Networks in the board of directors : a consideration sets approach

Are pre-existing relationship the driving factor of the board recruitment process ?

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Introduction

Recruitment in the board of directors involves many factors, which are hard to disentangle. It is in the firm's interest to have skilled directors and a board devoid of deadlock, and shareholders may want to appoint directors who are able to both advise and monitor the CEO. On the other hand, it might be in the interest of the CEO to pack the board with friends to ensure his continuation as a CEO, and he may prefer board members that vindicate his decisions and support him in front of the shareholders.

When thinking about the importance of preexisting relationships in the board's recruitment process, we accordingly end up with several intuitions. First, there is the coordination concern, as it may be optimal to recruit like-minded individuals. Then, there is the screening concern: because of incomplete information, preexisting relationships may help with inference about the type of a director. That is, it may be easier for the board to reliably recruit skilled, fitting candidates through its network. Finally, there is the possibility of cronyism or nepotism. Bringing friends and cronies to the board may make governance easier while decreasing the supervision faced by the CEO and the board.

I use insights and methods from the product market literature to produce reliable estimates of the role of networks in the appointment process. By aggregating the potential candidates into profiles based on observables, I can produce novel joint estimates of the importance of networks in the recruitment process relative to other candidate characteristics.

Moreover, I can meaningfully interact firm characteristics and director characteristics, which allows me to disentangle the various intuitions outlined above. For example, if the coordination concern is paramount, I would expect larger multi-industry firms to recruit directors connected to the board. If recruitment through networks is mostly about CEO power, I would expect firms with longer CEO tenure to be more likely to recruit directors through the CEO's network.

My main contribution is twofold. First, I propose a rich and flexible specification inspired by the consideration set literature that allows me to jointly estimate the determinants of director choice and the composition of the choice set. This allows me to isolate the bias on parameters due to the composition of the choice set and recover the true parameter estimates. Secondly, I can exploit the vast dataset over 35 years and the structure of the model to get robust estimates on the relative importance of different observables in the recruitment process. This in turn allows me to shed light on which type of firm prefers to hire a given type of director and helps unravel the processes behind director appointment.

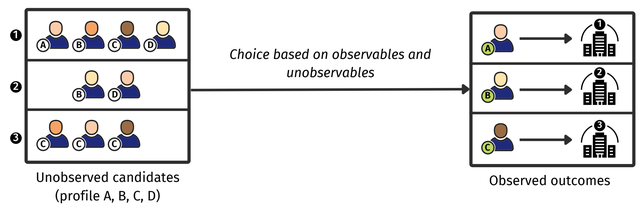
The dataset is based on BoardEx data for the directors and network component, augmented with CRSP-Compustat data for firms and market variables.
BoardEx is a business-oriented dataset focused on network data on business executives, by far the most complete dataset on firm board composition and maintains an impressive array of director and executive profiles. The dataset contains 1.4 million individual executive profiles, linked to over more than 300 000 identified firms and a million other various organizations. From these profiles' career and extra-professional history, it maps over 10 billion interpersonal relationships, with detailed information such as length of overlap, hierarchical positions, or the type of connection (educational, professional, social network, etc).

Why a consideration sets approach ?

The main issue in the director appointments literature is the fact that the choice set is unobservable. Standard approaches in the literature to tackle the issue have been to run the analysis on outcomes only, or to specify an ad hoc choice set.

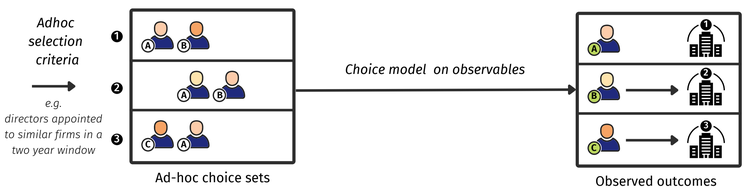
THE UNOBSERVED REALITY

Note we base the analysis on observation outcomes only, we cannot make causal inference. Knowing that A and C graduated from Harvard does not allow us to infer anything about the value of a Harvard education to the firm, as it might be that most candidates graduated from Harvard (e.g. A,C,D graduated from Harvard, but B graduated from Yale). Causal inference is therefore impossible without a model of choice.



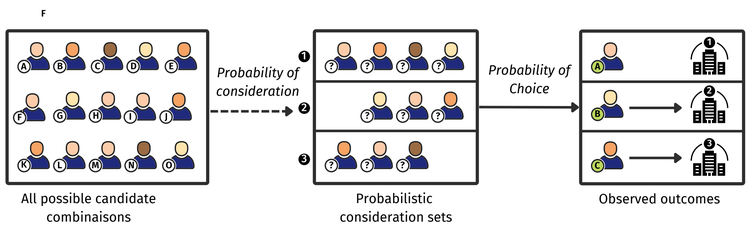
STANDARD CHOICE MODELS

Misspecified choice sets can introduce bias. If a given characteristic is over-represented in the choice set w.r.t. reality, then the model will underestimate the importance of this characteristic, and conversely if a characteristic is under-represented.
Here, profile A is assumed to be part of the pool of candidates for all firms but only ends up director of firm 1, while profile C is prefered to profile A in firm 3. In reality, profile A is a rare profile that is prefered to all other profiles by firm 1, and profile C was chosen by firm 3 because it was the only candidate profile. Estimates will be biased.



CONSIDERATION SET MODELS

In a consideration set model, we jointly estimate the probability of one option to be present in the choice set and the probability for this option to be chosen. Such a consideration set model allows for the endogenous determination of the choice set for each and every firm according to a set of parameters.



Assumptions

Identification of consideration sets is achieved through an exclusion restriction: I assume that the size of the network of the board shifts the choice set available to the firm without shifting its preferences conditional on choice set. (Goeree 2008, Abaluck and Adams-Prassl 2021)

Characteristics that affect the probability of a given profile to be considered:

- Experience
- Size of network
- Number of pre-existing relationships

I only consider the first appointment of a given director to a board, and I exclude appointees who were internally promoted.

Directors are considered to share a relationship if they:

- Worked in the same company, at the same location and at the same time
- Sat on the same board
- Held an executive position in the same company
- Were part of the same church
- Studied together (same major in the same university at the same time)

The network of an individual is the sum of all her relationships

Model

CHOICE MODEL

Let us denote firms by i, and observable profiles as j .
x_j denote the observable characteristics, with x_{jl} an element of x_j.
z_i the observed firm attributes, with z_{ir} an element of z_i.
ϵ_{ij} the idiosyncratic individual preferences, Gumbel EV over j.
We obtain the following model :

- $u_{ij} = \sum_l x_{jl}\tilde{\beta}_{il} + \tilde{\xi}_j + \epsilon_{ij} = V_{ij} + \epsilon_{ij}$
- $\tilde{\beta}_{il} = \bar{\beta}_l + \sum_r z_{ir}\beta^o_{lr}$ the taste of i for characteristic l.
- $\mathbb{P}_{ij} = \frac{e^{V_{ij}}}{1+\sum_m e^{V_{im}}}$

CONSIDERATION MODEL

Define the consideration function ϕ_{ij}, defining the probability of profile j being considered by firm i.

$$\phi_{ij} = \frac{e^{\gamma_{ij}}}{1 + e^{\gamma_{ij}}}$$

Where γ_{ij} is a function of firm characteristics and director characteristics.
Then, the probability that choice set $\mathcal{C}$ is being considered by firm i is given by

$$\pi_i^{\mathcal{C}} = \prod_{j\in\mathcal{C}} \phi_{ij} \prod_{k\notin\mathcal{C}} (1 - \phi_{ik})$$

This yields the formal choice probabilities:

$$p_{ij} = \sum_{\mathcal{C}} \prod_{l\in\mathcal{C}} \phi_{il} \prod_{k\notin\mathcal{C}} (1 - \phi_{ik}) \mathbb{P}_{ij}(x_j, z_i|\mathcal{C})$$

Results

I find that most of the evidence pointing towards nepotistic behaviour disappears when properly accounting for choice set selection. Notably, firms that hire individuals connected to the board are bigger, span less industries and have CEOs that are more recently appointed. Overall, the impact of personal connections on the likelihood of board nomination is very small. On the other hand, the size of the network of a candidate matters a lot, which suggests that networks are most likely used as a screening device: boards will gauge potential appointees through their networks.

TABLE 1: Importance of pre-existing relationships with members of the board

THE LEFT PART OF THE TABLE DISPLAYS THE RESULTS OF THE ESTIMATION FOR A BASELINE MODEL WHERE I MAKE NO ASSUMPTION ON THE CHOICE SET AND ALL PROFILES ARE CONSIDERED. THE RIGHT PART OF THE TABLE DISPLAYS THE RESULTS OF THE CONSIDERATION SET ESTIMATION. THE DEPENDENT VARIABLE IS THE LIKELIHOOD FOR A FIRM TO APPOINT A DIRECTOR WITH THE OBSERVED APPOINTEE'S PROFILE. IN EACH TABLE, THE FIRST COLUMN DISPLAYS THE RAW ESTIMATE FOR THE IMPACT OF ONE ADDITIONAL PRE-EXISTING RELATIONSHIP INTERACTED WITH THE DISPLAYED FIRM CHARACTERISTIC ON Uij , THE SECOND COLUMN DISPLAYS THE IMPACT OF A STANDARD DEVIATION IN FIRM CHARACTERISTIC ON Uij (ESTIMATE × STANDARD DEVIATION OF THE CHARACTERISTIC), THE THIRD COLUMN DISPLAYS THE T-STATISTIC AND THE FOURTH COLUMN DISPLAYS THE SIGNIFICANCE LEVEL (*=10%, **=5%, ***=1%).

	Base Model				CSC Model			
Firm Variable	Estimate	Std Effect	t-stat		Estimate	Std Effect	t-stat	
Board Size	0.05	0.15	25.82	***	0.05	0.15	21.45	***
ROA	-0.13	-0.03	-4.93	***	-0.07	-0.017	-1.87	*
Size	0.07	0.15	20.19	***	-0.01	-0.011	-1.29	
leverage	0.01	0.01	2.77	***	0.02	0.04	6.73	***
Q	0.08	0.08	12.38	***	0.07	0.01	5.84	***
Industries	-0.08	-0.06	-11.82	***	-0.14	-0.11	-18.37	***
NEWCEO	0.18	0.09	17.23	***	0.08	0.037	5.64	***
Board Network	0.07	0.10	13.37	***				
Supervisory Director	-0.10	-0.04	-6.78	***	-0.16	-0.055	-8.61	***
Intercept	-2.67		-66.83	***	-1.76		-53.84	***
Mean effect	-1.272695				-1.533248			
N° of observations	69843							
Log-Likelihood	-130696.2	Pseudo R^2	0.39229		Log-Lik	-68523.18		

TABLE 1

TABLE 2: Importance of past industry experience

THE LEFT PART OF THE TABLE DISPLAYS THE RESULTS OF THE ESTIMATION FOR A BASELINE MODEL WHERE I MAKE NO ASSUMPTION ON THE CHOICE SET AND ALL PROFILES ARE CONSIDERED. THE RIGHT PART OF THE TABLE DISPLAYS THE RESULTS OF THE CONSIDERATION SET ESTIMATION. THE DEPENDENT VARIABLE IS THE LIKELIHOOD FOR A FIRM TO APPOINT A DIRECTOR WITH THE OBSERVED APPOINTEE'S PROFILE. IN EACH TABLE, THE FIRST COLUMN DISPLAYS THE RAW ESTIMATE FOR THE IMPACT OF PAST INDUSTRY EXPERIENCE AT THE 3-DIGIT SIC INTERACTED WITH THE DISPLAYED FIRM CHARACTERISTIC ON uij , THE SECOND COLUMN DISPLAYS THE IMPACT OF A StandaRD DEVIATION IN FIRM CHARACTERISTIC ON uij (ESTIMATE × STANDARD DEVIATION OF THE CHARACTERISTIC), THE THIRD COLUMN DISPLAYS THE T-STATISTIC AND THE FOURTH COLUMN DISPLAYS THE SIGNIFICANCE LEVEL (*=10%, **=5%, ***=1%).

	Base Model				CSC Model			
Firm Variable	Estimate	Std Effect	t-stat		Estimate	Std Effect	t-stat	
boardsize	-0.04	-0.13	-6.23	***	-0.07	-0.23	-5.93	***
ROA	0.01	0.00	0.25		-0.16	-0.039	-0.74	
Size	-0.01	-0.02	-0.77		-0.07	-0.17	-3.33	***
leverage	-0.04	-0.11	-7.33	***	-0.03	-0.085	-2.32	**
Q	0.10	0.09	7.05	***	0.17	0.162	1.73	*
Industries	-0.47	-0.38	-22.65	***	-0.08	-0.061	-2.26	**
NEWCEO	0.36	0.18	13.78	***	0.56	0.27	7.14	***
Board Network	0.46	0.68	31.39	***				
Supervisory Director	-0.04	-0.01	-0.81		0.83	0.30	7.28	***
Intercept	-5.64		-44.52	***	5.71		25.52	***
Mean effect	-1.914566				5.682979			
N° of observations	69843							
Log-Likelihood	-130696.2	Pseudo R^2	0.3922		Log-Lik	-68523.18		

TABLE 3: Importance of the magnitude of the candidate's network

THE LEFT PART OF THE TABLE DISPLAYS THE RESULTS OF THE ESTIMATION FOR A BASELINE MODEL WHERE I MAKE NO ASSUMPTION ON THE CHOICE SET AND ALL PROFILES ARE CONSIDERED. THE RIGHT PART OF THE TABLE DISPLAYS THE RESULTS OF THE CONSIDERATION SET ESTIMATION. THE DEPENDENT VARIABLE IS THE LIKELIHOOD FOR A FIRM TO APPOINT A DIRECTOR WITH THE OBSERVED APPOINTEE'S PROFILE. IN EACH TABLE, THE FIRST COLUMN DISPLAYS THE RAW ESTIMATE FOR THE IMPACT OF AN INCREASE IN MAGNITUDE OF THE APPOINTEE'S NETWORK INTERACTED WITH THE DISPLAYED FIRM CHARACTERISTIC ON uij , THE SECOND COLUMN DISPLAYS THE IMPACT OF A StandaRD DEVIATION IN FIRM CHARACTERISTIC ON uij (ESTIMATE × STANDARD DEVIATION OF THE CHARACTERISTIC), THE THIRD COLUMN DISPLAYS THE T-STATISTIC AND THE FOURTH COLUMN DISPLAYS THE SIGNIFICANCE LEVEL (*=10%, **=5%, ***=1%).

	Base Model				CSC Model			
Firm Variable	Estimate	Std Effect	t-stat		Estimate	Std Effect	t-stat	
boardsize	-0.02	-0.08	-8.74	***	-0.09	-0.29	-18.68	***
ROA	-0.04	-0.01	-1.24		0.15	0.0366	2.14	**
Size	0.06	0.14	14.25	***	-0.01	-0.032	-1.74	*
leverage	-0.02	-0.05	-6.07	**	-0.01	-0.015	-1.19	
Q	-0.02	-0.02	-2.17	**	-0.05	-0.049	-2.53	**
Industries	0.01	0.01	1.38		0.05	0.042	3.26	***
NEWCEO	0.06	0.03	3.85	***	0.02	0.00	0.54	
Board Network	0.19	0.28	30.37	***				
Supervisory Director	0.13	0.05	5.58	***	0.92	0.33	24.16	***
Intercept	-1.81		-34.41	***	2.84		43.49	***
Mean effect	0.252426				2.82782			
N° of observations	69843							
Log-Likelihood	-130696.2	Pseudo R^2	0.3922		Log-Lik	-68523.18		

Conclusion

- The evidence points towards spurious estimates in the previous literature: The size the network of a potential appointees matters, not their personal connexions to members of the board. Past industry experience is also highly valued. This is coherent with a market where screening and referrals play an important role.
- Overall, having a pre-existing relationship to a member of the board seems to be unfavourable to the potential appointee. This can be explained by the fact that shareholders may have a strong negative reaction towards obvious cronyism (Cai et al., 2021), but also by the fact that board members barely benefit from appointing their friends to the board: helping a relationship to become a director to another board expands the joint network of the appointed director and the refereeing director, while appointing them to the referee's own board does not expand their joint network (Fahlenbrach et al., 2018).
- Notably, having a pre-existing relationship is less detrimental to the appointee in the case of executive directorships and directors appointed after a change of CEO.
- Consideration sets offer promising avenues for the Finance literature: investor preferences/inattention, executive appointments, credit markets, etc.

Robustness

I confirm these results by estimating the nomination process in board committees. Since the choice set (i.e. the board) is known, the core difficulty of our study is entirely alleviated. Board members with pre-existing connections to the board or the CEO at the time of their recruitment are not more likely to be appointed to prominent and impactful committees (audit/compensation), whereas board members with a large network are.

TABLE XI

COMPENSATION COMMITTEE APPOINTMENTS

THIS TABLE DISPLAYS THE RESULT OF THE ESTIMATION OF THE CHOICE SET CONSIDERATION SPECIFICATION. THE DEPENDENT VARIABLE IS THE LIKELIHOOD FOR A BOARD TO APPOINT A GIVEN DIRECTOR TO THE AUDIT COMMITTEE. THE CHOICE SET IS COMPOSED OF ALL MEMBERS OF THE BOARD APART FROM THE CEO. THE FIRST COLUMN DISPLAYS THE ESTIMATES, THE SECOND COLUMN DISPLAYS THE T-STATISTIC AND THE FOURTH COLUMN DISPLAYS THE SIGNIFICANCE LEVEL (*=10%, **=5%, ***=1%)
THE GENDER VARIABLE TAKES A VALUE OF 1 FOR MEN AND 0 FOR WOMEN.

	Estimates	t-stat	p.value
Board size-Intercept	−0.46	-30.71	***
Size-Intercept	−2.16e-2	-0.77	
ROA-Intercept	0.65	3.53	***
Board Network-Intercept	0.81	17.17	***
Leverage-Intercept	3.84e-2	1.98	**
Intercept-Intercept	−7.17	-18.20	***
Board Size - Contacts at nomination	3.03e-2	15.00	***
Size - Contacts at nomination	−1.38e-2	-2.71	***
ROA - Contacts at nomination	−5.52e-3	-0.15	
Board Network - Contacts at nomination	1.81e-2	2.03	**
Leverage - Contacts at nomination	−1.67e-3	-0.55	
Intercept - Contacts at nomination	−0.30	-3.93	***
Mean :	−8.02e-2		
Board Size - Network Size	6.72e-2	17.40	***
Size - Network Size	8.02e-2	9.72	***
ROA - Network Size	−0.25	-4.34	***
Board Network - Network Size	−0.43	-27.29	***
Leverage - Network Size	−8.39e-2	-1.49	
Intercept - Network Size	3.32	25.14	***
Mean:	0.45		
Gender	−0.23	-11.43	***
Age	−7.56e-3	-9.62	***
Supervisory	4.35	67.39	***
Bachelor	2.47e-2	1.22	
MBA	−1.61e-3	-0.10	
GraduateDegree	−7.36e-2	-4.69	***
Experience	−0.21	-9.89	***
Nobservations	33400	Log-Likelihood	-49938

CONSIDERATION FUNCTION ESTIMATES

Note that the consideration function estimates are consistent with the identification assumptions: profiles with more experience, a larger network and many pre-existing relationships with member of the board are rarer and therefore less likely to be considered overall, but boards with a wider network are much more likely to consider rare profiles than boards with a small network. In other words, firms seem to use the network of the board as a recruitment tool.

Consideration probability estimates

$z_i \cdot x_j$	Estimate	StdEffect	pvalue
Board Network - Relationships	0.75	1.09	***
Intercept - Relationships	-7.11		***
Board Network - Network Size	0.375	0.547	***
Intercept - Network Size	-5.01		***
Board Network - Experience	1.12	1.63	***
Intercept - Experience	-17.1		***
Board Network - Intercept	0.07	0.01	***
Intercept - Intercept	-1.19		***
Number of observations	69843	Log-Likelihood	-68523.18

ROBUSTNESS: MODEL FIT

- Model Fit.
  - Distance: Less is better
  - Fit: More is better, max = 1

	Base Model Distance	Fit	CSC Model Distance	Fit
Manhattan Distance	0.624	0.500	0.345	0.723
Euclidian Distance	0.057	0.452	0.033	0.680