Block-Booking and IPO Share Allocation: The Importance of Being Ignorant[1]

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Abstract

Given the opportunity to buy IPO shares of uncertain value at a fixed price, potentially informed investors have an incentive to refuse to participate in offerings the underwriter happens to overprice. We show that an underwriter can efficiently resolve this problem by entering into a repeat game with a stable coalition of investors who agree to participate in all of the bank's IPOs (block-booking). Using a unique data-set consisting of UK transaction records that enables us to identify original investors for all large UK IPOs between 1997 and 2000, we find strong empirical support for this implication.

Key words: Initial public offerings; Share allocation; Underpricing; Book-building, Asymmetric Information; Investment banking

JEL classifications: G24; D82; G32; G18

I do not approve of anything that tampers with natural ignorance. Ignorance is like a delicate exotic fruit; touch it and the bloom is gone.

Lady Bracknel (Gwendolen's lead manager), *The Importance of Being Earnest*

The enormous volatility in IPO initial returns demonstrates that investment banks generally set an IPO's offer price without possessing any very precise idea about its market value. This state of affairs creates a problem for the underwriting bank: any offer price it sets that exceeds an offering's worst case market value presents investors with the opportunity to "lemon-dodge", that is, to refuse to participate in an offering that the bank happens to overprice.[2] Since lemon-dodging consumes real resources (offerings fail, etc.) but creates no new wealth, the offering process would proceed in a more efficient manner if investors would just remain ignorant about an IPO share's precise market value when making their participation decision.

A bank can bring this state of ignorance about by pooling together its IPOs and offering them to a stable coalition of investors as a package deal. This practice, known as block-booking, works in the following manner. The bank offers shares in each of its IPO to coalition investors at a price greater than their worst-case value but less than their expected value, thereby making membership in its coalition valuable. To counteract the incentive to lemon-dodge that arises from this practice, a bank commits to eject any investor who does lemon-dodge from its coalition (a bank can do so as it allocates shares at its discretion). An investor must therefore choose between remaining in the coalition (and obtaining on average underpriced shares in the future) and lemon-dodging once. The bank then sets each IPO's offer price at the maximum level such that investors choose to remain in the coalition.

In addition to explaining the most obvious features of the IPO market (underpricing on average and highly volatile initial returns), the block-booking theory yields two unique implications regarding the pattern of underpricing and the allocation of shares. Consider pricing first. The gain an investor expects to obtain by remaining in the bank's coalition is independent of the characteristics of the bank's current offering. The bank raises an IPO's offer price from its

[2] The rapid convergence between an IPO's share price and its market value once trading begins (documented by Aggarwal and Conroy [2000] among others) suggests that investors know enough to make this problem real.

worst-case value until the benefits of lemon-dodging (avoiding downside risk) equals this constant coalition benefit. It follows that banks set offer prices to equalize downside risk across their offerings, **not** expected returns. Examining US IPOs over the 1986 to 2003 period, James [2004] demonstrates that this is so: while the expected return on high tech IPOs during the boom of the late 90's exceeded that of non-tech IPOs issued in non-boom years by over 35 *percentage points*, downside risk across the two groups of offerings differed by a trivial 9 *basis points*.[3]

Turning now to allocation, the block-booking theory implies that a bank offers shares in *all* of its IPOs to the investors in its coalition (a bank can set offer price higher when offering shares to coalition investors rather than to lemon-dodging non-coalition investors). We test this implication here with a unique dataset that enables us to observe original investors for a sample of all 130 domestic UK IPOs that raised more than £10 million over the 1997 to 2000 period. We find that: 1) the probability that a bank selects a given investor to participate in one of its IPOs is far higher if that investor has participated in the bank's previous IPOs; and 2) the characteristics of the deals in which an investor has participated do not affect this selection probability. Our data allows us to control for each investor's general level of participation in the IPO market, so we are confident that our finding that banks form coalitions is not an illusion arising from the fact that all banks draw IPO investors from the same small pool. Thus, we conclude that banks do block-book their IPOs.

Previous Literature

Kenney and Klein [1983] were the first to explore the economics of block-booking. We apply their general analysis to the specific circumstances of the IPO market. In so doing we extend and modify the Information Extraction (IE) approach to understanding underwriting pioneered by Benveniste and Spindt [1989], Benveniste and Wilhelm [1990], and Sherman and Titman [2002]. In our view the IE theory does the best job of explaining the IPO market's observed empirical regularities, so we concentrate on that theory here. Ritter and Welch's [2002] excellent survey of the extensive IPO literature provides an overview of the alternatives.

[3] The block-booking theory can therefore explain the "risk"/expected return relationship documented by Asquith, Jones and Kieschnick [1998], building upon earlier papers by Beatty and Ritter [1986] and Ibbotson, Sindelar, and Ritter [1988].

In the IE approach, a generally observable IPO type comes in a variety of flavors (e.g., high value and low value) observable by investors alone. The task of the bank is then to extract the information investors possess so as to set an IPO's offer price more accurately. To do so, the bank forms a stable coalition of investors and rewards the investors who provide their information with underpriced shares (engaging in a repeat game with a stable set of investors reduces the average discount needed to sustain the equilibrium). In this framework, however, an investor has an incentive to declare an IPO's value to be lower than it in fact is so as to get high value shares at a low price. To limit an investor's incentive to engage in such behavior, the bank allocates shares in IPOs the investors declare to be of high value to *coalition* investors (at a discount) and allocates the shares coalition investors declare to be of low value to *non-coalition* investors at their expected value.

The IE approach does a good job of explaining why banks underprice IPOs on average and why banks form investor coalitions. The IE approach also provides an explanation for why banks take their offerings on "road-shows" for potential investors (we show below that a block-booking bank will also use road-shows to extract information on an IPO's flavor). However, the IE approach provides a less satisfactory account for why initial returns are so volatile. If initial investors are really getting–generously–compensated for the information they provide on market value, one would think that they would do a better job. Furthermore, the IE theory provides little insight into how the pattern of underpricing will vary across different observable types of IPOs (tech vs. non-tech). After all, the bank need hardly compensate investors for providing information that it can easily observe itself. And, while the IE approach does imply that banks form coalitions, it does not imply that they allocate shares in *all* of their IPOs to coalition investors.[4]

Turning now to previous empirical research on share allocation, the fact that investment banks

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[4] Of course, the existing empirical evidence on allocation already provides little support for the IE theory's implication that banks exclude coalition investors from a subset of their IPOs. IE theorists have attempted to reconcile their theories with this evidence in two ways. First, they argue that the separation result is far starker in theory than it is in reality. Benveniste and Wilhelm [1990], for example, suggest that if a project could assume a continuum of values rather than just the two (high/low) they model, the bank would exclude coalition investors from only IPOs with the (seldom observed) lowest possible share value (empirically: those with an expected return of zero). However, Asquith, Jones, and Kieshnick's [1998] analysis of IPO return distributions finds that zero expected return IPOs are in fact far from uncommon. The second argument is that a bank (somehow) just has to offer shares in all of its IPOs to its coalition (Hanley and Wilhelm [1995], Benveniste, Busaba, and Wilhelm [1996]). We find this "coalition investors must participate" constraint to be extremely artificial, as banks do not have any incentive (within the IE approach) to behave in this manner.

very rarely disclose any information on allocation has limited both the detail of the questions that can be explored and the size of the sample with which to explore them. For example, Hanley and Wilhelm [1995] find that, for one (US) bank from whom they could obtain data, institutional investors as a whole receive roughly the same proportion of each offering. Cornelli and Goldreich [2001], examining IPOs and secondary offerings at a single (European) bank, find that higher allocations are given to those institutional investors who participate regularly and to those who reveal strong indications of interest. Aggarwal, Prabhala, and Puri [2002] obtain similar results with US data.

One potential problem with generalizing single bank results is that it is difficult to tell if the investors who participate regularly in that bank's IPOs are really part of that bank's coalition or if the bank selects investors at random from the pool of possible investors, with a given investor's selection probability determined by its size (etc.). Our data allows us to overcome this problem, as it enables us to directly examine individual investors' participation in IPOs across multiple banks. We can therefore estimate the probability that a given investor participates in a given bank's IPOs controlling for that investor's general level of participation in the IPO market. We are, to our knowledge, the first to do so.

I. A Model of Block-Booking

A. Set-up and Assumptions

We model the IPO process as a game involving entrepreneurs with projects to sell, investors with money to invest, and a bank that intermediates between the two.

Projects

Projects consist of a single observable type that comes in two flavors H and L. In each period T Fate endows an entrepreneur with either an H or an L project, each with probability ½. The value of the period T project is V_T, which lies on the range $[0, V_{Max}]$. For H (L) projects, V is drawn at random from distribution W_H (W_L), with density w_H (w_L). L projects are more likely to find their values closer to 0 than are H projects. Formally, $Prob[V_T|_H < V^*] < Prob[V_T|_L < V^*]$ for all $V^* < V_{Max} - \varepsilon$. A project consists of a single infinitely divisible share.

The Bank

The bank competes for the business of risk neutral entrepreneurs by devising an underwriting method that is successful,[5] and, conditional upon achieving success, maximizes expected offer price. We assume that the bank charges a fixed fee for underwriting projects, which we set to 0 for convenience.

The bank sets offer prices and selects the investors to whom it offers shares at its discretion. The bank can not observe either a project's flavor (H or L) or its value (V_T) before setting its offer price (P_T).[6]

Investors

Investors behave competitively, are risk neutral, and maximize profits (π). Investors and the bank live forever. It follows that the bank and investors can form long-term relationships if they so wish. Each investor the bank selects for a given IPO invests $1.

We incorporate the idea that investors, by virtue of their position in the market, possess information on project value not known to the bank in two ways. First, investors can observe a project's flavor. Second, an investor can detect (at some small cost ε) if $V_T < P_T$ when presented with a concrete offer to buy at P_T. An investor "lemon-dodges" when he avoids participating in an ex-post overpriced IPO.

Sequence of Play

Each period consists of the following phases:

τ_1: An entrepreneur presents his project to the bank. Investors observe its flavor.

τ_2: The bank presents the project to selected investors at a "road-show" and polls them on its flavor (investors need not declare truthfully);

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[5] We make this assumption for convenience, but our results require only that having a deal fail imposes a cost. Sherman [2002] shows that auctions have a higher probability of failure than book-building (of which block-booking is a varient), and argues that this risk accounts why underwriters do not use auctions to allocate IPO shares.

[6] The bank can not set a project's offer price at a level higher than its best estimate of the project's value. For simplicity, we assume that this constraint does not bind in the analysis below.

τ_3: The bank sets T's offer price P_T and offers the share to investors;

τ_4: The selected investors decide whether or not participate;

τ_5: If the investors choose to purchase, the offering is successful and trading begins. The project's flavor and market value are revealed.

B. Block-Booking

A bank could market an IPO by simply asking a randomly selected group of investors to declare its flavor and then offering these investors that IPO at its expected value. And, if investors would declare flavor truthfully and would disdain the practice of lemon-dodging, then this underwriting method would be socially efficient, as this method would maximize expected proceeds for entrepreneurs while providing investors with a non-negative return. However, in this situation, investors would both have an incentive to declare type H projects to be of (lower expected value) type L and would find it profitable to embrace rather than to disdain the practice of lemon-dodging. To get around the problems posed by (potentially) misleading, lemon-dodging investors, the bank must devise a more sophisticated underwriting method.

We think that this more sophisticated method is block-booking. To block-book, a bank enters into a repeat game with a stable coalition on investors. It offers the investors the following deal:

- The bank underprices its IPO shares on average, thereby making coalition membership valuable;
- The bank ejects from its coalition any investor who lemon-dodges; and
- The bank sets each IPO's offer price at the maximum level such that an investor finds the profits of remaining in the coalition higher than the expected profits of lemon-dodging once.[7]

[7] For simplicity, we assume that the bank can detect lemon-dodging with probability 1. As lemon-dodging becomes harder to detect, the average discount the bank must offer to get block-booking to work will increase.

Implementing Block-Booking

Assume for the moment that the bank can induce investors to declare each IPO's flavor truthfully (we show how the bank can do so below). The bank and investors then know each IPO's share value distribution. Suppose that the bank sets T's offer price to P_T. Recalling that an investor invests $1 in each offering for which he is selected, the expected return an investor obtains by remaining in the bank's coalition (buying in all cases) equals

$$E[\pi_{BB}] = -\left| \int_0^{P_T} \frac{V_T - P_T}{P_T} \; w_T \; dV \right| + \int_{P_T}^{V_{T,Max}} \frac{V_T - P_T}{P_T} w_T \; dV$$

$$= -\lambda_T[P_T] + U_T[P_T] \tag{1}$$

λ (U) measures absolute value of downside (upside) risk, that is, the portion of the investor's expected return due to the possibility that V_T may be less than (greater than) P_T. Obviously, $\lambda_T | (P_T=0) = 0$ and $\partial\lambda/\partial P > 0$.

If an investor lemon-dodges, he avoids downside risk but he loses future coalition profits of χ. Hence,

$$E[\pi_{LD}] = U_T[P_T] - \chi \tag{2}$$

In equilibrium the bank sets offer price a the maximum level (P_{BB}) such that

$$E[\pi_{BB}] = U_T[P_T] - \lambda_T[P_T] \geq U_T[P_T] - \chi = E[\pi_{LD}]$$

$$\Rightarrow \lambda_T[P_{T,BB}] = \chi \tag{3}$$

The profit an investor expects to obtain by remaining in the bank's coalition is independent of the type of IPO the bank underwrites in the current period. That is, χ is a constant. It follows that a given value of χ implies an equilibrium set of prices for H and L IPOs. Denote a set of offer prices $\{P_{H,BB}, P_{L,BB}\}$ that satisfy equation 3 as **P***. As a higher value of $P_{H,BB}$ will imply a higher value of $P_{L,BB}$, we shall speak loosely of **P*** itself as increasing or decreasing.

Now consider χ in more detail. Denote the present discounted number of the bank's future IPOs in which an investor expects to participate by N. It follows that

$$\lambda_T|_{\mathbf{P}*} = \chi = \frac{N}{2}\left(E[V_H] - P_{H,BB}\right) + \frac{N}{2}\left(E[V_L] - P_{L,BB}\right) \tag{4}$$

The bank then chooses **P*** to satisfy equation 4. It is obvious that there is a unique **P*** that does so, as downside risk increases in **P*** and coalition profits decrease in **P***. Denote the offer prices that bring this result about as $\mathbf{P}_{H,BB}$ and $\mathbf{P}_{L,BB}$. Consider two implications of this equilibrium.

Proposition 1: A block-booking underprices its IPOs on average.

> Proof: If a bank sets $P_T > 0$, then $\lambda_T > 0$, implying that $\chi > 0$ in equilibrium. Since $\chi > 0$ iff N * (E[V] – E[P]) > 0, it follows that E[V] > E[P].
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Proposition 2: A bank that block-books will allocate shares in all of its IPOs to the investors in its coalition.

> Proof: Suppose that a bank can offer an IPO to either coalition (N > 0) or non-coalition (N = 0) investors. If the bank selects the coalition investors, then the offer succeeds (no lemon-dodging) and $P_T > 0$. If the bank chooses non-coalition investors and sets $P_T > 0$, then $D_T > 0$ and $\chi = 0$, implying that the non-coalition investors lemon-dodge ($\pi_{LD} = U_T|_P - \chi_{\text{No Coalition}} > \pi_{\text{No LD}} = U_T|_P - \lambda_T|_P$). The bank therefore allocates all IPOs to coalition investors.
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Under the block-booking theory, a bank underprices shares (on average) and allocates those shares to a stable coalition of investors so as to deter investors from embarking upon a socially inefficient quest for information on share value (lemon-dodging). Under the information extraction theory that we discussed in the introduction, on the other hand, a bank underprices shares and allocates at least flavor H IPO shares to a stable coalition of investors so as to induce investors to reveal project type. Since we derived the block-booking equilibrium assuming that the bank knew project flavor, one might wonder if we have simply assumed away the real problem that an actual bank must solve. To allay any such concerns, we now show that a block-booking bank can (almost costlessly) extract information on project flavor from coalition investors.

To see why truthful revelation may be a problem, recall that the share value distribution of H

IPOs lies to the right of that of L IPOs. Since the bank acts to equalize downside risk across its offerings (see James [2004]), it follows that $\mathbf{P}_{L,BB} < \mathbf{P}_{H,BB}$. Hence, investors will benefit if they can convince the bank to offer H IPOs at $\mathbf{P}_{L,BB}$ instead of $\mathbf{P}_{H,BB}$. To counteract this incentive, the bank can exploit collective action problems among investors.

Proposition 3: A block-booking bank can almost costlessly induce coalition investors to reveal project flavor truthfully by exploiting collective action problems among them.

> Intuition: The bank polls investors at the road-show as to project flavor and acts as if the project is of the type declared by the majority. Investors have a collective interest in persuading the bank that H projects are L projects as L projects have a lower offer price. However, the bank ejects investors who mislead it from its coalition, depriving those investors of the profits they could expect to obtain by purchasing on average underpriced IPO shares in the future. It follows that each individual investor has an incentive to free-ride upon the deception created by other investors. The probability that any one investor's H or L vote affects offer price declines as the number of investors increases. The bank can therefore make it optimal for each individual investor to declare project flavor truthfully by a combination of choosing a coalition of sufficient size shading down the offer price of H projects. Since banks can construct reasonably (if not infinitely) large coalitions, they will never have to shade H IPO offer prices down by much to bring this result about.
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> Proof: See Appendix
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So, if a bank does block-book, one would expect the offering process to proceed as follows. After an entrepreneur approaches the bank with a project to sell, the bank presents the project to its coalition investors at a road-show (with an offer price range of $\mathbf{P}_{L,BB}$ to $\mathbf{P}_{H,BB}$). At the road-show, the bank polls investors on the project's flavor and incorporates this information when deciding upon the project's final offer price (choosing $\mathbf{P}_{L,BB}$ or $\mathbf{P}_{H,BB}$). Finally, the bank offers coalition investors shares at the offer price, and the investors accept (i.e., do not lemon-dodge). We think that this (stylized) description of the offering process is consistent with what happens, as discussed in Hanley and Wilhelm [1995] and Cornelli and Goldreich [2001].

Efficiency

While we have now demonstrated that a bank can block-book, and have explored what one would expect to observe if a bank does block-book, we have yet to show that a bank would wish to block-book. We turn to that question now. We assume in this section that the bank underwrites just one flavor of IPO so as to avoid the need to explicitly take into account the constraint that an IPO's offer price cannot exceed its expected value.

Proposition 4: An entrepreneur will never prefer a non-block-booking bank (whatever method it uses) to a block-booking bank in a position to underwrite a sufficient volume of projects.

Proof: Denote the value of λ that occurs when P = E[V] as λ_{Max}. Investors choose not to lemon-dodge if

$$\lambda_{Max} - \alpha \leq N\left(E[V] - P\big|_{\lambda=\lambda_{Max}-\alpha}\right) \tag{5}$$

Note that P < E[V] if α > 0 and that P → E[V] as α → 0. It follows from equation 8 that there is an N* such that, if N > N*, the block-booking equilibrium holds. Since a block-booking bank maximizes P, the bank also chooses $\lambda_T > \lambda_{Max} - \alpha$ if N > N*. Hence,

$$\underset{N\to\infty}{\text{Limit}}[P] = E[V] \tag{6}$$

Since an entrepreneur can never expect to obtain more than E[V] for his project, a non-block-booking bank will not be able to offer an entrepreneur a higher expected offer price for his project than a block-booking bank in a position to underwrite a sufficient volume of deals.

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Having established that a block-booking bank can attract entrepreneurs with projects to sell, we now consider whether or not this state of affairs is a good thing from the perspective of the economy as a whole.

Proposition 5: The practice of block-booking maximizes the expected net wealth created per project. Block-booking therefore leads to static efficiency.

Proof: The period T project creates gross wealth of V_T. The period T entrepreneur receives P_T and investors receive $V_T - P_T$. Hence, the investors and the entrepreneur split the entire gross value of each project, implying that the net wealth created per projected equals the gross wealth created per project. It follows that block-booking maximizes the net wealth created per project.

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Proposition 6: Block-booking provides, in the limit, first best incentives for entrepreneurs to create projects. Block-booking therefore promotes dynamic efficiency.

Proof: Entrepreneurs possess socially optimal incentives to create new projects when the price they expect to obtain ($E[P_T]$) equals the expected gross wealth created per project ($E[V_T]$). It follows from Proposition 4 block-booking achieves dynamic efficiency as N approaches infinity.

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Consequently, a bank that chooses to block-book its IPOs will be in an excellent position to attract entrepreneurs with projects to sell. Furthermore, since block-booking is also socially efficient, investors and entrepreneurs have no incentive to enter into some Coasian bargain to jointly develop an alternative underwriting regime. Thus, we think that banks in a position to exploit the advantages of block-booking will block-book.[8]

II. Do Banks Form Coalitions?

So, do banks in fact block-book? We established above that the hypothesis that banks do block-book is consistent with what previous research has revealed about the way the offering process works and with the pattern of underpricing that this offering process generates. The block-booking hypothesis also yields the additional empirical implication that

- A block-booking bank forms a strong and stable coalition of investors to which it allocates shares in *all* of its IPOs (Proposition 2).

We therefore assay the block-booking hypothesis against the data by seeing if this implication holds.

A. Designing the Test

If a bank does in fact select investors for its IPOs from a stable coalition, then one may identify the members of that bank's coalition by seeing who it selects. This observation suggests that one may test the proposition that banks block-book by:

- Sorting each bank b's IPOs by offer date, and splitting the IPOs into a control group (the first C_b IPOs) and a test group (the remaining T_b IPOs, numbered t=1...T);
- Identifying an investor as a putative member of b's coalition if b selected that investor for one of its control group IPOs; and

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[8] Sherman [2002] provides an analysis of why bookbuilding is superior to allocating IPO shares by auction. Consistent with her analysis, Derrien and Womack [2003] find that bookbuilding generally leads to less underpricing than allocation by auction (using a dataset from France where both methods are used). However, due to an institutional feature of the French market, banks that use the bookbuilding method face constraints when adjusting the offer price to information arising during the offering process. When these constraints bind, the amount of underpricing is greater under the bookbuilding method. Banks in the US and UK markets do not labor under these constraints, and we do not include such constraints in our analysis.

- Seeing if the bank preferentially selects the investors in its putative coalition for its test group IPOs.

We implement this test as follows (we summarize our variable definitions in Table I). We first construct a sample of potential IPO investors consisting of eligible (as we define below) investors who we can identify as taking a position in at least one control group IPO within its first 40 trading days. We number these investors with i, i = 1...I. Denoting IPO t underwritten by bank b as $IPO_{b,t}$, we then track participation (*Y*es/*N*o) by sample investors in test group IPOs with the variable $InvestYN_{i,t,b}$, with

- $InvestYN_{i,t,b}$ = 1 if investor i participates in IPO t (underwritten by bank b), and 0 otherwise.

We then construct three coalition membership variables, viz., $BookZeroR_{i,t,b}$, $BookOne_{i,t,b}$, and $BookMany_{i,t,b}$, with

- $BookZeroR_{i,t,b}$ = 1 if investor i participated in *at least* one zero expected return control group IPO brought public by the bank (b) underwriting the current IPO (t), and 0 otherwise;[9]

- $BookOne_{i,t,b}$ = 1 if investor i participated in *only* one control group IPO brought public by the bank (b) underwriting the current IPO (t), and 0 otherwise; and

- $BookMany_{i,t,b}$ = 1 if investor i participated in *at least* two control group IPOs brought public by the bank (b) underwriting the current IPO (t), and 0 otherwise.

Before proceeding, consider these coalition measures in more detail. We developed the block-booking theory assuming that a single bank was wholly responsible for bringing a given project to market, and in our empirical work we assign an IPO to its bookrunner. In reality, of course, most offerings are handled by syndicates. Furthermore, banks may hold back a proportion of IPO shares to allocate to non-coalition investors, perhaps to create a liquid market or to avoid creating a dominant shareholder (Brennan and Franks [1997]). Consequently, we would not

[9] Following Asquith, Jones and Kieschnick [1998], we identify an IPO as a zero expected return IPO if its actual return fell into the –5% to +5% range.

expect to find that IPO shares are exclusively allocated to the members of the bookrunner's coalition.[10]

These considerations suggest that, under the block-booking theory, one may order the three coalition membership variables by strength as follows: BookZeroR, BookOne, BookMany. BookZeroR will, under the block-booking theory, simply be an incomplete measure of coalition membership as it is based upon only a subsample of a bank's control group IPOs, and BookMany will be a stronger measure of coalition membership that BookOne as it is likely that an investor who appears frequently among the original investors in a given bank's deals is there because the bank is deliberately choosing him. Under the Information Extraction (IE) theory, on the other hand, a bank offers shares in zero expected return IPOs to non-coalition investors. Hence, the IE theory implies that BookZeroR is a measure of coalition **non**-membership rather than coalition membership. If the IE theory is correct, then, one would expect to find that banks do **not** select the investors who appear in zero expected initial return control group IPOs to participate in their test group IPOs.

In light of these considerations, we test the block-booking theory by estimating the following two probit equations (we discuss control variables below):

$$\text{(CT1)} \quad \text{InvestYN} = \beta_0 + \beta_1 * \text{BookZeroR}$$

$$\text{(CT2)} \quad \text{InvestYN} = \gamma_0 + \gamma_1 * \text{BookZeroR} + \gamma_2 * \text{BookOne} + \gamma_3 * \text{BookMany} \qquad (7)$$

CT1 provides a direct test of the IE theory as, under this theory, β_1 will be insignificant (or even negative). CT2 sheds further light on bank coalitions. We expect to find that both γ_2 and γ_3 are positive and significant, and that $\gamma_3 > \gamma_2$. Furthermore, since, from the perspective of the block-booking theory, BookZeroR contains no information not contained in BookOne and BookMany, we also expect to find that γ_1 is insignificant.

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[10] Once a bank constructs a large enough coalition of institutional (potentially lemon-dodging) investors to ensure that its offerings will succeed, other investors (not necessarily in a position to lemon-dodge) will know that the expected return on an IPO share is positive. A block-booking bank can therefore allocate a proportion of each offering to such investors knowing that they will choose to participate.

An Alternative Hypothesis and Control Variables

IPO theories in general (and ours is no exception) envision a world in which banks devise intricate pricing and allocation strategies to induce investors to behave in the appropriate fashion (which varies from theory to theory). One might instead suppose that banks simply select investors from the pool of suitable investors at random, with the selection probability being a function of investor characteristics.

If banks did behave in this way, what look like "coalitions" could still arise in the data in the following manner. If a given investor i has a high selection probability, bank b is likely to have selected i for one of its control group IPOs. The bank is also likely to select that investor for its test group IPOs. Hence, γ_2 and γ_3 will be significant and positive (and γ_1 will be insignificant), but only because BookOne and BookMany measure the same investor specific selection probability rather than because bank b preferentially selects its investors from a stable coalition.

Exploiting the fact that we have participation data for all UK IPOs over our sample period, we can control for this possibility with the variable $GenPart_i$, with

- $GenPart_i$ = The proportion of control group IPOs in which investor i took a position in the first 40 trading days.

If the probability that a bank selects a given investor for one of its test group IPOs is a function of that investors general level of activity in the IPO market, then including $GenPart_i$ into specifications 1 and 2 above will render γ_1, γ_2 and γ_3 insignificant (as they will be nothing more than poor measures of GenPart). If these coefficients remain positive after including a GenPart term, then one may be confident that banks do indeed form coalitions.

Since the probability that a bank selects a high GenPart investor may not be a linear function of GenPart and coalition membership, we also include a BookMany/GenPart interaction term in specification 2.

Of course, the probability that a bank selects a given investor to participate in one of its IPOs is also a function of how many investors the bank picks, which in turn will be a function of the size of the IPO. Assuming that banks wish to create a fairly diffuse shareholding for liquidity purposes–implying that the number of investors per IPO will not decrease proportionally as an IPO's size decreases–we also include a Ln[Size] term in our regressions.

Last, we also include individual bank coalition strength variables. Individual banks vary considerably in their prestige/market share, so we thought that it would be interesting to see if all banks form coalitions of equal strength. Each major bank has its own variable. We assign a single dummy to SecondTier to all minor banks. For reasons of confidentiality, we label the major bank variables BCS1 to BCS9. We define a bank coalition strength variable follows:

- Individual $BCSb_{i,t}$ = 1 if bank b is the book for the current IPO (t), and if investor i participated in one of its control group IPOs (i.e., if BookZeroR, BookOne, or BookMany = 1), and 0 otherwise.

A BCS variable will thus capture the extent to which an investor's selection probability will vary across banks given that the investor belongs to a bank's coalition.

B. The IPO Sample

Our empirical analysis requires data on IPOs and their investors. We take as our IPO sample all new equity offerings on the London Stock Exchange (i.e., that appear on the Official List) or the London Stock Exchange's Alternative Investment Market (AIM) over the period 1 January 1997 - 3 August 2000 that raised at least £10 million.[11] These criteria leave us with a sample of 130 IPOs (see Table II for summary statistics on the IPO sample).

To implement our coalition test, we divide the IPOs in our sample into a control group and a test group. To do so, we sort each bank's IPOs by offer date and allocate the first 2/3^rds^ of the IPOs to the control group and the remaining 1/3^rd^ to the test group. We provide a breakdown of the two groups by bank in Table III. Banks that underwrote less than 3 IPOs have all of their IPOs allocated to the control group (we use data from these IPOs to identify investors and to calculate GenPart).

This simple description masks several complexities. First, though IPOs are generally underwritten by syndicates, one cannot analyze a syndicate as a single meta-bank because syndicates are not that stable. Consequently, we assign each IPO to its bookrunner. However, even thinking about a "book" over time is not without difficulty. First, several of the banks in our sample merged over the course of our sample period. To deal with

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[11] We excluded offerings of units or investment trusts from our sample.

ownership changes, we assume that, if banks A and B merge to form C, then C inherits the coalitions of both A and B. So, for a bank C IPO in our test group, we include both bank A and bank B IPOs in C's control group. We treat the case of multiple books as a temporary merger: if a given test group deal is underwritten by banks A and B, we construct our coalition membership variables on the basis of both A and B control group IPOs.

To construct the BookZeroR variable, we also need to sort control group IPOs by expected return. In light of the empirical results of Asquith, Jones, and Kieshnick [1998], we assume that IPOs with an actual initial return of between –5% and +5% fall into the zero expected return group, and that all other IPOs fall into the positive expected return group.[12]

C. The Investor Sample

Our investor coalition test requires tracking IPO participation on an individual investor level across all the IPOs in our sample. We do so using a dataset known as Sabre, an internal trade reporting dataset collected by the UK's financial regulator the Financial Services Authority (FSA). Though the legal underpinnings and precise details of the reporting rules are complex, it suffices here to say that–basically– any firm executing a secondary market trade (On or Off-Exchange) cleared and settled in London must report that trade to the FSA. As a bonus, many firms do not bother to separate primary and secondary market transactions and so report both. A transaction report will contain data that allows one to observe the identity of the Reporting Firm and the Ultimate Transactor (UT).

Reflecting the fact that Sabre is derived from clearing records, UTs are reported on the "account" level. There are two sorts of accounts in the data, those associated with FSA authorized firms and those that are not. Accounts associated with authorized firms (e.g., Mercury Asset Management) are tagged with a unique market-wide ID known as a SIB Reference (or SIBREF) number. A SIBREF follows an authorized firm in all of its transactions, and so enables us to track an authorized firm in its dealings across banks. Non-authorized (e.g., retail) investors do not have a unique market-wide identifier, and so

[12] We experimented with other sorting schemes, but the empirical results below held no matter what sorting scheme we used.

can only be observed on the account level. Consequently, there is no way to link accounts held by the same non-authorized investor across banks.[13]

Given the way the data is reported, is not possible to calculate a General Participation level for investors who are not authorized firms. Since GenPart is a key variable in our analysis, we therefore focus our empirical work upon authorized firms. We do not think that limiting our focus in this way will hinder our ability to detect investor coalitions (if they exist), as: 1) it is likely that institutional investors will form the core of any coalition; and 2) virtually every entity that one would think of as an institutional investor requires authorization (with the exception of hedge funds).[14]

Taking our focus on authorized firms as given, there is still the question of whether we examine them on the account level or the SIBREF level. The question is important as a single authorized firm can transact through more than a dozen separate accounts in a single deal. Since it seems unlikely to us that each such account represents an autonomous economic agent acting within the authorized firm's umbrella, we think it more economically meaningful to aggregate account level data by SIBREF.

While authorized firms will generally correspond to economic agents, this correspondence is weaker for firms with complex organizational structures such as investment banks. Since one would generally expect the various subsidiary parts of a bank to get involved in a deal the bank is underwriting (either as the book or as a syndicate member), failing to take the complex organizational structure of a bank into account could create a bias in favor of finding coalitions. We remove this potential for bias by further aggregating SIBREFs to bank level for each book and syndicate member for each IPO in our sample. We then exclude any of these bank SIBREFs from the list of an IPO's participating investors.

Most authorized firms (let alone retail investors) never become involved in the IPO market. We therefore take as our investor sample authorized firms (examined on the SIBREF level)

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[13] Strictly speaking, there is also a third type of account (much less common than the other two). Firms authorized in non-UK jurisdictions (e.g., the Bank of New York) are at least sometimes tagged with their Bank Identifier Code (or BIC) number. However, linking accounts with BIC numbers is not required in the UK, and we are unsure as to the extent of this practice. We use BIC codes like SIBREFs when available. This practice allows us to increase (slightly) the number of institutions whose participation in IPOs we can track.

[14] There exist about 55,000 authorized firms in the UK with SIBREF numbers.

that took a position in at least one of the IPOs in our sample within its first 40 trading days. 10,303 authorized firms did so.

Identifying Investors That Participate in IPOs

We count a sample investor (SI) as a participant in an IPO if:

- The SI bought on the offer day at the offer price; or
- The SI had a negative net position in the issue at the close of its 40^{th} trading day[15]

We include the negative net position channel because we reasoned that an investor selling shares from "no where"–recall that Sabre contains all secondary market transactions–most likely acquired those shares in an unreported primary market transaction. In total, we identify 4322 IPO participants. Of this total, 3804 enter via the original purchase channel and the remaining 518 enter via the negative net position channel (see Table IV).

The 4322 investors who participate in at least one IPO participate a total of 7697 times in the 130 sample IPOs (i.e., each investor who participates in at least one IPO participates in an average of 1.8 IPOs). However, the participation distribution is highly skewed. To illustrate this point, we plot the conditional probability that a SI participates in at least X+1 IPOs given that he has participated in at least X (see Figure 1). Inspecting the figure, one can see that a SI participates in at least one IPO with probability 0.4. However, given that a SI has participated in at least 5 IPOs, he participates in at least one more with probability 0.8.

If banks selected investors at random this conditional probability plot would be flat (just as the conditional probability of getting "heads" while flipping a coin for the Nth time is 50% independent of the number of heads one obtained on the first N – 1 flips). Since this plot in fact rises steeply, this plot demonstrates that banks as a group preferentially select the investors for their IPOs from a small charmed circle.

The conditional probability plot also suggests that the investors in this charmed circle will

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[15] In fact, we tracked investors' negative net positions over various windows in post-issue trading and considered the first 40 trading day window as the most satisfactory one.

account for a highly disproportionate share of total participation, and such is indeed the case. While only 2% of SIs participate in 5 or more IPOs, these investors account for 30% of total participation (see Table V).

D. The Coalition Test

We test the block-booking hypothesis by estimating the probability that a control group sample investor participates in a test group IPO. We do so using probits.[16] The test group consists of 35 IPOs, and the control group yields a list of 7491 sample investors. Consequently, our regression dataset contains 262,185 observations (35 * 7491). One may find summary statistics on this dataset in Table VI, and the probits in Table VII.

In specification CT1 of Table VII we estimate selection probability as a function of BookZeroR (and control variables) so as to test the IE hypothesis. To recap: under the IE hypothesis, participating in a zero expected return IPO underwritten by bank b will indicate that the investor is **not** a member of b's coalition, implying that b will not preferentially select such an investor for its test group IPOs. Hence, the coefficient on BookZeroR (β_1) will be insignificant or negative. Under the block-booking hypothesis, however, participating in such an IPO indicates that the investor **is** a member of the bank's coalition, implying that β_1 will be positive and significant.

Inspecting Table VII reveals that β_1 is both positive and highly significant (after controlling for an investor's general level of participation in the IPO market). The empirical evidence on coalition membership is thus strongly inconsistent with the principal prediction of the IE hypothesis and (correspondingly) strongly in support of the block-booking hypothesis.

We explore coalitions further in specification CT2 by adding BookOne, BookMany, and individual bank coalition strength variables. CT2 yields several interesting results. Consider each in turn.

First, BookZeroR becomes insignificant. Under the block-booking hypothesis, BookZeroR is simply a less informative measure of coalition membership than either BookOne or BookMany. One would therefore expect this variable to become insignificant once one

[16] We estimate the probits using the econometrics package Shazam.

includes these variables in the regression.

Second, BookOne and BookMany are highly significant (after controlling for an investor's general level of participation in the IPO market), with BookMany having a considerably stronger effect than BookOne. This pattern too is consistent with the block-booking hypothesis as one would expect BookMany to provide a more accurate indicator of coalition membership than BookOne.

Third, our analysis indicates that the importance of coalition membership varies considerably across the banks in our sample (some of the BCS variables are large and significant), and that investor characteristics too affect an investor's selection probability (GenPart is highly significant). Though exploring these bank and investor effects is beyond the scope of this paper, we do plan to explore these effects in future work.

To illustrate the economic significance of these results, we show in Table VIII how an investor's selection probability varies with the investor's general level of participation in the IPO market, IPO size, bank coalition strength, and the investor/bank relationship. Consider, for example, an investor who is active in the IPO market, a large IPO (one standard deviation above the mean), and a bank with a strong coalition. If the investor is a member of the bank's coalition (BookMany = 1), the bank selects that investor with probability 0.36. If that investor is not a member of the bank's coalition, the bank selects that investor with a probability of about 0.005. If the bank has a weak coalition, on the other hand, a coalition investor's selection probability falls to 0.06.

Thus, coalition membership exercises an economically important influence upon an investor's selection probability. That is, investor coalitions exist.

We note here that, if anything, our analysis may understate the importance of coalition membership. Most importantly, we assign each IPO to a single bank (its book). Since in reality the IPOs in our sample are underwritten by multi-bank syndicates, a considerable proportion of the investors who appear in a given bank's control group IPOs will not be there because they are members of that bank's coalition. Consequently, one would not expect the bank to select such investors for its test group IPOs. This effect will exert a downward bias on our estimate of the coalition membership variables. Furthermore, our data, marvelous as it is, is not perfect (witness the fact that we pick some investors up through the negative net position channel). Thus, we do not identify all of an IPO's original investors. This problem too will likely bias down our estimates of the coalition membership variables. In addition, GenPart may measure (in part) membership in multiple coalitions. That is, the impact of GenPart on selection probability may arise because all banks tend to choose the same investors for their coalitions rather than because GenPart plays a role in selection probability as such. This effect will also bias down our estimate of the coalition membership variables. In light of these potential biases, we are confident that our coalition membership results arise because banks do form coalitions rather than as an artifact of the data.

So, the empirical evidence indicates that banks do form stable coalitions of investors to whom they preferentially allocate shares in all of their IPOs. Or, in other words, the data suggests that banks do indeed block-book.

III. Conclusion

A bank bringing a firm public must set the firm's offer price before trading establishes its market value. It follows that a bank inevitably presents an investor it invites to participate in an IPO with an opportunity to lemon-dodge, that is, to decline to participate in an IPO that the bank happens to overprice (to take advantage of this option, investors need only know whether the IPO's offer price exceeds its market value, not the IPO's market value itself). A block-booking bank reduces the incentive to lemon-dodge by entering into a repeat game with a stable coalition of investors. The bank underprices its IPOs on average (thereby making coalition membership valuable) and ejects any investor that does lemon-dodge from its coalition. The bank then sets an IPO's offer price at the maximum level such that an investor finds remaining in the bank's coalition more profitable than lemon-dodging once. In essence, block-booking enables a bank to amortize the cost of dealing with lemon-dodging in each of its IPO over a number of future IPOs, significantly reducing its per-IPO impact.

In addition to explaining the obvious features of the IPO market (underpricing on average, volatility in initial returns, the variation in expected return by IPO type), the block-booking theory yields two principal implications. First, a block-booking bank sets offer prices to equalize downside risk across its offerings, not expected return. James [2003] demonstrates that banks do set offer prices in this manner. Second, a block-booking bank will form a stable coalition of investors to which it will preferentially allocate shares in all of its IPOs. Using a unique dataset that allows us to identify original investors in all large (>£10 million) IPOs in the UK over the 1997 to 2000 period, we find that banks do indeed form stable coalitions. To illustrate, a bank with a strong coalition underwriting a large offering is about 20 times more likely to allocate shares to a coalition investor (an investor with whom the bank has dealt before) than to a non-coalition investor, controlling for that investor's general level of activity in the IPO market. Thus, we conclude that banks do block-book.

We note that block-booking inevitably leads to IPO shares being distributed "unfairly" in that a block-booking bank will favor the investors in its coalition over other investors. Yet, while being a member of a bank's coalition is definitely a good deal for the lucky investors so chosen, banks do not form coalitions to benefit those investors. Rather, banks form coalitions because they must do so to block-book and a bank block-books because doing so enables it to bring projects to market more efficiently. So, what appears to be "unfair" treatment of investors arises as a necessary byproduct of providing entrepreneurs with an efficient way to raise capital. If one were to deny banks the ability to block-book, then, one would–at best–be raising the cost of capital for entrepreneurs in order to benefit (non-coalition) investors who have done nothing to deserve it. To paraphrase Talleyrand, imposing "fairness" in share allocation would be worse than unfair, it would be a blunder.

Instead of acting to bring about "fairness" for investors, regulators may do better to concentrate on creating an efficient market for issuers. And while the empirical evidence on underwriting strongly suggests that block-booking promotes such efficiency, this practice is at least potentially open to abuse. Once a bank puts together a large enough coalition to ensure that its offering succeed, it can allocate a portion of shares to non-coalition investors. For such investors IPO shares are essentially free money due to the on-average underpricing that block-booking brings about. A bank will thus be tempted to extract some revenue from these investors in exchange for offering them the shares. Indeed, the US government's investigation into IPO share allocation suggests that at least some banks yielded to this temptation.[17]

To some extent, one might argue that this is a case of "no harm, no foul". That is, if the offer

[17] "Morgan Stanley May Face Charges in IPO Investigation", Wall Street Journal, 14 July 2003.

price is set at the maximum level such that coalition investors do not find it worthwhile to lemon-dodge, the fact that a bank extracts side-payments from non-coalition investors does not affect the proceeds raised. And from the perspective of maximizing social welfare, it can hardly matter whether or not a hedge fund must kick-back some portion of its free money to the underwriting bank. However, if a bank can extract kick-backs from investors, then it will have an incentive to shade-down a firm's offer price so as to increase the value of the kick-backs it can extract. Again, we emphasize here that the evidence on pricing does not suggest that banks underpriced tech stocks during the boom by an excessive amount relative to non-tech stocks during non-boom years. Nonetheless, the regulations governing the IPO process are clearly designed to align the incentives of the bank and the issuer by prohibiting the bank from (directly) profiting from underpricing. Since individual issuers are in an extremely poor position to detect and respond to an incentive misalignment that may arise from banks' lack of compliance with these regulations, regulators must monitor the market on their behalf so as to ensure that banks do not exploit the discretion that capital market efficiency demands they be granted.

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Appendix: Proof of Proposition 3

Proposition 3: A block-booking bank can almost costlessly induce coalition investors to reveal project flavor truthfully by exploiting collective action problems among them.

Proof: At the road show the bank polls a large number Q of investors on project flavor. Denote the number of investors who declare the project to by of type L by D_L. The bank sets the project's offer price at P_L if $D_L \geq Q/2$, and at P_H otherwise. Each investor acts independently.

Consider an investor Z and the interesting case in which the project is of type H. Since the investors cannot collude and are identical, Z assumes that the probability that a non-Z investor declares L is φ, $0 \leq \varphi \leq 1$. Assume that φ is such that it maximizes Prob[$D_{L,O} = (Q/2) - 1$], where $D_{L,O}$ denotes the number of the Non-Z investors who declare L. This assumption maximizes Z's benefit from declaring L. It follows that if Z does not find it optimal to declare L in these circumstances, there will not be an equilibrium in which any investor finds it optimal to declare L.

If Z does declare L, then the bank ejects Z from the coalition. Hence, if Z acts to mislead the bank by declaring L he also lemon-dodges (avoiding downside risk in the current offering) and loses future coalition profits of χ. Denoting upside risk given that the project's offer price equals P_H (P_L) by U_H (U_L), and downside risk by λ_H (λ_L), Z's profit as function of what other investors do is:

State	**Declare H**	**Declare L**	**Profitable Option**
$D_{L,O} \geq Q/2$	$U_L - \lambda_L$	$U_L - \chi$	Declare H
$D_{L,O} = (Q/2) - 1$	$U_H - \lambda_H$	$U_L - \chi$	Declare L
$D_{L,O} < (Q/2) - 1$	$U_H - \lambda_H$	$U_H - \chi$	Declare H

To see which option is the most profitable in each state, note that, since $P_L < P_H$, it follows that upside risk is larger and downside risk is smaller when the project's offer price equals P_L rather than P_H (given that the project is of type H). Recall also that we know from the block-booking equilibrium condition that $\lambda_H \approx \chi$. Hence,

$$\begin{aligned} U_L - \lambda_L &> U_L - \chi \\ U_H - \lambda_H &< U_L - \chi \\ U_H - \lambda_H &\approx U_L - \chi \end{aligned} \tag{A1}$$

Note also that if the Bank shades down P_H then the relative profit of declaring H increases (it is both more profitable to declare H in the current period and future coalition profits increase).

Z's expected profit from declaring L equals

$$E[\pi_{\text{Declare L}}] = (\text{Prob}[D_{L,O} = (Q/2) - 1] * (\Delta) \; - \text{Prob}[D_{L,O} \neq (Q/2) - 1] * F[P_H] \qquad \text{(A2)}$$

where Δ denotes the profits Z obtains in the case that Z casts the deciding vote in favor of L. The first term in equation A2 is positive, but decreases to 0 as Q increases as the probability that the state is such that Z's vote will be the deciding one decreases to 0. The second term is always positive. It follows that if the bank can choose a large enough coalition, then Z will never find it worthwhile to declare project flavor to be L when it is fact H even given the equilibrium offer prices we derived in the main text of the paper (assuming that the bank knew project flavor before setting offer price). If the bank is constrained on coalition size, then the bank can still ensure that declaring L is unprofitable by shading down P_H (making the second term larger). Since the bank can choose a reasonably large Q, it will never have to shade P_H down by much to ensure that coalition investors declare project flavor truthfully.

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Figure 1

Conditional Participation Probabilities

In this figure we plot the probability that a sample investor who has participated in X sample IPOs participates in at least one more sample IPO. Our IPO sample consists of the 130 new equity offerings on the London Stock Exchange (i.e., that appear on the Official List) or the Alternative Investment Market (AIM) over the period 1 January 1997 - 3 August 2000 that raised at least £10 million (excluding unit or investment trusts). Our investor sample consists of the 10,303 FSA authorized firms that took a position in a sample IPO within its first 40 trading days. We count a sample investor as participating in a given IPO if either: 1) that investor bought shares in the IPO at the offer price on the offer date; or 2) that investor had a negative net position in the IPO's stock at the close of its 40th trading day.

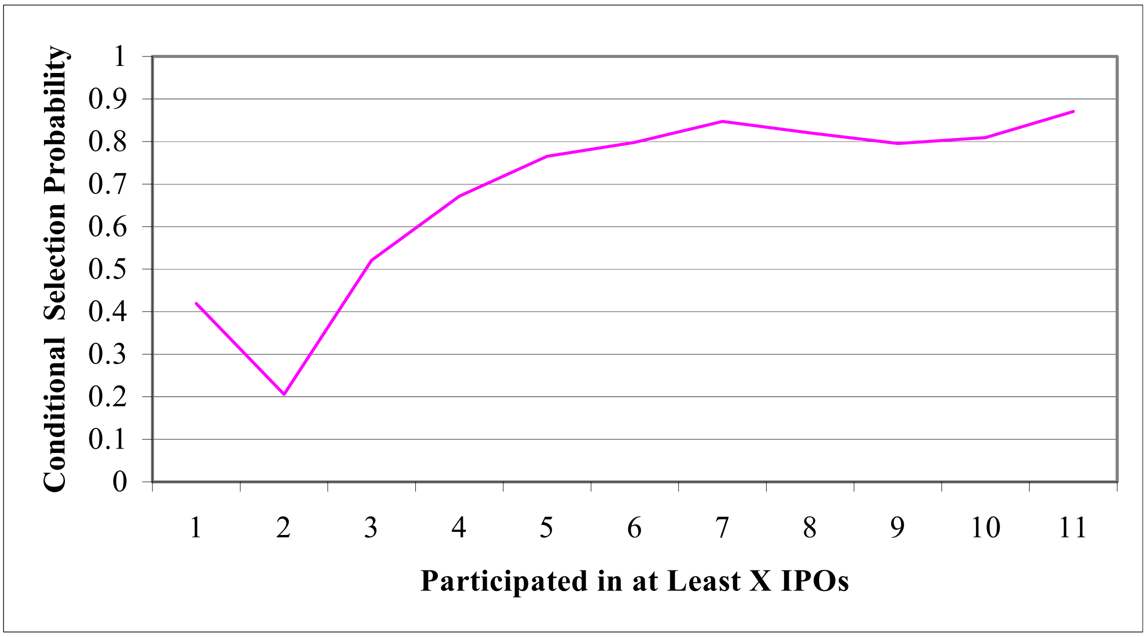

Table I

Coalition Test Variable Definitions

We test the block-booking theory by seeing if a bank selects investors for its IPOs from a stable coalition. To carry out the test, we allocate each IPO to (each of its) bookrunner(s) and split the IPOs into a control group and a test group. We identify an investor i as a putative member of bank b's coalition if that investor participated in at least one of b's control group IPOs. To establish that banks select investors from a stable coalition, we estimate the probability that a bank selects members of its putative coalition to participate in its control group IPOs.

Variable	Definition
$InvestYN_{i,t,b}$	A dummy variable that equals 1 if investor i participates in test group IPO t (underwritten by bank b), and 0 otherwise
$BookZeroR_{i,t,b}$	A dummy variable that equals 1 if investor i participated in a low (between –5% and +5%) expected return control group IPO brought public by the bank (b) underwriting the current IPO (t), and 0 otherwise
$BookOne_{i,t,b}$	A dummy variable that equals 1 if investor i participated in only one control group IPO brought public by the bank (b) underwriting the current IPO (t), and 0 otherwise
$BookMany_{i,t,b}$	A dummy variable that equals 1 if investor i participated in at least two control group IPOs brought public by the bank (b) underwriting the current IPO (t), and 0 otherwise
$GenPart_i$	The proportion of control group IPOs in which investor i took a position in the first 40 trading days
$Ln[Size_t]$	Ln[Total Proceeds (£ millions) of IPO t]
$BCSb_{i,t}$	Bank b's Coalition Strength variable equals 1 if b underwrote the current deal (t) and if either BookZeroR, BookOne, or BookMany equal 1, and it equals 0 otherwise. Each major bank has its own Coalition Strength dummy, while second tier banks are assigned a common Coalition Strength dummy.

Tables II

Summary Statistics: IPOs

Our IPO sample consists of the 130 new equity offerings on the London Stock Exchange (i.e., that appear on the Official List) or the Alternative Investment Market (AIM) over the period 1 January 1997 - 3 August 2000 that raised at least £10 million (excluding unit offerings and investment trusts).

Variable	**Mean**	**Std Deviation**	**Median**
Initial Return	0.2325	0.577	0.093
Size (£ Millions)	110.95	151.19	77.74
Ln[Size]	4.16	1.00	4.35
Number of sample investors per IPO	58.02	131.74	12

Table III

The Number of IPOs by Book

We assign each IPO to (each of) its bookrunner(s). Sorting IPOs by offer date, we assign the first 2/3[rds] of each bank's IPOs to the control group and the remaining 1/3[rd] to the test group. In the event that banks A and B merge to form C, we assign all A and B IPOs to C. We treat each second tier bank individually, but pool them together for reporting purposes. Banks that underwrote fewer than three IPOs have all of their IPOs put into the control group (we use investor data from these banks to identify sample investors and to calculate each investor's General Participation level). The sample consists of 130 IPOs, 95 control group IPOs and 35 test group IPOs. The sum of control group and test group IPOs in the table exceeds 130 due to multiple bookrunners.

Bank	Control Group IPOs	Test Group IPOs
Cazenove	12	5
CSFB	4	2
Deutche Morgan Grenfell	3	1
Dresdner Kleinwort Benson	6	3
Goldman Sachs	5	3
Merrill Lynch	4	3
Morgan Stanley	3	2
UBS Warburg	10	5
WestLB Panmure	5	3
Second Tier	54	10
Total Number of IPOs	106	37

Table IV

IPO Investors

Our investor sample consists of the 10,303 FSA authorized firms that took a position in a sample IPO within its first 40 trading days. We count a sample investor as participating in an IPO if either: 1) that investor bought shares in the IPO at the offer price on the offer date (the direct observation channel); or 2) that investor had a negative net position in the IPO's stock at the close of its 40th trading day. We identify investors using the FSA's trade-reporting dataset Sabre which contains all secondary market and at least some primary market transactions executed in the UK. Each FSA authorized firm is assigned a unique identifier number (a SIBREF) that enables us to track its transactions across banks. We do not count an underwriting bank or a member of its syndicate as an investor in its own IPOs.

Investors	**All IPOs**	**Control Group IPOs**	**Test Group IPOs**	**In Control and Test Group**
Investor Sample	10303	7491	4038	1226
Participating Investors: Direct Observation Channel	3804	2047	2130	373
Participating Investors: Negative Net Position Channel	1565	1133	694	262
Participating Investors: Total	4322	2529	2287	494

Table V

The Distribution of IPO Participation

In this table we report the distribution of IPO participation for sample investors. The 10303 sample investors participate a total of 7697 times in sample IPOs.

Sample Investors Who Participate In…	Proportion of Total Sample Investors	Proportion of Total Investor Appearances
O IPOs	58%	0%
1 IPO	33%	35%
2 – 4 IPOs	7%	35%
5+ IPOs	2%	30%

Table VI

The Coalition Test: Sample Summary Statistics

See Table I for variable definitions. We track the participation in our 35 test group IPOs by the 7491 FSA authorized firms that took a position in a control group IPO in its first 40 trading days, leaving us with a dataset consisting of 262,185 observations. For reasons of confidentiality, we cannot identify the bank to which each individual Bank Coalition Strength (BCS) Dummy applies. We therefore sort BSC variables by the magnitude of their coefficient estimates in Table VII.

Panel A: Discrete (0-1) Variables			
Variable	Mean	Variable	Mean
InvestYN	0.0056	BCS 4	0.0022
BookZeroR	0.0100	BCS 5	0.0039
BookOne	0.0441	BCS 6	0.0004
BookMany	0.0080	BCS 7	0.0029
BCS1	0.0019	BCS 8	0.0023
BCS 2	0.0117	BCS 9	0.0189
BCS 3	0.0018	BCS–SecondTier	0.0067

Panel B: Continuous Variables			
Variable	Mean	Standard Deviation	Median
Size (£ Millions)	110.95	151.19	77.74
Ln[Size]	4.16	1.00	4.35
GenPart	0.022	0.051	0.011

Table VII

The Coalition Test: Estimating Selection Probabilities

In this table we estimate the probability that a bank selects a control group sample investor to participate in one of its test group IPOs. The dependent variable is $InvestYN_{i,t,b}$, which equals 1 if control group sample investor i participates in test group IPO t (whose book is bank b), and 0 otherwise. Our dataset consists of 262,185 observations. We estimate each specification using a probit. See Table 1 for variable definitions. A "*" denotes statistical significance at the 1% level. To avoid over-identification, we omit BCS9 from CT2.

	CT1			CT2		
	Coefficient	Standard Error	t-Stat	Coefficient	Standard Error	t-Stat
Constant	-4.17*	0.05	78.42	-4.08*	0.06	68.93
BookZeroR	0.66*	0.04	16.67	0.012	0.05	0.21
BookOne	–	–	–	0.29*	0.05	5.31
BookMany	–	–	–	1.06*	0.08	13.30
GenPart	3.68*	0.08	47.80	3.64*	0.09	38.72
BookMany* GenPart	–	–	–	-1.70*	0.19	-8.93
Ln[Size]	0.30*	0.01	29.04	0.26*	0.01	22.17
BCS1	–	–	–	1.20*	0.08	14.26
BCS2	–	–	–	0.55*	0.06	8.85
BCS3	–	–	–	0.51*	0.10	5.23
BCS4	–	–	–	0.45*	0.09	5.11
BCS5	–	–	–	0.33*	0.07	4.39
BCS6	–	–	–	0.22	0.19	1.16
BCS7	–	–	–	-0.04	0.12	0.31
BCS8	–	–	–	-0.06	0.09	0.61
BCS–SecondTier	–	–	–	-0.10	0.12	0.82
McFadden R^2	0.23			0.28		

Table VIII

The Coalition Test: Selection Probabilities

In this table we report our point estimate of the probability that a bank selects an investor for one of its IPOs as a function of the investor's general level of activity in the IPO market, IPO size, bank coalition strength, and the relationship between the investor and the bank. We calculate these probabilities using specification CT2 in Table VII. We consider three levels of investor activity: Highly Active (GenPart = 0.2), Active (GenPart = 0.05), and Inactive (GenPart = 0.01). We consider two IPO sizes: Large (Ln[Size] = 5.16) and Average (Ln[Size] = 4.16). We consider two bank types: Strong Coalition (BCS1) and Weak Coalition (BCS9). We consider two levels of the Investor/Bank relationship: Non-Coalition (the investor did not participate in any of the bank's control group IPOs) and Coalition (BookMany = 1).

Case		Investor/Bank Relationship	
Investor and IPO Type	Bank Type	Non-Coalition Investor	Coalition Investor
		Selection Probabilities	
Highly Active Investor Large IPO	Strong Coalition	0.02	0.45
	Weak Coalition		0.09
Highly Active Investor Average-Sized IPO	Strong Coalition	0.01	0.36
	Weak Coalition		0.06
Active Investor Large IPO	Strong Coalition	0.005	0.36
	Weak Coalition		0.06
Active Investor Average-Sized IPO	Strong Coalition	0.002	0.26
	Weak Coalition		0.03
Inactive Investor Large IPO	Strong Coalition	0.001	0.33
	Weak Coalition		0.05
Inactive Investor Average-Sized IPO	Strong Coalition	0.001	0.24
	Weak Coalition		0.03