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Business Networks and Crisis Performance: Professional, Political, and Family Ties

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Abstract

Previous research on firm performance does not adequately account for the interrelatedness of a firm's professional connections, political ties, and family business-group affiliation. Many widely-cited findings may therefore be subject to confounding bias. To address this problem, we adopt a holistic approach by assembling a new dataset covering professional, political, and family networks for 1,290 large East Asian firms. We find that professional networks buoyed performance during the 2008 financial crisis; political and family networks did not. We provide evidence that information access is a key mechanism underlying the effect of professional networks. A one standard deviation improvement to a firm's professional network position cushioned the fall in quarterly ROA by approximately 35% during the crisis.

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1 Introduction

Recent studies have demonstrated the importance for firm performance of various business networks related to corporate governance. A growing body of literature investigates the implications of interlocking directorates (e.g., Larcker, So, and Wang 2013; Dass et al 2014). The impact of political connections has received considerable attention both with regard to directors' political ties (e.g., Faccio 2006; Faccio, Masulis, and McConnell 2006), and in relation to state ownership (e.g., Megginson and Netter 2001; Aivazian, Ge, and Chiu 2005; Chen, Firth, and Xu 2009). And ownership by family business groups has also been studied extensively (e.g., Khanna and Palepu 2002; Khanna and Yafeh 2007). Professional networks (interlocking directorates) are widely considered to facilitate the flow of information; family networks (family business group affiliation) to grant a firm access to internal capital markets; and political networks (via state ownership or directors' political ties) to heighten a firm's involvement with (or exposure to) cronyism and corruption. These ideas have been developed under parallel streams of literature and, until now, studied largely in isolation from one another. But anecdotally, and in our data, these networks are strongly interrelated.

Researchers have long been aware that firms which comprise powerful family business groups often enjoy political connections, and are also likely to establish interlocking directorates. To disentangle potentially confounding effects, it is therefore imperative that we examine professional, political, and family networks jointly, rather than separately. Otherwise, the implications of network connections along one of these dimensions may be mistaken for those of another. To our knowledge, we offer the first comparative assessment of the relative performance effects of these three fundamental types of business networks related to corporate governance. The effort to unify these separate streams of literature constitutes the first of this paper's three key contributions.

To clarify the importance of this endeavor, consider the following example. If a single politician sits on the board/executive of multiple firms, each of those firms would be deemed politically connected by conventional standards (Faccio 2006; Faccio, Masulis, and McConnell 2006). But multiple board occupancy also implies the existence of interlocking directorates. Thus, conventional analyses which overlook this mechanical relation (and consequently overlook related literature) could attribute firm outcomes to the wrong network factor. Another example can be drawn from Almeida, Kim, and Kim (2015), who argue that Korean chaebol weathered the Asian Financial Crisis better than counterparts due to internal capital markets. Because the political connectedness of chaebol firms is not accounted for, however, they are not able to rule out politics as

an alternative explanation for their findings. Similar critiques apply to most work in this literature whose identification is based on observational (rather than experimental) variation along a single network dimension. Because of the simultaneity of these networks in many global contexts (which we will demonstrate with our sample), potential confound is a serious concern in the absence of multidimensional network data.

By virtue of the dataset we assembled, we are able to show professional connections cushioned the decline in performance across East Asia during the global financial crisis, whereas political ties and family affiliation did not. This finding caveats previous research highlighting the importance of political or family networks without regard for the professional networks which often accompany them. Furthermore, our analysis indicates that the estimated effects of political and family networks in our sample are subject to positive confounding bias when measured in isolation from other types of networks. On theoretical grounds, our findings suggest information, rather than cronyism or internal capital markets, serves to benefit networked firms most in times of financial distress. We further investigate the role of information by employing various measures of network centrality which account for distant (higher-order) professional connections. *Closeness centrality* - a measure capturing the potential to access information - proves the strongest determinant of crisis performance. We find that a one standard deviation improvement to a firm's professional network position (measured by closeness centrality) cushioned the fall in quarterly return on assets (ROA) by two-fifths of a percentage point during the hardest-hit quarter of the global financial crisis. Relative to an average fall in quarterly ROA of just over one percentage point (1.16 pp) between the third and fourth quarters of 2008, this is an economically significant effect alleviating approximately 35% of the brunt of the crisis.

In order to disentangle professional, political, and family networks, a comprehensive dataset was required. To clearly identify the relative importance of these different networks, we focus on a region in which each of them is well known to be highly salient - East Asia (Hamilton 1996; Greif and Tabellini 2010). Our sample consists of 1,290 of the largest publicly traded firms across nine East Asian economies: Hong Kong, Indonesia, Japan, South Korea, Malaysia, the Philippines, Singapore, Taiwan, and Thailand. To measure professional and political networks we use hand-collected data on approximately 29,000 directors as well as all politicians holding executive and legislative positions across East Asia. We supplement this with direct and indirect ownership data in order to complete our measure of family, political, and professional networks for each of our sample firms. To our knowledge, this is the first dataset permitting the exploration of various interrelated network phenomena, and it spans a range of institutional contexts. As such, this dataset constitutes our second key contribution to

the literature.

To improve identification, we exploit the global financial crisis following the collapse of Lehman Brothers in 2008. Because the negative shock was unexpected, selection is less of a concern than if our study was set in a period of regular economic activity. We start the analysis by exploring cross-sectional patterns relating networks to performance during the crisis. To argue for a causal interpretation of our effect, we then use a difference-in-differences approach in which a firm's network determines its treatment intensity, and the crisis denotes the treatment period. We thus net out the effects of networks on performance during regular times, rendering selection a less convincing explanation for our results. Still, we acknowledge it is possible that networks are selected on the basis of performance-potential during a crisis, net of regular performance. We include additional controls and conduct a number of robustness checks to alleviate such concerns. Having provided considerable evidence for the impact of professional networks on crisis performance, we proceed to explore the role of these networks in closer detail. To this end, we invoke network theory to differentiate among alternative explanations for our findings, and shed light on the specific mechanism underlying our effects.

So in addition to the methodological contribution of introducing a 'holistic' approach to this subject area, our analytical findings offer a key substantive contribution to the literature by adding to recent work on the effects of professional networks on firm performance. Previous work has argued that board connections serve as conduits for information (e.g., Bizjak, Lemmon, and Whitby 2009; Stuart and Yim 2010). More recent work has demonstrated that professional networks actually boost firm performance, and the transmission of information is advanced as a key channel explaining that effect (Larcker, So, and Wang 2013; Dass et al 2014; Cai and Szeidl 2015). Our findings extend this literature by providing further evidence for the association between professional networks and performance, during a crisis episode, and across a range of country-specific institutional contexts. We also provide new evidence for the role of information by drawing heavily on network theory, and accounting for distant (higher-order) board network connections. We differentiate between various measures of network centrality on theoretical grounds. By comparing the explanatory power and effect sizes of different centrality measures, we explore the nature of information as it affects performance. This nuanced approach suggests that efficient access to information, rather than control over information or exposure to information, serves to best explain the positive impact of board networks on performance.[1]

[1]We also contribute to literature that examines the relationship between corporate governance and its impact on firm performance during a crisis (Mitton 2002; Lemmon and Lins 2003; Baek, Kang,

The rest of the paper is structured as follows. Section two discusses the importance of networks to the organization of business across East Asia, and the theoretical relationship networks on performance (in and out of crises). The third section discusses the collection of our dataset. In section four we examine the crisis performance of firms across three network dimensions. The subsequent section presents a gamut of robustness exercises to strengthen our causal interpretation. In section six we focus exclusively on the impact of professional networks, by constructing additional network centrality measures, and exploring the role of information. Section seven concludes.

2 Background

2.1 The Importance of Networks to Asian Business

The importance of business networks as an institutional medium by which East Asian economies are organized is well documented (Redding 1996; Dacin and Delios 2005; Carney 2005; Greif and Tabellini 2010). The prevalence of these networks in East Asia contrasts with their relative unimportance to business in the United States (Hamilton 1996; 1999). For this reason, East Asia is better suited to an examination of the relative importance of different types of business networks than the United States.

Professional, political, and family business group networks are important to the organization of business throughout the region. However, countries are often characterized as privileging one type of network over others due to historical circumstances. For example, Chinese networks are commonly regarded as being dominated by kinship ties. Southeast Asian networks are usually considered to be kinship-based and/or organized around patron-client political relationships. Inter-corporate ties that cement together a vast community of firms are widely viewed as dominating the structure of Japanese business networks. South Korean business networks are regarded as being heavily influenced by elite business families that prospered through privileges granted by a strong state.

Chinese networks are of particular importance to the region. They are important not only to societies dominated by ethnically Chinese citizens (Taiwan, Singapore, and Hong Kong), but also to Southeast Asian economies (Yeung 2006). The organizational

and Park 2004; and on financial firms in particular: Erkens, Hung, and Matos 2012; Peni and Vahamaa 2012; Beltratti and Stulz 2009; Fahlenbrach and Stulz 2011; Laeven and Levine 2009). Our work is distinguished from this literature by focusing on *networks* arising from corporate governance arrangements, rather than the corporate governance characteristics per se. Hence, our contribution highlights the role of corporate governance in giving rise to business networks, which can in turn have implications for crisis-performance.

logic governing Chinese society originates from a battle between Confucianism and Buddhism in China around 1000AD in which the former prevailed (Greif and Tabellini 2010). Confucianism considers moral obligations among kin as the basis for social order while Buddhism promotes a legalistic form of organizing society that stresses generalized morality. Because Confucianism won, large kinship organizations came to dominate the structure of Chinese commerce and society.

This contributed to business relations being based on networking, *guanxi*, which means social connections. "[Guanxi] works on the basis of personal obligations, the maintenance of reputation and face, and not on any assumption that a society's shared faith makes all who share it equally righteous regardless of whether you know them or not" (Redding 1993, 67). For these networks to function effectively, they require the maintenance of specific, or particularistic, trust that is restricted to individuals in the bond. Hence, in China "you trust your family absolutely, your friends and acquaintances to the degree that mutual dependence has been established... With everybody else you make no assumptions about their good will" (Redding 1993, 66).

Although important institutional and cultural changes occurred in subsequent centuries, economic arrangements have continued to reflect early traditions. Kinship groups therefore remain influential to the manner by which economic exchange occurs in China and Chinese societies. This is reflected in the World Value Survey (WVS, 2010-14) which reports that only 10.9 percent of Chinese trust a person whom they met for the first time compared to between 20.9 percent to 56.9 percent in the West (i.e., United States, Germany, Sweden, and Spain).

Non-Chinese business networks in Southeast Asia are also organized along family- or kin-based lines. In Thailand, family and kinship are the most important form of social bond in business networks (Suehiro and Wailerdsak 2014), and they form the core around which the country's dominant business groups (*glum thurakit*) have been organized (Suehiro 1989).

In the Philippines, family forms the backbone of society. But in contrast to Chinese kinship which privileges male children, Filipino kinship places equal importance on both male and female progeny (Wolters 1999; Abinalez and Amorozo 2005). This contributes to the vast spread of kin around senior family members, enabling the number of extended relatives to reach hundreds. Large and dense family networks are common to family-owned conglomerates, but interpersonal relations beyond family and kin are characterized by fragmentation and mistrust (Kondo 2014).

In Indonesia and Malaysia, patron-client relations are regarded as having had a significant impact on the organization of business networks. The importance of these patron-client networks emerged out of the weakening capacity of kin networks to act as

units of cooperation and security with the introduction of new hierarchical structures associated with the colonial economy (Scott 1972). In Indonesia, the existence of a legal system that has long been characterized by high levels of corruption and inefficiency has reinforced the reliance on close personal relationships with powerful political patrons to reduce the uncertainties involved in carrying on a business (Carney, Dieleman, and Sachs 2008; Turner 2007; Rademakers 1998). The importance of patron-client networks was of particular importance during the Suharto era, but links to senior political figures have remained important into the post-Suharto period (Chua 2008).

In Malaysia, outside of ethnic Chinese businesses, inter-company networks are commonly state-led and state-mediated (Gomez 1994; Rasiah 1997), and heavily influenced by racial politics.[2] State-led networks commonly arise from federal government agencies disbursing allocations to regional state governments (Woo 2009). Often these networks are based on direct government ownership of enterprises which provides a framework for Bumiputera (ethnic Malay) firms to obtain public sector contracts. Because public investment comprises a large fraction of total investment, these government business relationships are typically more important than inter-company relationships among private sector actors (Carney and Andriesse 2014). The dependence of private actors on public investment therefore contributes to the proliferation of patron-client business networks in Malaysia.

In Japan, relationships tend be intercorporate and are not heavily dependent on family ties. These ties are stable, long-term linkages that precede any inter-firm commercial engagements (Hiroshi 1996; Ueda 1996; Lincoln and Shimotani 2008). Post-WWII networks originate from the reorganization of firms that were structured as family-owned business groups in the pre-WWII period (zaibatsu), but were broken up by the American Occupation authorities immediately following the war in an effort to weaken the power of large conglomerates. While new laws forbade them from reforming the family-owned business group structure, firms successfully reconstituted their intercorporate relationships through alternative means such as cross-shareholdings, ongoing long-term business relationships, and financing via a main bank. These new groups came to be known as keiretsu and they have dominated the structure of the post-war Japanese economy although their cohesiveness has varied across groups and time (Orru 1996; Lincoln and Shimotani 2008). An important characteristic of these groups is the sharing of information, leading some scholars to label them "information clubs" (Imai 1988).

[2]For example, inter-ethnic ties involving Chinese entrepreneurs who retain Malays as nominal owners or in senior managerial positions (Ali-Baba networks) have been an important means through which Chinese entrepreneurs could win state contracts.

The pre-World War II zaibatsu business groups have often been compared to the Korean chaebol of today.[3] Both chaebol and zaibatsu are terms represented by the same Chinese characters and denote large family owned and centrally controlled business networks. But in contrast to the zaibatsu, the chaebol draw on the traditional values of Confucianism to provide an ideological foundation for their industrial organization (Kim 1997). Additionally, the chaebol are distinguished by their relations with the Korean state which has granted these large groups special privileges (Hamilton 1996). As a result, chaebol are often characterized as exhibiting more hierarchically oriented network arrangements than comparable business groups in other East Asian contexts.

2.2 Business Networks and Firm Performance

Existing work on professional connections, family business groups, and political ties offers mixed expectations regarding the impact of each on firm performance during a crisis. We review the literature for each in turn.

2.2.1 Professional networks and performance

The existing literature offers strong reasons to expect professional networks, as manifested by interlocking directorates, to affect firm performance. Mechanisms by which professional (board) networks can affect firm performance include information-sharing (Davis 1991; Bizjak, Lemmon, and Whitby 2009; Stuart and Yim 2010; Cai and Szeidl 2015), alignment of market preferences (Palmer 1983; Gulati and Westphal 1999), and fomenting or proxying for social ties (Cohen, Frazzini, and Malloy 2008). Recent work by Larcker, So, and Wang (2013) assesses the net performance effects from all of the above by measuring the impact of boardroom network centrality on the performance of US firms and finds a net positive relationship. But importantly, the above studies are set in times of regular economic activity.

During periods of normal market operations, funds flow from those with a surplus to those who can use the funds to engage in productive investments. An important barrier to this occurring efficiently is asymmetric information. This leads one party to have less information than another and results in moral hazard and adverse selection problems. These problems occur not just with regard to the efficient allocation of capital, but also for developing new and sustaining existing business relationships. When a financial crisis strikes, these problems become much worse (Mishkin 1996, 1997; Mishkin and Hahm 2000). A major business failure increases the uncertainty and inability of lenders to

[3]See Lee and Shim (2012) chapter 5 for an overview of the literature comparing the two.

gauge the creditworthiness of borrowers.[4] These problems also pertain to firms looking to initiate or expand business opportunities. In a crisis, it becomes much harder to distinguish those with productive investment opportunities and healthy balance sheets from those without (Morellec and Schurhoff 2011; Lambert, Leuz, and Verrechia 2012). The lack of credit and the reluctance to initiate new business relationships or modify existing contracts to ride-out temporary problems can magnify the negative performance consequences for individual firms.

However, the existing literature has demonstrated that firms with strong professional (board) networks have several informational advantages which could address these problems and potentially reduce the severity of a crisis. Specifically, a well-connected firm that experiences financial distress will have better access to credit because of the greater availability of information as well as the enhanced capacity for contracts to be enforced (Davis 1991; Mol 2001; Nicholson, Alexander, and Kiel 2004; Stuart and Yim 2010). More connected boards are also likely to have better information about business partners capable of modifying terms of contracts, such as allowing for orders and payments to be temporarily altered (Uzzi 1999; Cohen, Frazzini, and Malloy 2008). Knowing which firms face a greater decline in the demand for their products/services, and which firms are less likely to make payments on time allows the well-connected firm to make calibrated adjustments to its own financial and business operations. Better information about business partners can also facilitate the creation or continuation of business relationships (Stuart and Yim 2010).

At the same time, the number of board positions that a director holds reduces the amount of time available for monitoring each company, resulting in poorer guidance on appropriate strategies to mitigate the crisis (Core, Holthausen, and Larcker 1999; Fich and Shivdasani 2006). Moreover, misleading or incorrect information may spread though the board network resulting in value decreasing strategies and investments.

In summary, firms with more professional connections benefit from a greater access to information which enhances the opportunities for reducing the negative performance consequences of a crisis. However, the benefits of interlocking directorates may be diluted if information being circulated is incomplete, misleading or incorrect. Moreover, professional connections come at the cost of reduced monitoring potential, which could be particularly important in times of financial distress.

[4]Screening is made difficult because prior methods for assessing borrower risk have proven problematic, or because of the heightened risk that problems arising in one firm may spread to others in their network.

2.2.2 Family networks and performance

A family business group is a group of legally independent firms under the ownership of single family or family member.[5] A distinctive feature of business groups is the existence of internal markets that allows for the allocation of capital among member firms. Conflicting views have emerged about whether business groups are beneficial or detrimental to firm performance. The primary negative effect of business groups is associated with tunneling incentives that emerge from the pyramidal ownership structures (Bertrand, Mehta, and Mullainathan, 2002).[6] Examination of Korean business groups has found negative firm-level outcomes associated with tunneling (Bae, Kang, and Kim 2002; Ferris, Kim and Kitsabunnarat 2003; Joh 2003; and Baek, Kang, and Lee 2006). Claessens, Fan, and Lang (2006) further argue that within-group internal capital markets function poorly during crisis periods, with negative consequences for firm performance.

But more recent work suggests the consequences of group affiliation are more ambiguous. Depending on the specific location of a firm within a pyramid, it may actually benefit from inter-firm resource transfers (Gopalan, Nanda and Seru 2007; Almeida et al 2011). Masulis, Pham, and Zein (2011), for example, report that holding companies at the top of a pyramid exploit their financing and reputation advantages to fund young, high growth firms with limited cash flows, at the bottom.[7] Khanna and Yafeh (2005) also argue that links between group firms may provide for mutual insurance which can help to dampen shocks.

2.2.3 Political networks and performance

Firms may be politically connected either through personal political ties or via state ownership. In the former context, firms try to influence politicians through bribes and/or political and campaign finance support in exchange for favorable treatment by the state (Shleifer and Vishny 1994). Benefits may include greater access to government financing (Duchin and Sosyura 2012; Li et al 2008) or bailout funds (Faccio, Masulis, and McConnell 2006); increased procurement of government contracts (Goldman, Rocholl, and So 2013);

[5]See Khanna and Yafeh (2007) for a review of the literature on business groups in emerging markets.

[6]Tunneling in the context of business groups refers to the transfer of assets and profits out of one firm and into another from the same business group. Related work on tunneling focuses on transfers from inside owners to outside owners (*within*, rather than across firms) and demonstrates that such firms underperformed during the 1997 East Asian Financial Crisis (Lemmon and Lins 2003; Johnson, Boone, Breach, and Friedman 2000; Mitton 2002; Baek, Kang, and Park 2004). We examine the network effect, while controlling for ownership concentration to net out the impact of tunneling within a firm.

[7]See also Morck, Wolfenzon, and Yeung (2005) and Khanna and Yafeh (2005) for surveys of this literature.

and protection from market competition (Bunkanwanicha and Wiwattanakantang 2009). Firms have been shown to benefit from their political connections in both emerging and high-income economies (Fisman 2001; Johnson and Mitton 2003; Cingano and Pinotti 2013; Jayachandran 2006; Goldman, Rocholl, and So 2009). Although political ties can enhance firm value, managers may also face pressures to pursue politically favorable strategies that are at odds with the firm's performance, such as elevated employment levels (Naughton 2009). Likewise, politicians may not be able to discipline politically connected managers who engage in expropriation for personal gain. Faccio, Masulis, and McConnell (2006), for example, find that although politically connected firms are more likely to be bailed out, they also exhibit significantly worse performance (with a lower ROA of about 2.4%). Recent work on Egypt also finds that politically connected firms display worse performance as measured by ROA (Chekir and Diwan 2013).

A similar array of benefits and costs also impact state-owned enterprises (SOEs). However, SOEs generally suffer from more ineffective incentives to innovate and contain costs due to soft budget constraints, especially in the presence of government-controlled banks (Shleifer 1998; Tian and Estrin 2007). As such, SOEs often underperform in relation to their privately owned counterparts (Megginson and Netter 2001). However, effective corporate governance structures that impose hard budget constraints or other features that enhance SOEs' competitiveness may yield positive performance effects (Aivazian, Ge, and Chiu 2005; Chen, Firth, and Xu 2009). Costs may nevertheless arise in times of crisis, as SOEs are called upon to engage in behavior that is detrimental to their performance (e.g., extending loans to troubled firms). The cumulative effect of state ownership thus depends on whether a firm's corporate governance practices suffer or benefit from state control, and whether the costs associated with politically motivated actions outweigh the benefits of preferential treatment by the state.

3 Data

To carry out the analysis herein, we assembled a unique dataset capturing the political ties, family affiliations, and professional connections of East Asian firms. Due to the substantial resources devoted to hand-collecting most of this data, our dataset faces natural constraints in terms of both cross-sectional breadth, and temporal depth. Still, we present network data for 1,290 firms, which are among the 200 largest companies by market capitalization in each of nine East Asian economies in 2008.[8] Our regional

[8]Data availability on board members precludes us from including all target firms in the analysis. For Malaysia, our sample is drawn from the largest *300* listed firms. The precise number of observations for any given test is determined by data availability of other relevant variables. For instance, a missing quarterly performance measure can exclude a firm from dynamic specifications.

coverage includes Hong Kong (accounting for 132 sample firms), Indonesia (168), Japan (121), South Korea (129), Malaysia (281), the Philippines (98), Singapore (116), Taiwan (107), and Thailand (127). Within East Asia, we restrict our sample to these countries because they have a sufficiently large number of listed firms with verifiable information available. We use cross-sectional network data for our sample in 2008. These are then supplemented with other cross-sectional and panel data throughout our analysis. We first discuss mapping three dimensions of East Asian business networks, corresponding to: political ties; family group affiliation; and professional connections. We then describe the source of data on firm characteristics, and close this section with some brief motivating descriptives.[9]

3.1 Professional Connections

Our measure of a firm's professional network is the extent to which its directorate is interlocked with those of other firms. In particular, we use a count variable of the number of board interlocks: the number of instances in which a firm's board member or executive is shared with another firm in the economy.[10] To construct our measure, we require board members and executives data for each sample firm. We focus on the largest 200 publicly-traded firms within each country insofar as the availability of annual reports permits collecting data on board members and executives. Annual reports are taken from Worldscope, OSIRIS, and company websites. In gathering data from these sources, we amass a pool of approximately 29,000 names affiliated with our sample firms. We program an algorithm to match directors and executives names across firms in order to depict each firm's professional network. Subsequently, we conduct manual verification to correct for inconsistencies arising from transliteration across various sources.

This method of identifying board networks follows Larcker, So, and Wang (2013); and Bizjak, Lemmon, and Whitby (2009). For a given year, we analyze a sample size of directors which is comparable to Bizjak, Lemmon, and Whitby (2009), and approximately

[9]Notably, we do not invoke data on social connections. Accurate data on social ties across East Asian directors/executives is not readily available (there is no East Asian analogue to the BoardEx database), and is not easily assembled (in part due to language barriers). But previous work draws a close association between social ties and board placements (Hwang and Kim 2009). Other types of firm linkages relating to economic interdependencies (such as supplier networks) do not fall within our corporate governance purview. Connections via (widely-held) institutional ownership are not sufficiently prevalent in our sample to warrant independent analysis (though we do control for institutional ownership). Financial blockholders identified with specific families, however, do contribute to our measure of family networks. Lastly, connections via auditors and creditors are secondary to our emphasis on the interrelated networks most commonly studied in this literature.

[10]More elaborate measures of professional networks are introduced later in section 6.1.

half that of Larcker, So, and Wang (2013). But attempting to collect directors' names for multiple years is complicated in our case by the need to hand collect the data (such historical information is not pre-coded in financial databases, as is often the case for data on US firms). Therefore we rely on cross-sectional variation in professional networks at the time of interest - the end of 2008.

3.2 Family Business Group Affiliation

To assess a firm's affiliation with large family business groups, we look to its ownership. We consider a firm to form part of a family group if it falls under the direct or indirect control of that group. Wherever two such firms share a common family owner, we consider these to form part of a family network. To be sure, in every such case there will undoubtedly be other non-sample firms which also comprise the same group. Hence, a family group (defined as such) consists of at minimum two large publicly-listed firms, in addition to any number of smaller listed, or large non-listed entities.

We draw on previously collected ownership data from Carney and Child (2013) to build our family group indicator. We use a 10% threshold of outstanding share ownership to depict control. The shares need not be held directly by the family in question, and are often held via other publicly traded firms in which the group enjoys majority control.[11] Whenever this type of pyramid exists, we calculate the level of ultimate ownership as the smallest stake in the chain of control. An exhaustive explanation of the construction of ownership figures is available in Carney and Child (2013). The sources for these data include the ThomsonONE Worldscope, Bureau Van Dijk OSIRIS, and LexisNexis databases; company websites; stock exchange filings; and media reports.

Our method of data collection (from Carney and Child 2013) is identical to the method established by the seminal study of Claessens, Djankov, and Lang (2000). We then define family business groups in the same way as Masulis, Pham, and Zein (2011); Khanna and Palepu (2002); and Almeida et al (2015). That is, if two sample firms share a common significant individual shareholder, they are deemed affiliated to a family group.[12] Due to the arduous and idiosyncratic nature of gleaning ultimate ownership data at the firm-level from primary sources, small differences in data sources and collection heuristics inevitably arise across studies. It is therefore reassuring that our proportion of *group-affiliated* listed firms per country closely resembles the analogous figures reported in Masulis, Pham, and

[11] Either the family group or the intermediate listed firm may be situated abroad, although this is rarely the case empirically.

[12] A subset of group firms in Almeida et al (2015) are affiliated via professional relationships, rather than common ownership. In our study, we conceptually distinguish this subset as firms belonging to a common *professional*, rather than *family*, network.

Zein (2011).

3.3 Political Ties

To capture a firm's political network, we consider government connections via both ownership and employment. That is, we consider a firm to be politically connected if it is either (i) owned by the state, or (ii) employing a politician. For the former criterion, we use the same ownership data as above to detect firms in which the state holds a controlling share. Again, we use a 10% threshold to define control. Ownership by the state may be either direct or indirect (via a number of other entities). Calculations are carried out as described in the preceding subsection.

Regarding the latter criterion, we consider a director to have political ties if he/she simultaneously occupies a position as a minister/head of state or as a member of parliament. To construct the indicator, we use a dataset on politicians, in addition to the above data on board members and firm executives. The data on politicians were hand collected from various government websites, hardcopy publications, and email correspondence with public officials (Carney and Child 2013). A complete list of sources used for this data is available in Appendix A. For each country, every member of the legislative and executive branches of government has been recorded. Using a programming algorithm (supplemented with manual verification), we cross-reference the full list of politicians with the full list of board members in order to detect firms with political ties.[13]

This method for identifying a firm's political network is similar to that used by Faccio (2006), except the coverage is expanded to include *all* directors (in addition to top executives), but without considering the political status of directors' friends and family. While our approach for identifying political ties is similar to that used by Faccio (2006), we believe our method is both more accurate and comprehensive. By restricting the measure to encompass only those directors/executive who *concurrently* hold political office, we can be confident about their access to political information of potential relevance to the firm. We also expand the measure to include state ownership. We identify political ties for 19.5% of our sample firms, in comparison to Faccio (2006) which identifies political ties for only 5% of firms across the same set of countries.

3.4 Firm Characteristics

We supplement the above network data with firm financials and other characteristics. Financials data are obtained from Datastream, from which we draw information to

[13]In our sample, it is never the case that foreign (regional) politicians fill domestic board positions.

calculate performance and other covariates of interest. Our key performance measure is return on assets (ROA), which is measured quarterly and calculated as the ratio of net income to total assets (expressed in percentage points). Three alternative performance measures are also used: operating return on assets (OROA), return on capital employed (ROCE), and return on equity (ROE), all of which are measured quarterly and expressed in percentage points.

Control variables included are: public listing date (year)[14]; tangible assets (ratio of investment in plants, property, and equipment to total assets, quarterly); firm size (log of total assets, quarterly); total liabilities (quarterly); cash (relative to total assets, quarterly); leverage (ratio of total liabilities to total assets, quarterly); share price return volatility (standard deviation of daily share price returns, quarterly); and industry classification (based on two-digit SIC codes in accordance with Campbell 1996). All monetary values are expressed in terms of USD. Additionally, we use previously hand-collected corporate governance data to report on board size (number of board members); blockholders (indicating whether a single entity holds more than 10% of outstanding shares); ownership concentration (control rights of the largest owner); and institutional ownership (percentage of shares held by financial institutions). Descriptive statistics of all firm characteristics are presented in Table 3. All accounting measures and volatility are winsorized at the 1% and 99% levels.

4 Networks and Crisis Performance

Our methodological line of inquiry regards potential confound arising from the omission of interrelated characteristics in single-dimension network studies. Descriptives of political, family, and professional networks are offered in Panel A of Table 1, broken down by country. For each of the three network dimensions, there is considerable variation across countries as well as within. All the while, at the firm level these networks often occur in tandem. Table 2 reports Pearson's correlation coefficients between various types of connectedness: professional connections; family business group affiliation; the presence of a politician-director; and state ownership. All of these measures are positively correlated with each other, but the correlation between family affiliation and state ownership is negative for obvious mechanical reasons. All correlations are significant at the 1%-level, except that between family affiliation and politician-directors. Importantly, the magnitudes of the pairwise correlations are not so high that identification of the individual network effects is problematic due to

[14]Year of establishment data is unavailable for some countries in our sample, so we opt instead for the listing date as a proxy for firm age.

multicollinearity (whether we base this assessment on the correlation coefficients reported here, or on the calculation of variance inflation factors for each network measure). But at the same time, the magnitudes are certainly not negligible, which confirms that potential confound is a valid concern for other studies not fully accounting for the interrelatedness of these networks. Indeed, with our sample we will provide evidence for omitted variable bias in the case where the impact of a given network dimension is estimated in isolation.

Our substantive line of inquiry is concerned with how business networks relate to firm performance during a crisis period, and which network dimensions transmit those effects. A visually apparent relationship between networks and crisis performance appropriately motivates our subsequent analysis. Figure 1 maps performance for more and less networked firms. Performance is calculated here as unexplained ROA, net of country and industry factors. The top panel divides firms into those with an above-median (relative to country counterparts) number of professional connections ('board') from those with a below-median amount ('non'). The middle panel separates firms with political ties from those without. The bottom panel splits the sample by family business group affiliation. We trace the performance of these subsets over seven quarters, centered around the crisis. It is obvious the performance of firms with stronger professional networks fell less dramatically during the global financial crisis. Immediately following the most heavily-hit quarter, performance differentials appear to have reverted back to pre-crisis levels. Political ties, on the other hand, display no clear relationship with performance at face value. Family group affiliation, like professional connections, does appear to have affected performance during the crisis period, but we turn to formal analysis to confirm these initial impressions.

Throughout the following analysis, we define firm performance as quarterly ROA, and network measures alternate between political ties, family group affiliation, and professional connections. The crisis period we examine is the fourth quarter of 2008, which directly follows the collapse of Lehman Brothers on September 15th of the same year.[15] In an effort to measure the causal effect of business networks on firm performance during the crisis, we conduct a series of tests yielding better identification as we progress from simple bivariate correlations, to difference-in-difference specifications, and a host of robustness checks.

Endogeneity is a key concern throughout our analysis. The effect we strive to measure,

[15]Crisis effects are likely to persist beyond the period examined here. In dynamic specifications we measure our crisis-period effect relative to the average network effect conveyed in the surrounding period. To the extent that crisis effects are persistent then, we will have underestimated the magnitude of the network effect during the fourth quarter of 2008.

however, is a crisis-contingent effect. Since the crisis arrives as a shock, we are less subject to concerns of selection. This is to say, it is not intuitive that firms select their position within a network on the basis of their potential crisis-performance. The question remains, of course, whether political, family, and professional networks are established on account of omitted traits which *are* correlated with crisis performance (for instance, performance during periods of regular economic activity). Through our main identification strategy, we hope to allay such concerns. Nevertheless, to alleviate extant doubts, we devote section 5 to robustness tests.

4.1 Crisis-period Tests

To get an immediate sense of the relationship between firm performance and networks during the 2008 crisis, we first conduct simple bivariate regressions. These comprise cross-sectional tests of the correlation between performance and networks during the fourth quarter of 2008. For ease of interpretation, we include country-industry fixed effects. We therefore examine whether networked firms enjoyed higher performance during the global financial crisis than non-networked country-industry counterparts. The statistical model we estimate is the following:

$$ROA_{ijk} = \beta N_{ijk} + \gamma_{jk} + \epsilon_{ijk}$$

where performance (ROA) of firm i in industry j of country k is determined only by the network measure (N) and the country-industry effect (γ).

The first column of Table 4 shows firm performance during the 2008 crisis exhibits a strong correspondence with a firm's professional connections. Columns 2 and 3 show, respectively, that political and family ties are not significantly correlated with crisis performance (at first pass). Because the three network dimensions are interrelated, as evidenced by Table 2, we include all networks together in the final column. The professional network remains significantly positively correlated with performance in the crisis, while family and political ties remain insignificant determinants. In other words, when comparing two firms with the same family and political ties, the firm with stronger professional networks performed better during the crisis. Importantly, we note a marked decline in the estimated effects of both political and family networks as we move from columns 2 and 3, respectively, to column 4. Due to the positive correlation between these networks and professional networks, it appears as though the point estimates were subject to positive confound when measured in isolation.

Of course, the estimates in column 4 may also be subject to omitted variable biases. Unaccounted-for firm characteristics may drive crisis-performance, and also be correlated with the various networks. In an effort to reduce omitted variable bias, we

next incorporate a number of control variables into our test. In particular, the controls we consider to be of greatest importance are: firm age; firm size; board size; institutional ownership; blockholders; ownership concentration; return volatility; leverage; tangible assets; liabilities; and cash.

Age is an important control because the performance of young firms (those with a low book-to-market ratio) exhibits a strong relationship to board networks (Larcker, So, and Wang 2013). Product market conditions are likely to influence performance, with larger firms capable of capturing a larger share of the market (Gorton and Rosen 1995). Additionally, larger firms may have denser networks due to their more numerous commercial ties; we therefore control for firm size. We control for board size because it is related to board connections, and may have implications for firm performance as well (Dass et al 2014). Additionally, (financial) institutional ownership may negatively impact firm performance by encouraging managers to increase risk-taking prior to the crisis (Erkens, Hung, and Matos 2012), but this effect may be moderated by the presence of a large shareholder; we therefore include controls for institutional ownership and the presence of blockholders. We also control for ownership concentration which is likely to have some influence on network ties insofar as more concentrated ownership corresponds to greater influence from an owner on the firm's board member composition and inter-corporate ties.

Following Adams, Almeida, and Ferreira (2004) and Masulis and Mobbs (2011), who demonstrate a relation between the identities of directors and return volatility, we control for the latter. Our tests also account for the impact of leverage on firm performance (Jensen 1986; De Jong 2002). Tangible assets proxy for firm growth opportunities while liabilities reduce these opportunities (e.g., Masulis and Mobbs 2011). Cash is used to indicate the firm's capacity to buffer a negative shock, which is enhanced by a stronger network due to the reduction of the cash conversion cycle (i.e., payments and receivables) and the alleviation of financial constraints (Dass et al 2014). Including all the aforementioned controls in a vector, X_{ijk}, we estimate the new equation:[16]

$$ROA_{ijk} = \beta N_{ijk} + \psi X_{ijk} + \gamma_{jk} + \epsilon_{ijk}$$

When controlling in Table 5 for the aforementioned potential confounds, we obtain qualitatively similar results. Professional networks remain a significant correlate of crisis performance while political and family networks do not. Coefficient magnitudes for professional networks are smaller than those in Table 4, and precision of the estimates declines. Loss in precision may be explained in part by the lower number of

[16]Refer back to section 3.4 for precise definitions of our control variables.

firms included in these tests, on account of missing control data. Overall, however, our results suggest observable firm characteristics do not explain the entire performance differential between firms with strong professional networks, and those with other types of networks (or none at all). Importantly, of our controls, only volatility and leverage are robust (negative) predictors of crisis performance.[17] The little explanatory power of other control variables suggests remaining omitted variable bias may be small. Still, the country-industry effects (suppressed) *are* significant, suggesting the most important omitted variables may be aggregated at this higher level.

4.2 Difference-in-Differences

We have so far shown crisis performance is strongly correlated with the extent of a firm's professional network, while it does not appear related to either political or family networks. We have also argued that networks are not proxying for some omitted firm characteristics. One obvious question at this stage is whether the correlations we observe (or lack thereof) are even restricted to the crisis period. To the extent that the relationship between network position and firm performance persists across all periods in time, our argument against selection effects deteriorates. The reason is as follows.

We ultimately favor an interpretation of causation, with the effect running from network position to crisis performance. Our argument against reverse causation is that potential crisis-performance alone is unlikely to determine a firm's network established well beforehand, during normal periods of economic activity. Of course, regular firm performance is much harder to rule out as a potential determinant of network position. So insofar as regular performance is correlated with crisis-performance, and we focus exclusively on the crisis period, we would misinterpret our results as causal, when they could in fact be rooted in selection.

For this reason, we invoke a difference-in-differences type model. We now use a 3-year sample window centered around the crisis period.[18] The fourth quarter of 2008 is considered the 'treatment' period, and all surrounding quarters are 'non-treatment' periods. Treatment intensity is determined by a firm's network position. We are interested in the crisis-contingent network effect - the interaction between treatment intensity (networks) and treatment period (crisis). A general network effect (our treatment intensity variable) allows for a performance wedge between networked (treated) and non-networked (non-treated) firms during non-crisis (non-treatment) periods. This wedge may be attributable to selection effects. The crisis-contingent network effect captures the magnitude of increase in that wedge during the crisis

[17] Allowing firm age (in years) to factor in quadratically does not meaningfully affect these results.

[18] The window of analysis runs from second quarter 2007 until second quarter 2010.

(treatment period). That increase is net of selection on performance. We match on country-industry, and allow for country-industry specific shocks during the crisis period. In this way, we exclude the possibility that networked firms happen to be concentrated in country-industries relatively unscathed by the 2008 crisis. Moreover, we explicitly control for a firm's performance path over the preceding two years to further capture any performance-related selection into treatment. We include time period dummies to net out common time shocks during non-crisis quarters. To account for likely interdependencies, standard errors are clustered at the country-industry level.[19] Our statistical model for estimation is thus:

$$ROA_{ijkt} = \omega N_{ijk} + \beta N_{ijk} crisis_t + \gamma_{jk} + \alpha_{jk} crisis_t + \rho ROA_{ijk,t-} + \delta_t + \epsilon_{ijkt} \quad (1)$$

where *crisis* is a dummy indicating whether period t is the fourth quarter of 2008. Hence, we allow both the network effects and the country-industry effects to vary during the crisis period.[20] It is the interaction term between network and crisis which is of primary interest here. Importantly, non-crisis periods include both pre- and post-crisis quarters. Hence, the crisis-contingent network effect we measure is short-lived (within the fourth quarter of 2008). To the extent that network effects on performance are more persistent in practice, by netting out the impact of networks from 2009 onward our estimate of the crisis-contingent effect is accordingly conservative.

Remarkably, the first column of Table 6 suggests the crisis-contingent board network effect is the *only* board network effect in this context. Outside of the crisis period, there is no difference in performance between highly and less professionally networked firms (conditional on a strict set of controls). Immediately following the collapse of Lehman Brothers, however, firms with more connections were buoyed by virtue of their professional networks. Even in comparison to country-industry counterparts, with similar performance trajectories, but with fewer connections, firms with stronger professional networks fared better. More precisely, a one standard deviation increase in the size of a firm's professional network mitigated the crisis-induced fall in quarterly ROA by approximately one third of a percentage point. The effect size is considerable relative to the magnitude of performance collapse evident in Figure 1.

When we examine the impact of political ties in column 2, a different story unfolds. During the crisis, we have no evidence to suggest political networks buoy firm

[19]Because firm clusters are nested within country-industry clusters, it is not surprising that the results herein remain intact when clustering instead at the firm level. With only nine countries, it is inadvisable to cluster over so few (unbalanced) clusters (Cameron and Miller 2015). Nevertheless, our results remain very similar when doing so.

[20]We can also allow the (quarterly) time period effects to vary by country, without meaningfully affecting our results. In our notation, this would imply replacing δ_t with δ_{kt}.

performance. Focusing on family group affiliation in column 3 also yields less compelling insights. As with the cross-sectional tests in the preceding two tables, affiliation with large family business groups does not confer benefits during the crisis, nor outside of it. These results remain insignificant when we include all types of networks in column 4.[21] Still, professional networks remain a significant determinant of crisis performance, but political and family networks do not significantly predict performance. This implies that even among firms with identical political and family ties, professional connections are a strong marginal predictor of performance.

Surprisingly, the magnitude of the crisis-contingent professional network effect does not meaningfully change when controlling for additional network dimensions. It is important to note, however, that the point estimates of political and family networks *do* change once we account for professional networks. In particular, it again appears that the estimated impact of political and family networks on performance, albeit imprecise, incurred considerable positive bias when measured in isolation. Had our sample yielded *significant* point estimates for the political and family networks in columns 2 and 3, respectively, our methodological contribution would be self-evident. Our argument hinges less on the precision of point estimates from our particular sample, however, and more on those of the literature. Political and family networks are widely considered important for performance, and here we provide evidence for considerable positive confounding bias in their estimated effects. Of course, it is not too ambitious to claim this confounding bias might also have implications for the confidence intervals reported in previous studies.

5 Robustness

5.1 Crisis-contingent Confounds

Our results of Table 6 cannot be explained by selection of networks on performance, country-industry, or country-industry sensitivity to shocks. Our results of Table 5 suggest a number of other firm characteristics are also insufficient to explain our results. Still, a form of omitted variable bias remains a concern. Perhaps networks are selected on some (observable) firm characteristic (time varying or not), and this is what actually drives performance, in and out of crises. If the direction of the impact of this third variable on performance switches during crises, this could explain a null result in Table 5 for a nevertheless critical factor.

[21] For the firm-level fixed effects analogue to Table 6, refer to section 5.2. Results are remarkably similar, likely due to the preponderance of controls in our model of choice (in particular - multiple lags of the dependent variable).

Consider, for example, a situation in which our professional network variable simply proxies for the size of a firm's board of directors. A larger board may be more likely to contain individuals with expertise in dealing with crises, but face decision-making constraints during regular times. As such, firms with larger boards may not stand out as particularly well performing vis-à-vis industry counterparts in our Table 5 tests, where the coefficient reports the *net* value of these countervailing effects. Still, the crisis-contingent effect of board size could be substantially positive, and would be erroneously attributed to the crisis-contingent professional network effect reported in Table 6. To illustrate once more, consider a scenario under which well-connected directors migrate towards stable (i.e. less volatile) firms. Those stable firms are likely to undergo less severe credit constraints during the crisis, and may perform better as a result. However, during regular times such firms may sacrifice profitability in favor of stability. Hence the net effect of two countervailing forces would be ambiguous during the crisis (Table 5), and the truly positive crisis-contingent effect of stability on performance would be reflected instead by our crisis-contingent professional network coefficient in Table 6.

To account for the above hypotheticals, and others in the same spirit, in Table B1 we include all our observable firm-level controls. Importantly, in this dynamic specification we also interact each control (both time varying, and time invariant) with the crisis period dummy, to rule out bias introduced by omitting firm-level characteristics with potentially important crisis-contingent effects on performance. Thus, we estimate the following:

$$ROA_{ijkt} = \omega N_{ijk} + \beta N_{ijk} crisis_t + \gamma_{jk} + \alpha_{jk} crisis_t + \rho ROA_{ijk,t-} + \delta_t + \psi X_{ijkt} + \theta X_{ijkt} crisis_t + \epsilon_{ijkt}$$

which is identical to equation 1, except firm-level time-varying and time invariant characteristics are captured in X_{ijkt}, which is also interacted with the crisis dummy to account for crisis-contingent firm effects in θ. The reported effect of professional networks on crisis performance is now slightly smaller in magnitude, and only significant at the 5% level. Otherwise, our findings remain unchanged.

5.2 Firm-specific Effects

Because we are also interested in measuring non-crisis network effects, thus far we have refrained from incorporating firm-level fixed effects into our analysis. Instead we have opted to include lagged performance indicators, in an effort to control for the unique trajectory undergone by each firm. But a model with firm fixed effects may be preferable to enhance identification - to approximate the true within-firm network effect on crisis performance.

A potentially valid criticism of our identification strategy thus far is that we have not sufficiently controlled for omitted firm characteristics which affect both networks and performance. The preceding subsection attempts to address those concerns by controlling for a host of time-varying and time invariant characteristics in our tests. Still, we are unable to rule out unobservables as potentially confounding factors. By incorporating fixed effects at the firm level, we can rule out time invariant unobservables as a valid argument for explaining our results. We therefore estimate the following:

$$ROA_{ijkt} = \omega N_{ijk} + \beta N_{ijk} crisis_t + \gamma_{ijk} + \alpha_{jk} crisis_t + \rho ROA_{ijk,t-} + \delta_t + \epsilon_{ijkt}$$

which is identical to equation 1 except γ is now firm-specific, rather than country-industry specific. Since we now include fixed effects and lagged performance indicators in our model, our resulting estimates are subject to Nickell bias. This problem is reduced, however, on account of the length of our panel (Nickell 1981).[22]

Table B2 presents those results, and we can see the magnitude on our coefficient of interest remains stable under this stricter specification. We therefore suggest the most relevant unobservables may aggregate at the country-industry (rather than firm) level. The results of Table B2 are comforting, but of course one can nevertheless conjure alternative scenarios of endogeneity involving time-*varying* firm-level characteristics unaccounted for in the preceding subsection.

5.3 Model Design

Through our approach thus far, pre- and post-crisis network effects have been pooled together for the purpose of estimating a 'regular' network effect. From a conceptual standpoint, this may be perceived as questionable, given that the global financial crisis persisted beyond one quarter. To the extent that crisis-contingent network effects are also persistent, our approach actually yields a conservative estimate by netting out the 'regular' network effect manifested in immediate post-crisis quarters (from January 1st 2009 onward). As Figure 1 suggests, the crisis did affect firm performance well into 2009. Our model suggests the lingering performance differential between firms with networks, and those without, can be explained by trajectories rather than long-lasting network effects per se. But again, if anything our approach downward biases our estimates. Still, to allay concerns regarding this design, we remove all post-crisis observations from the sample. Our results are essentially unchanged, and they are suppressed to conserve space.

[22] With 13 time periods, the size of the resulting bias will be small relative to our coefficient magnitude.

5.4 Measurement Error

One caveat is in order here in that board composition and ownership structures are persistent, but do in fact change. Because our network data are cross-sectional for 2008, the further from the crisis we stray, the more measurement error we incur. This could lead to attenuation bias in measuring the regular network effect, which could in turn lead to overestimation of the marginally additive effect during the crisis period. Importantly, this is not a great concern. In the US, Dass et al (2014) find that 82% of board members holding a directorship in a related industry hold on to that directorship in the subsequent year. Across East Asia, there are very strong reasons to expect board appointments to be even more persistent than in the US. Ownership of East Asian corporations is also reasonably persistent. Across our sample countries, from 1997-2012, state-owned firms were likely to remain under state control the following year with probability 84.5% (Carney et al 2015). Ownership by family business groups is traditionally even more persistent.

Nevertheless, to address the possibility that our results are significantly overstated due to measurement error at the boundaries of our sample period, we restrict our window of analysis to sharpen network data precision. We use instead a 2-year frame around the crisis period, and our results are basically unchanged. A remaining concern regards whether the crisis itself may have spurred board turnover, thereby increasing measurement error over the post-crisis period. The preceding subsection implicitly addresses this concern. Again, the results of this subsection are not reported in the interest of space.

5.5 Outliers

We acknowledge there are likely to be heterogeneous effects across firms, and we have so far presented average effects in this sense. We contend that professional networks matter generally, but perhaps to varying degrees across firms. Others may doubt this assertion, however, and suppose networks are unimportant for most firms, even if they play a strong role in a less compelling subpopulation. That is, an exceedingly large network effect in one country or industry could misleadingly yield a significant 'average' effect across our sample. In Malaysia, for example, the government has been developing Islamic banking since the Asian Financial Crisis. If firms learned through professional contacts that Islamic financial services were relatively unaffected by a crisis originating in the United States or Europe, well connected Malaysian firms could potentially increase their use of these services and financial institutions. This could result in cushioning their performance during the 2008 crisis, and inflating the 'average' estimated effect of

professional networks across East Asia at once. To verify that such anomalous conditions are not driving our results, we exclude one country (industry) at a time in Table B3 (B4). Our main result on the crisis-contingent professional network effect is robust across all specifications in both tables, suggesting this finding applies generally beyond any one country or industry.

As a side remark, it is noteworthy that some specifications in these tables yield significant (and sizeable) positive estimates for the effect of board networks on regular economic performance. For the corresponding subsamples this estimated effect is consistent with previous research associating firm performance with board networks (see Larcker, So, and Wang 2013).

Another potential concern surrounding outliers regards the functional form of our professional network variable. As seen in Tables 1 and 3, values in this field are considerably dispersed. While the mean number of board connections remains at 4.4 on average, maximum values reach nearly an order of magnitude higher in most countries. One might therefore suspect our results are driven by only a handful of well-performing and highly connected firms. To address this concern, we reclassify professional networks as a dummy variable indicating whether the firm is above its respective country mean in terms of board connections. Our results (suppressed) are robust to this alternative functional form.

5.6 Placebo Tests

The test procedure of section 4.2 isolates the additive crisis-period network effect relative to the average network effect. As such, a significant difference between this crisis-contingent effect and the general (average) effect can arise for a number of reasons: (1) the network effect is particularly strong in the crisis period; (2) the general network effect is dragged down by especially poor performance of networked firms in a different (non-crisis) period; or (3) the network effect wildly fluctuates over time, and so the network effect of any period taken in isolation may significantly differ from the mean. We have interpreted our findings as evidence for the first scenario depicted above. Under scenarios 2 and 3, however, our results thus far could be similar, and yet the empirical 'crisis-period network effect' would not be theoretically compelling. So to ensure we are capturing a network effect which is truly borne of the crisis, we therefore need to rule out these alternative interpretations of our Table 6 results.

In order to validate our interpretation of a crisis-contingent network effect, we employ placebo tests of the difference-in-differences specification of equation 1 for periods in the vicinity of the crisis. We take three quarters before and after the crisis, and reproduce Table 6 considering each of the periods, in turn, as the treatment period. By doing so,

we test whether in any of those periods the contemporaneous network effects significantly differ from the general network effects. If scenarios 2 or 3 are at work, we should obtain statistically significant differences between other period-specific network effects and the general network effect. But networks during other periods do not exhibit statistically significant effects beyond the general network effects conveyed throughout the sample period. To conserve space, tabular results are not presented. Figure 2, however, depicts the estimated coefficient magnitudes and 95% confidence intervals resulting from those tests. Political networks do exhibit a significant negative effect in the first quarter of 2008. Given there are 18 placebo tests (6 for each network dimension), however, it is entirely conceivable this finding constitutes a spurious correlation at the 5%-level of significance.

Not only is the crisis-period professional network effect statistically exceptional, but the effect magnitude is also clearly an outlier (see panel A). In fact, the differential between non-crisis period-specific professional network effects and the average effect is consistently close to zero. This is also the case for the family network effects depicted in panel B. As seen in panel C, period-specific political network effects are much more volatile. Given the general network effect for this dimension is also insignificant, this randomness in the point estimates is what we might expect if political networks do not confer performance implications in or out of crises. Lastly, the pattern exhibited in panel C by the period-specific political network effect merits exploration. While political networks clearly do not serve as a boon to performance during the fourth quarter of 2008, the graphic suggests an effect may be lagged to the first quarter of 2009. To explore this possibility, we take a closer look in the next subsection.

5.7 Null Effects

Thus far, our results suggest only professional networks improve firm performance during times of crisis. The development of internal capital markets and political favoritism appear to be less relevant functions of networks regarding firm performance. However, the null effect estimated for political and family networks does not support widely-cited findings in the literature. In this subsection we conduct additional tests to help ensure our null results are not the consequence of misspecification. Throughout this subsection, results are suppressed to conserve space.

5.7.1 Delayed effects

Our results thus far suggest neither political nor family networks are determinants of crisis performance. But until now we have narrowly defined the crisis period as the fourth quarter of 2008. As discussed in section 5.3, this approach should not bring into question the significance of our professional network effect (though it may introduce downward

bias in the point estimate). However, this conservative approach could explain why we do not identify political or family network effects, if these are manifested in later periods. After all, Figure 1 shows that in the first quarter of 2009, the crisis still prevented firms from performing at regular levels. Panel C of Figure 2 suggests there may be an effect worth exploring in that subsequent quarter.

In an effort to reveal delayed network effects, we estimate equation 1 anew, treating the first quarter of 2009 as the crisis quarter. We benchmark the new 'crisis-contingent' network effects against the average network effects in all remaining periods. But the fourth quarter of 2008 is excluded from the reference category (and the estimation) to yield a more generous estimate of political and family network effects. Still we cannot detect statistically significant crisis-contingent effects for either type of network.

5.7.2 Disaggregated political networks

To further explore the potential relevance of political networks during crises, we disaggregate the composite measure into constituent parts. That is, we test separately for the effects of state ownership and politician-directors. As mentioned earlier (in section 2.2.3), there potentially exists both costs and benefits associated with political ties. Firms with political ties may have preferential access to government financing and bailout funds, which could be particularly beneficial during a crisis. By contrast, they also may be called upon to engage in behavior that is detrimental to their performance, such as extending loans to troubled firms or allowing more time to firms seeking to repay debts. The net balance of these countervailing effects may differ between state-owned firms and those with politically connected directors. As such, we test for heterogeneous effects across these two types of political ties. The specification used is based on equation 1, and we alternately treat the fourth quarter of 2008, and the first quarter of 2009 (in accordance with section 5.7.1) as the crisis quarter. Neither state ownership nor directors' political status significantly predict crisis performance.

5.7.3 Institutional context

Finally, we consider the possibility that family and political networks matter more under certain institutional frameworks. Through the creation of internal factor markets via a business group, family networks can compensate for poor institutional environments in the wider economy. Likewise, political networks often exist where property rights enforcement is weak. In the absence of strong institutions, cronyism acts as a mean by which politicians guarantee investment protections to a select subgroup of investors in exchange for political support. In countries with weak democratic arrangements, such

as those in which corruption is rife and democratic institutions are not yet consolidated, political networks can have disproportionately beneficial effects for firm performance.

In light of the above, we alternately divide our countries into groups based on their levels of GDP per capita, various governance indicators for the quality of a country's institutions, as well as the strength of its democratic arrangements. The governance indicators include the rule of law, voice and accountability, political stability, corruption, and contract enforcement. These variables come from the Worldwide Governance Indicators project (Kaufman, Kraay, and Mastruzzi 2009). The measure for the quality of a country's democratic arrangements is an average of the Polity score from the Polity IV dataset in combination with its Freedom House score. This variable comes from Hadenius and Teorell (2007); and Wahman, Teorell, and Hadenius (2012). We find no evidence to suggest that the crisis-specific effects of either family or political networks are heterogeneous across institutional contexts. Reassuringly, we do find that political networks are significantly associated with greater firm performance *during regular times* in less democratic countries. This finding is consistent with Jiang, Lee, and Yue (2010), Leuz and Oberholzer-Gee (2006), and Fan, Wei, and Xu (2011).

It is beyond the scope of this paper to further explore this non-crisis relationship in less democratic countries. Suffice to state: any corruption, cronyism, favors, or kickbacks associated with political ties during periods of regular economic activity seem to simply persist during the crisis. If indeed certain aspects of the patron-client relationship are accentuated in these difficult times, it must also be the case that offsets attenuate the overall effect. We now turn to the remaining network dimension which does convey crisis-specific effects, across a wide range of institutional contexts.

6 Professional Networks and Crisis Performance

So far, we have shown professional networks conveyed performance advantages to East Asian firms during a crisis, whereas political and family networks did not. Drawing on existing literature, we have linked board networks (professional networks) to firm performance through an information-centric mechanism. However, direct board ties may correspond to functions other than information transmission such as diminished monitoring on the part of directors with numerous board positions. On the other hand, *indirect* ties are more clearly associated with information transmission (Renneboog and Zhao 2011). To closer examine which feature of board networks is driving our observed effect, we next introduce various theoretical concepts of network centrality and test the relative importance of each. Because each measure captures information dynamics differently, this method enables us to provide further suggestive evidence regarding the

role of information.

Figure 3 illustrates the importance of accounting for a firm's network beyond the first degree. Each firm is depicted as a node uniquely positioned in a complex national network of interlocking directorates. Two firms with the same number of direct professional connections may nevertheless find themselves in drastically different positions with respect to the information flow of the broader board network. After all, it is the *indirect* network ties which are most informative regarding information flow. In what follows, we examine the importance for crisis performance of second-order board network properties, giving special attention to the implicit role of information.

6.1 Network Centrality

The landscape for our analysis moving forward is the network of interlocking directorates. The nodes of this network are firms, and each weighted link within the network constitutes the number of cross-directorships between corresponding firms. We calculate network centrality using measures from three separate classes: degree centrality, betweenness centrality, and closeness centrality. If we focus exclusively on information dynamics, the measures can be associated with three different network position attributes: (1) exposure to information; (2) control over information; and (3) ease of access to information. Degree centrality captures the volume of information to which an actor is potentially exposed. Closeness centrality captures the efficiency with which an actor can access information. Betweenness centrality indicates the capacity for an actor to influence outcomes by withholding or distorting information in transmission. Information aside, degree centrality - a measure of direct ties - also corresponds to other network-borne firm characteristics (e.g., monitoring capacity of directors). Hence, by assessing the empirical relevance of direct ties in relation to indirect ties, we hope to shed light on the overall importance of network information to firm crisis performance. Then, by distinguishing among measures of indirect ties, we aim to shed light on the nature of information-related benefits stemming from board networks.

Importantly, we do not consider a fourth prominent measure: eigenvector centrality (or prestige, Katz 1953). This is because it overlaps, both conceptually and mechanically, with degree and closeness. Historically there have been three categories in the theoretical network literature, to which our three measures already pertain (Freeman 1978). By contrast, Larcker, So, and Wang (2013), and Renneboog and Zhao (2011), consider eigenvector centrality as a refinement of degree. While we are sympathetic to this conceptualization, we also highlight its parallels to closeness. Both closeness and prestige are computed similarly in that centrality increases with indirect connections, but the marginal contribution of higher-order connections to centrality

decreases with the distance between nodes as determined by an exponentiated decay parameter. At once, eigenvector centrality therefore captures the importance of immediate connections (information exposure) and the wider position within a network (information access). Indeed, in our sample prestige is correlated with degree and closeness at a level of 0.80 and 0.79, respectively (the latter two are correlated to a lesser extent at 0.65). In this setting, because eigenvector (or prestige) centrality is both conceptually and technically inseparable from two of our existing measures, we opt for its omission. After all, the following analysis is premised on drawing distinctions between the measures, and disentangling their unique effects.

6.1.1 Degree centrality

The degree centrality of a firm is simply the sum of board interlocks with other firms, with each interlock weighted according to the number of board members involved. It is in fact the measure heretofore used to summarize professional networks.[23] With respect to the flow of information, an actor with a relatively high measure of degree centrality is a focal point of communication and information (Freeman 1978). An actor with a low measure of degree centrality would be at the periphery of the network's information flow, isolated from direct communication with others in the network. Hence, degree centrality is important as a baseline index of potential communication activity and information exposure. On the other hand, degree centrality also uniquely captures the level of additional responsibilities for directors, which can compromise their ability to monitor executive management. The measure is calculated as:

$$D = Gn$$

where G is the matrix of interlocking directorates, and n the unit vector. The symmetric matrix G is of dimension N-by-N, where N is the number of sample firms within the subject country, and also the length of n. Each element G_{ij} indicates the number of common board members between firm i and firm j.

6.1.2 Closeness centrality

Unlike degree, decay centrality (our measure of closeness) accounts for indirect (distant) professional connections. As connections increase in distance they are afforded smaller weights in the centrality measure, and the rate of decay is determined by a decay parameter. Hence, closeness additionally captures second order exposure beyond degree

[23]Henceforth, all centrality measures regard board networks. Accordingly, we change this variable name from 'Board' to 'Degree'.

centrality, taking into account the entire network structure facing each individual firm (rather than only the immediate neighbors). In this sense, closeness values are more a metric of information (which circulates throughout the broader network) than directors' monitoring capacity (which is a first-order network effect).

Generally, closeness centrality refers to the capacity for an actor to avoid the control potential of others in the network (Freeman 1978). In this view, a central position is one that is not dependent upon others as intermediaries of messages. Hence, the independence of an actor is determined by its closeness to all other actors in the network. An actor that has a high level of closeness to others in a network is one with the minimum cost or time for communicating with others. In other words, closeness captures the ease of access to information available in the network. Closeness centrality has been characterized (in contrast to degree) as being critical to capturing the information absorptive efficiency of a firm's network position (Renneboog and Zhao 2011). Following Jackson (2008), decay centrality is calculated in the following manner:

$$C(i) = \sum_{j \neq i} a^{l(i,j)}$$

The function l expresses the distance between firms i and j in the network. The decay parameter a determines the weight ratio between connections of different degrees. Throughout the analysis, we adopt $a = 1/2$[24] (under the natural restriction $0 < a < 1$), but our results are robust to other choices of this parameter value. In computing this measure, we factor in all board connections up to the fifth degree. We restrict our analysis to relatively short network ties because distant ones are not overly compelling from a theoretical standpoint. However, our results remain intact when accounting for more distant network ties.

6.1.3 Betweenness centrality

Our final measure of centrality - Freeman's (1978) betweenness centrality - captures the frequency with which an actor acts as a go-between for other actors in the network. The more frequently that an actor lies on the path of communication between any other two actors, the more strategically located that actor is. An actor in such a position can influence outcomes by withholding or distorting information in transmission. As a result, actors with a high level of betweenness centrality are regarded as having a high potential for control of communication and information, and thus a considerable degree of power.

A geodesic is a 'shortest path' between two nodes in a network. Betweenness centrality is the average share of geodesics along which a firm sits. More practically, if

[24] With a=1/2, a second-degree connection contributes one half of the weight of a first-degree connection to a firm's total network centrality.

communication through a network were only transmitted efficiently (via shortest paths), then betweenness centrality would report the share of network communication facilitated by a given firm (the share of communication passing through that firm)[25]. A special feature of this measure is that it depends less heavily on the connections of the subject firm, and more heavily on the firm's strategic position within the network. The measure then proxies less for the volume of information at the disposal of a firm. It captures instead how well-positioned the firm is to monopolize or hijack that information, and thus exert influence over others. Computationally, we invoke UCINET software (Borgatti, Everett, and Freeman 2002) to calculate betweenness centrality as:

$$B(i) = \sum_{k \neq j : i \notin \{k,j\}} \frac{g_i(jk)/g(jk)}{(n^2 - 3n + 2)/2}$$

where $g_i(jk)$ is the number of geodesics between nodes j and k which pass through node i, $g(jk)$ is the total number of geodesics between j and k, and $(n^2 - 3n + 2)/2$ is the maximum number of geodesics along which any node may be situated, given network size n.

6.2 Board Network Position and Crisis Performance

Having interpreted the qualitative differences between the above centrality indicators, Panel B of Table 1 breaks down, by country, the summary statistics for degree, betweenness, and closeness (degree centrality statistics were previously referred to in Panel A as professional networks). Units of measurement differ across measures, and value magnitudes are sensitive to country network size. As such, direct comparisons across countries or centrality measures is problematic. Still, the country-rank ordering of means, standard deviations, and maximum values does change across centrality measures. This variation provides evidence for the aforementioned conceptual distinctions between measures, further motivating the following analysis. Table 3 summarizes statistics for each measure across the entire sample.

We now compare the relative importance of board centrality measures for firm performance during a crisis. The first column of Table 8 reports the impact of each centrality score on our primary indicator of crisis performance - ROA, using the specification from equation 1. For ease of comparison, in place of standard coefficients we report the effect size (in percentage points) of a one standard deviation increase in the corresponding network centrality measure.[26] Because the centrality measures are

[25] Assuming the same amount of communication runs between every pair of firms in the network

[26] Nonstandardized coefficient magnitudes are not to be compared *across* centrality measures because the unit of measurement is not consistent across variables.

empirically correlated with each other[27], we first compare their effects individually. Column 1 therefore consists of three separate tests - each panel corresponds to tests for a single centrality measure. We can see all three centrality measures carry significant implications for crisis performance, but from column 1 we cannot disentangle the distinct effects stemming from various aforementioned network attributes.

Nevertheless, we are able to compare effect sizes across measures. A one standard deviation increase in degree or closeness induces a performance cushion of approximately one-third or two-fifths of a percentage point in terms of quarterly ROA, respectively. Betweenness centrality, however, exhibits a smaller effect of 0.16 percentage points. This observation suggests exposure and ease of access to information may be more advantageous than control over information in times of crisis.

So far we have focused exclusively on return on assets (ROA) as the indicator of firm performance. To assess the robustness of our results across alternative performance indicators, and to further compare network property effects, we consider alternative performance measures examined in related work (e.g., Bennedsen et al 2007; Dass et al 2014). The additional performance measures include operating return on assets (OROA), return on equity (ROE), and return on capital employed (ROCE).[28] In columns 2-4, we reproduce our tests from column 1 for the various performance outcomes.

A vertical reading of the columns of Table 7 suggests firm performance - defined generally - is affected by professional network centrality in times of crisis. Through a horizontal reading, however, we can compare the relative robustness of each centrality measure, and shed light on which measures are potentially most relevant for our application. Panel A presents the results for the impact of degree centrality on each performance measure. Degree centrality may drive ROA upward in times of crisis, but is not significant for the remaining performance measures. Panel B tests the effect of betweenness centrality, which is a determinant of ROA, and perhaps ROE and ROCE. In Panel C, closeness centrality appears to be a significant determinant of all accounting measures of performance. Closeness centrality is the most robust determinant of firm performance during a crisis, and consistently carries the strongest effect. A one standard deviation improvement in closeness centrality cushioned the crisis performance decline by 0.40, 0.35, 1.64, and 0.86 percentage points, when measured by quarterly ROA, OROA, ROE, and ROCE, respectively. Compared to an average fall in quarterly

[27]The correlation between degree and closeness is 0.65; that between closeness and betweenness is 0.29; and that between degree and betweenness is 0.39.

[28]Tobin's Q is not significantly affected by board centrality. This may be explained by its sensitivity to extreme share price fluctuations, making it problematic to use as a gauge of firm value during such crisis episodes (Blanchard, Rhee, and Summers 1993).

ROA of just over one percentage point (1.16 pp) between the third and fourth quarters of 2008, this amounts to reducing the impact of the crisis by approximately 35% during that period.

While the above means of indirect comparison is suggestive evidence for the relative importance of closeness, it is by no means conclusive. Accordingly, despite the high correlation (0.65) between degree and closeness, we next include all measures (standardized) into the same specification to draw formal distinctions between their effects. Panel A of Table 8 simultaneously tests the importance of all centrality measures for each performance indicator in turn. Panel B reports p-values for corresponding Wald tests of equality of coefficients.

In the first column of Table 8 we see none of the board centrality measures stand out as significant predictors of firm performance (ROA) during the crisis. In Panel B, the statistical differences between the effects of each measure are not significant. As such, from column 1 we cannot make any claim regarding which type of centrality is most beneficial during the crisis. In column 2, closeness emerges as the most important determinant of performance (OROA), in terms of effect size and statistical significance. The corresponding Wald tests in Panel B permit us to reject the hypothesis that all measures carry the same effect (p-value: 0.083). We also reject the hypotheses that closeness is equivalent to either degree (p-value: 0.036) or betweenness (p-value: 0.048). Moreover, we cannot formally differentiate between degree and betweenness. The third column of Table 8 further substantiates the relative importance of closeness. Again, closeness exhibits the strongest and most significant effect on crisis-performance (ROE). Marginally at the 10%-level of significance, we are unable to reject that all measures are equal (p-value: 0.108). We can however assert that closeness is neither equivalent to degree (p-value: 0.038) nor betweenness (p-value: 0.059). As with all columns of the table, we are unable to draw formal distinction between the other centrality measures. The final column of panel A shares qualitative features of the preceding two, but lower levels of statistical certainty prevent us from reading heavily into the results. Still, closeness has the greatest impact on performance (ROCE) during the crisis, although the effect is statistically indistinguishable from zero, and from the effect of the other measures (as seen in Panel B). In sum, however, the collective evidence from Tables 7 and 8 seem to suggest closeness centrality is the most robust predictor of performance during a crisis.

The evidence above may clarify which network attribute is the largest asset in times of crisis. It appears that firms positioned to ease access to information will benefit more from their professional networks than firms exerting control over information flows, or maximizing their potential exposure. Additionally, that closeness is a more robust indicator of crisis performance than degree suggests broader professional network

context matters beyond local neighbourhood arrangements. Importantly, the relevance of closeness over degree also reassures our information-centric interpretation of the findings. As noted, a key distinction between the two is the tendency for degree to proxy for monitoring potential, which could obscure its precision as a measure of information exposure (and indeed introduce countervailing performance effects).

7 Conclusion

Thus far, the literature has investigated family business groups, political ties, and professional connections as empirically distinct phenomena. But due to the co-incidence of these various networks in practice, one should compare them side-by-side to disentangle their potentially overlapping effects. To our knowledge, our paper is the first to engage in this type of analysis. We hand-collected data for a region in which each of these networks is widely regarded as highly salient - East Asia. The end product is a dataset spanning 1,290 companies across nine countries, documenting the professional, political, and family networks of each. To improve identification (by conceivably rooting out selection effects), we assemble data around an external shock - the 2008 financial crisis. Our findings suggest the resilience of firms to adverse shocks is determined in part by their professional network, and the informational advantages it confers. A one standard deviation improvement to a firm's closeness centrality buoyed quarterly ROA by two-fifths of a percentage point during the crisis.

To illustrate the potential benefits of professional connections over family group affiliations or political ties, we can turn to a comparison of Singapore's two largest steel-making firms, Hupsteel and HG Metal. Economic growth across the globe in 2007 and early 2008 spurred a rise in construction activity, leading to an increase in steel prices, which peaked at the end of June 2008 at a high of $1265/ton, but soon thereafter nosedived to a low of $250/ton in October. This, in combination with the sharp global economic contractions at the end of 2008 created a difficult environment for steel producers. Up until the end of 2008, HG Metal outperformed Hupsteel, but Hupsteel maintained a positive ROA in the fourth quarter (5.71%) which exceeded that of the average Singaporean firm (1.74%) while HG Metal's ROA fell deep into negative territory (-5.04%). Both companies acted quickly to reduce inventories, scale down purchases, and cut costs as the global economy contracted. While there are numerous factors that may account for the performance difference between these two firms, media outlets and Hupsteel's annual report specifically point to "faster and higher cash collection" as the primary reason for its superior performance.[29]

[29]Broker's Digest, *The Edge Singapore*, 25 May 2009.

Like Hupsteel itself, its affiliated group firms are also involved in steel manufacturing. Hence, its superior performance is not due to funds being shifted from one family-owned firm to another (i.e. firms operating in relatively unscathed sectors subsidizing those harder hit), as verified by its independent auditor, PricewaterhouseCoopers. And while a member of parliament sat on the board of Hupsteel, it seems unlikely this could explain its more efficient debt collection across numerous firms (political ties are typically thought to serve alternative functions). Rather, Hupsteel's central position within a professional network made it well placed to gather information about which customers were more capable of paying their debts, and this would in turn enhance the speed with which it could successfully seek payment. Indeed, Hupsteel's degree and centrality scores considerably exceed those of HG Metal, indicating that it has access to a wider information network, and easier access to that information.[30] Of course, this is not to suggest other factors did not play a role. But in those difficult times, Hupsteel surely benefitted from knowing who could pay and who could not, thereby improving the timeliness of debt collection.

Our study is based in East Asia, but the prevalence of business networks in other global and regional contexts makes our findings of general interest. For example, interlocking directorates are commonplace in Latin America (Cardenas 2014), Europe (van Veen and Kratzer 2011) and the United States (Larcker, So, and Wang 2013). Faccio (2006) finds widespread evidence that controlling shareholders and top corporate officers have political connections in a study of 47 countries. Finally, Khanna and Yafeh (2007) document the prevalence of family business groups around the world. In effect, wherever these business networks coexist along multiple dimensions, this research is of relevance.

By drawing conceptual and empirical distinctions between different measures of network centrality, we are able to demonstrate that distant ties collectively carry a first-order effect, even beyond the *direct* connections upon which the literature is almost exclusively focused. To date, few studies in this vein of research have differentiated between theoretically distinct measures of centrality. We feel this approach begins to explore the importance of professional networks along the intensive, rather than extensive, margin. But still, some networks may be 'active' while others lie 'dormant'. A common drawback of this literature (our own work included) is that few research designs are able to distinguish among these possibilities. Rich data on the frequency of interaction between connected firms, or the strength of a bond between firms and families or politicians, would certainly enable a better understanding of effect sizes along the intensive margin.

We provide evidence that the key benefit arising from professional connections is the

[30]Hupsteel's degree and centrality scores are 6 and 10.4, respectively. The corresponding scores for HG Metal are 4 and 7.4, respectively.

efficiency of accessing information. The question remains, however, exactly *which* information is made available via these networks, and exactly *how* does it translate into performance advantages. The case of Hupsteel above provides one example, but our research is constrained similarly to related work (e.g., Larker, So, and Wang 2013; Dass et al 2014) in that we are missing detailed data on the content of board meetings and interpersonal communication. More nuanced research could shed light on these questions, but the required methods would likely necessitate sacrificing breadth for depth of coverage.

Perhaps the most intriguing outcome of this research is that political and family networks do *not* appear beneficial during such critical times. Our paper's focus is on East Asia - a region in which political, family, and professional networks are deemed fundamental to business systems. The finding that political ties are not influential is particularly surprising given that they have been found to be important in other prominent studies of the region (e.g., Fisman 2001; Johnson and Mitton 2003; Faccio 2006). One caveat is that our identification strategy aims to measure *crisis-contingent* effects. For periods of regular economic activity, we report only correlations. Hence, causal effects for political and family networks could nevertheless be present during normal times (as suggested in section 5.7.3 for political networks in the least democratic countries), but our analysis is not designed to capture them. Also, our estimates capture the *net* effect of networks. While it may be true that some concrete benefits accrue on account of these networks during crises, it may simultaneously be true that commensurate offsetting forces nullify the overall effect.

Despite these caveats, our interpretation suggests political and family ties may not be as generally influential as previously thought. Studies focusing only on a single network dimension may be subject to confounding bias. Both the network correlations we observe, and the behaviour of the point estimates for political and family networks, are consistent with this perspective. In other words, part of the effect that has been attributed to political and family networks in the past may instead be due to the professional networks which often accompany them. But one might wonder why such networks exist if not solely to benefit the individual firms of which they are comprised? Perhaps a political or family network could arise as an end unto itself, rather than as a means to market outcomes. After all, aside from economic implications, such networks also connote success, power, and privilege. Therefore, our results do not suggest political and family networks are without purpose. Rather, we caution against stressing their importance to firm performance without recognizing the potentially confounding role of concomitant professional networks.

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Table 1: **Networks Across East Asia**

Panel A: Business Networks										
Country	Professional:				Political:			Family:		
	Firms	Mean	SD	Max	Firms	Mean	SD	Firms	Mean	SD
Hong Kong	133	5.1	6.1	33	133	0.346	0.477	133	0.278	0.450
Indonesia	169	1.6	3.3	23	169	0.166	0.373	115	0.304	0.462
Japan	126	1.8	2.3	15	126	0.056	0.230	125	0.016	0.126
South Korea	133	2.5	2.8	21	133	0.090	0.288	133	0.474	0.501
Malaysia	281	7.3	6.6	37	281	0.292	0.455	146	0.247	0.433
Philippines	98	8.5	8.9	38	98	0.133	0.341	98	0.480	0.502
Singapore	116	3.5	3.2	15	116	0.284	0.453	116	0.147	0.355
Taiwan	107	1.6	2.2	12	107	0.093	0.292	105	0.048	0.214
Thailand	127	5.1	5.0	23	127	0.157	0.366	126	0.198	0.400

Panel B: Professional Networks										
Country	Firms	Degree:			Betweenness:			Closeness:		
		Mean	SD	Max	Mean	SD	Max	Mean	SD	Max
Hong Kong	133	5.1	6.1	33	0.79	1.65	11.33	6.39	5.69	20.63
Indonesia	169	1.6	3.3	23	0.01	0.04	0.30	0.76	1.19	4.81
Japan	126	1.8	2.3	15	0.88	2.22	15.15	3.12	3.21	13.09
South Korea	133	2.5	2.8	21	2.12	3.13	12.50	3.59	2.82	11.59
Malaysia	281	7.3	6.6	37	0.70	1.00	7.50	22.37	12.03	49.16
Philippines	98	8.5	8.9	38	1.06	1.79	9.69	8.29	6.33	19.16
Singapore	116	3.5	3.2	15	1.36	1.94	10.03	6.14	4.47	14.59
Taiwan	107	1.6	2.2	12	0.11	0.31	2.02	1.01	1.19	4.66
Thailand	127	5.1	5.0	23	1.43	2.37	12.00	8.70	6.09	21.16

Data are for 1,290 firms spread across nine East Asian economies. All network data are assembled by the authors, and are cross-sectional for 2008. Panel A reports country-level statistics on board interlocks, political ties, and family group affiliations. Panel B reports on three types of board network centrality: degree, betweenness, and closeness. For political ties and family affiliations, Min and Max values are everywhere 0 and 1. For professional connections (board centrality) measures, Min values are everywhere 0.

Table 2: **Correlation Matrix**

	Board	Politician	Family	State-owned
Board	1.00			
Politician	0.12	1.00		
Family	0.35	0.03	1.00	
State-owned	0.16	0.10	-0.20	1.00

Reported numbers are Pearson correlations, and are significant at the 1% level, *except for the correlation between 'Family' and 'Politician'*. Data are for the 1,097 firms for which network data is available across all three dimensions. 'Board' is a count variable for the amount of board/executive interlocks. 'Family' indicates affiliation with a family business group. 'Politician' indicates whether a director or executive concurrently holds a seat in parliament. 'State-owned' indicates a government entity is a significant shareholder.

Table 3: **Descriptive Statistics**

	N	Mean	SD	Min	Max
ROA	15315	1.90	4.0	-14.4	16.4
OROA	13289	1.96	3.0	-8.1	13.2
ROE	13278	2.54	6.6	-32.8	29.0
ROCE	13288	4.03	6.7	-23.2	30.8
Board	1290	4.4	5.6	0	38
Political	1290	0.195	0.40	0	1
Family	1097	0.243	0.43	0	1
Director	1290	0.04	0.21	0	1
Control	1290	0.17	0.37	0	1
Between	1290	0.89	1.9	0	15.1
Close	1290	8.43	10.3	0	49.2
boardsize	1290	11.3	4.9	0	34
listing	1273	1992	8.8	1973	2007
concentration	1145	34.2	26.0	0	100
institutional	1145	1.2	7.5	0	100
blockholder	1150	0.59	0.49	0	1
tangible	13282	0.33	0.24	0	0.90
cash	11981	0.072	0.084	0	0.47
liabilities	15602	5.64	18.7	0	145
volatility	16154	0.033	0.026	0	0.16
leverage	13271	0.52	0.27	0.03	1.46
size	13452	13.6	2.1	9.0	18.8

Data are for 1,290 firms spread across nine East Asian countries. Financial indicators come from Worldscope and Datastream, and are measured quarterly. Performance data are measured quarterly and expressed in terms of percentage points. Network and corporate governance data are assembled by the authors, and are cross-sectional for 2008. Other (financial) data span from second quarter 2007 until second quarter 2010.

Table 4: **Firm Performance and Networks**

	(1)	(2)	(3)	(4)
Board	0.0800***			0.0913***
	(2.916)			(2.704)
Political		0.421		0.0372
		(1.158)		(0.0910)
Family			-0.113	-0.492
			(-0.298)	(-1.198)
Observations	1,178	1,178	1,033	1,033
R-squared	0.192	0.187	0.188	0.195

Data are for 1,178 firms spread across nine East Asian countries. Financial indicators come from Worldscope and Datastream. Network data are assembled by the authors. Dependent variable is quarterly return on assets (ROA), expressed in percentage points. Explanatory variables are various measures of networks. Data are cross-sectional for the fourth quarter of 2008 - the crisis period following the collapse of Lehman Brothers. All specifications include country-industry fixed effects. The t-statistics reported in parentheses are based on standard errors clustered by country-industry (*** p<0.01, ** p<0.05, * p<0.1).

Table 5: **Networks and Confounding Factors**

	(1)	(2)	(3)	(4)
Board	0.0553*			0.0729*
	(1.692)			(1.963)
Political		-0.246		-0.607
		(-0.424)		(-0.976)
Family			-0.0855	-0.379
			(-0.192)	(-0.825)
boardsize	-0.0156	0.00740	-0.00299	-0.0190
	(-0.341)	(0.171)	(-0.0701)	(-0.408)
listing	0.0415*	0.0383	0.0358	0.0408*
	(1.809)	(1.637)	(1.536)	(1.667)
concentration	0.00747	0.00867	0.00784	0.0116
	(1.100)	(1.107)	(1.184)	(1.534)
institutional	-0.0190	-0.0224	-0.0240	-0.0217
	(-0.543)	(-0.654)	(-0.696)	(-0.632)
blockholder	0.182	0.108	0.0450	-0.134
	(0.642)	(0.286)	(0.126)	(-0.283)
tangible	-1.281	-1.326	-1.273	-1.185
	(-1.280)	(-1.321)	(-1.180)	(-1.116)
cash	1.632	1.557	1.090	1.212
	(0.564)	(0.545)	(0.368)	(0.414)
liabilities	-0.0117	-0.0126	-0.0101	-0.0105
	(-1.058)	(-1.143)	(-0.905)	(-0.957)
volatility	-27.52***	-27.62***	-27.83***	-27.59***
	(-3.451)	(-3.421)	(-3.212)	(-3.194)
leverage	-4.899***	-5.052***	-4.784***	-4.737***
	(-4.560)	(-4.790)	(-4.511)	(-4.421)
size	0.344	0.409**	0.338	0.296
	(1.620)	(2.031)	(1.605)	(1.360)
Observations	935	935	899	899
R-squared	0.278	0.276	0.261	0.265

Data are for 935 firms spread across nine East Asian countries. Financial indicators come from Worldscope and Datastream. Network data are assembled by the authors. Corporate governance controls are from Carney & Child (2013). Dependent variable is quarterly return on assets (ROA), expressed in percentage points. Explanatory variables of interest are various measures of networks. Data are cross-sectional for the fourth quarter of 2008 - the crisis period following the collapse of Lehman Brothers. All specifications include country-industry fixed effects. The t-statistics reported in parentheses are based on standard errors clustered by country-industry (*** p<0.01, ** p<0.05, * p<0.1).

Table 6: **Impact of Networks on Crisis Performance**

	(1)	(2)	(3)	(4)
Board*crisis	0.0571***			0.0577***
	(3.510)			(2.740)
Board	0.00534			0.00858
	(1.016)			(1.467)
Political*crisis		0.159		-0.0745
		(0.555)		(-0.230)
Political		-0.0268		-0.0395
		(-0.412)		(-0.596)
Family*crisis			-0.0171	-0.263
			(-0.0668)	(-0.895)
Family			0.0428	0.00114
			(0.587)	(0.0169)
Observations	12,205	12,205	10,453	10,453
R-squared	0.592	0.592	0.615	0.615

Data are for 1,197 firms spread across nine East Asian countries. Financial indicators come from Worldscope and Datastream. Network data are assembled by the authors. Dependent variable is quarterly return on assets (ROA) expressed in percentage points. Explanatory variables of interest are various measures of networks, interacted with the crisis period to capture the crisis-contingent network effect. Network data are cross-sectional for 2008. Observations run from second quarter 2007 until second quarter 2010, leaving a panel of thirteen quarters. All specifications include country-industry fixed effects, as well as crisis-period country-industry shocks. Each specification contains eight quarterly lags of the dependent variable. The t-statistics in parentheses are based on standard errors clustered by country-industry (*** p<0.01, ** p<0.05, * p<0.1).

Table 7: **Impact of Board Network Centrality on Crisis Performance**

	(1) ROA	(2) OROA	(3) ROE	(4) ROCE
Panel A:				
Degree*crisis	0.320***	0.049	0.622	0.339
	(3.510)	(0.339)	(1.462)	(0.981)
Degree	0.030	0.076***	0.103	0.080
	(1.016)	(2.776)	(1.514)	(1.320)
Panel B:				
Between*crisis	0.159**	0.068	0.581*	0.466*
	(2.149)	(0.602)	(1.738)	(1.855)
Between	0.038*	0.011	0.031	0.007
	(1.839)	(0.403)	(0.470)	(0.126)
Panel C:				
Close*crisis	0.401**	0.346*	1.638**	0.864*
	(2.291)	(1.867)	(2.529)	(1.667)
Close	0.061	0.050*	0.061	0.080
	(1.338)	(1.833)	(0.797)	(1.224)
Observations	12,205	9,632	9,589	9,623
R-squared	0.59	0.48	0.23	0.36

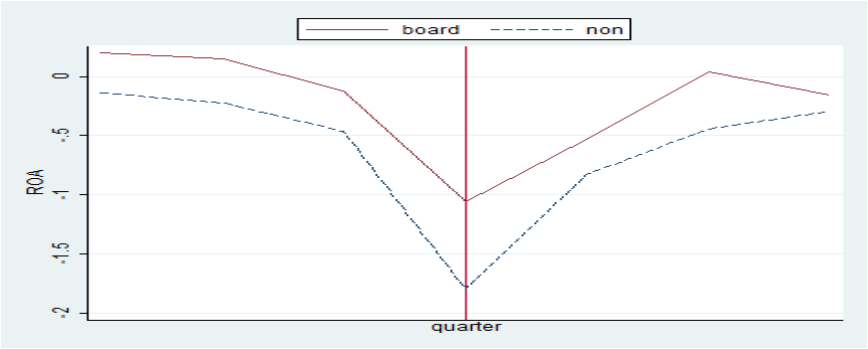
Data are for 1,197 firms spread across nine East Asian countries. Financial indicators come from Worldscope and Datastream. Network data are assembled by the authors. Dependent variables are listed in column headings, and expressed quarterly as percentage points: return on assets (ROA), operating return on assets (OROA), return on equity (ROE), and return on capital employed (ROCE). Explanatory variables of interest are various measures of board network centrality (separated by panel), interacted with the crisis period to capture the crisis-contingent network effect. Network data are cross-sectional for 2008. Observations run from second quarter 2007 until second quarter 2010, leaving a panel of thirteen quarters. All specifications include country-industry fixed effects, as well as crisis-period country-industry shocks. Each specification contains eight quarterly lags of the dependent variable. Reported effect size is for a one standard deviation change in the corresponding network variable. The t-statistics in parentheses are based on standard errors clustered by country-industry (*** p<0.01, ** p<0.05, * p<0.1).

Table 8: **Relative Importance of Board Centrality Effects**

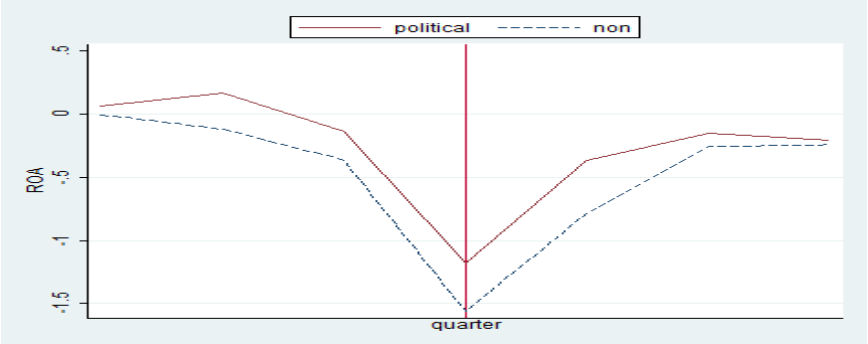
	(1) ROA	(2) OROA	(3) ROE	(4) ROCE
Panel A: regression results				
Degree*crisis	0.228	-0.170	-0.203	-0.136
	(1.495)	(-0.993)	(-0.479)	(-0.391)
Between*crisis	0.0134	-0.0366	0.0261	0.219
	(0.173)	(-0.287)	(0.0777)	(0.703)
Close*crisis	0.187	0.514**	1.792**	0.849
	(0.716)	(2.424)	(2.447)	(1.474)
Degree	-0.00449	0.0947***	0.128	0.0820
	(-0.169)	(2.969)	(1.574)	(1.193)
Between	0.0243	-0.0284	-0.0167	-0.0450
	(1.175)	(-1.075)	(-0.250)	(-0.790)
Close	0.0496	-0.0139	-0.0383	0.0363
	(1.177)	(-0.516)	(-0.462)	(0.572)
Observations	12,205	9,632	9,589	9,623
R-squared	0.592	0.476	0.229	0.358
Panel B: Wald test p-values				
$H_0 : D = B = C$	0.269	0.083	0.108	0.374
$H_0 : D = B$	0.222	0.586	0.693	0.521
$H_0 : D = C$	0.917	0.036	0.038	0.170
$H_0 : B = C$	0.555	0.048	0.059	0.414

Data are for 1,197 firms spread across nine East Asian countries. Financial indicators come from Worldscope and Datastream. Network data are assembled by the authors. Dependent variables are listed in column headings, and expressed quarterly in percentage points: return on assets (ROA), operating return on assets (OROA), return on equity (ROE), and return on capital employed (ROCE). Explanatory variables of interest are various measures of network centrality, interacted with the crisis period to capture the crisis-contingent network effect. Network data are cross-sectional for 2008. Observations run from second quarter 2007 until second quarter 2010, leaving a panel of thirteen quarters. All specifications include country-industry fixed effects, as well as crisis-period country-industry shocks. Each specification contains eight quarterly lags of the dependent variable. Reported effect size is for a one standard deviation change in the corresponding network variable. The t-statistics in parentheses are based on standard errors clustered by country-industry (*** p<0.01, ** p<0.05, * p<0.1).

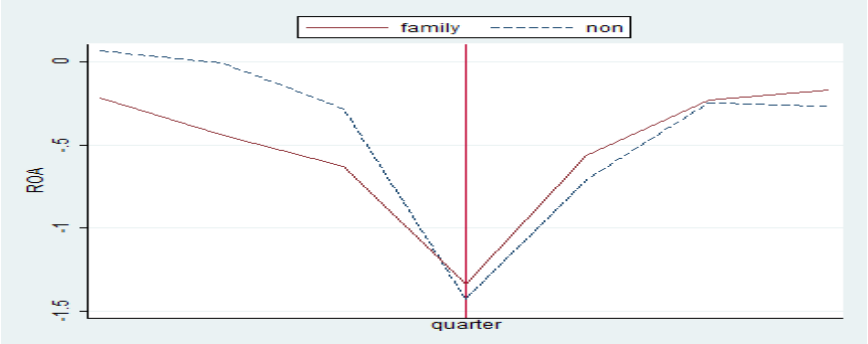
Figure 1: **Central vs. Peripheral Firm Performance**
Graph compares performance (ROA) between central and peripheral firms, for each network type, over six quarters surrounding the crisis period. Performance levels depicted are unexplained by country and industry factors. That is, performance is calculated net of country and industry based predictions, and then averaged over the relevant subsample. Quarterly ROA is expressed in percentage points along the y-axis. Accounting quarters are ordered along the x-axis, with a vertical line indicating the crisis quarter. Top panel compares firms with above-median board interlocks (board), with those below (non). Middle panel compares politically connected firms (political), with those not politically connected (non). Bottom panel compares firms forming part of a family business group (family), with those not (non).



(a) Professional



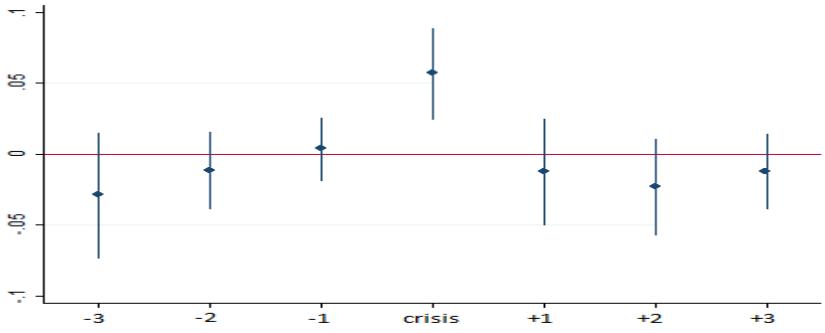
(b) Political



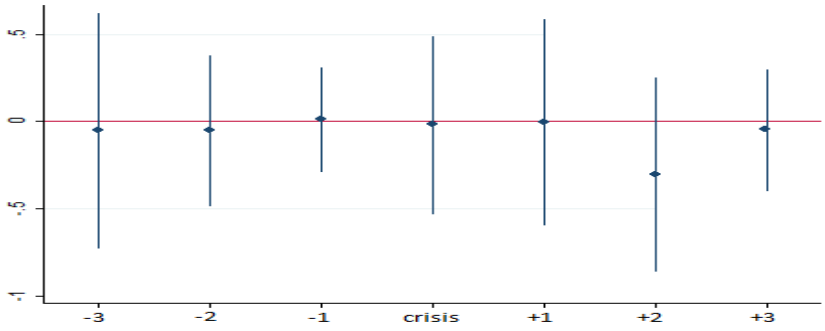
(c) Family

Figure 2: **Crisis Vicinity Placebo Effects**

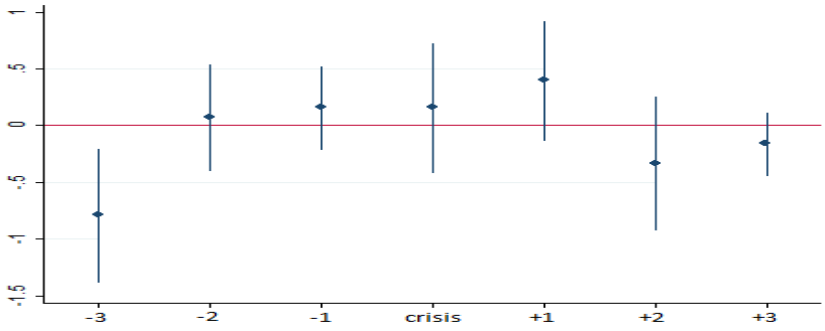
Placebo tests estimate period-specific network effects. Tests are based on specification of equation 1, and are conducted for six quarters surrounding the crisis period. For each quarter, the period-specific effect of each network measure is presented with the 95% confidence band for that estimate. Magnitudes are referenced along the y-axis, while accounting quarters are ordered along the x-axis. Coefficient magnitudes and standard errors are not to be compared across measures.



(a) Professional

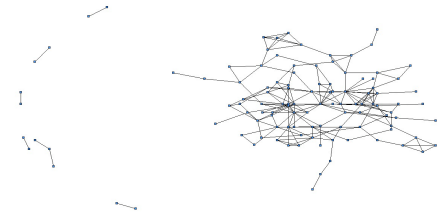


(b) Family

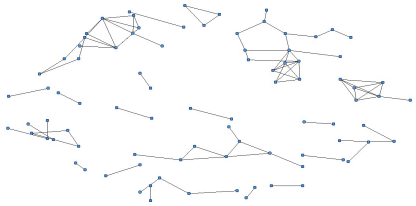


(c) Political

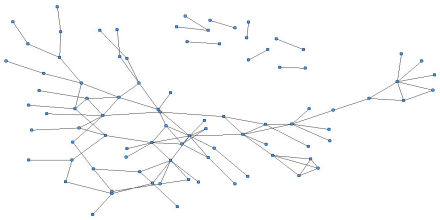
Figure 3: **Networks Across East Asia**
Board networks are depicted for 1,290 firms across nine countries, based on approximately 29,000 directors. The number of firm nodes varies by country, as reported in Table 1. To facilitate comparison, the graph of Malaysia is limited to 169 firms randomly selected from the full set of 281. For the sake of exposition, isolate nodes are not presented.



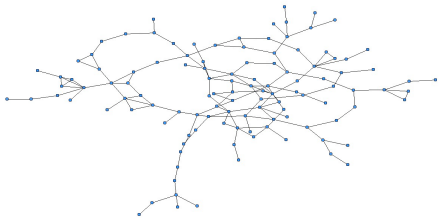
(a) Hong Kong



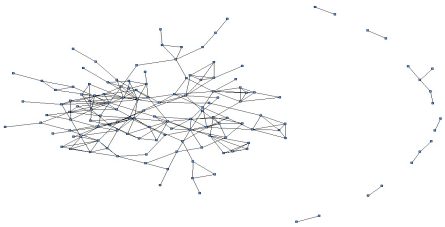
(b) Indonesia



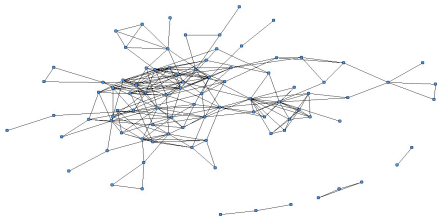
(c) Japan



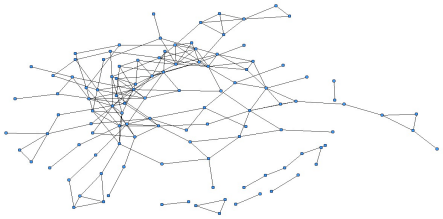
(d) South Korea



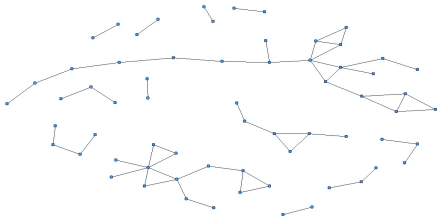
(e) Malaysia



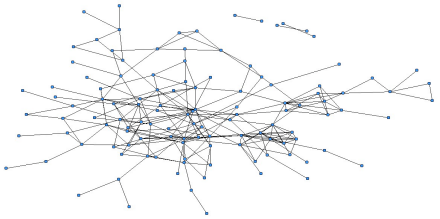
(f) Philippines



(g) Singapore



(h) Taiwan



(i) Thailand

Appendix A: Sources for politicians data

Parliament Members:

Hong Kong Legislative Council: www.elections.gov.hk/elections/legco2004

Hong Kong Election Committee Members: webb-site.com/dbpub

Indonesia: www.mpr.go.id/profil/anggota

Japan: www.weblio.jp/wkpja/content

South Korea: Source file emailed to us by the National Assembly

Malaysia National Assembly: psephos.adam-carr.net

Malaysia Senate: www.parlimen.gov.my

Philippines House: www.congress.gov.ph/download/archives/mem_14th.pdf

Philippines Senate: en.wikipedia.org/wiki/14th_Congress_of_the_Philippines

Singapore: www.parliament.gov.sg/history/11th-parliament

Taiwan: www.ly.gov.tw/en/03_leg/legList.action

Thailand: www.senate.go.th/inforcenter/documents/infosection23_1.pdf

Ministers:

For all countries except Hong Kong: United States Central Intelligence Agency. Various years. Chiefs of State and Cabinet Members of Foreign Governments. Washington, DC.

Hong Kong Executive (Secretaries): webb-site.com/dbpub

Table B1: **Crisis-Contingent Confounds**

	(1)	(2)	(3)	(4)
Board*crisis	0.0482**			0.0562**
	(2.006)			(2.159)
Board	0.00177			0.00173
	(0.338)			(0.305)
Political*crisis		-0.127		-0.428
		(-0.313)		(-1.037)
Political		0.00246		0.0152
		(0.0327)		(0.191)
Family*crisis			0.172	-0.0502
			(0.562)	(-0.156)
Family			0.0118	0.00568
			(0.163)	(0.0757)
Observations	8,242	8,242	7,807	7,807
R-squared	0.576	0.575	0.588	0.588

Data are for 966 firms spread across nine East Asian countries. Financial indicators come from Worldscope and Datastream. Network data are assembled by the authors. Dependent variable is quarterly return on assets (ROA), expressed in percentage points. Explanatory variables of interest are various measures of networks, interacted with the crisis period to capture the crisis-contingent network effect. Network data are cross-sectional for 2008. Observations run from second quarter 2007 until second quarter 2010, leaving a panel of thirteen quarters. All specifications include country-industry fixed effects, as well as crisis-period country-industry shocks. All specifications also include all time-varying firm-level financial characteristics, and the interaction between all firm-level characteristics (time varying or not) and the corresponding network measures. Each specification contains eight quarterly lags of the dependent variable. The t-statistics in parentheses are based on standard errors clustered by country-industry (*** $p<0.01$, ** $p<0.05$, * $p<0.1$).

Table B2: **Firm-Level Effects**

	(1)	(2)	(3)	(4)
Board*crisis	0.0517***			0.0513**
	(3.008)			(2.299)
Political*crisis		0.222		0.0341
		(0.802)		(0.108)
Family*crisis			-0.0401	-0.241
			(-0.159)	(-0.832)
Observations	12,205	12,205	10,453	10,453
R-squared	0.248	0.248	0.276	0.277
Number of firms	1,197	1,197	1,035	1,035

Data are for 1,197 firms spread across nine East Asian countries. Financial indicators come from Worldscope and Datastream. Network data are assembled by the authors. Dependent variable is quarterly return on assets (ROA) expressed in percentage points. Explanatory variables of interest are various measures of networks, interacted with the crisis period to capture the crisis-contingent network effect. Network data are cross-sectional for 2008. Observations run from second quarter 2007 until second quarter 2010, leaving a panel of thirteen quarters. All specifications include firm-level fixed effects, as well as crisis-period country-industry shocks. Each specification contains eight quarterly lags of the dependent variable. The t-statistics in parentheses are based on standard errors clustered by country-industry (*** p<0.01, ** p<0.05, * p<0.1).

Table B3: **Country Outliers**

	(1) HKG	(2) IDN	(3) JPN	(4) KOR	(5) MYS	(6) PHL	(7) SGP	(8) TWN	(9) THA
Board*crisis	0.0710**	0.0585***	0.0606***	0.0621***	0.0474**	0.0657**	0.0577***	0.0590***	0.0379*
	(2.588)	(2.639)	(2.789)	(2.655)	(2.248)	(2.581)	(2.690)	(2.786)	(1.861)
Board	0.00356	0.00662	0.00908	0.0122**	0.0132**	0.00553	0.00761	0.00832	0.0116*
	(0.665)	(1.067)	(1.533)	(2.077)	(2.007)	(0.726)	(1.282)	(1.411)	(1.836)
Political*crisis	-0.238	-0.0784	-0.113	-0.109	0.100	-0.0660	-0.0569	-0.0820	-0.0490
	(-0.572)	(-0.243)	(-0.329)	(-0.295)	(0.299)	(-0.192)	(-0.184)	(-0.251)	(-0.146)
Political	0.0576	-0.0542	-0.0416	-0.00426	-0.0800	-0.0542	-0.0695	-0.0449	-0.0437
	(1.110)	(-0.738)	(-0.602)	(-0.0558)	(-0.963)	(-0.809)	(-0.993)	(-0.664)	(-0.617)
Family*crisis	-0.217	-0.240	-0.301	-0.329	-0.374	-0.169	-0.154	-0.280	-0.295
	(-0.624)	(-0.761)	(-1.005)	(-0.872)	(-1.204)	(-0.565)	(-0.530)	(-0.947)	(-1.026)
Family	-0.0191	0.0306	-0.00488	-0.0348	0.0263	0.0186	-0.00692	-0.000710	-0.0144
	(-0.288)	(0.420)	(-0.0722)	(-0.434)	(0.343)	(0.271)	(-0.0995)	(-0.0105)	(-0.198)
Observations	9,032	9,242	9,097	9,076	8,906	9,653	9,475	10,100	9,043
R-squared	0.552	0.626	0.618	0.553	0.626	0.636	0.655	0.615	0.636

Data are for 1,197 firms spread across nine East Asian countries. Financial indicators come from Worldscope and Datastream. Network data are assembled by the authors. Dependent variable is quarterly return on assets (ROA), expressed in percentage points. Explanatory variables of interest are various measures of networks, interacted with the crisis period to capture the crisis-contingent network effect. Sample varies across columns in that the country specified in each column header is *excluded* from the test reported in that same column. Country abbreviations are as follows: Hong Kong (HKG), Indonesia (IDN), Japan (JPN), South Korea (KOR), Malaysia (MYS), the Philippines (PHL), Singapore (SGP), Taiwan (TWN), and Thailand (THA). Network data are cross-sectional for 2008. Observations run from second quarter 2007 until second quarter 2010, leaving a panel of thirteen quarters. All specifications include country-industry fixed effects, as well as crisis-period country-industry shocks. Each specification contains eight quarterly lags of the dependent variable. The t-statistics in parentheses are based on standard errors clustered by country-industry (*** p<0.01, ** p<0.05, * p<0.1).

Table B4: **Industry Outliers**

	(1) PET	(2) FRE	(3) CDR	(4) BAS	(5) FTB	(6) CNS	(7) CAP	(8) TRN	(9) UTI	(10) TEX	(11) SVS	(12) LSR
Board*crisis	0.0446**	0.0722***	0.0625***	0.0622***	0.0488**	0.0555**	0.0593***	0.0591***	0.0650***	0.0574**	0.0558**	0.0554**
	(2.560)	(2.636)	(2.835)	(2.958)	(2.150)	(2.434)	(2.740)	(2.650)	(2.975)	(2.609)	(2.568)	(2.508)
Board	0.0104*	0.00360	0.00858	0.00856	0.0104	0.00753	0.0100*	0.00978	0.00719	0.00889	0.00776	0.00894
	(1.746)	(0.572)	(1.397)	(1.451)	(1.660)	(1.187)	(1.746)	(1.646)	(1.142)	(1.494)	(1.281)	(1.490)
Political*crisis	-0.0314	-0.106	-0.235	-0.0473	-0.0352	0.0307	-0.0784	-0.156	-0.107	0.0462	-0.125	-0.0517
	(-0.101)	(-0.287)	(-0.661)	(-0.136)	(-0.102)	(0.0961)	(-0.239)	(-0.452)	(-0.307)	(0.142)	(-0.381)	(-0.151)
Political	-0.0509	-0.0848	-0.0171	-0.0331	-0.0531	-0.0415	-0.0322	-0.0395	-0.0585	-0.0180	-0.0178	-0.0369
	(-0.772)	(-1.016)	(-0.237)	(-0.466)	(-0.729)	(-0.595)	(-0.485)	(-0.565)	(-0.798)	(-0.300)	(-0.302)	(-0.543)
Family*crisis	-0.175	-0.123	-0.382	-0.215	-0.325	-0.198	-0.310	-0.274	-0.347	-0.299	-0.267	-0.212
	(-0.608)	(-0.356)	(-1.165)	(-0.708)	(-0.998)	(-0.700)	(-1.028)	(-0.912)	(-1.127)	(-0.989)	(-0.880)	(-0.717)
Family	-0.0115	0.00196	-0.0134	-0.0178	0.00758	0.0126	-0.0133	-0.00125	0.0567	-0.0108	0.00412	-0.00262
	(-0.172)	(0.0229)	(-0.181)	(-0.248)	(0.102)	(0.188)	(-0.197)	(-0.0183)	(0.956)	(-0.152)	(0.0579)	(-0.0379)
Observations	10,212	8,022	8,904	9,405	9,324	9,853	9,884	9,853	9,641	9,919	10,033	9,933
R-squared	0.618	0.628	0.611	0.617	0.612	0.623	0.620	0.623	0.610	0.600	0.607	0.620

Data are for 1,197 firms spread across nine East Asian countries. Financial indicators come from Worldscope and Datastream. Network data are assembled by the authors. Dependent variable is quarterly return on assets (ROA), expressed in percentage points. Explanatory variables of interest are various measures of networks, interacted with the crisis period to capture the crisis-contingent network effect. Sample varies across columns in that the sector specified in each column header is *excluded* from the test reported in that same column. Sector categories (from Campbell 1996) are as follows: petroleum (PET), finance/real estate (FRE), consumer durables (CDR), basic (BAS), food/tobacco (FTB), construction (CNS), capital goods (CAP), transportation (TRN), utilities (UTI), textiles/trade (TEX), services (SVS), and leisure (LSR). Network data are cross-sectional for 2008. Observations run from second quarter 2007 until second quarter 2010, leaving a panel of thirteen quarters. All specifications include country-industry fixed effects, as well as crisis-period country-industry shocks. Each specification contains eight quarterly lags of the dependent variable. The t-statistics in parentheses are based on standard errors clustered by country-industry (*** p<0.01, ** p<0.05, * p<0.1).