incentive Ratio* with the measures of underwriter capability remain qualitatively unchanged and consistent with the OLS results (Models 1 and 4, respectively).

To examine economic significance and the total effect of *Incentive Ratio* on the width of the price range, we focus on the coefficients in Model 4 of Table 3. Consistent with Hypotheses 1b and 2b, the *total* effect of *Incentive Ratio* is larger for IPOs with underwriters that are more capable of producing information (with information-production capability indicators equal to one) than for less capable underwriters (with indicators equal to zero). For the latter, the effect is fully captured by the coefficient of *Incentive Ratio*. For the former, we find the total effect by summing the coefficient of *Incentive Ratio* and each of the coefficients of the three interaction terms of *Incentive Ratio* with the indicators of underwriters' information-production capability. We find this sum to be −0.670 (= −0.125–0.139–0.128–0.278), which is over five times the size of the uninteracted coefficient of *Incentive Ratio* (−0.125). This indicates that a one-percent increase in *Incentive Ratio* is associated with a 0.670% reduction in the width of the price range. Consider an IPO that has a price-range width of HK$0.764 (the sample mean).[19] If this IPO adopts incentive fees and increases *Incentive Ratio* from zero to 26.4% of the gross spread (0.264 is the mean of *Incentive Ratio*), then this should reduce the price range by almost one quarter, specifically by 23.5%, of the average price-range width, *all else being equal*.[20] In conclusion, we find that the impact of *Incentive Ratio* on the price range is both statistically and economically significant. Our results show that most (over 80%) of the effect of *Incentive Ratio* occurs through the channel of the interaction effects of the incentive ratio with underwriters' information-production capability.[21]

Next, we examine the revision of the offer price relative to the price range. Our previous results in Table 3 show that better incentivized underwriters set higher and more informed (narrower) price ranges. Based on the findings of Hanley and Hoberg (2010), we may expect that price ranges that reflect more information require less subsequent price revision resulting in a negative association between the incentive ratio and price revision. However, price revision may be driven mostly by new information that was not previously available when the price range was set. Underwriters need to decide whether to produce this information themselves or rely on disclosures from investors. Better-incentivized underwriters rely less on information produced by investors to reduce partial adjustment and underpricing, as their incentives are more aligned with issuers who typically prefer higher offer prices. Hence, we expect the incentive ratio to have a positive impact on price revision (Hypothesis 3a). If this effect results from underwriters' information production, we also expect to find support for Hypothesis 3b, which predicts that the positive association between the underwriters' incentive ratio and the price revision will be more pronounced for more reputable and experienced underwriters with larger market share and relevant industry experience, and for larger underwriting syndicates.

As in Table 2, we measure price revision as the difference between the offer price and *Midpoint* divided by *Midpoint* following Hanley (1993). We also include commonly used control variables including measures of investor sentiment.[22] The results are reported in Table 4 and show that, consistent with Hypotheses 3a and 3b, the incentive ratio has a significant, positive impact on price revision both directly and through its interaction effects with the three measures of underwriters' information-production capability.

We address endogeneity due to observable variables using entropy balancing and due to unobservable variables using IV regressions. The results for entropy balancing are reported in Model 2 and the IV regressions in Model 3. The coefficients on the independent variables of interest (*Incentive ratio* and the interaction terms of *Incentive Ratio* with each of the three measures of underwriter information-production capability) remain qualitatively unchanged and consistent with the OLS results in Model 1.

Our results are economically as well as statistically significant. In Model 1, a one-percent increase in the incentive ratio would increase price revision by 0.131% if the IPO is backed by underwriters with low information-production capabilities. By contrast, for IPOs with capable underwriters, the full effect of a change in the incentive ratio is given by the sum of the direct effect and the three interaction effects: 0.686 (= 0.131 + 0.118 + 0.108 + 0.329). Hence, with capable underwriters, a one-percent increase in *Incentive Ratio* results in a 0.686% increase in the offer price relative to the midpoint of the price range for IPOs. For other IPOs, the corresponding effect is only a 0.131% increase. Our results confirm that most (over 80%) of the effect of *Incentive Ratio* occurs through the channel of the interaction effects of the incentive ratio with underwriters' information-production capability.

Our results so far demonstrate that incentive fees significantly impact both the price range and the final offer price. As a result, IPOs with incentive fees are less underpriced. If the short-term performance of IPOs, measured by initial returns, is largely due to underpricing, we expect that IPOs with incentive fees have lower initial returns. We test Hypothesis 4a (incentive fees are associated with

[18] Appendix Table A4 reports the univariate analysis of the treatment group (incentive IPOs) relative to the weighted and unweighted control group (non-incentive IPOs). Weighting ensures that there is no statistical difference between the treatment group and the weighted control group as shown in Table A4. Table A5 reports the first stage of the IV models. The dependent variable is *Incentive Ratio* and the explanatory variables are the same as in the Probit model reported in Panel B of Table 2A. In the second stage, we use the predicted incentive ratio instead of the actual to deal with potential endogeneity. The Wu-Hausman test confirms the suitability of our instruments.

[19] The average width of the price range can be found as the weighted average of the means of the two subsamples in Table 1.

[20] The price range will be reduced by an amount equal to HK$(−0.670 × 0.264) = HK$0.18; as a proportion of the average width of the price range (HK$0.764), HK$0.18 is 23.5% of the range.

[21] We conclude this by calculating [−0.670 - (−0.125)]/(−0.670) = 0.813.

[22] The results based on the alternate measure of price revision (defined as the difference between the offer price and the low end of the price range deflated by the width of the price range) are qualitatively similar. They are not reported for brevity but available from the authors.

Table 4
The impact of incentive-fee clauses on IPO price revision.

	OLS	*Entropy balancing*	IV Regression
Variables	Dep: *Price revision* *Model 1*	Dep: *Price revision* *Model 2*	Dep: *Price revision* *Model 3*
Incentive Ratio	0.131**	0.122**	0.106**
	(0.021)	(0.021)	(0.021)
Incentive Ratio x Exp. Underwriter	0.118**	0.114**	0.119**
	(0.033)	(0.031)	(0.041)
Incentive ratio x Large Syndicate	0.108**	0.112**	0.106**
	(0.021)	(0.026)	(0.021)
Incentive ratio x High Specialization	0.329***	0.258**	0.325***
	(0.000)	(0.048)	(0.000)
Exp. Underwriter	0.298***	0.143**	0.296***
	(0.004)	(0.041)	(0.002)
Large Syndicate (binary)	0.197***	0.188**	0.194***
	(0.000)	(0.032)	(0.000)
High specialization (binary)	0.221**	0.177**	0.216**
	(0.025)	(0.041)	(0.022)
Ln(Size)	0.001	0.001	0.001
	(0.371)	(0.162)	(0.342)
Ln(Age)	0.0161	0.006	0.0162
	(0.210)	(0.184)	(0.214)
Ln(Proceeds)	−0.047***	−0.025*	−0.045***
	(0.000)	(0.072)	(0.000)
Ownership	0.096***	0.021	0.098***
	(0.001)	(0.214)	(0.001)
Industry market to book	0.048***	0.022*	0.049***
	(0.000)	(0.075)	(0.000)
Multiple	0.051***	0.022*	0.056***
	(0.000)	(0.074)	(0.000)
Market-Return	0.002	0.001	0.002
	(0.411)	(0.332)	(0.455)
Industry & Year Fixed effects	*Yes*	*Yes*	*Yes*
Obs	1155	1155	1155
Adj. R-square	0.328	0.126	0.304
Wu-Hausman (p-value)			*(0.168)*

The table examines the impact of the incentive ratio (incentive fees divided by gross spread) and underwriter experience on offer price setting in terms of the revision of the offer price within the price range. The models are estimated using OLS, Entropy balancing and IV regression on our full sample of IPOs. The dependent variable *Price revision* is defined as the difference between the offer price and the midpoint of the price range divided by the midpoint. Model 1 reports the result for the OLS, Model 2 the results for entropy balancing and Models 3 the IV regressions. All other variables are as defined in the Appendix Table A2. Constant term is included in all regressions. ***, **, * indicate 1%, 5% and 10% significance levels.

lower IPO initial returns) and Hypothesis 4b (the effect of incentive fees on initial returns is larger for more capable underwriters). The results presented in Table 5 show that the incentive ratio has a significant negative coefficient indicating a direct effect on underpricing consistent with Hypothesis 4a. Also, the coefficients of the three interaction terms of *Incentive Ratio* with underwriters' information-production capability are statistically significant and negative, consistent with Hypothesis 4b. Our results remained robust using entropy balancing and IV regression as shown in Models 2 and 3, respectively.

The effect of incentive-fee clauses on IPO initial returns is economically significant. The full effect of a change in the incentive ratio for IPOs with capable underwriters is given by the sum of the direct effect and the three interaction effects. Based on the estimates of Model 1 in Table 5, the sum of the coefficient of *Incentive Ratio* plus the coefficients of the three interaction terms of *Incentive Ratio* with underwriters' information-production capability is −0.119.[23] Hence, for an IPO with capable underwriters and an average initial return of 8.82%, an increase in the *Incentive Ratio* from zero to 26.4% of the gross spread (0.264 is the mean of *Incentive Ratio*) is associated with a reduction in the initial return of 3.14 percentage points *all else being equal*. Expressed relative to the mean initial return of 8.82%, this corresponds to a 35.62% reduction in the initial return.[24] Our results confirm that, as in Table 3, most of the effect of *Incentive Ratio* on underpricing (around three quarters) occurs through the channel of the interaction effects of the incentive ratio

[23] This is calculated as the sum of the four coefficients: (−0.031–0.018–0.018–0.052) = (−0.119).

[24] The average initial return of 8.82% can be found as the weighted average of the mean initial returns of the two subsamples in Table 1. The initial return will be reduced by 3.14 percentage points, which is 35.62% of the average initial return of 8.82%: (−0.119 × 0.264)/0.0882 = (−0.0314/0.0882) = (−0.3562).

Table 5
The impact of incentive-fee clauses and underwriter experience on initial returns.

	OLS	*Entropy balancing*	IV Regression
Variables	Dep: *Initial ret.* *Model 1*	Dep: *Initial ret.* *Model 2*	Dep: *Initial ret.* *Model 3*
Incentive Ratio	−0.031***	−0.032**	−0.028***
	(0.000)	(0.027)	(0.000)
Incentive Ratio x Exp. Underwriter	−0.018***	−0.017***	−0.016***
	(0.000)	(0.001)	(0.000)
Incentive ratio x Large Syndicate	−0.018***	−0.016**	−0.018***
	(0.000)	(0.034)	(0.000)
Incentive ratio x High Specialization	−0.052***	−0.032**	−0.036***
	(0.000)	(0.035)	(0.000)
Exp. Underwriter	−0.014**	−0.012*	−0.017***
	(0.000)	(0.072)	(0.000)
Large Syndicate (binary)	−0.021***	−0.016*	−0.017***
	(0.000)	(0.061)	(0.000)
High specialization (binary)	−0.027**	−0.021**	−0.027**
	(0.032)	(0.022)	(0.033)
Ln(Size)	−0.010***	−0.003	−0.011***
	(0.000)	(0.144)	(0.000)
Ln(Age)	0.005	0.001	0.002
	(0.206)	(0.161)	(0.225)
Ln(Proceeds)	−0.006**	−0.002*	−0.005**
	(0.025)	(0.066)	(0.026)
Ownership	0.015***	0.001	0.018***
	(0.000)	(0.111)	(0.000)
Industry market to book	−0.002***	0.002	−0.003***
	(0.000)	(0.177)	(0.000)
Multiple	0.025***	0.015*	0.001
	(0.000)	(0.081)	(0.183)
Market-Return	0.001	0.001	0.025***
	(0.182)	(0.384)	(0.000)
Industry & Year Fixed effects.	*Yes*	*Yes*	*Yes*
Obs	1155	1155	1155
Adj. R-square	0.211	0.164	0.192
Wu-Hausman (p-value)			*(0.226)*

The table examines the impact of the incentive ratio (incentive fees divided by gross spread) and underwriter experience on short-term IPO performance (underpricing). The models are estimated using OLS, Entropy balancing and IV regression on our full IPO sample. The dependent variable is *Initial returns* defined as the difference between first day closing price and offer price deflated by the offer price. Model 1 reports the OLS results, Model 2 reports the result for entropy balancing, while Model 3 reports the IV regression. All other variables are as defined in the Appendix Table A2. Constant term is included in all regressions. ***, **, * indicate 1%, 5% and 10% significance levels.

with underwriters' information-production capability.

Next, we test whether underwriters' incentive compensation affects the duration of IPO roadshows. Our existing results suggest that incentive fees increase underwriters' efforts in information production. Based on these results, we hypothesize that incentive fees are likely to motivate underwriters to allocate more time to information collection, including the gauging of investor interest during roadshows. More generally, better incentivized underwriters should exert greater efforts in the pursuit of issuers' best interests, including more efforts spent on IPO marketing and information-production. We expect to observe that IPOs with incentive fees have longer road shows.[25]

We gather data on the start of the roadshow from Factiva for some of the IPO in our sample. For a subsample of 260 IPOs, we find data from Factiva on the start of the roadshow for 198 IPOs. For this subsample, we observe that the roadshow starts one week prior to the prospectus publication. Using the prospectus publication date, which we observe for all sample firms, we estimate that prospectus publication takes place on average 11 calendar days before the listing date. Based on this, we estimate the roadshow duration as the number of days between prospectus publication and the listing date plus six days. This results in an average roadshow duration of 17 days which is consistent with timelines shown in timetables by prestigious market participants.[26] We observe some variation around these dates, and while this variation is small it is sufficient to warrant analysis.

Thus, we estimate a model of roadshow duration as a function of the binary incentive-fee indicator (*Incentive Dummy*) and the

[25] We thank the reviewer for helpful suggestions that motivated this analysis.

[26] E.g., the timetable of Allen and Overy (2022) shows the publication date on Day −11 and the road-show start on Day −17 relative to the listing date.

interaction terms of *Incentive Dummy* with each of the three measures of underwriter capability. The results are shown in Table 6. Using alternate OLS, IV and Entropy approaches, we find robust and statistically significant results that suggest that IPOs with incentive fees have roadshows that are longer by around 1.2 days than IPOs without incentive fees. This considers both the direct and indirect effects of *Incentive Dummy*, with around three-quarters of the effect coming through the interaction terms with underwriters' capability measures. This is consistent with the results of our earlier analysis showing that incentive fees motivate underwriter information production, and that this effect is substantially stronger for more capable underwriters.

Next, we examine whether the increased marketing efforts of incentivized underwriters increase investor participation in terms of the level of (over-)subscription of the issue.[27] We estimate a regression with the (over-)subscription level, defined as the demand *Multiple* of the given IPO (see Table A2 for variable definitions), as the dependent variable and the roadshow duration as the explanatory variable of interest. We estimate this model using OLS, Entropy and Instrumental Variables and find robust results, reported in Table 7. In the Entropy analysis, we match IPOs with and without incentive fees as in our baseline analysis. In the IV analysis, we estimate the predicted roadshow duration using the regression model outlined above and use the predicted duration instead of the actual. The results suggest a highly significant positive association between roadshow duration and the oversubscription *Multiple*. These results complement and extend the hypotheses and findings of our baseline analysis. Our paper focuses on the information-production efforts of underwriters, and these new results provide direct evidence that incentive fees encourage underwriters to work harder in pursuit of issuers' best interest by exerting greater marketing and information-production efforts. Our results suggest that IPO roadshow duration may serve as a direct measure of underwriter efforts, and that longer roadshows seem to be one of the channels through which underwriters' incentive fees impact IPO pricing and performance.

4.5. Endogenous underwriter matching

We address potential endogeneity in underwriter experience due to two-sided matching between underwriters and issuers (Fang, 2005). In the analysis so far, we have found significant interaction effects of underwriter information-production capability with *Incentive ratio*. Next, we extend this earlier analysis by dropping the implicit assumption that underwriter selection is exogenous, and we allow for two-sided matching between underwriters and issuers, which means that underwriter selection is non-random and influenced by issuers' characteristics. We adopt the approach of Fang (2005) and use a two-stage Heckman model. In the first stage, we estimate the probability that an IPO involves capable underwriters using a Probit model with IPO characteristics as explanatory variables and controlling for year and industry effects. The binary dependent variable is *Experienced Underwriter*. The two main instruments are the average IPO oversubscription and the proportion of IPOs with incentive-fee clauses in the three months prior to the IPO. Higher IPO oversubscription prior to the IPO indicates greater investor demand which attracts lower-quality issuers to the IPO market and increases adverse selection. Lower-quality issues are less likely to be associated with experienced underwriters due to self-selection by issuers and underwriters. Hence, we expect that higher oversubscription of prior IPOs reduces the likelihood of an IPO being backed by an experienced underwriter. Issues following periods with a higher prevalence of incentive compensation adopted by prior IPOs will be more likely to involve incentive compensation and hence will also be more likely associated with experienced underwriters as the beneficial effects of incentive compensation are greater for more capable underwriters. Our prior findings in Tables 3–5 of significant interaction effects of incentive compensation with underwriters' information-production capabilities suggest this. The results of the first stage of the Heckman model in Table 8 show that IPO characteristics, including the key instruments, significantly influence the likelihood of IPOs being backed by experienced underwriters, consistent with two-sided matching.

In the second stage, we investigate the impact of the incentive ratio on underwriters' pricing decisions. Specifically, we re-estimate the models in Tables 3–5 above with the dependent variables measuring price-range width (scaled by the midpoint of the range), price revision and initial returns, respectively. We estimate each of the second-stage models separately for IPOs with and without experienced underwriters including the Inverse Mill's Ratio (based on the first-stage estimates) to address endogenous underwriter-issuer matching. We estimate a separate two-stage model for each of the three underwriter information-capability measures. The results reported in Table 8 are based on the binary indicator *Experienced Underwriter* that equals one if at least one of the underwriters of an IPO is among the top 10 of underwriters by market share.[28] The second-stage results in Table 8 are consistent with the findings in Tables 3–5. Moreover, the Inverse Mill's Ratio is insignificant in the models for price-range width and initial returns and only marginally significant in the models for price revision. This suggests that our prior results are unlikely to be affected by bias due to endogenous two-sided matching.

Our earlier analysis in Tables 3–5 finds significant interaction effects between underwriter experience and *Incentive ratio*, and our results in Table 8 confirm these interaction effects after addressing endogenous two-sided matching. Comparing the coefficients on *Incentive Ratio* in the models with experienced underwriters (Models 1, 3 and 5) and those without experienced underwriters (Models 2, 4 and 6), we find that the coefficients are statistically significantly different, and the coefficients are larger in absolute terms for IPOs with experienced underwriters (based on one-sided F-tests not reported in the table). This confirms that, consistent with Hypotheses 1b, 3b and 4b, experienced underwriters significantly reinforce the impact of *Incentive Ratio* resulting in significantly narrower price ranges, higher price revisions, and lower initial returns.

[27] We thank the anonymous reviewer for suggesting this analysis.

[28] The results for the two other measures (*High Specialization, Large Syndicate*) are qualitatively similar. They are not reported for brevity but are available from the authors.

Table 6
The impact of incentive fees on roadshow duration.

Panel A	*Obs*	Mean	Median	STD
Roadshow Duration (in days)	*1155*	16.52	14.33	3.58

	Dep: *Duration*		
	OLS	ENTROPY	IV
Panel B	Model 1	Model 2	Model 3
Incentive Dummy	0.317***	0.296***	0.306***
	(0.000)	(0.000)	(0.000)
Incentive Dummy x Exp. Underwriter	0.378**	0.378**	0.369**
	(0.014)	(0.015)	(0.014)
Incentive Dummy x Large Syndicate	0.118**	0.113**	0.119**
	(0.019)	(0.018)	(0.016)
Incentive Dummy x High Specialization	0.392**	0.409**	0.388**
	(0.026)	(0.024)	(0.025)
Exp. Underwriter	0.132**	0.121**	0.127**
	(0.032)	(0.029)	(0.032)
Large Syndicate (binary)	0.064**	0.062**	0.062**
	(0.036)	(0.035)	(0.035)
High Specialization (binary)	0.249**	0.240**	0.258**
	(0.024)	(0.022)	(0.023)
Ln(Size)	0.001	0.001	0.001
	(0.309)	(0.285)	(0.287)
Ln(Age)	0.133**	0.133**	0.131**
	(0.035)	(0.031)	(0.034)
Ln(Proceeds)	0.251***	0.249***	0.242***
	(0.000)	(0.000)	(0.000)
Ownership	0.174**	0.161**	0.176**
	(0.025)	(0.023)	(0.024)
Industry market to book	0.037*	0.035*	0.037*
	(0.086)	(0.081)	(0.082)
Industry & Year Fixed Effects	*Yes*	*Yes*	*Yes*
Obs	*1155*	*1155*	*1155*
Adj. R-square	0.267	0.251	0.271
Wu-Hausman (p-value)			(0.175)

Panel A reports descriptive statistics on the roadshow duration of the IPOs in our sample. Panel B shows the results of the regression of incentive fees (as measured by the binary indicator *Incentive Dummy*) on the *Duration* of the IPO roadshow. Model 1 reports the OLS results, while Models 2 and 3 report the entropy and IV models, respectively. All variables are defined in the Appendix Table A2. Constant term is included in all regressions. ***, **, * indicate 1%, 5% and 10% significance levels.

4.6. Further robustness checks

In this section we further extend and check the robustness of our main analysis. We return to the analysis of the partial-adjustment phenomenon in Table 2 and check the robustness of the key result that incentive compensation mitigates the partial-adjustment effect. First, we conduct a similar analysis as in Panel A of Table 2. There we split the sample into two subsamples (IPOs with incentives fees and IPOs without) and use selection models to deal with the potentially resulting selection bias. Here, for robustness, we use the full sample and include the binary indicator *Incentive Dummy* and an interaction term of the *Incentive Dummy* with *Price Revision*. The results, reported as Model 1 in Table A6, are consistent with our earlier results in Table 2. We observe a significant positive coefficient of *Price Revision* and a significant negative coefficient of the interaction term between *Price Revision* and *Incentive Dummy* that of the same magnitude in absolute terms (the difference between the coefficients being statistically insignificant). Consistent with the results in Table 2, the positive *Price Revision* coefficient indicates the presence of the partial adjustment phenomenon while the negative interaction-term coefficient suggests that the inclusion of incentive-fee clauses offsets the partial-adjustment phenomenon.

We further check the robustness of this result by conducting a placebo test. We randomly generate a binary variable and use this as '*Pseudo Incentive Dummy*' in place of the actual *Incentive Dummy* to re-estimate Model 1 (using OLS). We repeat this analysis 500 times, each time with a newly generated random dummy variable. The results of this placebo test in Model 2 of Table A6 show a statistically insignificant coefficient on the interaction term of the *Pseudo Incentive Dummy* and *Price Revision*. Our key finding in Model 1 of a statistically negative coefficient on the interaction term, suggesting that incentive fees mitigate the partial-adjustment effect, appears to be not a spurious result.

4.7. Discussion and alternative explanations

A potential alternative explanation of our finding that underwriter incentives are associated with lower initial returns may be that

Table 7
The Impact of Roadshow Duration on IPO Oversubscription.

	Dep: *Multiple*		
	OLS	ENTROPY	IV
	Model 1	Model 2	Model 3
Duration	0.288***	0.293***	0.301***
	(0.000)	(0.000)	(0.000)
Exp. Underwriter	0.121**	0.125**	0.124**
	(0.029)	(0.027)	(0.030)
Large Syndicate (binary)	0.057**	0.056**	0.058**
	(0.034)	(0.031)	(0.036)
High Specialization (binary)	0.233**	0.246**	0.251**
	(0.023)	(0.025)	(0.026)
Ln(Size)	0.001	0.001	0.001
	(0.285)	(0.290)	(0.280)
Ln(Age)	0.123*	0.122*	0.112*
	(0.064)	(0.072)	(0.061)
Ln(Proceeds)	0.242***	0.233***	0.249***
	(0.000)	(0.000)	(0.000)
Ownership	0.164*	0.170*	0.170*
	(0.064)	(0.063)	(0.075)
Industry market to book	0.017	0.020	0.019
	(0.182)	(0.183)	(0.188)
Industry & Year Fixed Effects	*Yes*	*Yes*	*Yes*
Obs	*1155*	*1155*	*1155*
Adj. R-square	0.189	0.193	0.192
Wu-Hausman (p-value)			(0.121)

Table 8
Robustness check for endogenous issuer-underwriter matching.

	Stage II							Stage I	
	Dep: *Width/Midpoint*		Dep: *Price Revision*		Dep: *Initial returns*			Dep: *Underwriter Experience*	
Variables	Exp	Less Exp	Exp	Less Exp	Exp	Less Exp			
	Model 1	*Model 2*	*Model 3*	*Model 4*	*Model 5*	*Model 6*			
							Average oversubscription of prior IPOs	−0.178***	(0.000)
Incentive ratio	−0.023**	−0.010*	0.106**	0.044***	−0.014**	−0.001	*Proportion of prior incentive IPOs*	0.166***	(0.000)
	(0.015)	(0.065)	(0.019)	(0.002)	(0.029)	(0.152)	*ROA*	0.126**	(0.024)
							Ln(Size)	0.025**	(0.026)
							Ln(Age)	0.020*	(0.082)
Controls							*Ln(Proceeds)*	0.016*	(0.077)
							Ownership	0.329**	(0.027)
Inverse Mill's	−0.001	−0.001	−0.031*	−0.022*	−0.022	0.011	*Industry market to book*	−0.001	(0.167)
	(0.152)	(0.190)	(0.074)	(0.081)	(0.267)	(0.391)	*Market return*	0.001	(0.165)
Industry& Year Fixed Effects	*Y*	*Y*	*Y*	*Y*	*Y*	*Y*			*Y*
Obs	*570*	*585*	*570*	*585*	*570*	*585*	*Obs*		1155
Adjusted R square	*0.132*	*0.139*	*0.139*	*0.139*	*0.130*	*0.138*	*Pseudo R square*		0.214

The table reports the results of a robustness check of the models in Tables 2–4, which are re-estimated here using two-stage Heckman models addressing endogenous issuer-underwriter matching. The first stage is a Probit model of high underwriter experience: the dependent variable is one if the IPO is underwritten by experienced underwriters and zero otherwise. The binary indicator *Experienced Underwriter* equals one if the underwriter is among the top 10 of underwriters by market share. The second-stage OLS models are specified as in Tables 2–4 except that to address endogenous matching, they also include the Inverse Mill's ratio estimated from the first-stage Probit model. The results are reported separately for IPOs with and without experienced underwriters. All other variables are as defined in the Appendix Table A2. Constant term is included in all regressions. ***, **, * indicate 1%, 5% and 10% significance levels.

better-incentivized underwriters expend more marketing efforts (unrelated to information production) and attract investors who are willing to pay more for the issue. However, this alternative explanation does not explain our findings of a significant relation between incentives and the width of the price range.

Also, we recognize that underwriters gain information from certain (institutional) investors and compensate them not just through underpricing but also through the preferential allocation of shares. Jenkinson et al. (2018) aim to test whether investors receive

preferential share allocations in return for their information revelation. Consistent with this hypothesis, they find that investors who participate in meetings before or during bookbuilding receive more generous allocations. Notably, they do not examine the use of incentive fees in their analysis of share allocations. Their analysis relies on access to unique data that is unavailable for most IPOs. While it is possible in the Hong Kong IPO market to observe the allocation of shares to broad categories of investors (such as retail investors and institutional investors), allocations to specific investors within each investor category are unobservable, and we lack the requisite data to explore preferential allocations empirically. However, it is important to note that underwriters in Hong Kong have less discretion in share allocation than in other countries due to regulation providing for the claw-back of shares provisionally set aside for institutional investors to reallocate them to retail investors in heavily oversubscribed issues (Mazouz et al., 2017).

We recognize that the two forms of compensation for investors' information revelation (underpricing and preferential share allocation) may not be mutually exclusive and are likely to be used simultaneously. If underwriters wish to reward investors through preferential allocations, there needs to be some underpricing so that preferential allocations are valuable to investors. However, beyond this low level of underpricing, preferential allocations can be used as a substitute for underpricing. Therefore, IPOs that do not use preferential allocations might be the most underpriced issues, and the introduction of incentive fees is likely to have the greatest impact on underpricing in these issues. Since we are unable to observe preferential allocation, we are also unable to separate these IPOs from issues with preferential allocations where the impact of incentive fees on underpricing is likely to be lower. As our analysis lacks data and hence omits indicators on preferential allocation, it may in fact *understate* the true impact of incentive fees in the subsample of IPOs with little or low preferential allocation. However, as outlined above, we conduct thorough robustness checks to address endogeneity due to observable and unobservable omitted variables, and our results are robust.

We also recognize that underwriters in IPOs with incentive-fee clauses may gain some information from certain (institutional) investors, and that these investors are compensated through both underpricing and the preferential allocations of shares. In the presence of incentive compensation, we would expect incentivized underwriters to pursue issuers' objectives and therefore target preferential allocations to investors that are desirable to the issuer. Issuers' objectives are known to go beyond the financial aspects of IPO performance and include 'investor quality' (Brennan and Franks, 1997; Espinasse, 2014). Therefore, underwriters are likely to gather information only from a subset of suitable institutional investors, which increases the need for underwriters to produce information themselves. Our results are particularly relevant for this subset of IPOs.

5. Conclusion

This paper examines the use of incentive fees as part of underwriters' compensation packages in IPOs. This method of compensation has become increasingly attractive but to date this is the only study to explore the impact of incentive fees on IPO pricing and short-term performance. We draw on, and contribute to, the literature of agency conflicts between issuers and underwriters, underwriters' information production capability, and the partial-adjustment phenomenon (including Baron, 1979, 1982; Ibbotson et al., 1988; Benveniste and Spindt, 1989; Hanley, 1993; Chemmanur and Fulghieri, 1994; Loughran and Ritter, 2002; Hanley and Hoberg, 2010). The stylized fact that IPOs with higher price revisions are associated with higher initial returns is known as the partial-adjustment phenomenon. Our paper shows that incentive compensation mitigates the partial-adjustment phenomenon. IPOs without incentive-fee clauses display the positive relation between initial returns and price revision that is characteristic of the partial-adjustment phenomenon. By contrast, IPOs *with* incentive-fee clauses do not exhibit the partial-adjustment phenomenon.

We hypothesize that incentive compensation aligns the interests of issuers and underwriters and motivates underwriters to pursue issuers' objectives and reduce IPO underpricing by producing more information themselves. As better-incentivized underwriters produce more information themselves, they rely less on information produced by investors, which reduces the need to compensate investors through partial adjustment of the offer price and IPO underpricing. The results of our analysis support this conjecture. We hypothesize that incentive compensation motivates underwriters to produce more information during pre-deal research, which results in more informative and hence narrower price ranges given in IPO prospectuses. Our results show that the stronger the incentives provided to underwriters (the higher the incentive ratio defined as incentive fees over gross spread), the narrower and higher the price range in the IPO prospectus. Further, the higher the incentive ratio, the higher the upward revision of the offer price relative to the mid-point of the price range, and the lower the IPO initial returns (i.e., the lower the IPO underpricing). We also document a significant positive association between the use of underwriters' incentive compensation and the duration of IPO roadshows, as well as between the roadshow duration and the level of over-subscription of the issue. These results suggest that better incentivized underwriters exert greater efforts on information production and issue marketing, and succeed in stimulating investor demand for IPOs.

We model underwriters' information production as a function of underwriters' incentives to produce information combined with their capability to produce information. Our results show that most of the impact of incentives comes from the interaction of incentives with underwriters' information-production capabilities. Our results contribute to the literature by shedding new light on the determinants of IPO (under-)pricing. The results suggest that incentive compensation is an effective mechanism to align the interests of issuers and underwriters and to reduce IPO underpricing.

Our analysis also suggests several directions for future research. These include an analysis of incentive fees based on alternative (potentially proprietary) datasets and in the context of alternative institutional frameworks. Based on (proprietary) data from underwriters and issuers, this might include the analysis of post-IPO incentive-fee payments as opposed to our analysis of incentive-fees

disclosed pre-IPO in prospectuses. Possible extensions also include an analysis of the impact of incentive fees on underwriters' non-pricing decisions such as IPO share allocation, the dispatch of teams in pre-deal research as well as (star) analyst following and reporting.[29]

CRediT authorship contribution statement

Susanne Espenlaub: Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Abdulkadir Mohamed:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Brahim Saadouni:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization.

Data availability

Data will be made available on request.

Acknowledgements

The authors wish to thank Phillipe Espinasse, Marc Goergen, Janice How, Krishna Paudyal and Peter Verhoeven and our colleagues at the University of Manchester, University of Leeds, and UNSW for their many valuable comments. We also thank the seminar participants and discussants at the 2017 Auckland Finance Meeting, the 2017 Australian Finance and Banking Conference, the 2019 Asian Finance Association Annual Meeting, and the 2021 Financial Management Association Annual Meeting for their constructive feedback. Finally, we are also grateful to several anonymous reviewers. The paper has benefitted greatly from their helpful comments. Any remaining errors are the authors' responsibility.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jcorpfin.2024.102625.

References

Abrahamson, M., Jenkinson, T., Jones, H., 2011. Why don't US issuers demand European fees for IPOs? J. Financ. 66, 2055–2082.
Allen and Overy, 2022. Indicative Timeline for an IPO in Hong Kong. https://www.allenovery.com/en-gb/global/news-and-insights/publications/indicative-timeline-for-an-ipo-in-hong-kong accessed on 30 January 2024.
Baron, D., 1979. The incentive problem and the design of investment banking contracts. J. Bank. Financ. 3, 157–175.
Baron, D., 1982. A model of the demand for investment banking advising and distribution services for new issues. J. Financ. 37, 955–976.
Beatty, R., Ritter, J., 1986. Investment banking, reputation and the underpricing of initial public offerings. J. Financ. Econ. 15, 213–232.
Benveniste, L., Spindt, P., 1989. How investment bankers determine the offer price and allocation of new issues. J. Financ. Econ. 24, 343–361.
Booth, J., Smith, L., 1986. Capital raising, underwriting and the certification hypothesis. J. Financ. Econ. 15, 261–281.
Brennan, M., Franks, J., 1997. Underpricing, ownership and control in initial public offerings of equity securities in the UK. J. Financ. Econ. 45, 391–413.
Chemmanur, T., Fulghieri, P., 1994. Investment bank reputation, information production, and financial intermediation. J. Financ. 49, 57–79.
Chen, H., Ritter, J., 2000. The seven percent solution. J. Financ. 55, 1105–1131.
Cornelli, F., Goldreich, D., 2003. Bookbuilding: how informative is the order book. J. Financ. 4, 1415–1443.
Corwin, S., Schultz, P., 2005. The role of IPO underwriting syndicates: pricing, information production, and underwriter competition. J. Financ. 60, 443–486.
Derrien, F., 2005. IPO pricing in "hot" market conditions: who leaves money on the table? J. Financ. 60, 487–521.
Dunbar, C.G., 1995. The use of warrants as underwriter compensation in initial public offerings. J. Financ. Econ. 38, 59–78.
Edmans, A., Gabaix, X., 2009. Is CEO pay really inefficient? A survey of new optimal contracting theories. Eur. Financ. Manag. 15, 486–496.
Espenlaub, S., Khurshed, A., Mohamed, A., Saadouni, B., 2016. Committed anchor investment and IPO survival – the roles of cornerstone and strategic investors. Finance 41, 139–155.
Espinasse, P., 2014. IPO Banks: Pitch, Selection and Mandate. Palgrave Macmillan.
Fang, L., 2005. Investment bank reputation and the price and quality of underwriting services. J. Financ. 60, 2729–2761.
Hainmueller, J., 2012. Entropy balancing for causal effect: a multivariate reweighting method to produce balanced samples in observational studies. Polit. Anal. 20, 25–46.
Hanley, K., 1993. The underpricing of initial public offerings and the partial adjustment phenomenon. J. Financ. Econ. 34, 231–250.
Hanley, K., Hoberg, G., 2010. The information content of IPO prospectuses. Rev. Financ. Stud. 23, 2821–2864.
Ibbotson, R.G., Sindelar, J.L., Ritter, J.R., 1988. Initial public offerings. J. Appl. Corp. Financ. 1, 37–45.
Jenkinson, T., Jones, H., 2009. Competitive IPOs. Eur. Financ. Manag. 15, 733–756.
Jenkinson, T., Morrison, A., Wilhelm, W., 2006. Why are European IPOs so rarely priced outside the indicative price range? J. Financ. Econ. 80, 185–209.
Jenkinson, T., Jones, H., Suntheim, F., 2018. Quid pro quo? What factors influence IPO allocations to investors? J. Financ. 73, 2303–2341.
KPMG, 2019. Hong Kong tops global IPO market in 2019 spurred by mega-sized deals, according to KPMG China. Available online. https://home.kpmg/cn/en/home/news-media/press-releases/2019/12/hk-tops-global-ipo-market-2019-spurred-by-mega-size-deals.html. accessed 26 June 2020.
Liu, X., Ritter, J., 2011. Local underwriter oligopolies and IPO underpricing. J. Financ. Econ. 102, 579–601.

[29] We thank the anonymous reviewer for suggesting these interesting extensions.

Ljungqvist, A., Wilhelm, W., 2002. IPO allocations: discriminatory or discretionary? J. Financ. Econ. 65, 167–201.
Loughran, T., Ritter, J., 2002. Why don't issuers get upset about leaving money on the table in IPOs? Rev. Financ. Stud. 15, 413–443.
Lyandres, E., Fu, F., Li, E., 2018. Do underwriters compete in IPO pricing? Manag. Sci. 64, 925–954.
Mazouz, K., Mohamed, A., Saadouni, B., Yin, S., 2017. Underwriters' allocation with and without discretionary power: evidence from the Hong Kong IPO market. Int. Rev. Financ. Anal. 49, 128–137.
Ritter, J., 2011. Equilibrium in the initial public offering market. Annu. Rev. Financ. Econ. 3, 347–374.
Welch, I., 1992. Sequential sales, learning, and cascades. J. Financ. 47, 695–732.
Yung, C., Colak, G., Wang, W., 2008. Cycles in the IPO market. J. Financ. Econ. 89, 192–208.