DO BOARD INTERLOCKS INCREASE INNOVATION? EVIDENCE FROM NATURAL EXPERIMENTS IN INDIA

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Overview of the paper

- Looks at effect of board network on innovation by firms
- Board network proxy → board interlocks
- Innovation proxies → R&D expenditure (current and capital)
  → patent filings, domestic and international
  → innovation propensity (synthetic variable)

- Uses panel data on all listed firms in the BSE and NSE consisting of 11358 firm-year observations for the period 2000-2007

- Accounts for possible endogeniety of the network variable in explaining innovation by exploiting the exogenous implementation of the Clause 49 regulations that lead to expansion/alteration of corporate boards in India

Overview … cont

- Study finds that network size positively affects
  - → current R&D
  - → international patent filings
  - → international patent propensity
- However, international patent filings are driven by filings of additional patents of an already patented innovation rather than by new discovery
  - → interprets this as a strategic effect
- Study also finds evidence of peer effects

Contribution of the paper

- Contributes to the literature on innovation and inter-firm alliances
- Contributes to the literature on network effects in different organizations
- Contributes to the CG literature on possible ways by which independent directors can contribute to firm value
- Innovative empirical methodology to account for endogeniety that is a challenge in all empirical work
- Lot of hard work while matching the firm level financial, CG and R&D data with the patent data which are from different sources
- Goes beyond just documenting network effects by trying to explaining it in terms of peer group and strategic effects

Comments structure

- Construction of the network variable
- Handling the challenge of endogeniety
- Data improvements
- Specification of empirical models
- More evidence

Construction of the Network variable

- Should the network be measured using the entire BOD or only using independent directors (IDs)/non-executive directors (NEDs)? The resource-dependency hypothesis, reputation; skill; etc. from a theoretical perspective; and the regulatory arguments discussed in context of Clause 49 apply only to IDs/NEDs

- The logic of information flow with respect to R&D and patent filing may be more appropriate for inside directors i.e., CEOs or other executive directors

- It may be useful to consider having three network measures, based on executive directors (of the firm), independent directors (of the firm) and all the directors

- Patent Propensity variable. What does it mean? Value exceeds 1 (max 46.415). What do you do with observations with 0 R&D?

  → Suggestion: Divide Patent deciles by R&D deciles

- Can use alternative network measures: degree centrality, closeness centrality, betweeness centrality, and eigenvector centrality

Handling the challenge of endogeniety

- Uses instrumental variable approach by exploiting the exogenous imposition of Clause 49 requirement. Two points:

  → Implementation of Clause 49 known in advance and companies would have reacted earlier by making potential choice of better connected directors, so network expansion may not be exogenous

  → Introduction of IDs may be exogenous but not the network (interlock) measure. Network is not equal to size

Handling the challenge of endogeniety

- Possible measurement error in the instrument
  - → Identification of IDs is important as a company meeting the non-executive director requirement may still fail the ID requirement especially those who have executive chairman
  - → This is very relevant as many promoter directors are non-executive directors and are therefore not independent directors. This becomes more important from October 2004 which changed the definition of IDs. Board size and accordingly network measure is likely to change because of these considerations
  - → Can use Sansco database for additional information on IDs and type of chairman
- Can use the DID approach directly for better presentation of the argument

Data improvements

- Why exclude companies with no patents? Does it bias the sample in favour of the findings?
- Why not then exclude companies with no R&D during the sample period?
- Lot of missing data on R&D in Prowess. Is there an alternative source?
- Is this balanced panel or you take all listed firms in 2007 and then look at them from 2000 to 2007. New and young firms born within the sample period may be systematically more prone to R&D and patent filing.
- The number of sample firms, per year should be given to understand if the network measure is being influenced by inclusion of more firms in the sample

Year	No. of Listed firms	No. of firms with sales data	No. of firms with R&D data (Miscellaneous expenditure)	No. of firms with total assets data	No. of firms with R&D data (Addendum information of expenses)
2000	4255	3508	594	3577	547
2001	4288	3466	566	3542	517
2002	4320	3679	630	3830	613
2003	4342	3628	637	3798	624
2004	4382	3581	636	3755	624
2005	4456	3697	638	3894	606
2006	4568	3818	652	4005	627
2007	4698	3908	667	4121	653

Empirical Models

- Two significant changes have happened in Clause 49 which has significantly influenced composition of corporate boards; one in October 2004 (implemented from January 1, 2006) that changed the definition of IDs, and one in August 2008 that extended the higher ID requirement of IDs to companies with promoter chairman. These events are sure to affect the network measure and accordingly it may be useful to see how the relation changes in response to these new regulations. Can ntroduce simple interaction terms with the network variable

- Timing issues of patent filing and R&D investment: Setting the correct dynamic model. You mention it at the end for Table 8 and 9 but all the initial models (Table 4, 5, 6, 7) can be modified to take this into account. Perhaps a distributed lag model will help?

- Count data model for Patent Counts?

- Clause 49 was implemented by SEBI in February 2000 on the recommendation of the KMBC Report of 1999. Correct timeline needs to be given. Correct referencing of definition of IDs need to be given. Two percent shareholding is missing

More Evidence

- Currently, network effects are found for only current R&D and increased filing of existing patents → weak innovation effect
- In fact network size has no independent effect on patent count (Table 9) and works only thorough additional patenting of an already existing patent (the interaction term)
- How can we make the results stronger?
- Small World effect: Do firms that belong in high intensity clusters have higher innovation? Can use the concepts of APL and CC to see if they are positively related to innovation measures
- Industry directors: Is the network effect strong if any of these directors sit in companies that are in related industries?
- Foreign Exposure: Is the strategic effect more pronounced for firms with higher exposure to foreign competition either in terms of exports or imports?
- Young and dynamic firms: Is the network effect stronger for young firms or firms in more competitive industries?

- Enjoyed reading the paper and hope to see it published

THANK YOU