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Takato Hiraki

Tokyo University of Science

Toshiki Honda

The Graduate School of International Corporate Strategy,
Hitotsubashi University

Akitoshi Ito

The Graduate School of International Corporate Strategy,
Hitotsubashi University

Ming Liu

International University of Japan

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Takato Hiraki,[(a)] Toshiki Honda,[(b)] Akitoshi Ito,[(c)] and Ming Liu[(d)]

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Abstract

We examine whether financial conglomeration enhances efficiency of capital allocation or conflicts of interest, focusing on pricing and allocation of IPO stocks in Japan. Regarding underwriting of IPO stocks, our results are consistent with the bank certification hypothesis. As for IPO allocation, the main bank underwriters allocate little to mutual funds, but when they do, they allocate the more underpriced IPOs to unaffiliated mutual funds. We also find some locally consistent evidence supporting the nepotism hypothesis in aftermarket returns of IPO shares. Bank-involved allocation to mutual funds is, however, unrelated to risk-adjusted return (i.e., real quality) and to bank loan reduction in the aftermarket. Overall, the main banks and underwriters do not co-work to allocate new shares in a way that further certifies IPO quality, prompting institutional investors to hold longer in the aftermarket. This is in sharp contrast to U.S. IPO share allocation practice.

Keywords: financial conglomerates, IPO, underwriting, mutual funds
JEL Codes: G14, G24, G38

Contact Information:
(a) Tokyo University of Science; E-mail: hiraki@rs.tus.ac.jp
(b) Hitotsubashi University; E-mail: thonda@ics.hit-u.ac.jp
(c) Hitotsubashi University; E-mail: aito@ics.hit-u.ac.jp
(d) International University of Japan; E-mail: mliu@iuj.ac.jp

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1. Introduction

Similarly to the U.S.,[1] the Japanese commercial and investment banking industries faced a challenge caused by deregulation trends called financial Big Bang in the late 1990's, coupled with tighter regulatory monitoring as a part of firewall regulations. As a result of financial conglomeration advanced since the late 1990's, a typical large financial group holds commercial banking, investment banking, and asset management businesses. A financial conglomerate could be a source of operational efficiency with coordinated use of private information, or alternatively a source of conflicts of interest with miss-uses of such information. In the meantime, the government authorities such as the Securities and Exchange Surveillance Commission (SESC) and the Financial Services Agency (FSA) are still very restrictive in implementing firewall regulations and active in monitoring primary market transactions, in particular, even under current worldwide deregulation trends.[2]

Japanese initial public offering (IPO) markets have undergone several major reforms, especially in underwriting. The latest book-building method was introduced in September 1997. As Funaoka (2008) documents, the Japanese book-building method in its early stage led to a mere 25.6% allocation of IPO shares to institutional investors, a strong contrast to the U.S., at more than 70% (Aggarwal, Prathama, and Puri, 2002).[3][4]

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[1] The 1999 Gramm-Leach-Bliley Act repealed the 1933 Glass-Steagall Act and substantially amended the 1956 Bank Holding Company Act, which facilitated financial conglomeration in the U.S.

[2] The International Bankers Association (IBA) Japan formally expressed their opinion on the firewall regulations in Japan in *News*: "Request to lift the ban on the sharing of customer information between affiliated legal entities in Japan," http://www.ibajapan.org/system/

[3] The U.S. book building method performs consistently with traditional theory (Benveniste and Spindt, 1989), in which valuable information provided by institutional investors is compensated.

[4] More recent allocation figures by each brokerage firm for each IPO can be retrieved from the home page of JSDA, http://www.jsda.or.jp/shiryo/toukei/shinkikoukai/.

Given the limited role played by institutional investors, banks, especially main banks, may play a valuable information role under financial conglomeration. The information asymmetries associated with IPO underpricing and allocation are potentially solved through well-coordinated universal banking. We investigate this effect on allocation, initial and aftermarket performance, and firm debt and loan deductions, focusing on the core role played by main banks when their clients go public.

While we find reduced underpricing in bank-certified IPOs, underpricing increases especially when main bank underwriters allocate IPO shares to unaffiliated mutual funds. In contrast, aftermarket performance of allocated IPO shares shows a consistent pattern of nepotism, allocating high quality IPO shares to affiliated funds. However, this nepotism is mainly realized in IPO shares in which only non-bank institutions provide debt capital before the IPO. Bank-involved IPO shares allocated to mutual funds is less exciting without providing positive α regardless of allocation destination. Thus, this end result demotivates institutional investors from committing to IPO firms on a long-term basis. Further, we find IPO firms significantly reduce debt as well as main bank loans in the early aftermarket. We then find that bank-involved underwriter allocation to mutual funds is unrelated to bank loan reduction in the aftermarket. This means that bank certification and allocation are not much related, beyond the primary and initial markets, to the long-range strategic consequences for both main banks and their client firms.

We hypothesize on IPO capital allocation issues in two aspects: underwriting and allocation. As for underwriting, we investigate the certification versus the conflict of interest hypothesis by extending the literature on the role of banks in underwriting securities (Drucker and Puri, 2005 and Puri, 1996). Many papers, including Gonzales

and James (2007), find that underpricing is reduced with banking relations in U.S. IPOs. The literature, however, shows only a limited number of studies that specifically test the bank certification (and the conflict of interest) theory from the viewpoint of the bank as an IPO underwriter, despite the theoretical contribution of Puri (1999).[5][6] To test these notions, we use several innovative classification methodologies to classify IPOs into lender–underwriter as well as underwriter–fund manager combinations. First, we create three variations within bank–underwriter relations: a lead underwriter chosen from the same financial group as the IPO firm's main bank; a lead underwriter from the other commercial banking group; and a lead underwriter from the other investment banking group. A top lending bank does not always successfully promote the same group underwriter to lead manager of an IPO.[7] Second, we also create three categories for the remaining IPOs: IPO deals in which IPO firms do not borrow from any institutions; those in which firms do not borrow from banks but borrow from other non-bank institutions; and those in which there is no information available on institutional borrowing. Third, we use four variations in allocations to money managers: no allocation; affiliated funds only; unaffiliated funds only; and a combination of affiliated and unaffiliated funds. We find this categorical framework helpful especially when underwriting (i.e., underpricing) and allocation analyses are combined.

[5] Schenone (2004), for the first time, by controlling for endogeneity, investigates whether an IPO underwriter having an established relationship with a bank can reduce underpricing based on unique data after the effective repeal of the Glass-Steagall Act in 1998.

[6] Drucker and Puri (2005) and Puri (1996) test lender-involved bond and preferred stock underwriting during the special period of the post Glass-Steagall Act in the U.S. Japanese IPOs during our sample period (2002-2012) are similarly ideal, since these IPOs can be managed by the underwriters of the same financial groups as the IPO firm's main banks.

[7] On average, the underwriting share of a lead manager is about 60 percent, while the underwriting fee is between 6.0 and 6.4% of the gross offering amount in our sample.

In allocation, we use mutual funds as if they are only institutional investors. Investments in private equity by pension funds and other public funds are basically against the fiduciary role expected of these funds in Japan. Fortunately, we have access to holdings data to identify the IPO share allocations if the destination is mutual funds. Thus, our focus on mutual funds as a representative group of institutional investors is reasonable and feasible.[8]

Regarding allocation to institutional investors, especially to affiliated versus unaffiliated mutual funds, we test the dumping ground and the nepotism hypotheses, originally introduced by Ritter and Zhang (2007), with some modification to fit the Japanese IPO institutional environment. The available IPO share allocation literature focuses on initial returns realized by different types of allocated investors. The certification role played (or the conflict of interest brought) by different lender–underwriter combinations interacted with allocation could extend to the return realized in the aftermarket (i.e., investment quality of IPO shares beyond the initial market). Under financial conglomeration, allocating high quality IPO shares to the unaffiliated group providing information or to the affiliated group money managers does not run counter to efficient allocation. We investigate this and other possibilities yielding nepotism or dumping ground types of allocation more precisely using initial returns and aftermarket (risk-adjusted) returns.

We further investigate the effect of firm debt or loan reduction on the performance of IPO shares differently underwritten and allocated. If generally observed debt or main

[8] Regarding a fiducially role of public pension funds, GPIF (Government Pension Investment Fund) released a new guideline not to create an alternative investment class, in which private equity is included (*Nikkei News Letter*, November 1, 2014). We assume that relevant institutional investors are dominantly mutual funds to which IPO shares are allocated in Japan.

bank loan reduction is related to poorer or better aftermarket performance of IPO shares differently underwritten and allocated to mutual funds, we can confirm the main testing result on the nepotism hypothesis versus the dumping ground hypothesis, in particular. Economically and statistically significant main bank certification in the primary market may extend to the real quality of IPO issues allocated; this should also be investigated to derive any implications for bank-involved asset management.

Overall, our empirical methodologies and data are useful to investigate underwriting and allocation for IPO issues whose entire process is affected by current financial conglomeration. Informationally linked financial institutions may reduce information asymmetries in underwriting, allocation, and initial and aftermarket price formation. We attempt to derive an important implication for possible commitment of institutional investors to IPO firms initially and on a long-run basis.

Our study contributes to the IPO underwriting and allocation literature in three ways. First, we go one step further than Puri (2005) and Puri (1996) by allowing a main bank and a lead underwriter to co-play in pricing and allocation. This is the very essence of conglomeration. Many papers address different channels of certification or conflicts of interest in underwriting. For example, underwriter certification is examined by Booth and Smith (1986) and Smith (1986), and bank certification is studied by Gonzales and James (2007) and Schenone (2004). Underpricing and allocation are simultaneously studied: Hanley (1993) and Hanley and Wilhelm (1995) test the information gathering hypothesis proposed by Benveniste and Spindt (1989), while Reuter (2006), among others, tests the commission pay-back hypothesis in connecting IPO underpricing to allocations. These U.S. studies either investigate IPO underwriting and allocations

separately or without incorporating information in each of the two stages into a single combined process of entire underwriting. Our study investigates Japanese underwriting and allocation as an informationally continuous procedure under financial conglomeration.[9] We focus on the role of the main bank throughout IPO underwriting, from pricing to allocation.[10]

Kutsuna, Smith and Smith (2006) and Ogura (2015) test possible bank certification using Japanese IPO data.[11] Similarly, Hamao, Packer and Ritter (2000) and Ogura (2015) test a certification role played by venture capital when IPOs are underwritten by venture capital–linked underwriters. These studies do not focus on allocation, especially, allocation destination. Thus, our study complements the existing literature on the role of banks as an underwriter and a fund manager when client proprietary information is initially shared and potentially used for pricing and allocation of IPO shares within a financial group.

Second, there is a large body of studies on the allocation of IPO shares that derives implications for asset management. In most studies, high-demand or hot IPO issues are allocated to funds in exchange for private information, commission tie-in-sales, market power and manager network favoritism. Such studies, including Massa and Rehman (2008), Hao and Yan (2012), and Qian and Zhong (2014) show the important

[9] The studies of bank certification role for underwriters affiliated with banks are limited only to the offerings of debt securities (Puri 1996, Becker and Puri, 2005) and of Israeli IPO stocks (Ber, et al., 2001).

[10] In the context of Japanese finance, it also helps mitigate existing debates on the value of main banks in traditional *keiretsu* banking vs. relationship banking for SME financing.

[11] The motivation of Kutsuna, Smith and Smith (2006) to test the possible conflict of interest during the period toward financial conglomeration and the role of main banks as a possible underwriter is similar to ours. These authors find evidence of increased access to capital markets for smaller issuers of main bank−affiliated underwriters and little evidence of the conflict of interest for large issuers. The motivation in Ogura (2005) is similar, but this author's main focus is on affiliated underwriters with venture capital to see possible certification. Neither study addresses actual new share allocations to institutional investors, like mutual funds.

performance consequence of IPO shares allocated to mutual funds. Hwang, Titman and Wang (2015) document "fast performance" of hot IPO shares allocated to mutual funds through manager educational networks, while Qian and Zhong (2014) show that a large number of IPO shares are currently more allocated to hedge funds. Further, Ritter and Zhang (2007) find more allocation of hot IPO issues to affiliated mutual funds. Rent-seeking money managers are willing to provide information, market influence, and commission payments to receive hot IPO shares. This well-documented U.S. result may not necessarily apply internationally.[12] We provide international evidence from Japan, where the information role of institutional investors is limited (Funaoka, 2008). We link banking in a financial conglomerate to underwriting and allocation to affiliated and unaffiliated fund managers under the Japanese institutional setting. Asset management under conglomeration is a relatively new area of research, but a few papers, including Ferreira, Matos and Pedro (2017), document relative underperformance of bank-affiliated compared to unaffiliated mutual funds using worldwide samples. These studies, at most, deal with underwriting and asset management for possible conflicts of interest. We use more precise bank–underwriter relations possibly affecting aftermarket performance of IPO shares allocated to mutual funds beyond the primary market. Our study also partly explains the results of Cai, Chan and Yamada (1997) and Brown et al. (2001) regarding the poor overall performance of Japanese equity mutual funds by international standards.

[12] Loughran, Ritter and Rydqvist (1994) suggest that international performance and allocation differences are caused by the design of IPO auction methods and binding regulations (in addition to market conditions). Enhanced information and discretion for the underwriter are the two keys for the efficiency required. The Israeli result provided by Ber, Yafeh and Yosha (2001) is actually different from the U.S. evidence.

Finally, our study contributes to evaluating overall performance of the market system and government capital market policy under which conglomerate lenders are expected to play an important role in information production and efficient capital allocation. The consequence of the enhanced role of commercial banks in the capital market is not fully understood in the literature. The main bank system has long been studied from both large and SME business viewpoints (*keiretsu* main banks in Hoshi, Kashyap, and Scharfstein, 1990 and 1991, and main banks in relationship banking in Uchida, Udell and Yamori, 2012 and Ogura and Uchida, 2014).[13] We are particularly interested in the choice of lead underwriter by a main bank and/or an IPO firm under enhanced competition. We show that main banks certify the quality of IPO firms for underwriters, but in allocation they allocate more underpriced IPO shares to the unaffiliated. We also find that main banks reduce their loans to IPO client firms. Risk-adjusted returns in the aftermarket are generally poor but not related to pre-IPO bank–underwriter relations. Regional banks tend to certify the quality of their client firm IPOs, but their effort is not statistically significant. Overall, it seems that Japanese IPOs are used as a debt-to-equity swap in which IPO shares are sold to retail investors for founders, venture capital, and institutional lenders jointly to exit and for debtors to be repaid. The result is surely different from what is intended by the recently introduced book-building method for Japanese IPOs. Thus, we present our results with policy implications.

This paper proceeds as follows. In Section 2, we explain our hypotheses, along with the Japanese IPO institutional background. In Section 3, we describe the data and

[13] This literature suggests that financial conglomeration negatively affects the performance of large (urban) client firms due to lost information through management integration. However, relationship-based banking could potentially enhance regional client SEMs due to more production of "soft information."

samples constructed for our empirical tests. In Section 4, we report the test results and interpret them in terms of the hypotheses. We draw conclusions in Section 5.

2. Institutional Background and Hypotheses

2.1 Movement toward Financial Conglomeration

The tight firewall regulations were introduced by modifying the Securities Exchange Law in 1993 when pure-play commercial baking and investment banking firms became allowed to diversify into other businesses through their specialized subsidiaries. The Japanese version of financial Big Bang in the later 1990's facilitates this movement, resulting in a few large scale financial holding companies newly formed.[14] Corporate Restructuring Laws are then all set to facilitate conglomeration in the banking industry, in particular. As financial conglomeration proceeds, the firewall regulations have been gradually relaxed due to the pressure from the industry moving toward universal banking. Sharing information on commercial banking clients between the commercial banking and investment banking subsidiaries of a large financial holding company became more allowed by amending the Financial Instruments and Exchange Law twice in 2009 and 2014.

In the meantime, the abused use of commercial and investment banking client proprietary information became more subject to tightened monitoring by the FSA. It is a natural consequence of firewall deregulations in the later 2000's. As for underwriting, the shared use of information on IPO issuers between the main bank and its affiliated

[14] Three large commercial banks, Industrial Bank of Japan, Daiichi-Kangyo Bank, and Fuji Bank, after forming their own holding companies in 2000, merged into a single integrated financial conglomerate called Mizuho Financial Group in 2002. Other major financial groups soon followed similar restructuring to Mizuho Group. The trend spilled over to regional banks to increase their affiliation with large conglomerate groups or to merge with neighboring regional banks.

underwriters and fund managers became more allowed but more strictly viewed as a possible source of conflict by the regulators. If not advantageous for bank clients, the use of such information by these underwriters may be heavily penalized. Thus, the deregulation associated with financial conglomeration caused the FSA to more strictly monitor information sharing and use, especially within the same financial group.

Since the FSA was spun off from the Ministry of Finance in 1998, SESC at FSA was given the full right to monitor and, if required, intervene in financial security deals, including new share transactions in IPOs. Due to the size of the SESC and the new implementation of Chinese Wall regulations more applied to investment banking businesses, however, FSA gave some of the right to monitor its members' practical activities to the industry's self-regulatory body, the Japan Securities Dealers' Association (JSDA). Their joint monitoring became more important and stricter during the 2000s as the book-building underwriting method became more established. This new underwriting method was expected to facilitate information exchanges between banks/underwriters and institutional investors. Both SESC and JSDA watch IPO market transactions more carefully in achieving efficient and equitable capital markets for national economic revitalization and future growth (Iwai, 2010). Since allocation to information-providing institutional investors is a cause of institutional monitoring, there may be a systemic incompatibility in IPO underwriting and allocation in Japan.

2.2 Japanese Book-Building Method

The Japanese IPO underwriting method has been changed twice in the past four decades from the formula method (of comparable firm multiples) to the (hybrid) auction

method in 1989 and to the book-building method in 1997. Under the latest method, the lead underwriter, managing nearly 60% of new shares sold in a typical IPO, sets a preliminary offering price and arranges a "road show" for marketing and "hearing" from institutional investors for pricing. Based on this first-stage information gathering, the lead manager sets the price range of the IPO shares.[15] In the second stage, the lead manager builds the indicated demand at each specific price over the relevant range, mostly formed of retail investors. The final offering price is determined based on the underwriter's assessments of indicated demand and market conditions. The allocation starts once the offering price is firmly set. In Japan, therefore, there are two stages toward the final offer price as opposed to one stage in the identically named book-building method in the U.S.

According to JSDA (2005, 2007), the allocation to institutional investors is less than 20% (for the 269-IPO sample over the 2003–2004 period with the mean initial return at 90%). Moreover, the final offering price is rigidly set at the most demanded quantity in the book building, which most times corresponds to the upper limit of the price range. JSDA also reports that retail investors place their demand indications at more than one retail outlet knowingly double booking improper.[16] This exposes an important point. That is, the lead underwriter seems to surrender its expected role of flexibly adjusting the offering price and discretionally allocating new shares to institutional investors at the final stage of underwriting. Book building was originally designed to increase institutional investor participation and to elicit quality information from them. Though partly due to stricter SESC and JSDA monitoring policies, the Japanese book building

[15] In the U.S., the book building process begins with this price range set as preliminary price information.
[16] In the Japanese retail-oriented IPO market, participation in the book building process is effectively mandatory for retail investors to receive the new shares.

method only attracting retail investors to participate is a failure of the grand design of the market system, as questioned by many observers including JSDA (JSDA 2007, 2012 and Iwai, 2010).

Information asymmetries between issuers and underwriters may be decreased due to bank involvement, but information asymmetries between underwriters and investors cannot be decreased without information provided by institutional investors. The Japanese book-building system does not give an incentive to these informed investors if intentionally less allocated and severely monitored.

2.3 Hypothesis Development

2.3.1 Underwriting of IPO Shares

We investigate the certification versus the conflict of interest hypothesis following Puri (1996, 1999). The certification hypothesis, in our setting, predicts that the lead underwriter in the same banking group uses better private information to certify the quality of IPO firms. IPOs underwritten by the underwriter in the same group as the IPO firm's main bank, *Undw_mb*, should show lower initial returns (due to less uncertainty). However, the effectiveness of main bank certification decreases when IPO firms choose the different-group underwriter from their main bank. In such a case, the same group investment banking firm may only be a part of the underwriting syndicate managed by either *Undw_cb* (an underwriter in the different commercial banking group than the IPO firm's main bank) or *Undw_ib* (an underwriter in the different investment banking group than the IPO firm's main bank). Between *Undw_cb* and *Undw_ib*, the certification by the latter is weaker. Non-bank lender certification for the underwriter

further decreases. Our certification hypothesis, when applied to the six lender–underwriter categories, predicts underpricing magnitude as follows: *Undw_zero* (highest), *Undw_na*, *Undw_na1*, *Undw_ib*, *Undw_cb*, and *Undw_mb* (lowest)[17].

Alternatively, the conflict of interest hypothesis in underwriting predicts that a bank-centered group would use its private information to reduce low-quality loans by underwriting IPOs of such firms. In this case, IPOs underwritten by the commercial bank-based group show relatively high initial returns (large underpricing required due to greater uncertainty and a lack of certification willingness). This hypothesis predicts larger underpricing for IPOs underwritten by *Undw_mb*, *Undw_ib*, and *Undw_ib* underwriters than for those underwritten by *Undw_na1*, *Undw_na*, and *Undw_zero* categories, which is opposite to the prediction of the certification hypothesis. For this hypothesis to hold, main banks must significantly reduce their loans in the early years following the IPO.

The two hypotheses above have allocation and aftermarket performance implications, while allocations are influenced by institutional monitoring. We thus add an allocation dimension to the hypotheses below.

2.3.2 IPO Share Allocation to Mutual Funds

First, we set the monitoring hypothesis for IPO stock allocations to mutual funds. Monitoring by SESC and JSDA may influence underwriter's allocation decision or mutual fund's investment decision. The regulatory body monitors more strictly as the tie of the bank–underwriter with institutional investors increases. Thus, the allocation

[17] *Undw_zero*, *Undw_na*, and *Undw_na1* represent IPOs whose issuers do not borrow from any institutions, do not disclose any information on institutional borrowing, and do borrow only form non-bank institutions. See Appendix I for their formal definitions.

decision by the differently related underwriters to banks or other lenders is hypothesized as follows:

Monitoring Hypothesis (1): The IPO issues underwritten by the same banking group underwriters, *Undw_mb*, are less allocated to mutual funds than those underwritten by different banking and investment banking group underwriters.

The same banking group underwriters as main banks can most hardly obtain a leeway from firewall regulations; thus they are monitored most severely when they allocate bank client's IPO shares to money managers in general. The IPO issues underwritten by the different banking group underwriters, *Undw_cb*, are also expected to show a low propensity to allocate to mutual funds, but not so low as that for *Undw_mb*. Different investment banking underwriters, *Undw_ib*, are also expected to show a higher propensity to allocate IPO shares to mutual funds than *Undw_mb* and *Undw_cb*.[18]

We next further break down the above hypothesis (1) regarding the allocated share's destination once allocation is chosen: affiliated only (*Affiliated_only*), unaffiliated only (*Unaffil_only*) and both (*Both*) affiliated and unaffiliated mutual funds. The underwriter is "affiliated" with the mutual funds if the underwriter and the asset management firm managing these mutual funds belong to the same financial group. Otherwise they are "unaffiliated."[19] The allocation decision between the affiliated and the unaffiliated funds by main bank–underwriter relations is hypothesized as follows:

Monitoring Hypothesis (2): Once allocation is chosen, the IPO shares underwritten by the same main bank group are least (most) allocated to affiliated (unaffiliated) mutual

[18] A main bank is expected to have more private information than other lenders and venture capitalists, thus *Undw_ib* is expected to be less monitored than *Undw_mb* and than *Undw_cb*.

[19] Refer to Figure I for more detailed illustration.

funds than those underwritten by different bank group and then investment banking group underwriters.

The monitoring hypothesis (2) predicts that the allocation propensity to the affiliated (unaffiliated) mutual funds, relative to *Both*, is lower (higher) for the IPOs underwritten by *Undw_mb* than for those by *Undw_cb* and then by the *Undw_ib* underwriters.[20] In the meantime, we are to know that only 9 out of the 381 allocated IPOs are allocated to the *Affiliated_only* by the same commercial banking underwriters. Thus, the effective test of the monitoring hypothesis (2) is essentially reduced to test *Both* as the more affiliated against *Unaffil_only* as the least affiliated. Under a more realistic regulatory monitoring situation, all underwriters effectively choose *Both* to realize their incentive to allocate IPO shares to affiliated mutual funds. The monitoring hypothesis (2) alternatively predict that the propensity to allocate their underwritten IPO shares to *Both* (*Unaffil_only*) is lower (higher) for each of the three bank–underwriter relations with a differing magnitude of *Undw_mb* > *Undw_cb* > *Undw_ib*.

We propose two alternative hypotheses to the monitoring hypothesis (2) by adding one more dimension, demand, to each of the two allocation states. We modify each of the two hypotheses proposed by Ritter and Zhang (2007): the dumping ground hypothesis and the nepotism hypothesis. The original dumping ground hypothesis predicts that the lead underwriter allocates low (high)-demand IPOs to affiliated (unaffiliated) mutual funds. As shown below, the relation between IPO market demand and initial returns is highly positive. Thus, we assume initial return is a proxy for the

[20] Note that the last two underwriter types, equally having asset management arms, are unevenly monitored for possible violation against Chinese wall regulations by the monitoring agent: the commercial bank group is more severely monitored and thus allocates less to affiliated funds than the investment banking group.

strength of pre-IPO demand. Similar to the second monitoring hypothesis, we add to the existing demand-allocation relation the possible influence of lender–underwriter relations. Underwriter motives to allocate such low-demand IPOs to their affiliated mutual funds should decrease as the link between a main bank and its underwriter becomes weaker. Thus, the modified dumping ground hypothesis is stated as follows:

Modified Dumping Ground Hypothesis: The low-demand IPO shares underwritten by the same main bank group underwriter are more (less) allocated to affiliated (unaffiliated) mutual funds than those underwritten by the different bank group and then by the different investment banking group of underwriters.

On the other hand, the original nepotism hypothesis of Ritter and Zhang (2007) predicts that the lead underwriter allocates more high-demand or hot IPOs to affiliated mutual funds to boost their performance. We similarly modify the original hypothesis by adding a possible interaction with the underwriter's relations with the IPO issuer's main bank, as follows:

Modified Nepotism Hypothesis: The high-demand IPO issues underwritten by the same main bank group underwriter are more (less) allocated to the affiliated (unaffiliated) mutual funds than those underwritten and allocated by the different-group commercial banking underwriter and then by the investment banking underwriter.

Similar to the test of the monitoring hypothesis (2), the test of the modified dumping ground and nepotism hypotheses is reduced to test *Both* as allocation to affiliated managers against *Unaffil_only* by using initial returns as a proxy for high or low IPO demand. These hypotheses also have performance implications for the allocated IPO firms in the aftermarket, as addressed below.

3. Data

We obtain IPO characteristic and stock return data from Capital Eye/Data and Financial Data Solutions (FDS) and financial statement data from Nikkei and Quick. Capital Eye/Data includes a rich menu of IPO attributes, including lead and co-managing underwriter information as well as many book-building and offering terms and conditions. We obtain detailed mutual fund holdings data from Investchar Co., an investor relations data vending firm in Tokyo. From this database, we extract holdings of IPO shares newly included in each mutual fund. Mutual fund holdings are also confirmed from the list of major institutional shareholders at each listed corporation, quarterly updated, in the database. Mutual fund holdings data from Investchar Co. is limited to the 2004–2012 period. We also use the IFIS/LionShares database to complement Investchar's mutual fund holdings data. IFIS/LionShares is useful to extend the sample period of mutual fund holdings by two additional years and to distinguish unallocated and omitted allocation information, since survivorship problems exist in our holdings data.

Since we observe post-IPO market performance over three years, we sample IPOs from January 2002 to March 2012, with three extra years to cover IPO aftermarket performance. The aftermarket sample period is through March 2015. There are initially 989 IPOs, after excluding foreign-registered and traditional financial services firms, i.e., banking, insurance and securities firms (panel A, Table 1). As of November 2016, our holdings data vendors excluded 210 of the 989 total IPO sample because of delisting of these stocks. As a result, we have 779 IPO firms as a common sample for underwriting

and allocation analyses. While we maintain the 989-member sample as much as possible, our main analyses and conclusions are based on the 779-member sample (panel B). Following Reuter (2006) and Ritter and Zhang (2007), we use the first post-IPO reported mutual fund holdings within six months of the offer date as a proxy for whether these 779 IPOs are allocated or not allocated (Alloc_D), and then identify allocation destination if allocated (i.e., *No_Alloc*, *Affil_only*, *Unaffil_only*, and *Both*)

To classify lender–underwriter relations for all IPO samples into six categories, we use the loan data for IPO firms from the Nikkei Financial Quest (FQ) database. We identify a top bank as the largest bank lender. A top bank is interchangeable with a main bank in our discussion. Depending on the choice of a lead underwriter, there are three types of bank–underwriter relation, *Undw_mb*, *Undw_cb*, and *Undw_ib* for IPOs with bank loans. Nikkei FQ also provides information to classify *Undw_na1*, *Undw_na*, and *Undw_zero*. In these three IPO categories, a lead underwriter is selected almost independently of pre-IPO debt financing by the issuer.[21] Though not very often, we sometimes observe lending relations change between year -1 and year 0 (the fiscal year including an IPO event). Changing the category from *Undw_na* to one of the three bank–underwriter relations is problematic. In such cases, we classify the bank–underwriter category based on top-bank information at the end of year 0 into one of the three bank–underwriter relations. As a result, there are a total of 654 IPOs (66.1%) identified as having pre-IPO lending relations with banks in panel A (N = 989) and 507 IPOs (65.0%) in panel B (N = 779). The percentage difference is very small.

[21] If an IPO firm borrow only from non-bank debtors like an insurance company, typically not having an investment banking firm but owning asset a management firm in the group, the issuer (and the main non-bank lender) have to find an underwriter outside the group.

Table 1 also includes the IPO deals for the four types of underwriter based on the main business or background of the underwriter or its group without linking the underwriter to client firm pre-IPO financing. Because of financial conglomeration, the number of IPOs underwritten by commercial banking underwriters (*Und_cb*) is close to that underwritten by traditional investment banking underwriters (*Und_ib*) in both panels A and B. Only a small proportion of IPOs is underwritten either by those from internet business (*Und_net*) or foreign-brand underwriters (*Und_frn*). Note that there are no directly corresponding relations between the six lender–underwriter relations and the four business background-based underwriter categories.[22]

As shown in Table 1, the first half of our sample period through 2007 corresponds to a hot market, and the second half corresponds to a cold market in terms of the size of initial returns and number of IPO issues, *Log(num_ipos)*, the logarithm of the number of IPOs within one year. Table 1 also includes IPO characteristics such as technology orientation (*Tech*) and venture capital involvement (*VC_backed*), both treated as dummy variables. *Tech* becomes higher during the cold market while *VC_backed* (between 0.51 and 0.52) is lower than *Bank_backed* (between 0.65 and 0.66) as a pre-IPO financing measure in Japan. All IPO characteristics and their time-series patterns are remarkably similar between the two panels.

Top banks obtain a lead underwriter position for only 80 (15.7%) out of the 507 client firm IPOs (panel B of Table 1). This means that the main bank fiercely competes with different commercial and investment banking groups for underwriting business. In

[22] For example, *Undw_cb* is realized by an IPO firm with a main bank choosing a different group commercial banking underwriter, while *Und_cb* is realized as *Undw_cb* or *Undw_na1*, *Und_na*, and *Undw_zero* choosing a commercial bank group investment banking underwriter. Refer to Figure I for more detailed illustration.

the meantime, different commercial banking underwriters (*Und_cb*) are as competitive as investment banking underwriters (*Und_ib*) in obtaining lead underwriter positions, as shown in B1. Non-main banks are active to become a lead underwriter in *Undw_cb* (182 out of the 507 total bank-involved IPOs) and *Undw_ib* (245 out of the 507 bank-involved IPOs). Among the three remaining IPO underwriting categories, zero-borrowing IPOs (*Undw_zero*) account for 153 (15.7%) and *Undw_na1* and *Undw_na* for 78 (10.0%) and 41 (5.3%) out of the 779 total IPOs, respectively, as shown in panel B. All statistics are very similar between panels A and B.

Table 2 shows basic statistics for the key variables used in our empirical tests. IPO characteristics are shown in panel A and firm financial characteristics in panel B, respectively, tabulated by lender–underwriter relation. The variables are all in original measures before taking logarithm, most of which are highly skewed. Thus, we show both mean and median statistics in the table. The mean initial return for the 779-member sample is 70.3% and the corresponding median is 37.9%. Again, the initial return result is remarkably similar to that for the full sample (N = 989). The highest initial returns both in mean (105.9%) and median (86.3%) are obtained for *Undw_zero*. The IPO *Offer_size* in million yen is most skewed. This is especially true for *Undw_mb* IPOs, with the largest mean at 7,660 million yen and the second smallest median at 873 million yen among the six categories. The median *Offer_size* is largest for *Undw_ib* underwritten IPOs. The *BTM* ratio, using the offering price, of the three bank-involved underwriting types is less skewed than the remaining three categories. The mean and median difference is minimal in the *Selling_out* ratio across different underwriting types. Regardless of offering size, approximately 40% of cash generated by an IPO goes to

pre-IPO shareholders exiting. For most IPOs, the number of underwriters is between 7 and 9 and the mean and median are around 8. *VC backed* does not vary much, with the highest average in *Undw_na1* at 59.0% and the next highest in *Undw_zero* at 55.6%, and the lowest in *Undw_na* and *Undw_mb* at about 42%. The age of Japanese IPO firms is a lot higher than their U.S. counterparts. IPOs underwritten by *Undw_mb*, for example, are as old as 23 at the mean and 22 years at the median. The age decreases to 9 years at the median for *Undw_zero*.

Similar to *Offer_size* in panel A, *Sales* and *Total assets* show high skewness in panel B. IPOs underwritten by *Undw_mb* show the highest mean and median with a similarly large gap between the two statistics in these characteristics. The same interpretation applies to *EBITDA* and *EAT*. *Debt/assets* shows a relatively small gap between the mean and median statistics, but varies across the six underwriter types, from the lowest at around 35% for *Undw_zero* to the highest for the three bank-involved underwriting types between 65% and 70%. The average debt ratio of *Undw_na1* IPOs is around 60%, which is lower than the that of the bank-involved IPOs by 5 to 10 percentage points in mean as well as in median. In the tangible fixed asset ratio (*Tangible_FA*), the bank-involved underwriting types show higher mean between 23% and 25% and median between 18% and 23% than the other types by a wide margin. EBITDA margin (*EBITDA/sales*) shows no notable patterns in distribution except for slightly lower median for the bank-involved underwritings.[23]

[23] Appendix I presents definitions of main variables used in the subsequent empirical analysis

As in Table 1, the main variables of IPO firms are similar between panels A and B. Thus, we subsequently use the reduced sample in which allocation information is available.[24]

Table 3 shows correlations of key variables used in the empirical analyses, with N = 779. As expected, all three bank-involved underwriting types have moderate and positive correlation, ranging from 0.08 to 0.15, and the bank-uninvolved have a negative correlation, with the largest at -0.51 for *Undw_zero*, a moderate level at -0.15 for *Undw_na*, and the smallest at -0.01 for *Undw_nal* with respect to the debt ratio (*Debt/assets*). These lender−underwriter combination variables have a similar pattern in correlations with *Log(sales)* but with opposite sign. *VC_backed* shows a low correlation with all six lender−underwriter combination variables, and a high and negative correlation with *Log(sales)*. IPO firm financial variables are correlated with one another. *Log(sales)* is most highly correlated with the other variables. These correlations take a positive sign except for the one with two-year asset growth rate at -0.36. *Log(sales)* are also correlated with most IPO underwriting characteristic variables, and most highly with *Log(offer_size)* at 0.46 and with *Stand_market*, a listing market quality dummy variable, at 0.53. *Log(sales)* shows the highest correlation with initial returns but with negative sign at -0.36. The correlation pattern for the entire sample with N = 989 is qualitatively similar to that for the reduced sample with N = 779.

[24] We conducted the goodness-of-fit test through probit regression to derive the Hosmer-Lemeshow chi-square statistic at 3.92 with p=0.86. The null hypothesis is that of no significant difference in the observed and the expected partitioning of the sample between surviving (N=779) and non-surviving IPO firms (N=210). This suggests that a survivorship bias is minimal in the 779-member sample used.

4. Empirical Results

4.1 Lender−Underwriter Relations under Conglomeration

In Table 4, we show the results of regressions when pre-IPO financing is separated from underwriting in determining IPO underpricing, in the spirit of Gonzales and James (2005). We use the four conventional categories to characterize underwriters based on their group's main business: investment banking (*Und_ib*), Internet (*Und_net*), foreign-brand investment banking (*Und_frn*), and commercial banking (*Und_cb*) as a reference category. While these dummy variables do not significantly explain initial returns, the direct measures of debt disciplines, that is, *Debt/assets* in model (2) and *Log(1+Total_loans)* in model (4), are highly significant in reducing underpricing.

Table 5 shows the regression result for IPO initial returns without firm financial characteristic variables. We use the six lender−underwriter relations (in which *Undw_zero* is a reference category) and IPO market characteristics: *Log(num_ipos)*, *Halloween*, *Stand_market*, and *Crisis*. We exclude financial variables, since a firm's lender−underwriter choice is endogenous to most firm financial characteristics, such as leverage choices and revenues. *VC_backed* is, however, included as an important pre-IPO financing alternative for venture firms to debt financing. *Tob_l* is a dummy variable to capture "soft information" held by regional banks as main banks on their lending clients going public. Relative to *Undw_zero*, any other form of external debt is expected to enhance certification for underwriters. As expected, the coefficients for all five lender−underwriter dummy variables are negative and statistically significant in all models. Regional bank involvement in IPO firms as a main bank does not significantly add certification for underwriters, as shown by the coefficient for *Tob_l*. *VC_backed*

significantly increases underpricing in all models, consistent with evidence reported in the U.S. literature (Gonzales and James, 2007 and Ritter, 2016). The coefficients for *Log(num_ipos)* and *Crisis* are positive and negative, respectively, and both are highly significant. The coefficient for *Halloween* is also positive and highly significant.[25] Also, as expected, the coefficient for *Stand_market* is negative and highly significant. While the adjusted R^2 is not very high, ranging from 0.06 to 0.13, all main and control variables are statistically significant with the expected sign. Our use of the lender−underwriter combined categories in Table 5 seems more useful than mechanical underwriter categories in Table 4 for our empirical modeling.

4.2 Allocation of IPO Shares

Allocation of IPO shares is an important function of the lead underwriter. Lender−underwriter relations are quasi-naturally brought about by regulatory shifts toward financial conglomeration, while *ex ante* (under)pricing and institutional allocations at the firm level are interactively determined and completed at almost the same time. Since allocation information is not used in the secondary market initially but is used by the underwriter in the primary market, we control our initial return regression for the underwriter's endogenous selection regarding the allocation given the pre-IPO lending−underwriter relations. This determines the framework used in the first stage of Heckman's two-stage regression procedures.

Table 6 provides the results of a simplified version of the two-stage procedures with firm financial variables after controlling for the endogeneity associated with the

[25] The Halloween effect in IPO initial returns is a well-known anomaly reported in Japan (see Chapter 5, Okamura 2013).

allocation. We convert the six lender−underwriter relations in Table 5 into two categories: bank-involved and bank-uninvolved, via a dummy variable, *BL_dummy*. *BL_dummy* takes the value 1 if the IPO issuer has bank loans, i.e., *Undw_mb*=1, *Undw_cb*=1 or *Undw_ib*=1, and 0 otherwise. In the first-stage probit regression, the dependent variable, *Alloc_D*, is a dummy variable that takes 1 if the IPO shares are allocated to mutual funds, and 0 otherwise. In addition to the control variables in Table 5, we include financial variables such as *Log(sales)*, *BTM*, *Tangible_FA*, *Selling_out*, *Log(age)*, and *Num_underws* both in the first- and second-stage regressions. The second-stage regression includes the interaction term (*BL_AD*) between *Alloc_D* and *BL_dummy* and *lambda* for the inverse Mills ratio to control for endogeneity. We also include 10 industry dummy variables with an 11th as a reference industry.[26]

In the first stage, the coefficient for *BL_dummy* is negative and significant at the 5% level. Main bank involvement in any form significantly reduces the probability of IPO shares being allocated to mutual funds. This shows a strong contrast with the significant and positive effect of *VC_backed*. The coefficients for *Log(offer_size)* are positive and highly significant, indicating that larger IPOs offer increased allocation to institutional investors. The highly significant negative effect of *Log(num_ipos)* shows IPO shares are less allocated in a hotter market than a colder market. In the second stage, the coefficient for *lambda* is positive and statistically significant at the 5% level. This suggests that IPO pricing is properly controlled for our treating allocation as an endogenous selection made by lender−underwriter combination. The negative and significant coefficient for *BL_dummy* supports the hypothesis that banks certify IPO

[26] Note that we do not use yearly dummy variables, but instead use *Log(num_ipos)* to control both yearly effect and IPO market conditions. The result remains mostly unchanged, but the coefficient for this measure is more useful to interpret.

pricing. The coefficient for *BL_AD* is positive and statistically significant at the 5% level. Main bank underwriters underprice more when they allocate. Most of the remaining independent variables are statistically significant with expected signs. This result supports the bank certification hypothesis with some caution when main-bank involved IPO shares are allocated.

Table 7 shows the Heckman two-stage regression results using the six lender−underwriter relations in both stages, and in the second stage their interactions with *Alloc_D* are considered. The first-stage probit regression result is shown in panel B. In the first stage, two of the bank−underwriter relation coefficients, *Undw_mb* and *Undw_ib*, are statistically significant with negative sign. Thus, the result is approximately consistent with that reported in panel B of Table 6, that is, a reluctance of main banks to allocate (or a reluctance of fund managers to receive) bank-backed IPO shares. The first-stage coefficient estimates for the remaining control variables are also similar to those in panel B of Table 6. *Log(offer_size)* and *Log(num_ipos)* are again the most important variables among the characteristics of IPOs and IPO firms.

The second-stage results are shown in panel A, Table 7. In model (1) with *Alloc_D*, *lambda*, and industry dummies included as independent variables, the coefficients for *Alloc_D* and *lambda* are positive and statistically significant. The results for the two full model specifications are shown under models (2) and (3). Model (3) is parallel with the model in panel A, Table 6. The model (3) result shows that two of the interactions between bank−underwriter relations and allocation, namely, *mb_AD* and *ib_AD*, are positively and significantly associated with initial returns at the 1% and the 10% levels, respectively. We confirm that main bank underwriters allocate more underpriced IPO

shares to mutual funds. Among the mostly significant negative coefficients for the lender−underwriter relations, those for *Undw_na1* and *Undw_na* are less negative (and less significant) than those for bank-involved *Undw_mb*, *Undw_cb*, and *Undw_ib*. This pattern suggests underpricing tends to decrease with the degree of bank involvedness even after controlling for allocation decisions by underwriters. In model (2), the allocation effect on underpricing is captured by *Alloc_D*, which is fixed across the lender−underwriter category. As expected, the coefficient for *Alloc_D* is positive and significant at the 5% level. However, the negative coefficient for *Undw_mb* is no longer significant, and the coefficients for *Undw_na1* and *Undw_na* become more negatively significant. In this model, part of the conflict of interest, if any, is reflected in the coefficients of the lender−underwriter relations. This coefficient pattern in model (2) with *Alloc_D* looks consistent with the conflict of interest hypothesis as predicted under the conflict of interest hypothesis in Section 2.3.1. However, the same pattern is not exactly repeated in the coefficients for the interaction dummies in model (3). We further investigate the possibility of the conflict of interest in relation to quality and destination of the allocated IPO shares in Section 4.4.

Overall, the basic bank certification effect for underwriters is for the most part significant and, at the same time, high-demand (i.e., more underpriced) issues are indeed allocated to mutual funds, especially by main bank underwriters, a pattern consistent with the conflict of interest hypothesis. We find possible coexistence of the two conflicting behaviors in bank-involved underwriting at this stage.

4.4 Extended Analysis: Allocation of IPO Shares

To further analyze the allocation/underwriter effect, we compute daily raw returns as well as benchmark- and risk-adjusted returns of individual IPO issues over half-year, one-year, two-year and three-year periods since the close of first-day trading. We eliminate the impact caused by IPO underpricing by the underwriter from the analysis of aftermarket market pricing. We first prepare a dividend-adjusted JASDAQ (Japan Securities Dealers Association Quotation) Index and its daily returns as a benchmark to adjust raw returns of each IPO stock. We compute excess return of each IPO stock over the JASDAQ Index, *Ex ret. over Jasdaq*, on a daily basis. Next, we prepare Fama–French three factors for the Japanese data of all listed firms except for financial services firms, to risk adjust. We do not use the U.S. standard Fama–French four factors since the momentum effect is not found in Japan.[27] The factors are updated on a daily basis even if the accounting data remain unchanged until newly disclosed.[28] For each investment horizon, we compute the cross-section average of excess and abnormal returns and then conduct significance tests for each mean return performance of the four investment horizons. We believe that the use of a daily return performance for all horizons is most consistent with IPO data with differing beginning dates. In addition, we derive Fama–French risk-adjusted return, *FF-3*α, as an intercept of the time-series regression of IPO stock returns on factor scores computed on a daily basis for each IPO. The result is directly comparable with initial returns, which are always returns per day in our sample. Thus, we do not annualize an α intercept, but use it as is.

[27] Momentum strategies fail in Japan according to Chui, et al. (2010) and Fama and French (2012), among others.

[28] See Hiraki, Watanabe and Watanabe (2017) for construction of daily factor series based on the Japanese practices of information disclosure of firm book values and other accounting numbers.

Table 8 summarizes IPO return performance by allocation status for each of the four investment horizons. The table also presents performance differentials between the allocated and unallocated IPOs. Panel A shows relative outperformance of the allocated to the unallocated in raw returns over a half-year horizon, significant at the 1% level. However, this relative outperformance becomes insignificant in half-year *Ex ret. over Jasdaq* and *FF3-α*. In one- and two-year investment horizons in panels B and C, respectively, the relative performance of the allocated to the unallocated IPOs in raw returns becomes negative, significant at the 10% level. No three-year relative performance measure is statistically significant in panel D. As to allocation impacts, initial returns completely dominate any other horizon returns. Raw returns over the first half-year may still be important for those allocated, while allocation is not meaningful even in raw returns beyond two years or any horizon on a benchmark- or risk-adjusted basis. Allocated mutual fund managers realize an average (raw) return of 0.082% per trading day over the following six months. Again, there is no significant result in risk-adjusted returns even in the shortest horizon of half a year. For long-only investors, including most mutual funds in Japan, an allocation advantage, including high initial returns, quickly diminishes in less than six months.

4.5 Allocation of IPO Shares in Detail

Table 9 (panel A) shows the result of multinomial logit analysis on IPO share allocation by lender–underwriter relation among the four categories: 0: *No_Alloc* (no mutual fund allocation as a reference category), 1: *Affiliated_only* (allocating to affiliated mutual funds only), 2: *Both* (allocating to both affiliated and unaffiliated

funds), and 3: *Unaffil_only* (allocating to unaffiliated funds only). Nearly one-half of the IPOs (388/779) are not allocated to mutual funds at all. The most important variable to distinguish between no allocation and allocation is *Log(offer_size)*, followed by *Log(num_ipos)*, *Num_underws*, and *VC_backed*. In contrast, all coefficients for the lender–underwriter relation dummies lack statistical significance and consistency in sign to support the monitoring hypothesis (1). A large part of passing through mutual funds seems related to small offering size and strong retail demand.

The *Affiliated_only* subsample includes only 9 IPOs. None of the coefficients for the lender–underwriter relations are statistically significant in this category. Underwriters rarely allocate their underwritten IPO shares to mutual funds in the same group. They allocate only to the affiliated by camouflaging (i.e., choosing *Both*). These underwriters allocate in *Unaffil_only* (N = 302) more often than in *Both* (N = 80). In the third category of *Unaffil_only*, the negative coefficients for *Undw_mb* and *Undw_cb* are statistically significant at the 1% and 10% levels, respectively, and the negative coefficient for *Undw_ib* is only marginally insignificant. Relative to *No_Alloc* (a reference category), being a bank-related underwriter reduces the occurrence of even *Unaffil_only* allocation and neither reduces nor increases the other types of allocation. These results are not consistent with the monitoring hypotheses, (1) and (2).

Table 9 (panel B) shows the result of multinomial logit analysis with somewhat modified allocation categories: 0: *No_Alloc* (a reference category), 1: *Domestic_only* (only allocating to mutual funds managed by domestic asset management firms), 2: *Both* (allocating to both domestic and foreign-brand funds), and 3: *Foreign_only* (allocating to foreign-brand funds only). Foreign funds are typically managed by asset

management firms unrelated to most Japanese underwriters or financial groups, while domestic funds are managed mostly within a commercial banking or investment banking group. Main bank−involved underwriters are reluctant to choose a *Domestic_only* type of allocation and, at the same time, their reluctance to choose *Foreign_only* is less than that of choosing *Unaffil_only* (shown in panel A). IPO underwriters as a whole are less eager to allocate to institutional investors and more reluctant to allocate to a safer class of mutual funds. Thus, the result is not consistent with the monitoring hypotheses, (1) and (2).

We next show the results of our main tests of the modified dumping ground vs. nepotism hypotheses. We are presumably interested in interactions of the two sets of dummy variables: [*Undw_mb*, *Undw_cb*, *Undw_ib*, *Undw_n1*, *Undw_na*] and [*Affiliated_only*, *Both*, *Unaffil_only*]. We already know the number of IPOs in *Affiliated_only* is very small at $N = 9$. Thus, we focus on *Both* (as allocated) vs. *Unaffil_only* (as unallocated). The modified dumping ground (nepotism) hypothesis predicts lower (higher) returns or quality for IPOs allocated to *Both* than for those allocated to *Unaffil_only* in each of the three bank-involved underwriter types, in particular. Further, the allocation-return effect, associated with each hypothesis, should be stronger for IPOs underwritten by the same bank group underwriters (*Undw_mb*) than for those underwritten by different commercial banking (*Undw_cb*) and investment banking underwriters (*Undw_ib*).

In Table 10, we follow the two-stage regression methodology as carried out in Table 7. However, in the second stage, we include the interaction terms newly created as independent variables to make each allocation path clearer. The first set of such

interaction variables consists of *Undw_mb1*, *Undw_mb2*, and Undw_mb3, indicating the destination of IPO shares allocated by the same group lead underwriter to *Affiliated_only*, *Both* (affiliated and unaffiliated), and *Unaffil_only*, respectively. The remaining sets of interaction terms for *Undw_cb*, *Undw_ib*, *Undw_na1*, and *Undw_na* are similarly constructed. There are six models in the table that use return measures as the dependent variable. Model (1) uses initial returns; models (2) and (3) use raw and risk-adjusted returns for the half-year horizon, respectively; and models (4), (5), and (6) use only risk-adjusted returns for one-, two- and three-year horizons, respectively. We include all interaction variables in each regression but do not tabulate the estimation result for some of the interaction variables when a corresponding number of observations is zero or very small: *Undw_mb1*, *Undw_cb1*, *Undw_ib1*, *Undw_na1_1*, and *Undw_na_1*.[29] For simplicity, we tabulate only the relevant parts of the results for hypothesis testing (i.e., the coefficients for the newly introduced interaction variables). The estimation results (not tabulated) for the control variables are similar to the those presented in Table 7.

The model (1) result for initial returns shows that the only significant coefficient (at the 5% level) is for *Undw_mb3*, which represents IPOs underwritten and allocated to *Unaffil_only* by the same commercial banking group underwriters as their main banks. The sign of this significant coefficient is positive. Thus, the result indicates that high-demand IPOs are allocated to *Unaffil_only*, and low-demand IPOs are allocated mostly to individual investors. Though the result of high-demand IPO shares being more allocated to the unaffiliated only seems locally consistent with the dumping

[29] *Undw_na1_1* and *Undw_na_1* are the interaction dummy variables for (*Undw_na1*)*(*Affiliated_only*) and (*Undw_na*)*(*Affiliated_only*).

ground hypothesis, the coefficient difference between *Undw_mb2* and *Undw_mb3* is statistically insignificant with *t*-value = 0.56 (p = 0.57). [30] No other underwriter-allocation variables are significantly associated with initial returns. While an allocation premium exists only in the IPOs allocated by the main bank underwriters, they might try to utilize it for commission or other types of tie-in sales. Thus, the result for model (1) is at most weakly and locally (within the category of *Undw_mb*) consistent with the modified dumping ground hypothesis and the conflict of interest hypothesis.

Initial returns may not reflect investment quality but do reflect demand for IPO shares. The investment quality of the IPOs can alternatively be measured in (risk-adjusted) returns realized through aftermarket seasoning. The result from regression model (2) reveals that the allocations to *Both* and *Unaffil_only* by different commercial banking group underwriters are positively and significantly associated with the average (raw) return over the first six-month period. The coefficient for the allocation to *Both* (*Undw_cb2*) is greater and more significant at the 1% level than that for *Unaffil_only* (*Undw_cb3*) at the 5% level. The coefficient difference is statistically significant with *t*-value = 2.19 (p = 0.03).[31] This local evidence (within *Undw_cb*) is therefore consistent with the modified nepotism hypothesis. On the other hand, the evidence for different investment banking underwriters is too weak to support the same hypothesis, even if the coefficient for *Undw_ib2* is slightly greater than that for *Undw_ib3*. The coefficient for *Undw_ib3* is positive and significant at the 1% level, but that for *Undw_ib2* is insignificant. There are no significant relations between *FF3-*α and

[30] This *t*-value is separately derived, and thus not tabulated in Table 10.

[31] This *t*-value is separately derived, and thus not tabulated in Table 10.

the allocation destination category interacted with bank−underwriter relations over the first six-month period (model 2) and beyond (models 3 through 6) among bank-involved underwriters.

For non-bank lenders, the coefficient associated with *Undw_na12* is positive and significant in models (3) through (5) using risk-adjusted FF3-α, which is stable over two years and consistent with the modified nepotism hypothesis. This nepotism hypothesis holds only for the relation between the underwriter and fund managers in the same group, but the underwriter in this case may not have pre-IPO financial links with the issuer.

Overall, we find locally consistent evidence for the modified nepotism hypothesis in raw returns in IPOs allocated by commercial banking underwriters and in risk-adjusted returns in those allocated by non-bank lenders. Since there is only slight evidence for the dumping ground hypothesis, our result is more consistent with the modified nepotism hypothesis, similar to Ritter and Zhang (2007). Our result is not parallel with that reached in Ferreira, Matos and Pedro (2017). We interpret this difference such that asset management within a baking group in IPO investment differs from that within banking groups in seasoned equity investment.

4.6 Leverage and Main Bank Role Changes

Table 11 (panel A) shows how the pre-IPO *Debt/assets* ratio changes over the four-year course of seasoning. Year -1 corresponds to the fiscal year preceding an IPO, while year 0 is the same fiscal year as the IPO. Years +1 is the following year of the IPO year and year +2 through +3 are similarly expressed. The average debt ratio of IPO

firms in our sample changes from 58.3% in year -1 to 49.0% in year +3, with the lowest at 47.2% in year +1. IPO firms therefore repay a significant portion of debt relative to total assets. Panel B shows the average loan amount borrowed from a top bank of the IPO firm over the same four-year period. The average IPO firm repays approximately one-half of its pre-IPO top bank loan amount of 4,259 million yen until year +1, when the debt ratio reaches a minimum. If such debt or loan deduction is related to poor (better) return performance, we could reach more precise conclusions about the two hypotheses regarding allocation destination and investment quality of allocated IPO shares in the aftermarket.

The result in panel A, Table 12, shows the association of the cumulative changes in *Debt/assets* with the corresponding aftermarket IPO return performance measure. At the end of fiscal year 0, six-month returns are not necessarily yet realized for some IPO firms. In the meantime, we can always relate a debt change from year -1 to year 0 or a later year to the return for a full year or longer return horizon. In general expression, the aftermarket risk-adjusted return over t years, *FF3-α(t)*, is related to the cumulative change in the debt ratio through the end of fiscal year t-1, *Δ(D/TA)(t-1)*. Depending on the return horizon selected, the sample size changes from 779 for a one-year horizon to 766 and 743 for two-year and three-year horizons, respectively, due to delisting from the exchanges. *Δ(D/TA)(t-1)*, *mbADD(t-1)*, *cbADD(t-1)*, *ibADD(t-1)*, *nalADD(t-1)*, and *naADD(t-1)* in panel A represent the cumulative change in *Debt/assets* and five interaction terms between a corresponding allocation dummy and the debt ratio change for the five different lender−underwriter combinations.

The cumulative change in debt ratios, *Δ(D/TA)(t-1)*, is negatively associated with aftermarket risk-adjusted performance in all models, while only one-year *FF3-α* in model (2) is significantly associated with debt deduction at the 10% level. As already shown in panel A of Table 11, the debt ratio sharply decreases until year +1 and then the decrease diminishes for most IPO firms. The negative coefficient for the debt ratio change implies that risk-adjusted return performance for most IPO firms increase as the debt ratio decreases. However, this marginally significant association between risk-adjusted return and the debt deduction effect becomes weaker and insignificant beyond a one-year horizon. Further, all interaction effects between allocation and debt ratio changes on quality (a) are positive but not statistically significant across models. We interpret this overall result such that high quality IPO firms, rather than lenders, tend to avoid debt, if any. There is no evidence that suggests a run-away by a debtor or conflict of interest.

Panel B of Table 12 shows the effects of top-bank loan rate changes, *Δ(Tob_L)(t-1)*, and the interactions between allocation and top-bank loan rate changes by bank–underwriter type, *mbADL(t-1)*, *cbADL(t-1)*, and *ibADL(t-1)*, on aftermarket risk-adjusted performance. While 507 out of the 779 IPOs in the total sample are classified as having banking relations, 412 have pre-IPO relations with banks and the remaining 95 are classified as having a main bank based on the financial statements at the end of fiscal year 0. We thus begin the analysis with the shortest horizon of one year with 412 original top banks at the end of year -1. The sample decreases over time because of delisting or reaching zero loan balance. The return effect of the top-bank loan rate changes is negative but insignificant across model specifications. Similarly, the

return interaction effects of allocation and the top-bank loan change are all insignificant while a positive sign dominates. Main bank loan reduction tends not to be associated with the quality of allocated IPO firms which is revealed in later seasoning.

Top-bank loan reductions have no significant effect. Since allocated and unallocated IPOs by type of underwriter are largely indistinguishable in quality realized in ex post terms, the result is not very helpful to obtaining additional insight on the nepotism hypothesis beyond that documented in Table 10, except for the confirmed tendency of high quality IPO firms reducing debt. The possibility of conflict of interest and dumping grounds, raised when interpreting the results in Tables and 7 and 10, is now further lowered (since the pattern reported there is unrelated to the quality of the allocated IPO shares).

5. Conclusions

Does financial conglomeration enhance efficiency of capital allocations? Are there any conflicts of interest in financial conglomerates that combine commercial banking, investment banking, and asset management businesses? This study attempts to answer these questions. Specifically, we focus on IPOs underwritten by financial conglomerate groups in today's primary market environment in Japan.

As for underwriting of IPOs, our empirical results are broadly consistent with the bank certification hypothesis: main banks in financial conglomerates use their private information obtained from previous or existing lending relations to underwrite IPOs within the same or different financial groups. These main banks certify the quality of IPOs. However, new shares of nearly one-half of the IPOs in our sample are not

allocated to mutual funds due to their small offering size and to IPO issuing market conditions. When main banks allocate some fraction of new shares to mutual funds, they increase underpricing and allocate more often to unaffiliated mutual funds. Further, the propensity to allocate to the most distant group is low relative to no allocation reference. Thus, limited allocation to institutional investors may not be due to regulatory monitoring.

For more precise allocation analysis, we use two kinds of interaction: one set of allocations interacted with bank–underwriter relations and another set of allocations interacted with bank–underwriter relations and debt and main bank loan reduction, simultaneously. We find some locally consistent evidence with the modified nepotism hypothesis for the IPO issues underwritten by the different commercial banking underwriters among the three bank–underwriter categories. However, this disappears after risk-adjustment. Allocation of non-bank-involved IPOs is most consistent with the modified nepotism hypothesis based on the aftermarket risk-adjusted measures. There is some positive relation between debt deduction and aftermarket risk-adjusted performance (i.e., a run-away from debt by firms going public). Nonetheless, the association between firm debt and loan deduction and allocation-specific aftermarket quality is so weak and short that we are not able to further interpret the result of our main hypothesis testing. Overall, main banks' significant initial certification for underwriters does not extend to aftermarket risk-adjusted returns for any bank-allocated institutional investors. Bank loan reduction cannot be related to the conflict of interest caused by institutional allocation.

Lower allocation of IPO shares to institutional investors in Japan seems most problematic given the objective of the new capital market system implemented under financial deregulation and the new underwriting method. This feature substantially differs from IPO share allocation in the U.S. (Hao and Yan (2012) for mutual funds and Qian and Zhong (2014) for hedge funds). Except for the larger issues allocated to mutual funds during colder periods, most money left on the table is distributed to book-building participating retail investors. A set of regulatory movements, including the Japanese book-building method, firewall and Chinese wall regulations, seems not well-integrated in a compatible manner. The system seems to have failed to bring in more institutional investors to reduce information asymmetries both before and after the IPO; main banks are not able to compensate for this.

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Figure 1
Major Financial Conglomerate Groups with Underwriting Facilities in 2013

	Financial Group Name		
	Bank	**Underwriter**	**Asset Management Firm**
Financial Group Type	(**Flagship** Bank)	(**Flagship** Sec. Company)	(**Flagship** Asset MGMT Co.)
I. Commercial Banking Group	***Mizuho Financial Group***		
	Mizuho Bank	**Mizuho Securities** (*Und_cb*)	**Mizuho Asset Management**
	Mizuho Trust& Banking	Mizuho Investors Securities (~2013, *Und_cb*)	DIAM Co., Ltd
	Mitsubishi UFJ Financial Group		
	Tokyo Mitsubishi UFJ Bank	**Mitsubishi UFJ Securities** (*Und_cb*)	**Mitsubishi UFJ Kokusai Asset Management**
	Mitsubishi UFJ Trust & Banking	Mitsubishi UFJ Morgan Stanley Securities (*Undw_cb*)	
	Mitsui Sumitomo Financial Group		
	Mitsui Sumitomo Bank	**SMBC Nikko Securities** (*Und_cb*)	**Sumitomo Mitsui Asset Management**
	SMBS Trust & Banking	SMBC Friend Securities (*Und_cb*)	
II. Investment Banking Group	***Nomura Group***		
		Nomura Securities (*Und_ib*)	**Nomura Asset Management**
	Daiwa Securities Group (2009~)		
		Daiwa Securities	**Daiwa Asset Management**
	Nikko Citi Group (~2009)		
		Nikko Securities (*Und_ib*)	**Nikko Asset Management**
	SBI Group		
	Sumishin-SBI Net Bank	**SBI Securities** (*Und_net*)	**SBI Asset Management**
	Ichiyoshi Securities Group		
		Ichiyoshi Securities (*Und_ib*)	**Ichiyoshi Asset Management**

Figure I (Continued)

	Financial Group Name		
		Underwriter	**Asset Management Firm**
Financial Group Type	(**Flagship** Bank)	(**Flagship** Sec. Company)	(**Flagship** Asset MGMT Co.)
III. Foreign Financial Group		***Goldman Sachs Group***	
		Goldman Sachs Securities (*Und_frn*)	**Goldman Sachs Asset Management**
		J.P. Morgan Group	
		J.P. Morgan Securities (*Und_frn*)	**J.P. Morgan Asset Management**
		UBS Group	
		UBS Securities (*Und_frn*)	**UBS Asset Management**
		Deutsche Bank Group	
		Deutsche Securities (*Und_frn*)	**Deutsche Asset Management**

This figure illustrates how investment banking subsidiaries are linked with commercial banking and asset management subsidiaries in the Japanese financial conglomerates in 2013, toward the end of the IPO sample period (2002-2012). There are three kinds of groups with underwriting facilities: I. Commercial banking group; 2. Investment banking group; and Foreign (brand) financial group. In each category, the figure includes only main players in the underwriting leaguer tables of 2013 by Bloomberg. Non-bank financial groups like life insurance-centered holding companies are not listed because they have basically no underwriting facilities. The commercial banking financial group consists of many other regional bank-centered groups than the three mega groups, which are not listed. Their investment subsidiaries are expressed as *Und_cb*. The investment banking group consists of traditional securities firms (*Und_ib*) which do not have commercial banking facilities and a small number of internet banking group whose investment banking subsidiaries are expressed as *Und_net*. The foreign financial group have both investment banking (*Und_frn*) and asset management subsidiaries. They are registered in Japan.

Table 1

Underwriter Types, Lender-Underwriter Rerations, Initial Returns and IPO Market trends: January 2022 to March 2012

This table shows the number of IPOs, initial returns and other market characteristics by year for the total (N=989) IPO sample in panel A and the reduced (N=799) IPO sample in panel B. The reduced sample has complete allocation information and is used for both underwriting and allocation analyses. Each panel tabulates the number of IPOs and aggregate market conditions across four underwriter types: *Und_cb* (underwriters out of commercial banking groups), *Und_ib* (underwriters out of investment banking groups), *Und_net* (underwriters out internet banking groups) and *Und_frn* (underwriters out of foreign-brand financial groups) and across six lender-underwriter relations: *Undw_zero* (no institutional borrowing), *Undw_mb* (underwriters out of the same group as main banks), *Undw_cb* (underwriters from different banking groups than those of main banks, *Undw_ib* (underwriters out of different investment banking groups than those of main banks), *Undw_nal* (borrowing only from non-bank institutions), and *Undw_na* (no detail information available on institutional borrowing). Initial ret., *IPO market cond*., *Tech* orientation and *VC_backed* indicate the first-day return in percent, Log(num of ipos) within one year, a dummy variable for technology orientation, and a dummy variable for venture capital back. The difference in observations between the two samples comes from the availability of mutual fund holdings

Panel A: Initial sample (N=989)

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
A1 Underwriter type												
Und_cb	57	57	83	72	96	60	27	12	1	14	1	480
Und_ib	61	56	73	69	72	52	20	7	18	21	4	453
Und_net	1	4	12	10	12	5	0	0	1	0	1	46
Und_frn	4	3	1	2	0	0	0	0	0	0	0	10
A2 Lender-underwriter relations												
Undw_zero	23	15	31	30	38	26	9	7	4	10	1	194
Undw_mb	14	14	16	14	23	8	5	3	1	2	0	100
Undw_cb	30	28	40	36	43	30	10	4	1	4	1	227
Undw_ib	48	53	60	52	50	33	9	3	7	11	1	327
Undw_na1	5	4	13	14	18	16	7	1	6	6	1	91
Undw_na	3	6	9	7	8	4	7	1	1	2	2	50
A3 Aggregation												
Number of IPOs	123	120	169	153	180	117	47	19	20	35	6	989
Initial ret. (%)	34.76	53.35	103.20	136.92	78.61	49.07	19.07	35.38	20.89	22.24	32.80	72.72
Log(num_ipos)	4.97	4.78	4.97	5.12	5.16	5.13	4.31	3.42	3.03	3.26	3.60	4.86
Tech	0.49	0.45	0.38	0.46	0.44	0.47	0.47	0.63	0.60	0.63	0.33	0.46
VC_backed	0.48	0.40	0.52	0.56	0.56	0.56	0.64	0.37	0.40	0.63	0.67	0.52
Panel B: Reduced sample (N=779)												
B1 Underwriter type												
Und_cb	42	39	65	56	79	51	23	11	1	14	1	382
Und_ib	46	45	50	52	59	45	17	6	17	20	4	361
Und_net	0	1	7	6	9	4	0	0	1	0	1	29
Und_frn	2	2	1	2	0	0	0	0	0	0	0	7
B2 Underwriter-bank relations												
Undw_zero	18	8	20	25	31	21	8	7	4	10	1	153
Undw_mb	8	10	14	11	20	7	4	3	1	2	0	80
Undw_cb	21	22	31	30	35	25	9	3	1	4	1	182
Undw_ib	39	39	37	37	39	27	7	2	7	10	1	245
Undw_na1	3	3	13	9	15	16	6	1	5	6	1	78
Undw_na	1	5	8	4	7	4	6	1	1	2	2	41
B3 Aggregation												
Number of IPOs	90	87	123	116	147	100	40	17	19	34	6	779
Initial ret. (%)	28.62	51.22	96.35	136.73	81.35	50.90	22.34	39.80	22.49	22.90	32.80	70.30
Log(num_ipos)	4.97	4.78	4.97	5.13	5.16	5.13	4.31	3.42	3.03	3.25	3.60	4.83
Tech	0.44	0.44	0.36	0.48	0.44	0.47	0.50	0.59	0.58	0.65	0.33	0.46
VC_backed	0.44	0.37	0.55	0.56	0.50	0.56	0.63	0.35	0.37	0.62	0.67	0.51

Table 2

Initial returns, IPO Firm Operational and Financial Characteristics by Lender-Underwriter Relations

This table shows the characteristics of our IPO sample by underwriter's relation with firm's main bank or other lenders. The full sample consists of 989 IPOs issued from January 2002 to March 2012. There are six categories in lender-underwiter relations: *Undw_zero*, *Undw_mb*, *Undw_cb*, *Undw_ib*, *Undw_na1* and *Undw_na*. The 779 sample includes only IPOs for which allocation and holdings data are available availability. *Initial ret.* is based on first rtrading day's closing price which usually takes one day to be realized. Offering size includes both new shares for financing and sales by insiders and early-stage investors, but exclude an internationally offered part of the IPO shares. the denominator of *BTM* is offering price per IPO share while the numerator of book equity is from pre-IPO (consolidated) financial statements. Standard exchanging listing (*Stand_market*) is a dummy variable: 1 for IPO listing on the first or the second-section of organized regular exchanges and 0 for IPO listing on emerging sections for young and venture-oriented SME firms going public. *VC_backed* is also an dummy variable: 1 for IPO firms at least one venture capital involved in firm's pre-IPO financing and 0 otherwise. For each variable, the mean and mdedian are presented in top and bottom cell, repsctively.All variables are defined in Appendix 1. All variables represent pre-IPO firm characteritics at the end of the prior fiscal year to IPO (year -1).

Panel A. IPO Characteristics

Underwriter / sample	*Initial ret.* (%)	*Offer_size* (mil. yen)	*BTM* (at offer price)	*Selling_out* (ratio)	*Num. of underws*	*Stand_* market	*VC_backed*	*Age* (Num. of years)
Undw_zero	105.90	5,330.6	0.342	0.376	7.693	0.098	0.556	14.3
(*N*=153)	86.30	1,089.3	0.194	0.386	7	0	1	9.0
Undw_mb	65.22	7,660.4	0.492	0.372	7.988	0.250	0.425	23.2
(*N*=80)	25.05	873.5	0.356	0.400	8	0	0	19.5
Undw_cb	63.62	4,562.6	0.445	0.332	8.126	0.126	0.533	24.9
(*N*=182)	29.30	867.3	0.302	0.335	8	0	1	22.0
Undw_ib	57.83	5,413.0	0.417	0.349	8.351	0.204	0.486	24.4
(*N*=245)	21.70	1,170.0	0.303	0.346	8	0	0	20.0
Undw_na1	58.06	4,580.2	0.363	0.398	8.154	0.141	0.590	19.9
(N=78)	46.10	1,239.8	0.247	0.423	8	0	1	11.0
Undw_na	74.86	2,533.0	0.378	0.405	8.171	0.073	0.415	17.7
(*N*=41)	51.40	1,015.0	0.182	0.412	8	0	0	12.0
Total	70.30	5,194.0	0.409	0.361	8.103	0.157	0.511	21.6
(*N*=779)	36.20	1,040.0	0.279	0.375	8	0	1	16.0
Full sample	72.72	4,570.6	0.385	0.354	8.152	0.145	0.522	20.2
(*N*=989)	37.90	1,004.5	0.256	0.359	8	0	1	15.0

Panel B. IPO firms' Financial and Pperational Characteristics

Underwriter / sample	*Sales* (mil. yen)	*Total assets* (mil. yen)	*Debt/assets* (ratio)	*EBITDA* (mil. yen)	*EBITDA* /sales	*EAT* (net profit)	*Tangibles_FA (/assets)*	*Ave. asset_ growth*
Undw_zero	19,993.4	20,242.7	0.352	2,288.6	0.112	1,527.5	0.092	0.431
(*N*=153)	2,155.0	1,605.0	0.352	337.0	0.145	302.0	0.040	0.342
Undw_mb	45,343.9	69,705.1	0.672	14,659.4	0.138	2,490.6	0.230	0.216
(*N*=80)	10,402.0	7,063.5	0.682	783.5	0.094	616.0	0.181	0.096
Undw_cb	39,342.6	31,549.4	0.674	2,745.1	0.096	1,530.0	0.247	0.250
(*N*=182)	6,253.0	5,036.5	0.700	586.5	0.094	484.5	0.228	0.158
Undw_ib	27,436.2	32,391.0	0.656	3,423.4	0.109	2,262.3	0.234	0.243
(N=245)	8,578.0	6,329.0	0.686	714.0	0.088	598.0	0.182	0.137
Undw_na1	27,627.5	18,037.0	0.569	2,483.8	0.124	2,037.4	0.162	0.310
(*N*=78)	4,711.0	3,390.0	0.601	490.0	0.096	283.0	0.080	0.236
Undw_na	27,699.3	15,444.7	0.462	987.3	0.131	808.4	0.122	0.425
(*N*=41)	2,159.0	1,728.0	0.415	288.0	0.134	216.5	0.070	0.201
Total	30,628.1	31,311.2	0.583	3,973.6	0.116	1,871.3	0.196	0.295
(*N*=779)	5,149.0	3,719.0	0.619	515.0	0.103	428.0	0.118	0.185
Full sample	26,926.7	27,317.7	0.595	3,454.1	0.116	739.5	0.192	0.317
(*N*=989)	5,051.0	3,679.0	0.632	504.0	0.099	215.0	0.105	0.198

Table 3
Correlation Matrix of Main Varianles

This table shows the correlations of manin variables used for underwrting analyses for the sample of 779 IPOs offered from January 2002 to March 2012. The difinitions of these variables are presented in Appendix 1.

N-779	*Initial_Ret*	*Undw_mb*	*Undw_cb*	*Undw_ib*	*Undw_na1*	*Undw_na*	*Undw_zero*	*Tob_l*	*Log(sales)*	*Debt/assets*	*BTM*	*EBITDA/ sales*	*Ave.asset_ growth*	*Log (offer_size*	*Tangible_ FA*	*Selling_out*	*Log(age)*
Undw_mb	-0.017																
Undw_cb	-0.037	-0.187															
Undw_ib	-0.086	-0.229	-0.374														
Undw_na1	-0.041	-0.113	-0.184	-0.226													
Undw_na	0.011	-0.080	-0.130	-0.160	-0.079												
Undw_zero	0.179	-0.167	-0.273	-0.335	-0.165	-0.117											
Tob_l	-0.094	-0.126	0.175	0.240	-0.147	-0.104	-0.201										
Log(sales)	-0.363	0.148	0.077	0.126	-0.015	-0.139	-0.252	0.050									
Debt/assets	-0.161	0.134	0.223	0.218	-0.021	-0.128	-0.508	0.209	0.444								
BTM	-0.281	0.070	0.050	0.014	-0.038	-0.018	-0.083	0.077	0.392	-0.057							
EBITDA/sales	-0.099	0.169	-0.032	-0.017	-0.023	-0.033	-0.039	-0.060	0.408	0.132	0.088						
Ave. asset_growth	0.285	-0.077	-0.071	-0.101	0.015	0.087	0.193	-0.122	-0.461	-0.208	-0.445	-0.117					
Log(offer_size)	-0.225	0.041	-0.081	0.019	0.027	-0.014	0.021	-0.123	0.529	0.041	-0.111	0.399	0.064				
Tangible_FA	-0.238	0.060	0.144	0.132	-0.057	-0.089	-0.261	0.229	0.305	0.323	0.211	0.215	-0.302	0.161			
Selling-out	-0.157	0.017	-0.069	-0.035	0.055	0.047	0.035	-0.083	0.165	-0.069	0.061	0.058	-0.135	0.187	-0.016		
Log(age)	-0.274	0.035	0.144	0.140	-0.061	-0.066	-0.259	0.141	0.462	0.235	0.485	0.081	-0.548	0.031	0.296	0.126	
Log(num_ipos)	0.191	0.022	0.097	0.031	-0.082	-0.064	-0.059	0.011	-0.018	0.131	-0.251	-0.002	0.102	0.031	0.042	-0.071	-0.015
VC backed	0.169	-0.058	0.024	-0.034	0.053	-0.045	0.044	-0.013	-0.363	-0.133	-0.197	-0.117	0.178	-0.185	-0.108	-0.063	-0.170
Stand_market	-0.213	0.087	-0.046	0.089	-0.014	-0.054	-0.080	0.011	0.534	0.094	0.306	0.336	-0.224	0.461	0.223	0.142	0.274
Num_Undws	0.034	-0.013	0.005	0.058	0.006	0.006	-0.069	-0.086	0.144	0.061	-0.072	0.298	0.076	0.281	0.069	0.045	-0.015
Halloween	0.120	-0.085	0.066	-0.015	-0.037	0.086	-0.009	0.009	-0.009	0.010	0.100	-0.072	-0.074	-0.134	-0.015	0.007	0.142

	Log (num_ipos)	*VC backed*	*Stand_ market*	*Num_Undws*
VC backed	0.017			
Stand_market	-0.077	-0.271		
Num_Undws	0.129	0.043	0.132	
Halloween	0.075	-0.036	-0.021	-0.111

Table 4

Regressions of Initial Returns on Debt, Venture Capital, Underwriter Type and Control Variables

779 IPOs' first-day returns are regressed on debt-related variables with similar control variables to those in Table 5 of Gonzales and James (2005). The debt-related independent variables are *Debt/assets*, *Total_loans/assets*, *Log(1+Total loans)* and *Tob_L/Total_loans*. *Und_ib*, *Und_net* and *Und_frn* are dummy variables with *Und_cb* as a reference category, indicating investment banking, internet-based newly entered and foreign-brand firms with commercial bank-based as a reference. *Tech*, *Crisis* and *VC_backed* are dummy variables for technology, crisis period (2008 through 2009) and venture capital backing, respectively. All variables are defined in Appendix I. *t*-statistics, based on robust standard error, are parenthesized. ***, ** and * indicated statistical significance of each coefficient estimated at the 1%, 5% and 10% level, respectively.

Firm characteristics	First-day ret. (1)	First-day ret. (2)	First-day ret. (3)	First-day ret. (4)	First-day ret. (5)
Debt/assets		-43.85			
		(-2.60)**			
Total loans/assets			-1.15		
			(-0.06)		
Log(1+Total_loans)				-5.80	
				(-4.68)***	
Tob_L/Total_loans					-14.24
					(-1.99)**
EBITDA/sales	7.31	7.64	9.15	8.60	8.79
	(1.65)*	(1.72)*	(1.63)*	(1.92)**	(2.77)***
Log(age)	-22.32	-20.50	-21.604	-16.46	-22.59
	(-5.71)***	(-5.17)***	(-5.16)***	(-3.80)***	(-6.14)***
Und_ib	12.64	12.93	13.52	10.21	8.64
	(1.85)*	(1.90)*	(1.85)*	(1.41)	(1.27)
Und_net	18.03	15.99	14.20	5.83	5.82
	(1.01)	(0.89)	(0.74)	(0.31)	(0.29)
Und_frn	-21.02	-39.70	-15.03	-12.24	-37.77
	(-0.60)	(-1.89)*	(-0.74)	(-0.32)	(-1.86)*
Tech	10.14	6.97	7.34	7.79	5.99
	(1.31)	(0.89)	(0.63)	(0.95)	(0.82)
Crisis	-53.84	-55.88	-51.58	-55.33	-53.55
	(-5.65)***	(-5.86)***	(-4.94)***	(-5.32)***	(-8.76)***
VC_backed	24.52	23.55	24.70	20.44	20.63
	(3.62)***	(3.49)***	(3.41)***	(3.01)***	(3.01)***
Constant	116.88	138.75	106.85	144.56	131.01
	(4.82)***	(5.43)***	(4.18)***	(6.69)***	(5.99)***
R^2	0.15	0.15	0.14	0.17	0.11
Observations	779	779	688	689	461
with 10 industrical sector dummy variables					

Table 5

Regressions of Initial Returns on Lender-Underwriters relations without Firm Fnancial Variables

The table shows the results of OLS regressions of initial returns on the five lender-underwriter relations, *Undw_mb*, *Undw_cb*, *Undw_ib*, *Undw_na1* and *Undw_na* together with a reference category of *Undw_zero*, venture capital involvement (*VC_backed*), regional bank dummy (*Tob_l*) and market conditions as control variables, *Log(num_ipos), Halloween* and *Crisis*. All variables are defined in Appendix I. Firm financial variables are possibly correlated with the main independent variables are not included. The 779 IPO sample is formed for 2002.01-2012.03. t-statistics, based on robust standard error, are parenthesized. ***, ** and * indicated statistical significance of each coefficient estimated at the 1%, 5% and 10% level, respectively. The sample of 779 IPOs are constructed by eliminating 210 IPOs for which mutual fund holdings data is not available.

Firm characteristics	First-day ret. (0)	First-day ret. (1)	First-day ret. (2)	First-day ret. (3)	First-day ret. (4)	First-day ret. (5)	First-day ret. (6)
Undw_mb	-40.68	-35.40		-33.27	-30.43	-26.47	-26.38
	(-3.03)***	(-2.66)***		(-4.25)***	(-2.32)**	(-2.02)**	(-2.03)**
Undw_cb	-42.28	-36.34		-37.46	-35.56	-38.10	-37.81
	(-3.96)***	(-3.36)***		(-3.51)***	(-3.26)***	(-3.62)***	(-3.61)***
Undw_ib	-48.07	-41.61		-41.61	-37.77	-37.85	-38.83
	(-4.79)***	(-4.11)***		(-4.13)***	(-3.68)***	(-3.83)***	(-3.95)***
Undw_na1	-47.84	-39.96		-42.21	-44.13	-39.92	-39.06
	(-3.53)***	(-3.02)***		(-3.23)***	(-3.18)***	(-3.09)***	(-3.04)***
Undw_na	-31.04	-26.81		-23.64	-27.68	-28.99	-25.92
	(-1.81)*	(-1.61)		(-1.44)	(-1.69)*	(-1.78)*	(-1.60)
Tob_l					-12.17		
					(-1.26)		
VC_backed			28.93	29.47	30.18	23.43	25.01
			(4.25)***	(4.25)***	(4.48***	(3.38)***	(3.63)***
Log(num_ipos)		35.15	33.32	34.45	32.73	31.25	
		(5.84)***	(5.60)***	(5.94)***	(5.52)**	(5.29)***	
Halloween					20.34	20.34	22.63
					(3.13)***	(3.17)***	(3.56)***
Stand_market						-36.34	-36.38
						(-3.69)***	(-3.72))***
Crisis							-58.22
							(-6.10)***
Constant	105.90	-81.37	-116.08	-89.18	-89.63	-73.43	86.58
	(13.46)***	(-2.24)**	(-3.26)***	(-2.48)**	(-2.51)**	(-2.05)**	(3.95)***
Adjusted R^2	0.03	0.07	0.09	0.12	0.13	0.14	0.14
Observations (*N*)	779	779	779	779	779	779	779

Table 6

Heckman's Two-stage Regression Estimating the Effect of Bank-involvement on Underpricing

This table shows Heckman's two-stage regression estimating the effect of bank-involved underwriting and allocation on underpricing the IPOs of 779 sample firms between January 2002 and March 2012, after excluding foreign-registered and traditional financial services firms. Out of this sample, 391 IPOs are allocated to mutual funds which are partitioned from the remaining 388 unallocated IPOs in the first-stage probit regression. The second-stage OLS regression regresses initial returns on a combined bank-underwriter category, *BL_dummy*, the interaction between *BL_dummy* and allocation dummy (*BL_AD*), *lambda* for the inverse Mills ratio and control variables. All variables are defined in Appendix I. The p-value of each coefficient estimate is parenthesized. The marginal effect shows the change in event probability for a given unit change in a particular independent variable. Pseudo R^2 is most naïve McFadden's showing the joint explanatory power, i.e., improvement by all included independent variables to the model with no variables.

Panel. A. Second-stage Estimates

Dependent Var.: Initial Return

IPO characteristic variables	Coefficient	t-value	p-value
BL_dummy	-23.15	-2.59	(0.01)
BL_AD	17.63	2.03	(0.04)
VC_backed	12.71	1.81	(0.07)
Log(num_ipos)	11.76	1.58	(0.11)
Halloween	24.61	4.01	(0.00)
Log(sales)	-11.60	-3.28	(0.00)
BTM	-35.37	-3.23	(0.00)
EBITDA/sales	14.30	3.24	(0.00)
Log(offer_size)	5.68	0.76	(0.44)
Tangible_FA	-46.50	-2.55	(0.01)
Selling_out	-46.48	-3.18	(0.00)
Log(age)	-7.18	-1.54	(0.12)
Num_underws	2.16	1.73	(0.08)
lambda	43.38	2.55	(0.01)
Constant	84.02	1.66	(0.09)
10 industrical sector dummy variables and a constant term included			
Adj R^2	0.25		
p-value (*F*-statistc)	0.00		
Observations (*N*)	779		

Panel. B. First-stage Probit Estimates

Dependent Var. *Alloc_D* (1=allocated, 0=unallocated)

IPO characteristic variables	Coefficient	*p*-value	Marginal effect
BL_dummy	-0.241	(0.05)	-0.096
VC_invloved	0.211	(0.06)	0.084
Log(num_ipos)	-0.508	(0.00)	-0.202
Halloween	0.032	(0.75)	0.013
Log(sales)	-0.009	(0.88)	-0.004
BTM	-0.267	(0.13)	-0.106
EBITDA/sales	0.046	(0.54)	0.018
Log(offer_size)	0.787	(0.00)	0.313
Tangible_FA	0.446	(0.16)	0.178
Selling_out	-0.386	(0.13)	-0.154
Log(age)	0.058	(0.47)	0.023
Num_underws	-0.044	(0.06)	-0.018
Constant	-2.337	(0.00)	-

10 Industry (sector) duummy variables for the 11 sectoors and a constant term are included.

Log likelihood = -396.63

Pseudo R^2 = 0.27

LR chi2(26) = 286.65 (0.00)

Table 7
Heckman's Two-stage Estimate of IPO Underpricing

This table shows the results of Heckman's two-stage estimates of the effect of IPO share allocations on initial returns. In the second stage (panel A), allocation dummy variable (*Alloc_D*) is treated either without interaction or with interaction with each of the five lender-underwriter-relations. The interactions between allocation and lender-underwriter relations include *mbAD* = (*Undw_mb*)*(*Alloc_D*), *cbAD* = (*Undw_cb*)*(*Alloc_D*), *cbAD* = (*Undw_cb*)*(*Alloc_D*), *ibAD* = (*Undw_ib*) * (*Alloc_D*), *na1AD* = (*Undw_na1*)*(*Alloc_D*), and *naAD* = (*Undw_na*)*(*Alloc_D*). All second-stage regressions include the inverse Mills ratio (*lamda*) derived through the first-stage probit regression (panel B). The rest of the independent variables are control variables defined in Appendix I. The coefficient estimates are provided together with *t*-value in the second stage result and *p*-value in the first stage, both parenthesized. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively, in the second-stage estimates.

Panel A. Second-stage Estimate of the Allocation and Underwriter Type on Initial Returns

IPO and Firm Variables	(1) *Initial ret.*	(2) Initial ret.	(3) Initial ret.
Alloc_D	14.90	16.03	
	(1.83)*	(2.18)**	
Undw_mb		-17.95	-39.55
		(-1.32)	(-2.51)**
Undw_cb		-30.64	-33.30
		(-2.86)***	(-2.74)***
Undw_ib		-33.46	-42.36
		(-3.32)***	(-3.73)***
Undw_na1		-34.90	-30.85
		(-2.84)***	(-1.95)*
Undw_na		-34.51	-26.56
		(-2.25)**	(-1.36)
mbAD			55.51
			(2.46)***
cbAD			4.79
			(0.35)
ibAD			19.391
			(1.65)*
na1AD			-8.34
			(-0.42)
naAD			-19.23
			(-0.71)
VC backed		11.96	11.09
		(1.70)*	(1.58)
Log(num_ipos)		12.97	12.66
		(1.77)*	(1.72)*
Halloween		25.38	24.71
		(4.13)***	(4.02)***
Log(sales)		-10.78	-11.43
		(-3.03)***	(-3.21)***
BTM		-37.53	-37.50
		(-3.43)***	(-3.43)***
EBITDA/sales		14.68	14.38
		(3.34)**	(3.26)***
Log(offer_size)		1.03	1.63
		(0.14)	(0.22)
TangibleFA		-42.41	-46.56
		(-2.33)**	(-2.54)**
Selling-out		-45.82	-44.36
		(-3.15)***	(-3.05)***

Log(age)		-6.43	-6.33
		(-1.39)	(-1.36)
Num_undws		2.80	2.86
		(2.23)**	(2.27)**
lamda	46.15	35.84	34.380
	(5.99)**	(2.17)**	(2.09)**
Constant	20.12	106.32	113.85
	(0.90)	(2.09)**	(2.25)**
10 industrical sector dummy variables included (except for model (0))			
Adj R^2	0.08	0.25	0.25
p-value (*F*-statistc)	0.00	0.00	0.00
Observations (N)	779	779	779

Panel B. First-stage Estimates by Probit Model: Allocation dummy variables (0, 1)

Dependent Var = *Alloc_D* (1, 0)

IPO characteristic variables	Coefficent	*p*-value	Marginal effect
Undw_mb	-0.540	(0.02)	-0.211
Undw_cb	-0.284	(0.11)	-0.113
Undw_ib	-0.310	(0.07)	-0.123
Undw_na1	-0.269	(0.19)	-0.107
Undw_na	0.015	(0.95)	0.006
VC_backed	0.226	(0.05)	0.090
Log(num_ipos)	-0.506	(0.00)	-0.201
Halloween	0.016	(0.88)	0.006
Log(sales)	0.010	(0.87)	0.004
BTM	-0.277	(0.12)	-0.110
EBITDA/sales	0.039	(0.60)	0.016
Log(offer_size)	0.786	(0.00)	0.313
Tangible_FA	0.465	(0.14)	0.185
Selling_out	-0.386	(0.13)	-0.154
Log(age)	0.049	(0.55)	0.019
Num_underws	-0.046	(0.05)	-0.018

10 Industry (sector) duummy variables for the 11 sectoors and a constant term are included.

Log likelihood = -394.84

Pseudo R^2 = 0.27

LR chi2(27) = 290.22 (0.00)

Mutual fund allocated funds = 50.19%

Table 8

IPO Aftermarket Returns over Various Investment Horizons

This table shows return performance available for investors investing in IPO shares since the closing of the first trading day. The 779 IPO sample covers January 2002 to March 2012 and various returns covers January 2002 to March 2017 on a daily basis. All IPO sample firms are partitioned by the record of allocation to mutual funds: 1 if allocated and 0 otherwise. There are three kinds of return measures reported: raw returns (*Raw ret.*), excess returns over Jasdaq returns (*Ex ret. over Jasdaq*) and Fama-French 3-factor α (*FF3-a*). We use daily returns and factors for average return per day and daily α. *t*-statistic tests the statisitical significance of the mean of the average raw and excess returns and α's for the total sample and the two partitioned sub-samples. *t*-value is parenthesized. The *t*-test of the mean difference in returns between the allocated and the unallocated IPO sub-categories assumes common variance. ***, **, and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

IPO characteristics	*Raw ret.*	(t-value)	*Ex ret. over*	(t-value)	*FF3-* α	(t-value)
Panel A. Half-year returns						
All (779)	0.024	(1.28)	-0.011	(-0.67)	0.003	(0.20)
Allocated 1 (391)	0.082	(3.39)***	-0.005	(-0.23)	0.012	(0.51)
Unallocated 0 (388)	-0.035	(-1.27)	-0.016	(-0.74)	-0.005	(0.24)
Diff (1)-(0)	0.117	(3.20)***	0.011	(0.34)	0.017	(0.53)
Panel B. One-year returns						
All (778)	-0.021	(-1.87)*	-0.032	(-3.32)***	-0.012	(-1.19)
Allocated 1 (391)	-0.042	(-2.73)***	-0.036	(-2.72)***	-0.019	(-1.45)
Unallocated 0 (387)	0.000	(0.02)	-0.028	(-2.00)**	-0.004	(-0.29)
Diff (1)-(0)	-0.043	(-1.90)*	-0.008	(-0.41)	-0.015	(-0.75)
Panel C. Two-year returns						
All (776)	-0.009	(-1.19)	-0.014	(-2.32)**	0.001	(0.21)
Allocated 1 (386)	-0.027	(-2.54)**	-0.020	(-2.54)**	-0.006	(-0.70)
Unallocated 0 (380)	0.009	(0.75)	-0.008	(-0.84)	-0.004	(-0.29)
Diff (1)-(0)	-0.036	(-2.28)**	-0.013	(-1.05)	-0.014	(-1.13)
Panel D. Three-year returns						
All (743)	-0.004	(-0.73)	-0.001	(-0.21)	0.008	(1.63)
Allocated 1 (375)	-0.012	(-1.48)	0.000	(0.05)	0.007	(1.19)
Unallocated 0 (368)	0.003	(0.39)	-0.002	(-0.34)	0.008	(1.11)
Diff (1)-(0)	-0.015	(-1.29)	0.003	(0.29)	0.000	(-0.04)

Table 9

Multinomial Logit Analysis of IPO Share Allocation by Affiliation Type and by Fund Orign Backgrounds

This table shows the results of multinomial logistic regression analysis of IPO share allocations by affiliation type in panel A and underwriter type of group's backgrounds. Category 0 is assigned to *No_Alloc* (reference category) in both panels. In panel A, the other three allocated categories of mutual funds by affiliation type includes: 1. *Affiliated_only*, 2. *Both* affiliated and unaffiliated and 3. *Unaffil_only*. In panel B, the other three allocated categories of mutual funds by fund's business backgrounds includes: 1. *Domestic_only*, 2. *Both* domestic and foreign funds and 3. *Foreign_only*. To control time-varying IPO market conditions, *Log (num_ipos)* is used while to conttrol fixed industry effects, we use 10 industry dummy variables (and the 11th is a reference year). The sample period is from January 2002 to March 2012 for 779 IPOs excluding foreign-registered firms and traditional financial institutions. The coefficient estimates are provided together with *z*-value parenthesized below each coefficent estimate. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

	Panel A			**Panel B**		
	0. Reference category = *No_Alloc* (*N* =388)			0. Reference category = *No_Alloc* (*N* =388)		
	1. *Affiliated_only*	2. *Both*	3. *Unaffil_only*	1. *Domestic_only*	2. *Both*	3. *Foreig_only*
Firm Variables	(*N*=9)	(*N*=80)	(*N*=302)	(*N*=106)	(*N*=200)	(*N*=85)
Undw_mb	0.071	-0.143	-1.171	-0.965	-0.612	-1.552
	(0.06)	(-0.23)	(-2.86)***	(-1.85)*	(-1.29)	(-2.21)**
Undw_cb	-0.618	0.155	-0.524	-0.791	-0.234	-0.320
	(-0.50)	(0.25)	(-1.71)*	(-1.88)*	(0.62)	(-0.75)
Undw_ib	-15.161	-0.800	-0.468	−0.471	-0.581	-0.478
	(-0.02)	(-1.57)	(-1.61)	(-1.24)	(-1.63)	(-1.15)
Undw_na1	0.843	-1.500	-0.530	-0.625	-1.500	-0.608
	(0.76)	(-0.25)	(-1.48)	(-1.32)	(-0.25)	(-1.14)
Undw_na	-14.395	-0.407	0.080	-0.312	-0.214	0.577
	(-0.01)	(-0.45)	(0.19)	(-0.51)	(-0.49)	(1.06)
VC backed	1.916	0. 930	0.269	0.635	0. 559	-0.137
	(1.90)*	(2.55)**	(1.37)	(2.36)**	(2.26)**	(-0.50)
Log(num_ipos)	3.391	-0.970	-0.897	-0.987	-1.230	0.253
	(1.10)	(-3.18)***	(-4.97)***	(-4.46)***	(-5.81)***	(0.70)
Halloween	1.357	-0.252	0.005	0.275	0.032	-0.371
	(1.57)	(0.78)	(0.03)	(1.16)	(0.15)	(-1.44)
Log(sales)	0.570	0.058	-0.005	0.146	-0.046	-0.028
	(1.08)	-0.34	(-0.05)	(1.03)	(-0.37)	(-0.19)
BTM	0.429	-0.418	-0.486	-0.372	-0.390	-0.817
	(0.38)	(-0.76)	(-1.54)	(-0.96)	(-1.05)	(-1.54)
EBITDA/sales	0.906	0.533	0.051	-0.064	0.230	0.026
	(0.22)	(1.01)	(0.37)	(-0.43)	(1.38)	(0.13)
Log(offer_size)	1.138	2.082	1.234	1.121	1.833	0.858
	(2.17)**	(9.73)***	(8.79)***	(6.32)***	(10.78)***	(4.52)***
Tangible_FA	-1.838	-0.807	1.049	0.512	0.92	0.6188
	(-0.66)	(-0.87)	(1.91)*	(0.70)	(1.38)	(0.79)
Selling-out	-2.450	-1.414	-0.580	-0.574	-1.276	-0.004
	(-1.34)	(-1.94)*	(-1.30)	(-1.02)	(-2.37)**	(-0.01)
Log(age)	0.216	-0.095	0.098	0.217	-0.018	0.093
	(0.38)	(-0.45)	(0.69)	(1.17)	(-0.11)	(0.69)
Num_undws	-0.459	-0.511	-0.065	-0.075	-0.103	-0.057
	(-2.04)**	(-2.64)***	(-1.58)	(-0.43)	(-2.20)**	(-1.05)
Constant	-47.428	-10.341	-3.170	-5.055	-5.512	-6.904
	(-0.02)	(-4.64)***	(-2.35)**	(-2.99)***	(-3.57)***	(-3.05)**
	Total *N*=779			Total *N*=779		
	LR chi2(78) = 434.73 (0.0)			LR chi2(78) = 406.21 (0.00)		
	R^2 = 0.28			R^2 = 0.22		
	Log likelihood = -561.47			Log likelihood = -739.00		
	with 10 industrical sector dummy variables included			*with 10 industrical sector dummy variables includd*		

Table 10

Regression Analysis of IPO Stock Performance over Three-year Period

This table shows the results of regression analysis of IPO stock return performance over six different investment horizons within three years including initial returns, half-year, one-year, two-year, and three-year returns with and without risk-adjustment. The interaction terms include those between bank-underwrite relations and three allocation categories: *Undw_mb2*, *Undw_mb3, Undw_cb2, Undw_cb3*, *Undw_ib2* and *Undw_ib3* IPOs. We do not include the interactions between bank-underwriter relations and allocation category of *Affiliated_only* (with only 9 such observation). The control variables, including lamda, are unchanged from our previous analysis in Table 9. The control variables include 10 industry (sector) variables with the 11th (*Others*) as a reference. The sample period is from January 2002 to March 2013 with *N*= 779. All variables are defined in Appendix I. The aftermarket return performance are measured from the end of the first trading day of IPOs through the end of stated investment horizon. The sample size decreases beyond one-year point because of delisting. The coefficients are provided together with t-value parenthesized below each estimate. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

IPO Characteristic Variables	(1) *Initial ret.*	(2) *Half-yr ret.*	(3) *Half-yr FF3-* α	(4) *1-yr FF3-* α	(5) *2-yr FF3-* α	(6) *3-yr FF3-* α
Undw_mb2	32.66	0.04	0.00	-0.11	-0.02	-0.02
	(1.30)	(0.26)	(-0.01)	(-1.44)	(-0.42)	(-0.58)
Undw_mb3	42.22	0.14	0.05	0.02	-0.02	0.00
	(1.96)**	(1.10)	(0.47)	(0.27)	(-0.48)	(0.04)
Undw_cb2	18.71	0.44	-0.15	-0.08	-0.04	-0.07
	(0.88)	(3.54)***	(-1.39)	(-1.23)	(-1.02)	(-2.09)**
Undw_cb3	-9.61	0.16	0.09	0.05	0.03	0.02
	(-0.78)	(2.26)**	(1.39)	(1.28)	(1.09)	(1.03)
Undw_ib2	6.73	0.20	-0.09	-0.06	-0.06	-0.02
	(0.30)	(1.58)	(0.77)	(-0.89)	(-1.29)	(-0.61)
Undw_ib3	3.56	0.16	0.04	-0.01	0.00	-0.01
	(0.35)	(2.64)***	(0.83)	(-0.18)	(0.15)	(-0.61)
Undw_na12	6.04	0.23	0.28	0.22	0.12	0.05
	(0.19)	(1.22)	(1.71)*	(2.16)**	(1.98)**	(1.18)
Undw_na13	-15.19	0.06	0.04	-0.01	-0.01	0.02
	(-0.94)	(0.64)	(0.47)	(-0.16)	(-0.32)	(0.86)
Undw_na2	-52.59	0.02	-0.15	-0.12	-0.11	-0.11
	(-0.85)	(0.05)	(-0.48)	(-0.60)	(-0.88)	(-0.89)
Undw_na3	-25.16	0.03	0.11	0.01	0.02	-0.01
	(-1.29)	(0.30)	(1.10)	(0.11)	(0.48)	(-0.30)
N (sample size)	779	779	779	778	766	743
adjusted R^2	0.25	0.04	0.03	0.05	0.11	0.09
All models include 10 industrical sector dummy variables.						

Table 11

Movement of IPO Firms' Leverage and Top-bank Borrowing over Time

Panel A of the Table shows debt-to-total asset ratio movements by lender-underwriter type over 5-fisical year periods: year -1 is one period year than the year of an IPO, year 0 corresponds to the year of IPO, years +1, +2 and +3 are similarly understood. N is the number of IPO firms, which is initially corrected at 989 and refined into 779 with allocation information. *increm.* shows a change over the two consecutive years while *cumulative* indicates cumulative changes over the four years from the level observed at the end of year -1. Panel B shows top-bank loan amounts over the same IPO window for the 507 firms classified by bank-underwriter relations with a top lending bank identified either at -1 or 0. Both mean and median are reported with median parenthesized below the mean statistic. cumulative shows a paired mean difference of the initial IPOs in *N*=412 whose top-bank loan is measured from year -1 to +3. ***, ** and * indicate statistical significance at the one, five and ten percent level.

Year relative to IPO	-1	0 (IPO period)		+1		+2		+3		-1 ~ +3	
Panel A Debt/assets	*N*	*level*	*N*	*increm.*	*N*	*increm.*	*N*	*increm.*	*N*	*increm.*	*cumulative*	
Undw_zero	153	0.352	153	-0.079 ***	152	0.000	150	0.012	151	0.018 *	-0.046	***
Undw_mb	80	0.672	80	-0.068 ***	80	-0.012	79	0.005	79	0.013	-0.067	***
Undw_cb	182	0.674	182	-0.100 ***	179	-0.019 ***	175	0.016 **	175	0.006	-0.100	***
Undw_ib	245	0.656	245	-0.093 ***	244	-0.034 ***	244	0.001	244	0.003	-0.122	***
Undw_na1	78	0.569	78	-0.092 ***	78	-0.001	78	0.021 *	78	0.007	-0.106	***
Undw_na	41	0.462	41	-0.045 ***	41	-0.090 ***	39	-0.002	39	0.005	-0.100	***
All	779	0.583	779	-0.091 ***	774	*-0.021* ***	765	*0.011* ***	*765*	*0.008* **	*-0.093*	***
Panel B Top-bank Loan		*mil. yen*		*mil. yen*		*mil. yen*		*mil. yen*		*mil. yen*	*cumulative*	
Undw_mb	69	9293.9	80	6652.0	79	5506.6	79	5931.9	79	5676.4	-2840.5	**
(median)		(802.0)		(600.0)		(567.0)		(451.0)		(195.0)	(-325.0)	
Undw_cb	148	2130.0	182	1898.4	179	1342.7	179	1707.2	175	1688.8	-181.6	
(median)		(597.0)		(397.0)		(263.0)		(279.5)		(261.0)	(-121.0)	
Undw_ib	195	4201.3	245	1921.4	244	1809.1	244	2006.8	244	1848.5	-2059.2	
(median)		(662.0)		(548.0)		(398.5)		(230.0)		(133.0)	(-205.0)	
All	*412*	4295.2	*507*	*2633.8*	502	*2199.9*	*502*	*2478.3*	*498*	*2361.0*	-1524.1	**
(median)		(660.0)		(520.0)		(354.0)		(278.5)		(180.0)	(-177.0)	

Table 12
Debt Deduction, Allocation and Aftermarket Performance IPO Shares

This Table shows the effects of the cumulative changes in Debt/assets through year t-1 and of the cumulative rates of changes in main-bank loans on the after-market risk-adjusted performance through year t in panel A and panel B, respectively. . Fama-Frech 3-factor risk-adjusted returns (α) are cross-sectional daily average of the stated holding period from the close of the first-day trading of IPO shares to the end of stated period. *Δ(Debt/assets)(t-1)* in panel A is the cumulative change in *Debt/assets* through year point t-1 for the IPOs allocated by stated category of underwriters, and , *mbADD(t-1)* , *mbADD(t-1)* , *cbADD(t-1)* , *ibADD(t-1)* , *nalADD(t-1)* and *naADD(t-1)* represent five interactions between allocation and the debt ratio for each of the five lender-underwriter categories. *Δ(Tob_l)(t-1)* in panel B indicates the rate of changes in pre-IPO main-bank loans through year point t-1. over years stated, the three kinds of interactions between allocation and top-bank loans by underwriter-banking relation types. *cbADL(t-1)* and *ibADL(t-1)* are the cumulative rates of changes in main-bank's loan amounts for the allocated IPOs by different banking underwriters and different investment banking underwriters. All other variables, defined in Appendix I, including bank-underwriter relations, IPO chracteristics and *lamda* are included but not tabulated in the table. ***, ** and * indicate statistical significance at the 1%, 5% and 10% level, respectively.

IPO characteristics	(1) 1-yr *FF3-α(t)*	(2) 1-yr *FF3-α(t)*	(3) 2-yr *FF3-α(t)*	(4) 2-yr *FF3-α(t)*	(5) 3-yr *FF3-α(t)*	(6) 3-yr *FF3-α(t)*
Panel A: Change in Debt/assets						
Alloc_D	-0.004		0.003		0.005	
	(-0.16)		(0.20)		(0.48)	
Δ(D/TA)(t-1)	-0.147	-0.180	-0.025	-0.043	-0.019	-0.021
	(-1.60)	(-1.73)*	(-0.53)	(-0.86)	(-0.64)	(-0.64)
mbADD(t-1)		0.561		0.071		0.142
		(0.98)		(0.24)		(0.69)
cbADD(t-1)		0.121		0.080		0.119
		(0.51)		(0.60)		(1.20)
ibADD(t-1)		0.089		0.142		0.016
		(0.44)		(1.35)		(0.22)
nalADD(t-1)		-0.113		-0.056		-0.165
		(0.36)		(-0.32)		(-1.40)
naADD(t-1)		0.210		-0.089		-0.012
		(0.38)		(-0.40)		(-0.09)
Standard control variables, lamda, industry dummy variables and a constant are all included.						
Adj R^2	0.05	0.05	0.10	0.10	0.08	0.08
p-value (*F*-statistc)	0.00	0.00	0.00	0.00	0.00	0.00
Observations (*N*)	778	778	766	766	743	743
Panel B: Change in Tob-bank Loans						
Alloc_D	-0.003		0.024		-0.002	
	(-0.10)		(1.12)		(-0.13)	
Δ(Tob_l)(t-1)	-0.008	-0.013	-0.003	-0.006	-0.001	0.000
	(-0.67)	(-0.99)	(-0.69)	(-0.97)	(-0.33)	(-0.08)
mbADL(t-1)		0.148		0.010		0.100
		(1.41)		(0.22)		(1.92)*
cbADL(t-1)		0.027		0.010		-0.011
		(0.87)		(0.75)		(-0.85)
ibADL(t-1)		-0.002		0.004		-0.003
		(-0.07)		(0.20)		(-0.47)
Standard control variables, lamda, industry dummy variables and a constant are all included.						
Adj R^2	0.06	0.06	0.10	0.10	0.10	0.11
p-value (*F*-statistc)	0.00	0.00	0.00	0.00	0.00	0.00
Observations (*N*)	412	412	401	401	366	366

Appendix I

Variable Definitions

Variable	Definition
Und_cb	•Dummy variable that takes the value of 1 if the lead underwriter of IPO is from a commercial banking financial group and 0 otherwise.
Und_ib	•Dummy variable that takes the value of 1 if the lead underwriter of IPO is from an investment banking financial group and 0 otherwise.
Und_net	•Dummy variable that takes the value of 1 if the lead underwriter of IPO is from an internet banking financial group and 0 otherwise.
Und_frn	•Dummy variable that takes the value of 1 if the lead underwriter of IPO is from a foreign-brand investment banking or commercial banking financial group and 0 otherwise.
Undw_mb	•Dummy variable that takes the value of 1 if the lead underwriter of IPO is from the same commercial banking financial group as the main bank of an IPO issuer and 0 otherwise.
Undw_cb	•Dummy variable that takes the value of 1 if the lead underwriter of IPO is from the different commercial banking group from the main bank of an IPO issuer and 0 otherwise.
Undw_ib	•Dummy variable that takes the value of 1 if the lead underwriter of IPO is from the different investment banking group from the main bank of an IPO issuer and 0 otherwise.
Undw_na1	•Dummy variable that takes the value of 1 if the IPO issuer does not borrow from any banks but borrows only from non-bank lending institutions and 0 otherwise.
Undw_na	•Dummy variable that takes the value of 1 if the IPO issuer does not disclose any information on institutional borrowing and 0 otherwise.
Undw_zero	•Dummy variable that takes the value of 1 if the IPO issuer does not borrow from any institutions and 0 otherwise.
Tob_l	•Dummy variable that takes the value of 1 if the main bank of an IPO issuer is a regional or local bank in the bank classification and 0 otherwise.
Log(num_ipos)	• Logarithm of the number of IPOs issued within one calendar year counting from the issue date of the IPO under consideration. This variable is specific to each IPO.
Initial ret.	•Initial return in percent on IPO shares based on the offering price and the closing price on the first trading day (not on the first market price).
Tech	•Dummy variable that takes the value of 1 if the high-technology key words we specify appear at least twice in the description of Company's Business in the Capital Eye database summarizing the content of IPO prospectus statement and 0 otherwise. The key words used in our text mining include *biotechnology*, *nanotechnology*, *artificial intelligence*, *3-D (or 4-D) technology*, *life science*, *science laboratory*, *robotics*, *ecology and new energy*, *degital* and *information technology* (excluding IT product services).
VC_backed	•Dummy variable that takes the value of 1 if the pre-IPO list of major shareholders include at least one venture capital investing in more than 1% of the totoal number of equity shares outstanding and 0 otherwise (Capita Eye database).
Offer_size	•Size of the total IPO offering amount in million yen including both sales by the existing owners and new equity capital raised by the firm going public.
BTM	•Book-to-Marker ratio of IPO shares using the book equity per share in the prior fiscal year to IPO and IPO's offering price per share.
Selling_out	•Fraction of the IPO shares sold out by the existing owners in the total IPO shares offered (including both selling out and new equity raised) by the IPO firm.

Num_ underws	•Number of underwriters invloved in the IPO under consideration.
Stand_market	•Dummy variable that takes the value of 1 if the shares of the IPO firm are listed on the first or the second section of the Tokyo (TSE), Osaka (OSE), Nagoya, Fukuoka and Sapporo Stock Exchnage and 0 otherwise. Emeging markets, taking the value of 0, include TSE Mothers, JASDAQ, Heracules (OSE), NEO (OSE), Centrex (Nagoya), Ambitious (Sapporo), and Q-Board (Fukuoka). They apply less restrictive listing standards than the established exchanges.
Age	•Number of years since the foundation date of the IPO firm.
Sales	•Net sales in million yen for the fiscal year prior to IPO.
Total assets	•Total assets in million for the fiscal year prior to IPO.
Debt/assets	•Debt to total assets ratio for the fiscal year prior to IPO.
EBITDA	•Earnings before interest, tax and depreciation and amortization in million yen for the fiscal year prior to IPO.
EBITDA/sales	•EBITDA margin for the fiscal year prior to IPO.
EAT	•Earnings after tax in million yen for the fiscal year prior to IPO.
Tangible_FA	•Ratio of tangible fixed assets to total assets of the IPO firm for the fiscal year prior to IPO.
Ave. asset_ growth	•Two-year average growth rate of total assets through the end of the fiscal year prior to IPO.
Halloween	•Dummy variable that takes the value of 1 if the IPO occurs during the first six months of the calender year and 0 otherwise.
Total_loans	•Total loan in million yen, borrowed from banks and non-bank financial institutions, for each of the IPO firms except for firms calssified into *Undw_zero* and *Undw_na*. This varibale is omitted for *Undw_zero* and *Undw_na* firms.
Tob_L	•Top-bank loan in million yen for each of the IPO firms with bank loans outstanding in the fiscal year prior to IPO. This variable is omitted for IPO issuers in *Undw_zero*, *Undw_na1* and *Undw_na*.
BL_dummy	•Dummy variable that takes the value of 1 if the IPO firm has a main bank, thus, bank loans, in the fiscal year prior to the IPO or the same fiscal year as the IPO.
Alloc_D	•Dummy variable that takes the value of 1 if the IPO firm's new shares are allocated to mutual funds in the underwriting/allocation process of IPO and 0 otherwise.
Industries	•Ten industry dummy variables for the eleven industry calcifications with the 11th as a reference category: 1. Food; 2. Materials/Energy; 3. Electronics/Auto/Precision; 4. Chemicals/Drug; 5. Metals/Machinery; 6. Information/Telecommunication; 7. Commerce; 8. Financials (other than banking, securities and insurance); 9. Construction/Real Estate; 10. Services; and 11. Others.
Raw ret.	•Daily average rate of returns on individual IPO shares in the aftermarket for a half year, one-year, two-year and three-year horizons. Initial returns are not included.
FF3-a	•Daily average abnormal return, alpha, derived from the Fama-French 3-factor model including market, SMB and HML facctors, for IPO shares in the aftermarket over a half-year, one-year, two-year and three-year horizons. Initial returns are not included.
Ex ret. over Jasdaq	•Daily average excess rate of returns over the Jasdaq dividend-adjusted returns in the aftermarket for IPO shares over a half year, one-year, two-year and three-year periods. Initial returns are not included.
Year 0 (-1)	•The same (prior) fiscal year as (to) the IPO year.
N	•Number of observations.